MAGYAR KÖZLÖNY

A MAGYAR KÖZTÁRSASÁG HIVATALOS LAPJA

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TARTALOMJEGYZÉK

II. Törvények

2009. évi LXXXVIII. törvény

a nemzetközi polgári repülésről szóló, Chicagóban, az 1944. évi december hó 7. napján aláírt Egyezmény Függelékei módosításának kihirdetéséről*

(Az Egyezmény 13. Függeléke 2006. november 23. napján, 9. Függeléke 2007. július 15. napján, 3. Függeléke 2007. november 7. napján, 1., 2., 4., 6/I., 6/II., 6/III., 10/I., 10/II., 10/III., 10/V., 11., 12., 15., 18. Függeléke 2007. november 22. napján, 10/IV. Függeléke 2007. november 28. napján lépett nemzetközi jogi értelemben hatályba.)

1. § Az Országgyűlés a nemzetközi polgári repülésről szóló, Chicagóban, az 1944. évi december hó 7. napján aláírt Egyezmény 1., 2., 3., 4., 6/I., 6/II., 6/III., 9., 10/I., 10/II., 10/III., 10/IV.,10/V., 11., 12., 13., 15. és 18. Függelékeit e törvénnyel kihirdeti.

2. § Az Egyezmény 1., 2., 3., 4., 6/I., 6/II., 6/III., 9., 10/I., 10/II., 10/III., 10/IV., 10/V., 11., 12., 13., 15. és 18. Függelékeinek hiteles angol nyelvű szövegét és hivatalos magyar nyelvű fordítását a törvény *melléklete* tartalmazza.

3. § (1) E törvény a kihirdetését követő 8. napon lép hatályba.

(2) E törvény végrehajtásához szükséges intézkedésekről a közlekedésért felelős miniszter gondoskodik.

(3) E törvény hatálybalépésével egyidejűleg hatályát veszti a nemzetközi polgári repülésről szóló, Chicagóban, az 1944. évi december hó 7. napján aláírt Egyezmény Függelékeinek kihirdetéséről szóló 2007. évi XLVI. törvény mellékleteként kihirdetett 3., 6/III., 10/III., 10/IV. Függelék.

(4) Felhatalmazást kap a közlekedésért felelős minisztert, hogy a nemzetközi polgári repülésről szóló, Chicagóban, az 1944. évi december hó 7. napján aláírt Egyezmény Függelékeinek a módosítással egységes szerkezetbe foglalt, hiteles szövegét és annak magyar nyelvű hivatalos fordítását a Magyar Közlönyben közzétegye.

Sólyom László s. k.,
köztársasági elnök

Dr. Szili Katalin s. k.,
az Országgyűlés elnöke

* A törvényt az Országgyűlés a 2009. június 22-i ülésnapján fogadta el.

COVER SHEET TO AMENDMENT 168

INTERNATIONAL STANDARDS
AND RECOMMENDED PRACTICES

PERSONNEL LICENSING

ANNEX 1
TO THE CONVENTION ON INTERNATIONAL CIVIL AVIATION

TENTH EDITION — JULY 2006

INTERNATIONAL CIVIL AVIATION ORGANIZATION

Checklist of Amendments to Annex 1

	Effective date	*Date of applicability*
Tenth Edition (incorporates Amendments 1 to 167)	17 July 2006	23 November 2006
Amendment 168 (adopted by the Council on 23 February 2007) Replacement pages (iii), (ix), 1-1 to 1-8 and 4-2 to 4-7	16 July 2007	22 November 2007

Transmittal note

Amendment 168

to the

International Standards and
Recommended Practices

PERSONNEL LICENSING

(Annex 1 to the Convention on International Civil Aviation)

1. Insert the following replacement pages in Annex 1 (Tenth Edition) to incorporate Amendment 168 which becomes applicable on 22 November 2007:

   a) Page (iii) — Table of Contents

   b) Page (ix) — Foreword

   c) Pages 1-1 to 1-8 — Chapter 1

   d) Pages 4-2 to 4-7 — Chapter 4

2. Record the entry of this amendment on page (ii).

TABLE OF CONTENTS

Amendment	*Source(s)*	*Subject(s)*	*Adopted Effective Applicable*
167 (10th Edition)	Air Navigation Commission studies; Second meeting of the Flight Crew Licensing and Training Panel.	Revised and new medical provisions on the upper age limits for flight crew members; new personnel licensing requirements for airships and powered-lifts; introduction of the multi-crew pilot licence; amendments to the details of existing flight crew licensing Standards; amendments to the provisions on the role of flight simulation training devices in acquiring or maintaining the competencies required for the various levels of licences and ratings.	10 March 2006 17 July 2006 23 November 2006
168	Air Navigation Commission study.	The amendment concerns: a) the replacement of the approach and area radar control ratings by approach and area control surveillance ratings to reflect the fact that surveillance systems are not limited to radar; b) the harmonization of the Human Factors knowledge requirements for air traffic controllers with those recently adopted as part of Amendment 167 to Annex 1 for flight crew; c) the applicability of the existing Standards on approved training for flight crew (Annex 1, 1.2.8 and Appendix 2) to the approved training required for the air traffic controller licence and ratings; and d) new provisions for student air traffic controllers receiving instruction in an operational environment.	23 February 2007 16 July 2007 22 November 2007

INTERNATIONAL STANDARDS AND RECOMMENDED PRACTICES

CHAPTER 1. DEFINITIONS AND GENERAL RULES CONCERNING LICENCES

1.1 Definitions

When the following terms are used in the Standards and Recommended Practices for Personnel Licensing, they have the following meanings:

Accredited medical conclusion. The conclusion reached by one or more medical experts acceptable to the Licensing Authority for the purposes of the case concerned, in consultation with flight operations or other experts as necessary.

Aeroplane. A power-driven heavier-than-air aircraft, deriving its lift in flight chiefly from aerodynamic reactions on surfaces which remain fixed under given conditions of flight.

Aircraft. Any machine that can derive support in the atmosphere from the reactions of the air other than the reactions of the air against the earth's surface.

Aircraft avionics. A term designating any electronic device — including its electrical part — for use in an aircraft, including radio, automatic flight control and instrument systems.

Aircraft — category. Classification of aircraft according to specified basic characteristics, e.g. aeroplane, helicopter, glider, free balloon.

Aircraft certificated for single-pilot operation. A type of aircraft which the State of Registry has determined, during the certification process, can be operated safely with a minimum crew of one pilot.

Aircraft required to be operated with a co-pilot. A type of aircraft that is required to be operated with a co-pilot, as specified in the flight manual or by the air operator certificate.

Aircraft — type of. All aircraft of the same basic design including all modifications thereto except those modifications which result in a change in handling or flight characteristics.

Airmanship. The consistent use of good judgement and well-developed knowledge, skills and attitudes to accomplish flight objectives.

Airship. A power-driven lighter-than-air aircraft.

Approved maintenance organization. An organization approved by a Contracting State, in accordance with the requirements of Annex 6, Part I, Chapter 8 — Aeroplane Maintenance, to perform maintenance of aircraft or parts thereof and operating under supervision approved by that State.

Note.— Nothing in this definition is intended to preclude that the organization and its supervision be approved by more than one State.

Approved training. Training conducted under special curricula and supervision approved by a Contracting State that, in the case of flight crew members, is conducted within an approved training organization.

Approved training organization**.** An organization approved by a Contracting State in accordance with the requirements of Annex 1, 1.2.8.2 and Appendix 2 to perform flight crew training and operating under the supervision of that State.

ATS surveillance service. A term used to indicate a service provided directly by means of an ATS surveillance system.

ATS surveillance system. A generic term meaning variously, ADS-B, PSR, SSR or any comparable ground-based system that enables the identification of aircraft.

Note.— A comparable ground-based system is one that has been demonstrated, by comparative assessment or other methodology, to have a level of safety and performance equal to or better than monopulse SSR.

Balloon. A non-power-driven lighter-than-air aircraft.

Note.— For the purposes of this Annex, this definition applies to free balloons.

Certify as airworthy (to). To certify that an aircraft or parts thereof comply with current airworthiness requirements after maintenance has been performed on the aircraft or parts thereof.

Commercial air transport operation. An aircraft operation involving the transport of passengers, cargo or mail for remuneration or hire.

Competency. A combination of skills, knowledge and attitudes required to perform a task to the prescribed standard.

Competency element. An action that constitutes a task that has a triggering event and a terminating event that clearly defines its limits, and an observable outcome.

Competency unit. A discrete function consisting of a number of competency elements.

Co-pilot. A licensed pilot serving in any piloting capacity other than as pilot-in-command but excluding a pilot who is on board the aircraft for the sole purpose of receiving flight instruction.

Credit. Recognition of alternative means or prior qualifications.

Cross-country. A flight between a point of departure and a point of arrival following a pre-planned route using standard navigation procedures.

Dual instruction time. Flight time during which a person is receiving flight instruction from a properly authorized pilot on board the aircraft.

Error. An action or inaction by an operational person that leads to deviations from organizational or the operational person's intentions or expectations.

Note — See Attachment E of Annex 13 — Aircraft Accident and Incident Investigation *for a description of operational personnel.*

Error management. The process of detecting and responding to errors with countermeasures that reduce or eliminate the consequences of errors and mitigate the probability of further errors or undesired aircraft states.

Note.— See Attachment C to Chapter 3 of the Procedures for Air Navigation Services — Training (PANS-TRG, Doc 9868) *and Circular 314 —* Threat and Error Management (TEM) in Air Traffic Control* *for a description of undesired states.*

Flight crew member. A licensed crew member charged with duties essential to the operation of an aircraft during a flight duty period.

Flight plan. Specified information provided to air traffic services units, relative to an intended flight or portion of a flight of an aircraft.

Flight procedures trainer. *See* Flight simulation training device.

Flight simulation training device. Any one of the following three types of apparatus in which flight conditions are simulated on the ground:

A flight simulator, which provides an accurate representation of the flight deck of a particular aircraft type to the extent that the mechanical, electrical, electronic, etc. aircraft systems control functions, the normal environment of flight crew members, and the performance and flight characteristics of that type of aircraft are realistically simulated;

A flight procedures trainer, which provides a realistic flight deck environment, and which simulates instrument responses, simple control functions of mechanical, electrical, electronic, etc. aircraft systems, and the performance and flight characteristics of aircraft of a particular class;

A basic instrument flight trainer, which is equipped with appropriate instruments, and which simulates the flight deck environment of an aircraft in flight in instrument flight conditions.

Flight simulator. *See* Flight simulation training device.

Flight time — aeroplanes. The total time from the moment an aeroplane first moves for the purpose of taking off until the moment it finally comes to rest at the end of the flight.

Note. — Flight time as here defined is synonymous with the term "block to block" time or "chock to chock" time in general usage which is measured from the time an aeroplane first moves for the purpose of taking off until it finally stops at the end of the flight.

Flight time — helicopters. The total time from the moment a helicopter's rotor blades start turning until the moment the helicopter finally comes to rest at the end of the flight, and the rotor blades are stopped.

Glider. A non-power-driven heavier-than-air aircraft, deriving its lift in flight chiefly from aerodynamic reactions on surfaces which remain fixed under given conditions of flight.

Glider flight time. The total time occupied in flight, whether being towed or not, from the moment the glider first moves for the purpose of taking off until the moment it comes to rest at the end of the flight.

Helicopter. A heavier-than-air aircraft supported in flight chiefly by the reactions of the air on one or more power-driven rotors on substantially vertical axes.

Human performance. Human capabilities and limitations which have an impact on the safety and efficiency of aeronautical operations.

* In preparation.

Instrument flight time. Time during which a pilot is piloting an aircraft solely by reference to instruments and without external reference points.

Instrument ground time. Time during which a pilot is practising, on the ground, simulated instrument flight in a flight simulation training device approved by the Licensing Authority.

Instrument time. Instrument flight time or instrument ground time.

Licensing Authority. The Authority designated by a Contracting State as responsible for the licensing of personnel.

Note.— In the provisions of this Annex, the Licensing Authority is deemed to have been given the following responsibilities by the Contracting State:

a) assessment of an applicant's qualifications to hold a licence or rating;

b) issue and endorsement of licences and ratings;

c) designation and authorization of approved persons;

d) approval of training courses;

e) approval of the use of flight simulation training devices and authorization for their use in gaining the experience or in demonstrating the skill required for the issue of a licence or rating; and

f) validation of licences issued by other Contracting States.

Likely. In the context of the medical provisions in Chapter 6, ***likely*** means with a probability of occurring that is unacceptable to the medical assessor.

Maintenance. The performance of tasks required to ensure the continuing airworthiness of an aircraft, including any one or combination of overhaul, inspection, replacement, defect rectification, and the embodiment of a modification or repair.

Medical Assessment. The evidence issued by a Contracting State that the licence holder meets specific requirements of medical fitness.

Medical assessor. A physician qualified and experienced in the practice of aviation medicine who evaluates medical reports submitted to the Licensing Authority by medical examiners.

Medical examiner. A physician with training in aviation medicine and practical knowledge and experience of the aviation environment, who is designated by the Licensing Authority to conduct medical examinations of fitness of applicants for licences or ratings for which medical requirements are prescribed.

Night. The hours between the end of evening civil twilight and the beginning of morning civil twilight or such other period between sunset and sunrise, as may be prescribed by the appropriate authority.

Note.— Civil twilight ends in the evening when the centre of the sun's disc is 6 degrees below the horizon and begins in the morning when the centre of the sun's disc is 6 degrees below the horizon.

Performance criteria. Simple, evaluative statements on the required outcome of the competency element and a description of the criteria used to judge whether the required level of performance has been achieved.

Pilot (to). To manipulate the flight controls of an aircraft during flight time.

Pilot-in-command. The pilot designated by the operator, or in the case of general aviation, the owner, as being in command and charged with the safe conduct of a flight.

Pilot-in-command under supervision. Co-pilot performing, under the supervision of the pilot-in-command, the duties and functions of a pilot-in-command, in accordance with a method of supervision acceptable to the Licensing Authority.

Powered-lift. A heavier-than-air aircraft capable of vertical take-off, vertical landing, and low-speed flight, which depends principally on engine-driven lift devices or engine thrust for the lift during these flight regimes and on non-rotating aerofoil(s) for lift during horizontal flight.

Problematic use of substances. The use of one or more psychoactive substances by aviation personnel in a way that:

a) constitutes a direct hazard to the user or endangers the lives, health or welfare of others; and/or

b) causes or worsens an occupational, social, mental or physical problem or disorder.

Psychoactive substances. Alcohol, opioids, cannabinoids, sedatives and hypnotics, cocaine, other psychostimulants, hallucinogens, and volatile solvents, whereas coffee and tobacco are excluded.

Quality system. Documented organizational procedures and policies; internal audit of those policies and procedures; management review and recommendation for quality improvement.

Rated air traffic controller. An air traffic controller holding a licence and valid ratings appropriate to the privileges to be exercised.

Rating. An authorization entered on or associated with a licence and forming part thereof, stating special conditions, privileges or limitations pertaining to such licence.

Rendering (a licence) valid. The action taken by a Contracting State, as an alternative to issuing its own licence, in accepting a licence issued by any other Contracting State as the equivalent of its own licence.

Sign a maintenance release (to). To certify that maintenance work has been completed satisfactorily in accordance with the applicable Standards of airworthiness, by issuing the maintenance release referred to in Annex 6.

Significant. In the context of the medical provisions in Chapter 6, ***significant*** means to a degree or of a nature that is likely to jeopardize flight safety.

Solo flight time. Flight time during which a student pilot is the sole occupant of an aircraft.

Threat. Events or errors that occur beyond the influence of an operational person, increase operational complexity and must be managed to maintain the margin of safety.

Note.— See Attachment E of Annex 13 — Aircraft Accident and Incident Investigation *for a description of operational personnel.*

Threat management. The process of detecting and responding to threats with countermeasures that reduce or eliminate the consequences of threats and mitigate the probability of errors or undesired aircraft states.

Note.— See Attachment C to Chapter 3 of the Procedures for Air Navigation Services — Training (PANS-TRG, Doc 9868) *and Circular 314* — Threat and Error Management (TEM) in Air Traffic Control* *for a description of undesired states.*

1.2 General rules concerning licences

Note 1.— Although the Convention on International Civil Aviation allocates to the State of Registry certain functions which that State is entitled to discharge, or obligated to discharge, as the case may be, the Assembly recognized, in Resolution A23-13, that the State of Registry may be unable to fulfil its responsibilities adequately in instances where aircraft are leased, chartered or interchanged — in particular without crew — by an operator of another State and that the Convention may not adequately specify the rights and obligations of the State of an operator in such instances until such time as Article 83 bis *of the Convention enters into force. Accordingly, the Council urged that if, in the above-mentioned instances, the State of Registry finds itself unable to discharge adequately the functions allocated to it by the Convention, it delegate to the State of the Operator, subject to acceptance by the latter State, those functions of the State of Registry that can more adequately be discharged by the State of the Operator. While Article 83* bis *of the Convention entered into force on 20 June 1997 in respect of Contracting States which have ratified the related Protocol (Doc 9318), the foregoing action will remain particularly relevant for those Contracting States which do not have treaty relations under Article 83* bis*. It was understood that pending entry into force of Article 83* bis *of the Convention, the foregoing action would only be a matter of practical convenience and would not affect either the provisions of the Chicago Convention prescribing the duties of the State of Registry or any third State. However, as Article 83* bis *of the Convention entered into force on 20 June 1997, such transfer agreements will have effect in respect of Contracting States which have ratified the related Protocol (Doc 9318) upon fulfilment of the conditions established in Article 83* bis*.*

Note 2.— International Standards and Recommended Practices are established for licensing the following personnel:

a) Flight crew

- *— private pilot — aeroplane, airship, helicopter or powered-lift;*
- *— commercial pilot — aeroplane, airship, helicopter or powered-lift;*
- *— multi-crew pilot — aeroplane;*
- *— airline transport pilot — aeroplane, helicopter or powered-lift*
- *— glider pilot;*
- *— free balloon pilot;*
- *— flight navigator;*
- *— flight engineer.*

b) Other personnel

- *— aircraft maintenance (technician/engineer/mechanic);*
- *— air traffic controller;*
- *— flight operations officer/flight dispatcher;*
- *— aeronautical station operator.*

1.2.1 Authority to act as a flight crew member

A person shall not act as a flight crew member of an aircraft unless a valid licence is held showing compliance with the specifications of this Annex and appropriate to the duties to be performed by that person. The licence shall have been issued by the State of Registry of that aircraft or by any other Contracting State and rendered valid by the State of Registry of that aircraft.

Note.— Article 29 of the Convention on International Civil Aviation requires that the flight crew members carry their appropriate licences on board every aircraft engaged in international air navigation.

* In preparation.

1.2.2 Method of rendering a licence valid

1.2.2.1 When a Contracting State renders valid a licence issued by another Contracting State, as an alternative to the issuance of its own licence, it shall establish validity by suitable authorization to be carried with the former licence accepting it as the equivalent of the latter. When a State limits the authorization to specific privileges, the authorization shall specify the privileges of the licence which are to be accepted as its equivalent. The validity of the authorization shall not extend beyond the period of validity of the licence. The authorization ceases to be valid if the licence upon which it was issued is revoked or suspended.

Note.— This provision is not intended to preclude the State that issued the licence from extending, by a suitable notification, the period of validity of the licence without necessarily requiring either the physical return of the licence or the appearance of the licence holder before the Authorities of that State.

1.2.2.2 When an authorization under 1.2.2.1 is issued for use in commercial air transport operations, the Licensing Authority shall confirm the validity of the other Contracting State's licence before issuing the authorization.

1.2.2.3 **Recommendation.—** *A pilot licence issued by a Contracting State should be rendered valid by other Contracting States for use in private flights.*

Note.— Contracting States which, without formality, render valid a licence issued by another Contracting State for use in private flights are encouraged to notify this facility in their Aeronautical Information Publications.

1.2.3 Privileges of the holder of a licence

A Contracting State shall not permit the holder of a licence to exercise privileges other than those granted by that licence.

1.2.4 Medical fitness

Note 1.— Guidance material is published in the Manual of Civil Aviation Medicine *(Doc 8984).*

Note 2.— To satisfy the licensing requirements of medical fitness for the issue of various types of licences, the applicant must meet certain appropriate medical requirements which are specified as three classes of Medical Assessment. Details are given in 6.2, 6.3, 6.4 and 6.5. To provide the necessary evidence to satisfy the requirements of 1.2.4.1, the Licensing Authority issues the licence holder with the appropriate Medical Assessment, Class 1, Class 2 or Class 3. This can be done in several ways such as a suitably titled separate certificate, a statement on the licence, a national regulation stipulating that the Medical Assessment is an integral part of the licence, etc.

1.2.4.1 An applicant for a licence shall, when applicable, hold a Medical Assessment issued in accordance with the provisions of Chapter 6.

1.2.4.2 The period of validity of a Medical Assessment shall begin on the day the medical examination is performed. The duration of the period of validity shall be in accordance with the provisions of 1.2.5.2.

1.2.4.2.1 The period of validity of a Medical Assessment may be extended, at the discretion of the Licensing Authority, up to 45 days.

Note.— It is advisable to let the calendar day on which the Medical Assessment expires remain constant year after year by allowing the expiry date of the current Medical Assessment to be the beginning of the new validity period under the proviso that the medical examination takes place during the period of validity of the current Medical Assessment but no more than 45 days before it expires.

1.2.4.3 Except as provided in 1.2.5.2.4, flight crew members or air traffic controllers shall not exercise the privileges of their licence unless they hold a current Medical Assessment appropriate to the licence.

1.2.4.4 Contracting States shall designate medical examiners, qualified and licensed in the practice of medicine, to conduct medical examinations of fitness of applicants for the issue or renewal of the licences or ratings specified in Chapters 2 and 3, and of the appropriate licences specified in Chapter 4.

1.2.4.4.1 Medical examiners shall have received training in aviation medicine and shall receive refresher training at regular intervals. Before designation, medical examiners shall demonstrate adequate competency in aviation medicine.

1.2.4.4.2 Medical examiners shall have practical knowledge and experience of the conditions in which the holders of licences and ratings carry out their duties.

Note.— Examples of practical knowledge and experience are flight experience, simulator experience, on-site observation or any other hands-on experience deemed by the Licensing Authority to meet this requirement.

1.2.4.5 Applicants for licences or ratings for which medical fitness is prescribed shall sign and furnish to the medical examiner a declaration stating whether they have previously undergone such an examination and, if so, the date, place and result of the last examination. They shall indicate to the examiner whether a Medical Assessment has previously been refused, revoked or suspended and, if so, the reason for such refusal, revocation or suspension.

1.2.4.5.1 Any false declaration to a medical examiner made by an applicant for a licence or rating shall be reported to the Licensing Authority of the issuing State for such action as may be considered appropriate.

1.2.4.6 Having completed the medical examination of the applicant in accordance with Chapter 6, the medical examiner shall coordinate the results of the examination and submit a signed report, or equivalent, to the Licensing Authority, in accordance with its requirements, detailing the results of the examination and evaluating the findings with regard to medical fitness.

1.2.4.6.1 If the medical report is submitted to the Licensing Authority in electronic format, adequate identification of the examiner shall be established.

1.2.4.6.2 If the medical examination is carried out by two or more medical examiners, Contracting States shall appoint one of these to be responsible for coordinating the results of the examination, evaluating the findings with regard to medical fitness, and signing the report.

1.2.4.7 Contracting States shall use the services of medical assessors to evaluate reports submitted to the Licensing Authorities by medical examiners.

1.2.4.7.1 The medical examiner shall be required to submit sufficient medical information to the Licensing Authority to enable the Authority to audit Medical Assessments.

Note.— The purpose of such auditing is to ensure that medical examiners meet applicable standards for good practice.

1.2.4.8 If the medical Standards prescribed in Chapter 6 for a particular licence are not met, the appropriate Medical Assessment shall not be issued or renewed unless the following conditions are fulfilled:

a) accredited medical conclusion indicates that in special circumstances the applicant's failure to meet any requirement, whether numerical or otherwise, is such that exercise of the privileges of the licence applied for is not likely to jeopardize flight safety;

b) relevant ability, skill and experience of the applicant and operational conditions have been given due consideration; and

c) the licence is endorsed with any special limitation or limitations when the safe performance of the licence holder's duties is dependent on compliance with such limitation or limitations.

1.2.4.9 Medical confidentiality shall be respected at all times.

1.2.4.9.1 All medical reports and records shall be securely held with accessibility restricted to authorized personnel.

1.2.4.9.2 When justified by operational considerations, the medical assessor shall determine to what extent pertinent medical information is presented to relevant officials of the Licensing Authority.

1.2.5 Validity of licences

1.2.5.1 A Contracting State, having issued a licence, shall ensure that the privileges granted by that licence, or by related ratings, are not exercised unless the holder maintains competency and meets the requirements for recent experience established by that State.

1.2.5.1.1 **Recommendation.—** *A Contracting State should establish maintenance of competency and recent experience requirements for pilot licences and ratings based on a systematic approach to accident prevention and should include a risk assessment process and analysis of current operations, including accident and incident data appropriate to that State.*

1.2.5.1.2 A Contracting State, having issued a licence, shall ensure that other Contracting States are enabled to be satisfied as to the validity of the licence.

Note 1.— The maintenance of competency of flight crew members, engaged in commercial air transport operations, may be satisfactorily established by demonstration of skill during proficiency flight checks completed in accordance with Annex 6.

Note 2.— Maintenance of competency may be satisfactorily recorded in the operator's records, or in the flight crew member's personal log book or licence.

Note 3.— Flight crew members may, to the extent deemed feasible by the State of Registry, demonstrate their continuing competency in flight simulation training devices approved by that State.

Note 4.— See the Manual of Criteria for the Qualification of Flight Simulators *(Doc 9625).*

Note 5.— See the Manual of Procedures for Establishment and Management of a State's Personnel Licensing System *(Doc 9379) for guidance material on the development of a risk assessment process.*

1.2.5.2 Except as provided in 1.2.5.2.1, 1.2.5.2.2, 1.2.5.2.3, 1.2.5.2.4, 1.2.5.2.5 and 1.2.5.2.6, a Medical Assessment issued in accordance with 1.2.4.5 and 1.2.4.6 shall be valid from the date of the medical examination for a period not greater than:

60 months for the private pilot licence — aeroplane, airship, helicopter and powered-lift;

12 months for the commercial pilot licence — aeroplane, airship, helicopter and powered-lift;

12 months for the multi-crew pilot licence — aeroplane;

12 months for the airline transport pilot licence — aeroplane, helicopter and powered-lift;

60 months for the glider pilot licence;

60 months for the free balloon pilot licence;

12 months for the flight navigator licence;

12 months for the flight engineer licence;

48 months for the air traffic controller licence.

Note 1.— The periods of validity listed above may be extended by up to 45 days in accordance with 1.2.4.2.1.

Note 2.— When calculated in accordance with 1.2.5.2 and its sub-paragraphs, the period of validity will, for the last month counted, include the day that has the same calendar number as the date of the medical examination or, if that month has no day with that number, the last day of that month.

1.2.5.2.1 The period of validity of a Medical Assessment may be reduced when clinically indicated.

1.2.5.2.2 When the holders of airline transport pilot licences — aeroplane, helicopter and powered-lift, and commercial pilot licences — aeroplane, airship, helicopter and powered-lift, who are engaged in single-crew commercial air transport operations carrying passengers, have passed their 40th birthday, the period of validity specified in 1.2.5.2 shall be reduced to six months.

1.2.5.2.3 When the holders of airline transport pilot licences — aeroplane, helicopter and powered-lift, commercial pilot licences — aeroplane, airship, helicopter and powered-lift, and multi-crew pilot licences — aeroplane, who are engaged in commercial air transport operations, have passed their 60th birthday, the period of validity specified in 1.2.5.2 shall be reduced to six months.

1.2.5.2.4 When the holders of private pilot licences — aeroplane, airship, helicopter and powered-lift, free balloon pilot licences, glider pilot licences and air traffic controller licences have passed their 40th birthday, the period of validity specified in 1.2.5.2 shall be reduced to 24 months.

1.2.5.2.5 **Recommendation.—** *When the holders of private pilot licences — aeroplane, airship, helicopter and powered-lift, free balloon pilot licences, glider pilot licences and air traffic controller licences have passed their 50th birthday, the period of validity specified in 1.2.5.2 should be further reduced to 12 months.*

Note.— The periods of validity listed above are based on the age of the applicant at the time of undergoing the medical examination.

1.2.5.2.6 *Circumstances in which a medical examination may be deferred.* The prescribed re-examination of a licence holder operating in an area distant from designated medical examination facilities may be deferred at the discretion of the Licensing Authority, provided that such deferment shall only be made as an exception and shall not exceed:

a) a single period of six months in the case of a flight crew member of an aircraft engaged in non-commercial operations;

b) two consecutive periods each of three months in the case of a flight crew member of an aircraft engaged in commercial operations provided that in each case a favourable medical report is obtained after examination by a designated medical examiner of the area concerned, or, in cases where such a designated medical examiner is not available, by a physician legally qualified to practise medicine in that area. A report of the medical examination shall be sent to the Licensing Authority where the licence was issued;

c) in the case of a private pilot, a single period not exceeding 24 months where the medical examination is carried out by an examiner designated under 1.2.4.4 by the Contracting State in which the applicant is temporarily located. A report of the medical examination shall be sent to the Licensing Authority where the licence was issued.

1.2.6 Decrease in medical fitness

1.2.6.1 Holders of licences provided for in this Annex shall not exercise the privileges of their licences and related ratings at any time when they are aware of any decrease in their medical fitness which might render them unable to safely and properly exercise these privileges.

1.2.6.1.1 **Recommendation.—** *Licence holders should inform the Licensing Authority of confirmed pregnancy or any decrease in medical fitness of a duration of more than 20 days or which requires continued treatment with prescribed medication or which has required hospital treatment.*

1.2.6.1.2 **Recommendation.—** *Each Contracting State should, as far as practicable, ensure that licence holders do not exercise the privileges of their licences and related ratings during any period in which their medical fitness has, from any cause, decreased to an extent that would have prevented the issue or renewal of their Medical Assessment.*

1.2.7 Use of psychoactive substances

1.2.7.1 Holders of licences provided for in this Annex shall not exercise the privileges of their licences and related ratings while under the influence of any psychoactive substance which might render them unable to safely and properly exercise these privileges.

1.2.7.2 Holders of licences provided for in this Annex shall not engage in any problematic use of substances.

1.2.7.3 **Recommendation.—** *Contracting States should ensure, as far as practicable, that all licence holders who engage in any kind of problematic use of substances are identified and removed from their safety-critical functions. Return to the safety-critical functions may be considered after successful treatment or, in cases where no treatment is necessary, after* *cessation of the problematic use of substances and upon determination that the person's continued performance of the function is unlikely to jeopardize safety.*

Note.— Guidance on suitable methods of identification (which may include biochemical testing on such occasions as pre-employment, upon reasonable suspicion, after accidents/ incidents, at intervals, and at random) and on other prevention topics is contained in the Manual on Prevention of Problematic Use of Substances in the Aviation Workplace *(Doc 9654).*

1.2.8 Approved training and approved training organization

Note.— The qualifications required for the issue of personnel licences can be more readily and speedily acquired by applicants who undergo closely supervised, systematic and continuous courses of training, conforming to a planned syllabus or curriculum. Provision has accordingly been made for some reduction in the experience requirements for the issue of certain licences and ratings prescribed in these Standards and Recommended Practices, in respect of an applicant who has satisfactorily completed a course of approved training.

1.2.8.1 Approved training shall provide a level of competency at least equal to that provided by the minimum experience requirements for personnel not receiving such approved training.

1.2.8.2 The approval of a training organization by a State shall be dependent upon the applicant demonstrating compliance with the requirements of Appendix 2.

Note.— Guidance on approval of a flight crew training organization can be found in the Manual on the Approval of Flight Crew Training Organizations *(Doc 9841).*

1.2.9 Language proficiency

1.2.9.1 Aeroplane, airship, helicopter and powered-lift pilots and those flight navigators who are required to use the radio telephone aboard an aircraft shall demonstrate the ability to speak and understand the language used for radiotelephony communications.

Note.— Pursuant to Article 42 of the Convention on International Civil Aviation, paragraph 1.2.9.1 does not apply to personnel whose licences are originally issued prior to 5 March 2004 but, in any case, does apply to personnel whose licences remain valid after 5 March 2008.

1.2.9.2 Air traffic controllers and aeronautical station operators shall demonstrate the ability to speak and understand the language used for radiotelephony communications.

1.2.9.3 **Recommendation.—** *Flight engineers, and glider and free balloon pilots should have the ability to speak and understand the language used for radiotelephony communications.*

1.2.9.4 As of 5 March 2008, aeroplane, airship, helicopter and powered-lift pilots, air traffic controllers and aeronautical station operators shall demonstrate the ability to speak and understand the language used for radiotelephony communications to the level specified in the language proficiency requirements in Appendix 1.

1.2.9.5 **Recommendation.—** *Aeroplane, airship, helicopter and powered-lift pilots, flight navigators required to use the radiotelephone aboard an aircraft, air traffic controllers and aeronautical station operators should demonstrate the ability to speak and understand the language used for radiotelephony communications to the level specified in the language proficiency requirements in Appendix 1.*

1.2.9.6 As of 5 March 2008, the language proficiency of aeroplane, airship, helicopter and powered-lift pilots, air traffic controllers and aeronautical station operators who demonstrate proficiency below the Expert Level (Level 6) shall be formally evaluated at intervals in accordance with an individual's demonstrated proficiency level.

1.2.9.7 **Recommendation.—** *The language proficiency of aeroplane, airship, helicopter and powered-lift pilots, flight navigators required to use the radiotelephone aboard an aircraft, air traffic controllers and aeronautical station operators who demonstrate proficiency below the Expert Level (Level 6) should be formally evaluated at intervals in accordance with an individual's demonstrated proficiency level, as follows:*

a) those demonstrating language proficiency at the Operational Level (Level 4) should be evaluated at least once every three years; and

b) those demonstrating language proficiency at the Extended Level (Level 5) should be evaluated at least once every six years.

Note 1.— Formal evaluation is not required for applicants who demonstrate expert language proficiency, e.g. native and very proficient non-native speakers with a dialect or accent intelligible to the international aeronautical community.

Note 2.— The provisions of 1.2.9 refer to Annex 10, Volume II, Chapter 5, whereby the language used for radiotelephony communications may be the language normally used by the station on the ground or English. In practice, therefore, there will be situations whereby flight crew members will only need to speak the language normally used by the station on the ground.

CHAPTER 4. LICENCES AND RATINGS FOR PERSONNEL OTHER THAN FLIGHT CREW MEMBERS

4.1 General rules concerning licences and ratings for personnel other than flight crew members

4.1.1 An applicant shall, before being issued with any licence or rating for personnel other than flight crew members, meet such requirements in respect of age, knowledge, experience and where appropriate, medical fitness and skill, as are specified for that licence or rating.

4.1.2 An applicant, for any licence or rating for personnel other than flight crew members, shall demonstrate, in a manner determined by the Licensing Authority, such requirements in respect of knowledge and skill as are specified for that licence or rating.

4.2 Aircraft maintenance (technician/engineer/mechanic)

Note.— The terms in brackets are given as acceptable additions to the title of the licence. Each Contracting State is expected to use in its own regulations the one it prefers.

4.2.1 Requirements for the issue of the licence

4.2.1.1 *Age*

The applicant shall be not less than 18 years of age.

4.2.1.2 *Knowledge*

The applicant shall have demonstrated a level of knowledge relevant to the privileges to be granted and appropriate to the responsibilities of an aircraft maintenance licence holder, in at least the following subjects:

Air law and airworthiness requirements

a) rules and regulations relevant to an aircraft maintenance licence holder including applicable airworthiness requirements governing certification and continuing airworthiness of aircraft and approved aircraft maintenance organization and procedures;

Natural science and aircraft general knowledge

b) basic mathematics; units of measurement; fundamental principles and theory of physics and chemistry applicable to aircraft maintenance;

Aircraft engineering

c) characteristics and applications of the materials of aircraft construction including principles of construction and functioning of aircraft structures, fastening techniques; powerplants and their associated systems; mechanical, fluid, electrical and electronic power sources; aircraft instrument and display systems; aircraft control systems; and airborne navigation and communication systems;

Aircraft maintenance

d) tasks required to ensure the continuing airworthiness of an aircraft including methods and procedures for the overhaul, repair, inspection, replacement, modification or defect rectification of aircraft structures, components and systems in accordance with the methods prescribed in the relevant Maintenance Manuals and the applicable Standards of airworthiness; and

Human performance

e) human performance relevant to aircraft maintenance.

Note.— Guidance material to design training programmes on human performance can be found in the Human Factors Training Manual *(Doc 9683).*

4.2.1.3 *Experience*

The applicant shall have had the following experience in the inspection, servicing and maintenance of aircraft or its components:

a) for the issue of a licence with privileges for the aircraft in its entirety, at least:

   1) four years; or

   2) two years if the applicant has satisfactorily completed an approved training course; and

b) for the issue of a licence with privileges restricted in accordance with 4.2.2.2 a) 2) or 3), a period of time that will enable a level of competency equivalent to that required in a) to be attained, provided that this is not less than:

1) two years; or

2) such a period as the State considers necessary to provide an equivalent level of practical experience to applicants who have satisfactorily completed an approved training course.

4.2.1.4 *Training*

Recommendation.— *The applicant should have completed a course of training appropriate to the privileges to be granted.*

Note.— The Training Manual *(Doc 7192), Part D-1, contains guidance material on a training course for applicants for an aircraft maintenance licence.*

4.2.1.5 *Skill*

The applicant shall have demonstrated the ability to perform those functions applicable to the privileges to be granted.

4.2.2 Privileges of the holder of the licence and the conditions to be observed in exercising such privileges

4.2.2.1 Subject to compliance with the requirements specified in 4.2.2.2 and 4.2.2.3, the privileges of the holder of an aircraft maintenance licence shall be to certify the aircraft or parts of the aircraft as airworthy after an authorized repair, modification or installation of a powerplant, accessory, instrument, and/or item of equipment, and to sign a maintenance release following inspection, maintenance operations and/or routine servicing.

4.2.2.2 The privileges of the holder of an aircraft maintenance licence specified in 4.2.2.1 shall be exercised only:

a) in respect of such:

1) aircraft as are entered on the licence in their entirety either specifically or under broad categories; or

2) airframes and powerplants and aircraft systems or components as are entered on the licence either specifically or under broad categories; and/or

3) aircraft avionic systems or components as are entered on the licence either specifically or under broad categories;

b) provided that the licence holder is familiar with all the relevant information relating to the maintenance and airworthiness of the particular aircraft for which the licence holder is signing a Maintenance Release, or such airframe, powerplant, aircraft system or component and aircraft avionic system or component which the licence holder is certifying as being airworthy; and

c) on condition that, within the preceding 24 months, the licence holder has either had experience in the inspection, servicing or maintenance of an aircraft or components in accordance with the privileges granted by the licence held for not less than six months, or has met the provision for the issue of a licence with the appropriate privileges, to the satisfaction of the Licensing Authority.

4.2.2.3 A Contracting State shall prescribe the scope of the privileges of the licence holder in terms of the complexity of the tasks to which the certification relates.

4.2.2.3.1 **Recommendation.—** *Details of the certification privileges should be endorsed on or attached to the licence, either directly or by reference to another document issued by the Contracting State.*

4.2.2.4 When a Contracting State authorizes an approved maintenance organization to appoint non-licensed personnel to exercise the privileges of 4.2.2, the person appointed shall meet the requirements specified in 4.2.1.

4.3 Student air traffic controller

4.3.1 Contracting States shall take the appropriate measures to ensure that student air traffic controllers do not constitute a hazard to air navigation.

4.3.2 Medical fitness

A Contracting State shall not permit a student air traffic controller to receive instruction in an operational environment unless that student air traffic controller holds a current Class 3 Medical Assessment.

4.4 Air traffic controller licence

4.4.1 Requirements for the issue of the licence

Before issuing an air traffic controller licence, a Contracting State shall require the applicant to meet the requirements of 4.4.1 and the requirements of at least one of the ratings set out in 4.5. Unlicensed State employees may operate as air traffic controllers on condition that they meet the same requirements.

4.4.1.1 *Age*

The applicant shall be not less than 21 years of age.

4.4.1.2 *Knowledge*

The applicant shall have demonstrated a level of knowledge appropriate to the holder of an air traffic controller licence, in at least the following subjects:

Air law

a) rules and regulations relevant to the air traffic controller;

Air traffic control equipment

b) principles, use and limitations of equipment used in air traffic control;

General knowledge

c) principles of flight; principles of operation and functioning of aircraft, powerplants and systems; aircraft performance relevant to air traffic control operations;

Human performance

d) human performance including principles of threat and error management;

Note.— Guidance material to design training programmes on human performance, including threat and error management, can be found in the Human Factors Training Manual *(Doc 9683).*

Meteorology

e) aeronautical meteorology; use and appreciation of meteorological documentation and information; origin and characteristics of weather phenomena affecting flight operations and safety; altimetry;

Navigation

f) principles of air navigation; principle, limitation and accuracy of navigation systems and visual aids; and

Operational procedures

g) air traffic control, communication, radiotelephony and phraseology procedures (routine, non-routine and emergency); use of the relevant aeronautical documentation; safety practices associated with flight.

4.4.1.3 *Experience*

The applicant shall have completed an approved training course and not less than three months of satisfactory service engaged in the actual control of air traffic under the supervision of an appropriately rated air traffic controller. The experience requirements specified for air traffic controller ratings in 4.5 may be credited as part of the experience specified in this paragraph.

4.4.1.4 *Medical fitness*

The applicant shall hold a current Class 3 Medical Assessment.

4.5 Air traffic controller ratings

4.5.1 Categories of air traffic controller ratings

Air traffic controller ratings shall comprise the following categories:

a) aerodrome control rating;

b) approach control procedural rating;

c) approach control surveillance rating;

d) approach precision radar control rating;

e) area control procedural rating; and

f) area control surveillance rating.

Note.— The World Meteorological Organization has specified requirements for personnel making meteorological observations which apply to air traffic controllers providing such a service.

4.5.2 Requirements for air traffic controller ratings

4.5.2.1 *Knowledge*

The applicant shall have demonstrated a level of knowledge appropriate to the privileges granted, in at least the following subjects in so far as they affect the area of responsibility:

a) *aerodrome control rating:*

1) aerodrome layout; physical characteristics and visual aids;

2) airspace structure;

3) applicable rules, procedures and source of information;

4) air navigation facilities;

5) air traffic control equipment and its use;

6) terrain and prominent landmarks;

7) characteristics of air traffic;

8) weather phenomena; and

9) emergency and search and rescue plans;

b) *approach control procedural and area control procedural ratings:*

1) airspace structure;

2) applicable rules, procedures and source of information;

3) air navigation facilities;

4) air traffic control equipment and its use;

5) terrain and prominent landmarks;

6) characteristics of air traffic and traffic flow;

7) weather phenomena; and

8) emergency and search and rescue plans; and

c) *approach control surveillance*, *approach precision radar control and area control surveillance ratings:* The applicant shall meet the requirements specified in b) in so far as they affect the area of responsibility, and shall have demonstrated a level of knowledge appropriate to the privileges granted, in at least the following additional subjects:

1) principles, use and limitations of applicable ATS surveillance systems and associated equipment; and

2) procedures for the provision of ATS surveillance service, as appropriate, including procedures to ensure appropriate terrain clearance.

4.5.2.2 *Experience*

4.5.2.2.1 The applicant shall have:

a) satisfactorily completed an approved training course;

b) provided, satisfactorily, under the supervision of an appropriately rated air traffic controller:

1) *aerodrome control rating:* an aerodrome control service, for a period of not less than 90 hours or one month, whichever is greater, at the unit for which the rating is sought;

2) *approach control procedural, approach control surveillance, area control procedural or area control surveillance rating:* the control service for which the rating is sought, for a period of not less than 180 hours or three months, whichever is greater, at the unit for which the rating is sought; and

3) *approach precision radar control rating:* not less than 200 precision approaches of which not more than 100 shall have been carried out on a radar simulator approved for that purpose by the Licensing Authority. Not less than 50 of those precision approaches shall have been carried out at the unit and on the equipment for which the rating is sought; and

c) if the privileges of the approach control surveillance rating include surveillance radar approach duties, the experience shall include not less than 25 plan position indicator approaches on the surveillance equipment of the type in use at the unit for which the rating is sought and under the supervision of an appropriately rated controller.

4.5.2.2.2 The experience specified in 4.5.2.2.1 b) shall have been completed within the 6-month period immediately preceding application.

4.5.2.2.3 When the applicant already holds an air traffic controller rating in another category, or the same rating for another unit, the Licensing Authority shall determine whether the experience requirement of 4.5.2.2 can be reduced, and if so, to what extent.

4.5.2.3 *Skill*

The applicant shall have demonstrated, at a level appropriate to the privileges being granted, the skill, judgement and performance required to provide a safe, orderly and expeditious control service.

4.5.2.4 *Concurrent issuance of two air traffic controller ratings*

When two air traffic controller ratings are sought concurrently, the Licensing Authority shall determine the applicable requirements on the basis of the requirements for each rating. These requirements shall not be less than those of the more demanding rating.

4.5.3 Privileges of the holder of the air traffic controller rating(s) and the conditions to be observed in exercising such privileges

4.5.3.1 Subject to compliance with the requirements specified in 1.2.5, 1.2.6, 1.2.7.1 and 1.2.9, the privileges of the holder of an air traffic controller licence endorsed with one or more of the undermentioned ratings shall be:

a) *aerodrome control rating:* to provide or to supervise the provision of aerodrome control service for the aerodrome for which the licence holder is rated;

b) *approach control procedural rating:* to provide or to supervise the provision of approach control service for the aerodrome or aerodromes for which the licence holder is rated, within the airspace or portion thereof, under the jurisdiction of the unit providing approach control service;

c) *approach control surveillance rating:* to provide and/or supervise the provision of approach control service with the use of applicable ATS surveillance systems for the aerodrome or aerodromes for which the licence holder is rated, within the airspace or portion thereof, under the jurisdiction of the unit providing approach control service;

   1) subject to compliance with the provisions of 4.5.2.2.1 c), the privileges shall include the provision of surveillance radar approaches;

d) *approach precision radar control rating:* to provide and/or supervise the provision of precision approach radar service at the aerodrome for which the licence holder is rated;

e) *area control procedural rating:* to provide and/or supervise the provision of area control service within the control area or portion thereof, for which the licence holder is rated; and

f) *area control surveillance rating:* to provide and/or supervise the provision of area control service with the use of an ATS surveillance system, within the control area or portion thereof, for which the licence holder is rated.

4.5.3.2 Before exercising the privileges indicated in 4.5.3.1, the licence holder shall be familiar with all pertinent and current information.

4.5.3.3 A Contracting State having issued an air traffic controller licence shall not permit the holder thereof to carry out instruction in an operational environment unless such holder has received proper authorization from such Contracting State.

4.5.3.4 *Validity of ratings*

A rating shall become invalid when an air traffic controller has ceased to exercise the privileges of the rating for a period determined by the Licensing Authority. That period shall not exceed six months. A rating shall remain invalid until the controller's ability to exercise the privileges of the rating has been re-established.

4.6 Flight operations officer/ flight dispatcher licence

4.6.1 Requirements for the issue of the licence

4.6.1.1 *Age*

The applicant shall be not less than 21 years of age.

4.6.1.2 *Knowledge*

The applicant shall have demonstrated a level of knowledge appropriate to the privileges granted to the holder of a flight operations officer licence, in at least the following subjects:

Air law

a) rules and regulations relevant to the holder of a flight operations officer licence; appropriate air traffic services practices and procedures;

Aircraft general knowledge

b) principles of operation of aeroplane powerplants, systems and instruments;

c) operating limitations of aeroplanes and powerplants;

d) minimum equipment list;

Flight performance calculation, planning procedures and loading

e) effects of loading and mass distribution on aircraft performance and flight characteristics; mass and balance calculations;

f) operational flight planning; fuel consumption and endurance calculations; alternate aerodrome selection procedures; en-route cruise control; extended range operation;

g) preparation and filing of air traffic services flight plans;

h) basic principles of computer-assisted planning systems;

Human performance

i) human performance relevant to dispatch duties;

Note.— Guidance material to design training programmes on human performance can be found in the Human Factors Training Manual *(Doc 9683).*

Meteorology

j) aeronautical meteorology; the movement of pressure systems; the structure of fronts, and the origin and characteristics of significant weather phenomena which affect take-off, en-route and landing conditions;

k) interpretation and application of aeronautical meteorological reports, charts and forecasts; codes and abbreviations; use of, and procedures for obtaining, meteorological information;

Navigation

l) principles of air navigation with particular reference to instrument flight;

Operational procedures

m) use of aeronautical documentation;

n) operational procedures for the carriage of freight and dangerous goods;

o) procedures relating to aircraft accidents and incidents; emergency flight procedures;

p) procedures relating to unlawful interference and sabotage of aircraft;

Principles of flight

q) principles of flight relating to the appropriate category of aircraft; and

Radio communication

r) procedures for communicating with aircraft and relevant ground stations.

4.6.1.3 *Experience*

4.6.1.3.1 The applicant shall have gained the following experience:

a) a total of two years of service in any one or in any combination of the capacities specified in 1) to 3) inclusive, provided that in any combination of experience the period serviced in any capacity shall be at least one year:

1) a flight crew member in air transportation; or

2) a meteorologist in an organization dispatching aircraft in air transportation; or

3) an air traffic controller; or a technical supervisor of flight operations officers or air transportation flight operations systems;

or

b) at least one year as an assistant in the dispatching of air transport;

or

c) have satisfactorily completed a course of approved training.

4.6.1.3.2 The applicant shall have served under the supervision of a flight operations officer for at least 90 working days within the six months immediately preceding the application.

4.6.1.4 *Skill*

The applicant shall have demonstrated the ability to:

a) make an accurate and operationally acceptable weather analysis from a series of daily weather maps and weather reports; provide an operationally valid briefing on weather conditions prevailing in the general neighbourhood of a specific air route; forecast weather trends pertinent to air transportation with particular reference to destination and alternates;

b) determine the optimum flight path for a given segment, and create accurate manual and/or computer generated flight plans; and

c) provide operating supervision and all other assistance to a flight in actual or simulated adverse weather conditions, as appropriate to the duties of the holder of a flight operations officer licence.

4.6.2 Privileges of the holder of the licence and the conditions to be observed in exercising such privileges

Subject to compliance with the requirements specified in 1.2.5, the privileges of the holder of a flight operations officer licence shall be to serve in that capacity with responsibility for each area for which the applicant meets the requirements specified in Annex 6.

4.7 Aeronautical station operator licence

Note.— This licence is not intended for personnel providing Aerodrome Flight Information Service (AFIS). Guidance on the qualifications to be met by these personnel can be found in Circular 211, Aerodrome Flight Information Service (AFIS).

4.7.1 Requirements for the issue of the licence

4.7.1.1 Before issuing an aeronautical station operator licence, a Contracting State shall require the applicant to meet the requirements of 4.7.1. Unlicensed individuals may operate as aeronautical station operators on the condition that the State from which they operate ensures that they meet the same requirements.

4.7.1.2 *Age*

The applicant shall be not less than 18 years of age.

4.7.1.3 *Knowledge*

The applicant shall have demonstrated a level of knowledge appropriate to the holder of an aeronautical station operator, in at least the following subjects:

General knowledge

a) air traffic services provided within the State;

Operational procedures

b) radiotelephony procedures; phraseology; telecommunication network;

Rules and regulations

c) rules and regulations applicable to the aeronautical station operator; and

Telecommunication equipment

d) principles, use and limitations of telecommunication equipment in an aeronautical station.

4.7.1.4 *Experience*

The applicant shall have:

a) satisfactorily completed an approved training course within the 12-month period immediately preceding application, and have served satisfactorily under a qualified aeronautical station operator for not less than two months; or

b) satisfactorily served under a qualified aeronautical station operator for not less than six months during the 12-month period immediately preceding application.

4.7.1.5 *Skill*

The applicant shall demonstrate, or have demonstrated, competency in:

a) operating the telecommunication equipment in use; and

b) transmitting and receiving radiotelephony messages with efficiency and accuracy.

4.7.2 Privileges of the aeronautical station operator and the conditions to be observed in exercising such privileges

Subject to compliance with the requirements specified in 1.2.5 and 1.2.9, the privileges of the holder of an aeronautical station operator licence shall be to act as an operator in an aeronautical station. Before exercising the privileges of the licence, the holder shall be familiar with all pertinent and current information regarding the types of equipment and operating procedures used at that aeronautical station.

4.8 Aeronautical meteorological personnel

Note.— The requirements for training and qualifications for all aeronautical meteorological personnel are the responsibility of the World Meteorological Organization (WMO) in accordance with the Working Arrangements between the International Civil Aviation Organization and the World Meteorological Organization *(Doc 7475). The requirements can be found in WMO Document 258 —* Guidelines for the education and training of personnel in meteorology and operational hydrology — *Volume I:* Meteorology.

Annex 1
Tenth Edition
Corrigendum
(English only)
14/8/07

**INTERNATIONAL STANDARDS
AND RECOMMENDED PRACTICES**

PERSONNEL LICENSING

**ANNEX 1
TO THE CONVENTION ON INTERNATIONAL CIVIL AVIATION**

TENTH EDITION — JULY 2006

CORRIGENDUM

1. Please replace existing pages 1-2 and 1-4, dated 22/11/07, by the attached new pages bearing the notation "Corr".

2. Record the entry of this corrigendum on page (ii) of Annex 1.

INTERNATIONAL STANDARDS AND RECOMMENDED PRACTICES

CHAPTER 1. DEFINITIONS AND GENERAL RULES CONCERNING LICENCES

1.1 Definitions

When the following terms are used in the Standards and Recommended Practices for Personnel Licensing, they have the following meanings:

Accredited medical conclusion. The conclusion reached by one or more medical experts acceptable to the Licensing Authority for the purposes of the case concerned, in consultation with flight operations or other experts as necessary.

Aeroplane. A power-driven heavier-than-air aircraft, deriving its lift in flight chiefly from aerodynamic reactions on surfaces which remain fixed under given conditions of flight.

Aircraft. Any machine that can derive support in the atmosphere from the reactions of the air other than the reactions of the air against the earth's surface.

Aircraft avionics. A term designating any electronic device — including its electrical part — for use in an aircraft, including radio, automatic flight control and instrument systems.

Aircraft — category. Classification of aircraft according to specified basic characteristics, e.g. aeroplane, helicopter, glider, free balloon.

Aircraft certificated for single-pilot operation. A type of aircraft which the State of Registry has determined, during the certification process, can be operated safely with a minimum crew of one pilot.

Aircraft required to be operated with a co-pilot. A type of aircraft that is required to be operated with a co-pilot, as specified in the flight manual or by the air operator certificate.

Aircraft — type of. All aircraft of the same basic design including all modifications thereto except those modifications which result in a change in handling or flight characteristics.

Airmanship. The consistent use of good judgement and well-developed knowledge, skills and attitudes to accomplish flight objectives.

Airship. A power-driven lighter-than-air aircraft.

Approved maintenance organization. An organization approved by a Contracting State, in accordance with the requirements of Annex 6, Part I, Chapter 8 — Aeroplane Maintenance, to perform maintenance of aircraft or parts thereof and operating under supervision approved by that State.

Note.— Nothing in this definition is intended to preclude that the organization and its supervision be approved by more than one State.

Approved training. Training conducted under special curricula and supervision approved by a Contracting State that, in the case of flight crew members, is conducted within an approved training organization.

Approved training organization. An organization approved by a Contracting State in accordance with the requirements of Annex 1, 1.2.8.2 and Appendix 2 to perform flight crew training and operating under the supervision of that State.

ATS surveillance service. A term used to indicate a service provided directly by means of an ATS surveillance system.

ATS surveillance system. A generic term meaning variously, ADS-B, PSR, SSR or any comparable ground-based system that enables the identification of aircraft.

Note.— A comparable ground-based system is one that has been demonstrated, by comparative assessment or other methodology, to have a level of safety and performance equal to or better than monopulse SSR.

Balloon. A non-power-driven lighter-than-air aircraft.

Note.— For the purposes of this Annex, this definition applies to free balloons.

Certify as airworthy (to). To certify that an aircraft or parts thereof comply with current airworthiness requirements after maintenance has been performed on the aircraft or parts thereof.

Commercial air transport operation. An aircraft operation involving the transport of passengers, cargo or mail for remuneration or hire.

Competency. A combination of skills, knowledge and attitudes required to perform a task to the prescribed standard.

Competency element. An action that constitutes a task that has a triggering event and a terminating event that clearly defines its limits, and an observable outcome.

Competency unit. A discrete function consisting of a number of competency elements.

Co-pilot. A licensed pilot serving in any piloting capacity other than as pilot-in-command but excluding a pilot who is on board the aircraft for the sole purpose of receiving flight instruction.

Credit. Recognition of alternative means or prior qualifications.

Cross-country. A flight between a point of departure and a point of arrival following a pre-planned route using standard navigation procedures.

Dual instruction time. Flight time during which a person is receiving flight instruction from a properly authorized pilot on board the aircraft.

Error. An action or inaction by an operational person that leads to deviations from organizational or the operational person's intentions or expectations.

Note — See Attachment E of Annex 13 — Aircraft Accident and Incident Investigation *for a description of operational personnel.*

Error management. The process of detecting and responding to errors with countermeasures that reduce or eliminate the consequences of errors and mitigate the probability of further errors or undesired states.

Note.— See Attachment C to Chapter 3 of the Procedures for Air Navigation Services — Training (PANS-TRG, Doc 9868) *and Circular 314 —* Threat and Error Management (TEM) in Air Traffic Control* *for a description of undesired states.*

Flight crew member. A licensed crew member charged with duties essential to the operation of an aircraft during a flight duty period.

Flight plan. Specified information provided to air traffic services units, relative to an intended flight or portion of a flight of an aircraft.

Flight procedures trainer. *See* Flight simulation training device.

Flight simulation training device. Any one of the following three types of apparatus in which flight conditions are simulated on the ground:

A flight simulator, which provides an accurate representation of the flight deck of a particular aircraft type to the extent that the mechanical, electrical, electronic, etc. aircraft systems control functions, the normal environment of flight crew members, and the performance and flight characteristics of that type of aircraft are realistically simulated;

A flight procedures trainer, which provides a realistic flight deck environment, and which simulates instrument responses, simple control functions of mechanical, electrical, electronic, etc. aircraft systems, and the performance and flight characteristics of aircraft of a particular class;

A basic instrument flight trainer, which is equipped with appropriate instruments, and which simulates the flight deck environment of an aircraft in flight in instrument flight conditions.

Flight simulator. *See* Flight simulation training device.

Flight time — aeroplanes. The total time from the moment an aeroplane first moves for the purpose of taking off until the moment it finally comes to rest at the end of the flight.

Note. — Flight time as here defined is synonymous with the term "block to block" time or "chock to chock" time in general usage which is measured from the time an aeroplane first moves for the purpose of taking off until it finally stops at the end of the flight.

Flight time — helicopters. The total time from the moment a helicopter's rotor blades start turning until the moment the helicopter finally comes to rest at the end of the flight, and the rotor blades are stopped.

Glider. A non-power-driven heavier-than-air aircraft, deriving its lift in flight chiefly from aerodynamic reactions on surfaces which remain fixed under given conditions of flight.

Glider flight time. The total time occupied in flight, whether being towed or not, from the moment the glider first moves for the purpose of taking off until the moment it comes to rest at the end of the flight.

Helicopter. A heavier-than-air aircraft supported in flight chiefly by the reactions of the air on one or more power-driven rotors on substantially vertical axes.

Human performance. Human capabilities and limitations which have an impact on the safety and efficiency of aeronautical operations.

* In preparation.

Instrument flight time. Time during which a pilot is piloting an aircraft solely by reference to instruments and without external reference points.

Instrument ground time. Time during which a pilot is practising, on the ground, simulated instrument flight in a flight simulation training device approved by the Licensing Authority.

Instrument time. Instrument flight time or instrument ground time.

Licensing Authority. The Authority designated by a Contracting State as responsible for the licensing of personnel.

Note.— In the provisions of this Annex, the Licensing Authority is deemed to have been given the following responsibilities by the Contracting State:

a) assessment of an applicant's qualifications to hold a licence or rating;

b) issue and endorsement of licences and ratings;

c) designation and authorization of approved persons;

d) approval of training courses;

e) approval of the use of flight simulation training devices and authorization for their use in gaining the experience or in demonstrating the skill required for the issue of a licence or rating; and

f) validation of licences issued by other Contracting States.

Likely. In the context of the medical provisions in Chapter 6, ***likely*** means with a probability of occurring that is unacceptable to the medical assessor.

Maintenance. The performance of tasks required to ensure the continuing airworthiness of an aircraft, including any one or combination of overhaul, inspection, replacement, defect rectification, and the embodiment of a modification or repair.

Medical Assessment. The evidence issued by a Contracting State that the licence holder meets specific requirements of medical fitness.

Medical assessor. A physician qualified and experienced in the practice of aviation medicine who evaluates medical reports submitted to the Licensing Authority by medical examiners.

Medical examiner. A physician with training in aviation medicine and practical knowledge and experience of the aviation environment, who is designated by the Licensing Authority to conduct medical examinations of fitness of applicants for licences or ratings for which medical requirements are prescribed.

Night. The hours between the end of evening civil twilight and the beginning of morning civil twilight or such other period between sunset and sunrise, as may be prescribed by the appropriate authority.

Note.— Civil twilight ends in the evening when the centre of the sun's disc is 6 degrees below the horizon and begins in the morning when the centre of the sun's disc is 6 degrees below the horizon.

Performance criteria. Simple, evaluative statements on the required outcome of the competency element and a description of the criteria used to judge whether the required level of performance has been achieved.

Pilot (to). To manipulate the flight controls of an aircraft during flight time.

Pilot-in-command. The pilot designated by the operator, or in the case of general aviation, the owner, as being in command and charged with the safe conduct of a flight.

Pilot-in-command under supervision. Co-pilot performing, under the supervision of the pilot-in-command, the duties and functions of a pilot-in-command, in accordance with a method of supervision acceptable to the Licensing Authority.

Powered-lift. A heavier-than-air aircraft capable of vertical take-off, vertical landing, and low-speed flight, which depends principally on engine-driven lift devices or engine thrust for the lift during these flight regimes and on non-rotating aerofoil(s) for lift during horizontal flight.

Problematic use of substances. The use of one or more psychoactive substances by aviation personnel in a way that:

a) constitutes a direct hazard to the user or endangers the lives, health or welfare of others; and/or

b) causes or worsens an occupational, social, mental or physical problem or disorder.

Psychoactive substances. Alcohol, opioids, cannabinoids, sedatives and hypnotics, cocaine, other psychostimulants, hallucinogens, and volatile solvents, whereas coffee and tobacco are excluded.

Quality system. Documented organizational procedures and policies; internal audit of those policies and procedures; management review and recommendation for quality improvement.

Rated air traffic controller. An air traffic controller holding a licence and valid ratings appropriate to the privileges to be exercised.

Rating. An authorization entered on or associated with a licence and forming part thereof, stating special conditions, privileges or limitations pertaining to such licence.

Rendering (a licence) valid. The action taken by a Contracting State, as an alternative to issuing its own licence, in accepting a licence issued by any other Contracting State as the equivalent of its own licence.

Sign a maintenance release (to). To certify that maintenance work has been completed satisfactorily in accordance with the applicable Standards of airworthiness, by issuing the maintenance release referred to in Annex 6.

Significant. In the context of the medical provisions in Chapter 6, ***significant*** means to a degree or of a nature that is likely to jeopardize flight safety.

Solo flight time. Flight time during which a student pilot is the sole occupant of an aircraft.

Threat. Events or errors that occur beyond the influence of an operational person, increase operational complexity and must be managed to maintain the margin of safety.

Note.— See Attachment E of Annex 13 — Aircraft Accident and Incident Investigation *for a description of operational personnel.*

Threat management. The process of detecting and responding to threats with countermeasures that reduce or eliminate the consequences of threats and mitigate the probability of errors or undesired states.

Note.— See Attachment C to Chapter 3 of the Procedures for Air Navigation Services — Training (PANS-TRG, Doc 9868) *and Circular 314* — Threat and Error Management (TEM) in Air Traffic Control* *for a description of undesired states.*

1.2 General rules concerning licences

Note 1.— Although the Convention on International Civil Aviation allocates to the State of Registry certain functions which that State is entitled to discharge, or obligated to discharge, as the case may be, the Assembly recognized, in Resolution A23-13, that the State of Registry may be unable to fulfil its responsibilities adequately in instances where aircraft are leased, chartered or interchanged — in particular without crew — by an operator of another State and that the Convention may not adequately specify the rights and obligations of the State of an operator in such instances until such time as Article 83 bis *of the Convention enters into force. Accordingly, the Council urged that if, in the above-mentioned instances, the State of Registry finds itself unable to discharge adequately the functions allocated to it by the Convention, it delegate to the State of the Operator, subject to acceptance by the latter State, those functions of the State of Registry that can more adequately be discharged by the State of the Operator. While Article 83* bis *of the Convention entered into force on 20 June 1997 in respect of Contracting States which have ratified the related Protocol (Doc 9318), the foregoing action will remain particularly relevant for those Contracting States which do not have treaty relations under Article 83* bis*. It was understood that pending entry into force of Article 83* bis *of the Convention, the foregoing action would only be a matter of practical convenience and would not affect either the provisions of the Chicago Convention prescribing the duties of the State of Registry or any third State. However, as Article 83* bis *of the Convention entered into force on 20 June 1997, such transfer agreements will have effect in respect of Contracting States which have ratified the related Protocol (Doc 9318) upon fulfilment of the conditions established in Article 83* bis*.*

Note 2.— International Standards and Recommended Practices are established for licensing the following personnel:

a) Flight crew

- *— private pilot — aeroplane, airship, helicopter or powered-lift;*
- *— commercial pilot — aeroplane, airship, helicopter or powered-lift;*
- *— multi-crew pilot — aeroplane;*
- *— airline transport pilot — aeroplane, helicopter or powered-lift*
- *— glider pilot;*
- *— free balloon pilot;*
- *— flight navigator;*
- *— flight engineer.*

b) Other personnel

- *— aircraft maintenance (technician/engineer/mechanic);*
- *— air traffic controller;*
- *— flight operations officer/flight dispatcher;*
- *— aeronautical station operator.*

1.2.1 Authority to act as a flight crew member

A person shall not act as a flight crew member of an aircraft unless a valid licence is held showing compliance with the specifications of this Annex and appropriate to the duties to be performed by that person. The licence shall have been issued by the State of Registry of that aircraft or by any other Contracting State and rendered valid by the State of Registry of that aircraft.

Note.— Article 29 of the Convention on International Civil Aviation requires that the flight crew members carry their appropriate licences on board every aircraft engaged in international air navigation.

* In preparation.

COVER SHEET TO AMENDMENT 40

INTERNATIONAL STANDARDS

RULES OF THE AIR

ANNEX 2
TO THE CONVENTION ON INTERNATIONAL CIVIL AVIATION

TENTH EDITION — JULY 2005

INTERNATIONAL CIVIL AVIATION ORGANIZATION

Checklist of Amendments to Annex 2

	Effective date	*Date of applicability*
Tenth Edition (incorporates Amendments 1 to 38)	11 July 2005	24 November 2005
Amendment 39 (adopted by the Council on 20 February 2006)	17 July 2006	23 November 2006
Amendment 40 (adopted by the Council on 26 February 2007) Replacement pages (x), 1-1 to 1-6, 3-8, 3-9, 4-1, APP 2-1, APP 4-3, APP 4-4, ATT A-2, ATT A-3, ATT A-4 and ATT B-1	16 July 2007	22 November 2007

Transmittal note

Amendment 40

to the

International Standards

RULES OF THE AIR

(Annex 2 to the Convention on International Civil Aviation)

1. Insert the following replacement pages in Annex 2 (Tenth Edition) to incorporate Amendment 40 which becomes applicable on 22 November 2007:

a) Page (x)	Foreword
b) Pages 1-1 to 1-6	Chapter 1
c) Pages 3-8 and 3-9	Chapter 3
d) Page 4-1	Chapter 4
e) Page APP 2-1	Appendix 2
f) Pages APP 4-3 and APP 4-4	Appendix 4
g) Pages ATT A-2 to ATT A-4	Attachment A
h) Page ATT B-1	Attachment B

2. Record the entry of this amendment on page (ii).

Amendment	*Source(s)*	*Subject(s)*	*Adopted/approved* *Effective* *Applicable*
22	Air Navigation Commission	Unmanned free balloons; estimated time of arrival.	2 March 1981 2 July 1981 26 November 1981
23 (7th Edition)	Air Navigation Commission	Interception of civil aircraft.	1 April 1981 1 August 1981 26 November 1981
24	Air Navigation Commission	Aircraft exterior lights.	19 March 1982 19 July 1982 25 November 1982
25	Air Navigation Commission; AGA Divisional Meeting (1981)	Definitions relating to height, instrument approach procedure, manoeuvring and movement area, taxiing, and taxiway; use of the phrase "HIJACK" in the event of interception of civil aircraft; note regarding lease, charter or interchange of aircraft; provisions related to surface movement of aircraft and taxiing; series 2 signals used by helicopters in the event of interception; units of measurement.	21 March 1983 29 July 1983 24 November 1983
26	ATS Data Acquisition, Processing and Transfer Panel, Third Meeting (1981); Air Navigation Commission	Definitions; contents of flight plans; repetitive flight plans; ATS data interchange; pronunciations to be used by intercepting aircraft; alignment of the radiotelephony urgency signal with Annex 10, Volume II; Coordinated Universal Time (UTC).	22 June 1984 22 October 1984 21 November 1985
27 (8th Edition)	Council; Air Navigation Commission	Identification and interception of civil aircraft.	10 March 1986 27 July 1986 20 November 1986
28	Air Navigation Commission	Definition of "apron"; special procedures for use during unlawful interference.	16 March 1987 27 July 1987 19 November 1987
29 (9th Edition)	Visual Flight Rules Operations Panel, Third Meeting (1986); Secretariat; Visual Aids Panel, Eleventh Meeting (1987); Air Navigation Commission; amendments consequential to adoption of amendments to Annex 6	Operation of aircraft in mixed VFR/IFR environments; surface movement of aircraft and surface movement guidance and control; acts of unlawful interference; helicopters as intercepting aircraft.	12 March 1990 30 July 1990 14 November 1991
30	Secondary Surveillance Radar Improvements and Collision Avoidance Systems Panel, Fourth Meeting (SICASP/4) (1989)	Definitions; airborne collision avoidance system (ACAS).	26 February 1993 26 July 1993 11 November 1993
31	Review of the General Concept of Separation Panel, Seventh Meeting (1990); Air Navigation Commission; Automatic Dependent Surveillance Panel, Second Meeting (1992)	Definitions; air-taxiing; separation between aircraft; formation flights by civil aircraft in controlled airspace; automatic dependent surveillance.	18 March 1994 25 July 1994 10 November 1994

Amendment	*Source(s)*	*Subject(s)*	*Adopted/approved* *Effective* *Applicable*
32	Air Navigation Commission	Note related to carriage requirements of airborne collision avoidance systems.	19 February 1996 19 February 1996 —
33	Air Navigation Commission	Communication failure procedures.	26 February 1997 21 July 1997 6 November 1997
34	Automatic Dependent Surveillance Panel, Fourth Meeting (1996); Review of the General Concept of Separation Panel, Ninth Meeting (1996); consequential to Amendment 162 to Annex 1	Definitions; automatic dependent surveillance systems and procedures; data interchange between automated ATS systems; ATS applications for air-ground data links; problematic use of psychoactive substances.	19 March 1998 20 July 1998 5 November 1998
35	Air Navigation Commission; Visual Aids Panel, Thirteenth Meeting (1997)	ATS airspace classifications; visual meteorological conditions clearance; runway-holding position.	10 March 1999 19 July 1999 4 November 1999
36	Consequential as a result of Amendment 40 to Annex 11; Amendments 23 and 25 to Annex 6, Part I; Amendments 20 and 7 to Annex 6, Parts II and III, respectively; and Amendment 72 to Annex 3	Revised definitions of “air traffic control unit”, “approach control unit”, “alternate aerodrome” “flight crew member”, “pilot-in-command” and “visibility”; editorial amendments.	12 March 2001 16 July 2001 1 November 2001
37	Separation and Airspace Safety Panel (SASP)	Pilot procedures in the event of unlawful interference; editorial amendments.	28 February 2003 — —
38 (10th Edition)	Secretariat	Definitions; marshalling signals; communication failure procedures; interception manoeuvres; editorial amendments.	23 February 2005 11 July 2005 24 November 2005
39	Secretariat	Restructuring of text to emphasize the responsibility of the pilot-in-command for the avoidance of collisions.	20 February 2006 17 July 2006 23 November 2006
40	Air Navigation Commission	Definitions and associated procedures for ADS-B, ADS-C and ADS-C agreement; pilot procedures in the event of unlawful interference.	26 February 2007 16 July 2007 22 November 2007

INTERNATIONAL STANDARDS

CHAPTER 1. DEFINITIONS

Note 1.— Throughout the text of this document the term "service" is used as an abstract noun to designate functions, or service rendered; the term "unit" is used to designate a collective body performing a service.

Note 2.— The designation (RR) in these definitions indicates a definition which has been extracted from the Radio Regulations of the International Telecommunication Union (ITU) (see Handbook on Radio Frequency Spectrum Requirements for Civil Aviation including statement of approved ICAO policies *(Doc 9718)).*

When the following terms are used in the International Standards for Rules of the Air, they have the following meanings:

Acrobatic flight. Manoeuvres intentionally performed by an aircraft involving an abrupt change in its attitude, an abnormal attitude, or an abnormal variation in speed.

ADS-C agreement. A reporting plan which establishes the conditions of ADS-C data reporting (i.e. data required by the air traffic services unit and frequency of ADS-C reports which have to be agreed to prior to using ADS-C in the provision of air traffic services).

Note.— The terms of the agreement will be exchanged between the ground system and the aircraft by means of a contract, or a series of contracts.

Advisory airspace. An airspace of defined dimensions, or designated route, within which air traffic advisory service is available.

Advisory route. A designated route along which air traffic advisory service is available.

Aerodrome. A defined area on land or water (including any buildings, installations and equipment) intended to be used either wholly or in part for the arrival, departure and surface movement of aircraft.

Aerodrome control service. Air traffic control service for aerodrome traffic.

Aerodrome control tower. A unit established to provide air traffic control service to aerodrome traffic.

Aerodrome traffic. All traffic on the manoeuvring area of an aerodrome and all aircraft flying in the vicinity of an aerodrome.

Note.— An aircraft is in the vicinity of an aerodrome when it is in, entering or leaving an aerodrome traffic circuit.

Aerodrome traffic zone. An airspace of defined dimensions established around an aerodrome for the protection of aerodrome traffic.

Aeronautical Information Publication (AIP). A publication issued by or with the authority of a State and containing aeronautical information of a lasting character essential to air navigation.

Aeronautical station (RR S1.81). A land station in the aeronautical mobile service. In certain instances, an aeronautical station may be located, for example, on board ship or on a platform at sea.

Aeroplane. A power-driven heavier-than-air aircraft, deriving its lift in flight chiefly from aerodynamic reactions on surfaces which remain fixed under given conditions of flight.

Airborne collision avoidance system (ACAS). An aircraft system based on secondary surveillance radar (SSR) transponder signals which operates independently of ground-based equipment to provide advice to the pilot on potential conflicting aircraft that are equipped with SSR transponders.

Aircraft. Any machine that can derive support in the atmosphere from the reactions of the air other than the reactions of the air against the earth's surface.

Air-ground control radio station. An aeronautical telecommunication station having primary responsibility for handling communications pertaining to the operation and control of aircraft in a given area.

Air-taxiing. Movement of a helicopter/VTOL above the surface of an aerodrome, normally in ground effect and at a ground speed normally less than 37 km/h (20 kt).

Note.— The actual height may vary, and some helicopters may require air-taxiing above 8 m (25 ft) AGL to reduce ground effect turbulence or provide clearance for cargo slingloads.

Air traffic. All aircraft in flight or operating on the manoeuvring area of an aerodrome.

Air traffic advisory service. A service provided within advisory airspace to ensure separation, in so far as practical, between aircraft which are operating on IFR flight plans.

Air traffic control clearance. Authorization for an aircraft to proceed under conditions specified by an air traffic control unit.

Note 1.— For convenience, the term "air traffic control clearance" is frequently abbreviated to "clearance" when used in appropriate contexts.

Note 2.— The abbreviated term "clearance" may be prefixed by the words "taxi", "take-off", "departure", "en route", "approach" or "landing" to indicate the particular portion of flight to which the air traffic control clearance relates.

Air traffic control service. A service provided for the purpose of:

a) preventing collisions:

1) between aircraft, and

2) on the manoeuvring area between aircraft and obstructions, and

b) expediting and maintaining an orderly flow of air traffic.

Air traffic control unit. A generic term meaning variously, area control centre, approach control unit or aerodrome control tower.

Air traffic service. A generic term meaning variously, flight information service, alerting service, air traffic advisory service, air traffic control service (area control service, approach control service or aerodrome control service).

Air traffic services airspaces. Airspaces of defined dimensions, alphabetically designated, within which specific types of flights may operate and for which air traffic services and rules of operation are specified.

Note.— ATS airspaces are classified as Class A to G.

Air traffic services reporting office. A unit established for the purpose of receiving reports concerning air traffic services and flight plans submitted before departure.

Note.— An air traffic services reporting office may be established as a separate unit or combined with an existing unit, such as another air traffic services unit, or a unit of the aeronautical information service.

Air traffic services unit. A generic term meaning variously, air traffic control unit, flight information centre or air traffic services reporting office.

Airway. A control area or portion thereof established in the form of a corridor.

Alerting service. A service provided to notify appropriate organizations regarding aircraft in need of search and rescue aid, and assist such organizations as required.

Alternate aerodrome. An aerodrome to which an aircraft may proceed when it becomes either impossible or inadvisable to proceed to or to land at the aerodrome of intended landing. Alternate aerodromes include the following:

Take-off alternate. An alternate aerodrome at which an aircraft can land should this become necessary shortly after take-off and it is not possible to use the aerodrome of departure.

En-route alternate. An aerodrome at which an aircraft would be able to land after experiencing an abnormal or emergency condition while en route.

ETOPS en-route alternate. A suitable and appropriate alternate aerodrome at which an aeroplane would be able to land after experiencing an engine shutdown or other abnormal or emergency condition while en route in an ETOPS operation.

Destination alternate. An alternate aerodrome to which an aircraft may proceed should it become either impossible or inadvisable to land at the aerodrome of intended landing.

Note.— The aerodrome from which a flight departs may also be an en-route or a destination alternate aerodrome for that flight.

Altitude. The vertical distance of a level, a point or an object considered as a point, measured from mean sea level (MSL).

Approach control service. Air traffic control service for arriving or departing controlled flights.

Approach control unit. A unit established to provide air traffic control service to controlled flights arriving at, or departing from, one or more aerodromes.

Appropriate ATS authority. The relevant authority designated by the State responsible for providing air traffic services in the airspace concerned.

Appropriate authority.

a) *Regarding flight over the high seas:* The relevant authority of the State of Registry.

b) *Regarding flight other than over the high seas:* The relevant authority of the State having sovereignty over the territory being overflown.

Apron. A defined area, on a land aerodrome, intended to accommodate aircraft for purposes of loading or unloading passengers, mail or cargo, fuelling, parking or maintenance.

Area control centre. A unit established to provide air traffic control service to controlled flights in control areas under its jurisdiction.

Area control service. Air traffic control service for controlled flights in control areas.

ATS route. A specified route designed for channelling the flow of traffic as necessary for the provision of air traffic services.

Note 1.— The term "ATS route" is used to mean variously, airway, advisory route, controlled or uncontrolled route, arrival or departure route, etc.

Note 2.— An ATS route is defined by route specifications which include an ATS route designator, the track to or from significant points (waypoints), distance between significant points, reporting requirements and, as determined by the appropriate ATS authority, the lowest safe altitude.

Automatic dependent surveillance — broadcast (ADS-B). A means by which aircraft, aerodrome vehicles and other objects can automatically transmit and/or receive data such as identification, position and additional data, as appropriate, in a broadcast mode via a data link.

Automatic dependent surveillance — contract (ADS-C). A means by which the terms of an ADS-C agreement will be exchanged between the ground system and the aircraft, via a data link, specifying under what conditions ADS-C reports would be initiated, and what data would be contained in the reports.

Note.— The abbreviated term "ADS contract" is commonly used to refer to ADS event contract, ADS demand contract, ADS periodic contract or an emergency mode.

Ceiling. The height above the ground or water of the base of the lowest layer of cloud below 6 000 metres (20 000 feet) covering more than half the sky.

Changeover point. The point at which an aircraft navigating on an ATS route segment defined by reference to very high frequency omnidirectional radio ranges is expected to transfer its primary navigational reference from the facility behind the aircraft to the next facility ahead of the aircraft.

Note.— Changeover points are established to provide the optimum balance in respect of signal strength and quality between facilities at all levels to be used and to ensure a common source of azimuth guidance for all aircraft operating along the same portion of a route segment.

Clearance limit. The point to which an aircraft is granted an air traffic control clearance.

Control area. A controlled airspace extending upwards from a specified limit above the earth.

Controlled aerodrome. An aerodrome at which air traffic control service is provided to aerodrome traffic.

Note.— The term "controlled aerodrome" indicates that air traffic control service is provided to aerodrome traffic but does not necessarily imply that a control zone exists.

Controlled airspace. An airspace of defined dimensions within which air traffic control service is provided in accordance with the airspace classification.

Note.— Controlled airspace is a generic term which covers ATS airspace Classes A, B, C, D and E as described in Annex 11, 2.6.

Controlled flight. Any flight which is subject to an air traffic control clearance.

Controller-pilot data link communications (CPDLC). A means of communication between controller and pilot, using data link for ATC communications.

Control zone. A controlled airspace extending upwards from the surface of the earth to a specified upper limit.

Cruise climb. An aeroplane cruising technique resulting in a net increase in altitude as the aeroplane mass decreases.

Cruising level. A level maintained during a significant portion of a flight.

Current flight plan. The flight plan, including changes, if any, brought about by subsequent clearances.

Danger area. An airspace of defined dimensions within which activities dangerous to the flight of aircraft may exist at specified times.

Data link communications. A form of communication intended for the exchange of messages via a data link.

Estimated off-block time. The estimated time at which the aircraft will commence movement associated with departure.

Estimated time of arrival. For IFR flights, the time at which it is estimated that the aircraft will arrive over that designated point, defined by reference to navigation aids, from which it is intended that an instrument approach procedure will be commenced, or, if no navigation aid is associated with the aerodrome, the time at which the aircraft will arrive over the aerodrome. For VFR flights, the time at which it is estimated that the aircraft will arrive over the aerodrome.

Expected approach time. The time at which ATC expects that an arriving aircraft, following a delay, will leave the holding fix to complete its approach for a landing.

Note.— The actual time of leaving the holding fix will depend upon the approach clearance.

Filed flight plan. The flight plan as filed with an ATS unit by the pilot or a designated representative, without any subsequent changes.

Flight crew member. A licensed crew member charged with duties essential to the operation of an aircraft during a flight duty period.

Flight information centre. A unit established to provide flight information service and alerting service.

Flight information region. An airspace of defined dimensions within which flight information service and alerting service are provided.

Flight information service. A service provided for the purpose of giving advice and information useful for the safe and efficient conduct of flights.

Flight level. A surface of constant atmospheric pressure which is related to a specific pressure datum, 1 013.2 hectopascals (hPa), and is separated from other such surfaces by specific pressure intervals.

Note 1.— A pressure type altimeter calibrated in accordance with the Standard Atmosphere:

a) when set to a QNH altimeter setting, will indicate altitude;

b) when set to a QFE altimeter setting, will indicate height above the QFE reference datum;

c) when set to a pressure of 1 013.2 hPa, may be used to indicate flight levels.

Note 2.— The terms "height" and "altitude", used in Note 1 above, indicate altimetric rather than geometric heights and altitudes.

Flight plan. Specified information provided to air traffic services units, relative to an intended flight or portion of a flight of an aircraft.

Flight visibility. The visibility forward from the cockpit of an aircraft in flight.

Ground visibility. The visibility at an aerodrome as reported by an accredited observer or by automatic systems.

Heading. The direction in which the longitudinal axis of an aircraft is pointed, usually expressed in degrees from North (true, magnetic, compass or grid).

Height. The vertical distance of a level, a point or an object considered as a point, measured from a specified datum.

IFR. The symbol used to designate the instrument flight rules.

IFR flight. A flight conducted in accordance with the instrument flight rules.

IMC. The symbol used to designate instrument meteorological conditions.

Instrument approach procedure. A series of predetermined manoeuvres by reference to flight instruments with specified protection from obstacles from the initial approach fix, or where applicable, from the beginning of a defined arrival route to a point from which a landing can be completed and thereafter, if a landing is not completed, to a position at which holding or en-route obstacle clearance criteria apply. Instrument approach procedures are classified as follows:

Non-precision approach (NPA) procedure. An instrument approach procedure which utilizes lateral guidance but does not utilize vertical guidance.

Approach procedure with vertical guidance (APV). An instrument approach procedure which utilizes lateral and vertical guidance but does not meet the requirements established for precision approach and landing operations.

Precision approach (PA) procedure. An instrument approach procedure using precision lateral and vertical guidance with minima as determined by the category of operation.

Note.— Lateral and vertical guidance refers to the guidance provided either by:

a) a ground-based navigation aid; or

b) computer-generated navigation data.

Instrument meteorological conditions. Meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling, less than the minima specified for visual meteorological conditions.

Note.— The specified minima for visual meteorological conditions are contained in Chapter 4.

Landing area. That part of a movement area intended for the landing or take-off of aircraft.

Level. A generic term relating to the vertical position of an aircraft in flight and meaning variously, height, altitude or flight level.

Manoeuvring area. That part of an aerodrome to be used for the take-off, landing and taxiing of aircraft, excluding aprons.

Movement area. That part of an aerodrome to be used for the take-off, landing and taxiing of aircraft, consisting of the manoeuvring area and the apron(s).

Pilot-in-command. The pilot designated by the operator, or in the case of general aviation, the owner, as being in command and charged with the safe conduct of a flight.

Pressure-altitude. An atmospheric pressure expressed in terms of altitude which corresponds to that pressure in the Standard Atmosphere.*

* As defined in Annex 8.

Problematic use of substances. The use of one or more psychoactive substances by aviation personnel in a way that:

a) constitutes a direct hazard to the user or endangers the lives, health or welfare of others; and/or

b) causes or worsens an occupational, social, mental or physical problem or disorder.

Prohibited area. An airspace of defined dimensions, above the land areas or territorial waters of a State, within which the flight of aircraft is prohibited.

Psychoactive substances. Alcohol, opioids, cannabinoids, sedatives and hypnotics, cocaine, other psychostimulants, hallucinogens, and volatile solvents, whereas coffee and tobacco are excluded.

Radiotelephony. A form of radiocommunication primarily intended for the exchange of information in the form of speech.

Repetitive flight plan (RPL). A flight plan related to a series of frequently recurring, regularly operated individual flights with identical basic features, submitted by an operator for retention and repetitive use by ATS units.

Reporting point. A specified geographical location in relation to which the position of an aircraft can be reported.

Restricted area. An airspace of defined dimensions, above the land areas or territorial waters of a State, within which the flight of aircraft is restricted in accordance with certain specified conditions.

Runway. A defined rectangular area on a land aerodrome prepared for the landing and take-off of aircraft.

Runway-holding position. A designated position intended to protect a runway, an obstacle limitation surface, or an ILS/MLS critical/sensitive area at which taxiing aircraft and vehicles shall stop and hold, unless otherwise authorized by the aerodrome control tower.

Note.— In radiotelephony phraseologies, the expression "holding point" is used to designate the runway-holding position.

Safety-sensitive personnel. Persons who might endanger aviation safety if they perform their duties and functions improperly including, but not limited to, crew members, aircraft maintenance personnel and air traffic controllers.

Signal area. An area on an aerodrome used for the display of ground signals.

Special VFR flight. A VFR flight cleared by air traffic control to operate within a control zone in meteorological conditions below VMC.

Taxiing. Movement of an aircraft on the surface of an aerodrome under its own power, excluding take-off and landing.

Taxiway. A defined path on a land aerodrome established for the taxiing of aircraft and intended to provide a link between one part of the aerodrome and another, including:

a) *Aircraft stand taxilane.* A portion of an apron designated as a taxiway and intended to provide access to aircraft stands only.

b) *Apron taxiway.* A portion of a taxiway system located on an apron and intended to provide a through taxi route across the apron.

c) *Rapid exit taxiway.* A taxiway connected to a runway at an acute angle and designed to allow landing aeroplanes to turn off at higher speeds than are achieved on other exit taxiways thereby minimizing runway occupancy times.

Terminal control area. A control area normally established at the confluence of ATS routes in the vicinity of one or more major aerodromes.

Total estimated elapsed time. For IFR flights, the estimated time required from take-off to arrive over that designated point, defined by reference to navigation aids, from which it is intended that an instrument approach procedure will be commenced, or, if no navigation aid is associated with the destination aerodrome, to arrive over the destination aerodrome. For VFR flights, the estimated time required from take-off to arrive over the destination aerodrome.

Track. The projection on the earth's surface of the path of an aircraft, the direction of which path at any point is usually expressed in degrees from North (true, magnetic or grid).

Traffic avoidance advice. Advice provided by an air traffic services unit specifying manoeuvres to assist a pilot to avoid a collision.

Traffic information. Information issued by an air traffic services unit to alert a pilot to other known or observed air traffic which may be in proximity to the position or intended route of flight and to help the pilot avoid a collision.

Transition altitude. The altitude at or below which the vertical position of an aircraft is controlled by reference to altitudes.

Unmanned free balloon. A non-power-driven, unmanned, lighter-than-air aircraft in free flight.

Note.— Unmanned free balloons are classified as heavy, medium or light in accordance with specifications contained in Appendix 4.

VFR. The symbol used to designate the visual flight rules.

VFR flight. A flight conducted in accordance with the visual flight rules.

Visibility. Visibility for aeronautical purposes is the greater of:

a) the greatest distance at which a black object of suitable dimensions, situated near the ground, can be seen and recognized when observed against a bright background;

b) the greatest distance at which lights in the vicinity of 1 000 candelas can be seen and identified against an unlit background.

Note 1.— The two distances have different values in air of a given extinction coefficient, and the latter b) varies with the background illumination. The former a) is represented by the meteorological optical range (MOR).

Note. 2.— The definition applies to the observations of visibility in local routine and special reports, to the observations of prevailing and minimum visibility reported in METAR and SPECI and to the observations of ground visibility.

Visual meteorological conditions. Meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling, equal to or better than specified minima.

Note.— The specified minima are contained in Chapter 4.

VMC. The symbol used to designate visual meteorological conditions.

3.6.1.4 An aircraft operated on a controlled aerodrome shall not taxi on the manoeuvring area without clearance from the aerodrome control tower and shall comply with any instructions given by that unit.

3.6.2 Adherence to flight plan

3.6.2.1 Except as provided for in 3.6.2.2 and 3.6.2.4, an aircraft shall adhere to the current flight plan or the applicable portion of a current flight plan submitted for a controlled flight unless a request for a change has been made and clearance obtained from the appropriate air traffic control unit, or unless an emergency situation arises which necessitates immediate action by the aircraft, in which event as soon as circumstances permit, after such emergency authority is exercised, the appropriate air traffic services unit shall be notified of the action taken and that this action has been taken under emergency authority.

3.6.2.1.1 Unless otherwise authorized by the appropriate ATS authority, or directed by the appropriate air traffic control unit, controlled flights shall, in so far as practicable:

a) when on an established ATS route, operate along the defined centre line of that route; or

b) when on any other route, operate directly between the navigation facilities and/or points defining that route.

3.6.2.1.2 Subject to the overriding requirement in 3.6.2.1.1, an aircraft operating along an ATS route segment defined by reference to very high frequency omnidirectional radio ranges shall change over for its primary navigation guidance from the facility behind the aircraft to that ahead of it at, or as close as operationally feasible to, the changeover point, where established.

3.6.2.1.3 Deviation from the requirements in 3.6.2.1.1 shall be notified to the appropriate air traffic services unit.

3.6.2.2 *Inadvertent changes.* In the event that a controlled flight inadvertently deviates from its current flight plan, the following action shall be taken:

a) *Deviation from track:* if the aircraft is off track, action shall be taken forthwith to adjust the heading of the aircraft to regain track as soon as practicable.

b) *Variation in true airspeed:* if the average true airspeed at cruising level between reporting points varies or is expected to vary by plus or minus 5 per cent of the true airspeed, from that given in the flight plan, the appropriate air traffic services unit shall be so informed.

c) *Change in time estimate:* if the time estimate for the next applicable reporting point, flight information region boundary or destination aerodrome, whichever comes first, is found to be in error in excess of 3 minutes from that notified to air traffic services, or such other period of time as is prescribed by the appropriate ATS authority or on the basis of air navigation regional agreements, a revised estimated time shall be notified as soon as possible to the appropriate air traffic services unit.

3.6.2.2.1 Additionally, when an ADS agreement is in place, the air traffic services unit (ATSU) shall be informed automatically via data link whenever changes occur beyond the threshold values stipulated by the ADS event contract.

3.6.2.3 *Intended changes.* Requests for flight plan changes shall include information as indicated hereunder:

a) *Change of cruising level:* aircraft identification; requested new cruising level and cruising speed at this level, revised time estimates (when applicable) at subsequent flight information region boundaries.

b) *Change of route:*

   1) *Destination unchanged:* aircraft identification; flight rules; description of new route of flight including related flight plan data beginning with the position from which requested change of route is to commence; revised time estimates; any other pertinent information.

   2) *Destination changed:* aircraft identification; flight rules; description of revised route of flight to revised destination aerodrome including related flight plan data, beginning with the position from which requested change of route is to commence; revised time estimates; alternate aerodrome(s); any other pertinent information.

3.6.2.4 *Weather deterioration below the VMC.* When it becomes evident that flight in VMC in accordance with its current flight plan will not be practicable, a VFR flight operated as a controlled flight shall:

a) request an amended clearance enabling the aircraft to continue in VMC to destination or to an alternative aerodrome, or to leave the airspace within which an ATC clearance is required; or

b) if no clearance in accordance with a) can be obtained, continue to operate in VMC and notify the appropriate ATC unit of the action being taken either to leave the airspace concerned or to land at the nearest suitable aerodrome; or

c) if operated within a control zone, request authorization to operate as a special VFR flight; or

d) request clearance to operate in accordance with the instrument flight rules.

3.6.3 Position reports

3.6.3.1 Unless exempted by the appropriate ATS authority or by the appropriate air traffic services unit under conditions specified by that authority, a controlled flight shall report to the appropriate air traffic services unit, as soon as possible, the time and level of passing each designated compulsory reporting point, together with any other required information. Position reports shall similarly be made in relation to additional points when requested by the appropriate air traffic services unit. In the absence of designated reporting points, position reports shall be made at intervals prescribed by the appropriate ATS authority or specified by the appropriate air traffic services unit.

3.6.3.1.1 Controlled flights providing position information to the appropriate air traffic services unit via data link communications shall only provide voice position reports when requested.

Note.— The conditions and circumstances in which ADS-B or SSR Mode C transmission of pressure-altitude satisfies the requirement for level information in position reports are indicated in the PANS-ATM (Doc 4444).

3.6.4 Termination of control

A controlled flight shall, except when landing at a controlled aerodrome, advise the appropriate ATC unit as soon as it ceases to be subject to air traffic control service.

3.6.5 Communications

3.6.5.1 An aircraft operated as a controlled flight shall maintain continuous air-ground voice communication watch on the appropriate communication channel of, and establish two-way communication as necessary with, the appropriate air traffic control unit, except as may be prescribed by the appropriate ATS authority in respect of aircraft forming part of aerodrome traffic at a controlled aerodrome.

Note 1.— SELCAL or similar automatic signalling devices satisfy the requirement to maintain an air-ground voice communication watch.

Note 2.— The requirement for an aircraft to maintain an air-ground voice communication watch remains in effect after CPDLC has been established.

3.6.5.2 *Communication failure.* If a communication failure precludes compliance with 3.6.5.1, the aircraft shall comply with the voice communication failure procedures of Annex 10, Volume II, and with such of the following procedures as are appropriate. The aircraft shall attempt to establish communications with the appropriate air traffic control unit using all other available means. In addition, the aircraft, when forming part of the aerodrome traffic at a controlled aerodrome, shall keep a watch for such instructions as may be issued by visual signals.

3.6.5.2.1 If in visual meteorological conditions, the aircraft shall:

a) continue to fly in visual meteorological conditions; land at the nearest suitable aerodrome; and report its arrival by the most expeditious means to the appropriate air traffic control unit;

b) if considered advisable, complete an IFR flight in accordance with 3.6.5.2.2.

3.6.5.2.2 If in instrument meteorological conditions or when the pilot of an IFR flight considers it inadvisable to complete the flight in accordance with 3.6.5.2.1 a), the aircraft shall:

a) unless otherwise prescribed on the basis of regional air navigation agreement, in airspace where radar is not used in the provision of air traffic control, maintain the last assigned speed and level, or minimum flight altitude if higher, for a period of 20 minutes following the aircraft's failure to report its position over a compulsory reporting point and thereafter adjust level and speed in accordance with the filed flight plan;

b) in airspace where radar is used in the provision of air traffic control, maintain the last assigned speed and level, or minimum flight altitude if higher, for a period of 7 minutes following:

   1) the time the last assigned level or minimum flight altitude is reached; or

   2) the time the transponder is set to Code 7600; or

   3) the aircraft's failure to report its position over a compulsory reporting point;

   whichever is later, and thereafter adjust level and speed in accordance with the filed flight plan;

c) when being radar vectored or having been directed by ATC to proceed offset using RNAV without a specified limit, rejoin the current flight plan route no later than the next significant point, taking into consideration the applicable minimum flight altitude;

d) proceed according to the current flight plan route to the appropriate designated navigation aid or fix serving the destination aerodrome and, when required to ensure compliance with e) below, hold over this aid or fix until commencement of descent;

e) commence descent from the navigation aid or fix specified in d) at, or as close as possible to, the expected approach time last received and acknowledged; or, if no expected approach time has been received and acknowledged, at, or as close as possible to, the estimated time of arrival resulting from the current flight plan;

f) complete a normal instrument approach procedure as specified for the designated navigation aid or fix; and

g) land, if possible, within 30 minutes after the estimated time of arrival specified in e) or the last acknowledged expected approach time, whichever is later.

Note 1.— The provision of air traffic control service to other flights operating in the airspace concerned will be based on the premise that an aircraft experiencing communication failure will comply with the rules in 3.6.5.2.2.

Note 2. — See also 5.1.2.

3.7 Unlawful interference

3.7.1 An aircraft which is being subjected to unlawful interference shall endeavour to notify the appropriate ATS unit of this fact, any significant circumstances associated therewith and any deviation from the current flight plan necessitated by the circumstances, in order to enable the ATS unit to give priority to the aircraft and to minimize conflict with other aircraft.

Note 1.— Responsibility of ATS units in situations of unlawful interference is contained in Annex 11.

Note 2.— Guidance material for use when unlawful interference occurs and the aircraft is unable to notify an ATS unit of this fact is contained in Attachment B to this Annex.

Note 3.— Action to be taken by SSR-, ADS-B- and ADS-C-equipped aircraft which are being subjected to unlawful interference is contained in Annex 11, the PANS-ATM (Doc 4444) and the PANS-OPS (Doc 8168).

Note 4.— Action to be taken by CPDLC-equipped aircraft which are being subjected to unlawful interference is contained in Annex 11, the PANS-ATM (Doc 4444), and guidance material on the subject is contained in the Manual of Air Traffic Services Data Link Applications *(Doc 9694).*

3.7.2 If an aircraft is subjected to unlawful interference, the pilot-in-command shall attempt to land as soon as practicable at the nearest suitable aerodrome or at a dedicated aerodrome assigned by the appropriate authority unless considerations aboard the aircraft dictate otherwise.

Note 1.— Requirements for State authorities with respect to aircraft on the ground that are subject to unlawful interference are contained in Annex 17, Chapter 5, 5.2.4.

Note 2.— See 2.4 regarding the authority of the pilot-in-command of an aircraft.

3.8 Interception

Note.— The word "interception" in this context does not include intercept and escort service provided, on request, to an aircraft in distress, in accordance with Volumes II and III of the International Aeronautical and Maritime Search and Rescue (IAMSAR) Manual *(Doc 9731).*

3.8.1 Interception of civil aircraft shall be governed by appropriate regulations and administrative directives issued by Contracting States in compliance with the Convention on International Civil Aviation, and in particular Article 3(d) under which Contracting States undertake, when issuing regulations for their State aircraft, to have due regard for the safety of navigation of civil aircraft. Accordingly, in drafting appropriate regulations and administrative directives due regard shall be had to the provisions of Appendix 1, Section 2 and Appendix 2, Section 1.

Note.— Recognizing that it is essential for the safety of flight that any visual signals employed in the event of an interception which should be undertaken only as a last resort be correctly employed and understood by civil and military aircraft throughout the world, the Council of the International Civil Aviation Organization, when adopting the visual signals in Appendix 1 to this Annex, urged Contracting States to ensure that they be strictly adhered to by their State aircraft. As interceptions of civil aircraft are, in all cases, potentially hazardous, the Council has also formulated special recommendations which Contracting States are urged to apply in a uniform manner. These special recommendations are contained in Attachment A.

3.8.2 The pilot-in-command of a civil aircraft, when intercepted, shall comply with the Standards in Appendix 2, Sections 2 and 3, interpreting and responding to visual signals as specified in Appendix 1, Section 2.

Note.— See also 2.1.1 and 3.4.

3.9 VMC visibility and distance from cloud minima

VMC visibility and distance from cloud minima are contained in Table 3-1.

Table 3-1*
(see 4.1)

Altitude band	Airspace class	Flight visibility	Distance from cloud
At and above 3 050 m (10 000 ft) AMSL	A*** B C D E F G	8 km	1 500 m horizontally 300 m (1 000 ft) vertically
Below 3 050 m (10 000 ft) AMSL and above 900 m (3 000 ft) AMSL, or above 300 m (1 000 ft) above terrain, whichever is the higher	A***B C D E F G	5 km	1 500 m horizontally 300 m (1 000 ft) vertically
At and below 900 m (3 000 ft) AMSL, or 300 m (1 000 ft) above terrain, whichever is the higher	A***B C D E	5 km	1 500 m horizontally 300 m (1 000 ft) vertically
	F G	5 km**	Clear of cloud and with the surface in sight

* When the height of the transition altitude is lower than 3 050 m (10 000 ft) AMSL, FL 100 should be used in lieu of 10 000 ft.

** When so prescribed by the appropriate ATS authority:

a) flight visibilities reduced to not less than 1 500 m may be permitted for flights operating:

1) at speeds that, in the prevailing visibility, will give adequate opportunity to observe other traffic or any obstacles in time to avoid collision; or

2) in circumstances in which the probability of encounters with other traffic would normally be low, e.g. in areas of low volume traffic and for aerial work at low levels.

b) HELICOPTERS may be permitted to operate *in less than 1 500 m* flight visibility, if manoeuvred at a speed that will give adequate opportunity to observe other traffic or any obstacles in time to avoid collision.

***The VMC minima in Class A airspace are included for guidance to pilots and do not imply acceptance of VFR flights in Class A airspace.

CHAPTER 4. VISUAL FLIGHT RULES

4.1 Except when operating as a special VFR flight, VFR flights shall be conducted so that the aircraft is flown in conditions of visibility and distance from clouds equal to or greater than those specified in Table 3-1.

4.2 Except when a clearance is obtained from an air traffic control unit, VFR flights shall not take off or land at an aerodrome within a control zone, or enter the aerodrome traffic zone or traffic pattern:

a) when the ceiling is less than 450 m (1 500 ft); or

b) when the ground visibility is less than 5 km.

4.3 VFR flights between sunset and sunrise, or such other period between sunset and sunrise as may be prescribed by the appropriate ATS authority, shall be operated in accordance with the conditions prescribed by such authority.

4.4 Unless authorized by the appropriate ATS authority, VFR flights shall not be operated:

a) above FL 200;

b) at transonic and supersonic speeds.

4.5 Authorization for VFR flights to operate above FL 290 shall not be granted in areas where a vertical separation minimum of 300 m (1 000 ft) is applied above FL 290.

4.6 Except when necessary for take-off or landing, or except by permission from the appropriate authority, a VFR flight shall not be flown:

a) over the congested areas of cities, towns or settlements or over an open-air assembly of persons at a height less than 300 m (1 000 ft) above the highest obstacle within a radius of 600 m from the aircraft;

b) elsewhere than as specified in 4.6 a), at a height less than 150 m (500 ft) above the ground or water.

Note.— See also 3.1.2.

4.7 Except where otherwise indicated in air traffic control clearances or specified by the appropriate ATS authority, VFR flights in level cruising flight when operated above 900 m (3 000 ft) from the ground or water, or a higher datum as specified by the appropriate ATS authority, shall be conducted at a cruising level appropriate to the track as specified in the tables of cruising levels in Appendix 3.

4.8 VFR flights shall comply with the provisions of 3.6:

a) when operated within Classes B, C and D airspace;

b) when forming part of aerodrome traffic at controlled aerodromes; or

c) when operated as special VFR flights.

4.9 A VFR flight operating within or into areas, or along routes, designated by the appropriate ATS authority in accordance with 3.3.1.2 c) or d) shall maintain continuous air-ground voice communication watch on the appropriate communication channel of, and report its position as necessary to, the air traffic services unit providing flight information service.

Note.— See Notes following 3.6.5.1.

4.10 An aircraft operated in accordance with the visual flight rules which wishes to change to compliance with the instrument flight rules shall:

a) if a flight plan was submitted, communicate the necessary changes to be effected to its current flight plan; or

b) when so required by 3.3.1.2, submit a flight plan to the appropriate air traffic services unit and obtain a clearance prior to proceeding IFR when in controlled airspace.

APPENDIX 2. INTERCEPTION OF CIVIL AIRCRAFT

(Note.— See Chapter 3, 3.8 of the Annex)

1. Principles to be observed by States

1.1 To achieve the uniformity in regulations which is necessary for the safety of navigation of civil aircraft due regard shall be had by Contracting States to the following principles when developing regulations and administrative directives:

a) interception of civil aircraft will be undertaken only as a last resort;

b) if undertaken, an interception will be limited to determining the identity of the aircraft, unless it is necessary to return the aircraft to its planned track, direct it beyond the boundaries of national airspace, guide it away from a prohibited, restricted or danger area or instruct it to effect a landing at a designated aerodrome;

c) practice interception of civil aircraft will not be undertaken;

d) navigational guidance and related information will be given to an intercepted aircraft by radiotelephony, whenever radio contact can be established; and

e) in the case where an intercepted civil aircraft is required to land in the territory overflown, the aerodrome designated for the landing is to be suitable for the safe landing of the aircraft type concerned.

Note.— In the unanimous adoption by the 25th Session (Extraordinary) of the ICAO Assembly on 10 May 1984 of Article 3 bis *to the Convention on International Civil Aviation, Contracting States have recognized that "every State must refrain from resorting to the use of weapons against civil aircraft in flight".*

1.2 Contracting States shall publish a standard method that has been established for the manoeuvring of aircraft intercepting a civil aircraft. Such method shall be designed to avoid any hazard for the intercepted aircraft.

Note.— Special recommendations regarding a method for the manoeuvring are contained in Attachment A, Section 3.

1.3 Contracting States shall ensure that provision is made for the use of secondary surveillance radar or ADS-B, where available, to identify civil aircraft in areas where they may be subject to interception.

2. Action by intercepted aircraft

2.1 An aircraft which is intercepted by another aircraft shall immediately:

a) follow the instructions given by the intercepting aircraft, interpreting and responding to visual signals in accordance with the specifications in Appendix 1;

b) notify, if possible, the appropriate air traffic services unit;

c) attempt to establish radiocommunication with the intercepting aircraft or with the appropriate intercept control unit, by making a general call on the emergency frequency 121.5 MHz, giving the identity of the intercepted aircraft and the nature of the flight; and if no contact has been established and if practicable, repeating this call on the emergency frequency 243 MHz;

d) if equipped with SSR transponder, select Mode A, Code 7700, unless otherwise instructed by the appropriate air traffic services unit.

e) if equipped with ADS-B or ADS-C, select the appropriate emergency functionality, if available, unless otherwise instructed by the appropriate air traffic services unit.

2.2 If any instructions received by radio from any sources conflict with those given by the intercepting aircraft by visual signals, the intercepted aircraft shall request immediate clarification while continuing to comply with the visual instructions given by the intercepting aircraft.

2.3 If any instructions received by radio from any sources conflict with those given by the intercepting aircraft by radio, the intercepted aircraft shall request immediate clarification while continuing to comply with the radio instructions given by the intercepting aircraft.

3. Radiocommunication during interception

If radio contact is established during interception but communication in a common language is not possible, attempts shall be made to convey instructions, acknowledgement of instructions and essential information by using the phrases and pronunciations in Table A2-1 and transmitting each phrase twice:

Table A2-1

Phrases for use by INTERCEPTING aircraft			*Phrases for use by INTERCEPTED aircraft*		
Phrase	*Pronunciation*[1]	*Meaning*	*Phrase*	*Pronunciation*[1]	*Meaning*
CALL SIGN	KOL SA-IN	What is your call sign?	CALL SIGN (call sign)[2]	KOL SA-IN (call sign)	My call sign is (call sign)
FOLLOW	FOL-LO	Follow me	WILCO Will comply	VILL-KO	Understood
DESCEND	DEE-SEND	Descend for landing	CAN NOT	KANN NOTT	Unable to comply
YOU LAND	YOU LAAND	Land at this aerodrome	REPEAT	REE-PEET	Repeat your instruction
PROCEED	PRO-SEED	You may proceed	AM LOST	AM LOSST	Position unknown
			MAYDAY	MAYDAY	I am in distress
			HIJACK[3]	HI-JACK	I have been hijacked
			LAND (place name)	LAAND (place name)	I request to land at (place name)
			DESCEND	DEE-SEND	I require descent

1. *In the second column, syllables to be emphasized are underlined.*
2. *The call sign required to be given is that used in radiotelephony communications with air traffic services units and corresponding to the aircraft identification in the flight plan.*
3. *Circumstances may not always permit, nor make desirable, the use of the phrase "HIJACK".*

b) for polyethylene zero-pressure balloons, at least two methods, systems, devices, or combinations thereof, that function independently of each other are employed for terminating the flight of the balloon envelope;

Note.— Superpressure balloons do not require these devices as they quickly rise after payload discharge and burst without the need for a device or system designed to puncture the balloon envelope. In this context a superpressure balloon is a simple non-extensible envelope capable of withstanding a differential of pressure, higher inside than out. It is inflated so that the smaller night-time pressure of the gas still fully extends the envelope. Such a superpressure balloon will keep essentially constant level until too much gas diffuses out of it.

c) the balloon envelope is equipped with either a radar reflective device(s) or radar reflective material that will present an echo to surface radar operating in the 200 MHz to 2 700 MHz frequency range, and/or the balloon is equipped with such other devices as will permit continuous tracking by the operator beyond the range of ground-based radar.

3.4 A heavy unmanned free balloon shall not be operated under the following conditions:

a) in an area where ground-based SSR equipment is in use, unless it is equipped with a secondary surveillance radar transponder, with pressure-altitude reporting capability, which is continuously operating on an assigned code, or which can be turned on when necessary by the tracking station; or

b) in an area where ground-based ADS-B equipment is in use, unless it is equipped with an ADS-B transmitter, with pressure-altitude reporting capability, which is continuously operating or which can be turned on when necessary by the tracking station.

3.5 An unmanned free balloon that is equipped with a trailing antenna that requires a force of more than 230 N to break it at any point shall not be operated unless the antenna has coloured pennants or streamers that are attached at not more than 15 m intervals.

3.6 A heavy unmanned free balloon shall not be operated below 18 000 m (60 000 ft) pressure-altitude between sunset and sunrise or such other period between sunset and sunrise (corrected to the altitude of operation) as may be prescribed by the appropriate ATS authority, unless the balloon and its attachments and payload, whether or not they become separated during the operation, are lighted.

3.7 A heavy unmanned free balloon that is equipped with a suspension device (other than a highly conspicuously coloured open parachute) more than 15 m long shall not be operated between sunrise and sunset below 18 000 m (60 000 ft) pressure-altitude unless the suspension device is coloured in alternate bands of high conspicuity colours or has coloured pennants attached.

4. Termination

The operator of a heavy unmanned free balloon shall activate the appropriate termination devices required by 3.3 a) and b) above:

a) when it becomes known that weather conditions are less than those prescribed for the operation;

b) if a malfunction or any other reason makes further operation hazardous to air traffic or to persons or property on the surface; or

c) prior to unauthorized entry into the airspace over another State's territory.

5. Flight notification

5.1 Pre-flight notification

5.1.1 Early notification of the intended flight of an unmanned free balloon in the medium or heavy category shall be made to the appropriate air traffic services unit not less than seven days before the date of the intended flight.

5.1.2 Notification of the intended flight shall include such of the following information as may be required by the appropriate air traffic services unit:

a) balloon flight identification or project code name;

b) balloon classification and description;

c) SSR code, aircraft address or NDB frequency as applicable;

d) operator's name and telephone number;

e) launch site;

f) estimated time of launch (or time of commencement and completion of multiple launches);

g) number of balloons to be launched and the scheduled interval between launches (if multiple launches);

h) expected direction of ascent;

i) cruising level(s) (pressure-altitude);

j) the estimated elapsed time to pass 18 000 m (60 000 ft) pressure-altitude or to reach cruising level if at or below 18 000 m (60 000 ft), together with the estimated location;

Note.— If the operation consists of continuous launchings, the time to be included is the estimated time at which the first and the last in the series will reach the appropriate level (e.g. 122136Z–130330Z).

k) the estimated date and time of termination of the flight and the planned location of the impact/recovery area. In the case of balloons carrying out flights of long duration, as a result of which the date and time of termination of the flight and the location of impact cannot be forecast with accuracy, the term “long duration” shall be used.

Note.— If there is to be more than one location of impact/recovery, each location is to be listed together with the appropriate estimated time of impact. If there is to be a series of continuous impacts, the time to be included is the estimated time of the first and the last in the series (e.g. 070330Z–072300Z).

5.1.3 Any changes in the pre-launch information notified in accordance with 5.1.2 above shall be forwarded to the air traffic services unit concerned not less than 6 hours before the estimated time of launch, or in the case of solar or cosmic disturbance investigations involving a critical time element, not less than 30 minutes before the estimated time of the commencement of the operation.

5.2 Notification of launch

Immediately after a medium or heavy unmanned free balloon is launched the operator shall notify the appropriate air traffic services unit of the following:

a) balloon flight identification;

b) launch site;

c) actual time of launch;

d) estimated time at which 18 000 m (60 000 ft) pressure-altitude will be passed, or the estimated time at which the cruising level will be reached if at or below 18 000 m (60 000 ft), and the estimated location; and

e) any changes to the information previously notified in accordance with 5.1.2 g) and h).

5.3 Notification of cancellation

The operator shall notify the appropriate air traffic services unit immediately it is known that the intended flight of a medium or heavy unmanned free balloon, previously notified in accordance with 5.1, has been cancelled.

6. Position recording and reports

6.1 The operator of a heavy unmanned free balloon operating at or below 18 000 m (60 000 ft) pressure-altitude shall monitor the flight path of the balloon and forward reports of the balloon’s position as requested by air traffic services. Unless air traffic services require reports of the balloon’s position at more frequent intervals, the operator shall record the position every 2 hours.

6.2 The operator of a heavy unmanned free balloon operating above 18 000 m (60 000 ft) pressure-altitude shall monitor the flight progress of the balloon and forward reports of the balloon’s position as requested by air traffic services. Unless air traffic services require reports of the balloon’s position at more frequent intervals, the operator shall record the position every 24 hours.

6.3 If a position cannot be recorded in accordance with 6.1 and 6.2, the operator shall immediately notify the appropriate air traffic services unit. This notification shall include the last recorded position. The appropriate air traffic services unit shall be notified immediately when tracking of the balloon is re-established.

6.4 One hour before the beginning of planned descent of a heavy unmanned free balloon, the operator shall forward to the appropriate ATS unit the following information regarding the balloon:

a) the current geographical position;

b) the current level (pressure-altitude);

c) the forecast time of penetration of 18 000 m (60 000 ft) pressure-altitude, if applicable;

d) the forecast time and location of ground impact.

6.5 The operator of a heavy or medium unmanned free balloon shall notify the appropriate air traffic services unit when the operation is ended.

ATTACHMENT A. INTERCEPTION OF CIVIL AIRCRAFT

(Note.— See Chapter 3, 3.8 of the Annex and associated Note)

Note.— In the interest of completeness, the substance of the provisions in Appendix 2 to the Annex is incorporated in this Attachment.

1. In accordance with Article 3 d) of the Convention on International Civil Aviation the Contracting States of ICAO "undertake, when issuing regulations for their state aircraft, that they will have due regard for the safety of navigation of civil aircraft". As interceptions of civil aircraft are, in all cases, potentially hazardous, the Council of ICAO has formulated the following special recommendations which Contracting States are urged to implement through appropriate regulatory and administrative action. The uniform application by all concerned is considered essential in the interest of safety of civil aircraft and their occupants. For this reason the Council of ICAO invites Contracting States to notify ICAO of any differences which may exist between their national regulations or practices and the special recommendations hereunder.

2. General

2.1 Interception of civil aircraft should be avoided and should be undertaken only as a last resort. If undertaken, the interception should be limited to determining the identity of the aircraft, unless it is necessary to return the aircraft to its planned track, direct it beyond the boundaries of national airspace, guide it away from a prohibited, restricted or danger area or instruct it to effect a landing at a designated aerodrome. Practice interception of civil aircraft is not to be undertaken.

2.2 To eliminate or reduce the need for interception of civil aircraft, it is important that:

a) all possible efforts be made by intercept control units to secure identification of any aircraft which may be a civil aircraft, and to issue any necessary instructions or advice to such aircraft, through the appropriate air traffic services units. To this end, it is essential that means of rapid and reliable communications between intercept control units and air traffic services units be established and that agreements be formulated concerning exchanges of information between such units on the movements of civil aircraft, in accordance with the provisions of Annex 11;

b) areas prohibited to all civil flights and areas in which civil flight is not permitted without special authorization by the State be clearly promulgated in Aeronautical Information Publications (AIP) in accordance with the provisions of Annex 15, together with the risk, if any, of interception in the event of penetration of such areas. When delineating such areas in close proximity to promulgated ATS routes, or other frequently used tracks, States should take into account the availability and overall systems accuracy of the navigation systems to be used by civil aircraft and their ability to remain clear of the delineated areas;

c) the establishment of additional navigation aids be considered where necessary to ensure that civil aircraft are able safely to circumnavigate prohibited or, as required, restricted areas.

2.3 To eliminate or reduce the hazards inherent in interceptions undertaken as a last resort, all possible efforts should be made to ensure coordinated actions by the pilots and ground units concerned. To this end, it is essential that Contracting States take steps to ensure that:

a) all pilots of civil aircraft be made fully aware of the actions to be taken by them and the visual signals to be used, as specified in Chapter 3 and Appendix 1 of this Annex;

b) operators or pilots-in-command of civil aircraft implement the provisions in Annex 6, Parts I, II and III, regarding the capability of aircraft to communicate on 121.5 MHz and the availability of interception procedures and visual signals on board aircraft;

c) all air traffic services personnel be made fully aware of the actions to be taken by them in accordance with the provisions of Annex 11, Chapter 2, and the PANS-ATM (Doc 4444);

d) all pilots-in-command of intercepting aircraft be made aware of the general performance limitations of civil aircraft and of the possibility that intercepted civil aircraft may be in a state of emergency due to technical difficulties or unlawful interference;

e) clear and unambiguous instructions be issued to intercept control units and to pilots-in-command of potential intercepting aircraft, covering interception manoeuvres, guidance of intercepted aircraft, action by intercepted aircraft, air-to-air visual signals, radiocommunication with intercepted aircraft, and the need to refrain from resorting to the use of weapons;

Note.— See paragraphs 3 to 8.

f) intercept control units and intercepting aircraft be provided with radiotelephony equipment compatible with the technical specifications of Annex 10, Volume I, so as to enable them to communicate with intercepted aircraft on the emergency frequency 121.5 MHz;

g) secondary surveillance radar and/or ADS-B facilities be made available to the extent possible to permit intercept control units to identify civil aircraft in areas where they might otherwise be intercepted. Such facilities should permit recognition of aircraft identity and immediate recognition of any emergency or urgency conditions.

3. Interception manoeuvres

3.1 A standard method should be established for the manoeuvring of aircraft intercepting a civil aircraft in order to avoid any hazard for the intercepted aircraft. Such method should take due account of the performance limitations of civil aircraft, the need to avoid flying in such proximity to the intercepted aircraft that a collision hazard may be created and the need to avoid crossing the aircraft's flight path or to perform any other manoeuvre in such a manner that the wake turbulence may be hazardous, particularly if the intercepted aircraft is a light aircraft.

3.2 An aircraft equipped with an airborne collision avoidance system (ACAS), which is being intercepted, may perceive the interceptor as a collision threat and thus initiate an avoidance manoeuvre in response to an ACAS resolution advisory. Such a manoeuvre might be misinterpreted by the interceptor as an indication of unfriendly intentions. It is important, therefore, that pilots of intercepting aircraft equipped with a secondary surveillance radar (SSR) transponder suppress the transmission of pressure-altitude information (in Mode C replies or in the AC field of Mode S replies) within a range of at least 37 km (20 NM) of the aircraft being intercepted. This prevents the ACAS in the intercepted aircraft from using resolution advisories in respect of the interceptor, while the ACAS traffic advisory information will remain available.

3.3 Manoeuvres for visual identification

The following method is recommended for the manoeuvring of intercepting aircraft for the purpose of visually identifying a civil aircraft:

Phase I

The intercepting aircraft should approach the intercepted aircraft from astern. The element leader, or the single intercepting aircraft, should normally take up a position on the left (port) side, slightly above and ahead of the intercepted aircraft, within the field of view of the pilot of the intercepted aircraft, and initially not closer to the aircraft than 300 m. Any other participating aircraft should stay well clear of the intercepted aircraft, preferably above and behind. After speed and position have been established, the aircraft should, if necessary, proceed with Phase II of the procedure.

Phase II

The element leader, or the single intercepting aircraft, should begin closing in gently on the intercepted aircraft, at the same level, until no closer than absolutely necessary to obtain the information needed. The element leader, or the single intercepting aircraft, should use caution to avoid startling the flight crew or the passengers of the intercepted aircraft, keeping constantly in mind the fact that manoeuvres considered normal to an intercepting aircraft may be considered hazardous to passengers and crews of civil aircraft. Any other participating aircraft should continue to stay well clear of the intercepted aircraft. Upon completion of identification, the intercepting aircraft should withdraw from the vicinity of the intercepted aircraft as outlined in Phase III.

Phase III

The element leader, or the single intercepting aircraft, should break gently away from the intercepted aircraft in a shallow dive. Any other participating aircraft should stay well clear of the intercepted aircraft and rejoin their leader.

3.4 Manoeuvres for navigational guidance

3.4.1 If, following the identification manoeuvres in Phase I and Phase II above, it is considered necessary to intervene in the navigation of the intercepted aircraft, the element leader, or the single intercepting aircraft, should normally take up a position on the left (port) side, slightly above and ahead of the intercepted aircraft, to enable the pilot-in-command of the latter aircraft to see the visual signals given.

3.4.2 It is indispensable that the pilot-in-command of the intercepting aircraft be satisfied that the pilot-in-command of the intercepted aircraft is aware of the interception and acknowledges the signals given. If repeated attempts to attract the attention of the pilot-in-command of the intercepted aircraft by use of the Series 1 signal in Appendix 1, Section 2, are unsuccessful, other methods of signalling may be used for this purpose, including as a last resort the visual effect of the reheat/afterburner, provided that no hazard is created for the intercepted aircraft.

3.5 It is recognized that meteorological conditions or terrain may occasionally make it necessary for the element leader, or the single intercepting aircraft, to take up a position on the right (starboard) side, slightly above and ahead of the intercepted aircraft. In such case, the pilot-in-command of the intercepting aircraft must take particular care that the intercepting aircraft is clearly visible at all times to the pilot-in-command of the intercepted aircraft.

4. Guidance of an intercepted aircraft

4.1 Navigational guidance and related information should be given to an intercepted aircraft by radiotelephony, whenever radio contact can be established.

4.2 When navigational guidance is given to an intercepted aircraft, care must be taken that the aircraft is not led into conditions where the visibility may be reduced below that required to maintain flight in visual meteorological conditions and that the manoeuvres demanded of the intercepted aircraft do not add to already existing hazards in the event that the operating efficiency of the aircraft is impaired.

4.3 In the exceptional case where an intercepted civil aircraft is required to land in the territory overflown, care must also be taken that:

a) the designated aerodrome is suitable for the safe landing of the aircraft type concerned, especially if the aerodrome is not normally used for civil air transport operations;

b) the surrounding terrain is suitable for circling, approach and missed approach manoeuvres;

c) the intercepted aircraft has sufficient fuel remaining to reach the aerodrome;

d) if the intercepted aircraft is a civil transport aircraft, the designated aerodrome has a runway with a length equivalent to at least 2 500 m at mean sea level and a bearing strength sufficient to support the aircraft; and

e) whenever possible, the designated aerodrome is one that is described in detail in the relevant Aeronautical Information Publication.

4.4 When requiring a civil aircraft to land at an unfamiliar aerodrome, it is essential that sufficient time be allowed it to prepare for a landing, bearing in mind that only the pilot-in-command of the civil aircraft can judge the safety of the landing operation in relation to runway length and aircraft mass at the time.

4.5 It is particularly important that all information necessary to facilitate a safe approach and landing be given to the intercepted aircraft by radiotelephony.

5. Action by intercepted aircraft

The Standards in Appendix 2, Section 2, specify as follows:

"2.1 An aircraft which is intercepted by another aircraft shall immediately:

a) follow the instructions given by the intercepting aircraft, interpreting and responding to visual signals in accordance with the specifications in Appendix 1;

b) notify, if possible, the appropriate air traffic services unit;

c) attempt to establish radiocommunication with the intercepting aircraft or with the appropriate intercept control unit, by making a general call on the emergency frequency 121.5 MHz, giving the identity of the intercepted aircraft and the nature of the flight; and if no contact has been established and if practicable, repeating this call on the emergency frequency 243 MHz;

d) if equipped with SSR transponder, select Mode A, Code 7700, unless otherwise instructed by the appropriate air traffic services unit.

e) if equipped with ADS-B or ADS-C, select the appropriate emergency functionality, if available, unless otherwise instructed by the appropriate air traffic services unit.

"2.2 If any instructions received by radio from any sources conflict with those given by the intercepting aircraft by visual signals, the intercepted aircraft shall request immediate clarification while continuing to comply with the visual instructions given by the intercepting aircraft.

"2.3 If any instructions received by radio from any sources conflict with those given by the intercepting aircraft by radio, the intercepted aircraft shall request immediate clarification while continuing to comply with the radio instructions given by the intercepting aircraft."

6. Air-to-air visual signals

The visual signals to be used by intercepting and intercepted aircraft are those set forth in Appendix 1 to this Annex. It is essential that intercepting and intercepted aircraft adhere strictly to those signals and interpret correctly the signals given by the other aircraft, and that the intercepting aircraft pay particular attention to any signals given by the intercepted aircraft to indicate that it is in a state of distress or urgency.

7. Radiocommunication between the intercept control unit or the intercepting aircraft and the intercepted aircraft

7.1 When an interception is being made, the intercept control unit and the intercepting aircraft should:

a) first attempt to establish two-way communication with the intercepted aircraft in a common language on the emergency frequency 121.5 MHz, using the call signs "INTERCEPT CONTROL", "INTERCEPTOR (call sign)" and "INTERCEPTED AIRCRAFT" respectively; and

b) failing this, attempt to establish two-way communication with the intercepted aircraft on such other frequency or frequencies as may have been prescribed by the appropriate ATS authority, or to establish contact through the appropriate ATS unit(s).

7.2 If radio contact is established during interception but communication in a common language is not possible, attempts must be made to convey instructions, acknowledgement of instructions and essential information by using the phrases and pronunciations in Table A-1 and transmitting each phrase twice.

8. Refraining from the use of weapons

Note.— In the unanimous adoption by the 25th Session (Extraordinary) of the ICAO Assembly on 10 May 1984 of Article 3 bis *to the Convention on International Civil Aviation, Contracting States have recognized that "every State must refrain from resorting to the use of weapons against civil aircraft in flight".*

The use of tracer bullets to attract attention is hazardous, and it is expected that measures will be taken to avoid their use so that the lives of persons on board and the safety of aircraft will not be endangered.

9. Coordination between intercept control units and air traffic services units

It is essential that close coordination be maintained between an intercept control unit and the appropriate air traffic services unit during all phases of an interception of an aircraft which is, or might be, a civil aircraft, in order that the air traffic services unit is kept fully informed of the developments and of the action required of the intercepted aircraft.

Table A-1

Phrases for use by INTERCEPTING aircraft			*Phrases for use by INTERCEPTED aircraft*		
Phrase	*Pronunciation*[1]	*Meaning*	*Phrase*	*Pronunciation*[1]	*Meaning*
CALL SIGN	KOL SA-IN	What is your call sign?	CALL SIGN (call sign)[2]	KOL SA-IN (call sign)	My call sign is (call sign)
FOLLOW	FOL-LO	Follow me	WILCO	VILL-KO	Understood Will comply
DESCEND	DEE-SEND	Descend for landing	CAN NOT	KANN NOTT	Unable to comply
YOU LAND	YOU LAAND	Land at this aerodrome	REPEAT	REE-PEET	Repeat your instruction
PROCEED	PRO-SEED	You may proceed	AM LOST	AM LOSST	Position unknown
			MAYDAY	MAYDAY	I am in distress
			HIJACK[3]	HI-JACK	I have been hijacked
			LAND (place name)	LAAND (place name)	I request to land at (place name)
			DESCEND	DEE-SEND	I require descent

1. *In the second column, syllables to be emphasized are underlined.*
2. *The call sign required to be given is that used in radiotelephony communications with air traffic services units and corresponding to the aircraft identification in the flight plan.*
3. *Circumstances may not always permit, nor make desirable, the use of the phrase "HIJACK".*

ATTACHMENT B. UNLAWFUL INTERFERENCE

1. General

The following procedures are intended as guidance for use by aircraft when unlawful interference occurs and the aircraft is unable to notify an ATS unit of this fact.

2. Procedures

2.1 If the pilot-in-command cannot proceed to an aerodrome in accordance with the rules in Chapter 3, 3.7.2, he/she should attempt to continue flying on the assigned track and at the assigned cruising level at least until able to notify an ATS unit or until within radar or ADS-B coverage.

2.2 When an aircraft subjected to an act of unlawful interference must depart from its assigned track or its assigned cruising level without being able to make radiotelephony contact with ATS, the pilot-in-command should, whenever possible:

a) attempt to broadcast warnings on the VHF channel in use or the VHF emergency frequency, and other appropriate channels, unless considerations aboard the aircraft dictate otherwise. Other equipment such as on-board transponders and data links should also be used when it is advantageous to do so and circumstances permit; and

b) proceed in accordance with applicable special procedures for in-flight contingencies, where such procedures have been established and promulgated in the *Regional Supplementary Procedures (*Doc 7030); or

c) if no applicable regional procedures have been established, proceed at a level which differs from the cruising levels normally used for IFR flight by:

   1) 150 m (500 ft) in an area where a vertical separation minimum of 300 m (1 000 ft) is applied; or

   2) 300 m (1 000 ft) in an area where a vertical separation minimum of 600 m (2 000 ft) is applied.

Note.— Action to be taken by an aircraft which is intercepted while being subject to an act of unlawful interference is prescribed in 3.8 of this Annex.

— END —

International Standards
and Recommended Practices

Annex 3
to the Convention on
International Civil Aviation

Meteorological Service for International Air Navigation

Part I
Core SARPs

Part II
Appendices and Attachments

This edition incorporates all amendments adopted by the Council prior to 22 February 2007 and supersedes, on 7 November 2007, all previous editions of Annex 3.

For information regarding the applicability of Standards and Recommended Practices, *see* Foreword.

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TRANSMITTAL NOTE

NEW EDITIONS OF ANNEXES TO THE CONVENTION ON INTERNATIONAL CIVIL AVIATION

It has come to our attention that when a new edition of an Annex is published, users have been discarding, along with the previous edition of the Annex, the **Supplement** to the previous edition. Please note that the Supplement to the previous edition should be retained until a new Supplement is issued.

IMPORTANT NOTE REGARDING AMENDMENT 74

This new edition incorporates all amendments from 1 to 74 and has an applicability date of **7 November 2007**. However, certain provisions regarding the use of WAFS forecasts, the extension of the validity period of an aerodrome forecast and other amendments related to aeronautical meteorological codes will only become applicable on **5 November 2008** and were **not** included in the new edition. Replacement pages for those provisions applicable in 2008 will be dispatched in September 2007.

International Standards
and Recommended Practices

Annex 3
to the Convention on International Civil Aviation

Meteorological Service for International Air Navigation

Part I
Core SARPs

Part II
Appendices and Attachments

This edition incorporates all amendments adopted by the Council prior to 22 February 2007 and supersedes, on 7 November 2007, all previous editions of Annex 3.

For information regarding the applicability of Standards and Recommended Practices, *see* Foreword.

Sixteenth Edition
July 2007

International Civil Aviation Organization

AMENDMENTS

Amendments are announced in the supplements to the *Catalogue of ICAO Publications;* the Catalogue and its supplements are available on the ICAO website at www.icao.int. The space below is provided to keep a record of such amendments.

RECORD OF AMENDMENTS AND CORRIGENDA

AMENDMENTS			
No.	Date applicable	Date entered	Entered by
1-74	7/11/07	–	ICAO
74	5/11/08	–	ICAO

CORRIGENDA			
No.	Date of issue	Date entered	Entered by
1	1/12/07	–	ICAO
2	12/5/08	–	ICAO

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APPENDICES

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FOREWORD

Historical background

Standards and Recommended Practices relating to meteorology were first adopted by the Council on 16 April 1948, pursuant to the provisions of Article 37 of the Convention on International Civil Aviation (Chicago, 1944), and designated as Annex 3 to the Convention with the title *Standards and Recommended Practices — Meteorological Codes*. The Standards and Recommended Practices were based on recommendations of the Special Session of the Meteorology Division, held in September 1947.

Table A shows the origin of subsequent amendments, together with a list of the principal subjects involved and the dates on which the Annex and the amendments were adopted or approved by the Council, when they became effective and when they became applicable.

Action by Contracting States

Notification of differences. The attention of Contracting States is drawn to the obligation imposed by Article 38 of the Convention by which Contracting States are required to notify the Organization of any differences between their national regulations and practices and the International Standards contained in this Annex and any amendments thereto. Contracting States are invited to extend such notification to any differences from the Recommended Practices contained in this Annex, and any amendments thereto, when the notification of such differences is important for the safety of air navigation. Further, Contracting States are invited to keep the Organization currently informed of any differences which may subsequently occur, or of the withdrawal of any differences previously notified. A specific request for notification of differences will be sent to Contracting States immediately after the adoption of each amendment to this Annex.

Attention of States is also drawn to the provisions of Annex 15 related to the publication of differences between their national regulations and practices and the related ICAO Standards and Recommended Practices through the Aeronautical Information Service, in addition to the obligation of States under Article 38 of the Convention.

Promulgation of information. The establishment and withdrawal of and changes to facilities, services and procedures affecting aircraft operations provided in accordance with the Standards and Recommended Practices specified in this Annex should be notified and take effect in accordance with the provisions of Annex 15.

Use of the text of the Annex in national regulations. The Council, on 13 April 1948, adopted a resolution inviting the attention of Contracting States to the desirability of using in their own national regulations, as far as is practicable, the precise language of those ICAO Standards that are of a regulatory character and also of indicating departures from the Standards, including any additional national regulations that are important for the safety or regularity of air navigation. Wherever possible, the provisions of this Annex have been written in such a way as would facilitate incorporation, without major textual changes, into national legislation.

Status of Annex components

An Annex is made up of the following component parts, not all of which, however, are necessarily found in every Annex; they have the status indicated:

1.— *Material comprising the Annex proper:*

a) *Standards* and *Recommended Practices* adopted by the Council under the provisions of the Convention. They are defined as follows:

Standard: Any specification for physical characteristics, configuration, matériel, performance, personnel or procedure, the uniform application of which is recognized as necessary for the safety or regularity of international air navigation and to which Contracting States will conform in accordance with the Convention; in the event of impossibility of compliance, notification to the Council is compulsory under Article 38.

Recommended Practice: Any specification for physical characteristics, configuration, matériel, performance, personnel or procedure, the uniform application of which is recognized as desirable in the interest of safety, regularity or efficiency of international air navigation, and to which Contracting States will endeavour to conform in accordance with the Convention.

b) *Appendices* comprising material grouped separately for convenience but forming part of the Standards and Recommended Practices adopted by the Council.

c) *Definitions* of terms used in the Standards and Recommended Practices which are not self-explanatory in that they do not have accepted dictionary meanings. A definition does not have independent status but is an essential part of each Standard and Recommended Practice in which the term is used, since a change in the meaning of the term would affect the specification.

d) *Tables* and *Figures* which add to or illustrate a Standard or Recommended Practice and which are referred to therein, form part of the associated Standard or Recommended Practice and have the same status.

2.— *Material approved by the Council for publication in association with the Standards and Recommended Practices:*

a) *Forewords* comprising historical and explanatory material based on the action of the Council and including an explanation of the obligations of States with regard to the application of the Standards and Recommended Practices ensuing from the Convention and the Resolution of Adoption;

b) *Introductions* comprising explanatory material introduced at the beginning of parts, chapters or sections of the Annex to assist in the understanding of the application of the text;

c) *Notes* included in the text, where appropriate, to give factual information or references bearing on the Standards or Recommended Practices in question, but not constituting part of the Standards or Recommended Practices;

d) *Attachments* comprising material supplementary to the Standards and Recommended Practices, or included as a guide to their application.

Selection of language

This Annex has been adopted in five languages — English, Arabic, French, Russian and Spanish. Each Contracting State is requested to select one of those texts for the purpose of national implementation and for other effects provided for in the Convention, either through direct use or through translation into its own national language, and to notify the Organization accordingly.

Editorial practices

The following practice has been adhered to in order to indicate at a glance the status of each statement: *Standards* have been printed in light face roman; *Recommended Practices* have been printed in light face italics, the status being indicated by the prefix **Recommendation**; *Notes* have been printed in light face italics, the status being indicated by the prefix *Note*.

The following editorial practice has been followed in the writing of specifications: for Standards the operative verb "shall" is used, and for Recommended Practices the operative verb "should" is used.

Any reference to a portion of this document, which is identified by a number, includes all subdivisions of the portion.

Applicability

The Standards and Recommended Practices in this document govern the application of the *Regional Supplementary Procedures* (Doc 7030), in which document will be found statements of regional choices, where such options are permitted by this Annex.

Responsibility

In accordance with a similar provision in the Foreword to Annex 6, Part II, the responsibility which devolves upon an operator, in accordance with the provisions of Annex 3, falls upon the pilot-in-command in the case of international general aviation.

Relation to corresponding WMO publications

The regulatory material contained in Annex 3 is, except for a few minor editorial differences, identical with that appearing in the Technical Regulations (Chapter C.3.1) of the World Meteorological Organization (WMO).

The aeronautical meteorological code forms referred to in Annex 3 are developed by the World Meteorological Organization on the basis of aeronautical requirements contained in this Annex, or stated from time to time by the Council. The aeronautical meteorological code forms are promulgated by WMO in its Publication No. 306 — *Manual on Codes*, Volume I.

Table A. Amendments to Annex 3

Amendment(s)	*Source(s)*	*Subject(s)*	*Adopted/approved* *Effective* *Applicable*
1st Edition	Second Session of the Meteorology Division	Meteorological codes for the transmission of meteorological information for aeronautical purposes.	16 April 1948 15 September 1948 1 January 1949
1 to 21 (2nd Edition)	Special Session of the Meteorology Division	Updating and improvement of meteorological codes.	17 September 1948 23 December 1948 1 January 1949

Amendment(s)	*Source(s)*	*Subject(s)*	*Adopted/approved Effective Applicable*
22 to 37	Third Session of the Meteorology Division	Use of plain language and a simplified code for flight conditions in air- reports.	28 May 1951 1 October 1951 1 January 1952
38 (3rd Edition)	First Air Navigation Conference	Introduction of the radiotelephony or radiotelegraphy AIREP form of air-report.	15 December 1953 1 August 1954 1 September 1954
39	First Air Navigation Conference	Revised radiotelegraphy form of POMAR Code for air-reports.	18 May 1954 20 August 1954 1 September 1954
40	World Meteorological Organization	New aeronautical meteorological figure codes in an Attachment, replacing those (except the POMAR code) hitherto appearing in the SARPs.	28 September 1954 1 January 1955 1 January 1955
41	Fourth Session of the Meteorology Division	Introduction of Standards and Recommended Practices governing the obligations of Contracting States relating to the establishment of meteorological organization in each State, adequate to satisfy Articles 28 and 37 of the Convention; consequential change of title of Annex 3 to read *International Standards and Recommended Practices — Meteorology*.	1 April 1955 1 August 1955 1 January 1956
42 (4th Edition)	Second Air Navigation Conference	Simplification of the detailed specifications for the method of determining the position in the AIREP and POMAR forms of air-report.	8 May 1956 1 September 1956 1 December 1956
43	Third Air Navigation Conference	Introduction of the term “SIGMET information” to replace the terms “advisory message” and “warning message”; amendment of the table for “State of Sea” in the POMAR code.	13 June 1957 1 October 1957 1 December 1957
44	Rules of the Air and Air Traffic Services/ Search and Rescue Divisions	Changes in the list of elements in Section 1 (Position report) of the AIREP form of air-report — deletion of the element “Flight conditions” and amendment of the last element in the section to read “Next position and time over”.	18 February 1960 1 May 1960 1 August 1960
45	Rules of the Air and Air Traffic Services/ Search and Rescue Divisions	Amendment of model AIREP and POMAR forms of air-report consequential to Amendment 44.	18 February 1960 — 1 August 1960
46	World Meteorological Organization	Updating of aeronautical meteorological figure codes, introduced by WMO, as of 1 January 1960.	8 June 1960 — 8 June 1960
47 (5th Edition)	Fifth Session of the Meteorology Division	Amendment to the procedures for aircraft meteorological observations and reports, modifying those for special observations and introducing requirements for additional observations; deletion of the POMAR form of air-report; elimination of flight meteorological watch and the introduction of en-route forecast service to supplement area meteorological watch; amendment to the provisions concerning meteorological conditions along the route to an alternate aerodrome.	2 December 1960 1 April 1961 1 July 1961
48	Fifth Session of the Meteorology Division	Amendment to model AIREP form of air-report to reflect changes in procedures for aircraft meteorological observations and reports, consequential to an amendment to the PANS-RAC.	2 December 1960 — 1 July 1961
49	Fifth Session of the Meteorology Division	Introduction of definition of “D-value”.	8 April 1963 1 August 1963 1 November 1963

Amendment(s)	*Source(s)*	*Subject(s)*	*Adopted/approved* *Effective* *Applicable*
50	World Meteorological Organization	Updating of aeronautical meteorological figure codes, introduced by WMO, as of 1 January 1964.	18 March 1964 — 18 March 1964
51 (6th Edition)	Meteorology and Operations Divisional Meeting	Introduction of a requirement for observations to be made at locations where they will be representative of the area for which they are primarily required; extension of the criteria for special air-reports to cover phenomena likely to affect efficiency as well as safety, and deleting the requirement for "additional aircraft observations" according to regionally agreed criteria; deletion from the AIREP form of air-report of D-value, weather and cloud as standard items; introduction of a modified model AIREP form; changes to the provisions relating to forms of meteorological messages and providing for the exchange of information in pictorial form; introduction of definition of "plain language".	31 May 1965 1 October 1965 10 March 1966
52	World Meteorological Organization	Updating of aeronautical meteorological figure codes, introduced by WMO, as of 10 March 1966.	12 December 1966 — 12 December 1966
53	Meteorology and Operations Divisional Meeting	Permitting regional air navigation agreement on the use of a pictorial form of message for the dissemination of forecasts; replacement of the term "symbolic form of message" by a more specific description of the form of message to which this expression was intended to refer.	12 December 1966 12 April 1967 24 August 1967
54	World Meteorological Organization	Updating of aeronautical meteorological figure codes, introduced by WMO, as of 1 January 1968.	13 June 1967 — 1 January 1968
55	France	Permitting changes to be made to air-reports before their ground-to-ground dissemination.	16 December 1968 16 April 1969 18 September 1969
56 (7th Edition)	Sixth Air Navigation Conference	Introduction of: specifications for area forecast centres; simplified specifications for meteorological offices to reflect increasing centralization; extended coverage of aircraft reports to include adverse weather conditions encountered during initial climb and final approach; routine reporting by aircraft of "spot" rather than "mean" winds; improved criteria for in-flight reports of the intensity of turbulence; new definition of "air traffic services reporting office" and changes in the definition of "air traffic services unit"; changes to the aeronautical meteorological codes introduced by WMO, as of 18 September 1969.	15 May 1970 15 September 1970 4 February 1971
57	Second Meeting of the Technical Panel on Supersonic Transport Operations	Amendment to the definition of "SIGMET information" to take account of the requirements of SST aircraft operations; introduction of provisions for making and recording special observations whenever moderate turbulence, hail or cumulonimbus clouds are encountered during transonic or supersonic flight.	19 March 1971 6 September 1971 6 January 1972
58	World Meteorological Organization	Updating of aeronautical meteorological codes, introduced by WMO, as of 1 January 1972.	19 March 1971 — 6 January 1972
59	Sixth Air Navigation Conference	Permitting the omission of information on "next position and time over" from Section 1 of air-reports exchanged between meteorological offices; introduction of changes to the formats and data conventions in the model form of air-report to make it suitable for direct input into computers.	24 March 1972 24 July 1972 7 December 1972

Amendment(s)	*Source(s)*	*Subject(s)*	*Adopted/approved Effective Applicable*
60 (8th Edition)	Sixth Air Navigation Conference. Eighth Air Navigation Conference. Meteorology Divisional Meeting (1974)	Complete revision of Annex 3, incorporating the PANS-MET, the specifications of which were regarded as being suitable for inclusion in Annex 3 as Standards and Recommended Practices; the revision took into account recently approved operational requirements and up-to-date methods of meeting them; introduction of new Standards and Recommended Practices, relating to service for operators and flight crew members, meteorological information for air traffic services and for search and rescue services, together with requirements for communications and their use; the title of Annex 3 was, accordingly, amended to read *Meteorological Service for International Air Navigation*.	26 November 1975 26 March 1976 12 August 1976
61	Ninth Air Navigation Conference. Meteorology Divisional Meeting (1974)	New provisions and revision of existing provisions to improve the coordination between meteorological offices/stations and air traffic services units and the supply of meteorological information to the latter; new specifications for observations and reports for take-off and landing; introduction of a note referring to the specifications of Annex 14 for the siting and construction of equipment and installations on operational areas to reduce the hazard to aircraft to a minimum; replacement of the expression “supersonic transport aircraft” by the expression “supersonic aircraft”; updating of Part 2, Appendix 2; revision of definition of “nephanalysis” and deletion of “(29.92 in.)” from definition of “flight level”; deletion of Attachment D — Aeronautical Meteorological Codes.	14 December 1977 14 April 1978 10 August 1978
62	Eighth Air Navigation Conference and ICAO Council	Inclusion in Appendix 1 of model charts and forms developed by WMO on the basis of the operational requirements contained in Annex 3; transfer of the data designators and geographical designators from Appendix 2 to Annex 3 to the *Manual of Aeronautical Meteorological Practice* (Doc 8896).	26 June 1978 26 October 1978 29 November 1979
63	MET Divisional Meeting (1974). ICAO Secretariat. Operational Flight Information Service Panel. Ninth Air Navigation Conference. Doc 9328	Definition for “meteorological bulletin”; correction to shortcomings in ground-to-ground dissemination of air-reports; decrease in SIGMET messages dealing with “active thunderstorm area”; deletion of reference to “reporting lines”; reference to new *Manual of Runway Visual Range Observing and Reporting Practices*.	23 March 1981 23 July 1981 26 November 1981
64	ICAO Secretariat	New provisions and revision of existing provisions to meet operational requirements for observing and reporting of low-level wind shear, including the introduction of wind shear warnings for the climb-out and approach phases of flight.	6 December 1982 6 April 1983 24 November 1983
65 (9th Edition)	Communications/ Meteorology Divisional Meeting (1982). Third Meeting of the ADAPT Panel	New provisions and revision of existing provisions related to the introduction of the new world area forecast system; methods of exchange of operational meteorological data; improvement of accuracy of runway visual range assessment, and reporting.	10 June 1983 10 October 1983 22 November 1984

Amendment(s)	*Source(s)*	*Subject(s)*	*Adopted/approved Effective Applicable*
66 (10th Edition)	Communications/ Meteorology Divisional Meeting (1982). Second Asia/ Pacific Regional Air Navigation Meeting. Twenty-second and twenty-third meetings of the European Air Navigation Planning Group. World Meteorological Organization. Recommendations of the ANC relating to the method of reference date/time and units of measurement. ICAO Secretariat	Amendment of the provisions related to the transmission of wind shear information beyond the aerodrome, criteria for the issuance of selected special reports, inclusion of cloud information in aerodrome forecasts, flight documentation to be provided for short-haul flights, format of the SIGMET message and meteorological bulletin headings; introduction of the definition for "SIGMET information"; alignment of Annex 3 with Annex 5 in respect of units of measurement and the referencing of time.	24 March 1986 27 July 1986 20 November 1986
67	Communications/ Meteorology Divisional Meeting (1982). Twenty-second and twenty-fifth meetings of the European Air Navigation Planning Group. ICAO Secretariat. World Meteorological Organization	Amendment of the provisions related to light intensity settings used for RVR assessment; the identification of selected aerodromes and the deletion of the requirement for temperature circles on WAFS charts; the transmission time of forecasts from regional area forecast centres to users; introduction of provisions for the origination and dissemination of volcanic ash warnings; inclusion of wind speed units in examples of the aviation meteorological figure codes; alignment of Annex 3 with the PANS-RAC in respect of the elements of the air-report; editorial amendment of the example of the SIGMET message.	27 March 1987 27 July 1987 19 November 1987
68	Communications/ Meteorology Divisional Meeting (1982). ICAO Secretariat. World Meteorological Organization	Amendment of the provisions relating to identification of RVR reporting positions; the criteria for the issuance of selected special reports for changes in RVR; RVR values for touchdown zone for all runways available for landing to be included in reports disseminated beyond the aerodrome; model charts and forms for flight documentation; issuance and updating of SIGMET messages relating to volcanic ash clouds; explicit provisions regarding the need to provide the aeronautical information services units with MET information; alignment with Annex 10 in respect of definitions for aeronautical fixed telecommunication network and aeronautical mobile service; alignment with PANS-OPS, Volume II, Part III, paragraph 6.3.1 in respect of terminology; editorial amendments to paragraph 3.3.7 to delete the equivalent pressure levels; the example of the SPECI report; the reference in Attachment B, Part 3, paragraph 1.4 b); and the footnote in Attachment C concerning visibility and RVR.	21 March 1989 23 July 1989 16 November 1989
69 (11th Edition)	Communications/ Meteorology/ Operations Divisional Meeting (1990). ICAO Secretariat	Amendment of the provisions related to the transition to the final phase of the WAFS; aeronautical meteorological codes, and guidance material on the selected criteria applicable to aerodrome reports; aeronautical climatological information; SIGMET information and related guidance material for the issuance of SIGMETs; automatic weather observing stations; meteorological information for helicopter operations; and alignment with Annex 6, Parts I and II in respect of the definition for alternate aerodrome.	23 March 1992 27 July 1992 12 November 1992; 1 July 1993

Amendment(s)	*Source(s)*	*Subject(s)*	*Adopted/approved Effective Applicable*
70 (12th Edition)	Communications/ Meteorology/ Operations Divisional Meeting (1990). Limited North Atlantic (COM/MET/RAC) Regional Air Navigation Meeting (1992). Third Asia/ Pacific Regional Air Navigation Meeting (1993). Thirty-second meeting of the European Air Navigation Planning Group. ICAO Secretariat	Definitions of AIRMET information, extended range operation, GAMET area forecast, operational control and tropical cyclone; amendment to the provisions concerning horizontal resolution of and the code form in which the upper wind and temperature grid point forecasts are to be prepared by the world area forecast centres; issuance of special reports for changes in temperature at aerodromes; provisions related to the reporting and forecasting of meteorological information at aerodromes on which the new aeronautical meteorological codes are based and a consequential amendment to Models A1, A2, TA1, TA2 and SN to take account of the updated aeronautical meteorological codes; automated air reporting; provision of information on weather phenomenon hazardous to low-level flights; introduction of the minimum threshold value for the maximum surface wind speed for which SIGMETs for tropical cyclones should be issued; observation and reporting of wind shear to take account of new technology in ground-based wind shear observing equipment; interregional exchange of METARs and SPECIs to support extended range operations and long-haul flights conducted under centralized operational control; editorial amendments to replace the term “line squall” by “squall line”; editorial amendments to Models SWL and SN, to align the depiction of freezing level, and editorial corrections to Model A2; inclusion in Model SN of symbols for “volcanic eruptions”, “state of the sea” and “sea surface temperature”; updating operationally desirable accuracy of measurement or observation and the currently attainable accuracy of measurement or observation; introduction of criteria for the inclusion of severe mountain waves in SIGMET information.	17 March 1995 24 July 1995 1 January 1996
71 (13th Edition)	Limited North Atlantic (COM/MET/RAC) Regional Air Navigation Meeting (1992). Third Asia/ Pacific Regional Air Navigation Meeting (1993). Thirty-eighth meeting of the European Air Navigation Planning Group (EANPG/38). United States. ICAO Secretariat	Definitions of automatic dependent surveillance, Human Factors principles, international airways volcano watch, level, tropical cyclone advisory centre, volcanic ash advisory centre and VOLMET data link service; amendment to the provisions regarding the indication of the designated meteorological authority in States’ AIPs; introduction of the role of the Human Factors principles; inclusion of 6-hour and 36-hour validity WAFS upper wind/temperature forecasts; introduction of requirements and a new model for volcanic ash advisories in graphical format; specification of the frequency of update of volcanic ash advisories and the specific role of VAACs and TCACs; an editorial amendment to ensure consistency in the order of the words “RVR” and “RWY”; an amendment to the present weather abbreviations; introduction of the requirements regarding “VOLMET” data link service; editorial amendments regarding air reporting; inclusion of “forecast temperature” in aerodrome forecasts; introduction of requirements for the standardization of area forecasts and flight documentation for low-level flights and consequential amendments to the Appendix — Model Charts and Forms; the deletion of the use of national language in connection with SIGMET messages; introduction of requirements for the provision of meteorological information by automated pre-flight information systems; introduction of the provision of meteorological information for centralized flight planning in extended range operations; quantitative definitions of CB clouds and thunderstorms to be used in WAFS SIGWX charts and consequential amendments to guidance material.	11 March 1998 20 July 1998 5 November 1998

Amendment(s)	*Source(s)*	*Subject(s)*	*Adopted/approved Effective Applicable*
72 (14th Edition)	Limited Middle East (COM/MET/RAC) RAN Meeting (1996). Ninth meeting of the ASIA/PAC Air Navigation Planning and Implementation Regional Group. Thirty-sixth, thirty-ninth and fortieth meetings of the European Air Navigation Planning Group. International Air Transport Association. Secretariat	Changes to the definition of flight crew member, grid point data in numerical form, pilot-in-command, regional area forecast centre and world area forecast centre; introduction of definitions for minimum sector altitude, quality assurance, quality control, quality management, quality system and visibility; introduction of requirements regarding global exchange of OPMET information; updated format for volcanic ash and tropical cyclone advisory messages; introduction of requirements on the transmission of information on the accidental release of radioactive materials, inclusion of radiation symbol on WAFS SIGWX charts; updated operational requirements for world area forecast system (WAFS) data regarding the frequency of issuance of WAFS upper wind/ temperature data increased to four times per day; inclusion of FL 140 and humidity in the GRIB global data, introduction of the BUFR code, inclusion of "strong surface winds" and "mountain obscuration" symbols on low-level SIGWX charts; operational requirements for aeronautical MET codes regarding the introduction of standardized VOLMET phraseologies, uniform use of date/time groups in METAR and TAF code forms, additional reference level for height of clouds and freezing level in GAMET messages, discrimination between improvements and deterioration of visibility, cloud base and vertical visibility in aerodrome reports and forecasts; introduction of templates for local meteorological report, METAR/SPECI, TAF and SIGMET; the algorithm to report turbulence and provision of a turbulence index, and the operational interpretation of turbulence index; provisions for the MET component for automated pre-flight information systems and harmonized AIS/MET pre-flight briefing; provisions regarding quality assurance and quality control of MET information; SIGMET information in graphical format and quantitative criteria for SIGMET messages; inclusion of forward-scatter meters in RVR provisions; and editorial amendments.	7 March 2001 16 July 2001 1 November 2001
73 (15th Edition)	Meteorology (MET) Divisional Meeting (2002). Secretariat	Restructuring of Annex 3 into two parts; new and amended definitions; upgrading of certain Recommended Practices to Standards; elimination of the need to issue WAFS products in T4 chart form; introduction of the requirement to maintain the integrity of WAFS forecasts; notification of volcanic activity to ACC, MWO and VAAC by selected State volcano observatories; introduction of provisions allowing the issuance of SIGMET messages for volcanic ash and tropical cyclones in graphical format using the WMO BUFR code form; introduction of templates for special air-report (downlink), volcanic ash and tropical cyclone advisory messages and aerodrome and wind shear warnings; introduction of a requirement to issue METARs and SPECIs prior to the aerodrome resuming operations; introduction of enabling provisions to use fully automatic observing systems during non-operational hours; introduction of prevailing visibility; introduction of a requirement to cancel aerodrome forecasts that cannot be kept under continuous review; introduction of a provision for the averaging period for measuring visibility and variation in the mean wind speed; introduction of a provision to use maximum light intensity for assessment of RVR for METAR and SPECI; the deletion of Model TB Example 2; inclusion of new Examples 3 and 4 under Model SWH, deletion of Attachment A; introduction of a new Attachment C describing back-up procedures at WAFCs; and editorial amendments.	25 February 2004 12 July 2004 25 November 2004

Amendment(s)	*Source(s)*	*Subject(s)*	*Adopted/approved Effective Applicable*
74 (16th Edition)	World Area Forecast System Operations Group (WAFSOPSG). International Airways Volcano Watch Operations Group (IAVWOPSG). International Air Transport Association (IATA). ICAO Secretariat	Amendments to the definitions of "cloud of operational significance" and "prevailing visibility" and the deletion of the definition for "service area (world area forecast system)"; deletion of all requirements by SST; introduction of a requirement for volcanic ash advisory centre (VAAC) back-up procedures; elimination of the need to amend significant weather (SIGWX) forecasts; introduction of forecasts of altitude of the standard WAFS flight levels; elimination of the requirement to issue aerodrome special meteorological reports (SPECI) when half-hourly aerodrome routine meteorological reports (METAR) are issued; amendment to the reporting of gusts in local routine and special reports when noise abatement procedures are being applied; alignment of the criteria for the use of change groups in a TAF with those for the issuance of SPECI; introduction of enabling clauses to use the binary universal form for the representation of meteorological data (BUFR) code form for the dissemination of METAR/SPECI and TAF on a bilateral basis; introduction of secondary surveillance radar (SSR) Mode S data link in automatic meteorological reporting; elimination of outlook from SIGMET related to volcanic ash and tropical cyclones; introduction of the requirement to provide standard WAFS charts for fixed areas of coverage; introduction of the provision preventing modifications to the meteorological content of WAFS forecasts; upgrading of provisions in order to foster the use of WAFS forecasts; elimination of surface fronts, convergence zones and clouds other than CB from the high- and medium-level SIGWX forecasts; advancement of the lead time of issuance of SIGWX forecasts; harmonization of the volcanic ash advisory format with the tropical cyclone advisory format; introduction of a criterion related to the issuance of tropical cyclone advisories; amendments to the tropical cyclone advisory to introduce 6-hour forecasts; change to the definition of "vicinity"; expansion of the use of automatic systems to include operational hours; amendments to the automatic reporting of turbulence; introduction of a new template for GAMET messages; extension of the validity period of TAF to meet requirements for very long-haul flights; introduction of provisions for graphical SIGMET for all phenomena; update of the SIGMET template to include radioactive cloud; introduction of "tsunami" in aerodrome warnings; alignment of Annexes 3 and 11 provisions concerning meteorological information to be supplied to air traffic services (ATS); amendment of the criteria to include SIGMET and TAF in VOLMET and D-VOLMET; deletion of the attainable accuracy of observation and measurement from Attachment A; update of the desirable accuracy in Attachment B; and editorial amendments.	21 February 2007 16 July 2007 7 November 2007; 5 November 2008

INTERNATIONAL STANDARDS AND RECOMMENDED PRACTICES

PART I

CORE SARPs

CHAPTER 1. DEFINITIONS

Note.— The designation (RR) in these definitions indicates a definition which has been extracted from the Radio Regulations of the International Telecommunication Union (ITU) (see Handbook on Radio Frequency Spectrum Requirements for Civil Aviation including Statement of Approved ICAO Policies *(Doc 9718)).*

1.1 Definitions

When the following terms are used in the Standards and Recommended Practices for Meteorological Service for International Air Navigation, they have the following meanings:

Aerodrome. A defined area on land or water (including any buildings, installations and equipment) intended to be used either wholly or in part for the arrival, departure and surface movement of aircraft.

Aerodrome climatological summary. Concise summary of specified meteorological elements at an aerodrome, based on statistical data.

Aerodrome climatological table. Table providing statistical data on the observed occurrence of one or more meteorological elements at an aerodrome.

Aerodrome control tower. A unit established to provide air traffic control service to aerodrome traffic.

Aerodrome elevation. The elevation of the highest point of the landing area.

Aerodrome meteorological office. An office, located at an aerodrome, designated to provide meteorological service for international air navigation.

Aerodrome reference point. The designated geographical location of an aerodrome.

Aeronautical fixed service (AFS). A telecommunication service between specified fixed points provided primarily for the safety of air navigation and for the regular, efficient and economical operation of air services.

Aeronautical fixed telecommunication network (AFTN). A worldwide system of aeronautical fixed circuits provided, as part of the aeronautical fixed service, for the exchange of messages and/or digital data between aeronautical fixed stations having the same or compatible communications characteristics.

Aeronautical meteorological station. A station designated to make observations and meteorological reports for use in international air navigation.

Aeronautical mobile service (RR S1.32). A mobile service between aeronautical stations and aircraft stations, or between aircraft stations, in which survival craft stations may participate; emergency position-indicating radio beacon stations may also participate in this service on designated distress and emergency frequencies.

Aeronautical telecommunication station. A station in the aeronautical telecommunication service.

Aircraft. Any machine that can derive support in the atmosphere from the reactions of the air other than the reactions of the air against the earth's surface.

Aircraft observation. The evaluation of one or more meteorological elements made from an aircraft in flight.

AIRMET information. Information issued by a meteorological watch office concerning the occurrence or expected occurrence of specified en-route weather phenomena which may affect the safety of low-level aircraft operations and which was not already included in the forecast issued for low-level flights in the flight information region concerned or sub-area thereof.

Air-report. A report from an aircraft in flight prepared in conformity with requirements for position, and operational and/or meteorological reporting.

Note.— Details of the AIREP form are given in the PANS-ATM (Doc 4444).

Air traffic services unit. A generic term meaning variously, air traffic control unit, flight information centre or air traffic services reporting office.

Alternate aerodrome. An aerodrome to which an aircraft may proceed when it becomes either impossible or inadvisable to proceed to or to land at the aerodrome of intended landing. Alternate aerodromes include the following:

Take-off alternate. An alternate aerodrome at which an aircraft can land should this become necessary shortly after take-off and it is not possible to use the aerodrome of departure.

En-route alternate. An aerodrome at which an aircraft would be able to land after experiencing an abnormal or emergency condition while en route.

ETOPS en-route alternate. A suitable and appropriate alternate aerodrome at which an aeroplane would be able to land after experiencing an engine shut-down or other abnormal or emergency condition while en route in an ETOPS operation.

Destination alternate. An alternate aerodrome to which an aircraft may proceed should it become either impossible or inadvisable to land at the aerodrome of intended landing.

Note.— The aerodrome from which a flight departs may also be an en-route or a destination alternate aerodrome for that flight.

Altitude. The vertical distance of a level, a point or an object considered as a point, measured from mean sea level (MSL).

Approach control unit. A unit established to provide air traffic control service to controlled flights arriving at, or departing from, one or more aerodromes.

Appropriate ATS authority. The relevant authority designated by the State responsible for providing air traffic services in the airspace concerned.

Area control centre. A unit established to provide air traffic control service to controlled flights in control areas under its jurisdiction.

Automatic dependent surveillance (ADS). A surveillance technique in which aircraft automatically provide, via a data link, data derived from on-board navigation and position-fixing systems, including aircraft identification, four-dimensional position and additional data as appropriate.

Briefing. Oral commentary on existing and/or expected meteorological conditions.

Cloud of operational significance. A cloud with the height of cloud base below 1 500 m (5 000 ft) or below the highest minimum sector altitude, whichever is greater, or a cumulonimbus cloud or a towering cumulus cloud at any height.

Consultation. Discussion with a meteorologist or another qualified person of existing and/or expected meteorological conditions relating to flight operations; a discussion includes answers to questions.

Control area. A controlled airspace extending upwards from a specified limit above the earth.

Cruising level. A level maintained during a significant portion of a flight.

Elevation. The vertical distance of a point or a level, on or affixed to the surface of the earth, measured from mean sea level.

Extended range operation. Any flight by an aeroplane with two turbine power-units where the flight time at the one power-unit inoperative cruise speed (in ISA and still air conditions), from a point on the route to an adequate alternate aerodrome, is greater than the threshold time approved by the State of the Operator.

Flight crew member. A licensed crew member charged with duties essential to the operation of an aircraft during a flight duty period.

Flight documentation. Written or printed documents, including charts or forms, containing meteorological information for a flight.

Flight information centre. A unit established to provide flight information service and alerting service.

Flight information region. An airspace of defined dimensions within which flight information service and alerting service are provided.

Flight level. A surface of constant atmospheric pressure which is related to a specific pressure datum, 1 013.2 hectopascals (hPa), and is separated from other such surfaces by specific pressure intervals.

Note 1.— A pressure type altimeter calibrated in accordance with the Standard Atmosphere:

a) when set to a QNH altimeter setting, will indicate altitude;

b) when set to a QFE altimeter setting, will indicate height above the QFE reference datum;

c) when set to a pressure of 1 013.2 hPa, may be used to indicate flight levels.

Note 2.— The terms "height" and "altitude", used in Note 1, indicate altimetric rather than geometric heights and altitudes.

Forecast. A statement of expected meteorological conditions for a specified time or period, and for a specified area or portion of airspace.

GAMET area forecast. An area forecast in abbreviated plain language for low-level flights for a flight information region or sub-area thereof, prepared by the meteorological office designated by the meteorological authority concerned and exchanged with meteorological offices in adjacent flight information regions, as agreed between the meteorological authorities concerned.

Grid point data in digital form. Computer processed meteorological data for a set of regularly spaced points on a chart, for transmission from a meteorological computer to another computer in a code form suitable for automated use.

Note.— In most cases, such data are transmitted on medium- or high-speed telecommunications channels.

Height. The vertical distance of a level, a point or an object considered as a point, measured from a specified datum.

Human Factors principles. Principles which apply to aeronautical design, certification, training, operations and maintenance and which seek safe interface between the human and other system components by proper consideration to human performance.

International airways volcano watch (IAVW). International arrangements for monitoring and providing warnings to aircraft of volcanic ash in the atmosphere.

Note.— The IAVW is based on the cooperation of aviation and non-aviation operational units using information derived from observing sources and networks that are provided by States. The watch is coordinated by ICAO with the cooperation of other concerned international organizations.

Level. A generic term relating to the vertical position of an aircraft in flight and meaning variously height, altitude or flight level.

Meteorological authority. The authority providing or arranging for the provision of meteorological service for international air navigation on behalf of a Contracting State.

Meteorological bulletin. A text comprising meteorological information preceded by an appropriate heading.

Meteorological information. Meteorological report, analysis, forecast, and any other statement relating to existing or expected meteorological conditions.

Meteorological office. An office designated to provide meteorological service for international air navigation.

Meteorological report. A statement of observed meteorological conditions related to a specified time and location.

Meteorological satellite. An artificial Earth satellite making meteorological observations and transmitting these observations to Earth.

Minimum sector altitude. The lowest altitude which may be used which will provide a minimum clearance of 300 m (1 000 ft) above all objects located in an area contained within a sector of a circle of 46 km (25 NM) radius centred on a radio aid to navigation.

Observation (meteorological). The evaluation of one or more meteorological elements.

Operational control. The exercise of authority over the initiation, continuation, diversion or termination of a flight in the interest of the safety of the aircraft and the regularity and efficiency of the flight.

Operational flight plan. The operator's plan for the safe conduct of the flight based on considerations of aeroplane performance, other operating limitations and relevant expected conditions on the route to be followed and at the aerodromes concerned.

Operational planning. The planning of flight operations by an operator.

Operator. A person, organization or enterprise engaged in or offering to engage in an aircraft operation.

Pilot-in-command. The pilot designated by the operator, or in the case of general aviation, the owner, as being in command and charged with the safe conduct of a flight.

Prevailing visibility. The greatest visibility value, observed in accordance with the definition of "visibility", which is reached within at least half the horizon circle or within at least half of the surface of the aerodrome. These areas could comprise contiguous or non-contiguous sectors.

Note.— This value may be assessed by human observation and/or instrumented systems. When instruments are installed, they are used to obtain the best estimate of the prevailing visibility.

Prognostic chart. A forecast of a specified meteorological element(s) for a specified time or period and a specified surface or portion of airspace, depicted graphically on a chart.

Quality assurance. Part of quality management focused on providing confidence that quality requirements will be fulfilled (ISO 9000*).

Quality control. Part of quality management focused on fulfilling quality requirements (ISO 9000*).

Quality management. Coordinated activities to direct and control an organization with regard to quality (ISO 9000*).

Regional air navigation agreement. Agreement approved by the Council of ICAO normally on the advice of a regional air navigation meeting.

Reporting point. A specified geographical location in relation to which the position of an aircraft can be reported.

Rescue coordination centre. A unit responsible for promoting efficient organization of search and rescue services and for coordinating the conduct of search and rescue operations within a search and rescue region.

Runway. A defined rectangular area on a land aerodrome prepared for the landing and take-off of aircraft.

Runway visual range (RVR). The range over which the pilot of an aircraft on the centre line of a runway can see the runway surface markings or the lights delineating the runway or identifying its centre line.

Search and rescue services unit. A generic term meaning, as the case may be, rescue coordination centre, rescue subcentre or alerting post.

SIGMET information. Information issued by a meteorological watch office concerning the occurrence or expected occurrence of specified en-route weather phenomena which may affect the safety of aircraft operations.

Standard isobaric surface. An isobaric surface used on a worldwide basis for representing and analysing the conditions in the atmosphere.

Threshold. The beginning of that portion of the runway usable for landing.

Touchdown zone. The portion of a runway, beyond the threshold, where it is intended landing aeroplanes first contact the runway.

Tropical cyclone. Generic term for a non-frontal synoptic-scale cyclone originating over tropical or sub-tropical waters with organized convection and definite cyclonic surface wind circulation.

Tropical cyclone advisory centre (TCAC). A meteorological centre designated by regional air navigation agreement to provide advisory information to meteorological watch offices, world area forecast centres and international OPMET databanks regarding the position, forecast direction and speed of movement, central pressure and maximum surface wind of tropical cyclones.

Upper-air chart. A meteorological chart relating to a specified upper-air surface or layer of the atmosphere.

Visibility. Visibility for aeronautical purposes is the greater of:

a) the greatest distance at which a black object of suitable dimensions, situated near the ground, can be seen and recognized when observed against a bright background;

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* ISO Standard 9000 — *Quality Management Systems — Fundamentals and Vocabulary*.

b) the greatest distance at which lights in the vicinity of 1 000 candelas can be seen and identified against an unlit background.

Note.— The two distances have different values in air of a given extinction coefficient, and the latter b) varies with the background illumination. The former a) is represented by the meteorological optical range (MOR).

Volcanic ash advisory centre (VAAC). A meteorological centre designated by regional air navigation agreement to provide advisory information to meteorological watch offices, area control centres, flight information centres, world area forecast centres and international OPMET databanks regarding the lateral and vertical extent and forecast movement of volcanic ash in the atmosphere following volcanic eruptions.

VOLMET. Meteorological information for aircraft in flight.

Data link-VOLMET (D-VOLMET). Provision of current aerodrome routine meteorological reports (METAR) and aerodrome special meteorological reports (SPECI), aerodrome forecasts (TAF), SIGMET, special air-reports not covered by a SIGMET and, where available, AIRMET via data link.

VOLMET broadcast. Provision, as appropriate, of current METAR, SPECI, TAF and SIGMET by means of continuous and repetitive voice broadcasts.

World area forecast centre (WAFC). A meteorological centre designated to prepare and issue significant weather forecasts and upper-air forecasts in digital form on a global basis direct to States by appropriate means as part of the aeronautical fixed service.

World area forecast system (WAFS). A worldwide system by which world area forecast centres provide aeronautical meteorological en-route forecasts in uniform standardized formats.

1.2 Terms used with a limited meaning

For the purpose of this Annex, the following terms are used with a limited meaning as indicated below:

a) to avoid confusion in respect of the term “service” between the meteorological service considered as an administrative entity and the service which is provided, “meteorological authority” is used for the former and “service” for the latter;

b) “provide” is used solely in connection with the provision of service;

c) “issue” is used solely in connection with cases where the obligation specifically extends to sending out the information to a user;

d) “make available” is used solely in connection with cases where the obligation ends with making the information accessible to a user; and

e) “supply” is used solely in connection with cases where either c) or d) applies.

CHAPTER 2. GENERAL PROVISIONS

Introductory Note 1.— It is recognized that the provisions of this Annex with respect to meteorological information are subject to the understanding that the obligation of a Contracting State is for the supply, under Article 28 of the Convention, of meteorological information and that the responsibility for the use made of such information is that of the user.

Introductory Note 2.— Although the Convention on International Civil Aviation allocates to the State of Registry certain functions which that State is entitled to discharge, or obligated to discharge, as the case may be, the Assembly recognized, in Resolution A23-13, that the State of Registry may be unable to fulfil its responsibilities adequately in instances where aircraft are leased, chartered or interchanged — in particular without crew — by an operator of another State and that the Convention may not adequately specify the rights and obligations of the State of an operator in such instances until such time as Article 83 bis *of the Convention enters into force. Accordingly, the Council urged that if, in the above-mentioned instances, the State of Registry finds itself unable to discharge adequately the functions allocated to it by the Convention, it delegate to the State of the Operator, subject to acceptance by the latter State, those functions of the State of Registry that can more adequately be discharged by the State of the Operator. It was understood that pending entry into force of Article 83* bis *of the Convention the foregoing action would only be a matter of practical convenience and would not affect either the provisions of the Chicago Convention prescribing the duties of the State of Registry or any third State. However, as Article 83* bis *of the Convention entered into force on 20 June 1997, such transfer agreements will have effect in respect of Contracting States which have ratified the related Protocol (Doc 9318) upon fulfilment of the conditions established in Article 83* bis*.*

Introductory Note 3.— In the case of international operations effected jointly with aeroplanes not all of which are registered in the same Contracting State, nothing in this Annex prevents the States concerned entering into an agreement for the joint exercise of the functions placed upon the State of Registry by the provisions of this Annex.

2.1 Objective, determination and provision of meteorological service

2.1.1 The objective of meteorological service for international air navigation shall be to contribute towards the safety, regularity and efficiency of international air navigation.

2.1.2 This objective shall be achieved by supplying the following users: operators, flight crew members, air traffic services units, search and rescue services units, airport managements and others concerned with the conduct or development of international air navigation, with the meteorological information necessary for the performance of their respective functions.

2.1.3 Each Contracting State shall determine the meteorological service which it will provide to meet the needs of international air navigation. This determination shall be made in accordance with the provisions of this Annex and with due regard to regional air navigation agreements; it shall include the determination of the meteorological service to be provided for international air navigation over international waters and other areas which lie outside the territory of the State concerned.

2.1.4 Each Contracting State shall designate the authority, hereinafter referred to as the meteorological authority, to provide or to arrange for the provision of meteorological service for international air navigation on its behalf. Details of the meteorological authority so designated shall be included in the State aeronautical information publication, in accordance with Annex 15, Appendix 1, GEN 1.1.

2.1.5 Each Contracting State shall ensure that the designated meteorological authority complies with the requirements of the World Meteorological Organization in respect of qualifications and training of meteorological personnel providing service for international air navigation.

Note.— Requirements concerning qualifications and training of meteorological personnel in aeronautical meteorology are given in WMO Publication No. 49, Technical Regulations, *Volume I —* General Meteorological Standards and Recommended Practices*, Chapter B.4 — Education and Training*.

2.2 Supply, quality assurance and use of meteorological information

2.2.1 Close liaison shall be maintained between those concerned with the supply and those concerned with the use of meteorological information on matters which affect the provision of meteorological service for international air navigation.

2.2.2 **Recommendation.—** *In order to meet the objective of meteorological service for international air navigation, the Contracting State should ensure that the designated meteorological authority referred to in 2.1.4 establishes and implements a properly organized quality system comprising procedures, processes and resources necessary to provide for the quality management of the meteorological information to be supplied to the users listed in 2.1.2.*

2.2.3 **Recommendation.—** *The quality system established in accordance with 2.2.2 should be in conformity with the International Organization for Standardization (ISO) 9000 series of quality assurance standards and should be certified by an approved organization.*

Note.— The International Organization for Standardization (ISO) 9000 series of quality assurance standards provide a basic framework for the development of a quality assurance programme. The details of a successful programme are to be formulated by each State and in most cases are unique to the State organization.

2.2.4 **Recommendation.—** *The quality system should provide the users with assurance that the meteorological information supplied complies with the stated requirements in terms of the geographical and spatial coverage, format and content, time and frequency of issuance and period of validity, as well as the accuracy of measurements, observations and forecasts. When the quality system indicates that meteorological information to be supplied to the users does not comply with the stated requirements, and automatic error correction procedures are not appropriate, such information should not be supplied to the users unless it is validated with the originator.*

Note.— Requirements concerning the geographical and spatial coverage, format and content, time and frequency of issuance and period of validity of meteorological information to be supplied to aeronautical users are given in Chapters 3, 4, 6, 7, 8, 9 and 10 and Appendices 2, 3, 5, 6, 7, 8 and 9 of this Annex and the relevant regional air navigation plans. Guidance concerning the accuracy of measurement and observation, and accuracy of forecasts is given in Attachments A and B, respectively, to this Annex.

2.2.5 **Recommendation.—** *In regard to the exchange of meteorological information for operational purposes, the quality system should include verification and validation procedures and resources for monitoring adherence to the prescribed transmission schedules for individual messages and/or bulletins required to be exchanged, and the times of their filing for transmission. The quality system should be capable of detecting excessive transit times of messages and bulletins received*.

Note.— Requirements concerning the exchange of operational meteorological information are given in Chapter 11 and Appendix 10 of this Annex.

2.2.6 **Recommendation.—** *Demonstration of compliance of the quality system applied should be by audit. If non-conformity of the system is identified, action should be initiated to determine and correct the cause. All audit observations should be evidenced and properly documented.*

2.2.7 The meteorological information supplied to the users listed in 2.1.2 shall be consistent with Human Factors principles and shall be in forms which require a minimum of interpretation by these users, as specified in the following chapters.

Note.— Guidance material on the application of Human Factors principles can be found in the Human Factors Training Manual *(Doc 9683).*

2.3 Notifications required from operators

2.3.1 An operator requiring meteorological service or changes in existing meteorological service shall notify, sufficiently in advance, the meteorological authority or the meteorological office(s) concerned. The minimum amount of advance notice required shall be as agreed between the meteorological authority or meteorological office(s) and the operator.

2.3.2 The meteorological authority shall be notified by the operator requiring service when:

a) new routes or new types of operations are planned;

b) changes of a lasting character are to be made in scheduled operations; and

c) other changes, affecting the provision of meteorological service, are planned.

Such information shall contain all details necessary for the planning of appropriate arrangements by the meteorological authority.

2.3.3 The aerodrome meteorological office, or the meteorological office concerned, shall be notified by the operator or a flight crew member:

a) of flight schedules;

b) when non-scheduled flights are to be operated; and

c) when flights are delayed, advanced or cancelled.

2.3.4 **Recommendation.—** *The notification to the aerodrome meteorological office, or the meteorological office concerned, of individual flights should contain the following information except that, in the case of scheduled flights, the requirement for some or all of this information may be waived by agreement between the meteorological office and the operator:*

a) aerodrome of departure and estimated time of departure;

b) destination and estimated time of arrival;

c) route to be flown and estimated times of arrival at, and departure from, any intermediate aerodrome(s);

d) alternate aerodromes needed to complete the operational flight plan and taken from the relevant list contained in the regional air navigation plan;

e) cruising level;

f) type of flight, whether under visual or instrument flight rules;

g) type of meteorological information requested for a flight crew member, whether flight documentation and/or briefing or consultation; and

h) time(s) at which briefing, consultation and/or flight documentation are required.

CHAPTER 3. WORLD AREA FORECAST SYSTEM AND METEOROLOGICAL OFFICES

Note.— Technical specifications and detailed criteria related to this chapter are given in Appendix 2.

3.1 Objective of the world area forecast system

The objective of the world area forecast system shall be to supply meteorological authorities and other users with global aeronautical meteorological en-route forecasts in digital form. This objective shall be achieved through a comprehensive, integrated, worldwide and, as far as practicable, uniform system, and in a cost-effective manner, taking full advantage of evolving technologies.

3.2 World area forecast centres

3.2.1 A Contracting State, having accepted the responsibility for providing a WAFC within the framework of the world area forecast system, shall arrange for that centre:

a) to prepare for grid points for all required levels global forecasts of:

  1) upper wind;

  2) upper-air temperature and humidity;

  3) geopotential altitude of flight levels;

  4) flight level and temperature of tropopause; and

  5) direction, speed and flight level of maximum wind;

b) to prepare global forecasts of significant weather (SIGWX) phenomena;

c) to issue the forecasts referred to in a) and b) in digital form to meteorological authorities and other users, as approved by the Contracting State on advice from the meteorological authority;

d) to receive information concerning the accidental release of radioactive materials into the atmosphere from its associated WMO regional specialized meteorological centre (RSMC) for the provision of transport model products for radiological environmental emergency response, in order to include the information in SIGWX forecasts; and

e) to establish and maintain contact with VAACs for the exchange of information on volcanic activity in order to coordinate the inclusion of information on volcanic eruptions in SIGWX forecasts.

3.2.2 In case of interruption of the operation of a WAFC, its functions shall be carried out by the other WAFC.

Note.— Back-up procedures to be used in case of interruption of the operation of a WAFC are updated by the World Area Forecast System Operations Group (WAFSOPSG) as necessary; the latest revision can be found at the WAFSOPSG website at www.icao.int/anb/wafsopsg.

3.3 Meteorological offices

3.3.1 Each Contracting State shall establish one or more aerodrome and/or other meteorological offices which shall be adequate for the provision of the meteorological service required to satisfy the needs of international air navigation.

3.3.2 An aerodrome meteorological office shall carry out all or some of the following functions as necessary to meet the needs of flight operations at the aerodrome:

a) prepare and/or obtain forecasts and other relevant information for flights with which it is concerned; the extent of its responsibilities to prepare forecasts shall be related to the local availability and use of en-route and aerodrome forecast material received from other offices;

b) prepare and/or obtain forecasts of local meteorological conditions;

c) maintain a continuous survey of meteorological conditions over the aerodromes for which it is designated to prepare forecasts;

d) provide briefing, consultation and flight documentation to flight crew members and/or other flight operations personnel;

e) supply other meteorological information to aeronautical users;

f) display the available meteorological information;

g) exchange meteorological information with other meteorological offices; and

h) supply information received on pre-eruption volcanic activity, a volcanic eruption or volcanic ash cloud, to its associated air traffic services unit, aeronautical information service unit and meteorological watch office as agreed between the meteorological, aeronautical information service and ATS authorities concerned.

3.3.3 The aerodrome meteorological offices at which flight documentation is required, as well as the areas to be covered, shall be determined by regional air navigation agreement.

3.3.4 The aerodromes for which landing forecasts are required shall be determined by regional air navigation agreement.

3.3.5 For aerodromes without meteorological offices:

a) the meteorological authority concerned shall designate one or more meteorological offices to supply meteorological information as required; and

b) the competent authorities shall establish means by which such information can be supplied to the aerodromes concerned.

3.4 Meteorological watch offices

3.4.1 A Contracting State, having accepted the responsibility for providing air traffic services within a flight information region or a control area, shall establish one or more meteorological watch offices, or arrange for another Contracting State to do so.

3.4.2 A meteorological watch office shall:

a) maintain watch over meteorological conditions affecting flight operations within its area of responsibility;

b) prepare SIGMET and other information relating to its area of responsibility;

c) supply SIGMET information and, as required, other meteorological information to associated air traffic services units;

d) disseminate SIGMET information;

e) when required by regional air navigation agreement, in accordance with 7.2.1:

   1) prepare AIRMET information related to its area of responsibility;

   2) supply AIRMET information to associated air traffic services units; and

   3) disseminate AIRMET information;

f) supply information received on pre-eruption volcanic activity, a volcanic eruption and volcanic ash cloud for which a SIGMET has not already been issued, to its associated ACC/FIC, as agreed between the meteorological and ATS authorities concerned, and to its associated VAAC as determined by regional air navigation agreement; and

g) supply information received concerning the accidental release of radioactive materials into the atmosphere, in the area for which it maintains watch or adjacent areas, to its associated ACC/FIC, as agreed between the meteorological and ATS authorities concerned, and to aeronautical information service units, as agreed between the meteorological and appropriate civil aviation authorities concerned. The information shall comprise location, date and time of the accident, and forecast trajectories of the radioactive materials.

Note.— The information is provided, at the request of the delegated authority in a State, by WMO regional specialized meteorological centres (RSMC) for the provision of transport model products for radiological environmental emergency response. The information is sent by the RSMC to a single contact point of the national meteorological service in each State. This contact point has the responsibility of redistributing the RSMC products within the State concerned.

3.4.3 **Recommendation.—** *The boundaries of the area over which meteorological watch is to be maintained by a meteorological watch office should, in so far as is practicable, be coincident with the boundaries of a flight information region or a control area or a combination of flight information regions and/or control areas.*

3.4.4 **Recommendation.—** *Meteorological watch should be maintained continuously; however, in areas with a low density of traffic, the watch may be restricted to the period relevant to expected flight operations.*

3.5 Volcanic ash advisory centres

3.5.1 A Contracting State, having accepted, by regional air navigation agreement, the responsibility for providing a VAAC within the framework of the international airways volcano watch, shall arrange for that centre to respond to a notification that a volcano has erupted, or is expected to erupt or volcanic ash is reported in its area of responsibility, by arranging for that centre to:

a) monitor relevant geostationary and polar-orbiting satellite data to detect the existence and extent of volcanic ash in the atmosphere in the area concerned;

b) activate the volcanic ash numerical trajectory/dispersion model in order to forecast the movement of any ash "cloud" which has been detected or reported;

Note.— The numerical model may be its own or, by agreement, that of another VAAC.

c) issue advisory information regarding the extent and forecast movement of the volcanic ash “cloud” to:

1) meteorological watch offices, area control centres and flight information centres serving flight information regions in its area of responsibility which may be affected;

2) other VAACs whose areas of responsibility may be affected;

3) world area forecast centres, international OPMET databanks, international NOTAM offices, and centres designated by regional air navigation agreement for the operation of aeronautical fixed service satellite distribution systems; and

4) airlines requiring the advisory information through the AFTN address provided specifically for this purpose; and

Note.— The AFTN address to be used by the VAACs is given in the Handbook on the International Airways Volcano Watch (IAVW) *(Doc 9766) and at http://www.icao.int/icao/en/anb/met/index.html.*

d) issue updated advisory information to the meteorological watch offices, area control centres, flight information centres and VAACs referred to in c), as necessary, but at least every six hours until such time as the volcanic ash “cloud” is no longer identifiable from satellite data, no further reports of volcanic ash are received from the area, and no further eruptions of the volcano are reported.

3.5.2 Volcanic ash advisory centres shall maintain a 24-hour watch.

3.5.3 In case of interruption of the operation of a VAAC, its functions shall be carried out by another VAAC or another meteorological centre, as designated by the VAAC Provider State concerned.

Note.— Back-up procedures to be used in case of interruption of the operation of a VAAC are included in the Handbook on the International Airways Volcano Watch (IAVW) *(Doc 9766).*

3.6 State volcano observatories

Contracting States that maintain volcano observatories monitoring active volcanoes shall arrange that selected State volcano observatories, as designated by regional air navigation agreement, observing:

a) significant pre-eruption volcanic activity, or a cessation thereof;

b) a volcanic eruption, or a cessation thereof; and/or

c) volcanic ash in the atmosphere

shall send this information as quickly as practicable to its associated ACC, MWO and VAAC.

Note.— Pre-eruption volcanic activity in this context means unusual and/or increasing volcanic activity which could presage a volcanic eruption.

3.7 Tropical cyclone advisory centres

A Contracting State having accepted, by regional air navigation agreement, the responsibility for providing a TCAC shall arrange for that centre to:

a) monitor the development of tropical cyclones in its area of responsibility, using geostationary and polar-orbiting satellite data, radar data and other meteorological information;

b) issue advisory information concerning the position of the cyclone centre, its direction and speed of movement, central pressure and maximum surface wind near the centre; in abbreviated plain language to:

   1) meteorological watch offices in its area of responsibility;

   2) other TCACs whose areas of responsibility may be affected; and

   3) world area forecast centres, international OPMET databanks, and centres designated by regional air navigation agreement for the operation of aeronautical fixed service satellite distribution systems; and

c) issue updated advisory information to meteorological watch offices for each tropical cyclone, as necessary, but at least every six hours.

CHAPTER 4. METEOROLOGICAL OBSERVATIONS AND REPORTS

Note.— Technical specifications and detailed criteria related to this chapter are given in Appendix 3.

4.1 Aeronautical meteorological stations and observations

4.1.1 Each Contracting State shall establish, at aerodromes in its territory, such aeronautical meteorological stations as it determines to be necessary. An aeronautical meteorological station may be a separate station or may be combined with a synoptic station.

Note.— Aeronautical meteorological stations may include sensors installed outside the aerodrome, where considered justified, by the meteorological authority to ensure the compliance of meteorological service for international air navigation with the provisions of this Annex.

4.1.2 **Recommendation.—** *Each Contracting State should establish, or arrange for the establishment of, aeronautical meteorological stations on offshore structures or at other points of significance in support of helicopter operations to offshore structures, if required by regional air navigation agreement.*

4.1.3 Aeronautical meteorological stations shall make routine observations at fixed intervals. At aerodromes, the routine observations shall be supplemented by special observations whenever specified changes occur in respect of surface wind, visibility, runway visual range, present weather, clouds and/or air temperature.

4.1.4 **Recommendation.—** *Each Contracting State should arrange for its aeronautical meteorological stations to be inspected at sufficiently frequent intervals to ensure that a high standard of observation is maintained, that instruments and all their indicators are functioning correctly, and that the exposure of the instruments has not changed significantly.*

4.1.5 At aerodromes with runways intended for Category II and III instrument approach and landing operations, automated equipment for measuring or assessing, as appropriate, and for monitoring and remote indicating of surface wind, visibility, runway visual range, height of cloud base, air and dew-point temperatures and atmospheric pressure shall be installed to support approach and landing and take-off operations. These devices shall be integrated automatic systems for acquisition, processing, dissemination and display in real time of the meteorological parameters affecting landing and take-off operations. The design of integrated automatic systems shall observe Human Factors principles and include back-up procedures.

Note 1.— Categories of precision approach and landing operations are defined in Annex 6, Part I.

Note 2.— Guidance material on the application of Human Factors principles can be found in the Human Factors Training Manual *(Doc 9683).*

4.1.6 **Recommendation.—** *At aerodromes with runways intended for Category I instrument approach and landing operations, automated equipment for measuring or assessing, as appropriate, and for monitoring and remote indicating of surface wind, visibility, runway visual range, height of cloud base, air and dew-point temperatures and atmospheric pressure should be installed to support approach and landing and take-off operations. These devices should be integrated automatic systems for acquisition, processing, dissemination and display in real time of the meteorological parameters affecting landing and take-off operations. The design of integrated automatic systems should observe Human Factors principles and include back-up procedures.*

4.1.7 **Recommendation.—** *Where an integrated semi-automatic system is used for the dissemination/display of meteorological information, it should be capable of accepting the manual insertion of data covering those meteorological elements which cannot be observed by automatic means.*

4.1.8 The observations shall form the basis for the preparation of reports to be disseminated at the aerodrome of origin and of reports to be disseminated beyond the aerodrome of origin.

4.1.9 Owing to the variability of meteorological elements in space and time, to limitations of observing techniques and to limitations caused by the definitions of some of the elements, the specific value of any of the elements given in a report shall be understood by the recipient to be the best approximation to the actual conditions at the time of observation.

Note.— Guidance on the operationally desirable accuracy of measurement or observation is given in Attachment A.

4.2 Agreement between air traffic services authorities and meteorological authorities

Recommendation.— *An agreement between the meteorological authority and the appropriate ATS authority should be established to cover, amongst other things:*

a) the provision in air traffic services units of displays related to integrated automatic systems;

b) the calibration and maintenance of these displays/instruments;

c) the use to be made of these displays/instruments by air traffic services personnel;

d) as and where necessary, supplementary visual observations (for example, of meteorological phenomena of operational significance in the climb-out and approach areas) if and when made by air traffic services personnel to update or supplement the information supplied by the meteorological station;

e) meteorological information obtained from aircraft taking off or landing (for example, on wind shear); and

f) if available, meteorological information obtained from ground weather radar.

Note.— Guidance on the subject of coordination between ATS and aeronautical meteorological services is contained in the Manual on Coordination between Air Traffic Services, Aeronautical Information Services and Aeronautical Meteorological Services *(Doc 9377)*.

4.3 Routine observations and reports

4.3.1 At aerodromes, routine observations shall be made throughout the 24 hours each day, except as otherwise agreed between the meteorological authority, the appropriate ATS authority and the operator concerned. Such observations shall be made at intervals of one hour or, if so determined by regional air navigation agreement, at intervals of one half-hour. At other aeronautical meteorological stations, such observations shall be made as determined by the meteorological authority taking into account the requirements of air traffic services units and aircraft operations.

4.3.2 Reports of routine observations shall be issued as:

a) local routine reports, only for dissemination at the aerodrome of origin, (intended for arriving and departing aircraft); and

b) METAR for dissemination beyond the aerodrome of origin (mainly intended for flight planning, VOLMET broadcasts and D-VOLMET).

Note.— Meteorological information used in ATIS (voice-ATIS and D-ATIS) is to be extracted from the local routine report, in accordance with Annex 11, 4.3.6.1 g).

4.3.3 At aerodromes that are not operational throughout 24 hours in accordance with 4.3.1, METAR shall be issued prior to the aerodrome resuming operations in accordance with regional air navigation agreement.

4.4 Special observations and reports

4.4.1 A list of criteria for special observations shall be established by the meteorological authority, in consultation with the appropriate ATS authority, operators and others concerned.

4.4.2 Reports of special observations shall be issued as:

a) local special reports, only for dissemination at the aerodrome of origin (intended for arriving and departing aircraft); and

b) SPECI for dissemination beyond the aerodrome of origin (mainly intended for flight planning, VOLMET broadcasts and D-VOLMET) unless METAR are issued at half-hourly intervals.

Note.— Meteorological information used in ATIS (voice-ATIS and D-ATIS) is to be extracted from the local special report, in accordance with Annex 11, 4.3.6.1 g).

4.4.3 At aerodromes that are not operational throughout 24 hours in accordance with 4.3.1, following the resumption of the issuance of METAR, SPECI shall be issued, as necessary.

4.5 Contents of reports

4.5.1 Local routine and special reports and METAR and SPECI shall contain the following elements in the order indicated:

a) identification of the type of report;

b) location indicator;

c) time of the observation;

d) identification of an automated or missing report, when applicable;

e) surface wind direction and speed;

f) visibility;

g) runway visual range, when applicable;

h) present weather;

i) cloud amount, cloud type (only for cumulonimbus and towering cumulus clouds) and height of cloud base or, where measured, vertical visibility;

j) air temperature and dew-point temperature; and

k) QNH and, when applicable, QFE (QFE included only in local routine and special reports).

Note.— The location indicators referred to under b) and their significations are published in Location Indicators *(Doc 7910).*

4.5.2 **Recommendation**.— *In addition to elements listed under 4.5.1 a) to k), local routine and special reports and METAR and SPECI should contain supplementary information to be placed after element k).*

4.5.3 Optional elements included under supplementary information shall be included in METAR and SPECI in accordance with regional air navigation agreement.

4.6 Observing and reporting meteorological elements

4.6.1 Surface wind

4.6.1.1 The mean direction and the mean speed of the surface wind shall be measured, as well as significant variations of the wind direction and speed, and reported in degrees true and kilometres per hour (or knots), respectively.

4.6.1.2 **Recommendation.—** *When local routine and special reports are used for departing aircraft, the surface wind observations for these reports should be representative of conditions along the runway; when local routine and special reports are used for arriving aircraft, the surface wind observations for these reports should be representative of the touchdown zone.*

4.6.1.3 **Recommendation.—** *For METAR and SPECI, the surface wind observations should be representative of conditions above the whole runway where there is only one runway and the whole runway complex where there is more than one runway.*

4.6.2 Visibility

4.6.2.1 The visibility as defined in Chapter 1 shall be measured or observed, and reported in metres or kilometres.

Note.— Guidance on the conversion of instrument readings into visibility is given in Attachment D.

4.6.2.2 **Recommendation.—** *When local routine and special reports are used for departing aircraft, the visibility observations for these reports should be representative of conditions along the runway; when local routine and special reports are used for arriving aircraft, the visibility observations for these reports should be representative of the touchdown zone of the runway.*

4.6.2.3 **Recommendation.—** *For METAR and SPECI, the visibility observations should be representative of the aerodrome*.

4.6.3 Runway visual range

Note.— Guidance on the subject of runway visual range is contained in the Manual of Runway Visual Range Observing and Reporting Practices *(Doc 9328).*

4.6.3.1 Runway visual range as defined in Chapter 1 shall be assessed on all runways intended for Category II and III instrument approach and landing operations.

4.6.3.2 **Recommendation.—** *Runway visual range as defined in Chapter 1 should be assessed on all runways intended for use during periods of reduced visibility, including:*

a) precision approach runways intended for Category I instrument approach and landing operations; and

b) runways used for take-off and having high-intensity edge lights and/or centre line lights.

Note.— Precision approach runways are defined in Annex 14, Volume I, Chapter 1, under "Instrument runway".

4.6.3.3 The runway visual range, assessed in accordance with 4.6.3.1 and 4.6.3.2, shall be reported in metres throughout periods when either the visibility or the runway visual range is less than 1 500 m.

4.6.3.4 Runway visual range assessments shall be representative of:

a) the touchdown zone of the runway intended for non-precision or Category I instrument approach and landing operations;

b) the touchdown zone and the mid-point of the runway intended for Category II instrument approach and landing operations; and

c) the touchdown zone, the mid-point and stop-end of the runway intended for Category III instrument approach and landing operations.

4.6.3.5 The units providing air traffic service and aeronautical information service for an aerodrome shall be kept informed without delay of changes in the serviceability status of the automated equipment used for assessing runway visual range.

4.6.4 Present weather

4.6.4.1 The present weather occurring at the aerodrome and/or its vicinity shall be observed and reported as necessary. The following present weather phenomena shall be identified, as a minimum: precipitation and freezing precipitation (including intensity thereof), fog, freezing fog and thunderstorms (including thunderstorms in the vicinity).

4.6.4.2 **Recommendation.—** *For local routine and special reports, the present weather information should be representative of conditions at the aerodrome.*

4.6.4.3 **Recommendation.—** *For METAR and SPECI, the present weather information should be representative of conditions at the aerodrome and, for certain specified present weather phenomena, in its vicinity.*

4.6.5 Clouds

4.6.5.1 Cloud amount, cloud type and height of cloud base shall be observed and reported as necessary to describe the clouds of operational significance. When the sky is obscured, vertical visibility shall be observed and reported, where measured, in lieu of cloud amount, cloud type and height of cloud base. The height of cloud base and vertical visibility shall be reported in metres (or feet).

4.6.5.2 **Recommendation.—** *Cloud observations for local routine and special reports should be representative of the approach area.*

4.6.5.3 **Recommendation.—** *Cloud observations for METAR and SPECI should be representative of the aerodrome and its vicinity.*

4.6.6 Air temperature and dew-point temperature

4.6.6.1 The air temperature and the dew-point temperature shall be measured and reported in degrees Celsius.

4.6.6.2 **Recommendation.—** *Observations of air temperature and dew-point temperature for local routine and special reports and METAR and SPECI should be representative of the whole runway complex.*

4.6.7 Atmospheric pressure

The atmospheric pressure shall be measured, and QNH and QFE values shall be computed and reported in hectopascals.

4.6.8 Supplementary information

Recommendation.— *Observations made at aerodromes should include the available supplementary information concerning significant meteorological conditions, particularly those in the approach and climb-out areas. Where practicable, the information should identify the location of the meteorological condition.*

4.7 Reporting meteorological information from automatic observing systems

4.7.1 **Recommendation.**— *METAR and SPECI from automatic observing systems should be used by States in a position to do so during non-operational hours of the aerodrome, and during operational hours of the aerodrome as determined by the meteorological authority in consultation with users based on the availability and efficient use of personnel.*

Note.— Guidance on the use of automatic meteorological observing systems is given in the Manual on Automatic Meteorological Observing Systems at Aerodromes *(Doc 9837)* .

4.7.2 METAR and SPECI from automatic observing systems shall be identified with the word “AUTO”.

4.8 Observations and reports of volcanic activity

Recommendation.— *The occurrence of pre-eruption volcanic activity, volcanic eruptions and volcanic ash cloud should be reported without delay to the associated air traffic services unit, aeronautical information services unit and meteorological watch office. The report should be made in the form of a volcanic activity report comprising the following information in the order indicated:*

a) message type, VOLCANIC ACTIVITY REPORT;

b) station identifier, location indicator or name of station;

c) date/time of message;

d) location of volcano and name if known; and

e) concise description of event including, as appropriate, level of intensity of volcanic activity, occurrence of an eruption and its date and time, and the existence of a volcanic ash cloud in the area together with direction of ash cloud movement and height.

Note.— Pre-eruption volcanic activity in this context means unusual and/or increasing volcanic activity which could presage a volcanic eruption.

CHAPTER 5. AIRCRAFT OBSERVATIONS AND REPORTS

Note.— Technical specifications and detailed criteria related to this chapter are given in Appendix 4.

5.1 Obligations of States

Each Contracting State shall arrange, according to the provisions of this chapter, for observations to be made by aircraft of its registry operating on international air routes and for the recording and reporting of these observations.

5.2 Types of aircraft observations

The following aircraft observations shall be made:

a) routine aircraft observations during en-route and climb-out phases of the flight; and

b) special and other non-routine aircraft observations during any phase of the flight.

5.3 Routine aircraft observations — designation

5.3.1 **Recommendation.**— *When air-ground data link is used and automatic dependent surveillance (ADS) or secondary surveillance radar (SSR) Mode S is being applied, automated routine observations should be made every 15 minutes during the en-route phase and every 30 seconds during the climb-out phase for the first 10 minutes of the flight.*

5.3.2 When voice communications are used, routine observations shall be made during the en-route phase in relation to those air traffic services reporting points or intervals:

a) at which the applicable air traffic services procedures require routine position reports; and

b) which are those separated by distances corresponding most closely to intervals of one hour of flying time.

5.3.3 **Recommendation.—** *For helicopter operations to and from aerodromes on offshore structures, routine observations should be made from helicopters at points and times as agreed between the meteorological authorities and the helicopter operators concerned.*

5.3.4 In the case of air routes with high-density air traffic (e.g. organized tracks), an aircraft from among the aircraft operating at each flight level shall be designated, at approximately hourly intervals, to make routine observations in accordance with 5.3.1 or 5.3.2, as appropriate. The designation procedures shall be subject to regional air navigation agreement.

5.3.5 In the case of the requirement to report during the climb-out phase, an aircraft shall be designated, at approximately hourly intervals, at each aerodrome to make routine observations in accordance with 5.3.1.

5.4 Routine aircraft observations — exemptions

5.4.1 When voice communications are used, an aircraft shall be exempted from making the routine observations specified in 5.3.2 when:

a) the aircraft is not equipped with RNAV equipment; or

b) the flight duration is 2 hours or less; or

c) the aircraft is at a distance equivalent to less than one hour of flying time from the next intended point of landing; or

d) the altitude of the flight path is below 1 500 m (5 000 ft).

5.4.2 **Recommendation.—** *When voice communications are used, additional exemptions may be prescribed by regional air navigation agreement for flights over routes and areas with high-density air traffic and/or with adequate synoptic networks. Such procedures should take the form of exemption or designation procedures and should:*

a) make it possible for the minimum requirements for aircraft observations of all meteorological offices concerned to be met; and

b) be as simple as possible to implement and preferably not involving consideration of individual cases.

5.5 Special aircraft observations

Special observations shall be made by all aircraft whenever the following conditions are encountered or observed:

a) severe turbulence; or

b) severe icing; or

c) severe mountain wave; or

d) thunderstorms, without hail, that are obscured, embedded, widespread or in squall lines; or

e) thunderstorms, with hail, that are obscured, embedded, widespread or in squall lines; or

f) heavy duststorm or heavy sandstorm; or

g) volcanic ash cloud; or

h) pre-eruption volcanic activity or a volcanic eruption.

Note.— Pre-eruption volcanic activity in this context means unusual and/or increasing volcanic activity which could presage a volcanic eruption.

5.6 Other non-routine aircraft observations

When other meteorological conditions not listed under 5.5, e.g. wind shear, are encountered and which, in the opinion of the pilot-in-command, may affect the safety or markedly affect the efficiency of other aircraft operations, the pilot-in-command shall advise the appropriate air traffic services unit as soon as practicable.

Note.— Icing, turbulence and, to a large extent, wind shear are elements which, for the time being, cannot be satisfactorily observed from the ground and for which in most cases aircraft observations represent the only available evidence.

5.7 Reporting of aircraft observations during flight

5.7.1 Aircraft observations shall be reported by air-ground data link. Where air-ground data link is not available or appropriate, aircraft observations during flight shall be reported by voice communications.

5.7.2 Aircraft observations shall be reported during flight at the time the observation is made or as soon thereafter as is practicable.

5.7.3 Aircraft observations shall be reported as air-reports.

5.8 Relay of air-reports by ATS units

The meteorological authority concerned shall make arrangements with the appropriate ATS authority to ensure that, on receipt by the ATS units of:

a) routine and special air-reports by voice communications, the ATS units relay them without delay to their associated meteorological watch office;

b) routine air-reports by data link communications, the ATS units relay them without delay to WAFCs; and

c) special air-reports by data link communications, the ATS units relay them without delay to their associated meteorological watch office and WAFCs.

5.9 Recording and post-flight reporting of aircraft observations of volcanic activity

Special aircraft observations of pre-eruption volcanic activity, a volcanic eruption or volcanic ash cloud shall be recorded on the special air-report of volcanic activity form. A copy of the form shall be included with the flight documentation provided to flights operating on routes which, in the opinion of the meteorological authority concerned, could be affected by volcanic ash clouds.

CHAPTER 6. FORECASTS

Note.— Technical specifications and detailed criteria related to this chapter are given in Appendix 5.

6.1 Interpretation and use of forecasts

6.1.1 Owing to the variability of meteorological elements in space and time, to limitations of forecasting techniques and to limitations caused by the definitions of some of the elements, the specific value of any of the elements given in a forecast shall be understood by the recipient to be the most probable value which the element is likely to assume during the period of the forecast. Similarly, when the time of occurrence or change of an element is given in a forecast, this time shall be understood to be the most probable time.

Note.— Guidance on the operationally desirable accuracy of forecasts is given in Attachment B.

6.1.2 The issue of a new forecast by a meteorological office, such as a routine aerodrome forecast, shall be understood to cancel automatically any forecast of the same type previously issued for the same place and for the same period of validity or part thereof.

6.2 Aerodrome forecasts

6.2.1 An aerodrome forecast shall be prepared by the meteorological office designated by the meteorological authority concerned.

6.2.2 An aerodrome forecast shall be issued at a specified time and consist of a concise statement of the expected meteorological conditions at an aerodrome for a specified period.

6.2.3 Aerodrome forecasts and amendments thereto shall be issued as TAF and include the following information in the order indicated:

a) identification of the type of forecast;

b) location indicator;

c) time of issue of forecast;

d) identification of a missing forecast, when applicable;

e) date and period of validity of forecast;

f) identification of a cancelled forecast, when applicable;

g) surface wind;

h) visibility;

i) weather;

j) cloud; and

k) expected significant changes to one or more of these elements during the period of validity.

Optional elements shall be included in TAF in accordance with regional air navigation agreement.

Note.— The visibility included in TAF refers to the forecast prevailing visibility.

6.2.4 Meteorological offices preparing TAF shall keep the forecasts under continuous review and, when necessary, shall issue amendments promptly. The length of the forecast messages and the number of changes indicated in the forecast shall be kept to a minimum.

Note.— Guidance on methods to keep TAF under continuous review is given in Chapter 3 of the Manual of Aeronautical Meteorological Practice *(Doc 8896).*

6.2.5 TAF that cannot be kept under continuous review shall be cancelled.

6.2.6 **Recommendation.—** *The period of validity of a routine TAF should be not less than 6 hours nor more than 30 hours; the period of validity should be determined by regional air navigation agreement. Routine TAF valid for less than 12 hours should be issued every 3 hours and those valid for 12 to 30 hours should be issued every 6 hours.*

6.2.7 When issuing TAF, meteorological offices shall ensure that not more than one TAF is valid at an aerodrome at any given time.

6.3 Landing forecasts

6.3.1 A landing forecast shall be prepared by the meteorological office designated by the meteorological authority concerned as determined by regional air navigation agreement; such forecasts are intended to meet the requirements of local users and of aircraft within about one hour's flying time from the aerodrome.

6.3.2 Landing forecasts shall be prepared in the form of a trend forecast.

6.3.3 A trend forecast shall consist of a concise statement of the expected significant changes in the meteorological conditions at that aerodrome to be appended to a local routine or local special report, or a METAR or SPECI. The period of validity of a trend forecast shall be 2 hours from the time of the report which forms part of the landing forecast.

6.4 Forecasts for take-off

6.4.1 A forecast for take-off shall be prepared by the meteorological office designated by the meteorological authority concerned.

6.4.2 **Recommendation.—** *A forecast for take-off should refer to a specified period of time and should contain information on expected conditions over the runway complex in regard to surface wind direction and speed and any variations thereof, temperature, pressure (QNH), and any other elements as agreed locally*.

6.4.3 **Recommendation.—** *A forecast for take-off should be supplied to operators and flight crew members on request within the 3 hours before the expected time of departure*.

6.4.4 **Recommendation.—** *Meteorological offices preparing forecasts for take-off should keep the forecasts under continuous review and, when necessary, should issue amendments promptly*.

6.5 Area forecasts for low-level flights

6.5.1 When the density of traffic operating below flight level 100 (or up to flight level 150 in mountainous areas, or higher, where necessary) warrants the routine issue and dissemination of area forecasts for such operations, the frequency of issue, the form and the fixed time or period of validity of those forecasts and the criteria for amendments thereto shall be determined by the meteorological authority in consultation with the users.

6.5.2 When the density of traffic operating below flight level 100 warrants the issuance of AIRMET information in accordance with 7.2.1, area forecasts for such operations shall be prepared in a format agreed upon between the meteorological authorities concerned. When abbreviated plain language is used, the forecast shall be prepared as a GAMET area forecast, employing approved ICAO abbreviations and numerical values; when chart form is used, the forecast shall be prepared as a combination of forecasts of upper wind and upper-air temperature, and of SIGWX phenomena. The area forecasts shall be issued to cover the layer between the ground and flight level 100 (or up to flight level 150 in mountainous areas, or higher, where necessary) and shall contain information on en-route weather phenomena hazardous to low-level flights, in support of the issuance of AIRMET information, and additional information required by low-level flights.

6.5.3 Area forecasts for low-level flights prepared in support of the issuance of AIRMET information shall be issued every 6 hours for a period of validity of 6 hours and transmitted to meteorological offices concerned not later than one hour prior to the beginning of their validity period.

CHAPTER 7. SIGMET AND AIRMET INFORMATION, AERODROME WARNINGS AND WIND SHEAR WARNINGS AND ALERTS

Note.— Technical specifications and detailed criteria related to this chapter are given in Appendix 6.

7.1 SIGMET information

7.1.1 SIGMET information shall be issued by a meteorological watch office and shall give a concise description in abbreviated plain language concerning the occurrence and/or expected occurrence of specified en-route weather phenomena, which may affect the safety of aircraft operations, and of the development of those phenomena in time and space.

7.1.2 SIGMET information shall be cancelled when the phenomena are no longer occurring or are no longer expected to occur in the area.

7.1.3 The period of validity of a SIGMET message shall be not more than 4 hours. In the special case of SIGMET messages for volcanic ash cloud and tropical cyclones, the period of validity shall be extended up to 6 hours.

7.1.4 **Recommendation.—** *SIGMET messages concerning volcanic ash cloud and tropical cyclones should be based on advisory information provided by VAACs and TCACs, respectively, designated by regional air navigation agreement.*

7.1.5 Close coordination shall be maintained between the meteorological watch office and the associated area control centre/flight information centre to ensure that information on volcanic ash included in SIGMET and NOTAM messages is consistent.

7.1.6 SIGMET messages shall be issued not more than 4 hours before the commencement of the period of validity. In the special case of SIGMET messages for volcanic ash cloud and tropical cyclones, these messages shall be issued as soon as practicable but not more than 12 hours before the commencement of the period of validity. SIGMET messages for volcanic ash and tropical cyclones shall be updated at least every 6 hours.

7.2 AIRMET information

7.2.1 AIRMET information shall be issued by a meteorological watch office in accordance with regional air navigation agreement, taking into account the density of air traffic operating below flight level 100. AIRMET information shall give a concise description in abbreviated plain language concerning the occurrence and/or expected occurrence of specified en-route weather phenomena, which have not been included in Section I of the area forecast for low-level flights issued in accordance with Chapter 6, Section 6.5 and which may affect the safety of low-level flights, and of the development of those phenomena in time and space.

7.2.2 AIRMET information shall be cancelled when the phenomena are no longer occurring or are no longer expected to occur in the area.

7.2.3 The period of validity of an AIRMET message shall be not more than 4 hours.

7.3 Aerodrome warnings

7.3.1 Aerodrome warnings shall be issued by the meteorological office designated by the meteorological authority concerned and shall give concise information of meteorological conditions which could adversely affect aircraft on the ground, including parked aircraft, and the aerodrome facilities and services.

7.3.2 **Recommendation.—** *Aerodrome warnings should be cancelled when the conditions are no longer occurring and/or no longer expected to occur at the aerodrome.*

7.4 Wind shear warnings and alerts

Note.— Guidance on the subject is contained in the Manual on Low-level Wind Shear *(Doc 9817). Wind shear alerts are expected to complement wind shear warnings and together are intended to enhance situational awareness of wind shear.*

7.4.1 Wind shear warnings shall be prepared by the meteorological office designated by the meteorological authority concerned for aerodromes where wind shear is considered a factor, in accordance with local arrangements with the appropriate ATS unit and operators concerned. Wind shear warnings shall give concise information on the observed or expected existence of wind shear which could adversely affect aircraft on the approach path or take-off path or during circling approach between runway level and 500 m (1 600 ft) above that level and aircraft on the runway during the landing roll or take-off run. Where local topography has been shown to produce significant wind shears at heights in excess of 500 m (1 600 ft) above runway level, then 500 m (1 600 ft) shall not be considered restrictive.

7.4.2 **Recommendation.—** *Wind shear warnings for arriving aircraft and/or departing aircraft should be cancelled when aircraft reports indicate that wind shear no longer exists or, alternatively, after an agreed elapsed time. The criteria for the cancellation of a wind shear warning should be defined locally for each aerodrome, as agreed between the meteorological authority, the appropriate ATS authority and the operators concerned.*

7.4.3 At aerodromes where wind shear is detected by automated, ground-based, wind shear remote-sensing or detection equipment, wind shear alerts generated by these systems shall be issued. Wind shear alerts shall give concise, up-to-date information related to the observed existence of wind shear involving a headwind/tailwind change of 30 km/h (15 kt) or more which could adversely affect aircraft on the final approach path or initial take-off path and aircraft on the runway during the landing roll or take-off run.

7.4.4 **Recommendation.**— *Wind shear alerts should be updated at least every minute. The wind shear alert should be cancelled as soon as the headwind/tailwind change falls below 30 km/h (15 kt).*

CHAPTER 8. AERONAUTICAL CLIMATOLOGICAL INFORMATION

Note.— Technical specifications and detailed criteria related to this chapter are given in Appendix 7.

8.1 General provisions

Note.— In cases where it is impracticable to meet the requirements for aeronautical climatological information on a national basis, the collection, processing and storage of observational data may be effected through computer facilities available for international use, and the responsibility for the preparation of the required aeronautical climatological information may be delegated by agreement between the meteorological authorities concerned.

8.1.1 Aeronautical climatological information required for the planning of flight operations shall be prepared in the form of aerodrome climatological tables and aerodrome climatological summaries. Such information shall be supplied to aeronautical users as agreed between the meteorological authority and those users.

Note.— Climatological data required for aerodrome planning purposes are set out in Annex 14, Volume I, 3.1.4 and in Attachment A.

8.1.2 **Recommendation.—** *Aeronautical climatological information should normally be based on observations made over a period of at least five years and the period should be indicated in the information supplied.*

8.1.3 **Recommendation.—** *Climatological data related to sites for new aerodromes and to additional runways at existing aerodromes should be collected starting as early as possible before the commissioning of those aerodromes or runways.*

8.2 Aerodrome climatological tables

Recommendation.— *Each Contracting State should make arrangements for collecting and retaining the necessary observational data and have the capability:*

a) to prepare aerodrome climatological tables for each regular and alternate international aerodrome within its territory; and

b) to make available such climatological tables to an aeronautical user within a time period as agreed between the meteorological authority and that user.

8.3 Aerodrome climatological summaries

Recommendation.— *Aerodrome climatological summaries should follow the procedures prescribed by the World Meteorological Organization. Where computer facilities are available to store, process and retrieve the information, the summaries should be published or otherwise made available to aeronautical users on request. Where such computer facilities are not available, the summaries should be prepared using the models specified by the World Meteorological Organization and should be published and kept up to date as necessary.*

8.4 Copies of meteorological observational data

Each meteorological authority, on request and to the extent practicable, shall make available to any other meteorological authority, to operators and to others concerned with the application of meteorology to international air navigation, meteorological observational data required for research, investigation or operational analysis.

CHAPTER 9. SERVICE FOR OPERATORS AND FLIGHT CREW MEMBERS

Note.— Technical specifications and detailed criteria related to this chapter are given in Appendix 8.

9.1 General provisions

9.1.1 Meteorological information shall be supplied to operators and flight crew members for:

a) pre-flight planning by operators;

b) in-flight re-planning by operators using centralized operational control of flight operations;

c) use by flight crew members before departure; and

d) aircraft in flight.

9.1.2 Meteorological information supplied to operators and flight crew members shall cover the flight in respect of time, altitude and geographical extent. Accordingly, the information shall relate to appropriate fixed times, or periods of time, and shall extend to the aerodrome of intended landing, also covering the meteorological conditions expected between the aerodrome of intended landing and alternate aerodromes designated by the operator.

9.1.3 Meteorological information supplied to operators and flight crew members shall be up to date and include the following information, as established by meteorological authority in consultation with operators concerned:

a) forecasts of

   1) upper wind and upper-air temperature;

   2) upper-air humidity;

   3) geopotential altitude of flight levels;

   4) flight level and temperature of tropopause;

   5) direction, speed and flight level of maximum wind; and

   6) SIGWX phenomena;

   Note.— Forecasts of upper-air humidity and geopotential altitude of flight levels are used only in automatic flight planning and need not be displayed.

b) METAR or SPECI (including trend forecasts as issued in accordance with regional air navigation agreement) for the aerodromes of departure and intended landing, and for take-off, en-route and destination alternate aerodromes;

c) TAF or amended TAF for the aerodromes of departure and intended landing, and for take-off, en-route and destination alternate aerodromes;

d) forecasts for take-off;

e) SIGMET information and appropriate special air-reports relevant to the whole route;

Note.— Appropriate special air-reports will be those not already used in the preparation of SIGMET.

f) subject to regional air navigation agreement, GAMET area forecast and/or area forecasts for low-level flights in chart form prepared in support of the issuance of AIRMET information, and AIRMET information for low-level flights relevant to the whole route;

g) aerodrome warnings for the local aerodrome;

h) meteorological satellite images; and

i) ground-based weather radar information.

9.1.4 Forecasts listed under 9.1.3 a) shall be generated from the digital forecasts provided by the WAFCs whenever these forecasts cover the intended flight path in respect of time, altitude and geographical extent, unless otherwise agreed between the meteorological authority and the operator concerned.

9.1.5 When forecasts are identified as being originated by the WAFCs, no modifications shall be made to their meteorological content.

9.1.6 Charts generated from the digital forecasts provided by the WAFCs shall be made available, as required by operators, for fixed areas of coverage as shown in Appendix 8, Figures A8-1, A8-2 and A8-3.

9.1.7 When forecasts of upper wind and upper-air temperature listed under 9.1.3 a) 1) are supplied in chart form, they shall be fixed time prognostic charts for flight levels as specified in Appendix 2, 1.2.2 a). When forecasts of SIGWX phenomena listed under 9.1.3 a) 6) are supplied in chart form, they shall be fixed time prognostic charts for an atmospheric layer limited by flight levels as specified in Appendix 2, 1.3.2 and Appendix 5, 4.3.2.

9.1.8 The forecasts of upper wind and upper-air temperature and of SIGWX phenomena above flight level 100 requested for pre-flight planning and in-flight re-planning by the operator shall be supplied as soon as they become available, but not later than 3 hours before departure. Other meteorological information requested for pre-flight planning and in-flight re-planning by the operator shall be supplied as soon as is practicable.

9.1.9 When necessary, the meteorological authority of the State providing service for operators and flight crew members shall initiate coordinating action with the meteorological authorities of other States with a view to obtaining from them the reports and/or forecasts required.

9.1.10 Meteorological information shall be supplied to operators and flight crew members at the location to be determined by the meteorological authority, after consultation with the operators and at the time to be agreed upon between the meteorological office and the operator concerned. The service for pre-flight planning shall be confined to flights originating within the territory of the State concerned. At an aerodrome without a meteorological office, arrangements for the supply of meteorological information shall be as agreed upon between the meteorological authority and the operator concerned.

9.2 Briefing, consultation and display

Note.— The requirements for the use of automated pre-flight information systems in providing briefing, consultation and display are given in 9.4.

9.2.1 Briefing and/or consultation shall be provided, on request, to flight crew members and/or other flight operations personnel. Its purpose shall be to supply the latest available information on existing and expected meteorological conditions along the route to be flown, at the aerodrome of intended landing, alternate aerodromes and other aerodromes as relevant, either to explain and amplify the information contained in the flight documentation or, if so agreed between the meteorological authority and the operator, in lieu of flight documentation.

9.2.2 Meteorological information used for briefing, consultation and display shall include any or all of the information listed in 9.1.3.

9.2.3 If the meteorological office expresses an opinion on the development of the meteorological conditions at an aerodrome which differs appreciably from the aerodrome forecast included in the flight documentation, the attention of flight crew members shall be drawn to the divergence. The portion of the briefing dealing with the divergence shall be recorded at the time of briefing and this record shall be made available to the operator.

9.2.4 The required briefing, consultation, display and/or flight documentation shall normally be provided by the meteorological office associated with the aerodrome of departure. At an aerodrome where these services are not available, arrangements to meet the requirements of flight crew members shall be as agreed upon between the meteorological authority and the operator concerned. In exceptional circumstances, such as an undue delay, the meteorological office associated with the aerodrome shall provide or, if that is not practicable, arrange for the provision of a new briefing, consultation and/or flight documentation as necessary.

9.2.5 **Recommendation.—** *The flight crew member or other flight operations personnel for whom briefing, consultation and/or flight documentation has been requested should visit the meteorological office at the time agreed upon between the meteorological office and the operator concerned. Where local circumstances at an aerodrome make personal briefing or consultation impracticable, the meteorological office should provide those services by telephone or other suitable telecommunications facilities.*

9.3 Flight documentation

Note.— The requirements for the use of automated pre-flight information systems in providing flight documentation are given in 9.4.

9.3.1 Flight documentation to be made available shall comprise information listed under 9.1.3 a) 1) and 6), b), c), e) and, if appropriate, f). However, when agreed between the meteorological authority and operator concerned, flight documentation for flights of two hours' duration or less, after a short stop or turnaround, shall be limited to the information operationally needed, but in all cases the flight documentation shall at least comprise information on 9.1.3 b), c), e) and, if appropriate, f).

9.3.2 Whenever it becomes apparent that the meteorological information to be included in the flight documentation will differ materially from that made available for pre-flight planning and in-flight re-planning, the operator shall be advised immediately and, if practicable, be supplied with the revised information as agreed between the operator and the meteorological office concerned.

9.3.3 **Recommendation.**— *In cases where a need for amendment arises after the flight documentation has been supplied, and before take-off of the aircraft, the meteorological office should, as agreed locally, issue the necessary amendment or updated information to the operator or to the local air traffic services unit, for transmission to the aircraft.*

9.3.4 The meteorological authority shall retain information supplied to flight crew members, either as printed copies or in computer files, for a period of at least 30 days from the date of issue. This information shall be made available, on request, for inquiries or investigations and, for these purposes, shall be retained until the inquiry or investigation is completed.

9.4 Automated pre-flight information systems for briefing, consultation, flight planning and flight documentation

9.4.1 Where the meteorological authority uses automated pre-flight information systems to supply and display meteorological information to operators and flight crew members for self-briefing, flight planning and flight documentation purposes, the information supplied and displayed shall comply with the relevant provisions in 9.1 to 9.3 inclusive.

9.4.2 **Recommendation.—** *Automated pre-flight information systems providing for a harmonized, common point of access to meteorological information and aeronautical information services information by operators, flight crew members and other aeronautical personnel concerned should be established by an agreement between the meteorological authority and the relevant civil aviation authority or the agency to which the authority to provide service has been delegated in accordance with Annex 15, 3.1.1 c).*

Note.— The meteorological and aeronautical information services information concerned is specified in 9.1 to 9.3 and Appendix 8 and in Annex 15, 8.1 and 8.2, respectively.

9.4.3 Where automated pre-flight information systems are used to provide for a harmonized, common point of access to meteorological information and aeronautical information services information by operators, flight crew members and other aeronautical personnel concerned, the meteorological authority concerned shall remain responsible for the quality control and quality management of meteorological information provided by means of such systems in accordance with Chapter 2, 2.2.2.

Note.— The responsibilities relating to aeronautical information services information and the quality assurance of the information are given in Annex 15, Chapter 3.

9.5 Information for aircraft in flight

9.5.1 Meteorological information for use by aircraft in flight shall be supplied by a meteorological office to its associated air traffic services unit and through D-VOLMET or VOLMET broadcasts as determined by regional air navigation agreement. Meteorological information for planning by the operator for aircraft in flight shall be supplied on request, as agreed between the meteorological authority or authorities and the operator concerned.

9.5.2 Meteorological information for use by aircraft in flight shall be supplied to air traffic services units in accordance with the specifications of Chapter 10.

9.5.3 Meteorological information shall be supplied through D-VOLMET or VOLMET broadcasts in accordance with the specifications of Chapter 11.

CHAPTER 10. INFORMATION FOR AIR TRAFFIC SERVICES, SEARCH AND RESCUE SERVICES AND AERONAUTICAL INFORMATION SERVICES

Note.— Technical specifications and detailed criteria related to this chapter are given in Appendix 9.

10.1 Information for air traffic services units

10.1.1 The meteorological authority shall designate a meteorological office to be associated with each air traffic services unit. The associated meteorological office shall, after coordination with the air traffic services unit, supply, or arrange for the supply of, up-to-date meteorological information to the unit as necessary for the conduct of its functions.

10.1.2 **Recommendation.—** *The associated meteorological office for an aerodrome control tower or approach control unit should be an aerodrome meteorological office.*

10.1.3 The associated meteorological office for a flight information centre or an area control centre shall be a meteorological watch office.

10.1.4 **Recommendation.—** *Where, owing to local circumstances, it is convenient for the duties of an associated meteorological office to be shared between two or more meteorological offices, the division of responsibility should be determined by the meteorological authority in consultation with the appropriate ATS authority.*

10.1.5 Any meteorological information requested by an air traffic services unit in connection with an aircraft emergency shall be supplied as rapidly as possible.

10.2 Information for search and rescue services units

Meteorological offices designated by the meteorological authority in accordance with regional air navigation agreement shall supply search and rescue services units with the meteorological information they require in a form established by mutual agreement. For that purpose, the designated meteorological office shall maintain liaison with the search and rescue services unit throughout a search and rescue operation.

10.3 Information for aeronautical information services units

The meteorological authority, in coordination with the appropriate civil aviation authority, shall arrange for the supply of up-to-date meteorological information to relevant aeronautical information services units, as necessary, for the conduct of their functions.

CHAPTER 11. REQUIREMENTS FOR AND USE OF COMMUNICATIONS

Note 1.— Technical specifications and detailed criteria related to this chapter are given in Appendix 10.

Note 2.— It is recognized that it is for each Contracting State to decide upon its own internal organization and responsibility for implementing the telecommunications facilities referred to in this chapter.

11.1 Requirements for communications

11.1.1 Suitable telecommunications facilities shall be made available to permit aerodrome meteorological offices and, as necessary, aeronautical meteorological stations to supply the required meteorological information to air traffic services units on the aerodromes for which those offices and stations are responsible, and in particular to aerodrome control towers, approach control units and the aeronautical telecommunications stations serving these aerodromes.

Note.— Circuits of the aeronautical fixed service are used for the collection and regional and interregional exchanges of operational meteorological information as well as for access to international operational meteorological databanks. Three aeronautical fixed service satellite distribution systems providing for global coverage are used to support the regional and interregional exchanges of operational meteorological information. Provisions relating to the satellite distribution systems are given in Annex 10, Volume III, Part 1, 10.1 and 10.2.

11.1.2 Suitable telecommunications facilities shall be made available to permit meteorological watch offices to supply the required meteorological information to air traffic services and search and rescue services units in respect of the flight information regions, control areas and search and rescue regions for which those offices are responsible, and in particular to flight information centres, area control centres and rescue coordination centres and the associated aeronautical telecommunications stations.

11.1.3 Suitable telecommunications facilities shall be made available to permit world area forecast centres to supply the required world area forecast system products to meteorological offices, meteorological authorities and other users.

11.1.4 Telecommunications facilities between meteorological offices and, as necessary, aeronautical meteorological stations and aerodrome control towers or approach control units shall permit communications by direct speech, the speed with which the communications can be established being such that the required points may normally be contacted within approximately 15 seconds.

11.1.5 **Recommendation.—** *Telecommunications facilities between meteorological offices and flight information centres, area control centres, rescue coordination centres and aeronautical telecommunications stations should permit:*

a) communications by direct speech, the speed with which the communications can be established being such that the required points may normally be contacted within approximately 15 seconds; and

b) printed communications, when a record is required by the recipients; the message transit time should not exceed 5 minutes.

Note.— In 11.1.4 and 11.1.5, "approximately 15 seconds" refers to telephony communications involving switchboard operation and "5 minutes" refers to printed communications involving retransmission.

11.1.6 **Recommendation.—** *The telecommunications facilities required in accordance with 11.1.4 and 11.1.5 should be supplemented, as and where necessary, by other forms of visual or audio communications, for example, closed-circuit television or separate information processing systems.*

11.1.7 **Recommendation.—** *As agreed between the meteorological authority and operators, provision should be made to enable operators to establish suitable telecommunications facilities for obtaining meteorological information from aerodrome meteorological offices or other appropriate sources.*

11.1.8 Suitable telecommunications facilities shall be made available to permit meteorological offices to exchange operational meteorological information with other meteorological offices.

11.1.9 **Recommendation.—** *The telecommunications facilities used for the exchange of operational meteorological information should be the aeronautical fixed service.*

11.2 Use of aeronautical fixed service communications — meteorological bulletins in alphanumeric format

Meteorological bulletins containing operational meteorological information to be transmitted via the aeronautical fixed service shall be originated by the appropriate meteorological office or aeronautical meteorological station.

Note.— Meteorological bulletins containing operational meteorological information authorized for transmission via the aeronautical fixed service are listed in Annex 10, Volume II, Chapter 4, together with the relevant priorities and priority indicators.

11.3 Use of aeronautical fixed service communications — world area forecast system products

Recommendation.— *World area forecast system products in digital form should be transmitted using binary data communications techniques. The method and channels used for the dissemination of the products should be as determined by regional air navigation agreement.*

11.4 Use of aeronautical mobile service communications

The content and format of meteorological information transmitted to aircraft and by aircraft shall be consistent with the provisions of this Annex.

11.5 Use of aeronautical data link service — contents of D-VOLMET

D-VOLMET shall contain current METAR and SPECI, together with trend forecasts where available, TAF and SIGMET, special air-reports not covered by a SIGMET and, where available, AIRMET.

Note.— The requirement to provide METAR and SPECI may be met by the data link-flight information service (D-FIS) application entitled "Data link-aerodrome routine meteorological report (D-METAR) service"; the requirement to provide TAF may be met by the D-FIS application entitled "Data link-aerodrome forecast (D-TAF) service"; and the requirement to provide SIGMET and AIRMET messages may be met by the D-FIS application entitled "Data link-SIGMET (D-SIGMET) service". The details of these data link services are specified in the Manual of Air Traffic Services Data Link Applications *(Doc 9694).*

11.6 Use of aeronautical broadcasting service — contents of VOLMET broadcasts

11.6.1 Continuous VOLMET broadcasts, normally on very high frequencies (VHF), shall contain current METAR and SPECI, together with trend forecasts where available.

11.6.2 Scheduled VOLMET broadcasts, normally on high frequencies (HF), shall contain current METAR and SPECI, together with trend forecasts where available and, where so determined by regional air navigation agreement, TAF and SIGMET.

INTERNATIONAL STANDARDS AND RECOMMENDED PRACTICES

PART II

APPENDICES AND ATTACHMENTS

APPENDIX 1

FLIGHT DOCUMENTATION — MODEL CHARTS AND FORMS

(See Chapter 9 of this Annex.)

MODEL A	—	OPMET information
MODEL IS	—	Upper wind and temperature chart for standard isobaric surface Example 1 — Arrows, feathers and pennants (Mercator projection) Example 2 — Arrows, feathers and pennants (Polar stereographic projection)
MODEL SWH	—	Significant weather chart (high level) Example — Polar stereographic projection (showing the jet stream and vertical extent)
MODEL SWM	—	Significant weather chart (medium level)
MODEL SWL	—	Significant weather chart (low level)
	—	Example 1
	—	Example 2
MODEL VAG	—	Volcanic ash advisory information in graphical format
MODEL SVA	—	SIGMET for volcanic ash in graphical format
MODEL SGE	—	SIGMET for phenomena other than tropical cyclone and volcanic ash in graphical format
MODEL SN	—	Sheet of notations used in flight documentation

OPMET information MODEL A

ISSUED BY . . . . METEOROLOGICAL OFFICE (DATE, TIME UTC) . . . .

INTENSITY

“ – ” (light); no indicator (moderate); “ + ” (heavy, or well-developed in the case of dust/sand whirls (dust devils) and funnel clouds) are used to indicate the forecast intensity of certain phenomena

DESCRIPTORS

MI – shallow	PR – partial	BL – blowing	TS – thunderstorm
BC – patches	DR – low drifting	SH – shower(s)	FZ – freezing (supercooled)

FORECAST WEATHER ABBREVIATIONS

DZ – drizzle	GS – small hail and/or snow pellets	SA – sand
RA – rain		HZ – haze
SN – snow	BR – mist	PO – dust/sand whirls (dust devils)
SG – snow grains	FG – fog	SQ – squall
IC – ice crystals (diamond dust)	FU – smoke	FC – funnel cloud(s) (tornado or waterspout)
PL – ice pellets	VA – volcanic ash	SS – sandstorm
GR – hail	DU – widespread dust	DS – duststorm

EXAMPLES

+SHRA – heavy shower of rain	TSSN – thunderstorm with moderate snow
FZDZ – moderate freezing drizzle	SNRA – moderate snow and rain
+TSSNGR – thunderstorm with heavy snow and hail	

SELECTED ICAO LOCATION INDICATORS

CYUL	Montreal Pierre Elliot Trudeau/Intl	HECA	Cairo/Intl	OBBI	Bahrain Intl
		HKJK	Nairobi/Jomo Kenyatta	RJTT	Tokyo Intl
EDDF	Frankfurt/Main	KJFK	New York/John F. Kennedy Intl	SBGL	Rio de Janeiro/Galeão Intl
EGLL	London/Heathrow	LFPG	Paris/Charles de Gaulle	YSSY	Sydney/Kingsford Smith Intl
GMMC	Casablanca/Anfa	NZAA	Auckland Intl	ZBAA	Beijing/Capital

METAR CYUL 240700Z 27018G30KT 9999 SN FEW020 BKN045 M02/M07 Q0995=

METAR EDDF 240950Z 05015KT 9999 FEW025 04/M05 Q1018 NOSIG=

METAR LFPG 241000Z 07010KT 5000 SCT010 BKN040 02/M01 Q1014 NOSIG=

SPECI GMMC 220530Z 24006KT 5000 –TSGR BKN016TCU FEW020CB SCT026 08/07 Q1013=

TAF AMD NZAA 240855Z 2409/2506 24010KT 9999 FEW030 BECMG 2411/2413 VRB02KT 2000 HZ FM 242224010KT CAVOK=

TAF ZBAA 240440Z 2406/2506 13015KMH 6000 NSC BECMG 2415/2416 2000 SN OVC040 TEMPO 2418/24211000 SN BECMG 2500/2501 32015KMH 3500 BR NSC BECMG 2503/2504 32030G60KMH CAVOK=

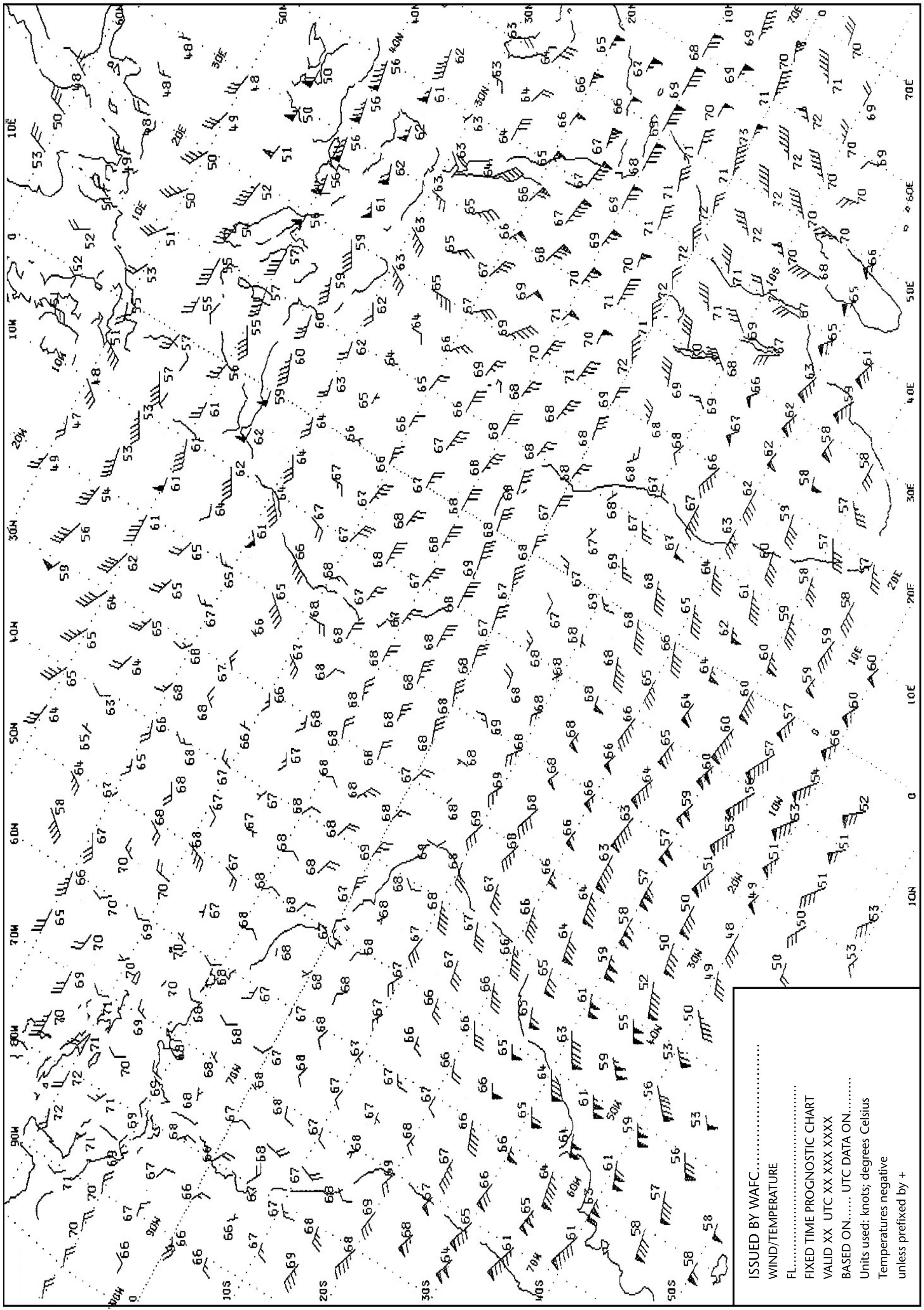
TAF YSSY 240443Z 2406/2506 05015KT 3000 BR SCT030 BECMG 2414/2416 33008KT FM 2422 04020KT CAVOK=

HECC SIGMET 2 VALID 240900/1200 HECA-
HECC CAIRO FIR SEV TURB OBS N OF N27 FL 390/440 MOV E25KMH NC.

MODEL IS

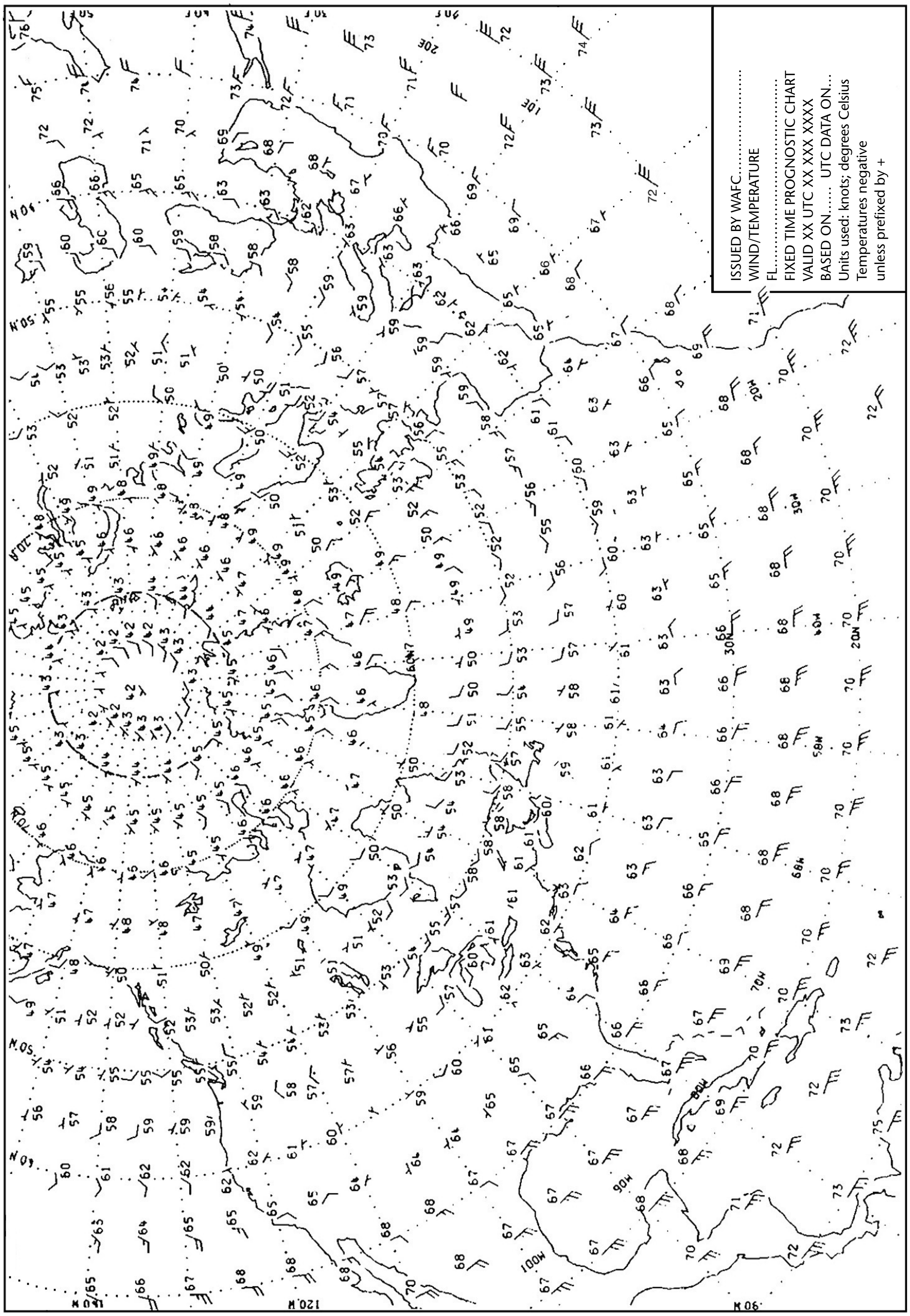
UPPER WIND AND TEMPERATURE CHART FOR STANDARD ISOBARIC SURFACE

Example 1 — Arrows, feathers and pennants (Mercator projection)



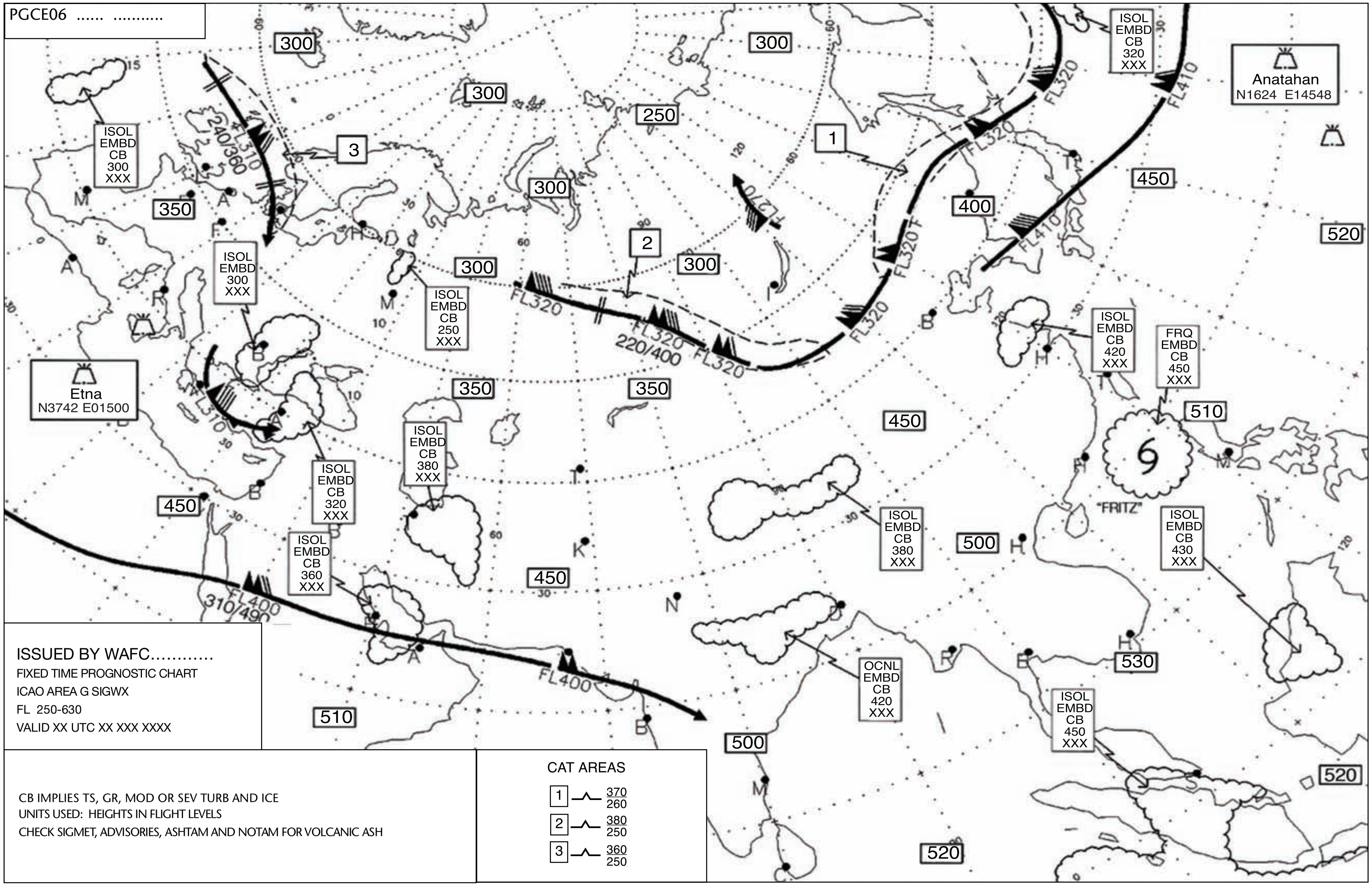
MODEL IS

UPPER WIND AND TEMPERATURE CHART FOR STANDARD ISOBARIC SURFACE
Example 2 — Arrows, feathers and pennants (Polar stereographic projection)



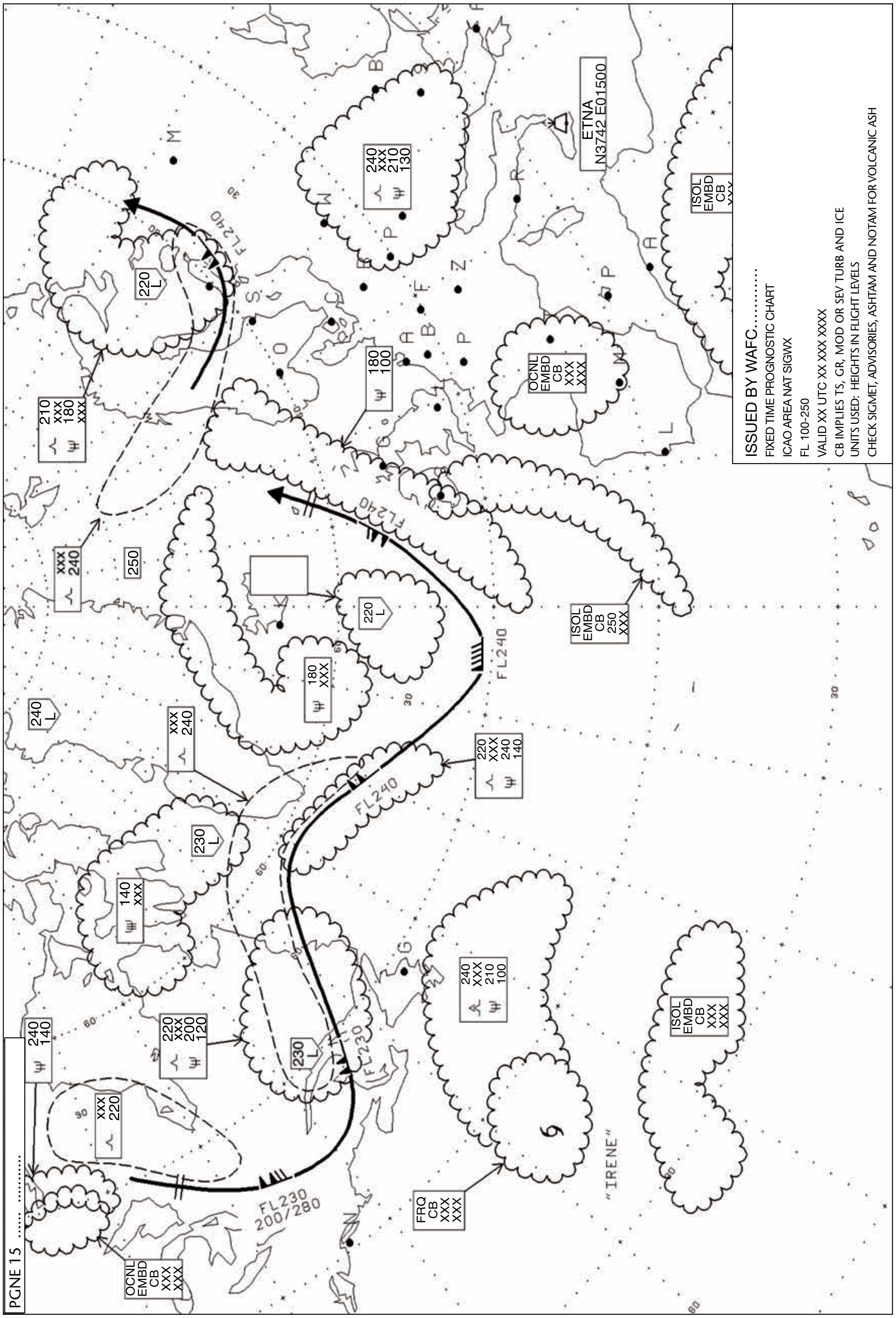
SIGNIFICANT WEATHER CHART (HIGH LEVEL) **MODEL SWH**

Example — Polar stereographic projection (showing the jet stream vertical extend)



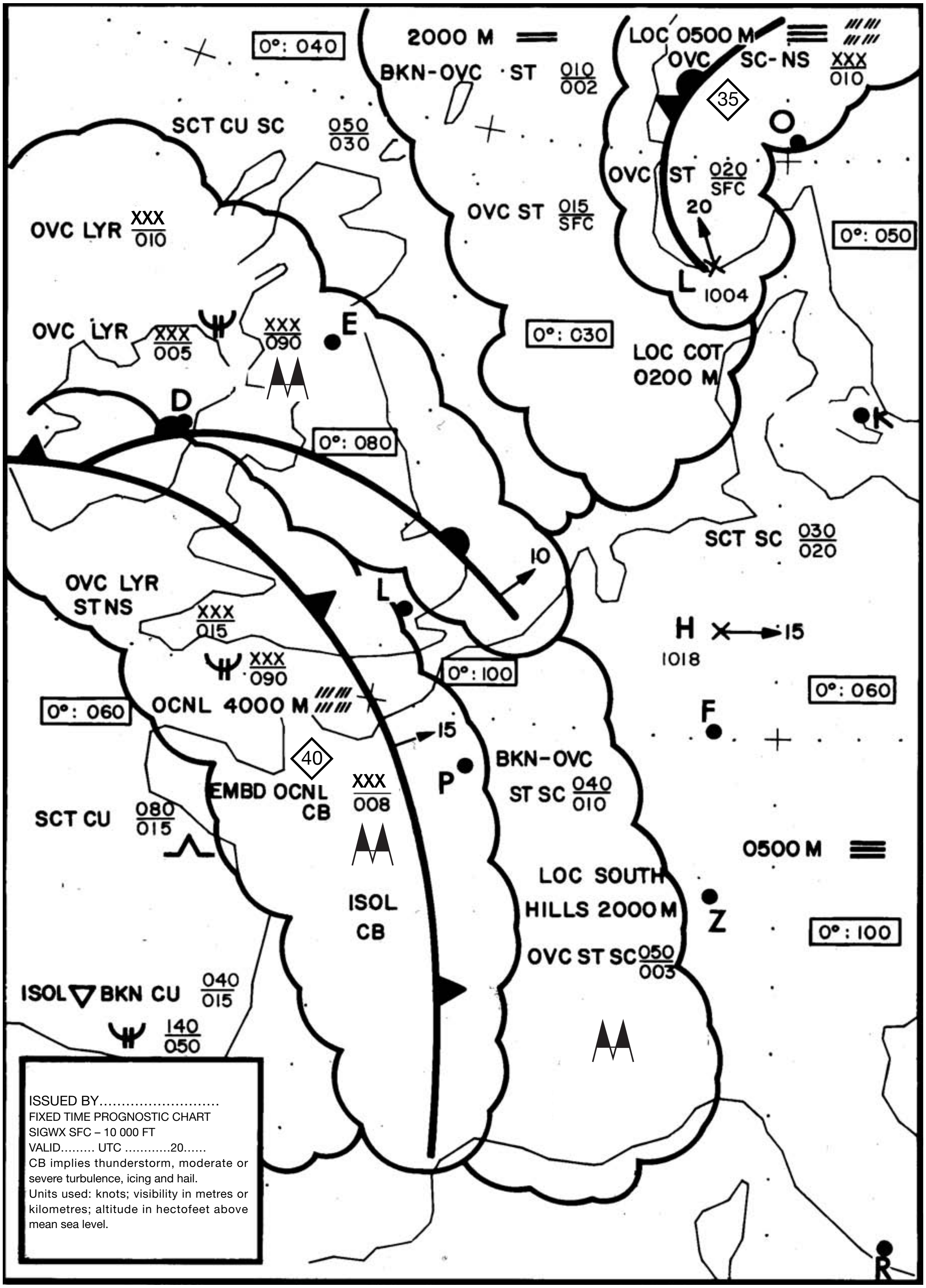
MODEL SWM

SIGNIFICANT WEATHER CHART (MEDIUM LEVEL)



SIGNIFICANT WEATHER CHART (LOW LEVEL) MODEL SWL

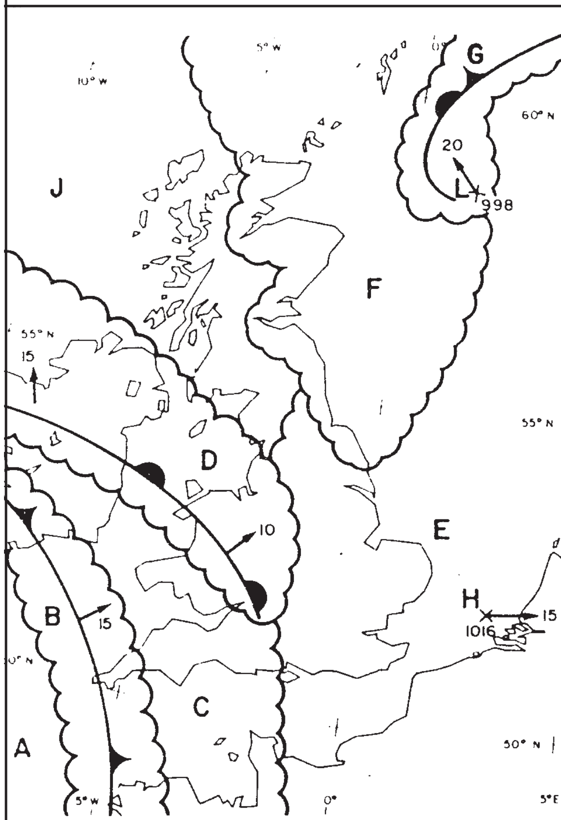
Example 1



SIGNIFICANT WEATHER CHART (LOW LEVEL)
Example 2

MODEL SWL

FIXED TIME PROGNOSTIC CHART VALID................ UTC.................. 20... BASED ON.......... UTC DATA ON.....................



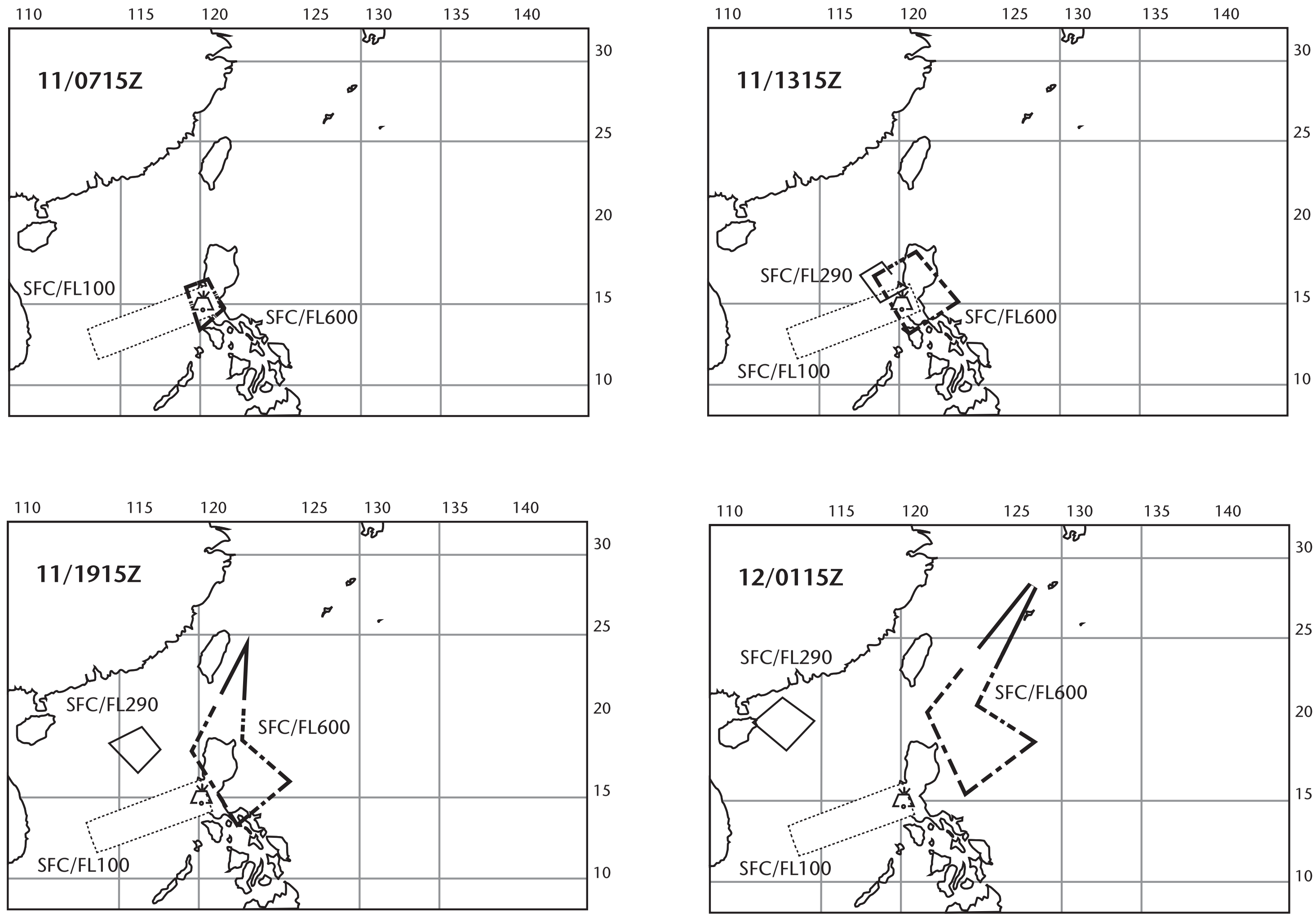
VARIANT	VIS	SIGNIFICANT WEATHER	CLOUD, TURBULENCE, ICING	0°C
AREA A			SCT CU 025/080	50
ISOL			BKN CU 015/XXX 050/XXX	
AREA B			OVC LYR ST NS 015/XXX 050/XXX	50
OCNL	4000	HEAVY RAIN	EMBD CB 008/XXX	
ISOL	1000	THUNDERSTORM		
AREA C			BKN to OVC ST SC 010/040	100
LOC SOUTH COT HILLS	2000	DRIZZLE	OVC ST SC 003/050	
AREA D			OVC LYR SC NS 010/XXX	90
LOC NORTH	4500	RAIN	OVC LYR ST NS 005/XXX 090/XXX	
AREA E			SCT SC 020/030	40
LOC LAND	0500	FOG		
AREA F	2000	MIST	BKN to OVC ST 002/010	30
LOC COT HILLS	0200	FOG	OVC ST SFC/015	
AREA G	4500	RAIN	OVC CU SC NS 010/XXX 030/XXX	30
LOC NORTH	0500	FOG	OVC ST SFC/010	
AREA J			SCT CU SC 030/050	40
LOC HILLS NORTH			BLW 070	

SIGWX SFC – 10 000 FT
ISSUED BY .... AT .... UTC

Notes:
1. Pressure in hPa and speeds in knots.
2. Vis in m included if less than 5 000 m. implies vis 200 m or less.
3. Altitude in hectofeet above MSL XXX = above 10 000 ft.
4. CB implies MOD/SEV icing, turbulence and thunderstorm.
5. Only significant weather and/or weather phenomena causing visibility reduction below 5 000 m included.

REMARKS:
EAST TO NE GALES SHETLAND TO HEBRIDES - SEVERE MOUNTAIN WAVES NW SCOTLAND -
FOG PATCHES EAST ANGLIA - WDSPR FOG OVER NORTH FRANCE, BELGIUM AND THE NETHERLANDS

VOLCANIC ASH ADVISORY INFORMATION IN GRAPHICAL FORMAT **MODEL VAG**

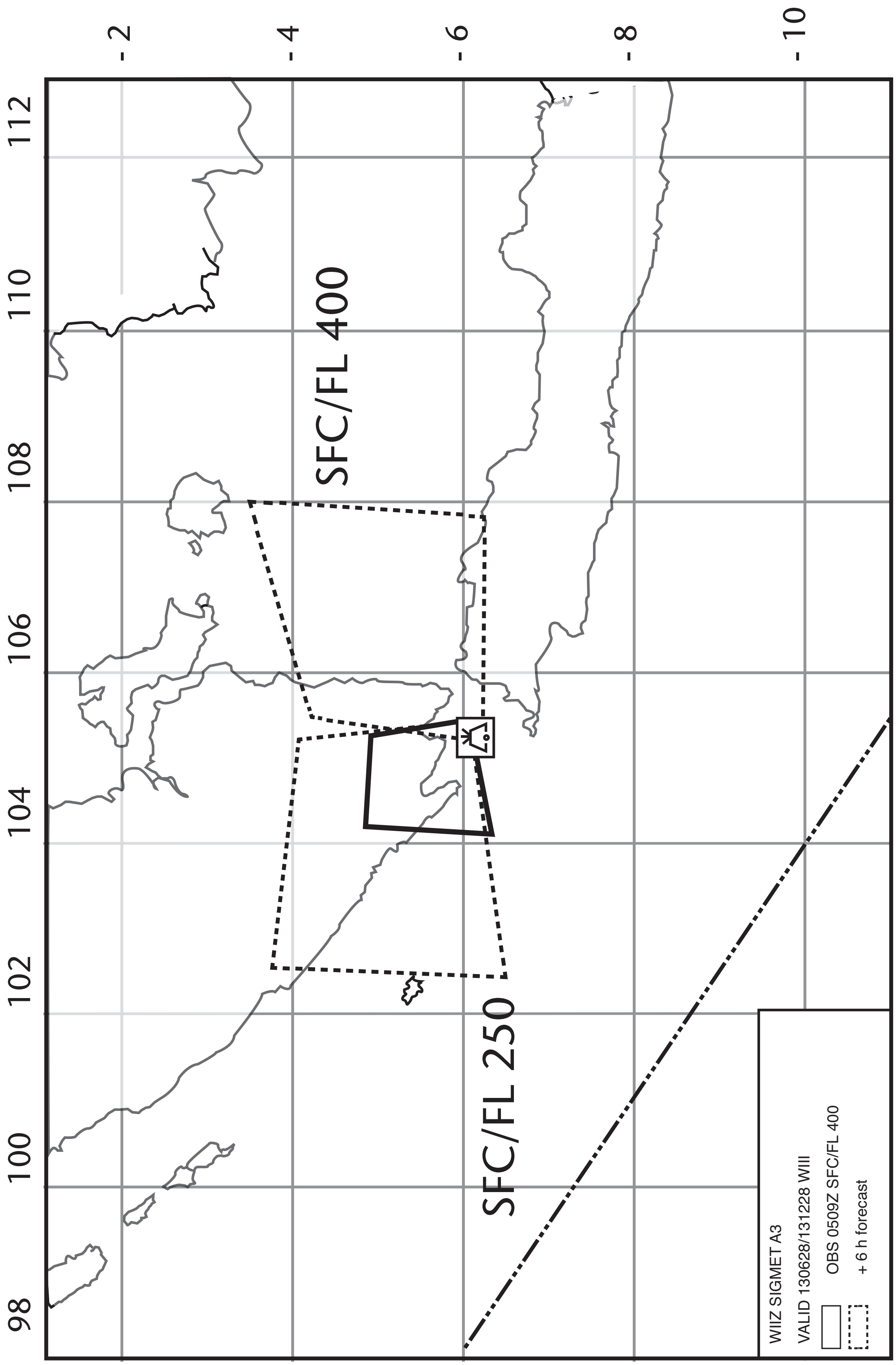


VOLCANIC ASH ADVISORY
DTG: 20050711/0728Z
VAAC: TOKYO
VOLCANO: PINATUBO 0703-083
AREA: LUZON PHILIPPINES
SUMMIT ELEV: 1486M
ADVISORY NR: 2005/1

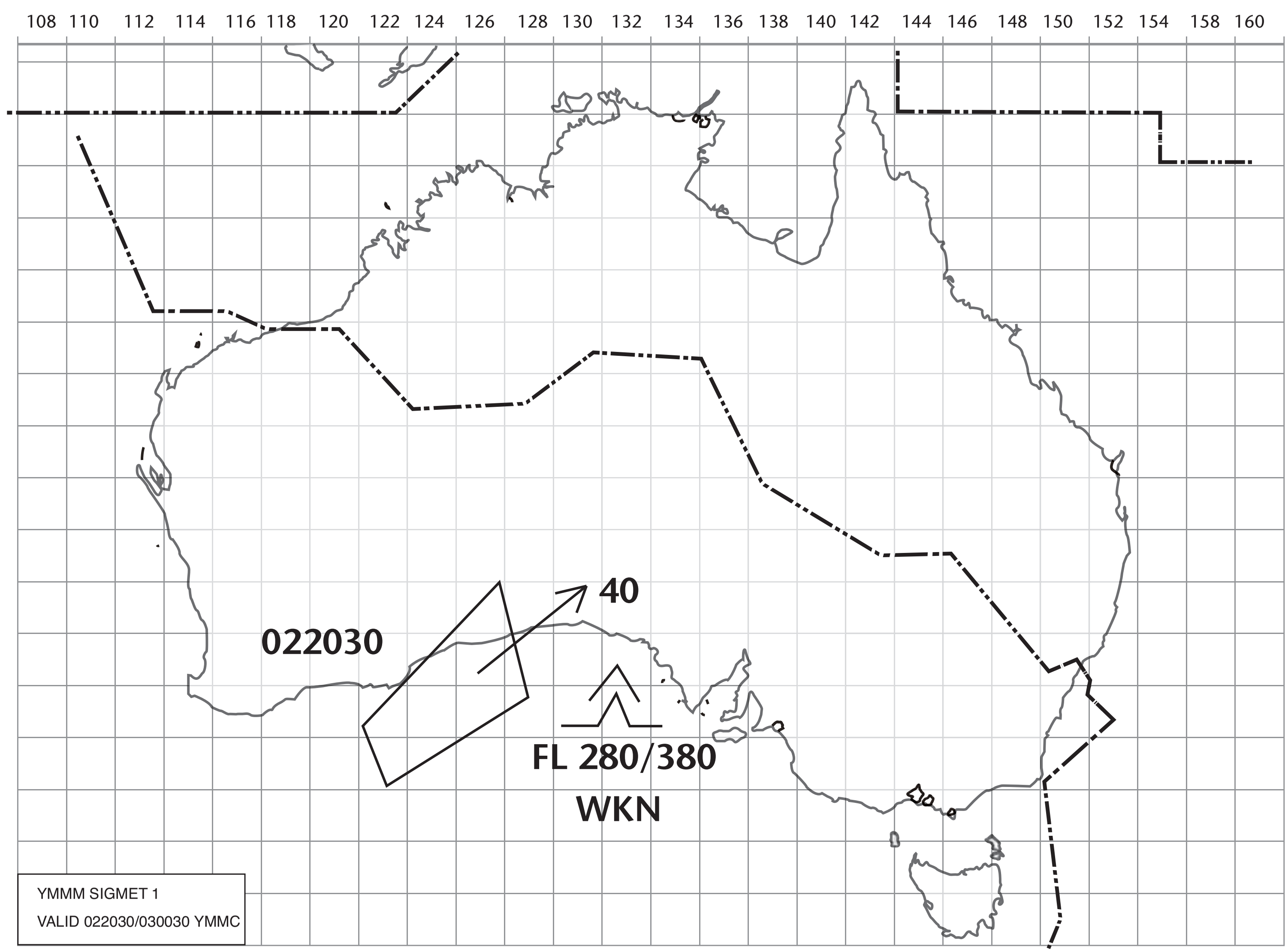
INFO SOURCE: MTSAT-1R, AIREP
AVIATION COLOUR CODE: RED
ERUPTION DETAILS: ERUPTED AT 20050711/0532Z
RMK: NIL
NXT ADVISORY: NO LATER THAN 20050711/1315Z

MODEL SVA

SIGMET FOR VOLCANIC ASH IN GRAPHICAL FORMAT



SIGMET FOR PHENOMENA OTHER THAN TROPICAL CYCLONE AND VOLCANIC ASH IN GRAPHICAL FORMAT MODEL SGE



SHEET OF NOTATIONS USED IN FLIGHT DOCUMENTATION

MODEL SN

1. Symbols for significant weather

Tropical cyclone	Drizzle
Severe squall line*	Rain
Moderate turbulence	Snow
Severe turbulence	Shower / Hail
Mountain waves	Widespread blowing snow
Moderate aircraft icing	Severe sand or dust haze
Severe aircraft icing	Widespread sandstorm or dust storm
Widespread fog	Widespread haze
Radioactive materials in the atmosphere**	Widespread mist
Volcanic eruption***	Widespread smoke
Mountain obscuration	Freezing precipitation ****

* In-flight documentation for flights operating up to FL100. This symbol refers to "squall line".

** The following information should be included at the side of the chart: radioactive materials symbol; latitude/longitude of accident site; date and time of accident; check NOTAM for further information.

*** The following information should be included at the side of the chart: volcanic eruption symbol; name and international number of volcano (if known); latitude/longitude; date and time of the first eruption (if known);
Check SIGMETs and NOTAM or ASHTAM for volcanic ash.

**** This symbol does not refer to icing due to precipitation coming into contact with an aircraft which is at a very low temperature.

NOTE: Height indications between which phenomena are expected, top above base as per chart legend.

2. Fronts and convergence zones and other symbols used

	Cold front at the surface	FL 270	Position, speed and level of max. wind
	Warm front at the surface		Convergence line
	Occluded front at the surface	0°:100	Freezing level
	Quasi-stationary front at the surface		Intertropical convergence zone
H 460	Tropopause High	10	State of the sea
270 L	Tropopause Low	18	Sea-surface temperature
380	Tropopause Level	40	Widespread strong surface wind *

Wind arrows indicate the maximum wind in jet and the flight level at which it occurs. If the maximum wind speed is 240 km/h (120 kt) or more, the flight levels between which winds are greater than 160 km/h (80 kt) is placed below the maximum wind level. In the example, winds are greater than 160 km/h (80 kt) between FL 220 and FL 400.

The heavy line delineating the jet axis begins/ends at the points where a wind speed of 160 km/h (80 kt) is forecast.

* This symbol refers to widespread surface wind speeds exceeding 60 km/h (30 kt).

3. Abbreviations used to describe clouds

3.1 Type

CI = Cirrus
CC = Cirrocumulus
CS = Cirrostratus
AC = Altocumulus
AS = Altostratus
NS = Nimbostratus
SC = Stratocumulus
ST = Stratus
CU = Cumulus
CB = Cumulonimbus

3.2 Amount

Clouds except CB
FEW = few (1/8 to 2/8)
SCT = scattered (3/8 to 4/8)
BKN = broken (5/8 to 7/8)
OVC = overcast (8/8)

CB only
ISOL = individual CBs (isolated)
OCNL = well-separated CBs (occasional)
FRQ = CBs with little or no separation (frequent)
EMBD = CBs embedded in layers of other clouds or concealed by haze (embedded)

3.3 Heights

Heights are indicated on SWH and SWM charts in flight levels (FL), top over base.
When XXX is used, tops or bases are outside the layer of the atmosphere to which the chart applies.
In SWL charts:
i) Heights are indicated as altitudes above mean sea level;
ii) The abbreviation SFC is used to indicate ground level.

4. Depicting of lines and systems on specific charts

4.1 Models SWH and SWM — Significant weather charts (high and medium)

Scalloped line = demarcation of areas of significant weather
Heavy broken line = delineation of area of CAT
Heavy solid line interrupted by wind arrow and flight level = position of jet stream axis with indication of wind direction, speed in kt or km/h and height in flight levels. The vertical extent of the jet stream is indicated (in flight levels) e.g. FL 270 accompanied by 240/290 indicates that the jet extends from FL 240 to FL 290.
Figures on arrows = speed in kt or km/h of movements of frontal system
Flight levels inside small rectangles = height in flight levels of tropopause at spot locations, e.g. $\boxed{340}$. Low and high points of the tropopause topography are indicated by the letters L or H, respectively, inside a pentagon with the height in flight levels.
Display explicit FL for JET depths and tropopause height even if outside forecast bounds

4.2 Model SWL — Significant weather chart (low level)

X = position of pressure centres given in hectopascals
L = centre of low pressure
H = centre of high pressure
Scalloped lines = demarcation of area of significant weather
Dashed lines = altitude of 0°C isotherm in feet (hectofeet) or metres
NOTE: 0°C level may also be indicated by $\boxed{0°: 060}$, i.e. 0°C level is at an altitude of 6 000 ft
Figures on arrows = speed in kt or km/h of movement of frontal systems, depressions or anticyclones
Figure inside the state of the sea symbol = total wave height in feet or metres
Figure inside the sea-surface temperature symbol = sea-surface temperature in °C
Figures inside the strong surface wind symbol = wind in kt or km/h

4.3 Arrows, feathers and pennants

Arrows indicate direction. Number of pennants and/or feathers correspond to speed.
Example:

270°/115 kt (equivalent to 230 km/h)
Pennants correspond to 50 kt or 100 km/h
Feathers correspond to 10 kt or 20 km/h
Half-feathers correspond to 5 kt or 10 km/h

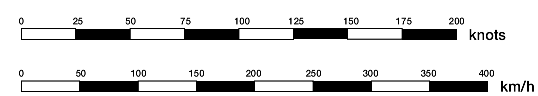
* A conversion factor of 1 to 2 is used.

Conversion of knots into kilometres per hour

Kilometres per hour

knots	0	1	2	3	4	5	6	7	8	9
00	0	1.85	3.70	5.56	7.41	9.26	11.11	12.96	14.82	16.67
10	18.52	20.37	22.22	24.08	25.93	27.78	29.63	31.48	33.34	35.19
20	37.04	38.89	40.74	42.60	44.45	46.30	48.15	50.00	51.86	53.71
30	55.56	57.41	59.26	61.12	62.97	64.82	66.67	68.52	70.38	72.23
40	74.08	75.93	77.78	79.64	81.49	83.34	85.19	87.04	88.90	90.75
50	92.60	94.45	96.30	98.16	100.01	101.86	103.71	105.56	107.42	109.27
60	111.12	112.97	114.82	116.68	118.53	120.38	122.23	124.08	125.94	127.79
70	129.64	131.49	133.34	135.20	137.05	138.90	140.75	142.60	144.46	146.31
80	148.16	150.01	151.86	153.72	155.57	157.42	159.27	161.12	162.98	164.83
90	166.68	168.53	170.38	172.24	174.09	175.94	177.79	179.64	181.50	183.35
100	185.20	187.05	188.90	190.76	192.61	194.46	196.31	198.16	200.02	201.87
110	203.72	205.57	207.42	209.28	211.13	212.98	214.83	216.68	218.54	220.39
120	222.24	224.09	225.94	227.80	229.65	231.50	233.35	235.20	237.06	238.91
130	240.76	242.61	244.46	246.32	248.17	250.02	251.87	253.72	255.58	257.43
140	259.28	261.13	262.98	264.84	266.69	268.54	270.39	272.24	274.10	275.95
150	277.80	279.65	281.50	283.36	285.21	287.06	288.91	290.76	292.62	294.47
160	296.32	298.17	300.02	301.88	303.73	305.58	307.43	309.28	311.14	312.99
170	314.84	316.69	318.54	320.40	322.25	324.10	325.95	327.80	329.66	331.51
180	333.36	335.21	337.06	338.92	340.77	342.62	344.47	346.32	348.18	350.03
190	351.88	353.73	355.58	357.44	359.29	361.14	362.99	364.84	366.70	368.55

kt:	200	210	220	230	240	250	260	270	280	290
km/h:	370.40	388.92	407.44	425.96	444.48	463.00	481.52	500.04	518.56	537.08
kt:	300	310	320	330	340	350	360	370	380	390
km/h:	555.60	574.12	592.64	611.16	629.68	648.20	666.72	685.24	703.76	722.28
kt:	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	
km/h:	0.19	0.37	0.56	0.74	0.93	1.11	1.30	1.48	1.67	



APPENDIX 2. TECHNICAL SPECIFICATIONS RELATED TO WORLD AREA FORECAST SYSTEM AND METEOROLOGICAL OFFICES

(See Chapter 3 of this Annex.)

1. WORLD AREA FORECAST SYSTEM

1.1 Formats and codes

WAFCs shall adopt uniform formats and codes for the supply of forecasts and amendments.

1.2 Upper-air forecasts

1.2.1 The forecasts of upper wind; upper-air temperature; and humidity; direction, speed and flight level of maximum wind; flight level and temperature of tropopause, and geopotential altitude of flight levels shall be prepared four times a day by a WAFC and shall be valid for fixed valid times at 6, 12, 18, 24, 30 and 36 hours after the time (0000, 0600, 1200 and 1800 UTC) of the synoptic data on which the forecasts were based. The dissemination of each forecast shall be in the above order and shall be completed as soon as technically feasible but not later than 6 hours after standard time of observation.

1.2.2 The grid point forecasts prepared by a WAFC shall comprise:

a) wind and temperature data for flight levels 50 (850 hPa), 100 (700 hPa), 140 (600 hPa), 180 (500 hPa), 240 (400 hPa), 300 (300 hPa), 340 (250 hPa), 390 (200 hPa), 450 (150 hPa), and 530 (100 hPa);

b) flight level and temperature of tropopause;

c) direction, speed and flight level of maximum wind;

d) humidity data for flight levels 50 (850 hPa), 100 (700 hPa), 140 (600 hPa) and 180 (500 hPa); and

e) geopotential altitude data for flight levels 50 (850 hPa), 100 (700 hPa), 140 (600 hPa), 180 (500 hPa), 240 (400 hPa), 300 (300 hPa), 340 (250 hPa), 390 (200 hPa) and 450 (150 hPa).

1.2.3 The foregoing grid point forecasts shall be issued by a WAFC in binary code form using the GRIB code form prescribed by WMO.

Note.— The GRIB code form is contained in WMO Publication No. 306, Manual on Codes*, Volume I.2, Part B — Binary Codes.*

1.2.4 The foregoing grid point forecasts shall be prepared by a WAFC in a fixed grid with a horizontal resolution of 140 km.

Note.— 140 km represents a distance of about 1.25° of latitude.

1.3 Significant weather (SIGWX) forecasts

1.3.1 General provisions

1.3.1.1 Forecasts of significant en-route weather phenomena shall be prepared as SIGWX forecasts four times a day by a WAFC and shall be valid for fixed valid times at 24 hours after the time (0000, 0600, 1200 and 1800 UTC) of the synoptic data on which the forecasts were based. The dissemination of each forecast shall be completed as soon as technically feasible but not later than 11 hours after standard time of observation.

1.3.1.2 SIGWX forecasts shall be issued in binary code form using the BUFR code form prescribed by WMO.

Note.— The BUFR code form is contained in WMO Publication No. 306, Manual on Codes, *Volume I.2, Part B — Binary Codes*.

1.3.2 Types of SIGWX forecasts

SIGWX forecasts shall be issued as:

a) high-level SIGWX forecasts for flight levels between 250 and 630; and

b) medium-level SIGWX forecasts for flight levels between 100 and 250 for limited geographical areas, as determined by regional air navigation agreement.

1.3.3 Items included in SIGWX forecasts

High-level and medium-level SIGWX forecasts shall include the following items:

a) tropical cyclone provided that the maximum of the 10-minute mean surface wind speed is expected to reach or exceed 63 km/h (34 kt);

b) severe squall lines;

c) moderate or severe turbulence (in cloud or clear air);

d) moderate or severe icing;

e) widespread sandstorm/duststorm;

f) cumulonimbus clouds associated with thunderstorms and with a) to e);

Note. — Non-convective cloud areas associated with in-cloud moderate or severe turbulence and/or moderate or severe icing are to be included in the SIGWX forecasts.

g) flight level of tropopause;

h) jet streams;

i) information on the location of volcanic eruptions that are producing ash clouds of significance to aircraft operations comprising: volcanic eruption symbol at the location of the volcano and, at the side of the chart, the volcano eruption symbol, the name of the volcano, latitude/longitude, the date and time of first eruption, if known, and a reference to SIGMET and NOTAM or ASHTAM issued for the area concerned; and

j) information on the location of an accidental release of radioactive materials into the atmosphere, of significance to aircraft operations, comprising: the radioactivity symbol at the site of the accident and, at the side of the chart, the radioactivity symbol, latitude/longitude of the site of the accident, date and time of the accident and a reminder to users to check NOTAM for the area concerned.

Note.— Items to be included in low-level SIGWX forecasts (i.e. flight levels below 100) are included in Appendix 5.

1.3.4 Criteria for including items in SIGWX forecasts

The following criteria shall be applied for high-level and medium-level SIGWX forecasts:

a) items a) to f) in 1.3.3 shall only be included if expected to occur between the lower and upper level of the SIGWX forecast;

b) the abbreviation "CB" shall only be included when it refers to the occurrence or expected occurrence of cumulonimbus clouds:

   1) affecting an area with a maximum spatial coverage of 50 per cent or more of the area concerned;

   2) along a line with little or no space between individual clouds; or

   3) embedded in cloud layers or concealed by haze.

c) the inclusion of "CB" shall be understood to include all weather phenomena normally associated with cumulonimbus clouds, i.e. thunderstorm, moderate or severe icing, moderate or severe turbulence and hail;

d) where a volcanic eruption or an accidental release of radioactive materials into the atmosphere warrants the inclusion of the volcanic activity symbol or the radioactivity symbol in SIGWX forecasts, the symbols shall be included on high-level and medium-level SIGWX forecasts irrespective of the height to which the ash column or radioactive material is reported or expected to reach; and

e) in the case of co-incident or the partial overlapping of items a), i) and j) in 1.3.3, the highest priority shall be given to item i), followed by item j) and a). The item with the highest priority shall be placed at the location of the event, and an arrow shall be used to link the location of the other item(s) to its associated symbol or text box.

2. METEOROLOGICAL OFFICES

2.1 Use of WAFS products

2.1.1 Aerodrome meteorological offices shall use forecasts issued by the WAFCs in the preparation of flight documentation, whenever these forecasts cover the intended flight path in respect of time, altitude and geographical extent, unless otherwise agreed between the meteorological authority and the operator concerned.

2.1.2 In order to ensure uniformity and standardization of flight documentation, the WAFS GRIB and BUFR data received shall be decoded into standard WAFS charts in accordance with relevant provisions in this Annex, and the meteorological content and identification of the originator of the WAFS forecasts shall not be amended.

2.2 Notification of WAFC concerning significant discrepancies

Meteorological offices using WAFS BUFR data shall notify the WAFC concerned immediately if significant discrepancies in accordance with the following criteria are detected or reported in respect of WAFS SIGWX forecasts:

a) icing, turbulence, thunderstorms that are obscured, frequent, embedded or occurring at a squall line, and sandstorms/duststorms:

— newly expected occurrence or non-occurrence; or

b) volcanic eruptions or an accidental release of radioactive materials into the atmosphere, of significance to aircraft operations:

— inclusion or removal of volcanic activity symbol or radiation symbol.

The WAFC receiving the message shall acknowledge its receipt to the originator, together with a brief comment on the report and any action taken, using the same means of communication employed by the originator.

Note.— Guidance on reporting significant discrepancies is provided in the Manual of Aeronautical Meteorological Practice *(Doc 8896).*

3. VOLCANIC ASH ADVISORY CENTRES (VAAC)

3.1 Volcanic ash advisory information

3.1.1 **Recommendation.—** *The advisory information on volcanic ash issued in abbreviated plain language, using approved ICAO abbreviations and numerical values of self-explanatory nature, should be in accordance with the template shown in Table A2-1. When no approved ICAO abbreviations are available, English plain language text, to be kept to a minimum, should be used.*

3.1.2 **Recommendation.—** *The volcanic ash advisory information listed in Table A2-1, when issued in graphical format, should be as specified in Appendix 1. When issued in binary format, the BUFR code form should be used.*

Note.— The BUFR code form is contained in WMO Publication No. 306, Manual on Codes, *Volume I.2, Part B — Binary Codes.*

4. STATE VOLCANO OBSERVATORIES

4.1 Information from State volcano observatories

Recommendation.— *The information required to be sent by State volcano observatories to their associated ACCs, MWO and VAAC should comprise:*

a) for significant pre-eruption volcanic activity: the date/time (UTC) of report; name and, if known, number of the volcano; location (latitude/longitude); and description of volcanic activity; and

b) for volcanic eruption: the date/time (UTC) of report and time of eruption (UTC) if different from time of report; name and, if known, number of the volcano; location (latitude/longitude); and description of the eruption including *whether an ash column was ejected and, if so, an estimate of height of ash column and the extent of any visible volcanic ash cloud, during and following an eruption.*

Note.— Pre-eruption volcanic activity in this context means unusual and/or increasing volcanic activity which could presage a volcanic eruption.

5. TROPICAL CYCLONE ADVISORY CENTRES (TCAC)

5.1 Tropical cyclone advisory information

5.1.1 The advisory information on tropical cyclones shall be issued for tropical cyclones when the maximum of the 10-minute mean surface wind speed is expected to reach or exceed 63 km/h (34 kt) during the period covered by the advisory.

5.1.2 The advisory information on tropical cyclones shall be in accordance with the template shown in Table A2-2.

5.1.3 **Recommendation.—** *When the tropical cyclone advisory information is issued in binary format, the BUFR code form should be used.*

Note.— The BUFR code form is contained in WMO Publication No. 306, Manual on Codes*, Volume I.2, Part B — Binary Codes.*

Table A2-1. Template for advisory message for volcanic ash

Key: M = inclusion mandatory, part of every message;
O = inclusion optional;
= = a double line indicates that the text following it should be placed on the subsequent line.

Note 1.— The ranges and resolutions for the numerical elements included in advisory messages for volcanic ash are shown in Appendix 6, Table A6-4.

Note 2.— The explanations for the abbreviations can be found in the Procedures for Air Navigation Services — ICAO Abbreviations and Codes *(PANS-ABC, Doc 8400).*

Note 3.— Inclusion of a "colon" after each element heading is mandatory.

Note 4.— The numbers 1 to 18 are included only for clarity and they are not part of the advisory message, as shown in the example.

	Element	*Detailed content*	*Template(s)*		*Examples*	
1	Identification of the type of message (M)	Type of message	VA ADVISORY		VA ADVISORY	
2	Time of origin (M)	Year, month, day, time in UTC	DTG:	nnnnnnnn/nnnnZ	DTG:	20000402/0700Z
3	Name of VAAC (M)	Name of VAAC	VAAC:	nnnnnnnnnnnn	VAAC:	TOKYO
4	Name of volcano (M)	Name and IAVCEI[1] number of volcano	VOLCANO:	nnnnnnnnnnnnnnnnnnnnn [nnnnnn] *or* UNKNOWN *or* UNNAMED	VOLCANO: VOLCANO:	USUZAN 805-03 UNNAMED
5	Location of volcano (M)	Location of volcano in degrees and minutes	PSN:	Nnnnn *or* Snnnn Wnnnnn *or* Ennnnn *or* UNKNOWN *or* UNNAMED	PSN: PSN:	N4230 E14048 UNKNOWN
6	State *or* region (M)	State, *or* region if ash is not reported over a State	AREA:	nnnnnnnnnnnnnnnn	AREA:	JAPAN
7	Summit elevation (M)	Summit elevation in m (*or* ft)	SUMMIT ELEV:	nnnnM (*or* nnnnnFT)	SUMMIT ELEV:	732M
8	Advisory number (M)	Advisory number: year in full and message number (separate sequence for each volcano)	ADVISORY NR:	nnnn/nnnn	ADVISORY NR:	2000/432
9	Information source (M)	Information source using free text	INFO SOURCE:	*Free text up to 32 characters*	INFO SOURCE:	GMS-JMA AIREP
10	Colour code (O)	Aviation colour code	AVIATION COLOUR CODE:	RED *or* ORANGE *or* YELLOW *or* GREEN *or* UNKNOWN *or* NOT GIVEN *or* NIL	AVIATION COLOUR CODE:	RED

	Element	*Detailed content*	*Template(s)*		*Examples*	
11	Eruption details (M)	Eruption details (including date/time of eruption(s))	ERUPTION DETAILS:	*Free text up to 64 characters* *or* UNKNOWN	ERUPTION DETAILS:	ERUPTED 20000402/0641Z ERUPTION OBS VA TO ABV FL300
12	Time of observation of ash (M)	Day and time (in UTC) of observation of volcanic ash	OBS VA DTG:	nn/nnnnZ	OBS VA DTG:	02/0645Z
13	Observed *or* estimated ash cloud (M)	Horizontal (in degrees and minutes) and vertical extent at the time of observation of the observed *or* estimated ash cloud *or*, if the base is unknown, the top of the observed *or* estimated ash cloud; movement of the observed *or* estimated ash cloud	OBS VA CLD *or* EST VA CLD:	TOP FLnnn *or* SFC/FLnnn *or* FLnnn/nnn [nnKM WID LINE[2] BTN (nnNM WID LINE BTN)] Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn][– Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn]][3] *or* TOP FLnnn *or* SFC/FLnnn *or* FLnnn/nnn MOV N nnKMH (*or* KT) *or* MOV NE nnKMH (*or* KT) *or* MOV E nnKMH (*or* KT) *or* MOV SE nnKMH (*or* KT) *or* MOV S nnKMH (*or* KT) *or* MOV SW nnKMH (*or* KT) *or* MOV W nnKMH (*or* KT) *or* MOV NW nnKMH (*or* KT)[4] VA NOT IDENTIFIABLE FROM SATELLITE DATA WINDS FLnnn/nnn nnn/nn[n] KMH (KT)[4]	OBS VA CLD:	FL150/350 N4230 E14048 – N4300 E14130 – N4246 E14230 – N4232 E14150 – N4230 E14048 SFC/FL150 MOV NE 25KT FL150/350 MOV E 30KT TOP FL240 MOV W 40KMH
14	Forecast height and position of the ash clouds (+6 HR) (M)	Day and time (in UTC) (6 hours from the "Time of observation of ash" given in Item 12); Forecast height and position (in degrees and minutes) for each cloud mass for that fixed valid time	FCST VA CLD +6 HR:	nn/nnnnZ SFC *or* FLnnn/[FL]nnn [nnKM WID LINE[2] BTN (nnNM WID LINE BTN)] Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn][– Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn]][3] *or* NO VA EXP	FCST VA CLD +6 HR:	02/1245Z SFC/FL200 N4230 E14048 – N4232 E14150 – N4238 E14300 – N4246 E14230 FL200/350 N4230 E14048 – N4232 E14150 – N4238 E14300 – N4246 E14230 FL350/600 NO VA EXP

	Element	*Detailed content*	*Template(s)*		*Examples*	
15	Forecast height and position of the ash clouds (+12 HR) (M)	Day and time (in UTC) (12 hours from the "Time of observation of ash" given in Item 12); Forecast height and position (in degrees and minutes) for each cloud mass for that fixed valid time	FCST VA CLD +12 HR:	nn/nnnnZ SFC *or* FLnnn/[FL]nnn [nnKM WID LINE[2] BTN (nnNM WID LINE BTN)] Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn][– Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn]][3] *or* NO VA EXP	FCST VA CLD +12 HR:	02/1845Z SFC/FL300 N4230 E14048 – N4232 E14150 – N4238 E14300 – N4246 E14230 FL300/600 NO VA EXP
16	Forecast height and position of the ash clouds (+18 HR) (M)	Day and time (in UTC) (18 hours from the "Time of observation of ash" given in Item 12); Forecast height and position (in degrees and minutes) for each cloud mass for that fixed valid time	FCST VA CLD +18 HR:	nn/nnnnZ SFC *or* FLnnn/[FL]nnn [nnKM WID LINE[2] BTN (nnNM WID LINE BTN)] Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn][– Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn]][3] *or* NO VA EXP	FCST VA CLD +18 HR:	03/0045Z SFC/FL600 NO VA EXP
17	Remarks (M)	Remarks, as necessary	RMK:	*Free text up to 256 characters* *or* NIL	RMK:	ASH CLD CAN NO LONGER BE DETECTED ON SATELLITE IMAGE
18	Next advisory (M)	Year, month, day and time in UTC	NXT ADVISORY:	nnnnnnnn/nnnnZ *or* NO LATER THAN nnnnnnnn/nnnnZ *or* NO FURTHER ADVISORIES *or* WILL BE ISSUED BY nnnnnnnn/nnnnZ	NXT ADVISORY:	20000402/1300Z

Notes.—

1. International Association of Volcanology and Chemistry of the Earth's Interior (IAVCEI).
2. A straight line between two points drawn on a map in the Mercator projection or a straight line between two points which crosses lines of longitude at a constant angle.
3. Up to 4 selected layers.
4. If ash reported (e.g. AIREP) but not identifiable from satellite data.

Example A2-1. Advisory message for volcanic ash

VA ADVISORY	
DTG:	20000402/0700Z
VAAC:	TOKYO
VOLCANO:	USUZAN 805-03
PSN:	N4230 E14048
AREA:	JAPAN
SUMMIT ELEV:	732M
ADVISORY NR:	2000/432
INFO SOURCE:	GMS JMA
AVIATION COLOUR CODE:	RED
ERUPTION DETAILS:	ERUPTED 20000402/0614Z ERUPTION OBS VA TO ABV FL300
OBS VA DTG:	02/0645Z
OBS VA CLD:	FL150/350 N4230 E14048 – N4300 E14130 – N4246 E14230 – N4232 E14150 – N4230 E14048 SFC/FL150 MOV NE 25KT FL150/350 MOV E 30KT
FCST VA CLD +6 HR:	02/1245Z SFC/FL200 N4230 E14048 – N4232 E14150 – N4238 E14300 – N4246 E14230 FL200/350 N4230 E14048 – N4232 E14150 – N4238 E14300 – N4246 E14230 FL350/600 NO VA EXP
FCST VA CLD +12 HR:	02/1845Z SFC/FL300 N4230 E14048 – N4232 E14150 – N4238 E14300 – N4246 E14230 FL300/600 NO VA EXP
FCST VA CLD +18 HR:	03/0045Z SFC/FL600 NO VA EXP
RMK:	VA CLD CAN NO LONGER BE DETECTED ON SATELLITE IMAGE
NXT ADVISORY:	20000402/1300Z

Table A2-2. Template for advisory message for tropical cyclones

Key: = = a double line indicates that the text following it should be placed on the subsequent line.

Note 1.— The ranges and resolutions for the numerical elements included in advisory messages for tropical cyclones are shown in Appendix 6, Table A6-4.

Note 2.— The explanations for the abbreviations can be found in the Procedures for Air Navigation Services — ICAO Abbreviations and Codes *(PANS-ABC, Doc 8400).*

Note 3.— All the elements are mandatory.

Note 4.— Inclusion of a "colon" after each element heading is mandatory.

Note 5. — The numbers 1 to 19 are included only for clarity and they are not part of the advisory message, as shown in the example.

	Element	*Detailed content*	*Template(s)*		*Examples*	
1	Identification of the type of message	Type of message	TC ADVISORY		TC ADVISORY	
2	Time of origin	Year, month, day and time in UTC of issue	DTG:	nnnnnnnn/nnnnZ	DTG:	20040925/1600Z
3	Name of TCAC	Name of TCAC (location indicator *or* full name)	TCAC:	nnnn *or* nnnnnnnnnn	TCAC: TCAC:	YUFO[1] MIAMI
4	Name of tropical cyclone	Name of tropical cyclone *or* "NIL" for unnamed tropical cyclone	TC:	nnnnnnnnnnnn *or* NIL	TC:	GLORIA
5	Advisory number	Advisory number (starting with "01" for each cyclone)	NR:	nn	NR:	01
6	Position of the centre	Position of the centre of the tropical cyclone (in degrees and minutes)	PSN:	Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn]	PSN:	N2706 W07306
7	Direction and speed of movement	Direction and speed of movement given in sixteen compass points and km/h (*or* kt), respectively, *or* moving slowly (< 6 km/h (3 kt)) *or* stationary (< 2 km/h (1 kt))	MOV:	N nnKMH (*or* KT) *or* NNE nnKMH (*or* KT) *or* NE nnKMH (*or* KT) *or* ENE nnKMH (*or* KT) *or* E nnKMH (*or* KT) *or* ESE nnKMH (*or* KT) *or* SE nnKMH (*or* KT) *or* SSE nnKMH (*or* KT) *or* S nnKMH (*or* KT) *or* SSW nnKMH (*or* KT) *or* SW nnKMH (*or* KT) *or* WSW nnKMH (*or* KT) *or* W nnKMH (*or* KT) *or* WNW nnKMH (*or* KT) *or* NW nnKMH (*or* KT) *or* NNW nnKMH (*or* KT) *or* SLW *or* STNR	MOV:	NW 20KMH

Element		Detailed content	Template(s)		Examples	
8	Central pressure	Central pressure (in hPa)	C:	nnnHPA	C:	965HPA
9	Maximum surface wind	Maximum surface wind near the centre (mean over 10 minutes, in km/h (*or* kt))	MAX WIND:	nn[n]KMH (*or* nn[n]KT)	MAX WIND:	90KMH
10	Forecast of centre position (+6 HR)	Day and time (in UTC) (6 hours from the "DTG" given in Item 2); Forecast position (in degrees and minutes) of the centre of the tropical cyclone	FCST PSN +6 HR:	nn/nnnnZ Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn]	FCST PSN +6 HR:	25/2200Z N2748 W07350
11	Forecast of maximum surface wind (+6 HR)	Forecast of maximum surface wind (6 hours after the "DTG" given in Item 2)	FCST MAX WIND +6 HR:	nn[n]KMH (*or* nn[n]KT)	FCST MAX WIND +6 HR:	90KMH
12	Forecast of centre position (+12 HR)	Day and time (in UTC) (12 hours from the "DTG" given in Item 2); Forecast position (in degrees and minutes) of the centre of the tropical cyclone	FCST PSN +12 HR:	nn/nnnnZ Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn]	FCST PSN +12 HR:	26/0400Z N2830 W07430
13	Forecast of maximum surface wind (+12 HR)	Forecast of maximum surface wind (12 hours after the "DTG" given in Item 2)	FCST MAX WIND +12 HR:	nn[n]KMH (*or* nn[n]KT)	FCST MAX WIND +12 HR:	90KMH
14	Forecast of centre position (+18 HR)	Day and time (in UTC) (18 hours from the "DTG" given in Item 2); Forecast position (in degrees and minutes) of the centre of the tropical cyclone	FCST PSN +18 HR:	nn/nnnnZ Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn]	FCST PSN +18 HR:	26/1000Z N2852 W07500
15	Forecast of maximum surface wind (+18 HR)	Forecast of maximum surface wind (18 hours after the "DTG" given in Item 2)	FCST MAX WIND +18 HR:	nn[n]KMH (*or* nn[n]KT)	FCST MAX WIND +18 HR:	85KMH
16	Forecast of centre position (+24 HR)	Day and time (in UTC) (24 hours from the "DTG" given in Item 2); Forecast position (in degrees and minutes) of the centre of the tropical cyclone	FCST PSN +24 HR:	nn/nnnnZ Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn]	FCST PSN +24 HR:	26/1600Z N2912 W07530
17	Forecast of maximum surface wind (+24 HR)	Forecast of maximum surface wind (24 hours after the "DTG" given in Item 2)	FCST MAX WIND +24 HR:	nn[n]KMH (*or* nn[n]KT)	FCST MAX WIND +24 HR:	80KMH

	Element	*Detailed content*	*Template(s)*		*Examples*	
18	Remarks	Remarks, as necessary	RMK:	*Free text up to 256 characters* *or* NIL	RMK:	NIL
19	Expected time of issuance of next advisory	Expected year, month, day and time (in UTC) of issuance of next advisory	NXT MSG:	[BFR] nnnnnnnn/nnnnZ *or* NO MSG EXP	NXT MSG:	20040925/2000Z

Note.—

1. Fictitious location.

Example A2-2. Advisory message for tropical cyclones

TC ADVISORY	
DTG:	19970925/1600Z
TCAC:	YUFO
TC:	GLORIA
NR:	01
PSN:	N2706 W07306
MOV:	NW 20KMH
C:	965HPA
MAX WIND:	90KMH
FCST PSN +6 HR:	25/2200Z N2748 W07350
FCST MAX WIND +6 HR:	90KMH
FCST PSN +12 HR:	26/0400Z N2830 W07430
FCST MAX WIND +12 HR:	90KMH
FCST PSN +18 HR:	26/1000Z N2852 W07500
FCST MAX WIND +18 HR:	85KMH
FCST PSN +24 HR:	26/1600Z N2912 W07530
FCST MAX WIND +24 HR:	80KMH
RMK:	NIL
NXT MSG:	19970925/2000Z

APPENDIX 3. TECHNICAL SPECIFICATIONS RELATED TO METEOROLOGICAL OBSERVATIONS AND REPORTS

(See Chapter 4 of this Annex.)

1. GENERAL PROVISIONS RELATED TO METEOROLOGICAL OBSERVATIONS

1.1 **Recommendation.—** *The meteorological instruments used at an aerodrome should be situated in such a way as to supply data which are representative of the area for which the measurements are required.*

Note.— Specifications concerning the siting and construction of equipment and installations on operational areas, aimed at reducing the hazard to aircraft to a minimum, are contained in Annex 14, Volume I, Chapter 8.

1.2 **Recommendation.—** *Meteorological instruments at aeronautical meteorological stations should be exposed, operated and maintained in accordance with the practices, procedures and specifications promulgated by the World Meteorological Organization.*

1.3 **Recommendation.—** *The observers at an aerodrome should be located, in so far as is practicable, so as to supply data which are representative of the area for which the observations are required.*

1.4 **Recommendation.—** *Where automated equipment forms part of an integrated semi-automatic observing system, displays of data which are made available to the local ATS units should be a subset of and displayed parallel to those available in the local meteorological service unit. In those displays, each meteorological element should be annotated to identify, as appropriate, the locations for which the element is representative.*

2. GENERAL CRITERIA RELATED TO METEOROLOGICAL REPORTS

2.1 Format of meteorological reports

2.1.1 Local routine and special reports shall be issued in abbreviated plain language, in accordance with the template shown in Table A3-1.

2.1.2 METAR and SPECI shall be issued in accordance with the template shown in Table A3-2 and disseminated in the METAR and SPECI code forms prescribed by the World Meteorological Organization.

Note.— The METAR and SPECI code forms are contained in WMO Publication No. 306, Manual on Codes*, Volume I.1, Part A — Alphanumeric Codes.*

2.1.3 **Recommendation**.— *METAR and SPECI should be disseminated, under bilateral agreements between States in a position to do so, in the WMO BUFR code form, in addition to the dissemination of the METAR and SPECI in accordance with 2.1.2.*

Note.— The BUFR code form is contained in WMO Publication No. 306, Manual on Codes*, Volume I.2, Part B — Binary Codes.*

2.2 Use of CAVOK

When the following conditions occur simultaneously at the time of observation:

a) visibility, 10 km or more;

Note.— In local routine and special reports, visibility refers to the value(s) to be reported in accordance with 4.2.4.2 and 4.2.4.3; in METAR and SPECI, visibility refers to the value(s) to be reported in accordance with 4.2.4.4.

b) no cloud of operational significance;

c) no weather of significance to aviation as given in 4.4.2.3 and 4.4.2.5;

information on visibility, runway visual range, present weather and cloud amount, cloud type and height of cloud base shall be replaced in all meteorological reports by the term "CAVOK".

2.3 Criteria for issuance of local special reports and SPECI

2.3.1 The list of criteria for the issuance of local special reports shall include the following:

a) those values which most closely correspond with the operating minima of the operators using the aerodrome;

b) those values which satisfy other local requirements of the air traffic services units and of the operators;

c) an increase in air temperature of 2°C or more from that given in the latest report, or an alternative threshold value as agreed between the meteorological authority, the appropriate ATS authority and the operators concerned;

d) the available supplementary information concerning the occurrence of significant meteorological conditions in the approach and climb-out areas as given in Table A3-1; and

e) those values which constitute criteria for SPECI.

2.3.2 **Recommendation.—** *SPECI should be issued whenever changes in accordance with the following criteria occur:*

a) when the mean surface wind direction has changed by 60° or more from that given in the latest report, the mean speed before and/or after the change being 20 km/h (10 kt) or more;

b) when the mean surface wind speed has changed by 20 km/h (10 kt) or more from that given in the latest report;

c) when the variation from the mean surface wind speed (gusts) has increased by 20 km/h (10 kt) or more from that given in the latest report, the mean speed before and/or after the change being 30 km/h (15 kt) or more;

d) when the wind changes through values of operational significance. The threshold values should be established by the meteorological authority in consultation with the appropriate ATS authority and operators concerned, taking into account changes in the wind which would:

1) require a change in runway(s) in use; and

2) indicate that the runway tailwind and crosswind components have changed through values representing the main operating limits for typical aircraft operating at the aerodrome;

e) when the visibility is improving and changes to or passes through one or more of the following values, or when the visibility is deteriorating and passes through one or more of the following values:

1) 800, 1 500 or 3 000 m; and

2) 5 000 m, in cases where significant numbers of flights are operated in accordance with the visual flight rules;

Note.— In local special reports, visibility refers to the value(s) to be reported in accordance with 4.2.4.2 and 4.2.4.3; in SPECI, visibility refers to the value(s) to be reported in accordance with 4.2.4.4.

f) when the runway visual range is improving and changes to or passes through one or more of the following values, or when the runway visual range is deteriorating and passes through one or more of the following values: 150, 350, 600 or 800 m;

g) when the onset, cessation or change in intensity of any of the following weather phenomena or combinations thereof occurs:

— *freezing precipitation*
— *moderate or heavy precipitation (including showers thereof)*
— *thunderstorm (with precipitation)*
— *duststorm*
— *sandstorm;*

h) when the onset or cessation of any of the following weather phenomena or combinations thereof occurs:

— *ice crystals*
— *freezing fog*
— *low drifting dust, sand or snow*
— *blowing dust, sand or snow*
— *thunderstorm (without precipitation)*
— *squall*
— *funnel cloud (tornado or waterspout);*

i) when the height of base of the lowest cloud layer of BKN or OVC extent is lifting and changes to or passes through one or more of the following values, or when the height of base of the lowest cloud layer of BKN or OVC extent is lowering and passes through one or more of the following values:

1) 30, 60, 150 or 300 m (100, 200, 500 or 1 000 ft); and

2) 450 m (1 500 ft), in cases where significant numbers of flights are operated in accordance with the visual flight rules;

j) when the amount of a cloud layer below 450 m (1 500 ft) changes:

1) from SCT or less to BKN or OVC; or

2) from BKN or OVC to SCT or less;

k) when the sky is obscured and the vertical visibility is improving and changes to or passes through one or more of the following values, or when the vertical visibility is deteriorating and passes through one or more of the following values: 30, 60, 150 or 300 m (100, 200, 500 or 1 000 ft); and

l) any other criteria based on local aerodrome operating minima, as agreed between the meteorological authority and the operators.

Note.— Other criteria based on local aerodrome operating minima are to be considered in parallel with similar criteria for the inclusion of change groups and for the amendment of TAF developed in response to Appendix 5, 1.3.1 k).

2.3.3 When a deterioration of one weather element is accompanied by an improvement in another element, a single SPECI shall be issued; it shall then be treated as a deterioration report.

3. DISSEMINATION OF METEOROLOGICAL REPORTS

3.1 METAR and SPECI

3.1.1 METAR and SPECI shall be disseminated to international OPMET databanks and the centres designated by regional air navigation agreement for the operation of aeronautical fixed service satellite distribution systems, in accordance with regional air navigation agreement.

3.1.2 METAR and SPECI shall be disseminated to other aerodromes in accordance with regional air navigation agreement.

3.1.3 **Recommendation.—** *SPECI representing a deterioration in conditions should be disseminated immediately after the observation. A SPECI representing an improvement in conditions should be disseminated only after the improvement has been maintained for 10 minutes; it should be amended before dissemination, if necessary, to indicate the conditions prevailing at the end of that 10-minute period. A SPECI representing a deterioration of one weather element and an improvement in another element should be disseminated immediately after the observation.*

3.2 Local routine and special reports

3.2.1 Local routine reports shall be transmitted to local air traffic services units and shall be made available to the operators and to other users at the aerodrome.

3.2.2 Local special reports shall be transmitted to local air traffic services units as soon as the specified conditions occur. However, by agreement between the meteorological authority and the appropriate ATS authority, they need not be issued in respect of:

a) any element for which there is in the local air traffic services unit a display corresponding to the one in the meteorological station, and where arrangements are in force for the use of this display to update information included in local routine and special reports; and

b) runway visual range, when all changes of one or more steps on the reporting scale in use are being reported to the local air traffic services unit by an observer on the aerodrome.

Local special reports shall also be made available to the operators and to other users at the aerodrome.

4. OBSERVING AND REPORTING OF METEOROLOGICAL ELEMENTS

Introductory Note.— Selected criteria applicable to meteorological information referred to under 4.1 to 4.8 for inclusion in aerodrome reports are given in tabular form at Attachment C.

4.1 Surface wind

4.1.1 Siting

4.1.1.1 **Recommendation.—** *Surface wind should be observed at a height of approximately 10 m (30 ft) above the runway(s).*

4.1.1.2 **Recommendation.—** *Representative surface wind observations should be obtained by the use of sensors appropriately sited. Sensors for surface wind observations for local routine and special reports should be sited to give the best practicable indication of conditions along the runway and touchdown zones. At aerodromes where topography or prevalent weather conditions cause significant differences in surface wind at various sections of the runway, additional sensors should be provided.*

Note.— Since, in practice, the surface wind cannot be measured directly on the runway, surface wind observations for take-off and landing are expected to be the best practicable indication of the winds which an aircraft will encounter during take-off and landing.

4.1.2 Displays

4.1.2.1 Surface wind displays relating to each sensor shall be located in the meteorological station with corresponding displays in the appropriate air traffic services units. The displays in the meteorological station and in the air traffic services units shall relate to the same sensors, and where separate sensors are required as specified in 4.1.1.2, the displays shall be clearly marked to identify the runway and section of runway monitored by each sensor.

4.1.2.2 **Recommendation.—** *The mean values of, and significant variations in, the surface wind direction and speed for each sensor should be derived and displayed by automated equipment.*

4.1.3 Averaging

4.1.3.1 The averaging period for surface wind observations shall be:

a) 2 minutes for local routine and special reports and for wind displays in air traffic services units; and

b) 10 minutes for METAR and SPECI, except that when the 10-minute period includes a marked discontinuity in the wind direction and/or speed, only data occurring after the discontinuity shall be used for obtaining mean values; hence, the time interval in these circumstances should be correspondingly reduced.

Note.— A marked discontinuity occurs when there is an abrupt and sustained change in wind direction of 30° or more, with a wind speed of 20 km/h (10 kt) before or after the change, or a change in wind speed of 20 km/h (10 kt) or more, lasting at least 2 minutes.

4.1.3.2 **Recommendation.—** *The averaging period for measuring variations from the mean wind speed (gusts) reported in accordance with 4.1.5.2 c) should be 3 seconds for local routine and special reports and for METAR and SPECI and for wind displays used for depicting variations from the mean wind speed (gusts) in air traffic services units.*

4.1.4 Accuracy of measurement

Recommendation.— *The reported direction and speed of the mean surface wind, as well as variations from the mean surface wind, should meet the operationally desirable accuracy of measurement as given in Attachment A.*

4.1.5 Reporting

4.1.5.1 In local routine and special reports and in METAR and SPECI, the surface wind direction and speed shall be reported in steps of 10 degrees true and 1 kilometre per hour (or 1 knot), respectively. Any observed value that does not fit the reporting scale in use shall be rounded to the nearest step in the scale.

4.1.5.2 In local routine and special reports and in METAR and SPECI:

a) the units of measurement used for the wind speed shall be indicated;

b) variations from the mean wind direction during the past 10 minutes shall be reported as follows, if the total variation is 60° or more:

   1) when the total variation is 60° or more and less than 180° and the wind speed is 6 km/h (3 kt) or more, such directional variations shall be reported as the two extreme directions between which the surface wind has varied;

   2) when the total variation is 60° or more and less than 180° and the wind speed is less than 6 km/h (3 kt), the wind direction shall be reported as variable with no mean wind direction; or

   3) when the total variation is 180° or more, the wind direction shall be reported as variable with no mean wind direction;

c) variations from the mean wind speed (gusts) during the past 10 minutes shall be reported when the maximum wind speed exceeds the mean speed by:

   1) 10 km/h (5 kt) or more in local routine and special reports when noise abatement procedures are applied in accordance with paragraph 7.2.3 of the PANS-ATM (Doc 4444); or

   2) 20 km/h (10 kt) or more otherwise;

d) when a wind speed of less than 2 km/h (1 kt) is reported, it shall be indicated as calm;

e) when a wind speed of 200 km/h (100 kt) or more is reported, it shall be indicated to be more than 199 km/h (99 kt); and

f) when the 10-minute period includes a marked discontinuity in the wind direction and/or speed, only variations from the mean wind direction and mean wind speed occurring since the discontinuity shall be reported.

Note.— See note under 4.1.3.1.

4.1.5.3 In local routine and special reports:

a) if the surface wind is observed from more than one location along the runway, the locations for which these values are representative shall be indicated;

b) when there is more than one runway in use and the surface wind related to these runways is observed, the available wind values for each runway shall be given, and the runways to which the values refer shall be reported;

c) when variations from the mean wind direction are reported in accordance with 4.1.5.2 b) 2), the two extreme directions between which the surface wind has varied shall be reported; and

d) when variations from the mean wind speed (gusts) are reported in accordance with 4.1.5.2 c), they shall be reported as the maximum and minimum values of the wind speed attained.

4.1.5.4 In METAR and SPECI, when variations from the mean wind speed (gusts) are reported in accordance with 4.1.5.2 c), the maximum value of the wind speed attained shall be reported.

4.2 Visibility

4.2.1 Siting

4.2.1.1 **Recommendation. —** *When instrumented systems are used for the measurement of visibility, the visibility should be measured at a height of approximately 2.5 m (7.5 ft) above the runway.*

4.2.1.2 **Recommendation.—** *When instrumented systems are used for the measurement of visibility, representative visibility observations should be obtained by the use of sensors appropriately sited. Sensors for visibility observations for local routine and special reports should be sited to give the best practicable indications of visibility along the runway and touchdown zone.*

4.2.2 Displays

Recommendation.— *When instrumented systems are used for the measurement of visibility, visibility displays relating to each sensor should be located in the meteorological station with corresponding displays in the appropriate air traffic services units. The displays in the meteorological station and in the air traffic services units should relate to the same sensors, and where separate sensors are required as specified in 4.2.1, the displays should be clearly marked to identify the area, e.g. runway and section of runway, monitored by each sensor.*

4.2.3 Averaging

Recommendation.— *When instrumented systems are used for the measurement of visibility, their output should be updated at least every 60 seconds to permit provision of current representative values. The averaging period should be:*

a) 1 minute for local routine and special reports and for visibility displays in air traffic services units; and

b) 10 minutes for METAR and SPECI, except that when the 10-minute period immediately preceding the observation includes a marked discontinuity in the visibility, only those values occurring after the discontinuity should be used for obtaining mean values.

Note.— A marked discontinuity occurs when there is an abrupt and sustained change in visibility, lasting at least 2 minutes, which reaches or passes through criteria for the issuance of SPECI reports given in 2.3.

4.2.4 Reporting

4.2.4.1 In local routine and special reports and in METAR and SPECI, the visibility shall be reported in steps of 50 m when the visibility is less than 800 m; in steps of 100 m, when it is 800 m or more but less than 5 km; in kilometre steps, when the visibility is 5 km or more but less than 10 km; and it shall be given as 10 km when the visibility is 10 km or more, except when the conditions for the use of CAVOK apply. Any observed value which does not fit the reporting scale in use shall be rounded down to the nearest lower step in the scale.

Note.— Specifications concerning the use of CAVOK are given in 2.2.

4.2.4.2 In local routine and special reports, visibility along the runway(s) shall be reported together with the units of measurement.

4.2.4.3 **Recommendation.—** *In local routine and special reports, when instrumented systems are used for the measurement of visibility:*

a) if the visibility is observed from more than one location along the runway as specified in Chapter 4, 4.6.2.2, the values representative of the touchdown zone should be reported first, followed, as necessary, by the values representative of the mid-point and stop-end of the runway, and the locations for which these values are representative should be indicated; and

b) when there is more than one runway in use and the visibility is observed related to these runways, the available visibility values for each runway should be reported, and the runways to which the values refer should be indicated.

4.2.4.4 **Recommendation.**— *In METAR and SPECI, visibility should be reported as prevailing visibility, as defined in Chapter 1. When the visibility is not the same in different directions and*

a) when the lowest visibility is different from the prevailing visibility, and 1) less than 1 500 m or 2) less than 50 per cent of the prevailing visibility and less than 5 000 m; the lowest visibility observed should also be reported and its general direction in relation to the aerodrome indicated by reference to one of the eight points of the compass. If the lowest visibility is observed in more than one direction, then the most operationally significant direction should be reported; and

b) when the visibility is fluctuating rapidly, and the prevailing visibility cannot be determined, only the lowest visibility should be reported, with no indication of direction.

4.2.4.5 **Recommendation**.**—** *In automated METAR and SPECI, when visibility sensors are sited in such a manner that no directional variations can be given, the visibility value reported should be followed by the abbreviation "NDV".*

4.3 Runway visual range

4.3.1 Siting

4.3.1.1 **Recommendation.—** *Runway visual range should be assessed at a height of approximately 2.5 m (7.5 ft) above the runway.*

4.3.1.2 **Recommendation.—** *Runway visual range should be assessed at a lateral distance from the runway centre line of not more than 120 m. The site for observations to be representative of the touchdown zone should be located about 300 m along the runway from the threshold. The sites for observations to be representative of the mid-point and stop-end of the runway should be located at a distance of 1 000 to 1 500 m along the runway from the threshold and at a distance of about 300 m from the other end of the runway. The exact position of these sites and, if necessary, additional sites should be decided after considering aeronautical, meteorological and climatological factors such as long runways, swamps and other fog-prone areas.*

4.3.2 Instrumented systems

Note.— Since accuracy can vary from one instrument design to another, performance characteristics are to be checked before selecting an instrument for assessing RVR. The calibration of a forward-scatter meter has to be traceable and verifiable to a transmissometer standard, the accuracy of which has been verified over the intended operational range. Guidance on the use of transmissometers and forward-scatter meters in instrumented RVR systems is given in the Manual of Runway Visual Range Observing and Reporting Practices *(Doc 9328).*

4.3.2.1 Instrumented systems based on transmissometers or forward-scatter meters shall be used to assess runway visual range on runways intended for Category II and III instrument approach and landing operations.

4.3.2.2 **Recommendation.—** *Instrumented systems based on transmissometers or forward-scatter meters should be used to assess runway visual range on runways intended for Category I instrument approach and landing operations.*

4.3.3 Display

4.3.3.1 Where runway visual range is determined by instrumented systems, one display or more, if required, shall be located in the meteorological station with corresponding displays in the appropriate air traffic services units. The displays in the meteorological station and in the air traffic services units shall be related to the same sensors, and where separate sensors are required as specified in 4.3.1.2, the displays shall be clearly marked to identify the runway and section of runway monitored by each sensor.

4.3.3.2 **Recommendation.—** *Where runway visual range is determined by human observers, runway visual range should be reported to the appropriate local air traffic services units, whenever there is a change in the value to be reported in accordance with the reporting scale (except where the provisions of 3.2.2 a) or b) apply). The transmission of such reports should normally be completed within 15 seconds after the termination of the observation.*

4.3.4 Averaging

Where instrumented systems are used for the assessment of runway visual range, their output shall be updated at least every 60 seconds to permit the provision of current, representative values. The averaging period for runway visual range values shall be:

a) 1 minute for local routine and special reports and for runway visual range displays in air traffic services units; and

b) 10 minutes for METAR and SPECI, except that when the 10-minute period immediately preceding the observation includes a marked discontinuity in runway visual range values, only those values occurring after the discontinuity shall be used for obtaining mean values.

Note.— A marked discontinuity occurs when there is an abrupt and sustained change in runway visual range, lasting at least 2 minutes, which reaches or passes through criteria for the issuance of SPECI reports given in 2.3.2 f).

4.3.5 Runway light intensity

Recommendation.— *When instrumented systems are used for the assessment of runway visual range, computations should be made separately for each available runway. RVR should not be computed for a light intensity of 3 per cent or less of the maximum light intensity available on a runway. For local routine and special reports, the light intensity to be used for the computation should be:*

a) for a runway with the lights switched on, the light intensity actually in use on that runway; and

b) for a runway with lights switched off (or at the lowest setting pending the resumption of operations), the optimum light intensity that would be appropriate for operational use in the prevailing conditions.

In METAR and SPECI, the runway visual range should be based on the maximum light intensity available on the runway.

Note.— Guidance on the conversion of instrumented readings into runway visual range is given at Attachment D.

4.3.6 Reporting

4.3.6.1 In local routine and special reports and in METAR and SPECI, the runway visual range shall be reported in steps of 25 m when the runway visual range is less than 400 m; in steps of 50 m when it is between 400 m and 800 m; and in steps of 100 m when the runway visual range is more than 800 m. Any observed value which does not fit the reporting scale in use shall be rounded down to the nearest lower step in the scale.

4.3.6.2 **Recommendation.—** *Fifty metres should be considered the lower limit and 2 000 metres the upper limit for runway visual range. Outside of these limits, local routine and special reports and METAR and SPECI should merely indicate that the runway visual range is less than 50 m or more than 2 000 m.*

4.3.6.3 In local routine and special reports and in METAR and SPECI:

a) when runway visual range is above the maximum value that can be determined by the system in use, it shall be reported using the abbreviation "ABV" in local routine and special reports and the abbreviation "P" in METAR and SPECI, followed by the maximum value that can be determined by the system; and

b) when the runway visual range is below the minimum value that can be determined by the system in use, it shall be reported using the abbreviation "BLW" in local routine and special reports and the abbreviation "M" in METAR and SPECI, followed by the minimum value that can be determined by the system.

4.3.6.4 In local routine and special reports:

a) the units of measurement used shall be included;

b) if runway visual range is observed from only one location along the runway, i.e. the touchdown zone, it shall be included without any indication of location;

c) if the runway visual range is observed from more than one location along the runway, the value representative of the touchdown zone shall be reported first, followed by the values representative of the mid-point and stop-end and the locations for which these values are representative shall be indicated; and

d) when there is more than one runway in use, the available runway visual range values for each runway shall be reported and the runways to which the values refer shall be indicated.

4.3.6.5 **Recommendation.—** *In METAR and SPECI:*

a) only the value representative of the touchdown zone should be reported and no indication of location on the runway should be included; and

b) where there is more than one runway available for landing, touchdown zone runway visual range values should be included for all such runways, up to a maximum of four, and the runways to which the values refer should be indicated.

4.3.6.6 **Recommendation.—** *In METAR and SPECI when instrumented systems are used for the assessment of runway visual range, the variations in runway visual range during the 10-minute period immediately preceding the observation should be included as follows:*

a) if the runway visual range values during the 10-minute period have shown a distinct tendency, such that the mean during the first 5 minutes varies by 100 m or more from the mean during the second 5 minutes of the period, this should be indicated. When the variation of the runway visual range values shows an upward or downward tendency, this should be indicated by the abbreviation "U" or "D", respectively. In circumstances when actual fluctuations during the 10-minute period show no distinct tendency, this should be indicated using the abbreviation "N". When indications of tendency are not available, no abbreviations should be included; and

b) if the 1-minute runway visual range values during the 10-minute period vary from the mean value by more than 50 m or more than 20 per cent of the mean value, whichever is greater, the 1-minute mean minimum and the 1-minute mean maximum values should be reported instead of the 10-minute mean value. If the 10-minute period immediately preceding the observation includes a marked discontinuity in runway visual range values, only those values occurring after the discontinuity should be used to obtain variations.

Note.— A marked discontinuity occurs when there is an abrupt and sustained change in runway visual range, lasting at least 2 minutes, which reaches or passes through criteria for the issuance of SPECI given in 2.3.2 f).

4.4 Present weather

4.4.1 Siting

Recommendation.— *When instrumented systems are used for observing present weather phenomena listed under 4.4.2.3 and 4.4.2.5, representative information should be obtained by the use of sensors appropriately sited.*

4.4.2 Reporting

4.4.2.1 In local routine and special reports, observed present weather phenomena shall be reported in terms of type and characteristics and qualified with respect to intensity, as appropriate.

4.4.2.2 In METAR and SPECI, observed present weather phenomena shall be reported in terms of type and characteristics and qualified with respect to intensity or proximity to the aerodrome, as appropriate.

4.4.2.3 **Recommendation.—** *In local routine and special reports and in METAR and SPECI, the following types of present weather phenomena should be reported, using their respective abbreviations and relevant criteria, as appropriate:*

a) Precipitation

Drizzle	*DZ*
Rain	*RA*
Snow	*SN*
Snow grains	*SG*
Ice pellets	*PL*
Ice crystals (very small ice crystals in suspension, also known as diamond dust) *— Reported only when associated visibility is 5 000 m or less.*	*IC*

Hail — *Reported when diameter of largest hailstones is 5 mm or more.*	*GR*
Small hail and/or snow pellets — *Reported when diameter of largest hailstones is less than 5 mm;*	*GS*

b) Obscurations (hydrometeors)

Fog — *Reported when visibility is less than 1 000 m, except when qualified by "MI", "BC", "PR" or "VC" (see 4.4.2.5 and 4.4.2.6).*	*FG*
Mist — *Reported when visibility is at least 1 000 m but not more than 5 000 m;*	*BR*

c) Obscurations (lithometeors)
— *The following should be used only when the obscuration consists predominantly of lithometeors and the visibility is 5 000 m or less except "SA" when qualified by "DR" (see 4.4.2.5) and volcanic ash.*

Sand	*SA*
Dust (widespread)	*DU*
Haze	*HZ*
Smoke	*FU*
Volcanic ash	*VA*

d) Other phenomena

Dust/sand whirls (dust devils)	*PO*
Squall	*SQ*
Funnel cloud (tornado or waterspout)	*FC*
Duststorm	*DS*
Sandstorm	*SS*

4.4.2.4 **Recommendation.—** *In automated METAR and SPECI, in addition to the precipitation types listed under 4.4.2.3 a), the abbreviation UP should be used for unidentified precipitation when the type of precipitation cannot be identified by the automatic observing system.*

4.4.2.5 **Recommendation.—** *In local routine and special reports and in METAR and SPECI, the following characteristics of present weather phenomena, as necessary, should be reported, using their respective abbreviations and relevant criteria, as appropriate:*

Thunderstorm — *Used to report a thunderstorm with precipitation in accordance with the templates shown in Tables A3-1 and A3-2. When thunder is heard or lightning is detected at the aerodrome during the 10-minute period preceding the time of observation but no precipitation is observed at the aerodrome, the abbreviation "TS" should be used without qualification.*	*TS*

Shower	*SH*
— *Used to report showers in accordance with the templates shown in Tables A3-1 and A3-2. Showers observed in the vicinity of the aerodrome (see 4.4.2.6) should be reported as "VCSH" without qualification regarding type or intensity of precipitation.*	
Freezing	*FZ*
— *Supercooled water droplets or precipitation, used with types of present weather phenomena in accordance with the templates shown in Tables A3-1 and A3-2.*	
Blowing	*BL*
— *Used in accordance with the templates shown in Tables A3-1 and A3-2 with types of present weather phenomena raised by the wind to a height of 2 m (6 ft) or more above the ground.*	
Low drifting	*DR*
— *Used in accordance with the templates shown in Tables A3-1 and A3-2 with types of present weather phenomena raised by the wind to less than 2 m (6 ft) above ground level.*	
Shallow	*MI*
— *Less than 2 m (6 ft) above ground level.*	
Patches	*BC*
— *Fog patches randomly covering the aerodrome.*	
Partial	*PR*
— *A substantial part of the aerodrome covered by fog while the remainder is clear.*	

4.4.2.6 **Recommendation.—** *In local routine and special reports and in METAR and SPECI, the relevant intensity or, as appropriate, the proximity to the aerodrome of the reported present weather phenomena should be indicated as follows:*

	(local routine and special reports)	*(METAR and SPECI)*
Light	*FBL*	—
Moderate	*MOD*	*(no indication)*
Heavy	*HVY*	+

Used with types of present weather phenomena in accordance with the templates shown in Tables A3-1 and A3-2. Light intensity should be indicated only for precipitation.

Vicinity	*VC*
— *Between approximately 8 and 16 km of the aerodrome reference point and used only in METAR and SPECI with present weather in accordance with the template shown in Table A3-2 when not reported under 4.4.2.5.*	

4.4.2.7 **Recommendation.—** *In local routine and special reports and in METAR and SPECI:*

a) *one or more, up to a maximum of three, of the present weather abbreviations given in 4.4.2.3 and 4.4.2.5 should be used, as necessary, together with an indication, where appropriate, of the characteristics and intensity or proximity to the aerodrome, so as to convey a complete description of the present weather of significance to flight operations;*

b) the indication of intensity or proximity, as appropriate, should be reported first followed respectively by the characteristics and the type of weather phenomena; and

c) where two different types of weather are observed, they should be reported in two separate groups, where the intensity or proximity indicator refers to the weather phenomenon which follows the indicator. However, different types of precipitation occurring at the time of observation should be reported as one single group with the dominant type of precipitation reported first and preceded by only one intensity qualifier which refers to the intensity of the total precipitation.

4.5 Clouds

4.5.1 Siting

Recommendation.— *When instrumented systems are used for the measurement of the cloud amount and the height of cloud base, representative observations should be obtained by the use of sensors appropriately sited. For local routine and special reports, in the case of aerodromes with precision approach runways, sensors for cloud amount and height of cloud base should be sited to give the best practicable indications of the height of cloud base and cloud amount at the middle marker site of the instrument landing system or, at aerodromes where a middle marker beacon is not used, at a distance of 900 to 1 200 m (3 000 to 4 000 ft) from the landing threshold at the approach end of the runway.*

Note.— Specifications concerning the middle marker site of an instrument landing system are given in Annex 10, Volume I, Chapter 3 and at Attachment C, Table C-5.

4.5.2 Display

Recommendation.— *When automated equipment is used for the measurement of the height of cloud base, height of cloud base display(s) should be located in the meteorological station with corresponding display(s) in the appropriate air traffic services units. The displays in the meteorological station and in the air traffic services units should relate to the same sensor, and where separate sensors are required as specified in 4.5.1, the displays should clearly identify the area monitored by each sensor.*

4.5.3 Reference level

Recommendation.— *The height of cloud base should normally be reported above aerodrome elevation. When a precision approach runway is in use which has a threshold elevation 15 m (50 ft) or more below the aerodrome elevation, local arrangements should be made in order that the height of cloud bases reported to arriving aircraft should refer to the threshold elevation. In the case of reports from offshore structures, the height of cloud base should be given above mean sea level.*

4.5.4 Reporting

4.5.4.1 In local routine and special reports and in METAR and SPECI, the height of cloud base shall be reported in steps of 30 m (100 ft) up to 3 000 m (10 000 ft). Any observed value which does not fit the reporting scale in use shall be rounded down to the nearest lower step in the scale.

4.5.4.2 **Recommendation.**— *In local routine and special reports and in METAR and SPECI:*

a) cloud amount should be reported using the abbreviations "FEW" (1 to 2 oktas), "SCT" (3 to 4 oktas), "BKN" (5 to 7 oktas) or "OVC" (8 oktas);

b) cumulonimbus clouds and towering cumulus clouds should be indicated as "CB" and "TCU", respectively;

c) the vertical visibility should be reported in steps of 30 m (100 ft) up to 600 m (2 000 ft);

d) if there are no clouds of operational significance and no restriction on vertical visibility and the abbreviation "CAVOK" is not appropriate, the abbreviation "NSC" should be used;

e) when several layers or masses of cloud of operational significance are observed, their amount and height of cloud base should be reported in increasing order of the height of cloud base, and in accordance with the following criteria:

1) the lowest layer or mass, regardless of amount to be reported as FEW, SCT, BKN or OVC as appropriate;

2) the next layer or mass, covering more than 2/8 to be reported as SCT, BKN or OVC as appropriate;

3) the next higher layer or mass, covering more than 4/8 to be reported as BKN or OVC as appropriate; and

4) cumulonimbus and/or towering cumulus clouds, whenever observed and not reported in 1) to 3);

f) when the cloud base is diffuse or ragged or fluctuating rapidly, the minimum height of cloud base, or cloud fragments, should be reported; and

g) when an individual layer (mass) of cloud is composed of cumulonimbus and towering cumulus clouds with a common cloud base, the type of cloud should be reported as cumulonimbus only.

Note.— Towering cumulus indicates cumulus congestus clouds of great vertical extent.

4.5.4.3 In local routine and special reports:

a) the units of measurement used for the height of cloud base and vertical visibility shall be indicated; and

b) when there is more than one runway in use and the heights of cloud bases are observed by instruments for these runways, the available heights of cloud bases for each runway shall be reported and the runways to which the values refer shall be indicated.

4.5.4.4 **Recommendation.—** *In automated METAR and SPECI:*

a) when the cloud type cannot be observed by the automatic observing system, the cloud type in each cloud group should be replaced by "///";

b) when no clouds are detected by the automatic observing system, it should be indicated by using the abbreviation "NCD"; and

c) when cumulonimbus clouds or towering cumulus clouds are detected by the automatic observing system and the cloud amount and the height of cloud base cannot be observed, the cloud amount and the height of cloud base should be replaced by "//////".

4.6 Air temperature and dew-point temperature

4.6.1 Display

Recommendation.— *When automated equipment is used for the measurement of air temperature and dew-point temperature, air temperature and dew-point temperature displays should be located in the meteorological station with* *corresponding displays in the appropriate air traffic services units. The displays in the meteorological station and in the air traffic services units should relate to the same sensors.*

4.6.2 Reporting

4.6.2.1 In local routine and special reports and in METAR and SPECI, the air temperature and the dew-point temperature shall be reported in steps of whole degrees Celsius. Any observed value which does not fit the reporting scale in use shall be rounded to the nearest whole degree Celsius, with observed values involving 0.5° rounded up to the next higher whole degree Celsius.

4.6.2.2 In local routine and special reports and in METAR and SPECI, a temperature below 0°C shall be identified.

4.7 Atmospheric pressure

4.7.1 Display

When automated equipment is used for the measurement of pressure, QNH and, if required in accordance with 4.7.3.2 b), QFE displays relating to the barometer shall be located in the meteorological station with corresponding displays in the appropriate air traffic services units. When QFE values are displayed for more than one runway, as specified in 4.7.3.2 d), the displays shall be clearly marked to identify the runway to which the QFE value displayed refers.

4.7.2 Reference level

Recommendation.— *The reference level for the computation of QFE should be the aerodrome elevation. For non-precision approach runways, the thresholds of which are 2 m (7 ft) or more below the aerodrome elevation, and for precision approach runways, the QFE, if required, should refer to the relevant threshold elevation.*

4.7.3 Reporting

4.7.3.1 For local routine and special reports and in METAR and SPECI, QNH and QFE shall be computed in tenths of hectopascals and reported therein in steps of whole hectopascals, using four digits. Any observed value which does not fit the reporting scale in use shall be rounded down to the nearest lower whole hectopascal.

4.7.3.2 In local routine and special reports:

a) QNH shall be included;

b) QFE shall be included if required by users or, if so agreed locally between the meteorological and air traffic services authorities and operators concerned, on a regular basis;

c) the units of measurement used for QNH and QFE values shall be included; and

d) if QFE values are required for more than one runway, the required QFE values for each runway shall be reported and the runways to which the values refer shall be indicated.

4.7.3.3 In METAR and SPECI, only QNH values shall be included.

4.8 Supplementary information

4.8.1 Reporting

4.8.1.1 **Recommendation.—** *In local routine and special reports and in METAR and SPECI, the following recent weather phenomena, i.e. weather phenomena observed at the aerodrome during the period since the last issued routine report or last hour, whichever is the shorter, but not at the time of observation, should be reported, up to a maximum of three groups, in accordance with the templates shown in Tables A3-1 and A3-2, in the supplementary information:*

— *freezing precipitation*
— *moderate or heavy precipitation (including showers thereof)*
— *blowing snow*
— *duststorm, sandstorm*
— *thunderstorm*
— *funnel cloud (tornado or water spout)*
— *volcanic ash*

4.8.1.2 **Recommendation.—** *In local routine and special reports, the following significant meteorological conditions, or combinations thereof, should be reported in supplementary information:*

— *cumulonimbus clouds*	*CB*
— *thunderstorm*	*TS*
— *moderate or severe turbulence*	*MOD TURB, SEV TURB*
— *wind shear*	*WS*
— *hail*	*GR*
— *severe squall line*	*SEV SQL*
— *moderate or severe icing*	*MOD ICE, SEV ICE*
— *freezing precipitation*	*FZDZ, FZRA*
— *severe mountain waves*	*SEV MTW*
— *duststorm, sandstorm*	*DS, SS*
— *blowing snow*	*BLSN*
— *funnel cloud (tornado or water spout)*	*FC*

The location of the condition should be indicated. Where necessary, additional information should be included using abbreviated plain language.

4.8.1.3 **Recommendation.—** *In automated METAR and SPECI, in addition to the recent weather phenomena listed under 4.8.1.1, recent unknown precipitation should be reported in accordance with the template shown in Table A3-2 when the type of precipitation cannot be identified by the automatic observing system.*

4.8.1.4 **Recommendation.—** *In METAR and SPECI, where local circumstances so warrant, information on wind shear should be added.*

Note.— The local circumstances referred to in 4.8.1.4 include, but are not necessarily limited to, wind shear of a non-transitory nature such as might be associated with low-level temperature inversions or local topography.

4.8.1.5 **Recommendation.—** *In METAR and SPECI, the following information should be included in the supplementary information, in accordance with regional air navigation agreement:*

a) *information on sea-surface temperature and the state of the sea from aeronautical meteorological stations established on offshore structures in support of helicopter operations; and* *b) information on the state of the runway provided by the appropriate airport authority.*

Note 1.— The state of the sea is specified in WMO Publication No. 306, Manual on Codes*, Volume I.1, Part A — Alphanumeric Codes, Code Table 3700.*

Note 2.— The state of the runway is specified in WMO Publication No. 306, Manual on Codes*, Volume I.1, Part A — Alphanumeric Codes, Code Tables 0366, 0519, 0919 and 1079.*

Table A3-1. Template for the local routine (MET REPORT) and local special (SPECIAL) reports

Key: M = inclusion mandatory, part of every message;
C = inclusion conditional, dependent on meteorological conditions;
O = inclusion optional.

Note 1.— The ranges and resolutions for the numerical elements included in the local routine and special reports are shown in Table A3-4 of this appendix.

Note 2.— The explanations for the abbreviations can be found in the Procedures for Air Navigation Services — ICAO Abbreviations and Codes *(PANS-ABC, Doc 8400).*

Element as specified in Chapter 4	*Detailed content*	*Template(s)*			*Examples*
Identification of the type of report (M)	Type of report	MET REPORT *or* SPECIAL			MET REPORT SPECIAL
Location indicator (M)	ICAO location indicator (M)	nnnn			YUDO[1]
Time of the observation (M)	Day and actual time of the observation in UTC	nnnnnnZ			221630Z
Surface wind (M)	Name of the element (M)	WIND			WIND 240/15KMH (WIND 240/8KT)
	Runway (O)[2]	RWY nn[L] *or* RWY nn[C] *or* RWY nn[R]			WIND RWY 18 TDZ 190/22KMH (WIND RWY 18 TDZ 190/11KT)
	Runway section (O)[3]	TDZ			
	Wind direction (M)	nnn/	VRB BTN nnn/ AND nnn/ *or* VRB	CALM	WIND VRB4KMH WIND CALM (WIND VRB2KT) WIND VRB BTN 350/ AND 050/4KMH (WIND VRB BTN 350/ AND 050/2KT)
	Wind speed (M)	[ABV] n[n][n]KMH (*or* [ABV] n[n]KT)			WIND 270/ABV 199KMH (WIND 270/ABV 99KT)
	Significant speed variations (C)[4]	MAX [ABV] nn [n] MNM n [n]			WIND 120/12KMH MAX35 MNM8 (WIND 120/6KT MAX18 MNM4)
	Significant directional variations (C)[5]	VRB BTN nnn/ AND nnn/	—		WIND 020/20KMH VRB BTN 350/ AND 070/ (WIND 020/10KT VRB BTN 350/ AND 070/)
	Runway section (O)[3]	MID			WIND RWY 14R MID 140/22KMH (WIND RWY 14R MID 140/11KT)
	Wind direction (O)[3]	nnn/	VRB BTN nnn/ AND nnn/ *or* VRB	CALM	
	Wind speed (O)[3]	[ABV] n[n][n]KMH (*or* [ABV] n[n]KT)			
	Significant speed variations (C)[4]	MAX [ABV] nn [n] MNM n [n]			
	Significant directional variations (C)[5]	VRB BTN nnn/ AND nnn/	—		
	Runway section (O)[3]	END			WIND RWY 27 TDZ 240/32KMH MAX54 MNM20 END 250/28KMH (WIND RWY 27 TDZ 240/16KT MAX27 MNM10 END 250/14KT)
	Wind direction (O)[3]	nnn/	VRB BTN nnn/ AND nnn/ *or* VRB	CALM	
	Wind speed (O)[3]	[ABV] n[n][n]KMH (*or* [ABV] n[n]KT)			
	Significant speed variations (C)[4]	MAX [ABV] nn [n] MNM n [n]			

Element as specified in Chapter 4	*Detailed content*	*Template(s)*			*Examples*
	Significant directional variations (C)[5]	VRB BTN nnn/ AND nnn/	—		
Visibility (M)	Name of the element (M)	VIS		C A V O K	VIS 350M CAVOK VIS 7KM VIS 10KM
	Runway (O)[2]	RWY nn[L] *or* RWY nn[C] *or* RWY nn[R]			VIS RWY 09 TDZ 800M END 1200M
	Runway section (O)[3]	TDZ			
	Visibility (M)	nn[n][n]M *or* n[n]KM			
	Runway section (O)[3]	MID			
	Visibility (O)[3]	nn[n][n]M *or* n[n]KM			
	Runway section (O)[3]	END			VIS RWY 18C TDZ 6KM RWY 27 TDZ 4000M
	Visibility (O)[3]	nn[n][n]M *or* n[n]KM			
RVR (C)[6]	Name of the element (M)	RVR			RVR RWY 32 400M RVR RWY 20 1600M
	Runway (C)[7]	RWY nn[L] *or* RWY nn[C] *or* RWY nn[R]			
	Runway section (C)[8]	TDZ			
	RVR (M)	[ABV *or* BLW] nn[n][n]M			RVR RWY 10L BLW 50M RVR RWY 14 ABV 2000M RVR RWY 10 BLW 150M RVR RWY 12 ABV 1200M
	Runway section (C)[8]	MID			RVR RWY 12 TDZ 1100M MID ABV 1400M
	RVR (C)[8]	[ABV *or* BLW] nn[n][n]M			
	Runway section (C)[8]	END			RVR RWY 16 TDZ 600M MID 500M END 400M RVR RWY 26 500M RWY 20 800M
	RVR (C)[8]	[ABV *or* BLW] nn[n][n]M			
Present weather (C)[9, 10]	Intensity of present weather (C)[9]	FBL *or* MOD *or* HVY	—		
	Characteristics and type of present weather (C)[9,11]	DZ *or* RA *or* SN *or* SG *or* PL *or* DS *or* SS *or* FZDZ *or* FZRA *or* SHGR *or* SHGS *or* SHRA *or* SHSN *or* TSGR *or* TSGS *or* TSRA *or* TSSN	IC *or* FG *or* BR *or* SA *or* DU *or* HZ *or* FU *or* VA *or* SQ *or* PO *or* FC *or* TS *or* BCFG *or* BLDU *or* BLSA *or* BLSN *or* DRDU *or* DRSA *or* DRSN *or* FZFG *or* MIFG *or* PRFG		MOD RA HZ HVY TSRA FG HVY DZ VA FBL SN MIFG HVY TSRASN FBL SNRA FBL DZ FG HVY SHSN BLSN
Cloud (M)[12]	Name of the element (M)	CLD			
	Runway (O)[2]	RWY nn[L] *or* RWY nn[C] *or* RWY nn[R]			CLD NSC

Element as specified in Chapter 4	*Detailed content*	*Template(s)*					*Examples*
	Cloud amount (M) *or* vertical visibility (O)[9]	FEW *or* SCT *or* BKN *or* OVC	OBSC	NSC			CLD SCT 300M OVC 600M (CLD SCT 1000FT OVC 2000FT) CLD OBSC VER VIS 150M (CLD OBSC VER VIS 500FT)
	Cloud type (C)[9]	CB *or* TCU	—				CLD BKN TCU 270M (CLD BKN TCU 900FT)
	Height of cloud base *or* the value of vertical visibility (C)[9]	nn[n][n]M (*or* nnn[n]FT)	[VER VIS nn[n]M (*or* VER VIS nnn[n]FT)]				CLD RWY 08R BKN 60M RWY 26 BKN 90M (CLD RWY 08R BKN 200FT RWY 26 BKN 300FT)
Air temperature (M)	Name of the element (M)	T					T17 TMS08
	Air temperature (M)	[MS]nn					
Dew-point temperature (M)	Name of the element (M)	DP					DP15 DPMS18
	Dew-point temperature (M)	[MS]nn					
Pressure values (M)	Name of the element (M)	QNH					QNH 0995HPA QNH 1009HPA
	QNH (M)	nnnnHPA					
	Name of the element (O)	QFE					QNH 1022HPA QFE 1001HPA QNH 0987HPA QFE RWY 18 0956HPA RWY 24 0955HPA
	QFE (O)	[RWY nn[L] *or* RWY nn[C] *or* RWY nn[R]] nnnnHPA [RWY nn[L] *or* RWY nn[C] *or* RWY nn[R] nnnnHPA]					
Supplementary information (C)[9]	Significant meteorological phenomena (C)[9]	CB *or* TS *or* MOD TURB *or* SEV TURB *or* WS *or* GR *or* SEV SQL *or* MOD ICE *or* SEV ICE *or* FZDZ *or* FZRA *or* SEV MTW *or* SS *or* DS *or* BLSN *or* FC[13]					FC IN APCH WS IN APCH 60M-WIND: 360/50KMH WS RWY 12
	Location of the phenomenon (C)[9]	IN APCH [nnnM-WIND nnn/nnKMH] *or* IN CLIMB-OUT [nnnM-WIND nnn/nnKMH] (IN APCH [nnnFT-WIND nnn/nnKT] *or* IN CLIMBOUT [nnnFT-WIND nnn/nnKT]) *or* RWY nn[n]					
	Recent weather (C)[9, 10]	REFZDZ *or* REFZRA *or* REDZ *or* RE[SH]RA *or* RERASN *or* RE[SH]SN *or* RESG *or* RESHGR *or* RESHGS *or* REBLSN *or* RESS *or* REDS *or* RETSRA *or* RETSSN *or* RETSGR *or* RETSGS *or* REFC *or* REPL *or* REVA *or* RETS					REFZRA CB IN CLIMB-OUT RETSRA
Trend forecast (O)[14]	Name of the element (M)	TREND					
	Change indicator (M)[15]	NOSIG	BECMG *or* TEMPO				TREND NOSIG TREND BECMG FEW 600M (TREND BECMG FEW 2000FT)
	Period of change (C)[9]		FMnnnn *and/or* TLnnnn *or* ATnnnn				
	Wind (C)[9]		nnn/ [ABV] n[n][n]KMH [MAX[ABV]nn[n]] (*or* nnn/ [ABV] n[n]KT [MAX[ABV]nn])				TREND TEMPO 250/70KMH MAX 100 (TREND TEMPO 250/35KT MAX 50)
	Visibility (C)[9]		VIS nn[n][n]M *or* VIS n[n]KM			CAVOK	TREND BECMG AT1800 VIS 10KM NSW TREND BECMG TL1700 VIS 800M FG TREND BECMG FM1030 TL1130 CAVOK
	Weather phenomenon: intensity (C)[9]		FBL *or* MOD *or* HVY	—	NSW		TREND TEMPO TL1200 VIS 600M BECMG AT1230 VIS 8KM NSW NSC

Element as specified in Chapter 4	*Detailed content*	*Template(s)*					*Examples*
	Weather phenomenon: characteristics and type (C)[9, 10, 12]		DZ *or* RA *or* SN *or* SG *or* PL *or* DS *or* SS *or* FZDZ *or* FZRA *or* SHGR *or* SHGS *or* SHRA *or* SHSN *or* TSGR *or* TSGS *or* TSRA *or* TSSN	IC *or* FG *or* BR *or* SA *or* DU *or* HZ *or* FU *or* VA *or* SQ *or* PO *or* FC *or* TS *or* BCFG *or* BLDU *or* BLSA *or* BLSN *or* DRDU *or* DRSA *or* DRSN *or* FZFG *or* MIFG *or* PRFG			TREND TEMPO FM0300 TL0430 MOD FZRA TREND BECMG FM1900 VIS 500M HVY SNRA TREND BECMG FM1100 MOD SN TEMPO FM1130 BLSN
	Name of the element (C)[9]		CLD				
	Cloud amount and vertical visibility (C)[9]		FEW *or* SCT *or* BKN *or* OVC	OBSC	NSC		TREND BECMG AT1130 CLD OVC 300M (TREND BECMG AT1130 CLD OVC 1000FT)
	Cloud type (C)[9]		CB *or* TCU	—			TREND TEMPO TL1530 HVY SHRA CLD BKN CB 360M (TREND TEMPO TL1530 HVY SHRA CLD BKN CB 1200FT)
	Height of cloud base *or* the value of vertical visibility (C)[9]		nn[n][n]M (*or* nnn[n]FT)	[VER VIS nn[n]M (*or* VER VIS nnn[n]FT)]			

Notes.—

1. Fictitious location.
2. Optional values for one or more runways.
3. Optional values for one or more sections of the runway.
4. To be included in accordance with 4.1.5.2 c).
5. To be included in accordance with 4.1.5.2 b) 1).
6. To be included if visibility or RVR < 1 500 m.
7. To be included in accordance with 4.3.6.4 d).
8. To be included in accordance with 4.3.6.4 c).
9. To be included whenever applicable.
10. One or more, up to a maximum of three groups, in accordance with 4.4.2.7 a), 4.8.1.1 and Appendix 5, 2.2.4.3.
11. Precipitation types listed under 4.4.2.3 a) may be combined in accordance with 4.4.2.7 c) and Appendix 5, 2.2.4.2. Only moderate or heavy precipitation to be indicated in trend forecasts in accordance with Appendix 5, 2.2.4.2.
12. Up to four cloud layers in accordance with 4.5.4.2 e).
13. Abbreviated plain language may be used in accordance with 4.8.1.2.
14. To be included in accordance with Chapter 6, 6.3.2.
15. Number of change indicators to be kept to a minimum in accordance with Appendix 5, 2.2.1, normally not exceeding three groups.

Table A3-2. Template for METAR and SPECI

Key: M = inclusion mandatory, part of every message;
C = inclusion conditional, dependent on meteorological conditions or method of observation;
O = inclusion optional.

Note 1.— The ranges and resolutions for the numerical elements included in METAR and SPECI are shown in Table A3-5 of this appendix.

Note 2.— The explanations for the abbreviations can be found in the Procedures for Air Navigation Services — ICAO Abbreviations and Codes *(PANS-ABC, Doc 8400)*.

Element as specified in Chapter 4	*Detailed content*	*Template(s)*		*Examples*
Identification of the type of report (M)	Type of report (M)	METAR, METAR COR, SPECI *or* SPECI COR		METAR METAR COR SPECI
Location indicator (M)	ICAO location indicator (M)	nnnn		YUDO[1]
Time of the observation (M)	Day and actual time of the observation in UTC (M)	nnnnnnZ		221630Z
Identification of an automated or missing report (C)[2]	Automated *or* missing report identifier (C)	AUTO *or* NIL		AUTO NIL
END OF METAR IF THE REPORT IS MISSING.				
Surface wind (M)	Wind direction (M)	nnn	VRB	24015KMH VRB04KMH (24008KT) (VRB02KT) 19022KMH (19011KT) 00000KMH (00000KT) 140P199KMH (140P99KT)
	Wind speed (M)	[P]nn[n]		
	Significant speed variations (C)[3]	G[P]nn[n]		12012G35KMH (12006G18KT) 24032G54KMH (24016G27KT)
	Units of measurement (M)	KMH (*or* KT)		
	Significant directional variations (C)[4]	nnnVnnn	—	02020KMH 350V070 (02010KT 350V070)
Visibility (M)	Prevailing *or* minimum visibility (M)[5]	nnnn	CAVOK	0350 CAVOK 7000NDV 9999
	Unidirectional visibility (C)[6]	NDV		0800
	Minimum visibility (C)[7]	nnnn		2000 1200NW 6000 2800E
	Direction of the minimum visibility (C)[7]	N *or* NE *or* E *or* SE *or* S *or* SW *or* W *or* NW		
RVR (C)[8]	Name of the element (M)	R		R32/0400 R12R/1700 R10/M0050 R14L/P2000
	Runway (M)	nn[L]/*or* nn[C]/ *or* nn[R]/		
	RVR (M)	[P *or* M]nnnn		R16L/0650 R16C/0500 R16R/0450 R17L/0450

Element as specified in Chapter 4	*Detailed content*	*Template(s)*			*Examples*
	RVR variations (C)[9]	V[P *or* M]nnnn			R20/0700V1200 R19/0350VP1200
	RVR past tendency (C)[10]	U, D *or* N			R12/1100U R26/0550N R20/0800D R09/0375V0600U R10/M0150V0500D
Present weather (C)[2, 11]	Intensity *or* proximity of present weather (C)[12]	– *or* +	—	VC	
	Characteristics and type of present weather (M)[13]	DZ *or* RA *or* SN *or* SG *or* PL *or* DS *or* SS *or* FZDZ *or* FZRA *or* FZUP[6] *or* SHGR *or* SHGS *or* SHRA *or* SHSN *or* SHUP *or* TSGR *or* TSGS *or* TSRA *or* TSSN *or* TSUP *or* UP[6]	IC *or* FG *or* BR *or* SA *or* DU *or* HZ *or* FU *or* VA *or* SQ *or* PO *or* FC *or* TS *or* BCFG *or* BLDU *or* BLSA *or* BLSN *or* DRDU *or* DRSA *or* DRSN *or* FZFG *or* MIFG *or* PRFG	FG *or* PO *or* FC *or* DS *or* SS *or* TS *or* SH *or* BLSN *or* BLSA *or* BLDU *or* VA	RA HZ VCFG +TSRA FG VCSH +DZ VA VCTS –SN MIFG VCBLSA +TSRASN –SNRA DZ FG +SHSN BLSN UP FZUP TSUP FZUP
Cloud (M)[14]	Cloud amount and height of cloud base *or* vertical visibility (M)	FEWnnn *or* SCTnnn *or* BKNnnn *or* OVCnnn *or* //////[6]	VVnnn *or* VV///	NSC *or* NCD[6]	FEW015 VV005 OVC030 VV/// NSC SCT010 OVC020 BKN025///
	Cloud type (C)[2]	CB *or* TCU *or* ///[6]	—		BKN009TCU NCD SCT008 BKN025CB /////CB
Air and dew-point temperature (M)	Air and dew-point temperatures (M)	[M]nn/[M]nn			17/10 02/M08 M01/M10
Pressure values (M)	Name of the element (M)	Q			Q0995 Q1009 Q1022 Q0987
	QNH (M)	nnnn			
Supplementary information (C)	Recent weather (C)[2, 11]	REFZDZ *or* REFZRA *or* REDZ *or* RE[SH]RA *or* RERASN *or* RE[SH]SN *or* RESG *or* RESHGR *or* RESHGS *or* REBLSN *or* RESS *or* REDS *or* RETSRA *or* RETSSN *or* RETSGR *or* RETSGS *or* RETS *or* REFC *or* REVA *or* REPL *or* REUP[6] *or* REFZUP[6] *or* RETSUP[6] *or* RESHUP[6]			REFZRA RETSRA
	Wind shear (C)[2]	WS Rnn[L] *or* WS Rnn[C] *or* WS Rnn[R] *or* WS ALL RWY			WS RWY03 WS ALL RWY
	Sea-surface temperature and state of the sea (C)[15]	W[M]nn/Sn			W15/S2

Element as specified in Chapter 4	*Detailed content*		*Template(s)*				*Examples*
	State of the runway (C)[16]	Runway designator (M)	R nn[L]/ *or* Rnn[C]/ *or* Rnn[R]/			R/SNOCLO	R99/421594 R/SNOCLO R14L/CLRD//
		Runway deposits (M)	n *or* /		CLRD//		
		Extent of runway contamination (M)	n *or* /				
		Depth of deposit (M)	nn *or* //				
		Friction coefficient or braking action (M)	nn *or* //				
Trend forecast (O)[17]	Change indicator (M)[18]		NOSIG	BECMG *or* TEMPO			NOSIG BECMG FEW020
	Period of change (C)[2]			FMnnnn *and/or* TLnnnn *or* ATnnnn			
	Wind (C)[2]			nnn[P]nn[n][G [P]nn[n]]KMH (*or* nnn[P]nn[G[P] nn]KT)			TEMPO 25070G100KMH (TEMPO 25035G50KT)
	Prevailing visibility (C)[2]			nnnn		CAVOK	BECMG FM1030 TL1130 CAVOK BECMG TL1700 0800 FG BECMG AT1800 9000 NSW BECMG FM1900 0500 +SNRA BECMG FM1100 SN TEMPO FM1130 BLSN TEMPO FM0330 TL0430 FZRA
	Weather phenomenon: intensity (C)[12]			– *or* +	—	NSW	
	Weather phenomenon: characteristics and type (C)[2, 11, 13]			DZ *or* RA *or* SN *or* SG *or* PL *or* DS *or* SS *or* FZDZ *or* FZRA *or* SHGR *or* SHGS *or* SHRA *or* SHSN *or* TSGR *or* TSGS *or* TSRA *or* TSSN	IC *or* FG *or* BR *or* SA *or* DU *or* HZ *or* FU *or* VA *or* SQ *or* PO *or* FC *or* TS *or* BCFG *or* BLDU *or* BLSA *or* BLSN *or* DRDU *or* DRSA *or* DRSN *or* FZFG *or* MIFG *or* PRFG		
	Cloud amount and height of cloud base *or* vertical visibility (C)[2]			FEWnnn *or* SCTnnn *or* BKNnnn *or* OVCnnn	VVnnn *or* VV///	NSC	TEMPO TL1200 0600 BECMG AT1200 8000 NSW NSC BECMG AT1130 OVC010
	Cloud type (C)[2]			CB *or* TCU	—		TEMPO TL1530 +SHRA BKN012CB

Notes.—

1. Fictitious location.
2. To be included whenever applicable.
3. To be included in accordance with 4.1.5.2 c).
4. To be included in accordance with 4.1.5.2 b) 1).
5. To be included in accordance with 4.2.4.4 b).
6. For automated reports only.
7. To be included in accordance with 4.2.4.4 a).
8. To be included if visibility or RVR < 1 500 m; for up to a maximum of four runways in accordance with 4.3.6.5 b).
9. To be included in accordance with 4.3.6.6 b).
10. To be included in accordance with 4.3.6.6 a).
11. One or more, up to a maximum of three groups, in accordance with 4.4.2.7 a), 4.8.1.1 and Appendix 5, 2.2.4.2.
12. To be included whenever applicable; no qualifier for *moderate* intensity in accordance with 4.4.2.6.
13. Precipitation types listed under 4.4.2.3 a) may be combined in accordance with 4.4.2.7 c) and Appendix 5, 2.2.4.2. Only moderate or heavy precipitation to be indicated in trend forecasts in accordance with Appendix 5, 2.2.4.2.
14. Up to four cloud layers in accordance with 4.5.4.2 e).
15. To be included in accordance with 4.8.1.5 a).
16. To be included in accordance with 4.8.1.5 b).
17. To be included in accordance with Chapter 6, 6.3.2.
18. Number of change indicators to be kept to a minimum in accordance with Appendix 5, 2.2.1, normally not exceeding three groups.

Table A3-3. Use of change indicators in trend forecasts

Change indicator	*Time indicator and period*	*Meaning*	
NOSIG	—	no significant changes are forecast	
BECMG	FM$n_1n_1n_1n_1$ TL$n_2n_2n_2n_2$	the change is forecast to	commence at $n_1n_1n_1n_1$ UTC and be completed by $n_2n_2n_2n_2$ UTC
	TLnnnn		commence at the beginning of the trend forecast period and be completed by nnnn UTC
	FMnnnn		commence at nnnn UTC and be completed by the end of the trend forecast period
	ATnnnn		occur at nnnn UTC (specified time)
	—		a) commence at the beginning of the trend forecast period and be completed by the end of the trend forecast period; *or* b) the time is uncertain
TEMPO	FM$n_1n_1n_1n_1$ TL$n_2n_2n_2n_2$	temporary fluctuations are forecast to	commence at $n_1n_1n_1n_1$ UTC and cease by $n_2n_2n_2n_2$ UTC
	TLnnnn		commence at the beginning of the trend forecast period and cease by nnnn UTC
	FMnnnn		commence at nnnn UTC and cease by the end of the trend forecast period
	—		commence at the beginning of the trend forecast period and cease by the end of the trend forecast period

Table A3-4. Ranges and resolutions for the numerical elements included in local reports

Element as specified in Chapter 4		*Range*	*Resolution*
Runway:		01 – 36	1
Wind direction:	°true	010 – 360	10
Wind speed:	KMH	1 – 399*	1
	KT	1 – 199*	1
Visibility:	M	0 – 800	50
	M	800 – 5 000	100
	KM	5 – 10	1
RVR:	M	0 – 400	25
	M	400 – 800	50
	M	800 – 2 000	100
Vertical visibility:	M	0 – 600	30
	FT	0 – 2 000	100
Clouds: height of cloud base:	M	0 – 3 000	30
	FT	0 – 10 000	100
Air temperature; Dew-point temperature:	°C	–80 – +60	1
QNH; QFE:	hPa	0500 – 1 100	1

* There is no aeronautical requirement to report surface wind speeds of 200 km/h (100 kt) or more; however, provision has been made for reporting wind speeds up to 399 km/h (199 kt) for non-aeronautical purposes, as necessary.

Table A3-5. Ranges and resolutions for the numerical elements included in METAR and SPECI

Element as specified in Chapter 4		*Range*	*Resolution*
Runway:	(no units)	01 – 36	1
Wind direction:	°true	000 – 360	10
Wind speed:	KMH	00 – 399*	1
	KT	00 – 199*	1
Visibility:	M	0000 – 0800	50
	M	0800 – 5 000	100
	M	5 000 – 9 000	1 000
	M	9 000 – 9 999	999
RVR:	M	0000 – 0400	25
	M	0400 – 0800	50
	M	0800 – 2 000	100
Vertical visibility:	30's M (100's FT)	000 – 020	1

Element as specified in Chapter 4			*Range*	*Resolution*
Clouds: height of cloud base:		30's M (100's FT)	000 – 100	1
Air temperature; Dew-point temperature:		°C	–80 – +60	1
QNH:		hPa	0850 – 1 100	1
Sea-surface temperature:		°C	–10 – +40	1
State of the sea:		(no units)	0 – 9	1
State of the runway	Runway designator:	(no units)	01 – 36; 88; 99	1
	Runway deposits:	(no units)	0 – 9	1
	Extent of runway contamination:	(no units)	1; 2; 5; 9	—
	Depth of deposit:	(no units)	00 – 90; 92 – 99	1
	Friction coefficient/braking action:	(no units)	00 – 95; 99	1

* There is no aeronautical requirement to report surface wind speeds of 200 km/h (100 kt) or more; however, provision has been made for reporting wind speeds up to 399 km/h (199 kt) for non-aeronautical purposes, as necessary.

Example A3-1. Routine report

a) *Local routine report (same location and weather conditions as METAR):*

MET REPORT YUDO 221630Z WIND 240/15KMH VIS 600M RVR RWY 12 TDZ 1000M MOD DZ FG CLD SCT 300M OVC 600M T17 DP16 QNH 1018 HPA TREND BECMG TL1700 VIS 800M FG BECMG AT1800 VIS 10KM NSW

b) *METAR for YUDO (Donlon/International)*:*

METAR YUDO 221630Z 24015KMH 0600 R12/1000U DZ FG SCT010 OVC020 17/16 Q1018 BECMG TL1700 0800 FG BECMG AT1800 9999 NSW

Meaning of both reports:

Routine report for Donlon/International* issued on the 22nd of the month at 1630 UTC; surface wind direction 240 degrees; wind speed 15 kilometres per hour; visibility (along the runway(s) in the local routine report; prevailing visibility in METAR) 600 metres; runway visual range representative of the touchdown zone for runway 12 is 1 000 metres and the runway visual range values have shown an upward tendency during previous 10 minutes (RVR tendency to be included in METAR only); and moderate drizzle and fog; scattered cloud at 300 metres; overcast at 600 metres; air temperature 17 degrees Celsius; dew-point temperature 16 degrees Celsius; QNH 1 018 hectopascals; trend during next 2 hours, visibility (along the runway(s) in the local routine report; prevailing visibility in METAR) becoming 800 metres in fog by 1700 UTC; at 1800 UTC visibility (along the runway(s) in the local routine report; prevailing visibility in METAR) becoming 10 kilometres or more and nil significant weather.

* Fictitious location

Note.— In this example, the primary units "kilometre per hour" and "metre" were used for wind speed and height of cloud base, respectively. However, in accordance with Annex 5, the corresponding non-SI alternative units "knot" and "foot" may be used instead.

Example A3-2. Special report

a) *Local special report (same location and weather conditions as SPECI):*

SPECIAL YUDO 151115Z WIND 050/25KT MAX37 MNM10 VIS 1200M RVR RWY 05 ABV 1800M HVY TSRA CLD BKN CB 500FT T25 DP22 QNH 1008 HPA TREND TEMPO TL1200 VIS 600M BECMG AT1200 VIS 8KM NSW NSC

b) *SPECI for YUDO (Donlon/International)*:*

SPECI YUDO 151115Z 05025G37KT 3000 1200NE+TSRA BKN005CB 25/22 Q1008 TEMPO TL1200 0600 BECMG AT1200 8000 NSW NSC

Meaning of both reports:

Special report for Donlon/International* issued on the 15th of the month at 1115 UTC; surface wind direction 050 degrees; wind speed 25 knots gusting between 10 and 37 knots (minimum wind speed not to be included in SPECI) visibility 1 200 metres (along the runway(s) in the local special report); prevailing visibility 3 000 metres (in SPECI) with minimum visibility 1 200 metres to north east (directional variations to be included in SPECI only); RVR above 1 800 metres on runway 05 (RVR not required in SPECI with prevailing visibility of 3 000 metres); thunderstorm with heavy rain; broken cumulonimbus cloud at 500 feet; air temperature 25 degrees Celsius; dew-point temperature 22 degrees Celsius; QNH 1 008 hectopascals; trend during next 2 hours, visibility (along the runway(s) in the local special report; prevailing visibility in SPECI) temporarily 600 metres from 1115 to 1200, becoming at 1200 UTC visibility (along the runway(s) in the local special report; prevailing visibility in SPECI) 8 kilometres, thunderstorm ceases and nil significant weather and nil significant cloud.

* Fictitious location

Note.— In this example, the non-SI alternative units "knot" and "foot" were used for wind speed and height of cloud base, respectively. However, in accordance with Annex 5, the corresponding primary units "kilometre per hour" and "metre" may be used instead.

Example A3-3. Volcanic activity report

VOLCANIC ACTIVITY REPORT YUSB* 231500 MT TROJEEN* VOLCANO N5605 W12652 ERUPTED 231445 LARGE ASH CLOUD EXTENDING TO APPROX 30000 FEET MOVING SW

Meaning:

Volcanic activity report issued by Siby/Bistock meteorological station at 1500 UTC on the 23rd of the month. Mt. Trojeen volcano 56 degrees 5 minutes north 126 degrees 52 minutes west erupted at 1445 UTC on the 23rd; a large ash cloud was observed extending to approximately 30 000 feet and moving in a south-westerly direction.

* Fictitious location

APPENDIX 4. TECHNICAL SPECIFICATIONS RELATED TO AIRCRAFT OBSERVATIONS AND REPORTS

(See Chapter 5 of this Annex.)

1. CONTENTS OF AIR-REPORTS

1.1 Routine air-reports by air-ground data link

1.1.1 When air-ground data link is used and automatic dependent surveillance (ADS) or SSR Mode S is being applied, the elements contained in routine air-reports shall be:

Message type designator
Aircraft identification

Data block 1
- Latitude
- Longitude
- Level
- Time

Data block 2
- Wind direction
- Wind speed
- Wind quality flag
- Temperature
- Turbulence (if available)
- Humidity (if available)

Note.— When ADS or SSR Mode S is being applied, the requirements of routine air-reports may be met by the combination of the basic ADS/SSR Mode S data block (data block 1) and the meteorological information data block (data block 2), available from ADS or SSR Mode S reports. The ADS message format is specified in the PANS-ATM (Doc 4444), 4.11.4 and Chapter 13 and the SSR Mode S message format is specified in Annex 10, Volume III, Part I — Digital Data Communication Systems*, Chapter 5.*

1.1.2 When air-ground data link is used while ADS and SSR Mode S are not being applied, the elements contained in routine reports shall be in accordance with 1.3.

Note.— When air-ground data link is used while ADS and SSR Mode S are not being applied, the requirements of routine air-reports may be met by the controller-pilot data link communication (CPDLC) application entitled "Position report". The details of this data link application are specified in the Manual of Air Traffic Services Data Link Applications *(Doc 9694) and in Annex 10, Volume III, Part I.*

1.2 Special air-reports by air-ground data link

When air-ground data link is used, the elements contained in special air-reports shall be:

Message type designator
Aircraft identification

Data block 1
- Latitude
- Longitude
- Level
- Time

Data block 2
- Wind direction
- Wind speed
- Wind quality flag
- Temperature
- Turbulence (if available)
- Humidity (if available)

Data block 3
- Condition prompting the issuance of a special air-report (one condition to be selected from the list presented in Table A4-2).

Note 1.— The requirements of special air-reports may be met by the data link flight information service (D-FIS) application entitled "Special air-report service". The details of this data link application are specified in Doc 9694.

Note 2.— In the case of a special air-report of pre-eruption volcanic activity, volcanic eruption or volcanic ash cloud, additional requirements are indicated in 4.2.

1.3 Routine air-reports by voice communications

When voice communications are used, the elements contained in routine air-reports shall be:

Message type designator

Section 1 (Position information)
- Aircraft identification
- Position or latitude and longitude
- Time
- Flight level or altitude
- Next position and time over
- Ensuing significant point

Section 2 (Operational information)
- Estimated time of arrival
- Endurance

Section 3 (Meteorological information)
- Air temperature
- Wind direction

Wind speed
Turbulence
Aircraft icing
Humidity (if available)

1.4 Special air-reports by voice communications

When voice communications are used, the elements contained in special air-reports shall be:

Message type designator

Section 1 (Position information)
Aircraft identification
Position or latitude and longitude
Time
Flight level or altitude

Section 3 (Meteorological information)
Condition prompting the issuance of a special air-report, to be selected from the list presented in Table A4-2.

Note 1.— Air-reports are considered routine by default. The message type designator for special air-reports is specified in the PANS-ATM (Doc 4444), Appendix 1.

Note 2.— In the case of a special air-report of pre-eruption volcanic activity, volcanic eruption or volcanic ash cloud, additional requirements are indicated in 4.2.

2. CRITERIA FOR REPORTING

2.1 General

When air-ground data link is used, the wind direction, wind speed, wind quality flag, temperature, turbulence and humidity included in air-reports shall be reported in accordance with the following criteria.

2.2 Wind direction

The wind direction shall be reported in terms of degrees true, rounded to the nearest whole degree.

2.3 Wind speed

The wind speed shall be reported in kilometres per hour or knots, rounded to the nearest 2 km/h (1 knot). The units used shall be indicated.

2.4 Wind quality flag

The wind quality flag shall be reported as 0 when the roll angle is less than 5 degrees and as 1 when the roll angle is 5 degrees or more.

2.5 Temperature

The temperature shall be reported to the nearest tenth of a degree Celsius.

2.6 Turbulence

The turbulence shall be reported in terms of the cube root of the eddy dissipation rate (EDR).

2.6.1 Routine air-reports

The turbulence shall be reported during the en-route phase of the flight and shall refer to the 15-minute period immediately preceding the observation. Both the average and peak value of turbulence, together with the time of occurrence of the peak value to the nearest minute, shall be observed. The average and peak values shall be reported in terms of the cube root of EDR. The time of occurrence of the peak value shall be reported as indicated in Table A4-1. The turbulence shall be reported during the climb-out phase for the first 10 minutes of the flight and shall refer to the 30-second period immediately preceding the observation. The peak value of turbulence shall be observed.

2.6.2 Interpretation of the turbulence report

Turbulence shall be considered:

a) severe when the peak value of the cube root of EDR exceeds 0.7;

b) moderate when the peak value of the cube root of EDR is above 0.4 and below or equal to 0.7;

c) light when the peak value of the cube root of EDR is above 0.1 and below or equal to 0.4;

d) nil when the peak value of the cube root of EDR is below or equal to 0.1.

Note.— The EDR is an aircraft-independent measure of turbulence. However, the relationship between the EDR value and the perception of turbulence is a function of aircraft type, and the mass, altitude, configuration and airspeed of the aircraft. The EDR values given above describe the severity levels for a medium-sized transport aircraft under typical en-route conditions (i.e. altitude, airspeed and weight).

2.6.3 Special air-reports

Special air-reports on turbulence shall be made during any phase of the flight whenever the peak value of the cube root of EDR exceeds 0.7. The special air-report on turbulence shall be made with reference to the 1-minute period immediately preceding the observation. Both the average and peak value of turbulence shall be observed. The average and peak values shall be reported in terms of the cube root of EDR. Special air-reports shall be issued every minute until such time as the peak values of the cube root of EDR fall below 0.7.

2.7 Humidity

The humidity shall be reported as the relative humidity, rounded to the nearest whole per cent.

Note.— The ranges and resolutions for the meteorological elements included in air-reports are shown in Table A4-3.

3. EXCHANGE OF AIR-REPORTS

3.1 Responsibilities of the meteorological watch offices

3.1.1 The meteorological watch offices shall assemble the routine air-reports received by voice communications and shall disseminate them to WAFCs and other meteorological offices in accordance with regional air navigation agreement.

Note.— The exchange of collectives on an hourly basis may be found desirable when reports are numerous.

3.1.2 The meteorological watch office shall transmit without delay the special air-reports received by voice communications to WAFCs.

3.1.3 The meteorological watch office shall transmit without delay special air-reports of pre-eruption volcanic activity, a volcanic eruption or volcanic ash cloud received to the associated VAACs.

3.1.4 When a special air-report is received at the meteorological watch office but the forecaster considers that the phenomenon causing the report is not expected to persist and, therefore, does not warrant issuance of a SIGMET, the special air-report shall be disseminated in the same way that SIGMET messages are disseminated in accordance with Appendix 6, 1.2.1, i.e. to meteorological watch offices, WAFCs, and other meteorological offices in accordance with regional air navigation agreement.

3.2 Responsibilities of world area forecast centres

Air-reports received at WAFCs shall be further disseminated as basic meteorological data.

Note.— The dissemination of basic meteorological data is normally carried out on the WMO global telecommunication system.

3.3 Supplementary dissemination of air-reports

Recommendation.— *Where supplementary dissemination of air-reports is required to satisfy special aeronautical or meteorological requirements, such dissemination should be arranged between the meteorological authorities concerned.*

3.4 Format of air-reports

Air-reports shall be exchanged in the format in which they are received, except that when voice communications are used, if the position is given by reference to an ATS reporting point, it shall be converted, by the meteorological watch office, into the corresponding latitude and longitude.

4. SPECIFIC PROVISIONS RELATED TO REPORTING WIND SHEAR AND VOLCANIC ASH

4.1 Reporting of wind shear

4.1.1 **Recommendation.—** *When reporting aircraft observations of wind shear encountered during the climb-out and approach phases of flight, the aircraft type should be included.*

4.1.2 **Recommendation.—** *Where wind shear conditions in the climb-out or approach phases of flight were reported or forecast but not encountered, the pilot-in-command should advise the appropriate air traffic services unit as soon as practicable unless the pilot-in-command is aware that the appropriate air traffic services unit has already been so advised by a preceding aircraft.*

4.2 Post-flight reporting of volcanic activity

Note.— The detailed instructions for recording and reporting volcanic activity observations are given in the PANS-ATM (Doc 4444), Appendix 1.

4.2.1 On arrival of a flight at an aerodrome, the completed report of volcanic activity shall be delivered by the operator or a flight crew member, without delay, to the aerodrome meteorological office, or if such office is not easily accessible to arriving flight crew members, the completed form shall be dealt with in accordance with local arrangements made by the meteorological authority and the operator.

4.2.2 The completed report of volcanic activity received by a meteorological office shall be transmitted without delay to the meteorological watch office responsible for the provision of meteorological watch for the flight information region in which the volcanic activity was observed.

Table A4-1. Time of occurrence of the peak value to be reported

Peak value of turbulence occurring during the one-minute period .... minutes prior to the observation	*Value to be reported*
0 – 1	0
1 – 2	1
2 – 3	2
. . .	. . .
13 – 14	13
14 – 15	14
No timing information available	15

Table A4-2. Template for the special air-report (downlink)

Key: M = inclusion mandatory, part of every message;
C = inclusion conditional; included whenever available.

Note.— Message to be prompted by the pilot-in-command. Currently only the condition "SEV TURB" can be automated (see 2.6.3).

Element as specified in Chapter 5	*Detailed content*	*Template(s)*	*Examples*
Message type designator (M)	Type of the air-report (M)	ARS	ARS
Aircraft identification (M)	Aircraft radiotelephony call sign (M)	nnnnnn	VA812
DATA BLOCK 1			
Latitude (M)	Latitude in degrees and minutes (M)	Nnnnn *or* Snnnn	S4506
Longitude (M)	Longitude in degrees and minutes (M)	Wnnnnn *or* Ennnnn	E01056
Level (M)	Flight level (M)	FLnnn	FL330
Time (M)	Time of occurrence in hours and minutes (M)	OBS AT nnnnZ	OBS AT 1216Z
DATA BLOCK 2			
Wind direction (M)	Wind direction in degrees true (M)	nnn/	262/
Wind speed (M)	Wind speed in kilometres per hour (*or* knots) (M)	nnnKMH (*or* nnnKT)	158KMH (079KT)
Wind quality flag (M)	Wind quality flag (M)	n	1
Temperature (M)	Air temperature in tenths of degrees C (M)	T[M]nnn	T127 TM455
Turbulence (C)	Turbulence in hundredths of $m^{2/3}s^{-1}$ and the time of occurrence of the peak value (C)[1]	EDRnnn/nn	EDR064/08
Humidity (C)	Relative humidity in per cent (C)	RHnnn	RH054
DATA BLOCK 3			
Condition prompting the issuance of a special air-report (M)		SEV TURB [EDRnnn][2] *or* SEV ICE *or* SEV MTW *or* TS GR[3] *or* TS[3] *or* HVY SS[4] *or* VA CLD [FL nnn/nnn] *or* VA[5] [MT nnnnnnnnnnnnnnnnnnnn]	SEV TURB EDR076 VA CLD FL050/100

Notes.—

1. The time of occurrence to be reported in accordance with Table A4-1.
2. The turbulence to be reported in accordance with 2.6.3.
3. Obscured, embedded or widespread thunderstorms or thunderstorms in squall lines.
4. Duststorm or sandstorm.
5. Pre-eruption volcanic activity or a volcanic eruption.

Table A4-3. Ranges and resolutions for the meteorological elements included in air-reports

Element as specified in Chapter 5		*Range*	*Resolution*
Wind direction:	°true	000 – 360	1
Wind speed:	KMH KT	00 – 500 00 – 250	2 1
Wind quality flag:	(index)*	0 – 1	1
Temperature:	°C	–80 – +60	0.1
Turbulence: routine air-report:	$m^{2/3}\ s^{-1}$ (time of occurrence)*	0 – 2 0 – 15	0.01 1
Turbulence: special air-report:	$m^{2/3}\ s^{-1}$	0 – 2	0.01
Humidity:	%	0 – 100	1

* Non-dimensional

APPENDIX 5. TECHNICAL SPECIFICATIONS RELATED TO FORECASTS

(See Chapter 6 of this Annex.)

1. CRITERIA RELATED TO TAF

1.1 TAF format

1.1.1 TAF shall be issued in accordance with the template shown in Table A5-1 and disseminated in the TAF code form prescribed by the World Meteorological Organization.

Note.— The TAF code form is contained in WMO Publication No. 306, Manual on Codes*, Volume I.1, Part A — Alphanumeric Codes.*

1.1.2 **Recommendation**.— *TAF should be disseminated, under bilateral agreements between States in a position to do so, in the WMO BUFR code form, in addition to the dissemination of the TAF in accordance with 1.1.1.*

Note.— The BUFR code form is contained in WMO Publication No. 306, Manual on Codes*, Volume I.2, Part B — Binary Codes.*

1.2 Inclusion of meteorological elements in TAF

Note.— Guidance on operationally desirable accuracy of forecasts is given in Attachment B.

1.2.1 Surface wind

Recommendation.— *In forecasting surface wind, the expected prevailing direction should be given. When it is not possible to forecast a prevailing surface wind direction due to its expected variability, for example, during light wind conditions (less than 6 km/h (3 kt)) or thunderstorms, the forecast wind direction should be indicated as variable using "VRB". When the wind is forecast to be less than 2 km/h (1 kt), the forecast wind speed should be indicated as calm. When the forecast maximum speed (gust) exceeds the forecast mean wind speed by 20 km/h (10 kt) or more, the forecast maximum wind speed should be indicated. When a wind speed of 200 km/h (100 kt) or more is forecast, it should be indicated to be more than 199 km/h (99 kt).*

1.2.2 Visibility

Recommendation.— *When the visibility is forecast to be less than 800 m, it should be expressed in steps of 50 m; when it is forecast to be 800 m or more but less than 5 km, in steps of 100 m; 5 km or more but less than 10 km, in kilometre steps; and when it is forecast to be 10 km or more, it should be expressed as 10 km, except when conditions of CAVOK are forecast to apply. The prevailing visibility should be forecast. When visibility is forecast to vary in different directions and the prevailing visibility cannot be forecast, the lowest forecast visibility should be given.*

1.2.3 Weather phenomena

Recommendation.— *One or more, up to a maximum of three, of the following weather phenomena or combinations thereof, together with their characteristics and, where appropriate, intensity, should be forecast if they are expected to occur at the aerodrome:*

— *freezing precipitation*
— *freezing fog*
— *moderate or heavy precipitation (including showers thereof)*
— *low drifting dust, sand or snow*
— *blowing dust, sand or snow*
— *duststorm*
— *sandstorm*
— *thunderstorm (with or without precipitation)*
— *squall*
— *funnel cloud (tornado or waterspout)*
— *other weather phenomena given in Appendix 3, 4.4.2.3, only if they are expected to cause a significant change in visibility.*

The expected end of occurrence of those phenomena should be indicated by the abbreviation "NSW".

1.2.4 Cloud

Recommendation.— *Cloud amount should be forecast using the abbreviations "FEW", "SCT", "BKN" or "OVC" as necessary. When it is expected that the sky will remain or become obscured and clouds cannot be forecast and information on vertical visibility is available at the aerodrome, the vertical visibility should be forecast in the form "VV" followed by the forecast value of the vertical visibility. When several layers or masses of cloud are forecast, their amount and height of base should be included in the following order:*

a) the lowest layer or mass regardless of amount, to be forecast as FEW, SCT, BKN or OVC as appropriate;

b) the next layer or mass covering more than 2/8, to be forecast as SCT, BKN or OVC as appropriate;

c) the next higher layer or mass covering more than 4/8, to be forecast as BKN or OVC as appropriate; and

d) cumulonimbus clouds, whenever forecast and not already included under a) to c).

Cloud information should be limited to cloud of operational significance; when no cloud of operational significance is forecast, and "CAVOK" is not appropriate, the abbreviation "NSC" should be used.

1.2.5 Temperature

Recommendation.— *When forecast temperatures are included in accordance with regional air navigation agreement, the maximum and minimum temperatures expected to occur during the period of validity of the TAF should be given, together with their corresponding times of occurrence.*

1.3 Use of change groups

Note. — Guidance on the use of change and time indicators in TAF is given in Table A5-2.

1.3.1 **Recommendation.**— *The criteria used for the inclusion of change groups in TAF or for the amendment of TAF should be based on the following:*

a) when the mean surface wind direction is forecast to change by 60º or more, the mean speed before and/or after the change being 20 km/h (10 kt) or more;

b) when the mean surface wind speed is forecast to change by 20 km/h (10 kt) or more;

c) when the variation from the mean surface wind speed (gusts) is forecast to increase by 20 km/h (10 kt) or more, the mean speed before and/or after the change being 30 km/h (15 kt) or more;

d) when the surface wind is forecast to change through values of operational significance. The threshold values should be established by the meteorological authority in consultation with the appropriate ATS authority and operators concerned, taking into account changes in the wind which would:

1) require a change in runway(s) in use; and

2) indicate that the runway tailwind and crosswind components will change through values representing the main operating limits for typical aircraft operating at the aerodrome;

e) when the visibility is forecast to improve and change to or pass through one or more of the following values, or when the visibility is forecast to deteriorate and pass through one or more of the following values:

1) 150, 350, 600, 800, 1 500 or 3 000 m; or

2) 5 000 m in cases where significant numbers of flights are operated in accordance with the visual flight rules;

f) when any of the following weather phenomena or combinations thereof are forecast to begin or end or change in intensity:

— *freezing precipitation*
— *moderate or heavy precipitation (including showers thereof)*
— *thunderstorm (with precipitation)*
— *duststorm*
— *sandstorm;*

g) when any of the following weather phenomena or combinations thereof are forecast to begin or end:

— *ice crystals*
— *freezing fog*
— *low drifting dust, sand or snow*
— *blowing dust, sand or snow*
— *thunderstorm (without precipitation)*
— *squall*
— *funnel cloud (tornado or waterspout);*

h) when the height of base of the lowest layer or mass of cloud of BKN or OVC extent is forecast to lift and change to or pass through one or more of the following values, or when the height of the lowest layer or mass of cloud of BKN or OVC extent is forecast to lower and pass through one or more of the following values:

1) 30, 60, 150 or 300 m (100, 200, 500 or 1 000 ft); or

2) 450 m (1 500 ft) in cases where significant numbers of flights are operated in accordance with the visual flight rules;

i) when the amount of a layer or mass of cloud below 450 m (1 500 ft) is forecast to change:

1) from NSC, FEW or SCT to BKN or OVC; or

2) from BKN or OVC to NSC, FEW or SCT;

j) when the vertical visibility is forecast to improve and change to or pass through one or more of the following values, or when the vertical visibility is forecast to deteriorate and pass through one or more of the following values: 30, 60, 150 or 300 m (100, 200, 500 or 1 000 ft); and

k) any other criteria based on local aerodrome operating minima, as agreed between the meteorological authority and the operators.

Note.— Other criteria based on local aerodrome operating minima are to be considered in parallel with similar criteria for the issuance of SPECI developed in response to Appendix 3, 2.3.2 l).

1.3.2 **Recommendation.—** *When a change in any of the elements given in Chapter 6, 6.2.3 is required to be indicated in accordance with the criteria given in 1.3.1, the change indicators "BECMG" or "TEMPO" should be used followed by the time period during which the change is expected to occur. The time period should be indicated as the beginning and end of the period in whole hours UTC. Only those elements for which a significant change is expected should be included following a change indicator. However, in the case of significant changes in respect of cloud, all cloud groups, including layers or masses not expected to change, should be indicated.*

1.3.3 **Recommendation.—** *The change indicator "BECMG" and the associated time group should be used to describe changes where the meteorological conditions are expected to reach or pass through specified threshold values at a regular or irregular rate and at an unspecified time during the time period. The time period should normally not exceed 2 hours but in any case should not exceed 4 hours.*

1.3.4 **Recommendation.—** *The change indicator "TEMPO" and the associated time group should be used to describe expected frequent or infrequent temporary fluctuations in the meteorological conditions which reach or pass specified threshold values and last for a period of less than one hour in each instance and, in the aggregate, cover less than one-half of the forecast period during which the fluctuations are expected to occur. If the temporary fluctuation is expected to last one hour or longer, the change group "BECMG" should be used in accordance with 1.3.3 or the validity period should be subdivided in accordance with 1.3.5.*

1.3.5 **Recommendation.—** *Where one set of prevailing weather conditions is expected to change significantly and more or less completely to a different set of conditions, the period of validity should be subdivided into self-contained periods using the abbreviation "FM" followed immediately by a four-figure time group in whole hours and minutes UTC indicating the time the change is expected to occur. The subdivided period following the abbreviation "FM" should be self-contained and all forecast conditions given before the abbreviation should be superseded by those following the abbreviation.*

1.4 Use of probability groups

Recommendation.— *The probability of occurrence of an alternative value of a forecast element or elements should be indicated, as necessary, by use of the abbreviation "PROB" followed by the probability in tens of per cent and the time period during which the alternative value(s) is (are) expected to apply. The probability information should be placed after the element or elements forecast and be followed by the alternative value of the element or elements. The probability of a forecast of temporary fluctuations in meteorological conditions should be indicated, as necessary, by use of the abbreviation "PROB" followed by the probability in tens of per cent, placed before the change indicator "TEMPO" and associated time group. A probability of an alternative value or change of less than 30 per cent should not be considered sufficiently significant to be indicated. A probability of an alternative value or change of 50 per cent or more, for aviation purposes, should not be considered a probability but instead should be indicated, as necessary, by use of the change indicators*

"BECMG" or "TEMPO" or by subdivision of the validity period using the abbreviation "FM". The probability group should not be used to qualify the change indicator "BECMG" nor the time indicator "FM".

1.5 Numbers of change and probability groups

Recommendation.— *The number of change and probability groups should be kept to a minimum and should not normally exceed five groups.*

1.6 Dissemination of TAF

TAF and amendments thereto shall be disseminated to international OPMET databanks and the centres designated by regional air navigation agreement for the operation of aeronautical fixed service satellite distribution systems, in accordance with regional air navigation agreement.

2. CRITERIA RELATED TO TREND FORECASTS

2.1 Format of trend forecasts

Trend forecasts shall be issued in accordance with the templates shown in Appendix 3, Tables A3-1 and A3-2. The units and scales used in the trend forecast shall be the same as those used in the report to which it is appended.

Note.— Examples of trend forecasts are given in Appendix 3.

2.2 Inclusion of meteorological elements in trend forecasts

2.2.1 General provisions

The trend forecast shall indicate significant changes in respect of one or more of the elements: surface wind, visibility, weather and clouds. Only those elements shall be included for which a significant change is expected. However, in the case of significant changes in respect of cloud, all cloud groups, including layers or masses not expected to change, shall be indicated. In the case of a significant change in visibility, the phenomenon causing the reduction of visibility shall also be indicated. When no change is expected to occur, this shall be indicated by the term "NOSIG".

2.2.2 Surface wind

The trend forecast shall indicate changes in the surface wind which involve:

a) a change in the mean wind direction of 60° or more, the mean speed before and/or after the change being 20 km/h (10 kt) or more;

b) a change in mean wind speed of 20 km/h (10 kt) or more; and

c) changes in the wind through values of operational significance. The threshold values shall be established by the meteorological authority in consultation with the appropriate ATS authority and operators concerned, taking into account changes in the wind which would:

1) require a change in runway(s) in use; and

2) indicate that the runway tailwind and crosswind components will change through values representing the main operating limits for typical aircraft operating at the aerodrome.

2.2.3 Visibility

When the visibility is expected to improve and change to or pass through one or more of the following values, or when the visibility is expected to deteriorate and pass through one or more of the following values: 150, 350, 600, 800, 1 500 or 3 000 m, the trend forecast shall indicate the change. When significant numbers of flights are conducted in accordance with the visual flight rules, the forecast shall additionally indicate changes to or passing through 5 000 m.

Note.— In trend forecasts appended to local routine and special reports, visibility refers to the forecast visibility along the runway(s); in trend forecasts appended to METAR and SPECI, visibility refers to the forecast prevailing visibility.

2.2.4 Weather phenomena

2.2.4.1 The trend forecast shall indicate the expected onset, cessation or change in intensity of one or more of the following weather phenomena or combinations thereof:

— freezing precipitation
— moderate or heavy precipitation (including showers thereof)
— thunderstorm (with precipitation)
— duststorm
— sandstorm
— other weather phenomena given in Appendix 3, 4.4.2.3, only if they are expected to cause a significant change in visibility.

2.2.4.2 The trend forecast shall indicate the expected onset or cessation of one or more of the following weather phenomena or combinations thereof:

— ice crystals
— freezing fog
— low drifting dust, sand or snow
— blowing dust, sand or snow
— thunderstorm (without precipitation)
— squall
— funnel cloud (tornado or waterspout).

2.2.4.3 The total number of phenomena reported in 2.2.4.1 and 2.2.4.2 shall not exceed three.

2.2.4.4 The expected end of occurrence of the weather phenomena shall be indicated by the abbreviation "NSW".

2.2.5 Clouds

When the height of the base of a cloud layer of BKN or OVC extent is expected to lift and change to or pass through one or more of the following values, or when the height of the base of a cloud layer of BKN or OVC extent is expected to lower and pass through one or more of the following values: 30, 60, 150, 300 and 450 m (100, 200, 500, 1 000 and 1 500 ft), the trend forecast shall indicate the change. When the height of the base of a cloud layer is below or is expected to fall below or rise above 450 m (1 500 ft), the trend forecast shall also indicate changes in cloud amount from FEW, or SCT increasing to BKN or OVC, or changes from BKN or OVC decreasing to FEW or SCT. When no clouds of operational significance are forecast and “CAVOK” is not appropriate, the abbreviation “NSC” shall be used.

2.2.6 Vertical visibility

When the sky is expected to remain or become obscured and vertical visibility observations are available at the aerodrome, and the vertical visibility is forecast to improve and change to or pass through one or more of the following values, or when the vertical visibility is forecast to deteriorate and pass through one or more of the following values: 30, 60, 150 or 300 m (100, 200, 500 or 1 000 ft), the trend forecast shall indicate the change.

2.2.7 Additional criteria

Criteria for the indication of changes based on local aerodrome operating minima, additional to those specified in 2.2.2 to 2.2.6, shall be used as agreed between the meteorological authority and the operator(s) concerned.

2.3 Use of change groups

Note. — Guidance on the use of change indicators in trend forecasts is given in Table A3-3.

2.3.1 When a change is expected to occur, the trend forecast shall begin with one of the change indicators “BECMG” or “TEMPO”.

2.3.2 The change indicator “BECMG” shall be used to describe forecast changes where the meteorological conditions are expected to reach or pass through specified values at a regular or irregular rate. The period during which, or the time at which, the change is forecast to occur shall be indicated, using the abbreviations “FM”, “TL”, or “AT”, as appropriate, each followed by a time group in hours and minutes. When the change is forecast to begin and end wholly within the trend forecast period, the beginning and end of the change shall be indicated by using the abbreviations “FM” and “TL”, respectively, with their associated time groups. When the change is forecast to commence at the beginning of the trend forecast period but be completed before the end of that period, the abbreviation “FM” and its associated time group shall be omitted and only “TL” and its associated time group shall be used. When the change is forecast to begin during the trend forecast period and be completed at the end of that period, the abbreviation “TL” and its associated time group shall be omitted and only “FM” and its associated time group shall be used. When the change is forecast to occur at a specified time during the trend forecast period, the abbreviation “AT” followed by its associated time group shall be used. When the change is forecast to commence at the beginning of the trend forecast period and be completed by the end of that period or when the change is forecast to occur within the trend forecast period but the time is uncertain, the abbreviations “FM”, “TL” or “AT” and their associated time groups shall be omitted and the change indicator “BECMG” shall be used alone.

2.3.3 The change indicator “TEMPO” shall be used to describe forecast temporary fluctuations in the meteorological conditions which reach or pass specified values and last for a period of less than one hour in each instance and, in the aggregate, cover less than one-half of the period during which the fluctuations are forecast to occur. The period during which the temporary fluctuations are forecast to occur shall be indicated, using the abbreviations “FM” and/or “TL”, as appropriate, each followed by a time group in hours and minutes. When the period of temporary fluctuations in the meteorological conditions is forecast to begin and end wholly within the trend forecast period, the beginning and end of the period of temporary fluctuations shall be indicated by using the abbreviations “FM” and “TL”, respectively, with their associated time groups. When the period of temporary fluctuations is forecast to commence at the beginning of the trend forecast period but cease before the end of that period, the abbreviation “FM” and its associated time group shall be omitted and only “TL” and its associated time group shall be used. When the period of temporary fluctuations is forecast to begin during the trend forecast period and cease by the end of that period, the abbreviation “TL” and its associated time group shall be omitted and only "FM" and its associated time group shall be used. When the period of temporary fluctuations is forecast to commence at the beginning of the trend forecast period and cease by the end of that period, both abbreviations "FM" and "TL" and their associated time groups shall be omitted and the change indicator "TEMPO" shall be used alone.

2.4 Use of the probability indicator

The indicator "PROB" shall not be used in trend forecasts.

3. CRITERIA RELATED TO FORECASTS FOR TAKE-OFF

3.1 Format of forecasts for take-off

Recommendation.— *The format of the forecast should be as agreed between the meteorological authority and the operator concerned. The order of the elements and the terminology, units and scales used in forecasts for take-off should be the same as those used in reports for the same aerodrome.*

3.2 Amendments to forecasts for take-off

Recommendation.— *The criteria for the issuance of amendments for forecasts for take-off for surface wind direction and speed, temperature and pressure and any other elements agreed locally should be agreed between the meteorological authority and the operators concerned. The criteria should be consistent with the corresponding criteria for special reports established for the aerodrome in accordance with Appendix 3, 2.3.1.*

4. CRITERIA RELATED TO AREA FORECASTS FOR LOW-LEVEL FLIGHTS

4.1 Format and content of GAMET area forecasts

When prepared in GAMET format, area forecasts shall contain two sections: Section I related to information on en-route weather phenomena hazardous to low-level flights, prepared in support of the issuance of AIRMET information, and Section II related to additional information required by low-level flights. The content and order of elements in a GAMET area forecast, when prepared, shall be in accordance with the template shown in Table A5-4. Additional elements in Section II shall be included in accordance with regional air navigation agreement. Elements which are already covered by a SIGMET message shall be omitted from GAMET area forecasts.

4.2 Amendments to GAMET area forecasts

When a weather phenomenon hazardous to low-level flights has been included in the GAMET area forecast and the phenomenon forecast does not occur, or is no longer forecast, a GAMET AMD shall be issued, amending only the weather element concerned.

Note.— Specifications regarding the issuance of AIRMET information amending the area forecast in respect of weather phenomena hazardous for low-level flights are given in Appendix 6.

4.3 Content of area forecasts for low-level flights in chart form

4.3.1 When chart form is used for area forecasts for low-level flights, the forecast of upper wind and upper-air temperature shall be issued for points separated by no more than 500 km (300 NM) and for at least the following altitudes: 600, 1 500 and 3 000 m (2 000, 5 000 and 10 000 ft), and 4 500 m (15 000 ft) in mountainous areas.

4.3.2 When chart form is used for area forecasts for low-level flights, the forecast of SIGWX phenomena shall be issued as low-level SIGWX forecast for flight levels up to 100 (or up to flight level 150 in mountainous areas, or higher, where necessary). Low-level SIGWX forecasts shall include the following items:

a) the phenomena warranting the issuance of a SIGMET as given in Appendix 6 and which are expected to affect low-level flights; and

b) the elements in area forecasts for low-level flights as given in Table A5-4 except elements concerning:

   1) upper winds and temperatures; and

   2) forecast QNH.

Note.— Guidance on the use of terms "ISOL", "OCNL" and "FRQ" referring to cumulonimbus and towering cumulus clouds, and thunderstorms is given in Appendix 6.

4.4 Exchange of area forecasts for low-level flights

Area forecasts for low-level flights prepared in support of the issuance of AIRMET information shall be exchanged between meteorological offices responsible for the issuance of flight documentation for low-level flights in the flight information regions concerned.

Table A5-1. Template for TAF

Key: M = inclusion mandatory, part of every message;
C = inclusion conditional, dependent on meteorological conditions or method of observation;
O = inclusion optional.

Note 1.— The ranges and resolutions for the numerical elements included in TAF are shown in Table A5-3 of this appendix.

Note 2.— The explanations for the abbreviations can be found in the Procedures for Air Navigation Services — ICAO Abbreviations and Codes *(PANS-ABC, Doc 8400)*.

Element as specified in Chapter 6	*Detailed content*	*Template(s)*			*Examples*
Identification of the type of forecast (M)	Type of forecast (M)	TAF *or* TAF AMD *or* TAF COR			TAF TAF AMD
Location indicator (M)	ICAO location indicator (M)	nnnn			YUDO[1]
Time of issue of forecast (M)	Day and time of issue of the forecast in UTC (M)	nnnnnnZ			160000Z
Identification of a missing forecast (C)	Missing forecast identifier (C)	NIL			NIL
END OF TAF IF THE FORECAST IS MISSING.					
Days and period of validity of forecast (M)	Days and period of the validity of the forecast in UTC (M)	nnnn/nnnn			1606/1624 0812/0918
Identification of a cancelled forecast (C)	Cancelled forecast identifier (C)	CNL			CNL
END OF TAF IF THE FORECAST IS CANCELLED.					
Surface wind (M)	Wind direction (M)	nnn *or* VRB[2]			24015KMH; VRB04KMH (24008KT); (VRB02KT) 19022KMH (19011KT)
	Wind speed (M)	[P]nn[n]			00000KMH (00000KT) 140P199KMH (140P99KT)
	Significant speed variations (C)[3]	G[P]nn[n]			12012G35KMH (12006G18KT) 24032G54KMH (24016G27KT)
	Units of measurement (M)	KMH (*or* KT)			
Visibility (M)	Prevailing visibility (M)	nnnn		C A V O K	0350 CAVOK 7000 9000 9999
Weather (C)[4, 5]	Intensity of weather phenomena (C)[6]	– *or* +	—		
	Characteristics and type of weather phenomena (C)[7]	DZ *or* RA *or* SN *or* SG *or* PL *or* DS *or* SS *or* FZDZ *or* FZRA *or* SHGR *or*	IC *or* FG *or* BR *or* SA *or* DU *or* HZ *or* FU *or* VA *or* SQ *or* PO *or* FC *or* TS *or* BCFG *or*		RA HZ +TSRA FG –FZDZ PRFG +TSRASN SNRA FG

Element as specified in Chapter 6	*Detailed content*	*Template(s)*				*Examples*
		SHGS *or* SHRA *or* SHSN *or* TSGR *or* TSGS *or* TSRA *or* TSSN		BLDU *or* BLSA *or* BLSN *or* DRDU *or* DRSA *or* DRSN *or* FZFG *or* MIFG *or* PRFG		
Cloud (M)[8]	Cloud amount and height of base or vertical visibility (M)	FEWnnn *or* SCTnnn *or* BKNnnn *or* OVCnnn	VVnnn *or* VV///	NSC		FEW010 VV005 OVC020 VV/// NSC SCT005 BKN012
	Cloud type (C)[4]	CB	—			SCT008 BKN025CB
Temperature (O)[9]	Name of the element (M)	TX				TX25/1013Z TN09/1005Z TX05/2112Z TNM02/2103Z
	Maximum temperature (M)	[M]nn/				
	Day and time of occurrence of the maximum temperature (M)	nnnnZ				
	Name of the element (M)	TN				
	Minimum temperature (M)	[M]nn/				
	Day and time of occurrence of the minimum temperature (M)	nnnnZ				
Expected significant changes to one or more of the above elements during the period of validity (C)[4, 10]	Change or probability indicator (M)	PROB30 [TEMPO] *or* PROB40 [TEMPO] *or* BECMG *or* TEMPO *or* FM				
	Period of occurrence or change (M)	nnnn/nnnn				
	Wind (C)[4]	nnn[P]nn[n][G[P]nn[n]]KMH *or* VRBnnKMH (*or* nnn[P]nn[G[P]nn]KT *or* VRBnnKT)				TEMPO 0815/0818 25070G100KMH (TEMPO 0815/0818 25035G50KT) TEMPO 2212/2214 17025G50KMH 1000 TSRA SCT010CB BKN020 (TEMPO 2212/2214 17012G25KT 1000 TSRA SCT010CB BKN020)
	Prevailing visibility (C)[4]	nnnn			C A V O K	BECMG 3010/3011 00000KMH 2400 OVC010 (BECMG 3010/3011 00000KT 2400 OVC010) PROB30 1412/1414 0800 FG
	Weather phenomenon: intensity (C)[6]	– or +	—	NSW		BECMG 1412/1414 RA TEMPO 2503/2504 FZRA TEMPO 0612/0615 BLSN PROB40 TEMPO 2923/3001 0500 FG
	Weather phenomenon: characteristics and type (C)[4, 7]	DZ *or* RA *or* SN *or* SG *or* PL *or* DS *or* SS *or* FZDZ *or* FZRA *or* SHGR *or* SHGS *or*	IC *or* FG *or* BR *or* SA *or* DU *or* HZ *or* FU *or* VA *or* SQ *or* PO *or* FC *or* TS *or* BCFG *or* BLDU *or*			

Element as specified in Chapter 6	*Detailed content*	*Template(s)*				*Examples*
		SHRA *or* SHSN *or* TSGR *or* TSGS *or* TSRA *or* TSSN	BLSA *or* BLSN *or* DRDU *or* DRSA *or* DRSN *or* FZFG *or* MIFG *or* PRFG			
	Cloud amount and height of base or vertical visibility (C)[4]	FEWnnn *or* SCTnnn *or* BKNnnn *or* OVCnnn	VVnnn *or* VV///	NSC		FM051230 15015KMH 9999 BKN020 (FM051230 15008KT 9999 BKN020) BECMG 1618/1620 8000 NSW NSC
	Cloud type (C)[4]	CB	—			BECMG 2306/2308 SCT015CB BKN020

Notes.—

1. Fictitious location.
2. To be used in accordance with 1.2.1.
3. To be included in accordance with 1.2.1.
4. To be included whenever applicable.
5. One or more, up to a maximum of three, groups in accordance with 1.2.3.
6. To be included whenever applicable in accordance with 1.2.3. No qualifier for *moderate* intensity.
7. Weather phenomena to be included in accordance with 1.2.3.
8. Up to four cloud layers in accordance with 1.2.4.
9. To be included in accordance with 1.2.5.
10. To be included in accordance with 1.3, 1.4 and 1.5.

Table A5-2. Use of change and time indicators in TAF

Change or time indicator		*Time period*	*Meaning*	
FM		$n_dn_dn_hn_hn_mn_m$	used to indicate a significant change in most weather elements occurring at n_dn_d day, n_hn_h hours and n_mn_m minutes (UTC); all the elements given before “FM” are to be included following “FM” (i.e. they are all superseded by those following the abbreviation)	
BECMG		$n_{d1}n_{d1}n_{h1}n_{h1}/n_{d2}n_{d2}n_{h2}n_{h2}$	the change is forecast to commence at $n_{d1}n_{d1}$ day and $n_{h1}n_{h1}$ hours (UTC) and be completed by $n_{d2}n_{d2}$ day and $n_{h2}n_{h2}$ hours (UTC); only those elements for which a change is forecast are to be given following “BECMG”; the time period $n_{d1}n_{d1}n_{h1}n_{h1}/n_{d2}n_{d2}n_{h2}n_{h2}$ should normally be less than 2 hours and in any case should not exceed 4 hours	
TEMPO		$n_{d1}n_{d1}n_{h1}n_{h1}/n_{d2}n_{d2}n_{h2}n_{h2}$	temporary fluctuations are forecast to commence at $n_{d1}n_{d1}$ day and $n_{h1}n_{h1}$ hours (UTC) and cease by $n_{d2}n_{d2}$ day and $n_{h2}n_{h2}$ hours (UTC); only those elements for which fluctuations are forecast are to be given following “TEMPO”; temporary fluctuations should not last more than one hour in each instance, and in the aggregate, cover less than half of the period $n_{d1}n_{d1}n_{h1}n_{h1}/n_{d2}n_{d2}n_{h2}n_{h2}$	
PROBnn	—	$n_{d1}n_{d1}n_{h1}n_{h1}/n_{d2}n_{d2}n_{h2}n_{h2}$	probability of occurrence (in %) of an alternative value of a forecast element or elements; nn = 30 or nn = 40 only; to be placed after the element(s) concerned	—
	TEMPO	$n_{d1}n_{d1}n_{h1}n_{h1}/n_{d2}n_{d2}n_{h2}n_{h2}$		probability of occurrence of temporary fluctuations

Table A5-3. Ranges and resolutions for the numerical elements included in TAF

Element as specified in Chapter 6		*Range*	*Resolution*
Wind direction:	° true	000 – 360	10
Wind speed:	KMH	00 – 399*	1
	KT	00 – 199*	1
Visibility:	M	0000 – 0800	50
	M	0800 – 5 000	100
	M	5 000 – 9 000	1 000
	M	9 000 – 9 999	999
Vertical visibility:	30’s M (100’s FT)	000 – 020	1
Cloud: height of cloud base:	30’s M (100’s FT)	000 – 100	1
Air temperature (maximum and minimum):	°C	–80 – +60	1

* There is no aeronautical requirement to report surface wind speeds of 200 km/h (100 kt) or more; however, provision has been made for reporting wind speeds up to 399 km/h (199 kt) for non-aeronautical purposes, as necessary.

Table A5-4. Template for GAMET

Key:
M = inclusion mandatory, part of every message;
C = inclusion conditional, dependent on meteorological conditions;
O = inclusion optional;
= = double line indicates that the text following it should be placed on the subsequent line.

Element	*Detailed content*	*Template*	*Examples*
Location indicator of FIR/CTA (M)	ICAO location indicator of the ATS unit serving the FIR or CTA to which the GAMET refers (M)	nnnn	YUCC[1]
Identification (M)	Message identification (M)	GAMET	GAMET
Validity period (M)	Day-time groups indicating the period of validity in UTC (M)	VALID nnnnnn/nnnnnn	VALID 220600/221200
Location indicator of meteorological office (M)	Location indicator of meteorological office originating the message with a separating hyphen (M)	nnnn-	YUDO-[1]
Name of the FIR/CTA *or* part thereof (M)	Location indicator and name of the FIR/CTA, *or* part thereof for which the GAMET is issued (M)	nnnn nnnnnnnnnn FIR[/n] [BLW FLnnn] *or* nnnn nnnnnnnnnn CTA[/n] [BLW FLnnn]	YUCC AMSWELL FIR/2 BLW FL120 YUCC AMSWELL FIR

Element	*Detailed content*	*Template*			*Examples*
		Identifier and time	*Content*	*Location*	
Indicator for the beginning of Section I (M)	Indicator to identify the beginning of Section I (M)	SECN I			SECN I
Surface wind (C)	Widespread surface wind exceeding 60 km/h (30 kt)	SFC WSPD: [nn/nn]	[n]nn KMH *(or* [n]nn KT)	[N of Nnn *or* Snn] *or* [S of Nnn *or* Snn] *or* [W of Wnnn *or* Ennn] *or* [E of Wnnn *or* Ennn] *or* [nnnnnnnnnn][2]	SFC WSPD: 10/12 65 KMH SFC WSPD: 40 KT E OF W110
Surface visibility (C)	Widespread surface visibility below 5 000 m including the weather phenomena causing the reduction in visibility	SFC VIS: [nn/nn]	nnnn M FG *or* BR *or* SA *or* DU *or* HZ *or* FU *or* VA *or* PO *or* DS *or* SS *or* DZ *or* RA *or* SN *or* SG *or* IC *or* FC *or* GR *or* GS *or* PL *or* SQ		SFC VIS: 06/08 3000 M BR N of N51

Element	*Detailed content*	*Template*			*Examples*
		Identifier and time	*Content*	*Location*	
Significant weather (C)	Significant weather conditions encompassing thunderstorms and heavy sandstorm and duststorm	SIGWX: [nn/nn]	ISOL TS *or* OCNL TS *or* FRQ TS *or* OBSC TS *or* EMBD TS *or* HVY DS *or* HVY SS *or* SQL TS *or* ISOL TSGR *or* OCNL TSGR *or* FRQ TSGR *or* OBSC TSGR *or* EMBD TSGR *or* SQL TSGR *or* VA		SIGWX: 11/12 ISOL TS SIGWX: 12/14 SS S OF N35
Mountain obscuration (C)	Mountain obscuration	MT OBSC: [nn/nn]	nnnnnnnnnn[2]		MT OBSC: MT PASSES S OF N48
Cloud (C)	Widespread areas of broken *or* overcast cloud with height of base less than 300 m (1 000 ft) above ground level (AGL) *or* above mean sea level (AMSL) *and/or* any occurrence of cumulonimbus (CB) *or* towering cumulus (TCU) clouds	SIG CLD: [nn/nn]	BKN *or* OVC nnn[n]/nnn[n] M *(or* nnn[n]/nnn[n] FT) AGL *or* AMSL ISOL *or* OCNL *or* FRQ *or* OBSC *or* EMBD CB[3] *or* TCU[3] nnn[n]/nnn[n] M *(or* nnn[n]/nnn[n] FT) AGL *or* AMSL		SIG CLD: 06/09 OVC 800/1100 FT AGL N OF N51 10/12 ISOL TCU 1200/8000 FT AGL
Icing (C)	Icing (except for that occurring in convective clouds and for severe icing for which a SIGMET message has already been issued)	ICE: [nn/nn]	MOD FLnnn/nnn *or* MOD ABV FLnnn *or* SEV FLnnn/nnn *or* SEV ABV FLnnn		ICE: MOD FL050/080
Turbulence (C)	Turbulence (except for that occurring in convective clouds and for severe turbulence for which a SIGMET message has already been issued)	TURB: [nn/nn]	MOD FLnnn/nnn *or* MOD ABV FLnnn *or* SEV FLnnn/nnn *or* SEV ABV FLnnn		TURB: MOD ABV FL090
Mountain wave (C)	Mountain wave (except for severe mountain wave for which a SIGMET message has already been issued)	MTW: [nn/nn]	MOD FLnnn/nnn *or* MOD ABV FLnnn *or* SEV FLnnn/nnn *or* SEV ABV FLnnn		MTW: MOD ABV FL080 N OF N63

Element	Detailed content	Template: Identifier and time	Template: Content	Template: Location	Examples
SIGMET (C)	SIGMET messages applicable to the FIR/CTA concerned or a sub-area thereof, for which the area forecast is valid	SIGMET APPLICABLE:	n [,n] [,n]		SIGMET APPLICABLE: 3,5
or HAZARDOUS WX NIL (C)[4]		HAZARDOUS WX NIL			HAZARDOUS WX NIL
Indicator for the beginning of Section II (M)	Indicator to identify the beginning of Section II (M)	SECN II			SECN II
Pressure centres and fronts (M)	Pressure centres and fronts and their expected movements and developments	PSYS: [nn]	L [n]nnn HPA *or* H [n]nnn HPA *or* FRONT *or* NIL	Nnnnn *or* Snnnn Wnnnnn *or* Ennnnn *or* Nnnnn *or* Snnnn Wnnnnn *or* Ennnnn TO Nnnnn *or* Snnnn Wnnnnn *or* Ennnnn	PSYS: 06 L 1004 HPA N5130 E01000 MOV NE 25KT WKN
			MOV N *or* NE *or* E *or* SE *or* S *or* SW *or* W *or* NW nnKMH (nnKT) WKN *or* NC *or* INTSF	–	
Upper winds and temperatures (M)	Upper winds and upper-air temperatures for at least the following altitudes: 600, 1 500 and 3 000 m (2 000, 5 000 and 10 000 ft)	WIND/T:	[n]nnn M (*or* [n]nnn FT) nnn/[n]nn KMH (*or* nnn/[n]nn KT) PSnn *or* MSnn	Nnnnn *or* Snnnn Wnnnnn *or* Ennnnn *or* [N of Nnn *or* Snn] *or* [S of Nnn *or* Snn] *or* [W of Wnnn *or* Ennn] *or* [E of Wnnn *or* Ennn] *or* [nnnnnnnnnn][2]	WIND/T: 2000 FT 270/70 KMH PS03 5000 FT 250/80 KMH MS02 10000 FT 240/85 KMH MS11
Cloud (M)	Cloud information not included in Section I giving type, height of base and top above ground level (AGL) or above mean sea level (AMSL)	CLD: [nn/nn]	FEW or SCT *or* BKN *or* OVC ST *or* SC *or* CU *or* AS *or* AC *or* NS [n]nnn/[n]nnn M *(or* [n]nnn/[n]nnn FT) AGL *or* AMSL *or* NIL		CLD: BKN SC 2500/8000 FT AGL
Freezing level (M)	Height indication of 0°C level(s) above ground level (AGL) or above mean sea level (AMSL), if lower than the top of the airspace for which the forecast is supplied	FZLVL:	[ABV] nnnn FT AGL *or* AMSL		FZLVL: 3000 FT AGL
Forecast QNH (M)	Forecast lowest QNH during the period of validity	MNM QNH:	[n]nnn HPA		MNM QNH: 1004 HPA

Element	*Detailed content*	*Template*			*Examples*
		Identifier and time	*Content*	*Location*	
Sea-surface temperature and state of sea (O)	Sea-surface temperature and state of the sea if required by regional air navigation agreement	SEA:	Tnn HGT [n]n M		SEA: T15 HGT 5 M
Volcanic eruptions (M)	Name of volcano	VA:	nnnnnnnnnn *or* NIL		VA: ETNA

Notes.—

1. Fictitious location.
2. Free text describing well-known geographical locations should be kept to a minimum.
3. The location of the CB and/or TCU should be specified in addition to any widespread areas of broken or overcast cloud as given in the example.
4. When no elements are included in Section I.

Example A5-1. TAF

TAF for YUDO (Donlon/International):*

TAF YUDO 160000Z 1606/1624 13018KMH 9000 BKN020 BECMG 1606/1608 SCT015CB BKN020 TEMPO 1608/1612 17025G45KMH 1000 TSRA SCT010CB BKN020 FM161230 15015KMH 9999 BKN020

Meaning of the forecast:

TAF for Donlon/International* issued on the 16th of the month at 0000 UTC valid from 0600 UTC to 2400 UTC on the 16th of the month; surface wind direction 130 degrees; wind speed 18 kilometres per hour; visibility 9 kilometres, broken cloud at 600 metres; becoming between 0600 UTC and 0800 UTC on the 16th of the month, scattered cumulonimbus cloud at 450 metres and broken cloud at 600 metres; temporarily between 0800 UTC and 1200 UTC on the 16th of the month surface wind direction 170 degrees; wind speed 25 kilometres per hour gusting to 45 kilometres per hour; visibility 1 000 metres in a thunderstorm with moderate rain, scattered cumulonimbus cloud at 300 metres and broken cloud at 600 metres; from 1230 UTC on the 16th of the month surface wind direction 150 degrees; wind speed 15 kilometres per hour; visibility 10 kilometres or more; and broken cloud at 600 metres.

* Fictitious location

Note.— In this example, the primary units "kilometre per hour" and "metre" were used for wind speed and height of cloud base, respectively. However, in accordance with Annex 5, the corresponding non-SI alternative units "knot" and "foot" may be used instead.

Example A5-2. Cancellation of TAF

Cancellation of TAF for YUDO (Donlon/International):*

TAF AMD YUDO 161500Z 1606/1624 CNL

Meaning of the forecast:

Amended TAF for Donlon/International* issued on the 16th of the month at 1500 UTC cancelling the previously issued TAF valid from 0600 UTC to 2400 UTC on the 16th of the month.

* Fictitious location

Example A5-3. GAMET area forecast

YUCC GAMET VALID 220600/221200 YUDO
YUCC AMSWELL FIR/2 BLW FL100
SECN I

SFC WSPD:	10/12 65 KMH
SFC VIS:	06/08 3000 M BR N OF N51
SIGWX:	11/12 ISOL TS
SIG CLD:	06/09 OVC 800/1100 FT AGL N OF N51 10/12 ISOL TCU 1200/8000 FT AGL
ICE:	MOD FL050/080
TURB:	MOD ABV FL090
SIGMETS APPLICABLE:	3, 5
SECN II	
PSYS:	06 L 1004 HPA N5130 E01000 MOV NE 25 KT WKN
WIND/T:	2000 FT 270/70 KMH PS03 5000 FT 250/80 KMH MS02 10000 FT 240/85 KMH MS11
CLD:	BKN SC 2500/8000 FT AGL
FZLVL:	3000 FT AGL
MNM QNH:	1004 HPA
SEA:	T15 HGT 5M
VA:	NIL

Meaning:	An area forecast for low-level flights (GAMET) issued for sub-area two of the Amswell* flight information region (identified by YUCC Amswell area control centre) for below flight level 100 by the Donlon/International* meteorological office (YUDO); the message is valid from 0600 UTC to 1200 UTC on the 22nd of the month.
Section I:	
surface wind speeds:	between 1000 UTC and 1200 UTC 65 kilometres per hour;
surface visibility:	between 0600 UTC and 0800 UTC 3 000 metres north of 51 degrees north (due to mist);
significant weather phenomena:	between 1100 UTC and 1200 UTC isolated thunderstorms without hail;
significant clouds:	between 0600 UTC and 0900 UTC overcast base 800, top 1 100 feet above ground level north of 51 degrees north; between 1000 UTC and 1200 UTC isolated towering cumulus base 1 200, top 8 000 feet above ground level;
icing:	moderate between flight level 050 and 080;
turbulence:	moderate above flight level 090 (at least up to flight level 100);
SIGMET messages:	3 and 5 applicable to the validity period and sub-area concerned.
Section II:	
pressure systems:	at 0600 UTC low pressure of 1 004 hectopascals at 51.5 degrees north 10.0 degrees east, expected to move north-eastwards at 25 knots and to weaken;
winds and temperatures:	at 2 000 feet above ground level wind direction 270 degrees; wind speed 70 kilometres per hour, temperature plus 3 degrees Celsius; at 5000 feet above ground level wind direction 250 degrees; wind speed 80 kilometres per hour, temperature minus 2 degrees Celsius; at 10 000 feet above ground level wind direction 240 degrees; wind speed 85 kilometres per hour, temperature minus 11 degrees Celsius;
clouds:	broken stratocumulus, base 2 500 feet, top 8 000 feet above ground level;
freezing level:	3 000 feet above ground level;
minimum QNH:	1 004 hectopascals;
sea:	surface temperature 15 degrees Celsius; and state of sea 5 metres;
volcanic ash:	nil.

* Fictitious locations

APPENDIX 6. TECHNICAL SPECIFICATIONS RELATED TO SIGMET AND AIRMET INFORMATION, AERODROME WARNINGS AND WIND SHEAR WARNINGS AND ALERTS

(See Chapter 7 of this Annex.)

Note.— Data type designators to be used in abbreviated headings for SIGMET, AIRMET, tropical cyclone and volcanic ash advisory messages are given in WMO Publication No. 386, Manual on the Global Telecommunication System.

1. SPECIFICATIONS RELATED TO SIGMET INFORMATION

1.1 Format of SIGMET messages

1.1.1 The content and order of elements in a SIGMET message shall be in accordance with the template shown in Table A6-1.

1.1.2 Messages containing SIGMET information shall be identified as: “SIGMET”.

1.1.3 The sequence number referred to in the template in Table A6-1 shall correspond with the number of SIGMET messages issued for the flight information region since 0001 UTC on the day concerned. The meteorological watch offices whose area of responsibility encompasses more than one FIR and/or CTA shall issue separate SIGMET messages for each FIR and/or CTA within its area of responsibility.

1.1.4 In accordance with the template in Table A6-1, only one of the following phenomena shall be included in a SIGMET message, using the abbreviations as indicated below:

At cruising levels (irrespective of altitude):

thunderstorm	
— obscured	OBSC TS
— embedded	EMBD TS
— frequent	FRQ TS
— squall line	SQL TS
— obscured with hail	OBSC TSGR
— embedded with hail	EMBD TSGR
— frequent, with hail	FRQ TSGR
— squall line with hail	SQL TSGR
tropical cyclone	
— tropical cyclone with 10-minute mean surface wind speed of 63 km/h (34 kt) or more	TC (+ cyclone name)

turbulence	
— severe turbulence	SEV TURB
icing	
— severe icing	SEV ICE
— severe icing due to freezing rain	SEV ICE (FZRA)
mountain wave	
— severe mountain wave	SEV MTW
duststorm	
— heavy duststorm	HVY DS
sandstorm	
— heavy sandstorm	HVY SS
volcanic ash	
— volcanic ash	VA (+ volcano name, if known)
radioactive cloud	RDOACT CLD

1.1.5 SIGMET information shall not contain unnecessary descriptive material. In describing the weather phenomena for which the SIGMET is issued, no descriptive material additional to that given in 1.1.4 shall be included. SIGMET information concerning thunderstorms or a tropical cyclone shall not include references to associated turbulence and icing.

1.1.6 **Recommendation.**— *Meteorological watch offices in a position to do so should issue SIGMET information in graphical format using the WMO BUFR code form, in addition to the issuance of this SIGMET information in abbreviated plain language in accordance with 1.1.1.*

Note.— The BUFR code form is contained in WMO Publication No. 306, Manual on Codes*, Volume I.2, Part B — Binary Codes.*

1.1.7 **Recommendation.**—*SIGMET, when issued in graphical format, should be as specified in Appendix 1.*

1.2 Dissemination of SIGMET messages

1.2.1 SIGMET messages shall be disseminated to meteorological watch offices, WAFCs and to other meteorological offices in accordance with regional air navigation agreement. SIGMET messages for volcanic ash shall also be disseminated to VAACs.

1.2.2 SIGMET messages shall be disseminated to international OPMET databanks and the centres designated by regional air navigation agreement for the operation of aeronautical fixed service satellite distribution systems, in accordance with regional air navigation agreement.

2. SPECIFICATIONS RELATED TO AIRMET INFORMATION

2.1 Format of AIRMET messages

2.1.1 The content and order of elements in an AIRMET message shall be in accordance with the template shown in Table A6-1.

2.1.2 The sequence number referred to in the template in Table A6-1 shall correspond with the number of AIRMET messages issued for the flight information region since 0001 UTC on the day concerned. The meteorological watch offices whose area of responsibility encompasses more than one FIR and/or CTA shall issue separate AIRMET messages for each FIR and/or CTA within its area of responsibility.

2.1.3 The flight information region shall be divided in sub-areas, as necessary.

2.1.4 In accordance with the template in Table A6-1, only one of the following phenomena shall be included in an AIRMET message, using the abbreviations as indicated below:

At cruising levels below flight level 100 (or below flight level 150 in mountainous areas, or higher, where necessary):

— surface wind speed	
– widespread mean surface wind speed above 60 km/h (30 kt)	SFC WSPD (+ wind speed and units)
— surface visibility	
– widespread areas affected by reduction of visibility to less than 5 000 m, including the weather phenomenon causing the reduction of visibility	SFC VIS (+ visibility) (+ one of the following weather phenomena or combinations thereof: BR, DS, DU, DZ, FC, FG, FU, GR, GS, HZ, IC, PL, PO, RA, SA, SG, SN, SQ, SS or VA)
— thunderstorms	
– isolated thunderstorms without hail	ISOL TS
– occasional thunderstorms without hail	OCNL TS
– isolated thunderstorms with hail	ISOL TSGR
– occasional thunderstorms with hail	OCNL TSGR
— mountain obscuration	
– mountains obscured	MT OBSC
— cloud	
– widespread areas of broken or overcast cloud with height of base less than 300 m (1 000 ft) above ground level:	
– broken	BKN CLD (+ height of the base and top and units)
– overcast	OVC CLD (+ height of the base and top and units)
– cumulonimbus clouds which are:	
– isolated	ISOL CB
– occasional	OCNL CB
– frequent	FRQ CB
– towering cumulus clouds which are:	
– isolated	ISOL TCU
– occasional	OCNL TCU
– frequent	FRQ TCU

— icing
  – moderate icing (except for icing in convective clouds) MOD ICE

— turbulence
  – moderate turbulence (except for turbulence in convective clouds) MOD TURB

— mountain wave
  – moderate mountain wave MOD MTW

2.1.5 AIRMET information shall not contain unnecessary descriptive material. In describing the weather phenomena for which the AIRMET is issued, no descriptive material additional to that given in 2.1.4 shall be included. AIRMET information concerning thunderstorms or cumulonimbus clouds shall not include references to associated turbulence and icing.

Note.— The specifications for SIGMET information which is also applicable to low-level flights are given in 1.1.4.

2.2 Dissemination of AIRMET messages

2.2.1 **Recommendation.—** *AIRMET messages should be disseminated to meteorological watch offices in adjacent flight information regions and to other meteorological offices, as agreed by the meteorological authorities concerned.*

2.2.2 **Recommendation.—** *AIRMET messages should be transmitted to international operational meteorological databanks and the centres designated by regional air navigation agreement for the operation of aeronautical fixed service satellite distribution systems, in accordance with regional air navigation agreement.*

3. SPECIFICATIONS RELATED TO SPECIAL AIR-REPORTS

Note.— This appendix deals with the uplink of special air-reports. The general specifications related to special air-reports are in Appendix 4.

3.1 **Recommendation.—** *Special air-reports should be uplinked for 60 minutes after their issuance.*

3.2 **Recommendation.—** *Information on wind and temperature included in automated special air-reports should not be uplinked to other aircraft in flight.*

4. DETAILED CRITERIA RELATED TO SIGMET AND AIRMET MESSAGES AND SPECIAL AIR-REPORTS (UPLINK)

4.1 Identification of the flight information region

Recommendation.— *In cases where the airspace is divided into a flight information region (FIR) and an upper flight information region (UIR), the SIGMET should be identified by the location indicator of the air traffic services unit serving the FIR.*

Note.— The SIGMET message applies to the whole airspace within the lateral limits of the FIR, i.e. to the FIR and to the UIR. The particular areas and/or flight levels affected by the meteorological phenomena causing the issuance of the SIGMET are given in the text of the message.

4.2 Criteria related to phenomena included in SIGMET and AIRMET messages and special air-reports (uplink)

4.2.1 **Recommendation.—** *An area of thunderstorms and cumulonimbus clouds should be considered:*

a) obscured (OBSC) if it is obscured by haze or smoke or cannot be readily seen due to darkness;

b) embedded (EMBD) if it is embedded within cloud layers and cannot be readily recognized;

c) isolated (ISOL) if it consists of individual features which affect, or are forecast to affect, an area with a maximum spatial coverage less than 50 per cent of the area concerned (at a fixed time or during the period of validity); and

d) occasional (OCNL) if it consists of well-separated features which affect, or are forecast to affect, an area with a maximum spatial coverage between 50 and 75 per cent of the area concerned (at a fixed time or during the period of validity).

4.2.2 **Recommendation.—** *An area of thunderstorms should be considered frequent (FRQ) if within that area there is little or no separation between adjacent thunderstorms with a maximum spatial coverage greater than 75 per cent of the area affected, or forecast to be affected, by the phenomenon (at a fixed time or during the period of validity).*

4.2.3 **Recommendation.—** *Squall line (SQL) should indicate a thunderstorm along a line with little or no space between individual clouds*.

4.2.4 **Recommendation.—** *Hail (GR) should be used as a further description of the thunderstorm, as necessary.*

4.2.5 **Recommendation.—** *Severe and moderate turbulence (TURB) should refer only to: low-level turbulence associated with strong surface winds; rotor streaming; or turbulence whether in cloud or not in cloud (CAT). Turbulence should not be used in connection with convective clouds.*

4.2.6 Turbulence shall be considered:

a) severe whenever the peak value of the cube root of EDR exceeds 0.7; and

b) moderate whenever the peak value of the cube root of EDR is above 0.4 and below or equal to 0.7.

4.2.7 **Recommendation.—** *Severe and moderate icing (ICE) should refer to icing in other than convective clouds. Freezing rain (FZRA) should refer to severe icing conditions caused by freezing rain.*

4.2.8 **Recommendation.—** *A mountain wave (MTW) should be considered:*

a) severe whenever an accompanying downdraft of 3.0 m/s (600 ft/min) or more and/or severe turbulence is observed or forecast; and

b) moderate whenever an accompanying downdraft of 1.75–3.0 m/s (350–600 ft/min) and/or moderate turbulence is observed or forecast.

5. SPECIFICATIONS RELATED TO AERODROME WARNINGS

5.1 Format and dissemination of aerodrome warnings

5.1.1 The aerodrome warnings shall be issued in accordance with the template in Table A6-2 where required by operators or aerodrome services, and shall be disseminated in accordance with local arrangements to those concerned.

5.1.2 The sequence number referred to in the template in Table A6-2 shall correspond with the number of aerodrome warnings issued for the aerodrome since 0001 UTC on the day concerned.

5.1.3 **Recommendation.—** *In accordance with the template in Table A6-2, aerodrome warnings should relate to the occurrence or expected occurrence of one or more of the following phenomena:*

— *tropical cyclone (to be included if the 10-minute mean surface wind speed at the aerodrome is expected to be 63 km/h (34 kt) or more)*
— *thunderstorm*
— *hail*
— *snow (including the expected or observed snow accumulation)*
— *freezing precipitation*
— *hoar frost or rime*
— *sandstorm*
— *duststorm*
— *rising sand or dust*
— *strong surface wind and gusts*
— *squall*
— *frost*
— *volcanic ash*
— *tsunami*
— *other phenomena as agreed locally.*

5.1.4 **Recommendation.—** *The use of text additional to the abbreviations listed in the template in Table A6-2 should be kept to a minimum. The additional text should be prepared in abbreviated plain language using approved ICAO abbreviations and numerical values. If no ICAO approved abbreviations are available, English plain language text should be used.*

5.2 Quantitative criteria for aerodrome warnings

Recommendation.— *When quantitative criteria are necessary for the issue of aerodrome warnings covering, for example, the expected maximum wind speed or the expected total snowfall, the criteria should be established by agreement between the meteorological office and the users of the warnings.*

6. SPECIFICATIONS RELATED TO WIND SHEAR WARNINGS

6.1 Detection of wind shear

Recommendation.— *Evidence of the existence of wind shear should be derived from:*

a) *ground-based, wind shear remote-sensing equipment, for example, Doppler radar;*

b) *ground-based, wind shear detection equipment, for example, a system of surface wind and/or pressure sensors located in an array monitoring a specific runway or runways and associated approach and departure paths;*

c) *aircraft observations during the climb-out or approach phases of flight to be made in accordance with Chapter 5; or*

d) *other meteorological information, for example, from appropriate sensors located on existing masts or towers in the vicinity of the aerodrome or nearby areas of high ground.*

Note.— Wind shear conditions are normally associated with the following phenomena:

— *thunderstorms, microbursts, funnel cloud (tornado or waterspout), and gust fronts*
— *frontal surfaces*
— *strong surface winds coupled with local topography*
— *sea breeze fronts*
— *mountain waves (including low-level rotors in the terminal area)*
— *low-level temperature inversions.*

6.2 Format and dissemination of wind shear warnings and alerts

Note.— Information on wind shear is also to be included as supplementary information in local routine and special reports and METAR and SPECI in accordance with the templates in Tables A3-1 and A3-2.

6.2.1 The wind shear warnings shall be issued in accordance with the template in Table A6-3 and shall be disseminated in accordance with local arrangements to those concerned.

6.2.2 The sequence number referred to in the template in Table A6-3 shall correspond with the number of wind shear warnings issued for the aerodrome since 0001 UTC on the day concerned.

6.2.3 **Recommendation**.— *The use of text additional to the abbreviations listed in the template in Table A6-3 should be kept to a minimum. The additional text should be prepared in abbreviated plain language using approved ICAO abbreviations and numerical values. If no ICAO approved abbreviations are available, English plain language text should be used.*

6.2.4 **Recommendation.**— *When an aircraft report is used to prepare a wind shear warning, or to confirm a warning previously issued, the corresponding aircraft report, including the aircraft type, should be disseminated unchanged in accordance with local arrangements to those concerned.*

Note 1.— Following reported encounters by both arriving and departing aircraft, two different wind shear warnings may exist: one for arriving aircraft and one for departing aircraft.

Note 2.— Specifications for reporting the intensity of wind shear are still undergoing development. It is recognized, however, that pilots, when reporting wind shear, may use the qualifying terms "moderate", "strong" or "severe", based to a large extent on their subjective assessment of the intensity of the wind shear encountered.

6.2.5 The wind shear alerts shall be disseminated from automated, ground-based, wind shear remote-sensing or detection equipment in accordance with local arrangements to those concerned.

6.2.6 **Recommendation.**— *Where microbursts are observed, reported by pilots or detected by ground-based, wind shear detection or remote-sensing equipment, the wind shear warning and wind shear alert should include a specific reference to microburst.*

6.2.7 Where information from ground-based, wind shear detection or remote-sensing equipment is used to prepare a wind shear alert, the alert shall, if practicable, relate to specific sections of the runway and distances along the approach path or take-off path as agreed between the meteorological authority, the appropriate ATS authority and the operators concerned.

Table A6-1. Template for SIGMET and AIRMET messages and special air-reports (uplink)

Key: M = inclusion mandatory, part of every message;
C = inclusion conditional, included whenever applicable;
= = a double line indicates that the text following it should be placed on the subsequent line.

Note.— The ranges and resolutions for the numerical elements included in SIGMET/AIRMET messages and in special air-reports are shown in Table A6-4 of this appendix.

Element as specified in Chapter 5 and Appendix 6	*Detailed content*	*Template(s)*			*Examples*
		SIGMET	*AIRMET*	*SPECIAL AIR-REPORT*[1]	
Location indicator of FIR/CTA (M)[2]	ICAO location indicator of the ATS unit serving the FIR or CTA to which the SIGMET/AIRMET refers (M)	nnnn		—	YUCC[3] YUDD[3]
Identification (M)	Message identification and sequence number[4] (M)	SIGMET [nn]n	AIRMET [nn]n	ARS	SIGMET 5 SIGMET A3 AIRMET 2 ARS
Validity period (M)	Day-time groups indicating the period of validity in UTC (M)	VALID nnnnnn/nnnnnn		— [5]	VALID 221215/221600 VALID 101520/101800 VALID 251600/252200
Location indicator of MWO (M)	Location indicator of MWO originating the message with a separating hyphen (M)	nnnn–			YUDO— [3] YUSO— [3]
Name of the FIR/CTA *or* aircraft identification (M)	Location indicator and name of the FIR/CTA[6] for which the SIGMET/AIRMET is issued *or* aircraft radiotelephony call sign (M)	nnnn nnnnnnnnnn FIR[/UIR] *or* nnnn nnnnnnnnnn CTA	nnnn nnnnnnnnnn FIR[/n]	nnnnnn	YUCC AMSWELL FIR[3] YUDD SHANLON FIR/UIR[3] YUCC AMSWELL FIR/2[3] YUDD SHANLON FIR[3] VA812
IF THE SIGMET IS TO BE CANCELLED, SEE DETAILS AT THE END OF THE TEMPLATE.					
Phenomenon (M)[7]	Description of phenomenon causing the issuance of SIGMET/AIRMET (C)	OBSC[8] TS[GR[9]] EMBD[10] TS[GR] FRQ[11] TS[GR] SQL[12] TS[GR] TC nnnnnnnnnn SEV TURB[13] SEV ICE[14] SEV ICE (FZRA)[14] SEV MTW[15] HVY DS HVY SS [VA ERUPTION] [MT nnnnnnnnnn] [LOC Nnn[nn] *or* Snn[nn]	SFC WSPD nn[n]KMH (*or* SFC WSPD nn[n]KT) SFC VIS nnnnM (nn)[16] ISOL[17] TS[GR][9] OCNL[18] TS[GR] MT OBSC BKN CLD nnn/[ABV]nnnnM (*or* BKN CLD nnn/[ABV]nnnnFT) OVC CLD nnn/[ABV]nnnnM (*or* OVC CLD nnn/[ABV]nnnnFT)	TS TSGR SEV TURB SEV ICE SEV MTW HVY SS VA CLD [FL nnn/nnn] VA [MT nnnnnnnnnn]	SEV TURB FRQ TS OBSC TSGR EMBD TSGR TC GLORIA VA ERUPTION MT ASHVAL LOC S15 E073 VA CLD MOD TURB MOD MTW ISOL CB BKN CLD 120/900M (BKN CLD 400/3000FT)

Element as specified in Chapter 5 and Appendix 6	*Detailed content*	*Template(s)*			*Examples*
		SIGMET	*AIRMET*	*SPECIAL AIR-REPORT*[1]	
		Ennn[nn] *or* Wnnn[nn]] VA CLD RDOACT CLD	ISOL[17] CB[19] OCNL[18] CB FRQ[11] CB ISOL[17] TCU[19] OCNL[18] TCU[19] FRQ[11] TCU MOD TURB[13] MOD ICE[14] MOD MTW[15]		OVC CLD 270/ABV3000M (OVC CLD 900/ABV10000FT) SEV ICE RDOACT CLD
Observed or forecast phenomenon (M)	Indication whether the information is observed and expected to continue, *or* forecast (M)	OBS [AT nnnnZ] FCST		OBS AT nnnnZ	OBS AT 1210Z OBS
Location (C)	Location (referring to latitude and longitude (in degrees and minutes) *or* locations *or* geographic features well known internationally)	Nnn[nn] Wnnn[nn] *or* Nnn[nn] Ennn[nn] *or* Snn[nn] Wnnn[nn] *or* Snn[nn] Ennn[nn] *or* N OF Nnn[nn] *or* S OF Nnn[nn] *or* N OF Snn[nn] *or* S OF Snn[nn] *or* [AND] W OF Wnnn[nn] *or* E OF Wnnn[nn] *or* W OF Ennn[nn] *or* E OF Ennn[nn] *or* [N OF, NE OF, E OF, SE OF, S OF, SW OF, W OF, NW OF] [LINE] Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] *or* [N OF, NE OF, E OF, SE OF, S OF, SW OF, W OF, NW OF, AT] nnnnnnnnnnnn *or* WI Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – [Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn]]		NnnnnWnnnnn *or* NnnnnWnnnnn *or* SnnnnWnnnnn *or* SnnnnEnnnnn	S OF N54 N OF N50 N2020 W07005 YUSB[3] N2706 W07306 N48 E010 N OF N1515 AND W OF E13530 W OF E1554 N OF LINE S2520 W11510 - S2520 W12010 WI N6030 E02550 – N6055 E02500 – N6050 E02630
Level (C)	Flight level and extent[20](C)	FLnnn *or* FLnnn/nnn *or* TOP FLnnn *or* [TOP] ABV FLnnn *or* [TOP] BLW FLnnn *or* BLW nnnnM (*or* BLW nnnnFT) *or* [21] CB TOP [ABV] FLnnn WI nnnKM OF CENTRE (*or* CB TOP [ABV] FLnnn WI nnnNM OF CENTRE) *or* CB TOP [BLW] FLnnn WI nnnKM OF CENTRE (*or* CB TOP [BLW] FLnnn WI nnnNM OF CENTRE) *or* [22] FLnnn/nnn [APRX nnnKM BY nnnKM] [nnKM WID LINE[23] BTN (nnNM WID LINE BTN)] [Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn]		FLnnn	FL180 FL050/080 TOP FL390 BLW FL200 TOP ABV FL100 FL310/450 CB TOP FL500 WI 270KM OF CENTRE (CB TOP FL500 WI 150NM OF CENTRE) FL310/350 APRX 220KM BY 35KM

Element as specified in Chapter 5 and Appendix 6	*Detailed content*	*Template(s)*			*Examples*
		SIGMET	*AIRMET*	*SPECIAL AIR-REPORT*[1]	
		– Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] [– Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn]] [– Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn]]] (*or* FLnnn/nnn [APRX nnnNM BY nnnNM] [Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] [– Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn]] [– Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn]]])			FL390
Movement *or* expected movement (C)	Movement *or* expected movement (direction and speed) with reference to one of the eight points of compass, *or* stationary (C)	MOV N [nnKMH] *or* MOV NE [nnKMH] *or* MOV E [nnKMH] *or* MOV SE [nnKMH] *or* MOV S [nnKMH] *or* MOV SW [nnKMH] *or* MOV W [nnKMH] *or* MOV NW[nnKMH] (*or* MOV N [nnKT] *or* MOV NE [nnKT] *or* MOV E [nnKT] *or* MOV SE [nnKT] *or* MOV S[nnKT] *or* MOV SW [nnKT] *or* MOV W [nnKT] *or* MOV NW [nnKT]) *or* STNR		—	MOV E 40KMH (MOV E 20KT) MOV SE STNR
Changes in intensity (C)	Expected changes in intensity (C)	INTSF *or* WKN *or* NC		—	WKN
Forecast position (C)[20]	Forecast position of volcanic ash cloud *or* the centre of the TC at the end of the validity period of the SIGMET message (C)	FCST nnnnZ TC CENTRE Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] *or* FCST nnnnZ VA CLD APRX [nnKM WID LINE[23] BTN (nnNM WID LINE BTN)] Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] [– Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn]] [– Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn]]	—	—	FCST 2200Z TC CENTRE N2740 W07345 FCST 1700Z VA CLD APRX S15 E075 – S15 E081 – S17 E083 – S18 E079 – S15 E075

OR

Cancellation of SIGMET/ AIRMET[24](C)	Cancellation of SIGMET/AIRMET referring to its identification	CNL SIGMET [nn]n nnnnnn/nnnnnn *or* CNL SIGMET [nn]n nnnnnn/nnnnnn [VA MOV TO nnnn FIR][22]	CNL AIRMET [nn]n nnnnnn/nnnnnn	—	CNL SIGMET 2 101200/101600[24] CNL SIGMET 3 251030/251430 VA MOV TO YUDO FIR[24] CNL AIRMET 151520/151800[24]

Notes.—

1. No wind and temperature to be uplinked to other aircraft in flight in accordance with 3.2.
2. See 4.1.
3. Fictitious location.
4. In accordance with 1.1.3 and 2.1.2.
5. See 3.1.
6. See 2.1.3.
7. In accordance with 1.1.4 and 2.1.4.
8. In accordance with 4.2.1 a).

9. In accordance with 4.2.4.
10. In accordance with 4.2.1 b).
11. In accordance with 4.2.2.
12. In accordance with 4.2.3.
13. In accordance with 4.2.5 and 4.2.6.
14. In accordance with 4.2.7.
15. In accordance with 4.2.8.
16. In accordance with 2.1.4.
17. In accordance with 4.2.1 c).
18 In accordance with 4.2.1 d).
19. The use of cumulonimbus, CB and towering cumulus, TCU, is restricted to AIRMETs in accordance with 2.1.4.
20. Only for SIGMET messages for volcanic ash cloud and tropical cyclones.
21. Only for SIGMET messages for tropical cyclones.
22. Only for SIGMET messages for volcanic ash.
23. A straight line between two points drawn on a map in the Mercator projection or a straight line between two points which crosses lines of longitude at a constant angle.
24. End of the message (as the SIGMET/AIRMET message is being cancelled).

Note.— In accordance with 1.1.5 and 2.1.5, severe or moderate icing and severe or moderate turbulence (SEV ICE, MOD ICE, SEV TURB, MOD TURB) associated with thunderstorms, cumulonimbus clouds or tropical cyclones should not be included.

Table A6-2. Template for aerodrome warnings

Key: M = inclusion mandatory, part of every message;
C = inclusion conditional, included whenever applicable.

Note 1.— The ranges and resolutions for the numerical elements included in aerodrome warnings are shown in Table A6-4 of this appendix.

Note 2.— The explanations for the abbreviations can be found in the Procedures for Air Navigation Services — ICAO Abbreviations and Codes *(PANS-ABC, Doc 8400).*

Element	*Detailed content*	*Template*	*Example*
Location indicator of the aerodrome (M)	Location indicator of the aerodrome	nnnn	YUCC[1]
Identification of the type of message (M)	Type of message and sequence number	AD WRNG [n]n	AD WRNG 2
Validity period (M)	Day and time of validity period in UTC	VALID nnnnnn/nnnnnn	VALID 211230/211530
IF THE AERODROME WARNING IS TO BE CANCELLED, SEE DETAILS AT THE END OF THE TEMPLATE.			
Phenomenon (M)[2]	Description of phenomenon causing the issuance of the aerodrome warning	TC[3] nnnnnnnnnn *or* [HVY] TS *or* GR *or* [HVY] SN [nnCM][3] *or* [HVY] FZRA *or* [HVY] FZDZ *or* RIME[4] *or* [HVY] SS *or* [HVY] DS *or* SA *or* DU *or* SFC WSPD nn[n]KMH MAX nn[n] (SFC WSPD nn[n]KT MAX nn[n]) *or* SQ *or* FROST *or* TSUNAMI *or* VA *or* *Free text up to 32 characters* [5]	TC ANDREW HVY SN 25CM SFC WSPD 80KMH MAX 120 VA TSUNAMI
Observed or forecast phenomenon (M)	Indication whether the information is observed and expected to continue, *or* forecast	OBS [AT nnnnZ] *or* FCST	OBS AT 1200Z OBS
Changes in intensity (C)	Expected changes in intensity	INTSF *or* WKN *or* NC	WKN
OR			
Cancellation of aerodrome warning[6]	Cancellation of aerodrome warning referring to its identification	CNL AD WRNG [n]n nnnnnn/nnnnnn	CNL AD WRNG 2 211230/211530[6]

Notes.—

1. Fictitious location.
2. One phenomenon or a combination thereof, in accordance with 5.1.3.
3. In accordance with 5.1.3.
4. Hoar frost *or* rime in accordance with 5.1.3.
5. In accordance with 5.1.4.
6. End of the message (as the aerodrome warning is being cancelled).

Table A6-3. Template for wind shear warnings

Key: M = inclusion mandatory, part of every message;
C = inclusion conditional, included whenever applicable.

Note 1.— The ranges and resolutions for the numerical elements included in wind shear warnings are shown in Table A6-4 of this appendix.

Note 2.— The explanations for the abbreviations can be found in the Procedures for Air Navigation Services — ICAO Abbreviations and Codes *(PANS-ABC, Doc 8400).*

Element	*Detailed content*	*Template*	*Example*
Location indicator of the aerodrome (M)	Location indicator of the aerodrome	nnnn	YUCC[1]
Identification of the type of message (M)	Type of message and sequence number	WS WRNG [n]n	WS WRNG 1
Time of origin and validity period (M)	Day and time of issue and, where applicable, validity period in UTC	nnnnnn [VALID TL nnnnnn] *or* [VALID nnnnnn/nnnnnn]	211230 VALID TL 211330 221200 VALID 221215/221315
IF THE WIND SHEAR WARNING IS TO BE CANCELLED, SEE DETAILS AT THE END OF THE TEMPLATE.			
Phenomenon (M)	Identification of the phenomenon and its location	[MOD] *or* [SEV] WS IN APCH *or* [MOD] *or* [SEV] WS [APCH] RWYnnn *or* [MOD] *or* [SEV] WS IN CLIMB-OUT *or* [MOD] *or* [SEV] WS CLIMB-OUT RWYnnn *or* MBST IN APCH *or* MBST [APCH] RWYnnn *or* MBST IN CLIMB-OUT *or* MBST CLIMB-OUT RWYnnn	WS APCH RWY12 MOD WS RWY34 WS IN CLIMB-OUT MBST APCH RWY26 MBST IN CLIMB-OUT
Observed, reported or forecast phenomenon (M)	Identification whether the phenomenon is observed or reported and expected to continue or forecast	REP AT nnnn nnnnnnnn *or* OBS [AT nnnn] *or* FCST	REP AT 1510 B747 OBS AT 1205 FCST
Details of the phenomenon (C)[2]	Description of phenomenon causing the issuance of the wind shear warning	SFC WIND: nnn/nnKMH (*or* nnn/nnKT) nnnM (nnnFT)-WIND: nnn/nnKMH (*or* nnn/nnKT) *or* nnKMH (*or* nnKT) ASPEEDL nnKM (*or* nnNM) FNA RWYnn *or* nnKMH (*or* nnKT) ASPEEDG nnKM (*or* nnNM) FNA RWYnn	SFC WIND: 320/20KMH 60M-WIND: 360/50KMH (SFC WIND: 320/10KT 200FT-WIND: 360/25KT) 60KMH ASPEEDL 4KM FNA RWY13 (30KT ASPEEDL 2NM FNA RWY13)
OR			
Cancellation of wind shear warning[3]	Cancellation of wind shear warning referring to its identification	CNL WS WRNG [n]n nnnnnn/nnnnnn	CNL WS WRNG 1211230/211330[3]

Notes.—

1. Fictitious location.
2. Additional provisions in 6.2.3.
3. End of the message (as the wind shear warning is being cancelled).

Table A6-4. Ranges and resolutions for the numerical elements included in volcanic ash and tropical cyclone advisory messages, SIGMET/AIRMET messages and aerodrome and wind shear warnings

Element as specified in Appendices 2 and 6		*Range*	*Resolution*
Summit elevation:	M FT	000 – 8 100 000 – 27 000	1 1
Advisory number:	for VA (index)* for TC (index)*	000 – 2 000 00 – 99	1 1
Maximum surface wind:	KMH KT	00 – 399 00 – 199	1 1
Central pressure:	hPa	850 – 1 050	1
Surface wind speed:	KMH KT	60 – 199 30 – 99	1 1
Surface visibility:	M M	0000 – 0800 0800 – 5 000	50 100
Cloud: height of base:	M FT	000 – 300 000 – 1 000	30 100
Cloud: height of top:	M M FT FT	000 – 3 000 3 000 – 20 000 000 – 10 000 10 000 – 60 000	30 300 100 1 000
Latitudes:	° (degrees) ´ (minutes)	00 – 90 00 – 60	1 1
Longitudes:	° (degrees) ´ (minutes)	000 – 180 00 – 60	1 1
Flight levels:		000 – 650	10
Movement:	KMH KT	0 – 300 0 – 150	10 5
* Non-dimensional			

Example A6-1. SIGMET and AIRMET message and the corresponding cancellations

SIGMET YUDD SIGMET 2 VALID 101200/101600 YUSO – YUDD SHANLON FIR/UIR OBSC TS FCST S OF N54 TOP FL390 MOV E WKN	**Cancellation of SIGMET** YUDD SIGMET 3 VALID 101345/101600 YUSO – YUDD SHANLON FIR/UIR CNL SIGMET 2 101200/101600
AIRMET YUDD AIRMET 1 VALID 151520/151800 YUSO – YUDD SHANLON FIR ISOL TS OBS N OF S50 TOP ABV FL100 STNR WKN	**Cancellation of AIRMET** YUDD AIRMET 2 VALID 151650/151800 YUSO – YUDD SHANLON FIR CNL AIRMET 1 151520/151800

Example A6-2. SIGMET message for tropical cyclone

YUCC SIGMET 3 VALID 251600/252200 YUDO –
YUCC AMSWELL FIR TC GLORIA OBS AT 1600Z N2706 W07306 CB TOP FL500 WI 150NM OF CENTRE MOV NW 10KT NC FCST 2200Z TC CENTRE N2740 W07345

Meaning:

The third SIGMET message issued for the AMSWELL* flight information region (identified by YUCC Amswell area control centre) by the Donlon/International* meteorological watch office (YUDO) since 0001 UTC; the message is valid from 1600 UTC to 2200 UTC on the 25th of the month; tropical cyclone Gloria was observed at 1600 UTC at 27 degrees 06 minutes north and 73 degrees 6 minutes west with cumulonimbus top at flight level 500 within 150 nautical miles of the centre; the tropical cyclone is expected to move northwestwards at 10 knots and not to undergo any changes in intensity; the forecast position of the centre of the tropical cyclone at 2200 UTC is expected to be at 27 degrees 40 minutes north and 73 degrees 45 minutes west.

* Fictitious locations

Example A6-3. SIGMET message for volcanic ash

YUDD SIGMET 2 VALID 211100/211700 YUSO –
YUDD SHANLON FIR/UIR VA ERUPTION MT ASHVAL LOC S1500 E07348 VA CLD OBS AT 1100Z FL310/450 APRX 220KM BY 35KM S1500 E07348 - S1530 E07642 MOV SE 65KMH FCST 1700Z VA CLD APRX S1506 E07500 - S1518 E08112 - S1712 E08330 - S1824 E07836

Meaning:

The second SIGMET message issued for the SHANLON* flight information region (identified by YUDD Shanlon area control centre/upper flight information region) by the Shanlon/International* meteorological watch office (YUSO) since 0001 UTC; the message is valid from 1100 UTC to 1700 UTC on the 21st of the month; volcanic ash eruption of Mount Ashval* located at 15 degrees south and 73 degrees 48 minutes east; volcanic ash cloud observed at 1100 UTC between flight levels 310 and 450 in an approximate area of 220 km by 35 km between 15 degrees south and 73 degrees 48 minutes east, and 15 degrees 30 minutes south and 76 degrees 42 minutes east; the volcanic ash cloud is expected to move southeastwards at 65 kilometres per hour; at 1700 UTC the volcanic ash cloud is forecast to be located approximately in an area bounded by the following points: 15 degrees 6 minutes south and 75 degrees east, 15 degrees 18 minutes south and 81 degrees 12 minutes east, 17 degrees 12 minutes south and 83 degrees 30 minutes east, and 18 degrees 24 minutes south and 78 degrees 36 minutes east.

* Fictitious locations

Example A6-4. SIGMET message for severe turbulence

YUCC SIGMET 5 VALID 221215/221600 YUDO –
YUCC AMSWELL FIR SEV TURB OBS AT 1210Z YUSB FL250 MOV E 40KMH WKN

Meaning:

The fifth SIGMET message issued for the AMSWELL* flight information region (identified by YUCC Amswell area control centre) by the Donlon/International* meteorological watch office (YUDO) since 0001 UTC; the message is valid from 1215 UTC to 1600 UTC on the 22nd of the month; severe turbulence was observed at 1210 UTC over Siby/Bistock* aerodrome (YUSB) at flight level 250; the turbulence is expected to move eastwards at 40 kilometres per hour and to weaken in intensity.

* Fictitious locations

Example A6-5. AIRMET message for moderate mountain wave

YUCC AIRMET 2 VALID 221215/221600 YUDO –
YUCC AMSWELL FIR MOD MTW OBS AT 1205Z AND FCST N48 E10 FL080 STNR NC

Meaning:

The second AIRMET message issued for the AMSWELL* flight information region (identified by YUCC Amswell area control centre) by the Donlon/International* meteorological watch office (YUDO) since 0001 UTC; the message is valid from 1215 UTC to 1600 UTC on the 22nd of the month; moderate mountain wave was observed at 1205 UTC at 48 degrees north and 10 degrees east at flight level 080; the mountain wave is expected to remain stationary and not to undergo any changes in intensity.

* Fictitious locations

APPENDIX 7. TECHNICAL SPECIFICATIONS RELATED TO AERONAUTICAL CLIMATOLOGICAL INFORMATION

(See Chapter 8 of this Annex.)

1. PROCESSING OF AERONAUTICAL CLIMATOLOGICAL INFORMATION

Recommendation.— *Meteorological observations for regular and alternate aerodromes should be collected, processed and stored in a form suitable for the preparation of aerodrome climatological information.*

2. EXCHANGE OF AERONAUTICAL CLIMATOLOGICAL INFORMATION

Recommendation.— *Aeronautical climatological information should be exchanged on request between meteorological authorities. Operators and other aeronautical users desiring such information should normally apply to the meteorological authority responsible for its preparation.*

3. CONTENT OF AERONAUTICAL CLIMATOLOGICAL INFORMATION

3.1 Aerodrome climatological tables

3.1.1 **Recommendation.—** *An aerodrome climatological table should give as applicable:*

a) mean values and variations therefrom, including maximum and minimum values, of meteorological elements (for example, of air temperature); and/or

b) the frequency of occurrence of present weather phenomena affecting flight operations at the aerodrome (for example, of sandstorms); and/or

c) the frequency of occurrence of specified values of one, or of a combination of two or more, elements (for example, of a combination of low visibility and low cloud).

3.1.2 **Recommendation.—** *Aerodrome climatological tables should include information required for the preparation of aerodrome climatological summaries in accordance with 3.2.*

3.2 Aerodrome climatological summaries

Recommendation.— *Aerodrome climatological summaries should cover:*

a) frequencies of the occurrence of runway visual range/visibility and/or height of the base of the lowest cloud layer of BKN or OVC extent below specified values at specified times;

b) frequencies of visibility below specified values at specified times;

c) frequencies of the height of the base of the lowest cloud layer of BKN or OVC extent below specified values at specified times;

d) frequencies of occurrence of concurrent wind direction and speed within specified ranges;

e) frequencies of surface temperature in specified ranges of 5°C at specified times; and

f) mean values and variations therefrom, including maximum and minimum values of meteorological elements required for operational planning purposes, including take-off performance calculations.

Note.— Models of climatological summaries related to a) to e) are given in WMO Publication No. 49, Technical Regulations*, Volume II, C.3.2.*

APPENDIX 8. TECHNICAL SPECIFICATIONS RELATED TO SERVICE FOR OPERATORS AND FLIGHT CREW MEMBERS

(See Chapter 9 of this Annex.)

Note.— Specifications related to flight documentation (including the model charts and forms) are given in Appendix 1.

1. MEANS OF SUPPLY AND FORMAT OF METEOROLOGICAL INFORMATION

1.1 Meteorological information shall be supplied to operators and flight crew members by one or more of the following, as agreed between the meteorological authority and operator concerned, and with the order shown below not implying priorities:

a) written or printed material, including specified charts and forms;

b) data in digital form;

c) briefing;

d) consultation;

e) display; or

f) in lieu of a) to e), by means of an automated pre-flight information system providing self-briefing and flight documentation facilities while retaining access by operators and aircrew members to consultation, as necessary, with the meteorological office, in accordance with 5.1.

1.2 The meteorological authority, in consultation with the operator, shall determine:

a) the type and format of meteorological information to be supplied; and

b) methods and means of supplying that information.

1.3 **Recommendation.—** *On request by the operator, the meteorological information supplied for flight planning should include data for the determination of the lowest usable flight level.*

2. SPECIFICATIONS RELATED TO INFORMATION FOR PRE-FLIGHT PLANNING AND IN-FLIGHT RE-PLANNING

2.1 Format of upper-air information

Upper-air information supplied by WAFCs for pre-flight and in-flight re-planning shall be in the GRIB code form.

Note.— The GRIB code form is contained in WMO Publication No. 306, Manual on Codes*, Volume I.2, Part B — Binary Codes.*

2.2 Format of information on significant weather

Information on significant weather supplied by WAFCs for pre-flight and in-flight re-planning shall be in the BUFR code form.

Note.— The BUFR code form is contained in WMO Publication No. 306, Manual on Codes, *Volume I.2, Part B — Binary Codes.*

2.3 Specific needs of helicopter operations

Recommendation.— *Meteorological information for pre-flight planning and in-flight re-planning by operators of helicopters flying to offshore structures should include data covering the layers from sea level to flight level 100. Particular mention should be made of the expected surface visibility, the amount, type (where available), base and tops of cloud below flight level 100, sea state and sea surface temperature, mean sea-level pressure, and the occurrence and expected occurrence of turbulence and icing, as determined by regional air navigation agreement.*

3. SPECIFICATIONS RELATED TO BRIEFING AND CONSULTATION

3.1 Information required to be displayed

Recommendation.— *The material displayed should be readily accessible to the flight crew members or other flight operations personnel concerned.*

4. SPECIFICATIONS RELATED TO FLIGHT DOCUMENTATION

4.1 Presentation of information

4.1.1 The flight documentation related to forecasts of upper wind and upper-air temperature and SIGWX phenomena shall be presented in the form of charts. For low-level flights, alternatively, GAMET area forecasts shall be used.

Note.— Models of charts and forms for use in the preparation of flight documentation are given in Appendix 1. These models and methods for their completion are developed by the World Meteorological Organization on the basis of relevant operational requirements stated by the International Civil Aviation Organization.

4.1.2 METAR and SPECI (including trend forecasts as issued in accordance with regional air navigation agreement), TAF, GAMET, SIGMET and AIRMET shall be presented in accordance with the templates in Appendices 3, 5 and 6, respectively. METAR, SPECI, TAF, GAMET, SIGMET and AIRMET received from other meteorological offices shall be included in flight documentation without change.

Note.— Examples of the form of presentation of METAR/SPECI and TAF are given in Appendix 1.

4.1.3 **Recommendation.**— *The location indicators and the abbreviations used should be explained in the flight documentation.*

4.1.4 **Recommendation**.— *The forms and the legend of charts included in flight documentation should be printed in English, French, Russian or Spanish. Where appropriate, approved abbreviations should be used. The units employed for each element should be indicated; they should be in accordance with Annex 5.*

4.2 Charts in flight documentation

4.2.1 Characteristics of charts

4.2.1.1 **Recommendation.—** *Charts included in flight documentation should have a high standard of clarity and legibility and should have the following physical characteristics:*

a) for convenience, the largest size of charts should be about 42 × 30 cm (standard size A3) and the smallest size should be about 21 × 30 cm (standard size A4). The choice between these sizes should depend on the route lengths and the amount of detail that needs to be given in the charts as agreed between meteorological authorities and users;

b) major geographical features, such as coastlines, major rivers and lakes should be depicted in a way that makes them easily recognizable;

c) for charts prepared by computer, meteorological data should take preference over basic chart information, the former cancelling the latter wherever they overlap;

d) major aerodromes should be shown as a dot and identified by the first letter of the name of the city the aerodrome serves as given in Table AOP of the relevant regional air navigation plan;

e) a geographical grid should be shown with meridians and parallels represented by dotted lines at each 10° latitude and longitude; dots should be spaced one degree apart;

f) latitude and longitude values should be indicated at various points throughout the charts (i.e. not only at the edges); and

g) labels on the charts for flight documentation should be clear and simple and should present the name of the world area forecast centre or, for non-WAFS products, the originating centre, the type of chart, date and valid time and, if necessary, the types of units used in an unambiguous way.

4.2.1.2 Meteorological information included in flight documentation shall be represented as follows:

a) winds on charts shall be depicted by arrows with feathers and shaded pennants on a sufficiently dense grid;

b) temperatures shall be depicted by figures on a sufficiently dense grid;

c) wind and temperature data selected from the data sets received from a world area forecast centre shall be depicted in a sufficiently dense latitude/longitude grid; and

d) wind arrows shall take precedence over temperatures and either shall take precedence over chart background.

4.2.1.3 **Recommendation**.— *For short-haul flights, charts should be prepared covering limited areas at a scale of* $1{:}15 \times 10^6$ *as required.*

4.2.2 Set of charts to be provided

4.2.2.1 The minimum number of charts for flights between flight level 250 and flight level 630 shall include a high-level SIGWX chart (flight level 250 to flight level 630) and a forecast 250 hPa wind and temperature chart. The actual charts provided for pre-flight and in-flight planning and for flight documentation shall be as agreed between meteorological authorities and users concerned.

4.2.2.2 Charts to be provided shall be generated from the digital forecasts provided by the WAFCs whenever these forecasts cover the intended flight path in respect of time, altitude and geographical extent, unless otherwise agreed between the meteorological authority and the operator concerned.

4.2.3 Height indications

In flight documentation, height indications shall be given as follows:

a) all references to en-route meteorological conditions, such as height indications of upper winds, turbulence or bases and tops of clouds, shall preferably be expressed in flight levels; they may also be expressed in pressure, altitude or, for low-level flights, height above ground level; and

b) all references to aerodrome meteorological conditions, such as height indications of the bases of clouds, shall be expressed in height above the aerodrome elevation.

4.3 Specifications related to low-level flights

4.3.1 In chart form

Recommendation.— *Where the forecasts are supplied in chart form, flight documentation for low-level flights, including those in accordance with the visual flight rules, operating up to flight level 100 (or up to flight level 150 in mountainous areas or higher, where necessary), should contain the following as appropriate to the flight:*

a) information from relevant SIGMET and AIRMET messages;

b) upper wind and upper-air temperature charts as given in Appendix 5, 4.3.1; and

c) significant weather charts as given in Appendix 5, 4.3.2.

4.3.2 In abbreviated plain language

Recommendation.— *Where the forecasts are not supplied in chart form, flight documentation for low-level flights, including those in accordance with the visual flight rules, operating up to flight level 100 (up to flight level 150 in mountainous areas or higher, where necessary), should contain the following information as appropriate to the flight:*

a) SIGMET and AIRMET information; and

b) GAMET area forecasts.

Note.— An example of the GAMET area forecast is given in Appendix 5.

5. SPECIFICATIONS RELATED TO AUTOMATED PRE-FLIGHT INFORMATION SYSTEMS FOR BRIEFING, CONSULTATION, FLIGHT PLANNING AND FLIGHT DOCUMENTATION

5.1 Access to the systems

Automated pre-flight information systems providing self-briefing facilities shall provide for access by operators and flight crew members to consultation, as necessary, with a meteorological office by telephone or other suitable telecommunications means.

5.2 Detailed specifications of the systems

Recommendation.— *Automated pre-flight information systems for the supply of meteorological information for self-briefing, pre-flight planning and flight documentation should*:

a) provide for the continuous and timely updating of the system database and monitoring of the validity and integrity of the meteorological information stored;

b) permit access to the system by operators and flight crew members and also by other aeronautical users concerned through suitable telecommunications means;

c) use access and interrogation procedures based on abbreviated plain language and, as appropriate, ICAO location indicators, and aeronautical meteorological code data-type designators prescribed by the WMO, or based on a menu-driven user interface, or other appropriate mechanisms as agreed between the meteorological authority and operators concerned; and

d) provide for rapid response to a user request for information.

Note.— ICAO abbreviations and codes and location indicators are given respectively in the Procedures for Air Navigation Services — ICAO Abbreviations and Codes *(PANS-ABC, Doc 8400) and* Location Indicators *(Doc 7910). Aeronautical meteorological code data-type designators are given in the WMO Publication No. 386,* Manual on the Global Telecommunication System*.*

6. SPECIFICATIONS RELATED TO INFORMATION FOR AIRCRAFT IN FLIGHT

6.1 Supply of information requested by an aircraft in flight

Recommendation.— *If an aircraft in flight requests meteorological information, the meteorological office which receives the request should arrange to supply the information with the assistance, if necessary, of another meteorological office.*

6.2 Information for in-flight planning by the operator

Recommendation.— *Meteorological information for planning by the operator for aircraft in flight should be supplied during the period of the flight and should normally consist of any or all of the following:*

a) METAR and SPECI (including trend forecasts as issued in accordance with regional air navigation agreement);

b) TAF and amended TAF;

c) SIGMET and AIRMET information and special air-reports relevant to the flight, unless the latter have been the subject of a SIGMET message; and

d) upper wind and upper-air temperature information.

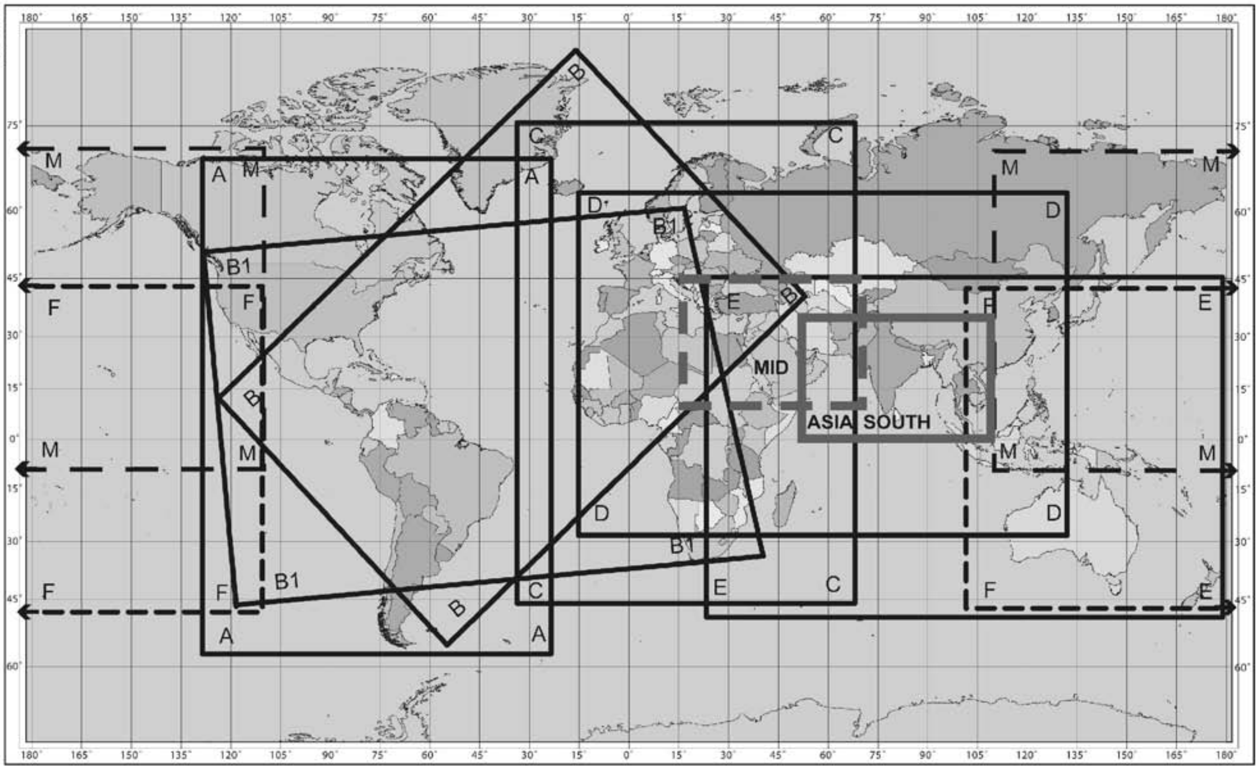


CHART	LATITUDE	LONGITUDE	CHART	LATITUDE	LONGITUDE
A	N7000	W12500	D	N6500	W01500
A	N7000	W02500	D	N6500	E13200
A	S5500	W02500	D	S2800	E13200
A	S5500	W12500	D	S2800	W01500
ASIA	N3600	E05300	E	N4500	E02500
ASIA	N3600	E10800	E	N4500	E18000
ASIA	0000	E10800	E	S4700	E18000
ASIA	0000	E05300	E	S4700	E02500
B	N8500	W01500	F	N4230	W11000
B	N4330	E05300	F	S4730	W11000
B	S5200	W05000	F	S4730	E10000
B	N1500	W12500	F	N4230	E10000
B1	N5000	W12800	M	S1000	E11000
B1	N6000	E01500	M	N7200	E11000
B1	S3500	E04000	M	N7200	W11000
B1	S4600	W10800	M	S1000	W11000
C	N7600	W03230	MID	N4400	E01700
C	N7600	E07000	MID	N4400	E07000
C	S4500	E07000	MID	N1000	E07000
C	S4500	W03230	MID	N1000	E01700

Figure A8-1. Fixed areas of coverage of WAFS forecasts in chart form — Mercator projection

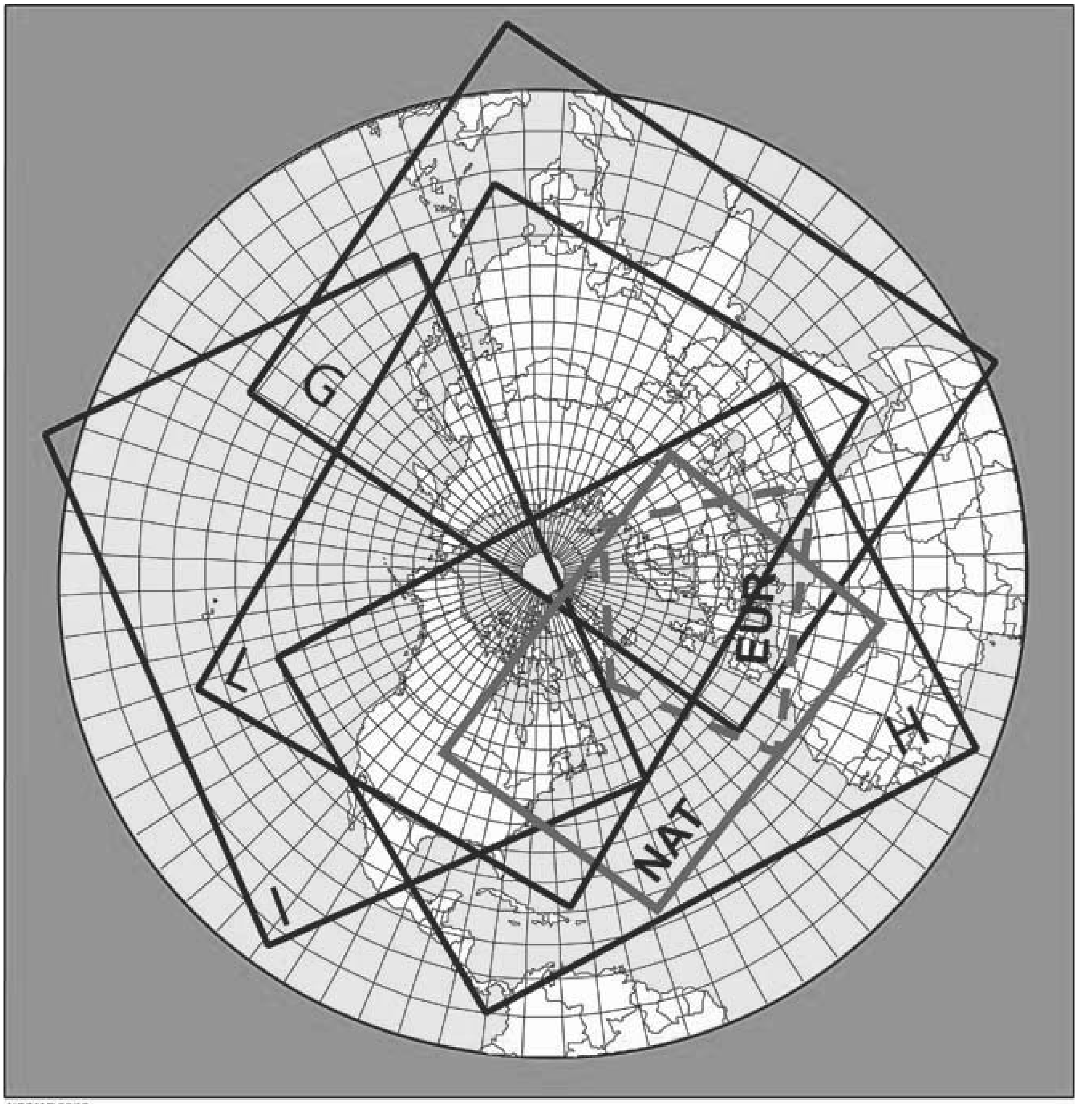


CHART	LATITUDE	LONGITUDE	CHART	LATITUDE	LONGITUDE
EUR	N5830	E06800	I	N0200	W11000
EUR	N2600	E03145	I	N4000	W03953
EUR	N2100	W02130	I	N2000	E13000
EUR	N4700	W05800	I	S0500	E18000
G	S1000	E11000	L	N1205	E11449
G	S0530	E04515	L	N1518	E4500
G	N3500	W02000	L	N2020	E6900
G	N2000	E16500	L	N1413	E14338
H	N0230	W00500	NAT	N4454	W10130
H	N2500	E05600	NAT	N1953	E00945
H	N3000	W14500	NAT	N1721	W05354
H	N0500	W08000	NAT	N5047	E06004

Figure A8-2. Fixed areas of coverage of WAFS forecasts in chart form — Polar stereographic projection (northern hemisphere)

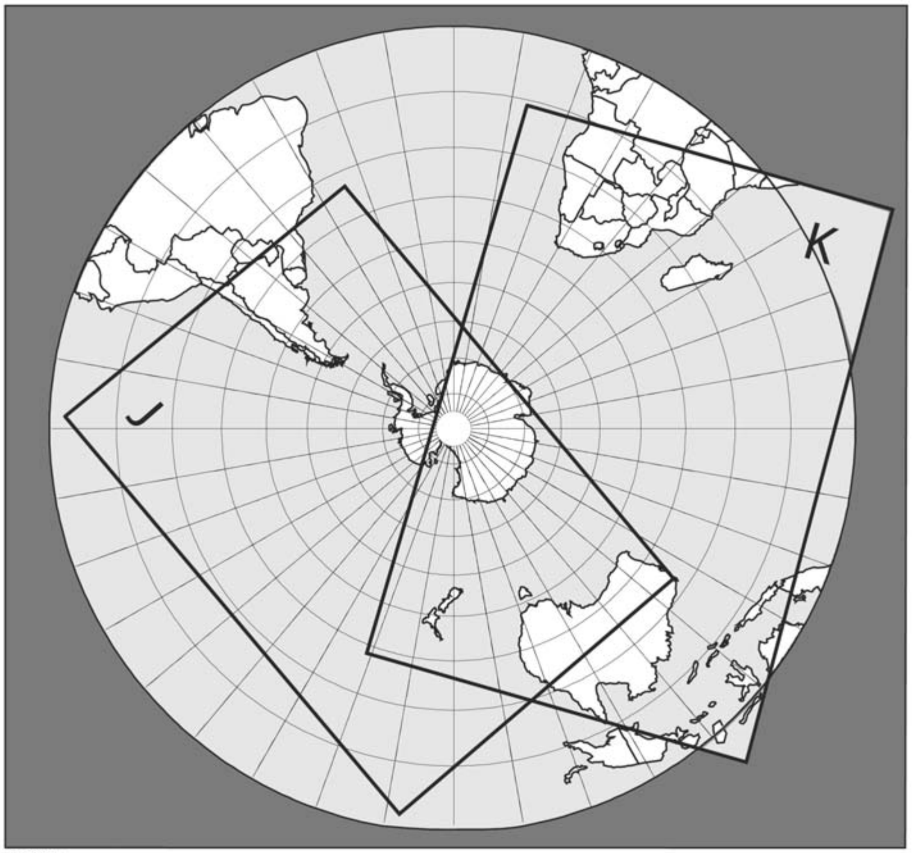


CHART	LATITUDE	LONGITUDE
J	S2305	W03700
J	S2245	E11322
J	S0616	E17245
J	S0722	W09347
K	S1000	E00500
K	S2845	W16730
K	N0500	E12800
K	N1200	E05500

Figure A8-3. Fixed areas of coverage of WAFS forecasts in chart form — Polar stereographic projection (southern hemisphere)

APPENDIX 9. TECHNICAL SPECIFICATIONS RELATED TO INFORMATION FOR AIR TRAFFIC SERVICES, SEARCH AND RESCUE SERVICES AND AERONAUTICAL INFORMATION SERVICES

(See Chapter 10 of this Annex.)

1. INFORMATION TO BE PROVIDED FOR AIR TRAFFIC SERVICES UNITS

1.1 List of information for the aerodrome control tower

The following meteorological information shall be supplied, as necessary, to an aerodrome control tower by its associated aerodrome meteorological office:

a) local routine and special reports, METAR and SPECI, TAF and trend forecasts and amendments thereto, for the aerodrome concerned;

b) SIGMET and AIRMET information, wind shear warnings and alerts and aerodrome warnings;

c) any additional meteorological information agreed upon locally, such as forecasts of surface wind for the determination of possible runway changes;

d) information received on volcanic ash cloud, for which a SIGMET has not already been issued, as agreed between the meteorological and ATS authorities concerned; and

e) information received on pre-eruption volcanic activity and/or a volcanic eruption as agreed between the meteorological and ATS authorities concerned.

1.2 List of information for the approach control unit

The following meteorological information shall be supplied, as necessary, to an approach control unit by its associated aerodrome meteorological office:

a) local routine and special reports, METAR and SPECI, TAF and trend forecasts and amendments thereto, for the aerodrome(s) with which the approach control unit is concerned;

b) SIGMET and AIRMET information, wind shear warnings and alerts and appropriate special air-reports for the airspace with which the approach control unit is concerned and aerodrome warnings;

c) any additional meteorological information agreed upon locally;

d) information received on volcanic ash cloud, for which a SIGMET has not already been issued, as agreed between the meteorological and ATS authorities concerned; and

e) information received on pre-eruption volcanic activity and/or a volcanic eruption as agreed between the meteorological and ATS authorities concerned.

1.3 List of information for the flight information centre

The following meteorological information shall be supplied, as necessary, to a flight information centre or an area control centre by its associated meteorological watch office:

a) METAR and SPECI, including current pressure data for aerodromes and other locations, TAF and trend forecasts and amendments thereto, covering the flight information region or the control area and, if required by the flight information centre or area control centre, covering aerodromes in neighbouring flight information regions, as determined by regional air navigation agreement;

b) forecasts of upper winds, upper-air temperatures and significant en-route weather phenomena and amendments thereto, particularly those which are likely to make operation under visual flight rules impracticable, SIGMET and AIRMET information and appropriate special air-reports for the flight information region or control area and, if determined by regional air navigation agreement and required by the flight information centre or area control centre, for neighbouring flight information regions;

c) any other meteorological information required by the flight information centre or area control centre to meet requests from aircraft in flight; if the information requested is not available in the associated meteorological watch office, that office shall request the assistance of another meteorological office in supplying it;

d) information received on volcanic ash cloud, for which a SIGMET has not already been issued, as agreed between the meteorological and ATS authorities concerned;

e) information received concerning the accidental release of radioactive materials into the atmosphere, as agreed between the meteorological and ATS authorities concerned;

f) tropical cyclone advisory information issued by a TCAC in its area of responsibility;

g) volcanic ash advisory information issued by a VAAC in its area of responsibility; and

h) information received on pre-eruption volcanic activity and/or a volcanic eruption as agreed between the meteorological and ATS authorities concerned.

1.4 Supply of information to aeronautical telecommunications stations

Where necessary for flight information purposes, current meteorological reports and forecasts shall be supplied to designated aeronautical telecommunication stations. A copy of such information shall be forwarded, if required, to the flight information centre or the area control centre.

1.5 Format of information

1.5.1 **Recommendation.—** *Local routine and special reports, METAR and SPECI, TAF and trend forecasts, SIGMET and AIRMET information, upper wind and upper-air temperature forecasts and amendments thereto should be supplied to air traffic services units in the form in which they are prepared, disseminated to other meteorological offices or received from other meteorological offices, unless otherwise agreed locally.*

1.5.2 **Recommendation.—** *When computer-processed upper-air data for grid points are made available to air traffic services units in digital form for use by air traffic services computers, the contents, format and transmission arrangements should be as agreed between the meteorological authority and the appropriate ATS authority. The data should normally be supplied as soon as is practicable after the processing of the forecasts has been completed.*

2. INFORMATION TO BE PROVIDED FOR SEARCH AND RESCUE SERVICES UNITS

2.1 List of information

Information to be supplied to rescue coordination centres shall include the meteorological conditions that existed in the last known position of a missing aircraft and along the intended route of that aircraft with particular reference to:

a) significant en-route weather phenomena;

b) cloud amount and type, particularly cumulonimbus; height indications of bases and tops;

c) visibility and phenomena reducing visibility;

d) surface wind and upper wind;

e) state of ground, in particular, any snow cover or flooding;

f) sea-surface temperature, state of the sea, ice cover if any and ocean currents, if relevant to the search area; and

g) sea-level pressure data.

2.2 Information to be provided on request

2.2.1 **Recommendation.—** *On request from the rescue coordination centre, the designated meteorological office should arrange to obtain details of the flight documentation which was supplied to the missing aircraft, together with any amendments to the forecast which were transmitted to the aircraft in flight.*

2.2.2 **Recommendation.—** *To facilitate search and rescue operations the designated meteorological office should, on request, supply:*

a) complete and detailed information on the current and forecast meteorological conditions in the search area; and

b) current and forecast conditions en route, covering flights by search aircraft from and returning to the aerodrome from which the search is being conducted.

2.2.3 **Recommendation.—** *On request from the rescue coordination centre, the designated meteorological office should supply or arrange for the supply of meteorological information required by ships undertaking search and rescue operations.*

3. INFORMATION TO BE PROVIDED FOR AERONAUTICAL INFORMATION SERVICES UNITS

3.1 List of information

The following information shall be supplied, as necessary, to an aeronautical information services unit:

a) information on meteorological service for international air navigation, intended for inclusion in the aeronautical information publication(s) concerned;

Note.— Details of this information are given in Annex 15, Appendix 1, Part 1, GEN 3.5 and Part 3, AD 2.2, 2.11, 3.2 and 3.11.

b) information necessary for the preparation of NOTAM or ASHTAM including, in particular, information on:

1) the establishment, withdrawal and significant changes in operation of aeronautical meteorological services. This information is required to be provided to the aeronautical information services unit sufficiently in advance of the effective date to permit issuance of NOTAM in compliance with Annex 15, 5.1.1 and 5.1.1.1;

2) the occurrence of volcanic activity; and

Note.— The specific information required is given in Chapter 3, 3.3.2 and Chapter 4, 4.8.

3) accidental release of radioactive materials into the atmosphere, as agreed between the meteorological and appropriate civil aviation authorities concerned; and

Note.— The specific information required is given in Chapter 3, 3.4.2 g).

c) information necessary for the preparation of aeronautical information circulars including, in particular, information on:

1) expected important changes in aeronautical meteorological procedures, services and facilities provided; and

2) effect of certain weather phenomena on aircraft operations.

APPENDIX 10. TECHNICAL SPECIFICATIONS RELATED TO REQUIREMENTS FOR AND USE OF COMMUNICATIONS

(See Chapter 11 of this Annex.)

1. SPECIFIC REQUIREMENTS FOR COMMUNICATIONS

1.1 Required transit times of meteorological information

Recommendation.— *Unless otherwise determined by regional air navigation agreement, AFTN messages and bulletins containing operational meteorological information should achieve transit times of less than the following:*

SIGMET and AIRMET messages, volcanic ash and tropical cyclone advisory information and special air-reports .... *5 minutes*

Abbreviated plain-language amendments to significant weather and upper air forecasts .... *5 minutes*

Amended TAF and corrections to TAF .... *5 minutes*

METAR *Trend forecasts* *TAF* *SPECI*	*0–900 km (500 NM)*	*5 minutes*
	more than 900 km (500 NM)	*10 minutes*

1.2 Grid point data for ATS and operators

1.2.1 **Recommendation.—** *When upper-air data for grid points in digital form are made available for use by air traffic services computers, the transmission arrangements should be as agreed between the meteorological authority and the appropriate ATS authority.*

1.2.2 **Recommendation.—** *When upper-air data for grid points in digital form are made available to operators for flight planning by computer, the transmission arrangements should be as agreed among the world area forecast centre concerned, the meteorological authority and the operators.*

2. USE OF AERONAUTICAL FIXED SERVICE COMMUNICATIONS

2.1 Meteorological bulletins in alphanumeric format

2.1.1 Composition of bulletins

Recommendation.— *Whenever possible, exchanges of operational meteorological information should be made in consolidated bulletins of the same types of meteorological information.*

2.1.2 Filing times of bulletins

Recommendation.— *Meteorological bulletins required for scheduled transmissions should be filed regularly and at the prescribed scheduled times. METAR should be filed for transmission not later than 5 minutes after the actual time of observation. TAF should be filed for transmission at least one hour before the commencement of their period of validity, unless otherwise determined by regional air navigation agreement.*

2.1.3 Heading of bulletins

Meteorological bulletins containing operational meteorological information to be transmitted via the aeronautical fixed service facilities shall contain a heading consisting of:

a) an identifier of four letters and two figures;

b) the ICAO four-letter location indicator corresponding to the geographical location of the meteorological office originating or compiling the meteorological bulletin;

c) a day-time group; and

d) if required, a three-letter indicator.

Note 1.— Detailed specifications on format and contents of the heading are given in the WMO Manual on the Global Telecommunication System*, Volume I and are reproduced in the* Manual of Aeronautical Meteorological Practice *(Doc 8896).*

Note 2.— ICAO location indicators are listed in Location Indicators *(Doc 7910).*

2.1.4 Structure of bulletins

Meteorological bulletins containing operational meteorological information to be transmitted via the AFTN shall be encapsulated in the text part of the AFTN message format.

2.2 World area forecast system products

2.2.1 Telecommunications for the supply of WAFS products

Recommendation.— *The telecommunications facilities used for the supply of world area forecast system products should be the aeronautical fixed service.*

2.2.2 Quality requirements for charts

Recommendation.— *Where world area forecast system products are disseminated in chart form, the quality of the charts received should be such as to permit reproduction in a sufficiently legible form for flight planning and documentation. Charts received should be legible over 95 per cent of their area.*

2.2.3 Quality requirements for transmissions

Recommendation.— *Transmissions should be such as to ensure that their interruption should not exceed 10 minutes during any period of 6 hours.*

2.2.4 Heading of bulletins containing WAFS products

Meteorological bulletins containing WAFS products in digital form to be transmitted via aeronautical fixed service facilities shall contain a heading as given in 2.1.3.

3. USE OF AERONAUTICAL MOBILE SERVICE COMMUNICATIONS

3.1 Content and format of meteorological messages

3.1.1 The contents and format of reports, forecasts and SIGMET information transmitted to aircraft shall be consistent with the provisions of Chapters 4, 6 and 7 of this Annex.

3.1.2 The contents and format of air-reports transmitted by aircraft shall be consistent with the provisions of Chapter 5 of this Annex and the *Procedures for Air Navigation Services — Air Traffic Management* (PANS-ATM, Doc 4444), Appendix 1.

3.2 Content and format of meteorological bulletins

The substance of a meteorological bulletin transmitted via the aeronautical mobile service shall remain unchanged from that contained in the bulletin as originated.

4. USE OF AERONAUTICAL DATA LINK SERVICE — D-VOLMET

4.1 Detailed content of meteorological information available for D-VOLMET

4.1.1 The aerodromes for which METAR, SPECI and TAF are to be available for uplink to aircraft in flight shall be determined by regional air navigation agreement.

4.1.2 The flight information regions for which SIGMET and AIRMET messages are to be available for uplink to aircraft in flight shall be determined by regional air navigation agreement.

4.2 Criteria related to information to be available for D-VOLMET

4.2.1 **Recommendation.—** *The latest available METAR, SPECI and TAF, and valid SIGMET and AIRMET should be used for uplink to aircraft in flight.*

4.2.2 **Recommendation.—** *TAF included in the D-VOLMET should be amended as necessary to ensure that a forecast, when made available for uplink to aircraft in flight, reflects the latest opinion of the meteorological office concerned.*

4.2.3 **Recommendation.—** *If no SIGMET message is valid for a flight information region, an indication of "NIL SIGMET" should be included in the D-VOLMET.*

4.3 Format of information to be available for D-VOLMET

The content and format of reports, forecasts and SIGMET and AIRMET information included in D-VOLMET shall be consistent with the provisions of Chapters 4, 6 and 7 of this Annex.

5. USE OF AERONAUTICAL BROADCASTING SERVICE — VOLMET BROADCASTS

5.1 Detailed content of meteorological information to be included in VOLMET broadcasts

5.1.1 The aerodromes for which METAR, SPECI and TAF are to be included in VOLMET broadcasts, the sequence in which they are to be transmitted and the broadcast time shall be determined by regional air navigation agreement.

5.1.2 The flight information regions for which SIGMET messages are to be included in scheduled VOLMET broadcasts shall be determined by regional air navigation agreement. Where this is done, the SIGMET message shall be transmitted at the beginning of the broadcast or of a five-minute time block.

5.2 Criteria related to information to be included in VOLMET broadcasts

5.2.1 **Recommendation.—** *When a report has not arrived from an aerodrome in time for a broadcast, the latest available report should be included in the broadcast, together with the time of observation.*

5.2.2 **Recommendation.—** *TAF included in scheduled VOLMET broadcasts should be amended as necessary to ensure that a forecast, when transmitted, reflects the latest opinion of the meteorological office concerned.*

5.2.3 **Recommendation.—** *Where SIGMET messages are included in scheduled VOLMET broadcasts, an indication of "NIL SIGMET" should be transmitted if no SIGMET message is valid for the flight information regions concerned.*

5.3 Format of information to be included in VOLMET broadcasts

5.3.1 The content and format of reports, forecasts and SIGMET information included in VOLMET broadcasts shall be consistent with the provisions of Chapters 4, 6 and 7 of this Annex.

5.3.2 **Recommendation.—** *VOLMET broadcasts should use standard radiotelephony phraseologies.*

Note.— Guidance on the standard radiotelephony phraseologies to be used in VOLMET broadcasts is given in the Manual on Coordination between Air Traffic Services, Aeronautical Information Services and Aeronautical Meteorological Services *(Doc 9377), Appendix 1.*

ATTACHMENT A. OPERATIONALLY DESIRABLE ACCURACY OF MEASUREMENT OR OBSERVATION

Note.— The guidance contained in this table relates to Chapter 4 — Meteorological observations and reports, in particular to 4.1.9.

Element to be observed	*Operationally desirable accuracy of measurement or observation**
Mean surface wind	Direction: ± 10° Speed: ± 2 km/h (1 kt) up to 20 km/h (10 kt) ± 10% above 20 km/h (10 kt)
Variations from the mean surface wind	± 4 km/h (2 kt), in terms of longitudinal and lateral components
Visibility	± 50 m up to 600 m ± 10% between 600 m and 1 500 m ± 20% above 1 500 m
Runway visual range	± 10 m up to 400 m ± 25 m between 400 m and 800 m ± 10% above 800 m
Cloud amount	± 1 okta
Cloud height	± 10 m (33 ft) up to 100 m (330 ft) ± 10% above 100 m (330 ft)
Air temperature and dew-point temperature	± 1°C
Pressure value (QNH, QFE)	± 0.5 hPa

* The operationally desirable accuracy is not intended as an operational requirement; it is to be understood as a goal that has been expressed by the operators.

Note.— Guidance on the uncertainties of measurement or observation can be found in WMO Publication No. 8 — Guide to Meteorological Instruments and Methods of Observation.

ATTACHMENT B. OPERATIONALLY DESIRABLE ACCURACY OF FORECASTS

Note 1.— The guidance contained in this table relates to Chapter 6 — Forecasts, in particular to 6.1.1.

Note 2.— If the accuracy of the forecasts remains within the operationally desirable range shown in the second column, for the percentage of cases indicated in the third column, the effect of forecast errors is not considered serious in comparison with the effects of navigational errors and of other operational uncertainties.

Element to be forecast	*Operationally desirable accuracy of forecasts*	*Minimum percentage of cases within range*
	TAF	
Wind direction	± 20°	80% of cases
Wind speed	± 10 km/h (5 kt)	80% of cases
Visibility	± 200 m up to 800 m ± 30% between 800 m and 10 km	80% of cases
Precipitation	Occurrence or non-occurrence	80% of cases
Cloud amount	One category below 450 m (1 500 ft) Occurrence or non-occurrence of BKN or OVC between 450 m (1 500 ft) and 3 000 m (10 000 ft)	70% of cases
Cloud height	± 30 m (100 ft) up to 300 m (1 000 ft) ± 30% between 300 m (1 000 ft) and 3 000 m (10 000 ft)	70% of cases
Air temperature	± 1°C	70% of cases
	TREND FORECAST	
Wind direction	± 20°	90% of cases
Wind speed	± 10 km/h (5 kt)	90% of cases
Visibility	± 200 m up to 800 m ± 30% between 800 m and 10 km	90% of cases
Precipitation	Occurrence or non-occurrence	90% of cases

Element to be forecast	*Operationally desirable accuracy of forecasts*	*Minimum percentage of cases within range*
Cloud amount	± One category below 450 m (1 500 ft) Occurrence or non-occurrence of BKN or OVC between 450 m (1 500 ft) and 3 000 m (10 000 ft)	90% of cases
Cloud height	± 30 m (100 ft) up to 300 m (1 000 ft) ± 30% between 300 m (1 000 ft) and 3 000 m (10 000 ft)	90% of cases
	FORECAST FOR TAKE-OFF	
Wind direction	± 20°	90% of cases
Wind speed	± 10 km/h (5 kt) up to 50 km/h (25 kt)	90% of cases
Air temperature	± 1°C	90% of cases
Pressure value (QNH)	± 1 hPa	90% of cases
	AREA, FLIGHT AND ROUTE FORECASTS	
Upper-air temperature	± 2°C (Mean for 900 km (500 NM)	90% of cases
Relative humidity	± 20%	90% of cases
Upper wind	± 20 km/h (10 kt) (Modulus of vector difference for 900 km (500 NM)	90% of cases
Significant en-route weather phenomena and cloud	Occurrence or non-occurrence Location: ± 100 km (60 NM Vertical extent: ± 300 m (1 000 ft) Flight level of tropopause: ± 300 m (1 000 ft) Max wind level: ± 300 m (1 000 ft)	80% of cases 70% of cases 70% of cases 80% of cases 80% of cases

ATTACHMENT C. SELECTED CRITERIA APPLICABLE TO AERODROME REPORTS

(The guidance in this table relates to Chapter 4 and Appendix 3.)

	Surface wind				*Visibility (VIS)*			*RVR[1]* A –10, B –5, C (OBS TIME) *(Time, MIN)*			*Present weather*	*Cloud* — *Amount*				*Cloud* — *Type[2]*	*Temperature*	*Pressure (QNH, QFE)*		*Supplementary information*
Specifications	Directional variations[3] ≥ 60° and < 180° — Mean speed < 6 km/h (3 kt)	Directional variations[3] ≥ 60° and < 180° — Mean speed ≥ 6 km/h (3 kt)	≥ 180°	Speed variations[3] — Exceeding the mean speed by ≥ 20 km/h (10 kt)	Directional variations[4] — General rule	Special cases Minimum VIS ≠ prevailing VIS — Minimum VIS < 1 500 m or < 0.5 × prevailing VIS	Special cases Minimum VIS ≠ prevailing VIS — VIS fluctuating and prevailing VIS cannot be determined	Past tendency[5] $\lvert\overline{R}_{5(AB)} - \overline{R}_{5(BC)}\rvert$ — < 100 m	Past tendency[5] $\lvert\overline{R}_{5(AB)} - \overline{R}_{5(BC)}\rvert$ — ≥ 100 m	Variations[5] $\lvert\overline{R}_1 - \overline{R}_{10}\rvert$ > MAX [50 m or 20% × $\overline{R}_{10}$]	No general criteria applicable to all the WX phenomena (for specific criteria, see Appendix 3, 4.4.2)	Layers reported if coverage — Lowest layer	Next layer >	Next higher layer >	CB[6] or TCU	Identification	No criteria	Parameters reported	Updated if changes > agreed magnitude	Parameter to be included
Local routine and special report	2 min[7] VRB + 2 extreme directions[11]	2 min mean + 2 extreme directions[11]	2 min VRB (no extremes)[11]	2 min Minimum and maximum speed	1 min VIS along the runway(s)	N/A	N/A	1 min N/A[8]				Always	2/8	4/8	Always	CB TCU		QNH QFE[9]	Yes	All[10]
METAR/ SPECI	10 min VRB (no extremes)	10 min mean + 2 extreme directions	10 min VRB (no extremes)	10 min Maximum speed[11]	10 min Prevailing VIS	Prevailing VIS and minimum VIS + direction	Minimum VIS	10 min No tendency observed ("N"); No tendency available, the tendency is to be omitted	Upward ("U") or downward ("D")	1 min Minimum and maximum (instead of 10-minute mean)		Always	2/8	4/8	Always	CB TCU		QNH	No	Recent WX of operational significance and wind shear[12]
Relevant reporting scales for all messages	Direction in three figures rounded off to the nearest 10 degrees (degrees 1 – 4 down, degrees 5 – 9 up)			Speed in 1 km/h or 1 kt; Speed < 2 km/h (1 kt) indicated as CALM	*If* VIS < 800 m *Step applicable*: 50 m; 800 m ≤ VIS < 5 000 m: 100 m; 5 000 m ≤ VIS < 10 km: 1 km; VIS ≥ 10 km: None, given as 10 km or covered under CAVOK			*If* RVR < 400 m *Step applicable*: 25 m; 400 ≤ RVR ≤ 800 m: 50 m; 800 < RVR < 2 000 m: 100 m[13]			N/A	*If* Base ≤ 3 000 m (10 000 ft) *Step applicable*: 30 m (100 ft) (Reference level: Aerodrome elevation[14] or mean sea level for off-shore structures)					Rounded off to whole degrees: up for decimal 5	In whole hPa[15] rounding down for decimals 1 – 9		N/A

Notes.—

1. Considered for the past 10 minutes (exception: if the 10-minute period includes a *marked discontinuity* (i.e. RVR changes or passes 150, 350, 600 or 800 m, lasting ≥ 2 minutes), only data after the discontinuity to be used). A simple diagrammatic convention is used to illustrate those parts of the 10-minute period prior to the observation relevant to RVR criteria, i.e. AB, BC and AC.
2. Layer composed of CB and TCU *with a common base* should be reported as "CB".
3. Considered for the past 10 minutes (exception: if the 10-minute period includes a *marked discontinuity* (i.e. the direction changes ≥ 30° with a speed ≥ 20 km/h *or* the speed changes ≥ 20 km/h lasting ≥ 2 minutes), only data after the discontinuity to be used).
4. If several directions, the most operationally significant direction used.
5. Let $\overline{R}_1$ = any 1-minute mean RVR-value during period AC, $\overline{R}_{10}$ = 10-minute mean RVR-value during period AC, $\overline{R}_{5(AB)}$ = 5-minute mean RVR-value during period AB and $\overline{R}_{5(BC)}$ = 5-minute mean RVR-value during period BC.
6. CB (cumulonimbus) and TCU (towering cumulus = cumulus congestus of great vertical extent) if not already indicated as one of the other layers.
7. Time averaging, if applicable, indicated in the upper left-hand corner.
8. N/A = not applicable.
9. QFE is to be included if required. Reference elevation for QFE should be aerodrome elevation except for precision approach runways, and non-precision approach runways with threshold ≥ 2 m (7 ft) below or above aerodrome elevation, where the reference level should be the relevant threshold elevation.
10. As listed in Appendix 3, 4.8.
11. According to the WMO *Manual on Codes* (WMO-No. 306), Volume I.1, Part A — Alphanumeric Codes, paragraph 15.5.5, "it is recommended that the wind measuring systems should be such that peak gusts should represent a three-second average".
12. Also sea-surface temperature and state of the sea from off-shore structures in accordance with regional air navigation agreement.
13. Report if RVR and/or VIS < 1 500 m, limits for assessments 50 and 2 000 m.
14. For landing at aerodromes with precision approach runways and with the threshold elevation ≥ 15 m below the aerodrome elevation, the *threshold elevation* to be used as a reference.
15. Measured in 0.1 hPa.

ATTACHMENT D. CONVERSION OF INSTRUMENTED READINGS INTO RUNWAY VISUAL RANGE AND VISIBILITY

(See Appendix 3, 4.3.5 of this Annex.)

1. The conversion of instrumented readings into runway visual range and visibility is based on Koschmieder's Law or Allard's Law, depending on whether the pilot can be expected to obtain main visual guidance from the runway and its markings or from the runway lights. In the interest of standardization in runway visual range assessments, this Attachment provides guidance on the use and application of the main conversion factors to be used in these computations.

2. In Koschmieder's Law one of the factors to be taken into account is the pilot contrast threshold. The agreed constant to be used for this is 0.05 (dimensionless).

3. In Allard's Law the corresponding factor is the illumination threshold. This is not a constant, but a continuous function dependent on the background luminance. The agreed relationship to be used in instrumented systems with continuous adjustment of the illumination threshold by a background luminance sensor is shown by the curve in Figure D-1. The use of a continuous function which approximates the step function such as displayed in Figure D-1 is preferred, due to its higher accuracy, to the stepped relationship described in paragraph 4.

4. In instrumented systems without continuous adjustment of the illumination threshold, the use of four equally spaced illumination threshold values with agreed corresponding back-ground luminance ranges is convenient but will reduce accuracy. The four values are shown in Figure D-1 in the form of a step function; they are tabulated in Table D-1 for greater clarity.

Note 1.— Information and guidance material on the runway lights to be used for assessment of runway visual range are contained in the Manual of Runway Visual Range Observing and Reporting Practices *(Doc 9328).*

Note 2.— In accordance with the definition of visibility for aeronautical purposes, the intensity of lights to be used for the assessment of visibility is in the vicinity of 1 000 cd.

Table D-1. Illumination threshold steps

Condition	*Illumination threshold (lx)*	*Background luminance (cd/m^2)*
Night	8×10^{-7}	≤ 50
Intermediate	10^{-5}	51 – 999
Normal day	10^{-4}	1000 – 12000
Bright day (sunlit fog)	10^{-3}	> 12000

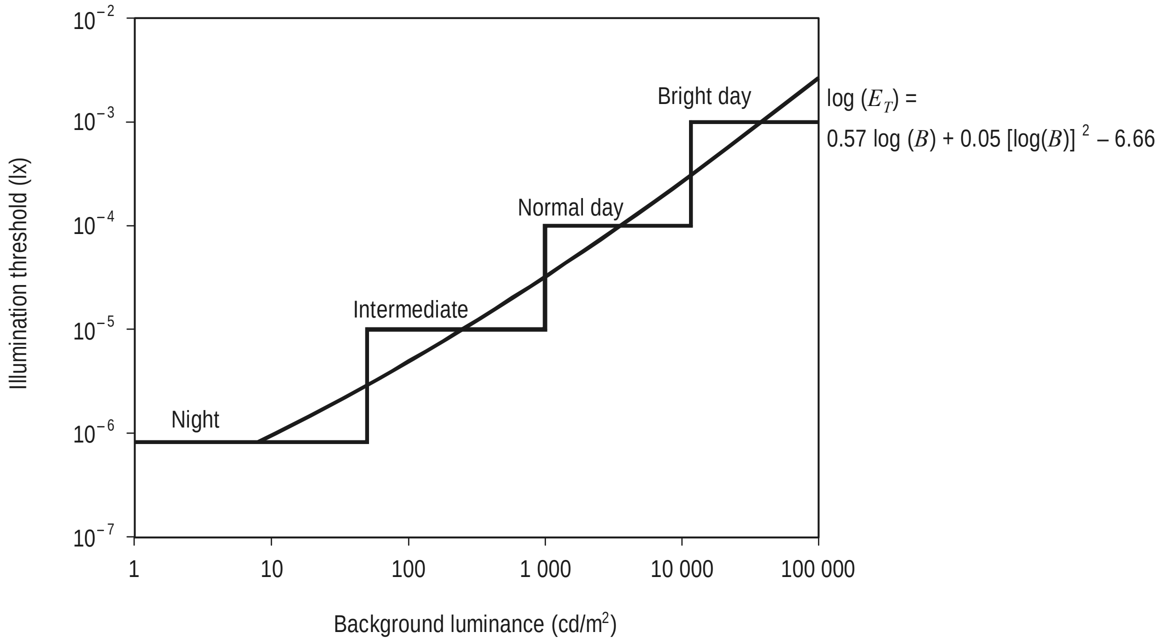


Figure D-1. Relationship between the illumination threshold E_T (lx) and background luminance B (cd/m^2)

— END —

ICAO TECHNICAL PUBLICATIONS

The following summary gives the status, and also describes in general terms the contents of the various series of technical publications issued by the International Civil Aviation Organization. It does not include specialized publications that do not fall specifically within one of the series, such as the Aeronautical Chart Catalogue *or the* Meteorological Tables for International Air Navigation.

International Standards and Recommended Practices are adopted by the Council in accordance with Articles 54, 37 and 90 of the Convention on International Civil Aviation and are designated, for convenience, as Annexes to the Convention. The uniform application by Contracting States of the specifications contained in the International Standards is recognized as necessary for the safety or regularity of international air navigation while the uniform application of the specifications in the Recommended Practices is regarded as desirable in the interest of safety, regularity or efficiency of international air navigation. Knowledge of any differences between the national regulations or practices of a State and those established by an International Standard is essential to the safety or regularity of international air navigation. In the event of non-compliance with an International Standard, a State has, in fact, an obligation, under Article 38 of the Convention, to notify the Council of any differences. Knowledge of differences from Recommended Practices may also be important for the safety of air navigation and, although the Convention does not impose any obligation with regard thereto, the Council has invited Contracting States to notify such differences in addition to those relating to International Standards.

Procedures for Air Navigation Services (PANS) are approved by the Council for worldwide application. They contain, for the most part, operating procedures regarded as not yet having attained a sufficient degree of maturity for adoption as International Standards and Recommended Practices, as well as material of a more permanent character which is considered too detailed for incorporation in an Annex, or is susceptible to frequent amendment, for which the processes of the Convention would be too cumbersome.

Regional Supplementary Procedures (SUPPS) have a status similar to that of PANS in that they are approved by the Council, but only for application in the respective regions. They are prepared in consolidated form, since certain of the procedures apply to overlapping regions or are common to two or more regions.

The following publications are prepared by authority of the Secretary General in accordance with the principles and policies approved by the Council.

Technical Manuals provide guidance and information in amplification of the International Standards, Recommended Practices and PANS, the implementation of which they are designed to facilitate.

Air Navigation Plans detail requirements for facilities and services for international air navigation in the respective ICAO Air Navigation Regions. They are prepared on the authority of the Secretary General on the basis of recommendations of regional air navigation meetings and of the Council action thereon. The plans are amended periodically to reflect changes in requirements and in the status of implementation of the recommended facilities and services.

ICAO Circulars make available specialized information of interest to Contracting States. This includes studies on technical subjects.

COVER SHEET TO AMENDMENT 54

INTERNATIONAL STANDARDS
AND RECOMMENDED PRACTICES

AERONAUTICAL CHARTS

ANNEX 4
TO THE CONVENTION ON INTERNATIONAL CIVIL AVIATION

TENTH EDITION — JULY 2001

INTERNATIONAL CIVIL AVIATION ORGANIZATION

Checklist of Amendments to Annex 4

	Effective date	Date of applicability
Tenth Edition (incorporates Amendments 1 to 52)	16 July 2001	1 November 2001; 28 November 2002
Amendment 53 (adopted by the Council on 23 February 2004)	12 July 2004	25 November 2004
Amendment 54 (adopted by the Council on 2 March 2007) Replacement pages (iii), (v), (xii), 1-1 to 1-7, 3-1, 4-1, 5-1 to 5-4, 6-1, 7-1, 7-2, 8-2, 8-3, 9-1 to 9-3, 10-1 to 10-3, 11-1, 11-3, 11-4, 11-5, 13-2, 14-1, 15-1, 21-1, 21-2, APP 2-10, APP 2-11, APP 6-3 and APP 6-4	16 July 2007	22 November 2007

Transmittal note

Amendment 54

to the

International Standards
and Recommended Practices

AERONAUTICAL CHARTS

(Annex 4 to the Convention on International Civil Aviation)

1. Insert the following replacement pages in Annex 4 (Tenth Edition) to incorporate Amendment 54 which becomes applicable on 22 November 2007:

a)	Pages (iii) and (v)	— Table of Contents
b)	Page (xii)	— Foreword
c)	Pages 1-1 to 1-7	— Chapter 1
d)	Page 3-1	— Chapter 3
e)	Page 4-1	— Chapter 4
f)	Pages 5-1 to 5-4	— Chapter 5
g)	Page 6-1	— Chapter 6
h)	Pages 7-1 and 7-2	— Chapter 7
i)	Pages 8-2 and 8-3	— Chapter 8
j)	Pages 9-1 to 9-3	— Chapter 9
k)	Pages 10-1 to 10-3	— Chapter 10
l)	Pages 11-1, 11-3, 11-4 and 11-5	— Chapter 11
m)	Page 13-2	— Chapter 13
n)	Page 14-1	— Chapter 14

o) Page 15-1 — Chapter 15

p) Pages 21-1 and 21-2 — Chapter 21

q) Pages APP 2-10 and APP 2-11 — Appendix 2

r) Pages APP 6-3 and APP 6-4 — Appendix 6

2. Record the entry of this amendment on page (ii).

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APPENDICES

Amendment	*Source(s)*	*Subject(s)*	*Adopted Effective Applicable*
48	Amendment 18 to Annex 6; Amendment 33 to Annex 14; Visual Aids Panel (Eleventh Meeting); Recommendation 2/2 and Secretariat	Aerodrome Obstacle Chart — ICAO Types A, B and C; Precision Approach Terrain Chart — ICAO; Standard Departure Chart — Instrument (SID) — ICAO; Standard Arrival Chart — Instrument (STAR) — ICAO; Instrument Approach Chart — ICAO; Visual Approach Chart — ICAO; Aerodrome Chart — ICAO; Aerodrome Ground Movement Chart — ICAO; Aircraft Parking/Docking Chart — ICAO; World Aeronautical Chart — ICAO 1:1 000 000; Aeronautical Chart — ICAO 1:500 000; Aeronautical Navigation Chart — ICAO Small Scale; Plotting Chart — ICAO; ICAO Chart Symbols.	24 February 1989 31 July 1989 16 November 1989
49	Amendment 33 to Annex 11; Amendment 39 to Annex 14; Adoption of Annex 14, Vol. II; Amendments 5 and 6 to Doc 8168, PANS-OPS, Vols. I and II, respectively	Definitions; General specifications; Enroute Chart — ICAO; Area Chart — ICAO; Instrument Approach Chart — ICAO; Visual Approach Chart — ICAO; Aerodrome Chart — ICAO; World Aeronautical Chart — ICAO 1:1 000 000; Aeronautical Chart — ICAO 1:500 000; ICAO Chart Symbols.	28 February 1992 27 July 1992 12 November 1992
50	Adoption by Council of WGS-84 as the standard geodetic reference system for international aviation; WAFS planning and implementation; PANS-OPS implementation problems; revision of the Manual of All-Weather Operations; integration of helicopter traffic with conventional aeroplane traffic; proposal by RGCSP/8; and the Secretariat	Definitions; introduction of new provisions concerning the promulgation, as of 1 January 1998, of WGS-84 related geographical coordinates; deletion of the requirement for presentation of level acceleration altitude/height; introduction of RNP type; inclusion of the note on close-in obstacles on SID charts; and introduction of new chart symbol for active volcano.	1 March 1995 24 July 1995 9 November 1995; 1 January 1998
51	Tenth and Eleventh Meetings of the Obstacle Clearance Panel and Air Navigation Commission	Definitions; aeronautical data bases; vertical component of the World Geodetic System — 1984 (WGS-84); Human Factors; identification of RNAV procedures; provision of final approach gradient; steep glide path angle approaches; and chart symbols for flyover and fly-by waypoints.	20 March 1998 20 July 1998 5 November 1998
52	Recommendations of the Visual Aids Panel (VAP), the Obstacle Clearance Panel (OCP), the joint ICAO and Industry Controlled Flight Into Terrain (CFIT) Task Force, the Aeronautical Information Services/ Aeronautical Charts (AIS/ MAP) Divisional Meeting (1998), and the Secretariat	Definitions; runway-holding position; air defence identification zone (ADIZ); portrayal of terrain and minimum flight altitudes; runway visual range (RVR) observation sites; airspace classifications, flight procedures and obstacle clearance criteria based on area navigation (RNAV) systems, and chart symbols for runway-holding position, ADIZ, electronic aeronautical charts, airspace classifications; nuclear power station and waypoint and, introduction of new provisions, as of 28 November 2002, concerning the Electronic Aeronautical Chart Display — ICAO.	7 March 2001 16 July 2001 1 November 2001; 28 November 2002

Amendment	*Source(s)*	*Subject(s)*	*Adopted Effective Applicable*
53	Twelfth and Thirteenth Meetings of the Obstacle Clearance Panel; the Air Navigation Commission; and the Secretariat	New provisions concerning definitions; vertical and temporal reference systems; terminal arrival altitude; Radar Minimum Altitude Chart — ICAO; and chart symbols for altitudes/flight levels and final approach fix. Updating of existing provisions related to the World Geodetic System — 1984 (WGS-84); obstacles; identification, aerodrome operating minima and supplementary information on the Instrument Approach Chart — ICAO; and aeronautical data quality requirements.	23 February 2004 12 July 2004 25 November 2004
54	Various sources, including Recommendation 2.3/2 of the AIS/MAP Divisional Meeting (1998), and recommendations of the OCP/14 and OPLINKP/1 meetings, the Runway Safety Education and Awareness Programme, and the Secretariat	Definitions and introduction of new provisions, as of 18 November 2010, concerning the Aerodrome Terrain and Obstacle Chart — ICAO (Electronic). Minimum en-route altitudes, minimum obstacle clearance altitudes, logon address, ATS surveillance system terminology, aeronautical database requirements, approach fixes and points, aeronautical data quality requirements for gradients and angles, steep angle approach cautionary note, hot spot and intermediate holding position including new symbols.	2 March 2007 16 July 2007 22 November 2007

INTERNATIONAL STANDARDS AND RECOMMENDED PRACTICES

CHAPTER 1. DEFINITIONS, APPLICABILITY AND AVAILABILITY

1.1 Definitions

When the following terms are used in the Standards and Recommended Practices for aeronautical charts, they have the following meanings:

Aerodrome. A defined area on land or water (including any buildings, installations and equipment) intended to be used either wholly or in part for the arrival, departure and surface movement of aircraft.

Aerodrome elevation. The elevation of the highest point of the landing area.

Aerodrome operating minima. The limits of usability of an aerodrome for:

a) take-off, expressed in terms of runway visual range and/or visibility and, if necessary, cloud conditions;

b) landing in precision approach and landing operations, expressed in terms of visibility and/or runway visual range and decision altitude/height (DA/H) as appropriate to the category of the operation; and

c) landing in approach and landing operations with vertical guidance, expressed in terms of visibility and/or runway visual range and decision altitude/height (DA/H); and

d) landing in non-precision approach and landing operations, expressed in terms of visibility and/or runway visual range, minimum descent altitude/height (MDA/H) and, if necessary, cloud conditions.

Aerodrome reference point. The designated geographical location of an aerodrome.

Aeronautical chart. A representation of a portion of the Earth, its culture and relief, specifically designated to meet the requirements of air navigation.

Aircraft stand. A designated area on an apron intended to be used for parking an aircraft.

Air defence identification zone. Special designated airspace of defined dimensions within which aircraft are required to comply with special identification and/or reporting procedures additional to those related to the provision of air traffic services (ATS).

Air taxiway. A defined path on the surface established for the air taxiing of helicopters.

Air traffic service. A generic term meaning variously, flight information service, alerting service, air traffic advisory service, air traffic control service (area control service, approach control service or aerodrome control service).

Air transit route. A defined path on the surface established for the air transitting of helicopters.

Airway. A control area or portion thereof established in the form of a corridor.

Altitude. The vertical distance of a level, a point or an object considered as a point, measured from mean sea level (MSL).

Application. Manipulation and processing of data in support of user requirements (ISO 19104*).

Apron. A defined area, on a land aerodrome, intended to accommodate aircraft for purposes of loading or unloading passengers, mail or cargo, fuelling, parking or maintenance.

Area minimum altitude (AMA). The minimum altitude to be used under instrument meteorological conditions (IMC), that provides a minimum obstacle clearance within a specified area, normally formed by parallels and meridians.

Arrival routes. Routes identified in an instrument approach procedure by which aircraft may proceed from the en-route phase of flight to an initial approach fix.

ATS route. A specified route designed for channelling the flow of traffic as necessary for the provision of air traffic services.

Note 1.— The term ATS route is used to mean variously, airway, advisory route, controlled or uncontrolled route, arrival or departure route, etc.

* All ISO Standards are listed at the end of this chapter.

Note 2.— An ATS route is defined by route specifications that include an ATS route designator, the track to or from significant points (waypoints), distance between significant points, reporting requirements and, as determined by the appropriate ATS authority, the lowest safe altitude.

ATS surveillance system. A generic term meaning variously, ADS-B, PSR, SSR or any comparable ground-based system that enables the identification of aircraft.

Note.— A comparable ground-based system is one that has been demonstrated, by comparative assessment or other methodology, to have a level of safety and performance equal to or better than monopulse SSR.

Bare Earth. Surface of the Earth including bodies of water and permanent ice and snow, and excluding vegetation and man-made objects.

Calendar. Discrete temporal reference system that provides the basis for defining temporal position to a resolution of one day (ISO 19108*).

Canopy. Bare Earth supplemented by vegetation height.

Change-over point. The point at which an aircraft navigating on an ATS route segment defined by reference to very high frequency omnidirectional radio ranges is expected to transfer its primary navigational reference from the facility behind the aircraft to the next facility ahead of the aircraft.

Note.— Change-over points are established to provide the optimum balance in respect of signal strength and quality between facilities at all levels to be used and to ensure a common source of azimuth guidance for all aircraft operating along the same portion of a route segment.

Clearway. A defined rectangular area on the ground or water under the control of the appropriate authority, selected or prepared as a suitable area over which an aeroplane may make a portion of its initial climb to a specified height.

Contour line. A line on a map or chart connecting points of equal elevation.

Culture. All man-made features constructed on the surface of the Earth, such as cities, railways and canals.

Cyclic redundancy check (CRC). A mathematical algorithm applied to the digital expression of data that provides a level of assurance against loss or alteration of data.

Danger area. An airspace of defined dimensions within which activities dangerous to the flight of aircraft may exist at specified times.

Data product specification. Detailed description of a data set or data set series together with additional information that will enable it to be created, supplied to and used by another party (ISO 19131*).

Note.— A data product specification provides a description of the universe of discourse and a specification for mapping the universe of discourse to a data set. It may be used for production, sales, end-use or other purpose.

Data quality. A degree or level of confidence that the data provided meet the requirements of the data user in terms of accuracy, resolution and integrity.

Data set. Identifiable collection of data (ISO 19101*).

Data set series. Collection of data sets sharing the same product specification (ISO 19115*).

Datum. Any quantity or set of quantities that may serve as a reference or basis for the calculation of other quantities (ISO 19104*).

Digital Elevation Model (DEM). The representation of terrain surface by continuous elevation values at all intersections of a defined grid, referenced to common datum.

Note.— Digital Terrain Model (DTM) is sometimes referred to as DEM.

Displaced threshold. A threshold not located at the extremity of a runway.

Electronic aeronautical chart display. An electronic device by which flight crews are enabled to execute, in a convenient and timely manner, route planning, route monitoring and navigation by displaying required information.

Elevation. The vertical distance of a point or a level, on or affixed to the surface of the earth, measured from mean sea level.

Ellipsoid height (Geodetic height). The height related to the reference ellipsoid, measured along the ellipsoidal outer normal through the point in question.

Feature. Abstraction of real world phenomena (ISO 19101*).

Feature attribute. Characteristic of a feature (ISO 19101*).

Note.— A feature attribute has a name, a data type and a value domain associated with it.

Final approach. That part of an instrument approach procedure which commences at the specified final approach fix or point, or where such a fix or point is not specified,

a) at the end of the last procedure turn, base turn or inbound turn of a racetrack procedure, if specified; or

b) at the point of interception of the last track specified in the approach procedure; and

ends at a point in the vicinity of an aerodrome from which:

1) a landing can be made; or

2) a missed approach procedure is initiated.

Final approach and take-off area (FATO). A defined area over which the final phase of the approach manoeuvre to hover or landing is completed and from which the take-off manoeuvre is commenced. Where the FATO is to be used by performance Class 1 helicopters, the defined area includes the rejected take-off area available.

Final approach fix or point. That fix or point of an instrument approach procedure where the final approach segment commences.

Final approach segment. That segment of an instrument approach procedure in which alignment and descent for landing are accomplished.

Flight information region. An airspace of defined dimensions within which flight information service and alerting service are provided.

Flight level. A surface of constant atmospheric pressure which is related to a specific pressure datum, 1 013.2 hectopascals (hPa), and is separated from other such surfaces by specific pressure intervals.

Note 1.— A pressure type altimeter calibrated in accordance with the Standard Atmosphere:

a) when set to a QNH altimeter setting, will indicate altitude;

b) when set to a QFE altimeter setting, will indicate height above the QFE reference datum;

c) when set to a pressure of 1 013.2 hPa, may be used to indicate flight levels.

Note 2.— The terms "height" and "altitude", used in Note 1 above, indicate altimetric rather than geometric heights and altitudes.

Geodesic distance. The shortest distance between any two points on a mathematically defined ellipsoidal surface.

Geodetic datum. A minimum set of parameters required to define location and orientation of the local reference system with respect to the global reference system/frame.

Geoid. The equipotential surface in the gravity field of the Earth which coincides with the undisturbed mean sea level (MSL) extended continuously through the continents.

Note.— The geoid is irregular in shape because of local gravitational disturbances (wind tides, salinity, current, etc.) and the direction of gravity is perpendicular to the geoid at every point.

Geoid undulation. The distance of the geoid above (positive) or below (negative) the mathematical reference ellipsoid.

Note.— In respect to the World Geodetic System — 1984 (WGS-84) defined ellipsoid, the difference between the WGS-84 ellipsoidal height and orthometric height represents WGS-84 geoid undulation.

Glide path. A descent profile determined for vertical guidance during a final approach.

Gregorian calendar. Calendar in general use; first introduced in 1582 to define a year that more closely approximates the tropical year than the Julian calendar (ISO 19108*).

Note.— In the Gregorian calendar, common years have 365 days and leap years 366 days divided into twelve sequential months.

Height. The vertical distance of a level, a point or an object considered as a point, measured from a specified datum.

Helicopter stand. An aircraft stand which provides for parking a helicopter and, where air taxiing operations are contemplated, the helicopter touchdown and lift-off.

Heliport. An aerodrome or a defined area on a structure intended to be used wholly or in part for the arrival, departure and surface movement of helicopters.

Holding procedure. A predetermined manoeuvre which keeps an aircraft within a specified airspace while awaiting further clearance.

Hot spot. A location on an aerodrome movement area with a history or potential risk of collision or runway incursion, and where heightened attention by pilots/drivers is necessary.

Human Factors principles. Principles which apply to aeronautical design, certification, training, operations and maintenance and which seek safe interface between the human and other system components by proper consideration to human performance.

Hypsometric tints. A succession of shades or colour gradations used to depict ranges of elevation.

Initial approach segment. That segment of an instrument approach procedure between the initial approach fix and the intermediate approach fix or, where applicable, the final approach fix or point.

Instrument approach procedure. A series of predetermined manoeuvres by reference to flight instruments with specified protection from obstacles from the initial approach fix, or where applicable, from the beginning of a defined arrival route to a point from which a landing can be completed and thereafter, if a landing is not completed, to a position at which holding or en-route obstacle clearance criteria apply.

Intermediate approach segment. That segment of an instrument approach procedure between either the intermediate approach fix and the final approach fix or point, or between the end of a reversal, racetrack or dead reckoning track procedure and the final approach fix or point, as appropriate.

Intermediate holding position. A designated position intended for traffic control at which taxiing aircraft and vehicles shall stop and hold until further cleared to proceed, when so instructed by the aerodrome control tower.

Isogonal. A line on a map or chart on which all points have the same magnetic variation for a specified epoch.

Isogriv. A line on a map or chart which joins points of equal angular difference between the North of the navigation grid and Magnetic North.

Landing area. That part of a movement area intended for the landing or take-off of aircraft.

Landing direction indicator. A device to indicate visually the direction currently designated for landing and for take-off.

Level. A generic term relating to the vertical position of an aircraft in flight and meaning variously, height, altitude or flight level.

Logon address. A specified code used for data link logon to an ATS unit.

Magnetic variation. The angular difference between True North and Magnetic North.

Note.— The value given indicates whether the angular difference is East or West of True North.

Manoeuvring area. That part of an aerodrome to be used for the take-off, landing and taxiing of aircraft, excluding aprons.

Marking. A symbol or group of symbols displayed on the surface of the movement area in order to convey aeronautical information.

Metadata. Data about data (ISO 19115*).

Note.— Data that describes and documents data.

Minimum en-route altitude (MEA). The altitude for an en-route segment that provides adequate reception of relevant navigation facilities and ATS communications, complies with the airspace structure and provides the required obstacle clearance.

Minimum obstacle clearance altitude (MOCA). The minimum altitude for a defined segment of flight that provides the required obstacle clearance.

Minimum sector altitude. The lowest altitude which may be used which will provide a minimum clearance of 300 m (1 000 ft) above all objects located in an area contained within a sector of a circle of 46 km (25 NM) radius centred on a radio aid to navigation.

Missed approach point (MAPt). That point in an instrument approach procedure at or before which the prescribed missed approach procedure must be initiated in order to ensure that the minimum obstacle clearance is not infringed.

Missed approach procedure. The procedure to be followed if the approach cannot be continued.

Movement area. That part of an aerodrome to be used for the take-off, landing and taxiing of aircraft, consisting of the manoeuvring area and the apron(s).

Obstacle. All fixed (whether temporary or permanent) and mobile objects, or parts thereof, that are located on an area intended for the surface movement of aircraft or that extend above a defined surface intended to protect aircraft in flight.

Note.— The term obstacle is used in this Annex solely for the purpose of specifying the charting of objects that are considered a potential hazard to the safe passage of aircraft in the type of operation for which the individual chart series is designed.

Obstacle clearance altitude (OCA) or obstacle clearance height (OCH). The lowest altitude or the lowest height above the elevation of the relevant runway threshold or the aerodrome elevation as applicable, used in establishing compliance with appropriate obstacle clearance criteria.

Note 1.— Obstacle clearance altitude is referenced to mean sea level and obstacle clearance height is referenced to the threshold elevation or in the case of non-precision approaches to the aerodrome elevation or the threshold elevation if that is more than 2 m (7 ft) below the aerodrome elevation. An obstacle clearance height for a circling approach is referenced to the aerodrome elevation.

Note 2.— For convenience when both expressions are used they may be written in the form "obstacle clearance altitude/height" and abbreviated "OCA/H".

Note 3.— See Procedures for Air Navigation Services — Aircraft Operations *(Doc 8168), Volume I, Part I, Section 4, Chapter 1, 1.5, and Volume II, Part I, Section 4, Chapter 5, 5.4, for specific applications of this definition.*

Obstacle free zone (OFZ). The airspace above the inner approach surface, inner transitional surfaces, and balked landing surface and that portion of the strip bounded by these surfaces, which is not penetrated by any fixed obstacle other than a low-mass and frangibly mounted one required for air navigation purposes.

Orthometric height. Height of a point related to the geoid, generally presented as an MSL elevation.

Point light. A luminous signal appearing without perceptible length.

Portrayal. Presentation of information to humans (ISO 19117*).

Position (geographical). Set of coordinates (latitude and longitude) referenced to the mathematical reference ellipsoid which define the position of a point on the surface of the Earth.

Precision approach procedure. An instrument approach procedure utilizing azimuth and glide path information provided by ILS or PAR.

Procedure altitude/height. A specified altitude/height flown operationally at or above the minimum altitude/height and established to accommodate a stabilized descent at a prescribed descent gradient/angle in the intermediate/final approach segment.

Procedure turn. A manoeuvre in which a turn is made away from a designated track followed by a turn in the opposite direction to permit the aircraft to intercept and proceed along the reciprocal of the designated track.

Note 1.— Procedure turns are designated "left" or "right" according to the direction of the initial turn.

Note 2.— Procedure turns may be designated as being made either in level flight or while descending, according to the circumstances of each individual procedure.

Prohibited area. An airspace of defined dimensions, above the land areas or territorial waters of a State, within which the flight of aircraft is prohibited.

Relief. The inequalities in elevation of the surface of the Earth represented on aeronautical charts by contours, hypsometric tints, shading or spot elevations.

Reporting point. A specified geographical location in relation to which the position of an aircraft can be reported.

Required navigation performance (RNP). A statement of the navigation performance necessary for operation within a defined airspace.

Note.— Navigation performance and requirements are defined for a particular RNP type and/or application.

Resolution. A number of units or digits to which a measured or calculated value is expressed and used.

Restricted area. An airspace of defined dimensions, above the land areas or territorial waters of a State, within which the flight of aircraft is restricted in accordance with certain specified conditions.

Reversal procedure. A procedure designed to enable aircraft to reverse direction during the initial approach segment of an instrument approach procedure. The sequence may include procedure turns or base turns.

RNP type. A containment value expressed as a distance in nautical miles from the intended position within which flights would be for at least 95 per cent of the total flying time.

Example.— RNP 4 represents a navigation accuracy of plus or minus 7.4 km (4 NM) on a 95 per cent containment basis.

Runway. A defined rectangular area on a land aerodrome prepared for the landing and take-off of aircraft.

Runway-holding position. A designated position intended to protect a runway, an obstacle limitation surface, or an ILS/MLS critical/sensitive area at which taxiing aircraft and vehicles shall stop and hold, unless otherwise authorized by the aerodrome control tower.

Note.— In radiotelephony phraseologies, the expression "holding point" is used to designate the runway-holding position.

Runway strip. A defined area including the runway and stopway, if provided, intended:

a) to reduce the risk of damage to aircraft running off a runway; and

b) to protect aircraft flying over it during take-off or landing operations.

Runway visual range (RVR). The range over which the pilot of an aircraft on the centre line of a runway can see the runway surface markings or the lights delineating the runway or identifying its centre line.

Shoulder. An area adjacent to the edge of a pavement so prepared as to provide a transition between the pavement and the adjacent surface.

Significant point. A specified geographical location used in defining an ATS route or the flight path of an aircraft and for other navigation and ATS purposes.

Stopway. A defined rectangular area on the ground at the end of take-off run available prepared as a suitable area in which an aircraft can be stopped in the case of an abandoned take-off.

Taxiing. Movement of an aircraft on the surface of an aerodrome under its own power, excluding take-off and landing.

Taxiway. A defined path on a land aerodrome established for the taxiing of aircraft and intended to provide a link between one part of the aerodrome and another, including:

a) *Aircraft stand taxilane.* A portion of an apron designated as a taxiway and intended to provide access to aircraft stands only.

b) *Apron taxiway.* A portion of a taxiway system located on an apron and intended to provide a through taxi route across the apron.

c) *Rapid exit taxiway.* A taxiway connected to a runway at an acute angle and designed to allow landing aeroplanes to turn off at higher speeds than are achieved on other exit taxiways thereby minimizing runway occupancy times.

Terminal arrival altitude (TAA). The lowest altitude that will provide a minimum clearance of 300 m (1 000 ft) above all objects located in an arc of a circle defined by a 46-km (25 NM) radius centred on the initial approach fix (IAF), or where there is no IAF on the intermediate approach fix (IF), delimited by straight lines joining the extremity of the arc to the IF. The combined TAAs associated with an approach procedure shall account for an area of 360 degrees around the IF.

Terrain. The surface of the Earth containing naturally occurring features such as mountains, hills, ridges, valleys, bodies of water, permanent ice and snow, and excluding obstacles.

Note.— In practical terms, depending on the method of data collection, terrain represents the continuous surface that exists at the bare Earth, the top of the canopy or something in-between, also known as "first reflective surface".

Threshold. The beginning of that portion of the runway usable for landing.

Touchdown and lift-off area (TLOF). A load bearing area on which a helicopter may touch down or lift off.

Touchdown zone. The portion of a runway, beyond the threshold, where it is intended landing aeroplanes first contact the runway.

Track. The projection on the earth's surface of the path of an aircraft, the direction of which path at any point is usually expressed in degrees from North (true, magnetic or grid).

Transition altitude. The altitude at or below which the vertical position of an aircraft is controlled by reference to altitudes.

Vectoring. Provision of navigational guidance to aircraft in the form of specific headings, based on the use of an ATS surveillance system.

Visual approach procedure. A series of predetermined manoeuvres by visual reference, from the initial approach fix, or where applicable, from the beginning of a defined arrival route to a point from which a landing can be completed and thereafter, if a landing is not completed, a go-around procedure can be carried-out.

Waypoint. A specified geographical location used to define an area navigation route or the flight path of an aircraft employing area navigation. Waypoints are identified as either:

Fly-by waypoint. A waypoint which requires turn anticipation to allow tangential interception of the next segment of a route or procedure; or

Flyover waypoint. A waypoint at which a turn is initiated in order to join the next segment of a route or procedure.

1.2 Applicability

1.2.1 The specifications in this Annex are applicable on and after 1 November 2001.

Note.— Chapter 20 Electronic Aeronautical Chart Display — ICAO is applicable on and after 28 November 2002.

1.2.2 All charts coming within the scope of this Annex and bearing the aeronautical information date of 1 November 2001 or later shall conform to the Standards relevant to the particular chart.

1.2.2.1 **Recommendation.—** *All such charts should in addition conform to the Recommended Practices relevant to the particular chart.*

1.3 Availability

1.3.1 *Information.* A Contracting State shall on request by another Contracting State provide all information relating to its own territory that is necessary to enable the Standards of this Annex to be met.

1.3.2 *Charts.* Contracting States shall, when so specified, ensure the availability of charts in whichever of the following ways is appropriate for a particular chart or single sheet of a chart series.

Note.— The availability of charts includes specified electronic charts.

1.3.2.1 For any chart or single sheet of a chart series entirely contained within the territory of a Contracting State, the State having jurisdiction over the territory shall either:

1) produce the chart or sheet itself; or

2) arrange for its production by another Contracting State or by an agency; or

3) provide another Contracting State prepared to accept an obligation to produce the chart or sheet with the data necessary for its production.

1.3.2.2 For any chart or single sheet of a chart series which includes the territory of two or more Contracting States, the States having jurisdiction over the territory so included shall determine the manner in which the chart or sheet will be made available. This determination shall be made with due regard being given to regional air navigation agreements and to any programme of allocation established by the Council of ICAO.

Note.— The phrase "regional air navigation agreements" refers to the agreements approved by the Council of ICAO normally on the advice of regional air navigation meetings.

1.3.3 A Contracting State shall take all reasonable measures to ensure that the information it provides and the aeronautical charts made available are adequate and accurate and that they are maintained up to date by an adequate revision service.

1.3.4 **Recommendation.—** *To improve worldwide dissemination of information on new charting techniques and production methods, appropriate charts produced by Contracting States should be made available without charge to other Contracting States on request on a reciprocal basis.*

Note.— Guidance material on the preparation of aeronautical charts, including sample formats, is contained in the Aeronautical Chart Manual *(Doc 8697).*

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* ISO Standard
19101, *Geographic information — Reference model*
19104, *Geographic information — Terminology*
19108, *Geographic information — Temporal schema*
19115, *Geographic information — Metadata*
19117, *Geographic information — Portrayal*
19131, *Geographic information — Data product specifications*

CHAPTER 3. AERODROME OBSTACLE CHART — ICAO TYPE A (OPERATING LIMITATIONS)

3.1 Function

This chart, in combination with the relevant information published in the AIP, shall provide the data necessary to enable an operator to comply with the operating limitations of Annex 6, Part I, Chapter 5, and Part III, Section II, Chapter 3.

3.2 Availability

3.2.1 Aerodrome Obstacle Charts — ICAO Type A (Operating Limitations) shall be made available in the manner prescribed in 1.3.2 for all aerodromes regularly used by international civil aviation, except for those aerodromes where there are no obstacles in the take-off flight path areas or where the Aerodrome Terrain and Obstacle Chart — ICAO (Electronic) is provided in accordance with Chapter 5.

3.2.2 Where a chart is not required because no obstacles exist in the take-off flight path area, a notification to this effect shall be published in the AIP.

3.3 Units of measurement

3.3.1 Elevations shall be shown to the nearest half-metre or to the nearest foot.

3.3.2 Linear dimensions shall be shown to the nearest half-metre.

3.4 Coverage and scale

3.4.1 The extent of each plan shall be sufficient to cover all obstacles.

Note.— Isolated distant obstacles that would unnecessarily increase the sheet size may be indicated by the appropriate symbol and an arrow, provided that the distance and bearing from the end of the runway farthest removed and the elevation are given.

3.4.2 The horizontal scale shall be within the range of 1:10 000 to 1:15 000.

3.4.3 **Recommendation.—** *The horizontal scale should be 1:10 000.*

Note.— When the production of the charts would be expedited thereby, a scale of 1:20 000 may be used.

3.4.4 The vertical scale shall be ten times the horizontal scale.

3.4.5 *Linear scales.* Horizontal and vertical linear scales showing both metres and feet shall be included in the charts.

3.5 Format

3.5.1 The charts shall depict a plan and profile of each runway, any associated stopway or clearway, the take-off flight path area and obstacles.

3.5.2 The profile for each runway, stopway, clearway and the obstacles in the take-off flight path area shall be shown above its corresponding plan. The profile of an alternative take-off flight path area shall comprise a linear projection of the full take-off flight path and shall be disposed above its corresponding plan in the manner most suited to the ready interpretation of the information.

3.5.3 A profile grid shall be ruled over the entire profile area exclusive of the runway. The zero for vertical coordinates shall be mean sea level. The zero for horizontal coordinates shall be the end of the runway furthest from the take-off flight path area concerned. Graduation marks indicating the subdivisions of intervals shall be shown along the base of the grid and along the vertical margins.

3.5.3.1 **Recommendation.—** *The vertical grid should have intervals of 30 m (100 ft) and the horizontal grid should have intervals of 300 m (1 000 ft).*

3.5.4 The chart shall include:

a) a box for recording the operational data specified in 3.8.3;

b) a box for recording amendments and dates thereof.

3.6 Identification

The chart shall be identified by the name of the country in which the aerodrome is located, the name of the city or town, or area, which the aerodrome serves, the name of the aerodrome and the designator(s) of the runway(s).

3.7 Magnetic variation

The magnetic variation to the nearest degree and date of information shall be indicated.

3.8 Aeronautical data

3.8.1 Obstacles

3.8.1.1 Objects in the take-off flight path area which project above a plane surface having a 1.2 per cent slope and having a common origin with the take-off flight path area, shall be regarded as obstacles, except that obstacles lying wholly below the shadow of other obstacles as defined in 3.8.1.2 need not be shown. Mobile objects such as boats, trains and trucks, which may project above the 1.2 per cent plane, shall be considered obstacles but shall not be considered as being capable of creating a shadow.

3.8.1.2 The shadow of an obstacle is considered to be a plane surface originating at a horizontal line passing through the top of the obstacle at right angles to the centre line of the take-off flight path area. The plane covers the complete width of the take-off flight path area and extends to the plane defined in 3.8.1.1 or to the next higher obstacle if it occurs first. For the first 300 m (1 000 ft) of the take-off flight path area, the shadow planes are horizontal and beyond this point such planes have an upward slope of 1.2 per cent.

3.8.1.3 If the obstacle creating a shadow is likely to be removed, objects that would become obstacles by its removal shall be shown.

3.8.2 Take-off flight path area

3.8.2.1 The take-off flight path area consists of a quadrilateral area on the surface of the earth lying directly below, and symmetrically disposed about, the take-off flight path. This area has the following characteristics:

a) it commences at the end of the area declared suitable for take-off (i.e. at the end of the runway or clearway as appropriate);

b) its width at the point of origin is 180 m (600 ft) and this width increases at the rate of 0.25D to a maximum of 1 800 m (6 000 ft), where D is the distance from the point of origin;

c) it extends to the point beyond which no obstacles exist or to a distance of 10.0 km (5.4 NM), whichever is the lesser.

3.8.2.2 For runways serving aircraft having operating limitations which do not preclude the use of a take-off flight path gradient of less than 1.2 per cent, the extent of the take-off flight path area specified in 3.8.2.1 c) shall be increased to not less than 12.0 km (6.5 NM) and the slope of the plane surface specified in 3.8.1.1 and 3.8.1.2 shall be reduced to 1.0 per cent or less.

Note.— When a 1.0 per cent survey plane touches no obstacles, this plane may be lowered until it touches the first obstacle.

3.8.3 Declared distances

3.8.3.1 The following information for each direction of each runway shall be entered in the space provided:

a) take-off run available;

b) accelerate-stop distance available;

c) take-off distance available;

d) landing distance available.

Note.— In Annex 14, Volume I, Attachment A, Section 3, guidance is given on declared distances.

3.8.3.2 **Recommendation.—** *Where a declared distance is not provided because a runway is usable in one direction only, that runway should be identified as "not usable for take-off, landing or both".*

3.8.4 Plan and profile views

3.8.4.1 The plan view shall show:

a) the outline of the runways by a solid line, including the length and width, the magnetic bearing to the nearest degree, and the runway number;

b) the outline of the clearways by a broken line, including the length and identification as such;

c) take-off flight path areas by a dashed line and the centre line by a fine line consisting of short and long dashes;

d) alternative take-off flight path areas. When alternative take-off flight path areas not centred on the extension of the runway centre line are shown, notes shall be provided explaining the significance of such areas;

e) obstacles, including:

   1) the exact location of each obstacle together with a symbol indicative of its type;

   2) the elevation and identification of each obstacle;

   3) the limits of penetration of obstacles of large extent in a distinctive manner identified in the legend.

CHAPTER 4. AERODROME OBSTACLE CHART — ICAO TYPE B

4.1 Function

This chart shall provide information to satisfy the following functions:

a) the determination of minimum safe altitudes/heights including those for circling procedures;

b) the determination of procedures for use in the event of an emergency during take-off or landing;

c) the application of obstacle clearing and marking criteria; and

d) the provision of source material for aeronautical charts.

4.2 Availability

4.2.1 **Recommendation.—** *Aerodrome Obstacle Charts — ICAO Type B should be made available, in the manner prescribed in 1.3.2, for all aerodromes regularly used by international civil aviation except for those aerodromes where the Aerodrome Terrain and Obstacle Chart — ICAO (Electronic) is provided in accordance with Chapter 5.*

4.2.2 When a chart combining the specifications of Chapters 3 and 4 is made available, it shall be called the Aerodrome Obstacle Chart — ICAO (Comprehensive).

4.3 Units of measurement

4.3.1 Elevations shall be shown to the nearest half-metre or to the nearest foot.

4.3.2 Linear dimensions shall be shown to the nearest half-metre.

4.4 Coverage and scale

4.4.1 The extent of each plan shall be sufficient to cover all obstacles.

Note.— Isolated distant obstacles that would unnecessarily increase the sheet size may be indicated by the appropriate symbol and an arrow, provided that the distance and bearing from the aerodrome reference point and elevation are given.

4.4.2 The horizontal scale shall be within the range of 1:10 000 to 1:20 000.

4.4.3 A horizontal linear scale showing both metres and feet shall be included in the chart. When necessary, a linear scale for kilometres and a linear scale for nautical miles shall also be shown.

4.5 Format

The charts shall include:

a) any necessary explanation of the projection used;

b) any necessary identification of the grid used;

c) a notation indicating that obstacles are those which penetrate the surfaces specified in Annex 14, Volume I, Chapter 4;

d) a box for recording amendments and dates thereof;

e) outside the neat line, every minute of latitude and longitude marked in degrees and minutes.

Note.— Lines of latitude and longitude may be shown across the face of the chart.

4.6 Identification

The chart shall be identified by the name of the country in which the aerodrome is located, the name of the city or town, or area, which the aerodrome serves and the name of the aerodrome.

4.7 Culture and topography

4.7.1 Drainage and hydrographic details shall be kept to a minimum.

4.7.2 Buildings and other salient features associated with the aerodrome shall be shown. Wherever possible, they shall be shown to scale.

4.7.3 All objects, either cultural or natural, that project above the take-off and approach surfaces specified in 4.9 or the clearing and marking surfaces specified in Annex 14, Volume I, Chapter 4, shall be shown.

4.7.4 Roads and railroads within the take-off and approach area, and less than 600 m (2 000 ft) from the end of the runway or runway extensions, shall be shown.

Note.— Geographical names of features may be shown if of significance.

4.8 Magnetic variation

The chart shall show a compass rose orientated to the True North, or a North point, showing the magnetic variation to the nearest degree with the date of magnetic information and annual change.

4.9 Aeronautical data

4.9.1 The charts shall show:

a) the aerodrome reference point and its geographical coordinates in degrees, minutes and seconds;

b) the outline of the runways by a solid line;

c) the length and width of the runway;

d) the magnetic bearing to the nearest degree of the runway and the runway number;

e) the elevation of the runway centre line at each end of the runway, at the stopway, at the origin of each take-off and approach area, and at each significant change of slope of runway and stopway;

f) taxiways, aprons and parking areas identified as such, and the outlines by a solid line;

g) stopways identified as such and depicted by a broken line;

h) the length of each stopway;

i) clearways identified as such and depicted by a broken line;

j) the length of each clearway;

k) take-off and approach surfaces identified as such and depicted by a broken line;

l) take-off and approach areas;

Note.— The take-off area is described in 3.8.2.1. The approach area consists of an area on the surface of the earth lying directly below the approach surface as specified in Annex 14, Volume I, Chapter 4.

m) obstacles at their exact location, including:

1) a symbol indicative of their type;

2) elevation;

3) identification;

4) limits of penetration of large extent in a distinctive manner identified in the legend;

Note.— This does not exclude the necessity for indicating critical spot elevations within the take-off and approach areas.

n) any additional obstacles, as determined by 3.8.1.1 including the obstacles in the shadow of an obstacle, which would otherwise be exempted.

Note.— The specifications in Annex 14, Volume I, Chapter 4, are minimum requirements. Where the competent authority has established lower surfaces, they may be used in the determination of obstacles.

4.9.1.1 **Recommendation.—** *The nature of the runway and stopway surfaces should be given.*

4.9.1.2 **Recommendation.—** *Wherever practicable, the highest object or obstacle between adjacent approach areas within a radius of 5 000 m (15 000 ft) from the aerodrome reference point should be indicated in a prominent manner.*

4.9.1.3 **Recommendation.—** *The extent of tree areas and relief features, part of which constitute obstacles, should be shown.*

4.10 Accuracy

4.10.1 The order of accuracy attained shall be shown on the chart.

4.10.2 **Recommendation.—** *The horizontal dimensions and the elevations of the movement area, stopways and clearways to be printed on the chart should be determined to the nearest 0.5 m (1 ft).*

CHAPTER 5. AERODROME TERRAIN AND OBSTACLE CHART — ICAO (ELECTRONIC)

5.1 Function

This electronic chart shall portray the terrain and obstacle data in combination with aeronautical data, as appropriate, necessary to:

a) enable an operator to comply with the operating limitations of Annex 6, Part I, Chapter 5, and Part III, Section II, Chapter 3 by developing contingency procedures for use in the event of an emergency during a missed approach or take-off, and by performing aircraft operating limitations analysis; and

b) support the following air navigation applications:

   1) instrument procedure design (including circling procedure);

   2) aerodrome obstacle restriction and removal; and

   3) provision of source data for the production of other aeronautical charts.

5.2 Availability

5.2.1 From 18 November 2010, Aerodrome Terrain and Obstacle Charts — ICAO (Electronic) shall be made available in the manner prescribed in 1.3.2 for all aerodromes regularly used by international civil aviation.

Note 1.— Where the Aerodrome Terrain and Obstacle Chart — ICAO (Electronic) is made available, the Aerodrome Obstacle Chart — ICAO Type A (Operating Limitations) and the Aerodrome Obstacle Chart — ICAO Type B are not required (see 3.2.1 and 4.2.1).

Note 2.— The information required by the Precision Approach Terrain Chart — ICAO may be provided in the Aerodrome Terrain and Obstacle Chart — ICAO (Electronic). Where this occurs the Precision Approach Terrain Chart — ICAO is not required (see 6.2.1).

5.2.2 **Recommendation.—** *Aerodrome Terrain and Obstacle Charts — ICAO (Electronic) should be made available in the manner prescribed in 1.3.2 for all aerodromes regularly used by international civil aviation.*

5.2.3 The Aerodrome Terrain and Obstacle Chart — ICAO (Electronic) shall also be made available in hard copy format upon request.

Note.— For specifications regarding hard copy printed output see 5.7.7.

5.2.4 The ISO 19100 series of standards for geographic information shall be used as a general data modelling framework.

Note.— The use of the ISO 19100 series of standards for geographic information supports the interchange and use of the Aerodrome Terrain and Obstacle Chart — ICAO (Electronic) among different users.

5.3 Identification

Electronic charts shall be identified by the name of the country in which the aerodrome is located, the name of the city or town which the aerodrome serves, and the name of the aerodrome.

5.4 Chart coverage

The extent of each chart shall be sufficient to cover Area 2 as specified in Annex 15, 10.2.

5.5 Chart content

5.5.1 General

5.5.1.1 When developing computer graphic applications that are used to portray features on the chart, the relationships between features, feature attributes, and the underlying spatial geometry and associated topological relationships shall be specified by an application schema. Portrayed information shall be provided on the basis of portrayal specifications applied according to defined portrayal rules. Portrayal specifications and portrayal rules shall not be part of the data set. Portrayal rules shall be stored in a portrayal catalogue which shall make reference to separately-stored portrayal specifications.

Note.— ISO Standard 19117 contains a definition of the schema describing the portrayal mechanism of feature-based geographic information, while ISO Standard 19109 contains rules for application schema. Spatial geometry and associated topological relationships are defined in ISO Standard 19107.

5.5.1.2 Symbols used to portray features shall be in accordance with 2.4 and Appendix 2 — ICAO Chart Symbols.

5.5.2 Terrain feature

5.5.2.1 The terrain feature, and associated attributes, to be portrayed and database linked to the chart shall be based on the electronic terrain data sets which satisfy the requirements of Annex 15, Chapter 10 and Appendix 8.

5.5.2.2 The terrain feature shall be portrayed in a manner that provides an effective general impression of a terrain. This shall be a representation of terrain surface by continuous elevation values at all intersections of the defined grid, also known as the Digital Elevation Model (DEM).

Note.— In accordance with Annex 15, Chapter 10 and Appendix 8, the DEM for Area 2 post spacing (grid) is specified at 1 arc second (approximately 30 m).

5.5.2.3 **Recommendation.—** *Representation of terrain surface should be provided as a selectable layer of contour lines in addition to the DEM.*

5.5.2.4 **Recommendation.—** *An ortho-rectified image which matches the features on the DEM with features on the overlying image should be used to enhance the DEM. The image should be provided as a separate selectable layer.*

5.5.2.5 The portrayed terrain feature shall be linked to the following associated attributes in the database(s):

a) horizontal positions of grid points in geographic coordinates and elevations of the points;

b) surface type;

c) contour line values, if provided; and

d) names of cities, towns and other prominent topographic features.

5.5.2.6 **Recommendation.—** *Other terrain attributes specified in Annex 15, Appendix 8, Table A8-3 and provided in the database(s) should be linked to the portrayed terrain feature.*

5.5.3 Obstacle features

5.5.3.1 Obstacle features, and associated attributes, portrayed or database-linked to the chart shall be based on electronic obstacle data sets which satisfy the requirements of Annex 15, Chapter 10 and Appendix 8.

5.5.3.2 Each obstacle shall be portrayed by an appropriate symbol and obstacle identifier.

5.5.3.3 The portrayed obstacle feature shall be linked to the following associated attributes in the database(s):

a) horizontal position in geographic coordinates and associated elevation;

b) obstacle type; and

c) obstacle extent, if appropriate.

5.5.3.4 **Recommendation.—** *Other obstacle attributes specified in Annex 15, Appendix 8, Table A8-4 and provided in the database(s) should be linked to the portrayed obstacle feature.*

5.5.4 Aerodrome features

5.5.4.1 Aerodrome features, and associated attributes, portrayed and database-linked to the chart shall be based on aerodrome data which satisfy the requirements of Annex 14, Volume I, Appendix 5 and Annex 15, Appendix 7.

5.5.4.2 The following aerodrome features shall be portrayed by an appropriate symbol:

a) aerodrome reference point;

b) runway(s), with designation numbers, and if available, stopway(s) and clearway(s); and

c) taxiways, aprons, large buildings and other prominent aerodrome features.

5.5.4.3 The portrayed aerodrome feature shall be linked to the following associated attributes in the database(s):

a) geographical coordinates of the aerodrome reference point;

b) aerodrome magnetic variation, year of information and annual change;

Note.— Magnetic variation may be database-linked to the aerodrome reference point.

c) length and width of runway(s), stopway(s) and clearway(s);

d) type of surface of runway(s) and stopway(s);

e) magnetic bearings of the runway(s) to the nearest degree;

f) elevations at each end of runway(s), stopway(s) and clearway(s), and at each significant change in slope of runway(s) and stopway(s);

g) declared distances for each runway direction, or the abbreviation "NU" where a runway direction cannot be used for take-off or landing or both.

Note.— Annex 14, Volume I, Attachment A, provides guidance on declared distances.

5.5.5 Radio navigation aid features

Each radio navigation aid feature located within the chart coverage shall be portrayed by an appropriate symbol.

Note.— Navigation aid feature attributes may be linked to the portrayed navigation aid features in the database(s).

5.6 Accuracy and resolution

5.6.1 The order of accuracy of aeronautical data shall be as specified in Annex 11, Appendix 5 and Annex 14, Volume I, Appendix 5 and Volume II, Appendix 1. The order of accuracy of terrain and obstacle data shall be as specified in Annex 15, Appendix 8.

5.6.2 The aeronautical data resolution shall be as specified in Annex 15, Appendix 7 while the resolution for terrain and obstacle data shall be as specified in Annex 15, Appendix 8.

5.7 Electronic functionality

5.7.1 It shall be possible to vary the scale at which the chart is viewed. Symbols and text size shall vary with chart scale to enhance readability.

5.7.2 Information on the chart shall be geo-referenced, and it shall be possible to determine cursor position to at least the nearest second.

5.7.3 The chart shall be compatible with widely available desktop computer hardware, software and media.

5.7.4 **Recommendation.—** *The chart should include its own "reader" software.*

5.7.5 It shall not be possible to remove information from the chart without an authorized update.

5.7.6 When, due to congestion of information, the details necessary to support the function of the chart cannot be shown with sufficient clarity on a single comprehensive chart view, selectable information layers shall be provided to allow for the customized combination of information.

Note.— An electronic chart format with user-selectable information layers is the preferred method of presentation for most aerodrome features.

5.7.7 It shall be possible to print the chart in hard copy format according to the content specifications and scale determined by the user.

Note 1.— Printed output may consist of "tiled" sheets or specific selected areas according to user requirements.

Note 2.— Feature attribute information available through database link may be supplied separately on appropriately referenced sheets.

5.8 Chart data product specifications

5.8.1 A comprehensive statement of the data sets comprising the chart shall be provided in the form of data product specifications on which basis air navigation users will be able to evaluate the chart data product and determine whether it fulfils the requirements for its intended use (application).

5.8.2 The chart data product specifications shall include an overview, a specification scope, a data product identification, data content information, the reference systems used, the data quality requirements, and information on data capture, data maintenance, data portrayal, data product delivery, as well as any additional information available, and metadata.

Note.— ISO Standard 19131 specifies the requirements and outline of data product specifications for geographic information.

5.8.3 The overview of the chart data product specifications shall provide an informal description of the product and shall contain general information about the data product. The specification scope of the chart data product specifications shall contain the spatial (horizontal) extent of the chart coverage. The chart data product identification shall include the title of the product, a brief narrative summary of the content and purpose, and a description of the geographic area covered by the chart.

5.8.4 The data content of the chart data product specifications shall clearly identify the type of coverage and/or imagery and shall provide a narrative description of each.

Note.— ISO Standard 19123 contains schema for coverage geometry and functions.

5.8.5 The chart data product specifications shall include information that defines the reference systems used. This shall include the spatial reference system (horizontal and vertical) and, if appropriate, temporal reference system. The chart data product specifications shall identify the data quality requirements. This shall include a statement on acceptable conformance quality levels and corresponding data quality measures. This statement shall cover all the data quality elements and data quality sub-elements, even if only to state that a specific data quality element or sub-element is not applicable.

Note.— ISO Standard 19113 contains quality principles for geographic information while ISO Standard 19114 covers quality evaluation procedures.

5.8.6 The chart data product specifications shall include a data capture statement which shall be a general description of the sources and of processes applied for the capture of chart data. The principles and criteria applied in the maintenance of the chart shall also be provided in the chart data product specifications, including the frequency with which the chart product is updated. Of particular importance shall be the maintenance information of obstacle data sets included on the chart and an indication of the principles, methods and criteria applied for obstacle data maintenance.

5.8.7 The chart data product specifications shall contain information on how data are portrayed on the chart, as detailed in 5.5.1.1. The chart data product specifications shall also contain data product delivery information which shall include delivery formats and delivery medium information.

5.8.8 The core chart metadata elements shall be included in the chart data product specifications. Any additional metadata items required to be supplied shall be stated in the product specifications together with the format and encoding of the metadata.

Note 1.— ISO Standard 19115 specifies requirements for geographic information metadata.

Note 2.— The chart data product specifications document the chart data product which is implemented as data set. Those data sets are described by metadata.

CHAPTER 6. PRECISION APPROACH TERRAIN CHART — ICAO

6.1 Function

The chart shall provide detailed terrain profile information within a defined portion of the final approach so as to enable aircraft operating agencies to assess the effect of the terrain on decision height determination by the use of radio altimeters.

6.2 Availability

6.2.1 The Precision Approach Terrain Chart — ICAO shall be made available for all precision approach runways Categories II and III at aerodromes used by international civil aviation, except where the requisite information is provided in the Aerodrome Terrain and Obstacle Chart — ICAO (Electronic) in accordance with Chapter 5.

6.2.2 The Precision Approach Terrain Chart — ICAO shall be revised whenever any significant change occurs.

6.3 Scale

6.3.1 **Recommendation.—** *The horizontal scale should be 1:2 500, and the vertical scale 1:500.*

6.3.2 **Recommendation.—** *When the chart includes a profile of the terrain to a distance greater than 900 m (3 000 ft) from the runway threshold, the horizontal scale should be 1:5 000.*

6.4 Identification

The chart shall be identified by the name of the country in which the aerodrome is located, the name of the city or town, or area, which the aerodrome serves, the name of the aerodrome and the designator of the runway.

6.5 Plan and profile information

6.5.1 The chart shall include:

1) a plan showing contours at 1 m (3 ft) intervals in the area 60 m (200 ft) on either side of the extended centre line of the runway, to the same distance as the profile, the contours to be related to the runway threshold;

2) an indication where the terrain or any object thereon, within the plan defined in 1) above, differs by ±3 m (10 ft) in height from the centre line profile and is likely to affect a radio altimeter;

3) a profile of the terrain to a distance of 900 m (3 000 ft) from the threshold along the extended centre line of the runway.

6.5.2 **Recommendation.—** *Where the terrain at a distance greater than 900 m (3 000 ft) from the runway threshold is mountainous or otherwise significant to users of the chart, the profile of the terrain should be shown to a distance not exceeding 2 000 m (6 500 ft) from the runway threshold.*

6.5.3 **Recommendation.—** *The ILS reference datum height should be shown to the nearest half metre or foot.*

CHAPTER 7. ENROUTE CHART — ICAO

7.1 Function

This chart shall provide flight crews with information to facilitate navigation along ATS routes in compliance with air traffic services procedures.

Note.— Simplified versions of these charts are appropriate for inclusion in Aeronautical Information Publications to complement the tabulation of communication and navigation facilities.

7.2 Availability

7.2.1 The Enroute Chart — ICAO shall be made available in the manner prescribed in 1.3.2 for all areas where flight information regions have been established.

Note.— Under certain conditions, an Area Chart — ICAO may have to be provided. (See Chapter 8.)

7.2.2 Where different air traffic services routes, position reporting requirements or lateral limits of flight information regions or control areas exist in different layers of airspace and cannot be shown with sufficient clarity on one chart, separate charts shall be provided.

7.3 Coverage and scale

Note 1.— A uniform scale for charts of this type cannot be specified due to the varying degree of congestion of information in certain areas.

Note 2.— A linear scale based on the mean scale of the chart may be shown.

7.3.1 **Recommendation.—** *Layout of sheet lines should be determined by the density and pattern of the ATS route structure.*

7.3.2 Large variations of scale between adjacent charts showing a continuous route structure shall be avoided.

7.3.3 An adequate overlap of charts shall be provided to ensure continuity of navigation.

7.4 Projection

7.4.1 **Recommendation.—** *A conformal projection on which a straight line approximates a great circle should be used.*

7.4.2 Parallels and meridians shall be shown at suitable intervals.

7.4.3 Graduation marks shall be placed at consistent intervals along selected parallels and meridians.

7.5 Identification

Each sheet shall be identified by chart series and number.

7.6 Culture and topography

7.6.1 Generalized shore lines of all open water areas, large lakes and rivers shall be shown except where they conflict with data more applicable to the function of the chart.

7.6.2 Within each quadrilateral formed by the parallels and meridians the area minimum altitude shall be shown, except as provided for in 7.6.3.

7.6.3 **Recommendation.—** *In areas of high latitude where it is determined by the appropriate authority that True North orientation of the chart is impractical, the area minimum altitude should be shown within each quadrilateral formed by reference lines of the graticule (grid) used.*

7.6.4 Where charts are not True North orientated, this fact and the selected orientation used shall be clearly indicated.

7.7 Magnetic variation

Recommendation.— *Isogonals should be indicated and the date of the isogonic information given.*

7.8 Bearings, tracks and radials

7.8.1 Bearings, tracks and radials shall be magnetic, except as provided for in 7.8.2.

7.8.2 **Recommendation.—** *In areas of high latitude where it is determined by the appropriate authority that reference to Magnetic North is impractical, another suitable reference, i.e. True North or Grid North, should be used.*

7.8.3 Where bearings, tracks or radials are given with reference to True North or Grid North, this shall be clearly indicated. When Grid North is used its reference grid meridian shall be identified.

7.9 Aeronautical data

7.9.1 Aerodromes

All aerodromes used by international civil aviation to which an instrument approach can be made shall be shown.

Note.— Other aerodromes may be shown.

7.9.2 Prohibited, restricted and danger areas

Prohibited, restricted and danger areas relevant to the layer of airspace, shall be depicted with their identification and vertical limits.

7.9.3 Air traffic services system

7.9.3.1 Where appropriate, the components of the established air traffic services system shall be shown.

7.9.3.1.1 The components shall include the following:

1) the radio navigation aids associated with the air traffic services system together with their names, identifications, frequencies and geographical coordinates in degrees, minutes and seconds;

2) in respect of DME, additionally the elevation of the transmitting antenna of the DME to the nearest 30 m (100 ft);

3) an indication of all designated airspace, including lateral and vertical limits and the appropriate class of airspace;

4) all ATS routes for en-route flight including route designators, required navigation performance (RNP) types, the track to the nearest degree in both directions along each segment of the routes and, where applicable, the direction of traffic flow;

5) all significant points which define the ATS routes and are not marked by the position of a radio navigation aid, together with their name-codes and geographical coordinates in degrees, minutes and seconds;

6) in respect of waypoints defining VOR/DME area navigation routes, additionally,

   a) the station identification and radio frequency of the reference VOR/DME;

   b) the bearing to the nearest tenth of a degree and the distance to the nearest two-tenths of a kilometre (tenth of a nautical mile) from the reference VOR/DME, if the waypoint is not collocated with it;

7) an indication of all compulsory and "on-request" reporting points and ATS/MET reporting points;

8) the distances to the nearest kilometre or nautical mile between significant points constituting turning points or reporting points;

   Note.— Overall distances between radio navigation aids may also be shown.

9) change-over points on route segments defined by reference to very high frequency omnidirectional radio ranges, indicating the distances to the nearest kilometre or nautical mile to the navigation aids;

   Note.— Change-over points established at the mid-point between two aids, or at the intersection of two radials in the case of a route which changes direction between the aids, need not be shown for each route segment if a general statement regarding their existence is made.

10) minimum en-route altitudes and minimum obstacle clearance altitudes, on ATS routes to the nearest higher 50 metres or 100 feet (see Annex 11, 2.22);

11) communication facilities listed with their channels and, if applicable, logon address;

12) air defence identification zone (ADIZ) properly identified.

   Note.— ADIZ procedures may be described in the chart legend.

7.9.4 Supplementary information

7.9.4.1 Details of departure and arrival routes and associated holding patterns in terminal areas shall be shown unless they are shown on an Area Chart, a Standard Departure Chart — Instrument (SID) — ICAO or a Standard Arrival Chart — Instrument (STAR) — ICAO.

Note 1.— For specifications of these charts see Chapters 8, 9 and 10.

Note 2.— Departure routes normally originate at the end of a runway; arrival routes normally terminate at the point where an instrument approach is initiated.

7.9.4.2 Where established, altimeter setting regions shall be shown and identified.

CHAPTER 8. AREA CHART — ICAO

8.1 Function

This chart shall provide the flight crew with information to facilitate the following phases of instrument flight:

a) the transition between the en-route phase and approach to an aerodrome;

b) the transition between take-off/missed approach and en-route phase of flight; and

c) flights through areas of complex ATS routes or airspace structure.

Note.— The function described in 8.1 c) may be satisfied by a separate chart or an inset on an Enroute Chart — ICAO.

8.2 Availability

8.2.1 The Area Chart — ICAO shall be made available in the manner prescribed in 1.3.2 where the air traffic services routes or position reporting requirements are complex and cannot be adequately shown on an Enroute Chart — ICAO.

8.2.2 Where air traffic services routes or position reporting requirements are different for arrivals and for departures, and these cannot be shown with sufficient clarity on one chart, separate charts shall be provided.

Note.— Under certain conditions a Standard Departure Chart — Instrument (SID) — ICAO and a Standard Arrival Chart — Instrument (STAR) — ICAO may have to be provided (see Chapters 9 and 10).

8.3 Coverage and scale

8.3.1 The coverage of each chart shall extend to points that effectively show departure and arrival routes.

8.3.2 The chart shall be drawn to scale and a scale-bar shown.

8.4 Projection

8.4.1 **Recommendation.—** *A conformal projection on which a straight line approximates a great circle should be used.*

8.4.2 Parallels and meridians shall be shown at suitable intervals.

8.4.3 Graduation marks shall be placed at consistent intervals along the neat lines, as appropriate.

8.5 Identification

The chart shall be identified by a name associated with the airspace portrayed.

Note.— The name may be that of the air traffic services centre, the name of the largest city or town situated in the area covered by the chart or the name of the city that the aerodrome serves. Where more than one aerodrome serves the city or town, the name of the aerodrome on which the procedures are based should be added.

8.6 Culture and topography

8.6.1 Generalized shorelines of all open water areas, large lakes and rivers shall be shown except where they conflict with data more applicable to the function of the chart.

8.6.2 **Recommendation.—** *To improve situational awareness in areas where significant relief exists, all relief exceeding 300 m (1 000 ft) above the elevation of the primary aerodrome should be shown by smoothed contour lines, contour values and layer tints printed in brown. Appropriate spot elevations, including the highest elevation within each top contour line, should be shown printed in black. Obstacles should also be shown.*

Note 1.— The next higher suitable contour line appearing on base topographic maps exceeding 300 m (1 000 ft) above the elevation of the primary aerodrome may be selected to start layer tinting.

Note 2.— An appropriate brown colour, on which half-tone layer tinting is to be based, is specified in Appendix 3 — Colour Guide for contours and topographic features.

Note 3.— Appropriate spot elevations and obstacles are those provided by the procedures specialist.

8.7 Magnetic variation

The average magnetic variation of the area covered by the chart shall be shown to the nearest degree.

8.8 Bearings, tracks and radials

8.8.1 Bearings, tracks and radials shall be magnetic, except as provided for in 8.8.2.

8.8.2 **Recommendation.—** *In areas of high latitude, where it is determined by the appropriate authority that reference to Magnetic North is impractical, another suitable reference, i.e. True North or Grid North, should be used.*

8.8.3 Where bearings, tracks or radials are given with reference to True North or Grid North, this shall be clearly indicated. When Grid North is used, its reference grid meridian shall be identified.

8.9 Aeronautical data

8.9.1 Aerodromes

All aerodromes which affect the terminal routings shall be shown. Where appropriate a runway pattern symbol shall be used.

8.9.2 Prohibited, restricted and danger areas

Prohibited, restricted and danger areas shall be depicted with their identification and vertical limits.

8.9.3 Area minimum altitudes

Area minimum altitudes shall be shown within quadrilaterals formed by the parallels and meridians.

Note.— Depending on the selected chart scale, quadrilaterals formed by the parallels and meridians normally correspond to the whole degree of latitude and longitude.

8.9.4 Air traffic services system

8.9.4.1 The components of the established relevant air traffic services system shall be shown.

8.9.4.1.1 The components shall include the following:

1) the radio navigation aids associated with the air traffic services system together with their names, identifications, frequencies and geographical coordinates in degrees, minutes and seconds;

2) in respect of DME, additionally the elevation of the transmitting antenna of the DME to the nearest 30 m (100 ft);

3) terminal radio aids which are required for outbound and inbound traffic and for holding patterns;

4) the lateral and vertical limits of all designated airspace and the appropriate class of airspace;

5) holding patterns and terminal routings, together with the route designators, and the track to the nearest degree along each segment of the prescribed airways and terminal routings;

6) all significant points which define the terminal routings and are not marked by the position of a radio navigation aid, together with their name-codes and geographical coordinates in degrees, minutes and seconds;

7) in respect of waypoints defining VOR/DME area navigation routes, additionally,

   a) the station identification and radio frequency of the reference VOR/DME;

   b) the bearing to the nearest tenth of a degree and the distance to the nearest two-tenths of a kilometre (tenth of a nautical mile) from the reference VOR/DME, if the waypoint is not collocated with it;

8) an indication of all compulsory and "on-request" reporting points;

9) the distances to the nearest kilometre or nautical mile between significant points constituting turning points or reporting points;

   Note.— Overall distances between radio navigation aids may also be shown.

10) change-over points on route segments defined by reference to very high frequency omnidirectional radio ranges, indicating the distances to the nearest kilometre or nautical mile to the radio navigation aids;

    Note.— Change-over points established at midpoint between two aids, or at the intersection of two radials in the case of a route which changes direction between the aids, need not be shown for each route segment if a general statement regarding their existence is made.

11) minimum en-route altitudes and minimum obstacle clearance altitudes, on ATS routes to the nearest higher 50 metres or 100 feet (see Annex 11, 2.22);

12) established minimum vectoring altitudes to the nearest higher 50 m or 100 ft, clearly identified;

Note 1.— Where ATS surveillance systems are used to vector aircraft to or from significant points on a published standard departure or arrival route or to issue clearance for descent below the minimum sector altitude during arrival, the relevant procedures may be shown on the Area Chart — ICAO unless excessive chart clutter will result.

Note 2.— Where excessive chart clutter will result, an ATC Surveillance Minimum Altitude Chart — ICAO may be provided (see Chapter 21), in which case the elements indicated by 8.9.4.1.1, 12), need not be duplicated on the Area Chart — ICAO.

13) area speed and level/altitude restrictions where established;

14) communication facilities listed with their channels and, if applicable, logon address.

CHAPTER 9. STANDARD DEPARTURE CHART — INSTRUMENT (SID) — ICAO

9.1 Function

This chart shall provide the flight crew with information to enable it to comply with the designated standard departure route — instrument from take-off phase to the en-route phase.

Note 1.— Provisions governing the identification of standard departure routes are in Annex 11, Appendix 3; guidance material relating to the establishment of such routes is contained in the Air Traffic Services Planning Manual *(Doc 9426).*

Note 2.— Provisions governing obstacle clearance criteria and details of the minimum information to be published are contained in the Procedures for Air Navigation Services — Aircraft Operations *(PANS-OPS, Doc 8168), Volume II, Part II.*

9.2 Availability

The Standard Departure Chart — Instrument (SID) — ICAO shall be made available wherever a standard departure route — instrument has been established and cannot be shown with sufficient clarity on the Area Chart — ICAO.

9.3 Coverage and scale

9.3.1 The coverage of the chart shall be sufficient to indicate the point where the departure route begins and the specified significant point at which the en-route phase of flight along a designated air traffic services route can be commenced.

Note.— The departure route normally originates at the end of a runway.

9.3.2 **Recommendation.—** *The chart should be drawn to scale.*

9.3.3 If the chart is drawn to scale, a scale-bar shall be shown.

9.3.4 When the chart is not drawn to scale the annotation "NOT TO SCALE" shall be shown and the symbol for scale-break shall be used on tracks and other aspects of the chart which are too large to be drawn to scale.

9.4 Projection

9.4.1 **Recommendation.—** *A conformal projection on which a straight line approximates a great circle should be used.*

9.4.2 **Recommendation.—** *When the chart is drawn to scale, parallels and meridians should be shown at suitable intervals.*

9.4.3 Graduation marks shall be placed at consistent intervals along the neat lines.

9.5 Identification

The chart shall be identified by the name of the city or town, or area, which the aerodrome serves, the name of the aerodrome and the identification of the standard departure route(s) — instrument as established in accordance with the *Procedures for Air Navigation Services — Aircraft Operations* (PANS-OPS, Doc 8168), Volume II, Part I, Section 3, Chapter 5.

Note.— The identification of the standard departure route(s) — instrument is provided by the procedures specialist.

9.6 Culture and topography

9.6.1 Where the chart is drawn to scale, generalized shore lines of all open water areas, large lakes and rivers shall be shown except where they conflict with data more applicable to the function of the chart.

9.6.2 **Recommendation.—** *To improve situational awareness in areas where significant relief exists, the chart should be drawn to scale and all relief exceeding 300 m (1 000 ft) above the aerodrome elevation should be shown by smoothed contour lines, contour values and layer tints printed in brown. Appropriate spot elevations, including the highest elevation within each top contour line, should be shown printed in black. Obstacles should also be shown.*

Note 1.— The next higher suitable contour line appearing on base topographic maps exceeding 300 m (1 000 ft) above the aerodrome elevation may be selected to start layer tinting.

Note 2.— An appropriate brown colour, on which half-tone layer tinting is to be based, is specified in Appendix 3 — Colour Guide for contours and topographic features.

Note 3.— Appropriate spot elevations and obstacles are those provided by the procedures specialist.

9.7 Magnetic variation

Magnetic variation used in determining the magnetic bearings, tracks and radials shall be shown to the nearest degree.

9.8 Bearings, tracks and radials

9.8.1 Bearings, tracks and radials shall be magnetic, except as provided for in 9.8.2.

Note.— A note to this effect may be included on the chart.

9.8.2 **Recommendation.—** *In areas of high latitude, where it is determined by the appropriate authority that reference to Magnetic North is impractical, another suitable reference, i.e. True North or Grid North, should be used.*

9.8.3 Where bearings, tracks or radials are given with reference to True North or Grid North, this shall be clearly indicated. When Grid North is used its reference grid meridian shall be identified.

9.9 Aeronautical data

9.9.1 Aerodromes

9.9.1.1 The aerodrome of departure shall be shown by the runway pattern.

9.9.1.2 All aerodromes which affect the designated standard departure route — instrument shall be shown and identified. Where appropriate the aerodrome runway patterns shall be shown.

9.9.2 Prohibited, restricted and danger areas

Prohibited, restricted and danger areas which may affect the execution of the procedures shall be shown with their identification and vertical limits.

9.9.3 Minimum sector altitude

9.9.3.1 The established minimum sector altitude, based on a navigation aid associated with the procedure, shall be shown with a clear indication of the sector to which it applies.

9.9.3.2 Where the minimum sector altitude has not been established, the chart shall be drawn to scale and area minimum altitudes shall be shown within quadrilaterals formed by the parallels and meridians. Area minimum altitudes shall also be shown in those parts of the chart not covered by the minimum sector altitude.

Note.— Depending on the selected chart scale, quadrilaterals formed by the parallels and meridians normally correspond to the half-degree of latitude and longitude.

9.9.4 Air traffic services system

9.9.4.1 The components of the established relevant air traffic services system shall be shown.

9.9.4.1.1 The components shall comprise the following:

1) a graphic portrayal of each standard departure route — instrument, including:

   a) route designator;

   b) significant points defining the route;

   c) track or radial to the nearest degree along each segment of the route;

   d) distances to the nearest kilometre or nautical mile between significant points;

   e) minimum obstacle clearance altitudes, along the route or route segments and altitudes required by the procedure to the nearest higher 50 m or 100 ft and flight level restrictions where established;

   f) where the chart is drawn to scale and vectoring on departure is provided, established minimum vectoring altitudes to the nearest higher 50 m or 100 ft, clearly identified;

   Note 1.— Where ATS surveillance systems are used to vector aircraft to or from significant points on a published standard departure route, the relevant procedures may be shown on the Standard Departure Chart — Instrument (SID) — ICAO unless excessive chart clutter will result.

   Note 2.— Where excessive chart clutter will result, an ATC Surveillance Minimum Altitude Chart — ICAO may be provided (see Chapter 21), in which case the elements indicated by 9.9.4.1.1, 1) f), need not be duplicated on the Standard Departure Chart — Instrument (SID) — ICAO.

2) the radio navigation aid(s) associated with the route(s) including:

   a) plain language name;

   b) identification;

c) frequency;

d) geographical coordinates in degrees, minutes and seconds;

e) for DME, the channel and the elevation of the transmitting antenna of the DME to the nearest 30 m (100 ft);

3) the name-codes of the significant points not marked by the position of a radio navigation aid, their geographical coordinates in degrees, minutes and seconds and the bearing to the nearest tenth of a degree and distance to the nearest two-tenths of a kilometre (tenth of a nautical mile) from the reference radio navigation aid;

4) applicable holding patterns;

5) transition altitude/height to the nearest higher 300 m or 1 000 ft;

6) the position and height of close-in obstacles which penetrate the obstacle identification surface (OIS). A note shall be included whenever close-in obstacles penetrating the OIS exist but which were not considered for the published procedure design gradient;

Note.— In accordance with PANS-OPS, Volume II, information on close-in obstacles is provided by the procedures specialist.

7) area speed restrictions, where established;

8) all compulsory and "on-request" reporting points;

9) radio communication procedures, including:

a) call sign(s) of ATS unit(s);

b) frequency;

c) transponder setting, where appropriate.

9.9.4.2 **Recommendation.—** *A textual description of standard departure route(s) — instrument (SID) and relevant communication failure procedures should be provided and should, whenever feasible, be shown on the chart or on the same page which contains the chart.*

9.9.4.3 Aeronautical database requirements

Appropriate data to support navigation database coding shall be published in accordance with the *Procedures for Air Navigation Services — Aircraft Operations* (PANS-OPS, Doc 8168), Volume II, Part III, Section 5, Chapter 2, 2.1, on the verso of the chart or as a separate, properly referenced sheet.

Note.— Appropriate data are those provided by the procedures specialist.

CHAPTER 10. STANDARD ARRIVAL CHART — INSTRUMENT (STAR) — ICAO

10.1 Function

This chart shall provide the flight crew with information to enable it to comply with the designated standard arrival route — instrument from the en-route phase to the approach phase.

Note 1.— Standard arrival routes — instrument are to be interpreted as including "standard descent profiles", "continuous descent approach", and other non-standard descriptions. In the case of a standard descent profile, the depiction of a cross-section is not required.

Note 2.— Provisions governing the identification of standard arrival routes are in Annex 11, Appendix 3; guidance material relating to the establishment of such routes is contained in the Air Traffic Services Planning Manual *(Doc 9426).*

10.2 Availability

The Standard Arrival Chart — Instrument (STAR) — ICAO shall be made available wherever a standard arrival route — instrument has been established and cannot be shown with sufficient clarity on the Area Chart.

10.3 Coverage and scale

10.3.1 The coverage of the chart shall be sufficient to indicate the points where the en-route phase ends and the approach phase begins.

10.3.2 **Recommendation.—** *The chart should be drawn to scale.*

10.3.3 If the chart is drawn to scale, a scale-bar shall be shown.

10.3.4 When the chart is not drawn to scale the annotation "NOT TO SCALE" shall be shown and the symbol for scale break shall be used on tracks and other aspects of the chart which are too large to be drawn to scale.

10.4 Projection

10.4.1 **Recommendation.—** *A conformal projection on which a straight line approximates a great circle should be used.*

10.4.2 **Recommendation.—** *When the chart is drawn to scale, parallels and meridians should be shown at suitable intervals.*

10.4.3 Graduation marks shall be placed at consistent intervals along the neat lines.

10.5 Identification

The chart shall be identified by the name of the city or town, or area, which the aerodrome serves, the name of the aerodrome, and the identification of the standard arrival route(s) — instrument as established in accordance with the *Procedures for Air Navigation Services — Aircraft Operations* (PANS-OPS, Doc 8168), Volume II, Part I, Section 4, Chapter 2.

Note.— The identification of the standard arrival route(s) — instrument is provided by the procedures specialist.

10.6 Culture and topography

10.6.1 Where the chart is drawn to scale, generalized shore lines of all open water areas, large lakes and rivers shall be shown except where they conflict with data more applicable to the function of the chart.

10.6.2 **Recommendation.—** *To improve situational awareness in areas where significant relief exists, the chart should be drawn to scale and all relief exceeding 300 m (1 000 ft) above the aerodrome elevation should be shown by smoothed contour lines, contour values and layer tints printed in brown. Appropriate spot elevations, including the highest elevation within each top contour line, should be shown printed in black. Obstacles should also be shown.*

Note 1.— The next higher suitable contour line appearing on base topographic maps exceeding 300 m (1 000 ft) above the aerodrome elevation may be selected to start layer tinting.

Note 2.— An appropriate brown colour, on which half-tone layer tinting is to be based, is specified in Appendix 3 — Colour Guide for contours and topographic features.

Note 3.— Appropriate spot elevations and obstacles are those provided by the procedures specialist.

10.7 Magnetic variation

Magnetic variation used in determining the magnetic bearings, tracks and radials shall be shown to the nearest degree.

10.8 Bearings, tracks and radials

10.8.1 Bearings, tracks and radials shall be magnetic, except as provided for in 10.8.2.

Note.— A note to this effect may be included on the chart.

10.8.2 **Recommendation.—** *In areas of high latitude, where it is determined by the appropriate authority that reference to Magnetic North is impractical, another suitable reference, i.e. True North or Grid North, should be used.*

10.8.3 Where bearings, tracks or radials are given with reference to True North or Grid North, this shall be clearly indicated. When Grid North is used its reference grid meridian shall be identified.

10.9 Aeronautical data

10.9.1 Aerodromes

10.9.1.1 The aerodrome of landing shall be shown by the runway pattern.

10.9.1.2 All aerodromes which affect the designated standard arrival route — instrument shall be shown and identified. Where appropriate the aerodrome runway patterns shall be shown.

10.9.2 Prohibited, restricted and danger areas

Prohibited, restricted and danger areas which may affect the execution of the procedures shall be shown with their identification and vertical limits.

10.9.3 Minimum sector altitude

10.9.3.1 The established minimum sector altitude shall be shown with a clear indication of the sector to which it applies.

10.9.3.2 Where the minimum sector altitude has not been established, the chart shall be drawn to scale and area minimum altitudes shall be shown within quadrilaterals formed by the parallels and meridians. Area minimum altitudes shall also be shown in those parts of the chart not covered by the minimum sector altitude.

Note.— Depending on the selected chart scale, quadrilaterals formed by the parallels and meridians normally correspond to the half-degree of latitude and longitude.

10.9.4 Air traffic services system

10.9.4.1 The components of the established relevant air traffic services system shall be shown.

10.9.4.1.1 The components shall comprise the following:

1) a graphic portrayal of each standard arrival route — instrument, including:

   a) route designator;

   b) significant points defining the route;

   c) track or radial to the nearest degree along each segment of the route;

   d) distances to the nearest kilometre or nautical mile between significant points;

   e) minimum obstacle clearance altitudes, along the route or route segments and altitudes required by the procedure to the nearest higher 50 m or 100 ft and flight level restrictions where established;

   f) where the chart is drawn to scale and vectoring on arrival is provided, established minimum vectoring altitudes to the nearest higher 50 m or 100 ft, clearly identified;

   Note 1.— Where ATS surveillance systems are used to vector aircraft to or from significant points on a published standard arrival route or to issue clearance for descent below the minimum sector altitude during arrival, the relevant procedures may be shown on the Standard Arrival Chart — Instrument (STAR) — ICAO unless excessive chart clutter will result.

   Note 2.— Where excessive chart clutter will result, an ATC Surveillance Minimum Altitude Chart — ICAO may be provided (see Chapter 21), in which case the elements indicated by 10.9.4.1.1, 1) f), need not be duplicated on the Standard Arrival Chart — Instrument (STAR) — ICAO.

2) the radio navigation aid(s) associated with the route(s) including:

   a) plain language name;

   b) identification;

   c) frequency;

   d) geographical coordinates in degrees, minutes and seconds;

e) for DME, the channel and the elevation of the transmitting antenna of the DME to the nearest 30 m (100 ft);

3) the name-codes of the significant points not marked by the position of a radio navigation aid, their geographical coordinates in degrees, minutes and seconds and the bearing to the nearest tenth of a degree and distance to the nearest two-tenths of a kilometre (tenth of a nautical mile) from the reference radio navigation aid;

4) applicable holding patterns;

5) transition altitude/height to the nearest higher 300 m or 1 000 ft;

6) area speed restrictions, where established;

7) all compulsory and “on-request” reporting points;

8) radio communication procedures, including:

a) call sign(s) of ATS unit(s);

b) frequency;

c) transponder setting, where appropriate.

10.9.4.2 **Recommendation.—** *A textual description of standard arrival route(s) — instrument (STAR) and relevant communication failure procedures should be provided and should, whenever feasible, be shown on the chart or on the same page which contains the chart.*

10.9.4.3 Aeronautical database requirements

Appropriate data to support navigation database coding shall be published in accordance with the *Procedures for Air Navigation Services — Aircraft Operations* (PANS-OPS, Doc 8168), Volume II, Part III, Section 5, Chapter 2, 2.2, on the verso of the chart or as a separate, properly referenced sheet.

Note.— Appropriate data are those provided by the procedures specialist.

CHAPTER 11. INSTRUMENT APPROACH CHART — ICAO

11.1 Function

This chart shall provide flight crews with information which will enable them to perform an approved instrument approach procedure to the runway of intended landing including the missed approach procedure and where applicable, associated holding patterns.

Note.— Detailed criteria for the establishment of instrument approach procedures and the resolutions of associated altitudes/heights are contained in the Procedures for Air Navigation Services — Aircraft Operations *(PANS-OPS, Doc 8168).*

11.2 Availability

11.2.1 Instrument Approach Charts — ICAO shall be made available for all aerodromes used by international civil aviation where instrument approach procedures have been established by the State concerned.

11.2.2 A separate Instrument Approach Chart — ICAO shall normally be provided for each precision approach procedure established by the State.

11.2.3 A separate Instrument Approach Chart — ICAO shall normally be provided for each non-precision approach procedure established by the State.

Note.— A single precision or non-precision approach procedure chart may be provided to portray more than one approach procedure when the procedures for the intermediate approach, final approach and missed approach segments are identical.

11.2.4 When the values for track, time or altitude differ between categories of aircraft on other than the final approach segment of the instrument approach procedures and the listing of these differences on a single chart could cause clutter or confusion, more than one chart shall be provided.

Note.— For categories of aircraft, see Procedures for Air Navigation Services — Aircraft Operations *(PANS-OPS, Doc 8168), Volume II, Part I, Section 4, Chapter 9.*

11.2.5 Instrument Approach Charts — ICAO shall be revised whenever information essential to safe operation becomes out of date.

11.3 Coverage and scale

11.3.1 The coverage of the chart shall be sufficient to include all segments of the instrument approach procedure and such additional areas as may be necessary for the type of approach intended.

11.3.2 The scale selected shall ensure optimum legibility consistent with:

1) the procedure shown on the chart;

2) sheet size.

11.3.3 A scale indication shall be given.

11.3.3.1 Except where this is not practicable, a distance circle with a radius of 20 km (10 NM) centred on a DME located on or close to the aerodrome, or on the aerodrome reference point where no suitable DME is available, shall be shown; its radius shall be indicated on the circumference.

11.3.3.2 **Recommendation.—** *A distance scale should be shown directly below the profile.*

11.4 Format

Recommendation.— *The sheet size should be 210 × 148 mm (8.27 × 5.82 in).*

11.5 Projection

11.5.1 A conformal projection on which a straight line approximates a great circle shall be used.

11.5.2 **Recommendation.—** *Graduation marks should be placed at consistent intervals along the neat lines.*

11.6 Identification

The chart shall be identified by the name of the city or town, or area, which the aerodrome serves, the name of the aerodrome and the identification of the instrument approach procedure as established in accordance with the *Procedures for Air Navigation Services — Aircraft Operations* (PANS-OPS, Doc 8168), Volume II, Part I, Section 4, Chapter 9.

Note.— The identification of the instrument approach procedure is provided by the procedures specialist.

11.7 Culture and topography

11.7.1 Culture and topographic information pertinent to the safe execution of the instrument approach procedure, including the missed approach procedure, associated holding procedures and visual manoeuvring (circling) procedure when established, shall be shown. Topographic information shall be named, only when necessary, to facilitate the understanding of such information, and the minimum shall be a delineation of land masses and significant lakes and rivers.

11.7.2 Relief shall be shown in a manner best suited to the particular elevation characteristics of the area. In areas where relief exceeds 1 200 m (4 000 ft) above the aerodrome elevation within the coverage of the chart or 600 m (2 000 ft) within 11 km (6 NM) of the aerodrome reference point or when final approach or missed approach procedure gradient is steeper than optimal due to terrain, all relief exceeding 150 m (500 ft) above the aerodrome elevation shall be shown by smoothed contour lines, contour values and layer tints printed in brown. Appropriate spot elevations, including the highest elevation within each top contour line, shall also be shown printed in black.

Note 1.— The next higher suitable contour line appearing on base topographic maps exceeding 150 m (500 ft) above the aerodrome elevation may be selected to start layer tinting.

Note 2.— An appropriate brown colour, on which half-tone layer tinting is to be based, is specified in Appendix 3 — Colour Guide for contours and topographic features.

Note 3.— Appropriate spot elevations are those provided by the procedures specialist.

11.7.3 **Recommendation.—** *In areas where relief is lower than specified in 11.7.2, all relief exceeding 150 m (500 ft) above the aerodrome elevation should be shown by smoothed contour lines, contour values and layer tints printed in brown. Appropriate spot elevations, including the highest elevation within each top contour line, should also be shown printed in black.*

Note 1.— The next higher suitable contour line appearing on base topographic maps exceeding 150 m (500 ft) above the aerodrome elevation may be selected to start layer tinting.

Note 2.— An appropriate brown colour, on which half-tone layer tinting is to be based, is specified in Appendix 3 — Colour Guide for contours and topographic features.

Note 3.— Appropriate spot elevations are those provided by the procedures specialist.

11.8 Magnetic variation

11.8.1 **Recommendation.—** *The magnetic variation should be shown.*

11.8.2 When shown, the value of the variation, indicated to the nearest degree, shall agree with that used in determining magnetic bearings, tracks and radials.

11.9 Bearings, tracks and radials

11.9.1 Bearings, tracks and radials shall be magnetic except as provided for in 11.9.2.

Note.— A note to this effect may be included on the chart.

11.9.2 **Recommendation.—** *In areas of high latitude, where it is determined by the appropriate authority that reference to Magnetic North is impractical, another suitable reference, i.e. True North or Grid North, should be used.*

11.9.3 Where bearings, tracks or radials are given with reference to True North or Grid North, this shall be clearly indicated. When Grid North is used its reference grid meridian shall be identified.

11.10 Aeronautical data

11.10.1 Aerodromes

11.10.1.1 All aerodromes which show a distinctive pattern from the air shall be shown by the appropriate symbol. Abandoned aerodromes shall be identified as abandoned.

11.10.1.2 The runway pattern, at a scale sufficiently large to show it clearly, shall be shown for:

1) the aerodrome on which the procedure is based;

2) aerodromes affecting the traffic pattern or so situated as to be likely, under adverse weather conditions, to be mistaken for the aerodrome of intended landing.

11.10.1.3 The aerodrome elevation shall be shown to the nearest metre or foot in a prominent position on the chart.

11.10.1.4 The threshold elevation or, where applicable, the highest elevation of the touchdown zone shall be shown to the nearest metre or foot.

11.10.2 Obstacles

11.10.2.1 Obstacles shall be shown on the plan view of the chart.

Note.— Appropriate obstacles are those provided by the procedures specialist.

11.10.2.2 **Recommendation.—** *If one or more obstacles are the determining factor of an obstacle clearance altitude/ height, those obstacles should be identified.*

11.10.2.3 The elevation of the top of obstacles shall be shown to the nearest (next higher) metre or foot.

11.10.2.4 **Recommendation.—** *The heights of obstacles above a datum other than mean sea level (see 11.10.2.3) should be shown. When shown, they should be given in parentheses on the chart.*

11.10.2.5 When the heights of obstacles above a datum other than mean sea level are shown, the datum shall be the aerodrome elevation except that, at aerodromes having an instrument runway (or runways) with a threshold elevation more than 2 m (7 ft) below the aerodrome elevation, the chart datum shall be the threshold elevation of the runway to which the instrument approach is related.

11.10.2.6 Where a datum other than mean sea level is used, it shall be stated in a prominent position on the chart.

11.10.2.7 Where an obstacle free zone has not been established for a precision approach runway Category I, this shall be indicated.

11.10.3 Prohibited, restricted and danger areas

Prohibited areas, restricted areas, and danger areas which may affect the execution of the procedures shall be shown with their identification and vertical limits.

11.10.4 Radio communication facilities and navigation aids

11.10.4.1 Radio navigation aids required for the procedures together with their frequencies, identifications and track-defining characteristics, if any, shall be shown. In the case of a procedure in which more than one station is located on the final approach track, the facility to be used for track guidance for final approach shall be clearly identified. In addition, consideration shall be given to the elimination from the approach chart of those facilities that are not used by the procedure.

11.10.4.2 The initial approach fix (IAF), the intermediate approach fix (IF), the final approach fix (FAF) (or final approach point (FAP) for an ILS approach procedure), the missed approach point (MAPt), where established, and other essential fixes or points comprising the procedure shall be shown and identified.

11.10.4.3 **Recommendation.—** *The final approach fix (or final approach point for an ILS approach procedure) should be identified with its geographical coordinates in degrees, minutes and seconds.*

11.10.4.4 Radio navigation aids that might be used in diversionary procedures together with their track-defining characteristics, if any, shall be shown or indicated on the chart.

11.10.4.5 Radio communication frequencies, including call signs, that are required for the execution of the procedures shall be shown.

11.10.4.6 When required by the procedures, the distance to the aerodrome from each radio navigation aid concerned with the final approach shall be shown to the nearest kilometre or nautical mile. When no track-defining aid indicates the bearing of the aerodrome, the bearing shall also be shown to the nearest degree.

11.10.5 Minimum sector altitude or terminal arrival altitude

The minimum sector altitude or terminal arrival altitude established by the competent authority shall be shown, with a clear indication of the sector to which it applies.

11.10.6 Portrayal of procedure tracks

11.10.6.1 The plan view shall show the following information in the manner indicated:

a) the approach procedure track by an arrowed continuous line indicating the direction of flight;

b) the missed approach procedure track by an arrowed broken line;

c) any additional procedure track, other than those specified in a) and b), by an arrowed dotted line;

d) bearings, tracks, radials to the nearest degree and distances to the nearest two-tenths of a kilometre or tenth of a nautical mile or times required for the procedure;

e) where no track-defining aid is available, the magnetic bearing to the nearest degree to the aerodrome from the radio navigation aids concerned with the final approach;

f) the boundaries of any sector in which visual manoeuvring (circling) is prohibited;

g) where specified the holding pattern and minimum holding altitude/height associated with the approach and missed approach;

h) caution notes where required, prominently displayed on the face of the chart.

11.10.6.2 **Recommendation.—** *The plan view should show the distance to the aerodrome from each radio navigation aid concerned with the final approach.*

11.10.6.3 A profile shall be provided normally below the plan view showing the following data:

a) the aerodrome by a solid block at aerodrome elevation;

b) the profile of the approach procedure segments by an arrowed continuous line indicating the direction of flight;

c) the profile of the missed approach procedure segment by an arrowed broken line and a description of the procedure;

d) the profile of any additional procedure segment, other than those specified in b) and c), by an arrowed dotted line;

e) bearings, tracks, radials to the nearest degree and distances to the nearest two-tenths of a kilometre or tenth of a nautical mile or times required for the procedure;

f) altitudes/heights required by the procedures, including transition altitude and procedure altitudes/heights, where established;

g) limiting distance to the nearest kilometre or nautical mile on procedure turn, when specified;

h) the intermediate approach fix or point, on procedures where no course reversal is authorized;

i) a line representing the aerodrome elevation or threshold elevation, as appropriate, extended across the width of the chart including a distance scale with its origin at the runway threshold.

11.10.6.4 **Recommendation.—** *Heights required by procedures should be shown in parentheses, using the height datum selected in accordance with 11.10.2.5.*

11.10.6.5 **Recommendation.—** *The profile view should include a ground profile or a minimum altitude/height portrayal as follows:*

a) a ground profile shown by a solid line depicting the highest elevations of the relief occurring within the primary area of the final approach segment. The highest elevations of the relief occurring in the secondary areas of the final approach segment shown by a dashed line; or

b) minimum altitudes/heights in the intermediate and final approach segments indicated within bounded shaded blocks.

Note 1.— For the ground profile portrayal, actual templates of the primary and secondary areas of the final approach segment are provided to the cartographer by the procedures specialist.

Note 2.— The minimum altitude/height portrayal is intended for use on charts depicting non-precision approaches with a final approach fix.

11.10.7 Aerodrome operating minima

11.10.7.1 Aerodrome operating minima when established by the State shall be shown.

11.10.7.2 The obstacle clearance altitudes/heights for the aircraft categories for which the procedure is designed shall be shown; for precision approach procedures, additional OCA/H for Cat D_L aircraft (wing span between 65 m and 80 m and/or vertical distance between the flight path of the wheels and the glide path antenna between 7 m and 8 m) shall be published, when necessary.

11.10.8 Supplementary information

11.10.8.1 When the missed approach point is defined by:

— a distance from the final approach fix, or

— a facility or a fix and the corresponding distance from the final approach fix,

the distance to the nearest two-tenths of a kilometre or tenth of a nautical mile and a table showing ground speeds and times from the final approach fix to the missed approach point shall be shown.

11.10.8.2 When DME is required for use in the final approach segment, a table showing altitudes/heights for each 2 km or 1 NM, as appropriate, shall be shown. The table shall not include distances which would correspond to altitudes/ heights below the OCA/H.

11.10.8.3 **Recommendation.—** *For procedures in which DME is not required for use in the final approach segment but where a suitably located DME is available to provide advisory descent profile information, a table showing the altitudes/ heights should be included.*

11.10.8.4 **Recommendation.—** *A rate of descent table should be shown.*

11.10.8.5 For non-precision approach procedures with a final approach fix, the final approach descent gradient to the nearest one-tenth of a per cent and, in parentheses, descent angle to the nearest one-tenth of a degree shall be shown.

11.10.8.6 For precision approach procedures and approach procedures with vertical guidance, the reference datum height to the nearest half metre or foot and the glide path/elevation/vertical path angle to the nearest one-tenth of a degree shall be shown.

11.10.8.7 When a final approach fix is specified at the final approach point for ILS, a clear indication shall be given whether it applies to the ILS, the associated ILS localizer only procedure, or both. In the case of MLS, a clear indication shall be given when an FAF has been specified at the final approach point.

11.10.8.8 If the final approach descent gradient/angle for any type of instrument approach procedure exceeds the maximum value specified in the *Procedures for Air Navigation Services Aircraft Operations* (PANS-OPS, Doc 8168), Volume II, Part I, Section 4, Chapter 5, a cautionary note shall be included.

11.10.9 Aeronautical database requirements

Appropriate data to support navigation database coding shall be published in accordance with the *Procedures for Air Navigation Services — Aircraft Operations* (PANS-OPS, Doc 8168), Volume II, Part III, Section 5, Chapter 2, 2.3 for RNAV procedures and Volume II, Part I, Section 4, Chapter 9, 9.4.1.4 for non-RNAV procedures, on the verso of the chart or as a separate, properly referenced sheet.

Note.— Appropriate data are those provided by the procedures specialist.

CHAPTER 13. AERODROME/HELIPORT CHART — ICAO

13.1 Function

This chart shall provide flight crews with information which will facilitate the ground movement of aircraft:

a) from the aircraft stand to the runway; and

b) from the runway to the aircraft stand;

and helicopter movement:

a) from the helicopter stand to the touchdown and lift-off area and to the final approach and take-off area;

b) from the final approach and take-off area to the touchdown and lift-off area and to the helicopter stand;

c) along helicopter ground and air taxiways; and

d) along air transit routes;

it shall also provide essential operational information at the aerodrome/heliport.

13.2 Availability

13.2.1 The Aerodrome/Heliport Chart — ICAO shall be made available in the manner prescribed in 1.3.2 for all aerodromes/heliports regularly used by international civil aviation.

13.2.2 **Recommendation.—** *The Aerodrome/Heliport Chart — ICAO should be made available also, in the manner prescribed in 1.3.2, for all other aerodromes/heliports available for use by international civil aviation.*

Note.— Under certain conditions an Aerodrome Ground Movement Chart — ICAO and an Aircraft Parking/Docking Chart — ICAO may have to be provided (see Chapters 14 and 15); in which case, the elements portrayed on these supplementary charts need not be duplicated on the Aerodrome/Heliport Chart — ICAO.

13.3 Coverage and scale

13.3.1 The coverage and scale shall be sufficiently large to show clearly all the elements listed in 13.6.1.

13.3.2 A linear scale shall be shown.

13.4 Identification

The chart shall be identified by the name of the city or town, or area, which the aerodrome/heliport serves and the name of the aerodrome/heliport.

13.5 Magnetic variation

True and Magnetic North arrows and magnetic variation to the nearest degree and annual change of the magnetic variation shall be shown.

13.6 Aerodrome/heliport data

13.6.1 This chart shall show:

a) geographical coordinates in degrees, minutes and seconds for the aerodrome/heliport reference point;

b) elevations, to the nearest metre or foot, of the aerodrome/heliport and apron (altimeter checkpoint locations) where applicable; and for non-precision approaches, elevations and geoid undulations of runway thresholds and the geometric centre of the touchdown and lift-off area;

c) elevations and geoid undulations, to the nearest half-metre or foot, of the precision approach runway threshold, the geometric centre of the touchdown and lift-off area, and at the highest elevation of the touchdown zone of a precision approach runway;

d) all runways including those under construction with designation number, length and width to the nearest metre, bearing strength, displaced thresholds, stopways, clearways, runway directions to the nearest degree magnetic, type of surface and runway markings;

Note.— Bearing strengths may be shown in tabular form on the face or verso of the chart.

e) all aprons, with aircraft/helicopter stands, lighting, markings and other visual guidance and control aids, where applicable, including location and type of visual docking guidance systems, type of surface for heliports, and bearing strengths or aircraft type restrictions where the bearing strength is less than that of the associated runways;

Note.— Bearing strengths or aircraft type restrictions may be shown in tabular form on the face or verso of the chart.

f) geographical coordinates in degrees, minutes and seconds for thresholds, geometric centre of touchdown and lift-off area and/or thresholds of the final approach and take-off area (where appropriate);

g) all taxiways, helicopter air and ground taxiways with type of surface, helicopter air transit routes, with designations, width, lighting, markings (including runway-holding positions and, where established, intermediate holding positions), stop bars, other visual guidance and control aids, and bearing strength or aircraft type restrictions where the bearing strength is less than that of the associated runways;

Note.— Bearing strengths or aircraft type restrictions may be shown in tabular form on the face or verso of the chart.

h) where established, hot spot locations with additional information properly annotated;

Note.— Additional information regarding hot spots may be shown in tabular form on the face or verso of the chart.

i) geographical coordinates in degrees, minutes, seconds and hundredths of seconds for appropriate taxiway centre line points and aircraft stands;

j) where established, standard routes for taxiing aircraft with their designators;

k) the boundaries of the air traffic control service;

l) position of runway visual range (RVR) observation sites;

m) approach and runway lighting;

n) location and type of the visual approach slope indicator systems with their nominal approach slope angle(s), minimum eye height(s) over the threshold of the on-slope signal(s), and where the axis of the system is not parallel to the runway centre line, the angle and direction of the displacement, i.e. left or right;

o) relevant communication facilities listed with their channels and, if applicable, logon address;

p) obstacles to taxiing;

q) aircraft servicing areas and buildings of operational significance;

r) VOR checkpoint and radio frequency of the aid concerned;

s) any part of the depicted movement area permanently unsuitable for aircraft, clearly identified as such.

13.6.2 In addition to the items in 13.6.1 relating to heliports, the chart shall show:

a) heliport type;

Note.— Heliport types are identified in Annex 14, Volume II, as surface-level, elevated or helideck.

b) touchdown and lift-off area including dimensions to the nearest metre, slope, type of surface and bearing strength in tonnes;

c) final approach and take-off area including type, true bearing to the nearest degree, designation number (where appropriate), length and width to the nearest metre, slope and type of surface;

d) safety area including length, width and type of surface;

e) helicopter clearway including length and ground profile;

f) obstacles including type and elevation of the top of the obstacles to the nearest (next higher) metre or foot;

g) visual aids for approach procedures, marking and lighting of final approach and take-off area, and of touchdown and lift-off area;

h) declared distances to the nearest metre for heliports, where relevant, including:

1) take-off distance available;

2) rejected take-off distance available;

3) landing distance available.

CHAPTER 14. AERODROME GROUND MOVEMENT CHART — ICAO

14.1 Function

This supplementary chart shall provide flight crews with detailed information to facilitate the ground movement of aircraft to and from the aircraft stands and the parking/docking of aircraft.

14.2 Availability

Recommendation.— *The Aerodrome Ground Movement Chart — ICAO should be made available in the manner prescribed in 1.3.2 where, due to congestion of information, details necessary for the ground movement of aircraft along the taxiways to and from the aircraft stands cannot be shown with sufficient clarity on the Aerodrome/Heliport Chart — ICAO.*

14.3 Coverage and scale

14.3.1 The coverage and scale shall be sufficiently large to show clearly all the elements listed in 14.6.

14.3.2 **Recommendation.—** *A linear scale should be shown.*

14.4 Identification

The chart shall be identified by the name of the city or town, or area, which the aerodrome serves and the name of the aerodrome.

14.5 Magnetic variation

14.5.1 A True North arrow shall be shown.

14.5.2 **Recommendation.—** *Magnetic variation to the nearest degree and its annual change should be shown.*

Note.— This chart need not be True North orientated.

14.6 Aerodrome data

This chart shall show in a similar manner all the information on the Aerodrome/Heliport Chart — ICAO relevant to the area depicted, including:

a) apron elevation to the nearest metre or foot;

b) aprons with aircraft stands, bearing strengths or aircraft type restrictions, lighting, marking and other visual guidance and control aids, where applicable, including location and type of visual docking guidance systems;

c) geographical coordinates in degrees, minutes, seconds and hundredths of seconds for aircraft stands;

d) taxiways with designations, width to the nearest metre, bearing strength or aircraft type restrictions where applicable, lighting, markings (including runway-holding positions and, where established, intermediate holding positions), stop bars, and other visual guidance and control aids;

e) where established, hot spot locations with additional information properly annotated;

Note.— Additional information regarding hot spots may be shown in tabular form on the face or verso of the chart.

f) where established, standard routes for taxiing aircraft, with their designators;

g) geographical coordinates in degrees, minutes, seconds and hundredths of seconds for appropriate taxiway centre line points;

h) the boundaries of the air traffic control service;

i) relevant communication facilities listed with their channels and, if applicable, logon address;

j) obstacles to taxiing;

k) aircraft servicing areas and buildings of operational significance;

l) VOR checkpoint and radio frequency of the aid concerned;

m) any part of the depicted movement area permanently unsuitable for aircraft, clearly identified as such.

CHAPTER 15. AIRCRAFT PARKING/DOCKING CHART — ICAO

15.1 Function

This supplementary chart shall provide flight crews with detailed information to facilitate the ground movement of aircraft between the taxiways and the aircraft stands and the parking/docking of aircraft.

15.2 Availability

Recommendation.— *The Aircraft Parking/ Docking Chart — ICAO should be made available in the manner prescribed in 1.3.2 where, due to the complexity of the terminal facilities, the information cannot be shown with sufficient clarity on the Aerodrome/Heliport Chart — ICAO or on the Aerodrome Ground Movement Chart — ICAO.*

15.3 Coverage and scale

15.3.1 The coverage and scale shall be sufficiently large to show clearly all the elements listed in 15.6.

15.3.2 **Recommendation.—** *A linear scale should be shown.*

15.4 Identification

The chart shall be identified by the name of the city or town, or area, which the aerodrome serves and the name of the aerodrome.

15.5 Magnetic variation

15.5.1 A True North arrow shall be shown.

15.5.2 **Recommendation.—** *Magnetic variation to the nearest degree and its annual change should be shown.*

Note.— This chart need not be True North orientated.

15.6 Aerodrome data

This chart shall show in a similar manner all the information on the Aerodrome/Heliport Chart — ICAO and the Aerodrome Ground Movement Chart — ICAO relevant to the area depicted, including:

a) apron elevation to the nearest metre or foot;

b) aprons with aircraft stands, bearing strengths or aircraft type restrictions, lighting, marking and other visual guidance and control aids, where applicable, including location and type of visual docking guidance systems;

c) geographical coordinates in degrees, minutes, seconds and hundredths of seconds for aircraft stands;

d) taxiway entries with designations, including runway-holding positions and, where established, intermediate holding positions, and stop bars;

e) where established, hot spot locations with additional information properly annotated;

Note.— Additional information regarding hot spots may be shown in tabular form on the face or verso of the chart.

f) geographical coordinates in degrees, minutes, seconds and hundredths of seconds for appropriate taxiway centre line points;

g) the boundaries of the air traffic control service;

h) relevant communication facilities listed with their channels and, if applicable, logon address;

i) obstacles to taxiing;

j) aircraft servicing areas and buildings of operational significance;

k) VOR checkpoint and radio frequency of the aid concerned;

l) any part of the depicted movement area permanently unsuitable for aircraft, clearly identified as such.

CHAPTER 21. ATC SURVEILLANCE MINIMUM ALTITUDE CHART — ICAO

21.1 Function

21.1.1 This supplementary chart shall provide information that will enable flight crews to monitor and cross-check altitudes assigned by a controller using an ATS surveillance system.

Note.— The objectives of the air traffic control service as prescribed in Annex 11 do not include prevention of collision with terrain. The procedures prescribed in the Procedures for Air Navigation Services — Air Traffic Management (PANS-ATM, Doc 4444) do not relieve pilots of their responsibility to ensure that any clearances issued by air traffic control units are safe in this respect, When an IFR flight is vectored or is given a direct routing which takes the aircraft off an ATS route, the PANS-ATM, Chapter 8, 8.6.5.2 applies.

21.1.2 A note indicating that the chart may only be used for cross-checking of altitudes assigned while the aircraft is identified shall be prominently displayed on the face of the chart.

21.2 Availability

Recommendation.— *The ATC Surveillance Minimum Altitude Chart — ICAO should be made available, in the manner prescribed in 1.3.2, where vectoring procedures are established and minimum vectoring altitudes cannot be shown adequately on the Area Chart — ICAO, Standard Departure Chart — Instrument (SID) — ICAO or Standard Arrival Chart — Instrument (STAR) — ICAO.*

21.3 Coverage and scale

21.3.1 The coverage of the chart shall be sufficient to effectively show the information associated with vectoring procedures.

21.3.2 The chart shall be drawn to scale.

21.3.3 **Recommendation.—** *The chart should be drawn to the same scale as the associated Area Chart — ICAO.*

21.4 Projection

21.4.1 **Recommendation.—** *A conformal projection on which a straight line approximates a geodesic line should be used.*

21.4.2 **Recommendation.—** *Graduation marks should be placed at consistent intervals along the neat lines, as appropriate.*

21.5 Identification

The chart shall be identified by the name of the aerodrome for which the vectoring procedures are established or, when procedures apply to more than one aerodrome, the name associated with the airspace portrayed.

Note.— The name may be that of the city which the aerodrome serves or, when the procedures apply to more than one aerodrome, that of the air traffic services centre or the largest city or town situated in the area covered by the chart.

21.6 Culture and topography

21.6.1 Generalized shorelines of all open water areas, large lakes and rivers shall be shown except where they conflict with data more applicable to the function of the chart.

21.6.2 Appropriate spot elevations and obstacles shall be shown.

Note.— Appropriate spot elevations and obstacles are those provided by the procedures specialist.

21.7 Magnetic variation

The average magnetic variation of the area covered by the chart shall be shown to the nearest degree.

21.8 Bearings, tracks and radials

21.8.1 Bearings, tracks and radials shall be magnetic, except as provided for in 21.8.2.

21.8.2 **Recommendation.—** *In areas of high latitude, where it is determined by the appropriate authority that reference to Magnetic North is impractical, another suitable reference, i.e. True North or Grid North, should be used.*

21.8.3 Where bearings, tracks or radials are given with reference to True North or Grid North, this shall be clearly indicated. When Grid North is used its reference grid meridian shall be identified.

21.9 Aeronautical data

21.9.1 Aerodromes

21.9.1.1 All aerodromes that affect the terminal routings shall be shown. Where appropriate a runway pattern symbol shall be used.

21.9.1.2 The elevation of the primary aerodrome to the nearest metre or foot shall be shown.

21.9.2 Prohibited, restricted and danger areas

Prohibited, restricted and danger areas shall be depicted with their identification.

21.9.3 Air traffic services system

21.9.3.1 The chart shall show components of the established air traffic services system including:

1) relevant radio navigation aids together with their identifications;

2) lateral limits of relevant designated airspace;

3) relevant significant points associated with standard instrument departure and arrival procedures;

   Note.— Routes used in the vectoring of aircraft to and from the significant points may be shown.

4) transition altitude, where established;

5) information associated with vectoring including:

   a) minimum vectoring altitudes to the nearest higher 50 m or 100 ft, clearly identified;

   b) lateral limits of minimum vectoring altitude sectors normally defined by bearings and radials to/from radio navigation aids to the nearest degree or, if not practicable, geographical coordinates in degrees, minutes and seconds and shown by heavy lines so as to clearly differentiate between established sectors;

      Note.— In congested areas geographical coordinates may be omitted in the interest of legibility.

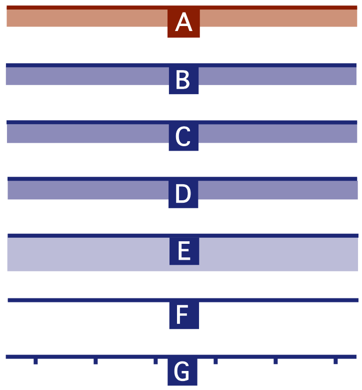
   c) distance circles at 20-km or 10-NM intervals or, when practicable, 10-km or 5-NM intervals shown as fine dashed lines with the radius indicated on the circumference and centred on the identified aerodrome main VOR radio navigation aid or, if not available, on the aerodrome/heliport reference point;

   d) notes concerning correction for low temperature effect, as applicable;

6) communications procedures including call sign(s) and channel(s) of the ATC unit(s) concerned.

21.9.3.2 **Recommendation.—** *A textual description of relevant communication failure procedures should be provided and should, whenever feasible, be shown on the chart or on the same page that contains the chart.*

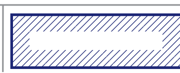
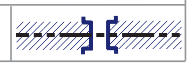
AIRSPACE CLASSIFICATIONS

127	Airspace classifications	

Aeronautical data in abbreviated form to be used in association with airspace classification symbols:

128		TMA DONLON 119.1 C 200m AGL - FL 245 Type / Name or call sign / Radio frequency(ies) / Airspace classification / Vertical limits
	Alternative	TMA DONLON C FL 245 200m AGL 119.1

AIRSPACE RESTRICTIONS

129	Restricted airspace (prohibited, restricted or danger area)		Common boundary of two areas	
	Note.– The angle and density of rulings may be varied according to scale and the size, shape and orientation of the area.			
130	International boundary closed to passage of aircraft except through air corridor			

OBSTACLES

131	Obstacle	
132	Lighted obstacle	
133	Group obstacles	
134	Lighted group obstacles	

135	Exceptionally high obstacle (optional symbol)	
136	Exceptionally high obstacle - lighted (optional symbol)	
	Note.– For obstacles having a height of the order of 300 m (1 000 ft) above terrain.	
137	Elevation of top (italics) *52*  (15) Height above specified datum (upright type in parentheses)	

MISCELLANEOUS

138	Prominent transmission line		139	Isogonic line or isogonal	3° E	140	Ocean station vessel (normal position) 

VISUAL AIDS

141	Marine light *Note 2.– Characteristics are to be indicated as follows:*	F *Note 1.– Marine alternating lights are red and white unless otherwise indicated. Marine lights are white unless colours are stated.*
		Alt Alternating, B Blue, F Fixed; Fl Flashing, G Green, Gp Group; Occ Occulting, R Red, SEC Sector; sec Second, (U) Unwatched, W White
142	Aeronautical ground light	 Electronic 
143	Lightship	

SYMBOLS FOR AERODROME/HELIPORT CHARTS

144	Hard surface runway	
145	Pierced steel plank or steel mesh runway	
146	Unpaved runway	
147	Stopway SWY	
148	Taxiways and parking areas	
149	Helicopter alighting area on an aerodrome	H
150	Aerodrome reference point	
151	VOR check-point	
152	Runway visual range (RVR) observation site	

153	Point light	
154	Obstacle light	
155	Landing direction indicator (lighted)	T
156	Landing direction indicator (unlighted)	T
157	Stop bar	
158	Runway-holding position Pattern A Pattern B *Note.– For application, see Annex 14, Volume I, 5.2.10.*	
159	Intermediate holding position *Note.– For application, see Annex 14, Volume I, 5.2.11.*	
160	Hot spot *Note.– Hot spot location to be circled.*	

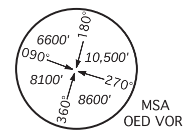
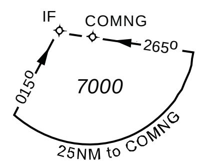
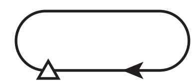
SYMBOLS FOR AERODROME OBSTACLE CHARTS - TYPE A, B AND C

		Plan	Profile
161	Tree or shrub		Identification number
162	Pole, tower, spire, antenna, etc.		1
163	Building or large structure		
164	Railroad		
165	Transmission line or overhead cable	—T—T—	

		Plan	Profile
166	Terrain penetrating obstacle plane		
167	Escarpment		
168	Stopway SWY		
169	Clearway CWY		

ADDITIONAL SYMBOLS FOR USE ON PAPER AND ELECTRONIC CHARTS

PLAN VIEW

170	Minimum sector altitude *Note.– This symbol may be modified to reflect particular sector shapes.*	MSA	
171	Terminal arrival altitude *Note.– This symbol may be modified to reflect particular TAA shapes.*	TAA	
172	Holding pattern		
173	Missed approach track		

PROFILE

174	Runway	
175	Radio navigation aid (type of aid and its use in the procedure to be annotated on top of the symbol)	
176	Radio marker beacon (type of beacon to be annotated on top of the symbol)	
177	Collocated radio navigation aid and marker beacon (type of aid to be annotated on top of the symbol)	
178	DME fix (distance from DME and the fix use in the procedure to be annotated on top of the symbol)	
179	Collocated DME fix and marker beacon (distance from DME and the type of beacon to be annotated on top of the symbol)	

Table 3. Gradients and angles

Type of gradient/angle	Chart resolution	Integrity Classification
Non-precision final approach descent gradient	0.1 per cent	1×10^{-8} critical
Final approach descent angle (Non-precision approach or approach with vertical guidance)	0.1 degree	1×10^{-8} critical
Precision approach glide path/elevation angle	0.1 degree	1×10^{-8} critical

Table 4. Magnetic variation

Magnetic variation	Chart resolution	Integrity Classification
Aerodrome/heliport magnetic variation	1 degree	1×10^{-5} essential

Table 5. Bearing

Bearing	Chart resolution	Integrity Classification
Airway segments	1 degree	1×10^{-3} routine
En-route and terminal fix formations	1/10 degree	1×10^{-3} routine
Terminal arrival/departure route segments	1 degree	1×10^{-3} routine
Instrument approach procedure fix formations	1/10 degree	1×10^{-5} essential
ILS localizer alignment	1 degree	1×10^{-5} essential
MLS zero azimuth alignment	1 degree	1×10^{-5} essential
Runway and FATO bearing	1 degree	1×10^{-3} routine

Table 6. Length/distance/dimension

Length/distance/dimension	Chart resolution	Integrity Classification
Airway segment length	1 km or 1 NM	1×10^{-3} routine
En-route fix formation distance	2/10 km (1/10 NM)	1×10^{-3} routine
Terminal arrival/departure route segment length	1 km or 1 NM	1×10^{-5} essential
Terminal and instrument approach procedure fix formation distance	2/10 km (1/10 NM)	1×10^{-5} essential
Runway and FATO length, TLOF dimensions	1 m	1×10^{-8} critical
Runway width	1 m	1×10^{-5} essential
Stopway length and width	1 m	1×10^{-8} critical
Landing distance available	1 m	1×10^{-8} critical
Take-off run available	1 m	1×10^{-8} critical
Take-off distance available	1 m	1×10^{-8} critical
Accelerate-stop distance available	1 m	1×10^{-8} critical
ILS localizer antenna-runway end, distance	as plotted	1×10^{-3} routine
ILS glide slope antenna-threshold, distance along centre line	as plotted	1×10^{-3} routine
ILS marker-threshold distance	2/10 km (1/10 NM)	1×10^{-5} essential
ILS DME antenna-threshold, distance along centre line	as plotted	1×10^{-5} essential
MLS azimuth antenna-runway end, distance	as plotted	1×10^{-3} routine
MLS elevation antenna-threshold, distance along centre line	as plotted	1×10^{-3} routine
MLS DME/P antenna-threshold, distance along centre line	as plotted	1×10^{-5} essential

— END —

COVER SHEET TO AMENDMENT 31

INTERNATIONAL STANDARDS
AND RECOMMENDED PRACTICES

OPERATION OF AIRCRAFT

ANNEX 6
TO THE CONVENTION ON INTERNATIONAL CIVIL AVIATION

PART I
INTERNATIONAL COMMERCIAL AIR TRANSPORT — AEROPLANES

EIGHTH EDITION — JULY 2001

INTERNATIONAL CIVIL AVIATION ORGANIZATION

Checklist of Amendments to Annex 6, Part I

	Effective date	*Date of applicability*
Eighth Edition (incorporates Amendments 1 to 26)	16 July 2001	1 November 2001
Amendment 27 (adopted by the Council on 15 March 2002)	15 July 2002	28 November 2002
Amendment 28 (adopted by the Council on 13 March 2003)	14 July 2003	27 November 2003
Amendment 29 (adopted by the Council on 9 March 2005)	11 July 2005	24 November 2005
Amendment 30 (adopted by the Council on 14 March 2006)	17 July 2006	23 November 2006
Amendment 31 (adopted by the Council on 14 March 2007) Replacement pages (iii), (iv), (vi) to (viii), (xxi), 1-5, 6-3, 6-10, 6-11, 7-1, 7-2, 8-3, 11-1, APP 2-2 and APP 2-3	16 July 2007	22 November 2007 1 July 2008 1 January 2009 1 January 2012

Transmittal note

Amendment 31

to the

International Standards and
Recommended Practices

OPERATION OF AIRCRAFT

(Annex 6, Part I to the Convention on International Civil Aviation)

1. Insert the following new and replacement pages in Annex 6, Part I (Eighth Edition) to incorporate Amendment 31 which becomes applicable on 22 November 2007:

    a) Pages (iii) and (iv) — Table of Contents

    b) Pages (vi) to (viii) — Abbreviations and Symbols

    c) Page (xxi) — Foreword

    d) Page 1-5 — Chapter 1

    e) Pages 6-3, 6-10 and 6-11 — Chapter 6

    f) Pages 7-1 and 7-2 — Chapter 7

    g) Page 8-3 — Chapter 8

    h) Page 11-1 — Chapter 11

    i) Pages APP 2-2 and APP 2-3 — Appendix 2

2. Record the entry of this amendment on page (ii).

TABLE OF CONTENTS

ABBREVIATIONS AND SYMBOLS

(used in this Annex)

Abbreviations

AC	Alternating current
ACAS	Airborne collision avoidance system
ADS	Automatic dependent surveillance
ADS-C	Automatic dependent surveillance — contract
AFCS	Automatic flight control system
AGA	Aerodromes, air routes and ground aids
AIG	Accident investigation and prevention
AOC	Aeronautical operational control
AOC	Air operator certificate
APU	Auxiliary power unit
ASDA	Accelerate stop distance available
ASE	Altimetry system error
ASIA/PAC	Asia/Pacific
ATC	Air traffic control
ATM	Air traffic management
ATS	Air traffic services
CAS	Calibrated airspeed
CAT I	Category I
CAT II	Category II
CAT III	Category III
CAT IIIA	Category IIIA
CAT IIIB	Category IIIB
CAT IIIC	Category IIIC
cm	Centimetre
CDL	Configuration deviation list
CFIT	Controlled flight into terrain
CPDLC	Controller-pilot data link communications
CVR	Cockpit voice recorder
DA	Decision altitude
DA/H	Decision altitude/height
DC	Device control
D-FIS	Data link-flight information services
DH	Decision height
DME	Distance measuring equipment
DSTRK	Desired track
ECAM	Electronic centralized aircraft monitor
EFIS	Electronic flight instrument system
EGT	Exhaust gas temperature
EICAS	Engine indication and crew alerting system
ELT	Emergency locator transmitter
ELT(AD)	Automatic deployable ELT
ELT(AF)	Automatic fixed ELT
ELT(AP)	Automatic portable ELT
ELT(S)	Survival ELT
EPR	Engine pressure ratio
ETOPS	Extended range operations by turbine-engined aeroplanes
EUROCAE	European Organization for Civil Aviation Equipment
FDAU	Flight data acquisition unit
FDR	Flight data recorder
FL	Flight level
FM	Frequency modulation
ft	Foot
ft/min	Feet per minute
g	Normal acceleration
GCAS	Ground collision avoidance system
GNSS	Global navigation satellite system
GPWS	Ground proximity warning system
hPa	Hectopascal
IFR	Instrument flight rules
ILS	Instrument landing system

Abbreviations

IMC	Instrument meteorological conditions
INS	Inertial navigation system
ISA	International standard atmosphere
kg	Kilogram
kg/m^2	Kilogram per metre squared
km	Kilometre
km/h	Kilometre per hour
kt	Knot
kt/s	Knots per second
lb	Pound
LDA	Landing distance available
m	Metre
MDA	Minimum descent altitude
MDA/H	Minimum descent altitude/height
MDH	Minimum descent height
MEL	Minimum equipment list
MHz	Megahertz
MLS	Microwave landing system
MMEL	Master minimum equipment list
MNPS	Minimum navigation performance specifications
MOPS	Minimum Operational Performance Specification
m/s	Metres per second
m/s^2	Metres per second squared
N	Newton
N_1	Low pressure compressor speed (two-stage compressor); fan speed (three-stage compressor)
N_2	High pressure compressor speed (two-stage compressor); intermediate pressure compressor speed (three-stage compressor)
N_3	High pressure compressor speed (three stage compressor)
NAV	Navigation
NM	Nautical mile
OCA	Obstacle clearance altitude
OCA/H	Obstacle clearance altitude/height
OCH	Obstacle clearance height
PANS	Procedures for Air Navigation Services
RCP	Required communication performance
RNP	Required navigation performance
RVR	Runway visual range
RVSM	Reduced vertical separation minima
SICASP	Secondary Surveillance Radar Improvements and Collision Avoidance Systems Panel
SOP	Standard operating procedures
SST	Supersonic transport
STOL	Short take-off and landing
TAS	True airspeed
TAWS	Terrain awareness warning system
TCAS	Traffic alert and collision avoidance system
TLA	Thrust lever angle
TLS	Target level of safety
TODA	Take-off distance available
TORA	Take-off run available
TVE	Total vertical error
UTC	Coordinated universal time
VFR	Visual flight rules
V_D	Design diving speed
VMC	Visual meteorological conditions
V_{MC}	Minimum control speed with the critical engine inoperative

Abbreviations

VOR	VHF omnidirectional radio range
V_{S_0}	Stalling speed or the minimum steady flight speed in the landing configuration
V_{S_1}	Stalling speed or the minimum steady flight speed in a specified configuration
VTOL	Vertical take-off and landing
WXR	Weather

Symbols

°C	Degrees Celsius
%	Per cent

PUBLICATIONS
(referred to in this Annex)

Convention on International Civil Aviation (Doc 7300)

European Organization for Civil Aviation Equipment (EUROCAE) Documents ED55 and ED56A

International Regulations for Preventing Collisions at Sea

Policy and Guidance Material on the Economic Regulation of International Air Transport (Doc 9587)

Protocol Relating to an Amendment to the Convention on International Civil Aviation (*Article 83* bis) (Doc 9318)

Annexes to the Convention on International Civil Aviation

Annex 1 — *Personnel Licensing*

Annex 2 — *Rules of the Air*

Annex 3 — *Meteorological Service for International Air Navigation*

Annex 4 — *Aeronautical Charts*

Annex 5 — *Units of Measurement to be Used in Air and Ground Operations*

Annex 6 — *Operation of Aircraft*
Part II — *International General Aviation — Aeroplanes*
Part III — *International Operations — Helicopters*

Annex 7 — *Aircraft Nationality and Registration Marks*

Annex 8 — *Airworthiness of Aircraft*

Annex 9 — *Facilitation*

Annex 10 — *Aeronautical Telecommunications*
Volume III (Part I — *Digital Data Communication Systems*, Part II — *Voice Communication Systems)*
Volume IV *(Surveillance Radar and Collision Avoidance Systems)*

Annex 11 — *Air Traffic Services*

Annex 12 — *Search and Rescue*

Annex 13 — *Aircraft Accident and Incident Investigation*

Annex 14 — *Aerodromes*
Volume I — *Aerodrome Design and Operations*

Annex 15 — *Aeronautical Information Services*

Annex 16 — Environmental Protection
Volume I — *Aircraft Noise*

Annex 18 — *The Safe Transport of Dangerous Goods by Air*

Procedures for Air Navigation Services

ATM — Air Traffic Management (Doc 4444)

OPS — Aircraft Operations (Doc 8168)
Volume I — *Flight Procedures*
Volume II — *Construction of Visual and Instrument Flight Procedures*
TRG — Training (Doc 9868)

Regional Supplementary Procedures (Doc 7030)

Manuals

Accident Prevention Manual (Doc 9422)

Airport Services Manual (Doc 9137)
Part 1 — *Rescue and Fire Fighting*
Part 8 — *Airport Operational Services*

Airworthiness Manual (Doc 9760)

Human Factors Training Manual (Doc 9683)

Manual of Aircraft Ground De-icing/Anti-icing Operations (Doc 9640)

Manual of All-Weather Operations (Doc 9365)

Manual of Criteria for the Qualification of Flight Simulators (Doc 9625)

Manual of Procedures for Operations Inspection, Certification and Continued Surveillance (Doc 8335)

Manual of Procedures for the Establishment of a State's Personnel Licensing System (Doc 9379)

Manual on Implementation of a 300 m (1 000 ft) Vertical Separation Minimum Between FL 290 and FL 410 Inclusive (Doc 9574)

Manual on Required Communications Performance (RCP) (Doc 9869)

Manual on Required Navigation Performance (RNP) (Doc 9613)

Preparation of an Operations Manual (Doc 9376)

Safety Management Manual (SMM) (Doc 9859)

Safety Oversight Manual (Doc 9734)
Part A — *The Establishment and Management of a State's Safety Oversight System*

Training Manual (Doc 7192)
Part D-3 — *Flight Operations Officers/Flight Dispatchers*

Circulars

Guidance Material on SST Aircraft Operations (Cir 126)

Guidance on the Implementation of Article 83 bis *of the Convention on International Civil Aviation* (Cir 295)

Amendment	*Source(s)*	*Subject(s)*	*Adopted Effective Applicable*
30	First meeting of the Surveillance and Conflict Resolution Systems Panel, Second meeting of the Flight Crew Licensing and Training Panel, Fourteenth meeting of the Obstacle Clearance Panel, a proposal by the United States, Council request, Assembly Resolution A35-17, 35th Session of the Assembly, and the Eleventh Air Navigation Conference	a) The carriage of altitude encoders with higher resolution; b) pilot recent experience and proficiency check requirements, cross-crew qualification and cross-crediting of experience, evaluation of competency, threat and error management and the biannual pilot proficiency check; c) pilot awareness of operational requirements determined by procedure design; d) qualifications for flight operations officers/flight dispatchers and the critical elements of a State regulatory system; e) the carriage of a copy of the air operator certificate in aircraft; f) legal guidance for the protection of information from safety data collection and processing systems; and g) safety management provisions and references to new guidance material on the concept of acceptable level of safety.	14 March 2006 17 July 2006 23 November 2006
31	First meeting of the Operational Data Link Panel (OPLINKP/1), First meeting of the Surveillance and Conflict Resolution Systems Panel (SCRSP/1) and Air Navigation Commission study	a) Amendments to Standards to facilitate implementation of the available technology in relation to the use of automatic dependent surveillance — contract (ADS-C) and to the introduction of required communication performance (RCP) in the provision of air traffic services (ATS); b) amendment of existing provisions related to the mandatory carriage requirements of emergency locator transmitters (ELTs) as of 1 July 2008; and c) changes to Standards related to pressure-altitude data sources used by transponders as of 1 January 2009 and 1 January 2012.	14 March 2007 16 July 2007 22 November 2007 1 July 2008 1 January 2009 1 January 2012

Operator. A person, organization or enterprise engaged in or offering to engage in an aircraft operation.

Operator's maintenance control manual. A document which describes the operator's procedures necessary to ensure that all scheduled and unscheduled maintenance is performed on the operator's aircraft on time and in a controlled and satisfactory manner.

Pilot-in-command. The pilot designated by the operator, or in the case of general aviation, the owner, as being in command and charged with the safe conduct of a flight.

Pressure-altitude. An atmospheric pressure expressed in terms of altitude which corresponds to that pressure in the Standard Atmosphere*.

Psychoactive substances. Alcohol, opioids, cannabinoids, sedatives and hypnotics, cocaine, other psychostimulants, hallucinogens, and volatile solvents, whereas coffee and tobacco are excluded.

Repair. The restoration of an aeronautical product to an airworthy condition to ensure that the aircraft continues to comply with the design aspects of the appropriate airworthiness requirements used for the issuance of the type certificate for the respective aircraft type, after it has been damaged or subjected to wear.

Required communication performance (RCP). A statement of the performance requirements for operational communication in support of specific ATM functions.

Required communication performance type (RCP type). A label (e.g. RCP 240) that represents the values assigned to RCP parameters for communication transaction time, continuity, availability and integrity.

Required navigation performance (RNP). A statement of the navigation performance necessary for operation within a defined airspace.

Note.— Navigation performance and requirements are defined for a particular RNP type and/or application.

Rest period. Any period of time on the ground during which a flight crew member is relieved of all duties by the operator.

RNP type. A containment value expressed as a distance in nautical miles from the intended position within which flights would be for at least 95 per cent of the total flying time.

Example.— RNP 4 represents a navigation accuracy of plus or minus 7.4 km (4 NM) on a 95 per cent containment basis.

Runway visual range (RVR). The range over which the pilot of an aircraft on the centre line of a runway can see the runway surface markings or the lights delineating the runway or identifying its centre line.

Safe forced landing. Unavoidable landing or ditching with a reasonable expectancy of no injuries to persons in the aircraft or on the surface.

Safety management system. A systematic approach to managing safety, including the necessary organizational structures, accountabilities, policies and procedures.

Safety programme**.** An integrated set of regulations and activities aimed at improving safety.

Small aeroplane. An aeroplane of a maximum certificated take-off mass of 5 700 kg or less.

State of Registry. The State on whose register the aircraft is entered.

Note.— In the case of the registration of aircraft of an international operating agency on other than a national basis, the States constituting the agency are jointly and severally bound to assume the obligations which, under the Chicago Convention, attach to a State of Registry. See, in this regard, the Council Resolution of 14 December 1967 on Nationality and Registration of Aircraft Operated by International Operating Agencies which can be found in Policy and Guidance Material on the Economic Regulation of International Air Transport *(Doc 9587).*

State of the Operator. The State in which the operator's principal place of business is located or, if there is no such place of business, the operator's permanent residence.

Target level of safety (TLS). A generic term representing the level of risk which is considered acceptable in particular circumstances.

Total vertical error (TVE). The vertical geometric difference between the actual pressure altitude flown by an aircraft and its assigned pressure altitude (flight level).

Visual meteorological conditions (VMC). Meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling**, equal to or better than specified minima.

Note.— The specified minima are contained in Chapter 4 of Annex 2.

* As defined in Annex 8.
** As defined in Annex 2.

Note.— This Standard does not require any aeroplane to have break-in areas.

6.3 Flight recorders

Note 1.— Flight recorders comprise two systems, a flight data recorder (FDR) and a cockpit voice recorder (CVR).

Note 2.— Combination recorders (FDR/CVR) can only be used to meet the flight recorder equipage requirements as specifically indicated in this Annex.

Note 3.— Detailed guidance on flight recorders is contained in Attachment D.

6.3.1 Flight data recorders — types

6.3.1.1 A Type I FDR shall record the parameters required to determine accurately the aeroplane flight path, speed, attitude, engine power, configuration and operation.

6.3.1.2 Types II and IIA FDRs shall record the parameters required to determine accurately the aeroplane flight path, speed, attitude, engine power and configuration of lift and drag devices.

6.3.1.3 The use of engraving metal foil FDRs shall be discontinued by 1 January 1995.

6.3.1.4 **Recommendation.—** *The use of analogue FDRs using frequency modulation (FM) should be discontinued by 5 November 1998.*

6.3.1.4.1 The use of photographic film FDRs shall be discontinued from 1 January 2003.

6.3.1.5 All aeroplanes for which the individual certificate of airworthiness is first issued after 1 January 2005, which utilize data link communications and are required to carry a CVR, shall record on a flight recorder, all data link communications to and from the aeroplane. The minimum recording duration shall be equal to the duration of the CVR, and shall be correlated to the recorded cockpit audio.

6.3.1.5.1 From 1 January 2007, all aeroplanes which utilize data link communications and are required to carry a CVR shall record on a flight recorder, all data link communications to and from the aeroplane. The minimum recording duration shall be equal to the duration of the CVR, and shall be correlated to the recorded cockpit audio.

6.3.1.5.2 Sufficient information to derive the content of the data link communications message and, whenever practical, the time the message was displayed to or generated by the crew shall be recorded.

Note.— Data link communications include, but are not limited to, automatic dependent surveillance — contract (ADS-C), controller-pilot data link communications (CPDLC), data link-flight information services (D-FIS) and aeronautical operational control (AOC) messages.

6.3.1.6 **Recommendation.—** *All aeroplanes of a maximum certificated take-off mass over 5 700 kg, required to be equipped with an FDR and a CVR, may alternatively be equipped with two combination recorders (FDR/CVR).*

6.3.1.7 **Recommendation.—** *All multi-engined turbine-powered aeroplanes of a maximum certificated take-off mass of 5 700 kg or less, required to be equipped with an FDR and/or a CVR, may alternatively be equipped with one combination recorder (FDR/CVR).*

6.3.1.8 A Type IA FDR shall record the parameters required to determine accurately the aeroplane flight path, speed, attitude, engine power, configuration and operation. The parameters that satisfy the requirements for a Type IA FDR are listed in the paragraphs below. The parameters without an asterisk (*) are mandatory parameters which shall be recorded. In addition, the parameters designated by an asterisk (*) shall be recorded if an information data source for the parameter is used by aeroplane systems or the flight crew to operate the aeroplane.

6.3.1.8.1 The following parameters satisfy the requirements for flight path and speed:

– Pressure altitude
– Indicated airspeed or calibrated airspeed
– Air-ground status and each landing gear air-ground sensor when practicable
– Total or outside air temperature
– Heading (primary flight crew reference)
– Normal acceleration
– Lateral acceleration
– Longitudinal acceleration (body axis)
– Time or relative time count
– Navigation data*: drift angle, wind speed, wind direction, latitude/longitude
– Groundspeed*
– Radio altitude*

6.3.1.8.2 The following parameters satisfy the requirements for attitude:

– Pitch attitude
– Roll attitude
– Yaw or sideslip angle*
– Angle of attack*

6.3.1.8.3 The following parameters satisfy the requirements for engine power:

– Engine thrust/power: propulsive thrust/power on each engine, cockpit thrust/power lever position
– Thrust reverse status*

– Engine thrust command*
– Engine thrust target*
– Engine bleed valve position*
– Additional engine parameters*: EPR, N_1, indicated vibration level, N_2, EGT, TLA, fuel flow, fuel cut-off lever position, N_3

6.3.1.8.4 The following parameters satisfy the requirements for configuration:

– Pitch trim surface position
– Flaps*: trailing edge flap position, cockpit control selection
– Slats*: leading edge flap (slat) position, cockpit control selection
– Landing gear*: landing gear, gear selector position
– Yaw trim surface position*
– Roll trim surface position*
– Cockpit trim control input position pitch*
– Cockpit trim control input position roll*
– Cockpit trim control input position yaw*
– Ground spoiler and speed brake*: Ground spoiler position, ground spoiler selection, speed brake position, speed brake selection
– De-icing and/or anti-icing systems selection*
– Hydraulic pressure (each system)*
– Fuel quantity*
– AC electrical bus status*
– DC electrical bus status*
– APU bleed valve position*
– Computed centre of gravity*

6.3.1.8.5 The following parameters satisfy the requirements for operation:

– Warnings
– Primary flight control surface and primary flight control pilot input: pitch axis, roll axis, yaw axis
– Marker beacon passage
– Each navigation receiver frequency selection
– Manual radio transmission keying and CVR/FDR synchronization reference
– Autopilot/autothrottle/AFCS mode and engagement status*
– Selected barometric setting*: pilot, first officer
– Selected altitude (all pilot selectable modes of operation)*
– Selected speed (all pilot selectable modes of operation)*
– Selected Mach (all pilot selectable modes of operation)*
– Selected vertical speed (all pilot selectable modes of operation)*
– Selected heading (all pilot selectable modes of operation)*
– Selected flight path (all pilot selectable modes of operation)*: course/DSTRK, path angle
– Selected decision height*
– EFIS display format*: pilot, first officer
– Multi-function/engine/alerts display format*
– GPWS/TAWS/GCAS status*: selection of terrain display mode including pop-up display status, terrain alerts, both cautions and warnings, and advisories, on/off switch position
– Low pressure warning*: hydraulic pressure, pneumatic pressure
– Computer failure*
– Loss of cabin pressure*
– TCAS/ACAS (traffic alert and collision avoidance system/airborne collision avoidance system)*
– Ice detection*
– Engine warning each engine vibration*
– Engine warning each engine over temperature*
– Engine warning each engine oil pressure low*
– Engine warning each engine over speed*
– Wind shear warning*
– Operational stall protection, stick shaker and pusher activation*
– All cockpit flight control input forces*: control wheel, control column, rudder pedal cockpit input forces
– Vertical deviation*: ILS glide path, MLS elevation, GNSS approach path
– Horizontal deviation*: ILS localizer, MLS azimuth, GNSS approach path
– DME 1 and 2 distances*
– Primary navigation system reference*: GNSS, INS, VOR/DME, MLS, Loran C, ILS
– Brakes*: left and right brake pressure, left and right brake pedal position
– Date*
– Event marker*
– Head up display in use*
– Para visual display on*

Note 1.— Parameter requirements, including range, sampling, accuracy and resolution, are as contained in the Minimum Operational Performance Specification (MOPS) document for Flight Recorder Systems of the European Organization for Civil Aviation Equipment (EUROCAE) or equivalent documents.

Note 2.— The number of parameters to be recorded will depend on aeroplane complexity. Parameters without an (*) are to be recorded regardless of aeroplane complexity. Those parameters designated by an (*) are to be recorded if an information source for the parameter is used by aeroplane systems and/or flight crew to operate the aeroplane.

6.3.2 Flight data recorders — duration

All FDRs shall be capable of retaining the information recorded during at least the last 25 hours of their operation, except for the Type IIA FDR which shall be capable of retaining the information recorded during at least the last 30 minutes of its operation.

6.3.3 Flight data recorders — aeroplanes for which the individual certificate of airworthiness is first issued on or after 1 January 1989

6.3.3.1 All aeroplanes of a maximum certificated take-off mass of over 27 000 kg shall be equipped with a Type I FDR.

whenever such aeroplanes are being operated in areas where thunderstorms or other potentially hazardous weather conditions, regarded as detectable with airborne weather radar, may be expected to exist along the route either at night or under instrument meteorological conditions.

6.12 All aeroplanes operated above 15 000 m (49 000 ft) — radiation indicator

All aeroplanes intended to be operated above 15 000 m (49 000 ft) shall carry equipment to measure and indicate continuously the dose rate of total cosmic radiation being received (i.e. the total of ionizing and neutron radiation of galactic and solar origin) and the cumulative dose on each flight. The display unit of the equipment shall be readily visible to a flight crew member.

Note.— The equipment is calibrated on the basis of assumptions acceptable to the appropriate national authorities.

6.13 All aeroplanes complying with the noise certification Standards in Annex 16, Volume I

An aeroplane shall carry a document attesting noise certification. When the document, or a suitable statement attesting noise certification as contained in another document approved by the State of Registry, is issued in a language other than English, it shall include an English translation.

Note.— The attestation may be contained in any document, carried on board, approved by the State of Registry.

6.14 Mach number indicator

All aeroplanes with speed limitations expressed in terms of Mach number, shall be equipped with a Mach number indicator.

Note.— This does not preclude the use of the airspeed indicator to derive Mach number for ATS purposes.

6.15 Aeroplanes required to be equipped with ground proximity warning systems (GPWS)

6.15.1 All turbine-engined aeroplanes of a maximum certificated take-off mass in excess of 5 700 kg or authorized to carry more than nine passengers shall be equipped with a ground proximity warning system.

6.15.2 All turbine-engined aeroplanes of a maximum certificated take-off mass in excess of 15 000 kg or authorized to carry more than 30 passengers shall be equipped with a ground proximity warning system which has a forward looking terrain avoidance function.

6.15.3 All turbine-engined aeroplanes of a maximum certificated take-off mass in excess of 5 700 kg or authorized to carry more than nine passengers, for which the individual certificate of airworthiness is first issued on or after 1 January 2004, shall be equipped with a ground proximity warning system which has a forward looking terrain avoidance function.

6.15.4 From 1 January 2007, all turbine-engined aeroplanes of a maximum certificated take-off mass in excess of 5 700 kg or authorized to carry more than nine passengers, shall be equipped with a ground proximity warning system which has a forward looking terrain avoidance function.

6.15.5 **Recommendation.—** *All turbine-engined aeroplanes of a maximum certificated take-off mass of 5 700 kg or less and authorized to carry more than five but not more than nine passengers should be equipped with a ground proximity warning system which provides the warnings of 6.15.8 a) and c), warning of unsafe terrain clearance and a forward looking terrain avoidance function.*

6.15.6 From 1 January 2007 all piston-engined aeroplanes of a maximum certificated take-off mass in excess of 5 700 kg or authorized to carry more than nine passengers shall be equipped with a ground proximity warning system which provides the warnings in 6.15.8 a) and c), warning of unsafe terrain clearance and a forward looking terrain avoidance function.

6.15.7 A ground proximity warning system shall provide automatically a timely and distinctive warning to the flight crew when the aeroplane is in potentially hazardous proximity to the earth’s surface.

6.15.8 A ground proximity warning system shall provide, unless otherwise specified herein, warnings of the following circumstances:

a) excessive descent rate;

b) excessive terrain closure rate;

c) excessive altitude loss after take-off or go-around;

d) unsafe terrain clearance while not in landing configuration;

1) gear not locked down;

2) flaps not in a landing position; and

e) excessive descent below the instrument glide path.

6.16 Aeroplanes carrying passengers — cabin crew seats

6.16.1 Aeroplanes for which the individual certificate of airworthiness is first issued on or after 1 January 1981

All aeroplanes shall be equipped with a forward or rearward facing (within 15 degrees of the longitudinal axis of the aeroplane) seat, fitted with a safety harness for the use of each cabin crew member required to satisfy the intent of 12.1 in respect of emergency evacuation.

6.16.2 Aeroplanes for which the individual certificate of airworthiness was first issued before 1 January 1981

Recommendation.— *All aeroplanes should be equipped with a forward or rearward facing (within 15 degrees of the longitudinal axis of the aeroplane) seat, fitted with a safety harness for the use of each cabin crew member required to satisfy the intent of 12.1 in respect of emergency evacuation.*

Note.— Safety harness includes shoulder straps and a seat belt which may be used independently.

6.16.3 Cabin crew seats provided in accordance with 6.16.1 and 6.16.2 shall be located near floor level and other emergency exits as required by the State of Registry for emergency evacuation.

6.17 Emergency locator transmitter (ELT)

Applicable until 30 June 2008

6.17.1 All aeroplanes for which the individual certificate of airworthiness is first issued after 1 January 2002, operated on long-range over-water flights as described in 6.5.3, shall be equipped with at least two ELTs, one of which shall be automatic.

6.17.2 From 1 January 2005, all aeroplanes operated on long-range over-water flights as described in 6.5.3 shall be equipped with at least two ELTs, one of which shall be automatic.

6.17.3 All aeroplanes for which the individual certificate of airworthiness is first issued after 1 January 2002, on flights over designated land areas as described in 6.6, shall be equipped with at least one automatic ELT.

6.17.4 From 1 January 2005, aeroplanes on flights over designated land areas as described in 6.6 shall be equipped with at least one automatic ELT.

6.17.5 **Recommendation.—** *All aeroplanes should carry an automatic ELT.*

6.17.6 ELT equipment carried to satisfy the requirements of 6.17.1, 6.17.2, 6.17.3, 6.17.4 and 6.17.5 shall operate in accordance with the relevant provisions of Annex 10, Volume III.

Applicable from 1 July 2008

6.17.7 **Recommendation.—** *All aeroplanes should carry an automatic ELT.*

6.17.8 Except as provided for in 6.17.9, from 1 July 2008, all aeroplanes authorized to carry more than 19 passengers shall be equipped with at least one automatic ELT or two ELTs of any type.

6.17.9 All aeroplanes authorized to carry more than 19 passengers for which the individual certificate of airworthiness is first issued after 1 July 2008 shall be equipped with at least two ELTs, one of which shall be automatic.

6.17.10 Except as provided for in 6.17.11, from 1 July 2008, all aeroplanes authorized to carry 19 passengers or less shall be equipped with at least one ELT of any type.

6.17.11 All aeroplanes authorized to carry 19 passengers or less for which the individual certificate of airworthiness is first issued after 1 July 2008 shall be equipped with at least one automatic ELT.

6.17.12 ELT equipment carried to satisfy the requirements of 6.17.7, 6.17.8, 6.17.9, 6.17.10 and 6.17.11 shall operate in accordance with the relevant provisions of Annex 10, Volume III.

Note.— The judicious choice of numbers of ELTs, their type and placement on aircraft and associated floatable life support systems will ensure the greatest chance of ELT activation in the event of an accident for aircraft operating over water or land, including areas especially difficult for search and rescue. Placement of transmitter units is a vital factor in ensuring optimal crash and fire protection. The placement of the control and switching devices (activation monitors) of automatic fixed ELTs and their associated operational procedures will also take into consideration the need for rapid detection of inadvertent activation and convenient manual switching by crew members.

6.18 Aeroplanes required to be equipped with an airborne collision avoidance system (ACAS II)

6.18.1 From 1 January 2003, all turbine-engined aeroplanes of a maximum certificated take-off mass in excess of 15 000 kg or authorized to carry more than 30 passengers shall be equipped with an airborne collision avoidance system (ACAS II).

6.18.2 From 1 January 2005, all turbine-engined aeroplanes of a maximum certificated take-off mass in excess of 5 700 kg or authorized to carry more than 19 passengers shall be equipped with an airborne collision avoidance system (ACAS II).

6.18.3 **Recommendation.—** *All aeroplanes should be equipped with an airborne collision avoidance system (ACAS II).*

6.18.4 An airborne collision avoidance system shall operate in accordance with the relevant provisions of Annex 10, Volume IV.

6.19 Requirements for pressure-altitude reporting transponders

6.19.1 All aeroplanes shall be equipped with a pressure-altitude reporting transponder which operates in accordance with the relevant provisions of Annex 10, Volume IV.

6.19.2 All aeroplanes for which the individual certificate of airworthiness is first issued after 1 January 2009 shall be equipped with a data source that provides pressure-altitude information with a resolution of 7.62 m (25 ft), or better.

6.19.3 After 1 January 2012, all aeroplanes shall be equipped with a data source that provides pressure-altitude information with a resolution of 7.62 m (25 ft), or better.

6.19.4 **Recommendation.** *The Mode S transponder should be provided with the airborne/on-the-ground status if the aeroplane is equipped with an automatic means of detecting such status.*

Note 1.— These provisions will improve the effectiveness of airborne collision avoidance systems as well as air traffic services that employ Mode S radar. In particular, tracking processes are significantly enhanced with a resolution of 7.62 m (25 ft), or better.

Note 2.— Mode C replies of transponders always report pressure altitude in 30.50 m (100 ft) increments irrespective of the resolution of the data source.

6.20 Microphones

All flight crew members required to be on flight deck duty shall communicate through boom or throat microphones below the transition level/altitude.

6.21 Turbo-jet aeroplanes — forward-looking wind shear warning system

6.21.1 **Recommendation.—** *All turbo-jet aeroplanes of a maximum certificated take-off mass in excess of 5 700 kg or authorized to carry more than nine passengers should be equipped with a forward-looking wind shear warning system.*

6.21.2 **Recommendation.—** *A forward-looking wind shear warning system should be capable of providing the pilot with a timely aural and visual warning of wind shear ahead of the aircraft, and the information required to permit the pilot to safely commence and continue a missed approach or go-around or to execute an escape manoeuvre if necessary. The system should also provide an indication to the pilot when the limits specified for the certification of automatic landing equipment are being approached, when such equipment is in use.*

6.22 All aeroplanes operated by a single pilot under the instrument flight rules (IFR) or at night

For approval in accordance with 4.9.1, all aeroplanes operated by a single pilot under the IFR or at night shall be equipped with:

a) a serviceable autopilot that has at least altitude hold and heading select modes;

b) a headset with a boom microphone or equivalent; and

c) means of displaying charts that enables them to be readable in all ambient light conditions.

CHAPTER 7. AEROPLANE COMMUNICATION AND NAVIGATION EQUIPMENT

7.1 Communication equipment

7.1.1 An aeroplane shall be provided with radio communication equipment capable of:

a) conducting two-way communication for aerodrome control purposes;

b) receiving meteorological information at any time during flight; and

c) conducting two-way communication at any time during flight with at least one aeronautical station and with such other aeronautical stations and on such frequencies as may be prescribed by the appropriate authority.

Note.— The requirements of 7.1.1 are considered fulfilled if the ability to conduct the communications specified therein is established during radio propagation conditions which are normal for the route.

7.1.2 The radio communication equipment required in accordance with 7.1.1 shall provide for communications on the aeronautical emergency frequency 121.5 MHz.

7.1.3 For flights in defined portions of airspace or on routes where an RCP type has been prescribed, an aeroplane shall, in addition to the requirements specified in 7.1.1:

a) be provided with communication equipment which will enable it to operate in accordance with the prescribed RCP type(s); and

b) be authorized by the State of the Operator for operations in such airspace.

Note.— Information on RCP and associated procedures, and guidance concerning the approval process, are contained in the Manual on Required Communications Performance (RCP) *(Doc 9869)*. This document also contains references to other documents produced by States and international bodies concerning communication systems and RCP.*

7.2 Navigation equipment

7.2.1 An aeroplane shall be provided with navigation equipment which will enable it to proceed:

a) in accordance with its operational flight plan; and

b) in accordance with the requirements of air traffic services;

except when, if not so precluded by the appropriate authority, navigation for flights under the visual flight rules is accomplished by visual reference to landmarks.

7.2.2 For flights in defined portions of airspace or on routes where an RNP type has been prescribed, an aeroplane shall, in addition to the requirements specified in 7.2.1:

a) be provided with navigation equipment which will enable it to operate in accordance with the prescribed RNP type(s); and

b) be authorized by the State of the Operator for operations in such airspace.

Note.— Information on RNP and associated procedures, and guidance concerning the approval process, are contained in the Manual on Required Navigation Performance (RNP) *(Doc 9613). This document also contains a comprehensive list of references to other documents produced by States and international bodies concerning navigation systems and RNP.*

7.2.3 For flights in defined portions of airspace where, based on Regional Air Navigation Agreement, minimum navigation performance specifications (MNPS) are prescribed, an aeroplane shall be provided with navigation equipment which:

a) continuously provides indications to the flight crew of adherence to or departure from track to the required degree of accuracy at any point along that track; and

b) has been authorized by the State of the Operator for MNPS operations concerned.

Note.— The prescribed minimum navigation performance specifications and the procedures governing their application are published in the Regional Supplementary Procedures *(Doc 7030).*

7.2.4 For flights in defined portions of airspace where, based on Regional Air Navigation Agreement, a reduced vertical separation minimum (RVSM) of 300 m (1 000 ft) is applied between FL 290 and FL 410 inclusive, an aeroplane:

a) shall be provided with equipment which is capable of:

*In preparation.

1) indicating to the flight crew the flight level being flown;

2) automatically maintaining a selected flight level;

3) providing an alert to the flight crew when a deviation occurs from the selected flight level. The threshold for the alert shall not exceed ± 90 m (300 ft); and

4) automatically reporting pressure-altitude; and

b) shall be authorized by the State of the Operator for operation in the airspace concerned.

7.2.5 Prior to granting the RVSM approval required in accordance with 7.2.4 b), the State shall be satisfied that:

a) the vertical navigation performance capability of the aeroplane satisfies the requirements specified in Appendix 4;

b) the operator has instituted appropriate procedures in respect of continued airworthiness (maintenance and repair) practices and programmes; and

c) the operator has instituted appropriate flight crew procedures for operations in RVSM airspace.

Note.— An RVSM approval is valid globally on the understanding that any operating procedures specific to a given region will be stated in the operations manual or appropriate crew guidance.

7.2.6 The State of the Operator, in consultation with the State of Registry if appropriate, shall ensure that, in respect of those aeroplanes mentioned in 7.2.4 , adequate provisions exist for:

a) receiving the reports of height-keeping performance issued by the monitoring agencies established in accordance with Annex 11, 3.3.4.1; and

b) taking immediate corrective action for individual aircraft, or aircraft type groups, identified in such reports as not complying with the height-keeping requirements for operation in airspace where RVSM is applied.

7.2.7 All States that are responsible for airspace where RVSM has been implemented, or have issued RVSM approvals to operators within their State, shall establish provisions and procedures which ensure that appropriate action will be taken in respect of aircraft and operators found to be operating in RVSM airspace without a valid RVSM approval.

Note.— These provisions and procedures need to address both the situation where the aircraft in question is operating without approval in the airspace of the State, and the situation where an operator for which the State has regulatory oversight responsibility is found to be operating without the required approval in the airspace of another State.

7.2.8 The aeroplane shall be sufficiently provided with navigation equipment to ensure that, in the event of the failure of one item of equipment at any stage of the flight, the remaining equipment will enable the aeroplane to navigate in accordance with 7.2.1 and where applicable 7.2.2, 7.2.3 and 7.2.4.

Note.— Guidance material relating to aircraft equipment necessary for flight in airspace where RVSM is applied is contained in the Manual on Implementation of a 300 m (1 000 ft) Vertical Separation Minimum Between FL 290 and FL 410 Inclusive *(Doc 9574).*

7.2.9 On flights in which it is intended to land in instrument meteorological conditions, an aeroplane shall be provided with radio equipment capable of receiving signals providing guidance to a point from which a visual landing can be effected. This equipment shall be capable of providing such guidance for each aerodrome at which it is intended to land in instrument meteorological conditions and for any designated alternate aerodromes.

7.3 Installation

The equipment installation shall be such that the failure of any single unit required for either communications or navigation purposes or both will not result in the failure of another unit required for communications or navigation purposes.

7.4 Electronic navigation data management

7.4.1 An operator shall not employ electronic navigation data products that have been processed for application in the air and on the ground unless the State of the Operator has approved the operator's procedures for ensuring that the process applied and the products delivered have met acceptable standards of integrity and that the products are compatible with the intended function of the equipment that will use them. The State of the Operator shall ensure that the operator continues to monitor both process and products.

Note.— Guidance relating to the processes that data suppliers may follow is contained in RTCA DO-200A/EUROCAE ED-76 *and* RTCA DO-201A/EUROCAE ED-77.

7.4.2 An operator shall implement procedures that ensure the timely distribution and insertion of current and unaltered electronic navigation data to all aircraft that require it.

i) a description, when applicable, of the additional procedures for complying with an operator's maintenance procedures and requirements;

j) a description of the procedures for complying with the service information reporting requirements of Annex 8, Part II, 4.2.3 f) and 4.2.4; and

k) a description of the procedure for receiving, assessing, amending and distributing within the maintenance organization all necessary airworthiness data from the type certificate holder or type design organization.

8.7.2.2 The maintenance organization shall ensure that the procedures manual is amended as necessary to keep the information contained therein up to date.

8.7.2.3 Copies of all amendments to the procedures manual shall be furnished promptly to all organizations or persons to whom the manual has been issued.

8.7.3 Safety management

8.7.3.1 States shall establish a safety programme in order to achieve an acceptable level of safety in the maintenance of aircraft.

8.7.3.2 The acceptable level of safety to be achieved shall be established by the State(s) concerned.

Note.— Guidance on safety programmes and on defining acceptable levels of safety is contained in Attachment E to Annex 11 and in the Safety Management Manual (SMM) *(Doc 9859).*

8.7.3.3 **Recommendation.—** *States should require, as part of their safety programme, that a maintenance organization implement a safety management system acceptable to the State that, as a minimum:*

a) identifies safety hazards;

b) ensures that remedial action necessary to maintain an acceptable level of safety is implemented;

c) provides for continuous monitoring and regular assessment of the safety level achieved; and

d) aims to make continuous improvement to the overall level of safety.

8.7.3.4 From 1 January 2009, States shall require, as part of their safety programme, that a maintenance organization implement a safety management system acceptable to the State that, as a minimum:

a) identifies safety hazards;

b) ensures that remedial action necessary to maintain an acceptable level of safety is implemented;

c) provides for continuous monitoring and regular assessment of the safety level achieved; and

d) aims to make continuous improvement to the overall level of safety.

8.7.3.5 A safety management system shall clearly define lines of safety accountability throughout a maintenance organization, including a direct accountability for safety on the part of senior management.

Note.— Guidance on safety management systems is contained in the Safety Management Manual (SMM) *(Doc 9859).*

8.7.4 Maintenance procedures and quality assurance system

8.7.4.1 The maintenance organization shall establish procedures, acceptable to the State granting the approval, which ensure good maintenance practices and compliance with all relevant requirements of this chapter.

8.7.4.2 The maintenance organization shall ensure compliance with 8.7.4.1 by either establishing an independent quality assurance system to monitor compliance with and adequacy of the procedures, or by providing a system of inspection to ensure that all maintenance is properly performed.

8.7.5 Facilities

8.7.5.1 The facilities and working environment shall be appropriate for the task to be performed.

8.7.5.2 The maintenance organization shall have the necessary technical data, equipment, tools and material to perform the work for which it is approved.

8.7.5.3 Storage facilities shall be provided for parts, equipment, tools and material. Storage conditions shall be such as to provide security and prevent deterioration of and damage to stored items.

8.7.6 Personnel

8.7.6.1 The maintenance organization shall nominate a person or group of persons whose responsibilities include ensuring that the maintenance organization is in compliance with the requirements of 8.7 for an approved maintenance organization.

8.7.6.2 The maintenance organization shall employ the necessary personnel to plan, perform, supervise, inspect and release the work to be performed.

8.7.6.3 The competence of maintenance personnel shall be established in accordance with a procedure and to a level acceptable to the State granting the approval. The person signing a maintenance release shall be qualified in accordance with Annex 1.

8.7.6.4 The maintenance organization shall ensure that all maintenance personnel receive initial and continuation training appropriate to their assigned tasks and responsibilities. The training programme established by the maintenance organization shall include training in knowledge and skills related to human performance, including coordination with other maintenance personnel and flight crew.

Note.— Guidance material to design training programmes to develop knowledge and skills in human performance can be found in the Human Factors Training Manual *(Doc 9683)*.

8.7.7 Records

8.7.7.1 The maintenance organization shall retain detailed maintenance records to show that all requirements for the signing of a maintenance release have been met.

8.7.7.2 The records required by 8.7.7.1 shall be kept for a minimum period of one year after the signing of the maintenance release.

8.8 Maintenance release

8.8.1 A maintenance release shall be completed and signed to certify that the maintenance work performed has been completed satisfactorily and in accordance with approved data and the procedures described in the maintenance organization's procedures manual.

8.8.2 A maintenance release shall contain a certification including:

a) basic details of the maintenance carried out including detailed reference of the approved data used;

b) the date such maintenance was completed;

c) when applicable, the identity of the approved maintenance organization; and

d) the identity of the person or persons signing the release.

CHAPTER 11. MANUALS, LOGS AND RECORDS

Note.— The following additional manuals, logs and records are associated with this Annex but are not included in this chapter:

Fuel and oil records — see 4.2.9

Maintenance records — see 8.4

Flight time records — see 4.2.10.3

Flight preparation forms — see 4.3

Operational flight plan — see 4.3.3.1

Pilot-in-command route and airport qualification records — see 9.4.3.4

11.1 Flight manual

Note.— The flight manual contains the information specified in Annex 8.

The flight manual shall be updated by implementing changes made mandatory by the State of Registry.

11.2 Operator's maintenance control manual

The operator's maintenance control manual provided in accordance with 8.2, which may be issued in separate parts, shall contain the following information:

a) a description of the procedures required by 8.1.1 including, when applicable:

   1) a description of the administrative arrangements between the operator and the approved maintenance organization;

   2) a description of the maintenance procedures and the procedures for completing and signing a maintenance release when maintenance is based on a system other than that of an approved maintenance organization.

b) names and duties of the person or persons required by 8.1.4;

c) a reference to the maintenance programme required by 8.3.1;

d) a description of the methods used for the completion and retention of the operator's maintenance records required by 8.4;

e) a description of the procedures for monitoring, assessing and reporting maintenance and operational experience required by 8.5.1;

f) a description of the procedures for complying with the service information reporting requirements of Annex 8, Part II, 4.2.3 f) and 4.2.4;

g) a description of procedures for assessing continuing airworthiness information and implementing any resulting actions, as required by 8.5.2;

h) a description of the procedures for implementing action resulting from mandatory continuing airworthiness information;

i) a description of establishing and maintaining a system of analysis and continued monitoring of the performance and efficiency of the maintenance programme, in order to correct any deficiency in that programme;

j) a description of aircraft types and models to which the manual applies;

k) a description of procedures for ensuring that unserviceabilities affecting airworthiness are recorded and rectified; and

l) a description of the procedures for advising the State of Registry of significant in-service occurrences.

11.3 Maintenance programme

11.3.1 A maintenance programme for each aeroplane as required by 8.3 shall contain the following information:

a) maintenance tasks and the intervals at which these are to be performed, taking into account the anticipated utilization of the aeroplane;

b) when applicable, a continuing structural integrity programme;

c) procedures for changing or deviating from a) and b) above; and

d) when applicable, condition monitoring and reliability programme descriptions for aircraft systems, components and powerplants.

11.3.2 Maintenance tasks and intervals that have been specified as mandatory in approval of the type design shall be identified as such.

11.3.3 **Recommendation.—** *The maintenance programme should be based on maintenance programme information made available by the State of Design or by the organization responsible for the type design, and any additional applicable experience.*

11.4 Journey log book

11.4.1 **Recommendation.—** *The aeroplane journey log book should contain the following items and the corresponding roman numerals:*

I — *Aeroplane nationality and registration.*

II — *Date.*

III — *Names of crew members.*

IV — *Duty assignments of crew members.*

V — *Place of departure.*

VI — *Place of arrival.*

VII — *Time of departure.*

VIII — *Time of arrival.*

IX — *Hours of flight.*

X — *Nature of flight (private, aerial work, scheduled or non-scheduled).*

XI — *Incidents, observations, if any.*

XII — *Signature of person in charge.*

11.4.2 **Recommendation.—** *Entries in the journey log book should be made currently and in ink or indelible pencil.*

11.4.3 **Recommendation.—** *Completed journey log book should be retained to provide a continuous record of the last six months' operations.*

11.5 Records of emergency and survival equipment carried

Operators shall at all times have available for immediate communication to rescue coordination centres, lists containing information on the emergency and survival equipment carried on board any of their aeroplanes engaged in international air navigation. The information shall include, as applicable, the number, colour and type of life rafts and pyrotechnics, details of emergency medical supplies, water supplies and the type and frequencies of the emergency portable radio equipment.

11.6 Flight recorder records

An operator shall ensure, to the extent possible, in the event the aeroplane becomes involved in an accident or incident, the preservation of all related flight recorder records and, if necessary, the associated flight recorders, and their retention in safe custody pending their disposition as determined in accordance with Annex 13.

APPENDIX 2. ORGANIZATION AND CONTENTS OF AN OPERATIONS MANUAL

(See Chapter 4, 4.2.2.1)

1. Organization

1.1 **Recommendation.—** *An operations manual, which may be issued in separate parts corresponding to specific aspects of operations, provided in accordance with Chapter 4, 4.2.2.1 should be organized with the following structure:*

a) General;

b) Aircraft operating information;

c) Areas, routes and aerodromes; and

d) Training.

1.2 From 1 January 2006, an operations manual, which may be issued in separate parts corresponding to specific aspects of operations, provided in accordance with Chapter 4, 4.2.2.1 shall be organized with the following structure:

a) General;

b) Aircraft operating information;

c) Areas, routes and aerodromes; and

d) Training.

2. Contents

The operations manual referred to in 1.1 and 1.2 shall contain at the least the following:

2.1 General

2.1.1 Instructions outlining the responsibilities of operations personnel pertaining to the conduct of flight operations.

2.1.2 Rules limiting the flight time and flight duty periods and providing for adequate rest periods for flight crew members and cabin crew as required by Chapter 4, 4.2.10.2.

2.1.3 A list of the navigational equipment to be carried including any requirements relating to operations in RNP airspace.

2.1.4 Where relevant to the operations, the long-range navigation procedures, engine failure procedure for ETOPS and the nomination and utilization of diversion aerodromes.

2.1.5 The circumstances in which a radio listening watch is to be maintained.

2.1.6 The method for determining minimum flight altitudes.

2.1.7 The methods for determining aerodrome operating minima.

2.1.8 Safety precautions during refuelling with passengers on board.

2.1.9 Ground handling arrangements and procedures.

2.1.10 Procedures, as prescribed in Annex 12, for pilots-in-command observing an accident.

2.1.11 The flight crew for each type of operation including the designation of the succession of command.

2.1.12 Specific instructions for the computation of the quantities of fuel and oil to be carried, having regard to all circumstances of the operation including the possibility of loss of pressurization and the failure of one or more power-units while en route.

2.1.13 The conditions under which oxygen shall be used and the amount of oxygen determined in accordance with Chapter 4, 4.3.8.2.

2.1.14 Instructions for mass and balance control.

2.1.15 Instructions for the conduct and control of ground de-icing/anti-icing operations.

2.1.16 The specifications for the operational flight plan.

2.1.17 Standard operating procedures (SOP) for each phase of flight.

2.1.18 Instructions on the use of normal checklists and the timing of their use.

2.1.19 Departure contingency procedures.

2.1.20 Instructions on the maintenance of altitude awareness and the use of automated or flight crew altitude call-out.

2.1.21 Instructions on the use of autopilots and auto-throttles in IMC.

2.1.22 Instructions on the clarification and acceptance of ATC clearances, particularly where terrain clearance is involved.

2.1.23 Departure and approach briefings.

2.1.24 Procedures for familiarization with areas, routes and aerodromes.

2.1.25 Stabilized approach procedure.

2.1.26 Limitation on high rates of descent near the surface.

2.1.27 Conditions required to commence or to continue an instrument approach.

2.1.28 Instructions for the conduct of precision and non-precision instrument approach procedures.

2.1.29 Allocation of flight crew duties and procedures for the management of crew workload during night and IMC instrument approach and landing operations.

2.1.30 Instructions and training requirements for the avoidance of controlled flight into terrain and policy for the use of the ground proximity warning system (GPWS).

2.1.31 Policy, instructions, procedures and training requirements for the avoidance of collisions and the use of the airborne collision avoidance system (ACAS).

Note.— Procedures for the operation of ACAS are contained in PANS-OPS (Doc 8168), Volume I, Part VIII, Chapter 3, and in PANS-ATM (Doc 4444), Chapters 12 and 15.

2.1.32 Information and instructions relating to the interception of civil aircraft including:

a) procedures, as prescribed in Annex 2, for pilots-in-command of intercepted aircraft; and

b) visual signals for use by intercepting and intercepted aircraft, as contained in Annex 2.

2.1.33 For aeroplanes intended to be operated above 15 000 m (49 000 ft):

a) information which will enable the pilot to determine the best course of action to take in the event of exposure to solar cosmic radiation; and

b) procedures in the event that a decision to descend is taken, covering:

1) the necessity of giving the appropriate ATS unit prior warning of the situation and of obtaining a provisional descent clearance; and

2) the action to be taken in the event that communication with the ATS unit cannot be established or is interrupted.

Note.— Guidance material on the information to be provided is contained in Circular 126 — Guidance Material on SST Aircraft Operations.

2.1.34 Details of the accident prevention and flight safety programme provided in accordance with Chapter 3, 3.2, including a statement of safety policy and the responsibility of personnel.

2.1.35 Information and instructions on the carriage of dangerous goods, including action to be taken in the event of an emergency.

Note.— Guidance material on the development of policies and procedures for dealing with dangerous goods incidents on board aircraft is contained in Emergency Response Guidance for Aircraft Incidents involving Dangerous Goods (Doc 9481).

2.1.36 Security instructions and guidance.

2.1.37 The search procedure checklist provided in accordance with Chapter 13, 13.3.

2.2 Aircraft operating information

2.2.1 Certification limitations and operating limitations.

2.2.2 The normal, abnormal and emergency procedures to be used by the flight crew and the checklists relating thereto as required by Chapter 6, 6.1.4.

2.2.3 Operating instructions and information on climb performance with all engines operating, if provided in accordance with Chapter 4, 4.2.3.3.

2.2.4 Flight planning data for pre-flight and in-flight planning with different thrust/power and speed settings.

2.2.5 The maximum crosswind and tailwind components for each aeroplane type operated and the reductions to be applied to these values having regard to gusts, low visibility, runway surface conditions, crew experience, use of autopilot, abnormal or emergency circumstances, or any other relevant operational factors.

2.2.6 Instructions and data for mass and balance calculations.

2.2.7 Instructions for aircraft loading and securing of load.

2.2.8 Aircraft systems, associated controls and instructions for their use, as required by Chapter 6, 6.1.4.

2.2.9 The minimum equipment list and configuration deviation list for the aeroplane types operated and specific operations authorized, including any requirements relating to operations in RNP airspace.

2.2.10 Checklist of emergency and safety equipment and instructions for its use.

2.2.11 Emergency evacuation procedures, including type-specific procedures, crew coordination, assignment of crew's emergency positions and the emergency duties assigned to each crew member.

2.2.12 The normal, abnormal and emergency procedures to be used by the cabin crew, the checklists relating thereto and aircraft systems information as required, including a statement related to the necessary procedures for the coordination between flight and cabin crew.

2.2.13 Survival and emergency equipment for different routes and the necessary procedures to verify its normal functioning before take-off, including procedures to determine the required amount of oxygen and the quantity available.

2.2.14 The ground-air visual signal code for use by survivors, as contained in Annex 12.

2.3 Routes and aerodromes

2.3.1 A route guide to ensure that the flight crew will have, for each flight, information relating to communication facilities, navigation aids, aerodromes, instrument approaches, instrument arrivals and instrument departures as applicable for the operation, and such other information as the operator may deem necessary for the proper conduct of flight operations.

2.3.2 The minimum flight altitudes for each route to be flown.

2.3.3 Aerodrome operating minima for each of the aerodromes that are likely to be used as aerodromes of intended landing or as alternate aerodromes.

2.3.4 The increase of aerodrome operating minima in case of degradation of approach or aerodrome facilities.

2.3.5 The necessary information for compliance with all flight profiles required by regulations, including but not limited to, the determination of:

a) take-off runway length requirements for dry, wet and contaminated conditions, including those dictated by system failures which affect the take-off distance;

b) take-off climb limitations;

c) en-route climb limitations;

d) approach climb limitations and landing climb limitations;

e) landing runway length requirements for dry, wet and contaminated conditions, including systems failures which affect the landing distance; and

f) supplementary information, such as tire speed limitations.

2.4 Training

2.4.1 Details of the flight crew training programme, as required by Chapter 9, 9.3.

2.4.2 Details of the cabin crew duties training programme as required by Chapter 12, 12.4.

2.4.3 Details of the flight operations officer/flight dispatcher training programme when employed in conjunction with a method of flight supervision in accordance with Chapter 4, 4.2.1.

Note.— Details of the flight operations officer/flight dispatcher training programme are contained in Chapter 10, 10.2.

COVER SHEET TO AMENDMENT 26

INTERNATIONAL STANDARDS
AND RECOMMENDED PRACTICES

OPERATION OF AIRCRAFT

ANNEX 6
TO THE CONVENTION ON INTERNATIONAL CIVIL AVIATION

PART II
INTERNATIONAL GENERAL AVIATION — AEROPLANES

SIXTH EDITION — JULY 1998

INTERNATIONAL CIVIL AVIATION ORGANIZATION

Checklist of Amendments to Annex 6, Part II

	Effective date	*Date of applicability*
Sixth Edition (incorporates Amendments 1 to 18)	20 July 1998	5 November 1998
Amendment 19 (adopted by the Council on 15 March 1999)	19 July 1999	4 November 1999
Amendment 20 (adopted by the Council on 15 March 2000)	17 July 2000	2 November 2000
Amendment 21 (adopted by the Council on 9 March 2001)	16 July 2001	1 November 2001
Amendment 22 (adopted by the Council on 15 March 2002)	15 July 2002	28 November 2002
Amendment 23 (adopted by the Council on 13 March 2003)	14 July 2003	27 November 2003
Amendment 24 (adopted by the Council on 28 February 2005)	11 July 2005	24 November 2005
Amendment 25 (approved by the Council on 6 March 2006)	—	—
Amendment 26 (adopted by the Council on 14 March 2007) Replacement pages (v), (vi), (xiv), 3, 3A, 15, 16A, 16B, 17, 18 and 19	16 July 2007	22 November 2007 1 July 2008

Transmittal note

Amendment 26

to the

International Standards and
Recommended Practices

OPERATION OF AIRCRAFT

(Annex 6, Part II to the Convention on International Civil Aviation)

1. Insert the following replacement pages in Annex 6, Part II (Sixth Edition) to incorporate Amendment 26 which becomes applicable on 22 November 2007:

a) Page (v)	—	Abbreviations and Symbols
b) Page (vi)	—	Publications
c) Page (xiv)	—	Foreword
d) Pages 3 and 3A	—	Chapter 1
e) Pages 15, 16A and 16B	—	Chapter 6
f) Pages 17 and 18	—	Chapter 7
g) Page 19	—	Chapter 8

2. Record the entry of this amendment on page (ii).

ABBREVIATIONS AND SYMBOLS
(used in this Annex)

Abbreviations

ACAS	Airborne collision avoidance system
ADREP	Accident/incident reporting
ADS-C	Automatic dependent surveillence — contract
AFCS	Automatic flight control system
AGA	Aerodromes, air routes and ground aids
AIG	Accident investigation and prevention
ASIA/PAC	Asia/Pacific
ASE	Altimetry system error
ATC	Air traffic control
ATS	Air traffic services
CAT I	Category I
CAT II	Category II
CAT III	Category III
CAT IIIA	Category IIIA
CAT IIIB	Category IIIB
CAT IIIC	Category IIIC
CFIT	Controlled flight into terrain
cm	Centimetre
CVR	Cockpit voice recorder
DA	Decision altitude
DA/H	Decision altitude/height
DH	Decision height
DME	Distance measuring equipment
ECAM	Electronic centralized aircraft monitor
EFIS	Electronic flight instrument system
EGT	Exhaust gas temperature
EICAS	Engine indication and crew alerting system
ELT	Emergency locator transmitter
ELT(AF)	Automatic fixed ELT
ELT(AP)	Automatic portable ELT
ELT(AD)	Automatic deployable ELT
ELT(S)	Survival ELT
EPR	Engine pressure ratio
EUROCAE	European Organization for Civil Aviation Equipment
FDAU	Flight data acquisition unit
FDR	Flight data recorder
FL	Flight level
FM	Frequency modulation
ft	Foot
g	Normal acceleration

Abbreviations

GPWS	Ground proximity warning system
hPa	Hectopascal
IFR	Instrument flight rules
IMC	Instrument meteorological conditions
INS	Inertial navigation systems
kg	Kilogram
km	Kilometre
km/h	Kilometres per hour
kt	Knot
m	Metre
MDA	Minimum descent altitude
MDA/H	Minimum descent altitude/height
MDH	Minimum descent height
MHz	Megahertz
MNPS	Minimum navigation performance specifications
NAV	Navigation
NM	Nautical mile
N1	High pressure turbine speed
OCA	Obstacle clearance altitude
OCA/H	Obstacle clearance altitude/height
OCH	Obstacle clearance height
RCP	Required communication performance
RNP	Required navigation performance
RVR	Runway visual range
RVSM	Reduced vertical separation minima
SI	International System of Units
SICASP	Secondary Surveillance Radar Improvements and Collision Avoidance Systems Panel
TLS	Target level of safety
TVE	Total vertical error
UTC	Coordinated universal time
V_D	Design diving speed
VFR	Visual flight rules
VMC	Visual meteorological conditions
V_{S0}	Stalling speed or the minimum steady flight speed in the landing configuration
WXR	Weather

Symbols

°C	Degrees Celsius
%	Per cent

PUBLICATIONS
(referred to in this Annex)

Convention on International Civil Aviation (Doc 7300)

International Regulations for Preventing Collisions at Sea

European Organization for Civil Aviation Equipment (EUROCAE) Documents ED55 and ED56A

Policy and Guidance Material on the Economic Regulation of International Air Transport (Doc 9587)

Annexes to the Convention on International Civil Aviation

Annex 1 — *Personnel Licensing*

Annex 2 — *Rules of the Air*

Annex 3 — *Meteorological Service for International Air Navigation*

Annex 5 — *Units of Measurement to be Used in Air and Ground Operations*

Annex 6 — *Operation of Aircraft*
Part I — *International Commercial Air Transport — Aeroplanes*
Part III — *International Operations — Helicopters*

Annex 8 — *Airworthiness of Aircraft*

Annex 10 — *Aeronautical Telecommunications*
Volume III (Part I — *Digital Data Communication Systems,* Part II — *Voice Communication Systems*)
Volume IV *(Surveillance Radar and Collision Avoidance Systems)*

Annex 11 — *Air Traffic Services*

Annex 12 — *Search and Rescue*

Annex 13 — *Aircraft Accident and Incident Investigation*

Annex 14 — *Aerodromes*
Volume I — *Aerodrome Design and Operations*

Annex 15 — *Aeronautical Information Services*

Annex 16 — *Environmental Protection*
Volume I — *Aircraft Noise*

Annex 18 — *The Safe Transport of Dangerous Goods by Air*

Procedures for Air Navigation Services

OPS — Aircraft Operations (Doc 8168)
Volume I — *Flight Procedures*
Volume II — *Construction of Visual and Instrument Flight Procedures*

ATM — Air Traffic Management (Doc 4444)

Protocol Relating to an Amendment to the Convention on International Civil Aviation (*Article 83* bis) (Doc 9318)

Regional Supplementary Procedures (Doc 7030)

Manuals

Accident/Incident Reporting Manual (ADREP Manual) (Doc 9156)

Airport Services Manual (Doc 9137)
Part 1 — *Rescue and Fire Fighting*
Part 8 — *Airport Operational Services*

Airworthiness Manual (Doc 9760)

Manual of Civil Aviation Medicine (Doc 8984)

Manual on Implementation of a 300 m (1 000 ft) Vertical Separation Minimum Between FL 290 and FL 410 Inclusive (Doc 9574)

Manual on Required Communications Performance (RCP) (Doc 9869)

Manual on Required Navigation Performance (RNP) (Doc 9613)

Amendment	*Source(s)*	*Subject(s)*	*Adopted/Approved Effective Applicable*
18 (6th Edition)	First meeting of the Flight Recorder Panel, ICAO and Industry CFIT Task Force, Air Navigation Commission studies, Amendment 162 to Annex 1, Amendment 38 to Annex 11, editorial amendment	a) Introduction of new and revised definitions for psychoactive substances and required navigation performance; b) revision of the notes concerning lease and interchange; c) introduction of a note concerning use of psychoactive substances; and d) new and revised provisions concerning ground proximity warning systems, pressure-altitude reporting transponders and flight recorders.	20 March 1998 20 July 1998 5 November 1998
19	Second meeting of the Flight Recorder Panel, Air Navigation Commission studies	a) Revised definitions; and b) new provisions concerning the mandatory carriage of ELTs operating on 406 MHz and 121.5 MHz, the addition of a predictive terrain hazard warning function to the ground proximity warning system (GPWS), pressure-altitude reporting transponders and the introduction of an implementation date for the recording of digital communications.	15 March 1999 19 July 1999 4 November 1999
20	Air Navigation Commission studies	a) Revised definitions; and b) revision of the duties of the pilot-in-command and the introduction of criteria for instrument approach operations.	15 March 2000 17 July 2000 2 November 2000
21	Second meeting of the Flight Recorder Panel, Third meeting of the Global Navigation Satellite System Panel, Fifth meeting of the Continuing Airworthiness Panel	a) Update of the provisions pertaining to flight recorders, including the recording of digital communications; FDR requirements for new aircraft; revised parameter listings; introduction of two-hour duration CVRs; b) amendment of the classification of instrument approach and landing operations; c) new provisions pertaining to approach with vertical guidance (APV) operations; and d) new definitions and update of provisions pertaining to maintenance-related requirements.	9 March 2001 16 July 2001 1 November 2001
22	Air Navigation Commission studies	Revised requirements for the ground proximity warning system (GPWS) and forward looking terrain avoidance function.	15 March 2002 15 July 2002 28 November 2002
23	Separation and Airspace Safety Panel	Authorization by the State of Registry for operations in RNP airspace.	13 March 2003 14 July 2003 27 November 2003
24	Separation and Airspace Safety Panel and Air Navigation Commission studies	a) New definitions and provisions regarding height-keeping performance and height-monitoring requirements associated with reduced vertical separation minimum (RVSM) operations; and b) new requirements for the carriage of airborne collision avoidance systems (ACAS II) in general aviation aeroplanes, and associated training requirements for pilots.	28 February 2005 11 July 2005 24 November 2005
25	Fourteenth meeting of the Obstacle Clearance Panel (OCP/14)	Pilot awareness of operational requirements determined by procedure design.	6 March 2006 — —

Amendment	*Source(s)*	*Subject(s)*	*Adopted/Approved* *Effective* *Applicable*
26	First meeting of the Operational Data Link Panel (OPLINKP/1) and Air Navigation Commission study	a) Amendments to Standards to facilitate implementation of the available technology in relation to the use of automatic dependent surveillance — contract (ADSC) and to the introduction of required communication performance (RCP) in the provision of air traffic services (ATS); and b) mandatory carriage requirements of emergency locator transmitters (ELTs).	14 March 2007 16 July 2007 22 November 2007 1 July 2008

Flight time — aeroplanes. The total time from the moment an aeroplane first moves for the purpose of taking off until the moment it finally comes to rest at the end of the flight.

Note.— Flight time as here defined is synonymous with the term "block to block" time or "chock to chock" time in general usage which is measured from the time an aeroplane first moves for the purpose of taking off until it finally stops at the end of the flight.

General aviation operation. An aircraft operation other than a commercial air transport operation or an aerial work operation.

Instrument meteorological conditions (IMC). Meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling*, less than the minima specified for visual meteorological conditions.

Note.— The specified minima for visual meteorological conditions are contained in Chapter 4 of Annex 2.

Maintenance. The performance of tasks required to ensure the continuing airworthiness of an aircraft, including any one or combination of overhaul, inspection, replacement, defect rectification, and the embodiment of a modification or repair.

Maintenance programme. A document which describes the specific scheduled maintenance tasks and their frequency of completion and related procedures, such as a reliability programme, necessary for the safe operation of those aircraft to which it applies.

Maintenance release. A document which contains a certification confirming that the maintenance work to which it relates has been completed in a satisfactory manner, either in accordance with the approved data and the procedures described in the maintenance organization's procedures manual or under an equivalent system.

Meteorological information. Meteorological report, analysis, forecast, and any other statement relating to existing or expected meteorological conditions.

Minimum descent altitude (MDA) or ***minimum descent height (MDH).*** A specified altitude or height in a non-precision approach or circling approach below which descent must not be made without the required visual reference.

Note 1.— Minimum descent altitude (MDA) is referenced to mean sea level and minimum descent height (MDH) is referenced to the aerodrome elevation or to the threshold elevation if that is more than 2 m (7 ft) below the aerodrome elevation. A minimum descent height for a circling approach is referenced to the aerodrome elevation.

Note 2.— The required visual reference means that section of the visual aids or of the approach area which should have been in view for sufficient time for the pilot to have made an assessment of the aircraft position and rate of change of position, in relation to the desired flight path. In the case of a circling approach the required visual reference is the runway environment.

Note 3.— For convenience when both expressions are used they may be written in the form "minimum descent altitude/height" and abbreviated "MDA/H".

Night. The hours between the end of evening civil twilight and the beginning of morning civil twilight or such other period between sunset and sunrise, as may be prescribed by the appropriate authority.

Note.— Civil twilight ends in the evening when the centre of the sun's disc is 6 degrees below the horizon and begins in the morning when the centre of the sun's disc is 6 degrees below the horizon.

Obstacle clearance altitude (OCA) or ***obstacle clearance height (OCH).*** The lowest altitude or the lowest height above the elevation of the relevant runway threshold or the aerodrome elevation as applicable, used in establishing compliance with appropriate obstacle clearance criteria.

Note 1.— Obstacle clearance altitude is referenced to mean sea level and obstacle clearance height is referenced to the threshold elevation or in the case of non-precision approaches to the aerodrome elevation or the threshold elevation if that is more than 2 m (7 ft) below the aerodrome elevation. An obstacle clearance height for a circling approach is referenced to the aerodrome elevation.

Note 2.— For convenience when both expressions are used they may be written in the form "obstacle clearance altitude/height" and abbreviated "OCA/H".

Pilot-in-command. The pilot designated by the operator, or in the case of general aviation, the owner, as being in command and charged with the safe conduct of a flight.

Psychoactive substances. Alcohol, opioids, cannabinoids, sedatives and hypnotics, cocaine, other psychostimulants, hallucinogens, and volatile solvents, whereas coffee and tobacco are excluded.

Required communication performance (RCP). A statement of the performance requirements for operational communication in support of specific ATM functions.

Required communication performance type (RCP type). A label (e.g. RCP 240) that represents the values assigned to RCP parameters for communication transaction time, continuity, availability and integrity.

Repair. The restoration of an aeronautical product to an airworthy condition to ensure that the aircraft continues to

*As defined in Annex 2.

comply with the design aspects of the appropriate airworthiness requirements used for the issuance of the type certificate for the respective aircraft type, after it has been damaged or subjected to wear.

Required navigation performance (RNP). A statement of the navigation performance necessary for operation within a defined airspace.

Note.— Navigation performance and requirements are defined for a particular RNP type and/or application.

RNP type. A containment value expressed as a distance in nautical miles from the intended position within which flights would be for at least 95 per cent of the total flying time.

Example.— RNP 4 represents a navigation accuracy of plus or minus 7.4 km (4 NM) on a 95 per cent containment basis.

Runway visual range (RVR). The range over which the pilot of an aircraft on the centre line of a runway can see the runway surface markings or the lights delineating the runway or identifying its centre line.

State of Registry. The State on whose register the aircraft is entered.

Note.— In the case of the registration of aircraft of an international operating agency on other than a national basis, the States constituting the agency are jointly and severally bound to assume the obligations which, under the Chicago Convention, attach to a State of Registry. See, in this regard, the Council Resolution of 14 December 1967 on Nationality and Registration of Aircraft Operated by International Operating Agencies which can be found in Policy and Guidance Material on the Economic Regulation of International Air Transport *(Doc 9587).*

Target level of safety (TLS). A generic term representing the level of risk which is considered acceptable in particular circumstances.

Total vertical error (TVE). The vertical geometric difference between the actual pressure altitude flown by an aircraft and its assigned pressure altitude (flight level).

Visual meteorological conditions (VMC). Meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling*, equal to or better than specified minima.

Note.— The specified minima are contained in Chapter 4 of Annex 2.

*As defined in Annex 2.

6.10.1.4.1 The use of photographic film flight data recorders shall be discontinued from 1 January 2003.

6.10.1.5 All aeroplanes for which the individual certificate of airworthiness is first issued after 1 January 2005, which utilize data link communications and are required to carry a cockpit voice recorder (CVR), shall record on a flight recorder, all data link communications to and from the aeroplane. The minimum recording duration shall be equal to the duration of the CVR, and shall be correlated to the recorded cockpit audio.

6.10.1.5.1 From 1 January 2007, all aeroplanes which utilize data link communications and are required to carry a CVR, shall record on a flight recorder, all data link communications to and from the aeroplane. The minimum recording duration shall be equal to the duration of the CVR, and shall be correlated to the recorded cockpit audio.

6.10.1.5.2 Sufficient information to derive the content of the data link communications message, and, whenever practical, the time the message was displayed to or generated by the crew shall be recorded.

Note.— Data link communications include, but are not limited to, automatic dependent surveillance — contract (ADS-C), controller-pilot data link communications (CPDLC), data link-flight information services (D-FIS) and aeronautical operational control (AOC) messages.

6.10.1.6 **Recommendation.—** *All aeroplanes of a maximum certificated take-off mass over 5 700 kg, required to be equipped with a flight data recorder and a cockpit voice recorder, may alternatively be equipped with two combination recorders (FDR/CVR).*

6.10.1.7 A Type IA flight data recorder shall record the parameters required to determine accurately the aeroplane flight path, speed, attitude, engine power, configuration and operation. The parameters that satisfy the requirements for a Type IA flight data recorder are listed in the paragraphs below. The parameters without an asterisk (*) are mandatory parameters which shall be recorded. In addition, the parameters designated by an asterisk (*) shall be recorded if an information data source for the parameter is used by aeroplane systems or the flight crew to operate the aeroplane.

6.10.1.7.1 The following parameters satisfy the requirements for flight path and speed:

– Pressure altitude
– Indicated airspeed or calibrated airspeed
– Air – ground status and each landing gear air-ground sensor when practicable
– Total or outside air temperature
– Heading (primary flight crew reference)
– Normal acceleration
– Lateral acceleration
– Longitudinal acceleration (body axis)
– Time or relative time count
– Navigation data*: drift angle, wind speed, wind direction, latitude/longitude
– Groundspeed*
– Radio altitude*

6.10.1.7.2 The following parameters satisfy the requirements for attitude:

– Pitch attitude
– Roll attitude
– Yaw or sideslip angle*
– Angle of attack*

6.10.1.7.3 The following parameters satisfy the requirements for engine power:

– Engine thrust/power: propulsive thrust/power on each engine, cockpit thrust/power lever position
– Thrust reverse status*
– Engine thrust command*
– Engine thrust target*
– Engine bleed valve position*
– Additional engine parameters*: EPR, N_1, indicated vibration level, N_2, EGT, TLA, fuel flow, fuel cut-off lever position, N_3

6.10.1.7.4 The following parameters satisfy the requirements for configuration:

– Pitch trim surface position
– Flaps*: trailing edge flap position, cockpit control selection
– Slats*: leading edge flap (slat) position, cockpit control selection
– Landing gear*: landing gear, gear selector position
– Yaw trim surface position*
– Roll trim surface position*
– Cockpit trim control input position pitch*
– Cockpit trim control input position roll*
– Cockpit trim control input position yaw*
– Ground spoiler and speed brake*: ground spoiler position, ground spoiler selection, speed brake position, speed brake selection
– De-icing and/or anti-icing systems selection*
– Hydraulic pressure (each system)*
– Fuel quantity*
– AC electrical bus status*
– DC electrical bus status*
– APU bleed valve position*
– Computed centre of gravity*

6.10.1.7.5 The following parameters satisfy the requirements for operation:

– Warnings
– Primary flight control surface and primary flight control pilot input: pitch axis, roll axis, yaw axis
– Marker beacon passage

– Each navigation receiver frequency selection
– Manual radio transmission keying and CVR/FDR synchronization reference
– Autopilot/autothrottle/AFCS mode and engagement status*
– Selected barometric setting*: pilot, first officer
– Selected altitude (all pilot selectable modes of operation)*
– Selected speed (all pilot selectable modes of operation)*
– Selected mach (all pilot selectable modes of operation)*
– Selected vertical speed (all pilot selectable modes of operation)*
– Selected heading (all pilot selectable modes of operation)*
– Selected flight path (all pilot selectable modes of operation)*: course/DSTRK, path angle
– Selected decision height*
– EFIS display format*: pilot, first officer
– Multi-function/engine/alerts display format*
– GPWS/TAWS/GCAS status*: selection of terrain display mode including pop-up display status, terrain alerts, both cautions and warnings, and advisories, on/off switch position
– Low pressure warning*: hydraulic pressure, pneumatic pressure
– Computer failure*
– Loss of cabin pressure*
– TCAS/ACAS (traffic alert and collision avoidance system/airborne collision avoidance system)*
– Ice detection*
– Engine warning each engine vibration*
– Engine warning each engine over temperature*
– Engine warning each engine oil pressure low*
– Engine warning each engine over speed*
– Wind shear warning*
– Operational stall protection, stick shaker and pusher activation*
– All cockpit flight control input forces*: control wheel, control column, rudder pedal cockpit input forces
– Vertical deviation*: ILS glide path, MLS elevation, GNSS approach path
– Horizontal deviation*: ILS localizer, MLS azimuth, GNSS approach path
– DME 1 and 2 distances*
– Primary navigation system reference*: GNSS, INS, VOR/DME, MLS, Loran C, ILS
– Brakes*: left and right brake pressure, left and right brake pedal position
– Date*
– Event marker*
– Head up display in use*
– Para visual display on*

Note 1.— Parameter requirements, including range, sampling, accuracy and resolution, as contained in the Minimum Operational Performance Specification (MOPS) document for Flight Recorder Systems of the European Organization for Civil Aviation Equipment (EUROCAE) or equivalent documents.

Note 2.— The number of parameters to be recorded will depend on aeroplane complexity. Parameters without an (*) are to be recorded regardless of aeroplane complexity. Those parameters designated by an (*) are to be recorded if an information source for the parameter is used by aeroplane systems and/or flight crew to operate the aeroplane.

6.10.2 Flight data recorders — duration

Types I and II flight data recorders shall be capable of retaining the information recorded during at least the last 25 hours of their operation.

6.10.3 Flight data recorders — aeroplanes for which the individual certificate of airworthiness is first issued on or after 1 January 1989

6.10.3.1 All aeroplanes of a maximum certificated take-off mass of over 27 000 kg shall be equipped with a Type I flight data recorder.

6.10.3.2 **Recommendation.—** *All aeroplanes of a maximum certificated take-off mass of over 5 700 kg up to and including 27 000 kg should be equipped with a Type II flight data recorder.*

6.10.4 Flight data recorders — aeroplanes for which the individual certificate of airworthiness is first issued after 1 January 2005

All aeroplanes of a maximum certificated take-off mass of over 5 700 kg shall be equipped with a Type IA flight data recorder.

6.10.5 Cockpit voice recorders — aeroplanes for which the individual certificate of airworthiness is first issued on or after 1 January 1987

Note.— Cockpit voice recorder performance requirements are as contained in the Minimum Operational Performance Specifications (MOPS) document for Flight Recorder Systems of the European Organization for Civil Aviation Equipment (EUROCAE) or equivalent documents.

6.10.5.1 All aeroplanes of a maximum certificated take-off mass of over 27 000 kg shall be equipped with a cockpit voice recorder, the objective of which is the recording of the aural environment on the flight deck during flight time.

6.10.5.2 **Recommendation.—** *All aeroplanes of a maximum certificated take-off mass of over 5 700 kg up to and including 27 000 kg should be equipped with a cockpit voice recorder, the objective of which is the recording of the aural environment on the flight deck during flight time.*

6.10.6 Cockpit voice recorders — duration

6.10.6.1 A cockpit voice recorder shall be capable of retaining the information recorded during at least the last 30 minutes of its operation.

6.10.6.2 **Recommendation.—** *A cockpit voice recorder, installed in aeroplanes of a maximum certificated take-off mass of over 5 700 kg for which the individual certificate of airworthiness is first issued on or after 1 January 1990, should be capable of retaining the information recorded during at least the last two hours of its operation.*

6.10.6.3 A cockpit voice recorder, installed in aeroplanes of a maximum certificated take-off mass of over 5 700 kg for which the individual certificate of airworthiness is first issued after 1 January 2003, shall be capable of retaining the information recorded during at least the last two hours of its operation.

6.10.7 Flight recorders — construction and installation

Flight recorders shall be constructed, located and installed so as to provide maximum practical protection for the recordings in order that the recorded information may be preserved, recovered and transcribed. Flight recorders shall meet the prescribed crashworthiness and fire protection specifications.

Note.— Industry crashworthiness and fire protection specifications can be found in documents such as the European Organization for Civil Aviation Equipment (EUROCAE) documents ED55 and ED56A.

6.10.8 Flight recorders — operation

6.10.8.1 Flight recorders shall not be switched off during flight time.

6.10.8.2 To preserve flight recorder records, flight recorders shall be de-activated upon completion of flight time following an accident or incident. The flight recorders shall not be re-activated before their disposition as determined in accordance with Annex 13.

Note 1.— The need for removal of the flight recorder records from the aircraft will be determined by the investigation authority in the State conducting the investigation with due regard to the seriousness of an occurrence and the circumstances, including the impact on the operation.

Note 2.— The pilot-in-command's responsibilities regarding the retention of flight recorder records are contained in 6.10.9.

6.10.9 Flight recorder records

The pilot-in-command shall ensure, to the extent possible, in the event the aeroplane becomes involved in an accident or incident, the preservation of all related flight recorder records, and if necessary the associated flight recorders, and their retention in safe custody pending their disposition as determined in accordance with Annex 13.

6.10.10 Flight recorders — continued serviceability

Operational checks and evaluations of recordings from the flight data and cockpit voice recorder systems shall be conducted to ensure the continued serviceability of the recorders.

Note.— Procedures for the inspections of the flight data and cockpit voice recorder systems are given in Attachment A.

6.11 Mach number indicator

All aeroplanes with speed limitations expressed in terms of Mach number shall be equipped with a Mach number indicator.

Note.— This does not preclude the use of the airspeed indicator to derive Mach number for ATS purposes.

6.12 Emergency locator transmitter (ELT)

Applicable until 30 June 2008

6.12.1 All aeroplanes for which the individual certificate of airworthiness is first issued after 1 January 2002, operated on long-range over-water flights as described in 6.3.3 b) and when operated on flights over designated land areas as described in 6.4, shall be equipped with one automatic ELT.

6.12.2 From 1 January 2005, all aeroplanes operated on extended flights over water as described in 6.3.3 b) and when operated on flights over designated land areas as described in 6.4 shall be equipped with one automatic ELT.

6.12.3 **Recommendation.—** *All aeroplanes should carry an automatic ELT.*

6.12.4 ELT equipment carried to satisfy the requirements of 6.12.1, 6.12.2 and 6.12.3 shall operate in accordance with the relevant provisions of Annex 10, Volume III.

Applicable from 1 July 2008

6.12.5 **Recommendation.—** *All aeroplanes should carry an automatic ELT.*

6.12.6 Except as provided for in 6.12.7, from 1 July 2008, all aeroplanes shall be equipped with at least one ELT of any type.

6.12.7 All aeroplanes for which the individual certificate of airworthiness is first issued after 1 July 2008 shall be equipped with at least one automatic ELT.

6.12.8 ELT equipment carried to satisfy the requirements of 6.12.5, 6.12.6 and 6.12.7 shall operate in accordance with the relevant provisions of Annex 10, Volume III.

Note.— The judicious choice of numbers of ELTs, their type and placement on aircraft and associated floatable life support systems will ensure the greatest chance of ELT activation in the event of an accident for aircraft operating over water or land, including areas especially difficult for search and rescue. Placement of transmitter units is a vital factor in ensuring optimal crash and fire protection. The placement of the control and switching devices (activation monitors) of automatic fixed ELTs and their associated operational procedures will also take into consideration the need for rapid detection of inadvertent activation and convenient manual switching by crew members.

6.13 Aeroplanes required to be equipped with a pressure-altitude reporting transponder

6.13.1 From 1 January 2003, unless exempted by the appropriate authorities, all aeroplanes shall be equipped with a pressure-altitude reporting transponder which operates in accordance with the relevant provisions of Annex 10, Volume IV.

6.13.2 **Recommendation.—** *All aeroplanes should be equipped with a pressure-altitude reporting transponder which operates in accordance with the relevant provisions of Annex 10, Volume IV.*

Note.— The provisions in 6.13.1 and 6.13.2 are intended to support the effectiveness of ACAS as well as to improve the effectiveness of air traffic services. Effective dates for carriage requirements of ACAS are contained in Annex 6, Part I, 6.18.1 and 6.18.2. The intent is also for aircraft not equipped with pressure-altitude reporting transponders to be operated so as not to share airspace used by aircraft equipped with airborne collision avoidance systems. To this end, exemptions from the carriage requirement for pressure-altitude reporting transponders could be given by designating airspace where such carriage is not required.

6.14 Aeroplanes required to be equipped with an airborne collision avoidance system (ACAS II)

6.14.1 **Recommendation.—** *All turbine-engined aeroplanes of a maximum certificated take-off mass in excess of 15 000 kg, or authorized to carry more than 30 passengers, for which the individual airworthiness certificate is first issued after 24 November 2005, should be equipped with an airborne collision avoidance system (ACAS II).*

6.14.2 All turbine-engined aeroplanes of a maximum certificated take-off mass in excess of 15 000 kg, or authorized to carry more than 30 passengers, for which the individual airworthiness certificate is first issued after 1 January 2007, shall be equipped with an airborne collision avoidance system (ACAS II).

6.14.3 **Recommendation.—** *All turbine-engined aeroplanes of a maximum certificated take-off mass in excess of 5 700 kg but not exceeding 15 000 kg, or authorized to carry more than 19 passengers, for which the individual airworthiness certificate is first issued after 1 January 2008, should be equipped with an airborne collision avoidance system (ACAS II).*

6.15 Microphones

Recommendation.— *All flight crew members required to be on flight deck duty should communicate through boom or* throat microphones below the transition level/altitude.

CHAPTER 7. AEROPLANE COMMUNICATION AND NAVIGATION EQUIPMENT

7.1 Communication equipment

7.1.1 An aeroplane to be operated in accordance with the instrument flight rules or at night shall be provided with radio communication equipment. Such equipment shall be capable of conducting two-way communication with those aeronautical stations and on those frequencies prescribed by the appropriate authority.

Note.— The requirements of 7.1.1 are considered fulfilled if the ability to conduct the communications specified therein is established during radio propagation conditions which are normal for the route.

7.1.2 When compliance with 7.1.1 requires that more than one communication equipment unit be provided, each shall be independent of the other or others to the extent that a failure in any one will not result in failure of any other.

7.1.3 An aeroplane to be operated in accordance with the visual flight rules, but as a controlled flight, shall, unless exempted by the appropriate authority, be provided with radio communication equipment capable of conducting two-way communication at any time during flight with such aeronautical stations and on such frequencies as may be prescribed by the appropriate authority.

7.1.4 An aeroplane to be operated on a flight to which the provisions of 6.3.3 or 6.4 apply shall, unless exempted by the appropriate authority, be provided with radio communication equipment capable of conducting two-way communication at any time during flight with such aeronautical stations and on such frequencies as may be prescribed by the appropriate authority.

7.1.5 The radio communication equipment required in accordance with 7.1.1 to 7.1.4 shall provide for communication on the aeronautical emergency frequency 121.5 MHz.

7.1.6 For flights in defined portions of airspace or on routes where an RCP type has been prescribed, an aeroplane shall, in addition to the requirements specified in 7.1.1 to 7.1.5:

a) be provided with communication equipment which will enable it to operate in accordance with the prescribed RCP type(s); and

b) be authorized by the State of Registry for operations in such airspace.

Note.— Information on RCP and associated procedures, and guidance concerning the approval process, are contained in the Manual on Required Communications Performance (RCP) *(Doc 9869)*. This document also contains references to other documents produced by States and international bodies concerning communication systems and RCP.*

7.2 Navigation equipment

7.2.1 An aeroplane shall be provided with navigation equipment which will enable it to proceed:

a) in accordance with the flight plan; and

b) in accordance with the requirements of air traffic services;

except when, if not so precluded by the appropriate authority, navigation for flights under the visual flight rules is accomplished by visual reference to landmarks at least every 110 km (60 NM).

7.2.2 For flights in defined portions of airspace or on routes where an RNP type has been prescribed, an aeroplane shall, in addition to the requirements specified in 7.2.1:

a) be provided with navigation equipment which will enable it to operate in accordance with the prescribed RNP type(s); and

b) be authorized by the State of Registry for operations in such airspace.

Note.— Information on RNP and associated procedures, and guidance concerning the approval process, are contained in the Manual on Required Navigation Performance (RNP) *(Doc 9613). This document also contains a comprehensive list of references to other documents produced by States and international bodies concerning navigation systems and RNP.*

7.2.3 For flights in defined portions of airspace where, based on Regional Air Navigation Agreement, minimum navigation performance specifications (MNPS) are prescribed, an aeroplane shall be provided with navigation equipment which:

a) continuously provides indications to the flight crew of adherence to or departure from track to the required degree of accuracy at any point along that track; and

*In preparation.

b) has been authorized by the State of Registry for MNPS operations concerned.

Note.— The prescribed minimum navigation performance specifications and the procedures governing their application are published in Regional Supplementary Procedures *(Doc 7030).*

7.2.4 For flights in defined portions of airspace where, based on Regional Air Navigation Agreement, a reduced vertical separation minimum (RVSM) of 300 m (1 000 ft) is applied between FL 290 and FL 410 inclusive, an aeroplane:

a) shall be provided with equipment which is capable of:

1) indicating to the flight crew the flight level being flown;

2) automatically maintaining a selected flight level;

3) providing an alert to the flight crew when a deviation occurs from the selected flight level. The threshold for the alert shall not exceed ± 90 m (300 ft); and

4) automatically reporting pressure-altitude; and

b) shall be authorized by the State of Registry for operation in the airspace concerned.

7.2.5 Prior to granting the RVSM approval required in accordance with 7.2.4 b), the State shall be satisfied that:

a) the vertical navigation performance capability of the aeroplane satisfies the requirements specified in Appendix 2;

b) the operator has instituted appropriate procedures in respect of continued airworthiness (maintenance and repair) practices and programmes; and

c) the operator has instituted appropriate flight crew procedures for operations in RVSM airspace.

Note.— An RVSM approval is valid globally on the understanding that any operating procedures specific to a given region will be stated in the operations manual or appropriate crew guidance.

7.2.6 The State of the Operator, in consultation with the State of Registry if appropriate, shall ensure that, in respect of those aeroplanes mentioned in 7.2.4, adequate provisions exist for:

a) receiving the reports of height-keeping performance issued by the monitoring agencies established in accordance with Annex 11, 3.3.4.1; and

b) taking immediate corrective action for individual aircraft, or aircraft type groups, identified in such reports as not complying with the height-keeping requirements for operation in airspace where RVSM is applied.

7.2.7 All States that are responsible for airspace where RVSM has been implemented, or have issued RVSM approvals to operators within their State, shall establish provisions and procedures which ensure that appropriate action will be taken in respect of aircraft and operators found to be operating in RVSM airspace without a valid RVSM approval.

Note 1.— These provisions and procedures need to address both the situation where the aircraft in question was operating without approval in the airspace of the State, and the situation where an operator for which the State has regulatory oversight responsibility is found to be operating without the required approval in the airspace of another State.

Note 2.— Guidance material relating to the approval for operation in RVSM airspace is contained in the Manual on Implementation of a 300 m (1 000 ft) Vertical Separation Minimum Between FL 290 and FL 410 Inclusive *(Doc 9574).*

7.2.8 The aeroplane shall be sufficiently provided with navigation equipment to ensure that, in the event of the failure of one item of equipment at any stage of the flight, the remaining equipment will enable the aeroplane to navigate in accordance with 7.2.1 and where applicable 7.2.2, 7.2.3 and 7.2.4.

Note 1.— This requirement may be met by means other than the duplication of equipment.

Note 2.— Guidance material relating to aircraft equipment necessary for flight in airspace where RVSM is applied is contained in the Manual on Implementation of a 300 m (1 000 ft) Vertical Separation Minimum Between FL 290 and FL 410 Inclusive *(Doc 9574).*

7.2.9 On flights in which it is intended to land in instrument meteorological conditions, an aeroplane shall be provided with radio equipment capable of receiving signals providing guidance to a point from which a visual landing can be effected. This equipment shall be capable of providing such guidance for each aerodrome at which it is intended to land in instrument meteorological conditions and for any designated alternate aerodromes.

CHAPTER 8. AEROPLANE MAINTENANCE

Note 1.— For the purpose of this chapter "aeroplane" includes: powerplants, propellers, components, accessories, instruments, equipment and apparatus including emergency equipment.

Note 2.— Guidance on continuing airworthiness requirements is contained in the Airworthiness Manual *(Doc 9760).*

8.1 Responsibilities

8.1.1 The owner of an aeroplane, or in the case where it is leased, the lessee, shall ensure that:

a) the aeroplane is maintained in an airworthy condition;

b) the operational and emergency equipment necessary for the intended flight is serviceable;

c) the Certificate of Airworthiness of the aeroplane remains valid; and

d) the maintenance of the aeroplane is performed in accordance with a maintenance programme acceptable to the State of Registry.

8.1.2 The aeroplane shall not be operated unless it is maintained and released to service under a system acceptable to the State of Registry.

8.1.3 When the maintenance release is not issued by an approved maintenance organization in accordance with Annex 6, Part I, 8.7, the person signing the maintenance release shall be licensed in accordance with Annex 1.

8.2 Maintenance records

8.2.1 The owner shall ensure that the following records are kept for the periods mentioned in 8.2.2:

a) the total time in service (hours, calendar time and cycles, as appropriate) of the aeroplane and all life limited components;

b) the current status of compliance with all mandatory continuing airworthiness information;

c) appropriate details of modifications and repairs;

d) the time in service (hours, calendar time and cycles, as appropriate) since last overhaul of the aeroplane or its components subject to a mandatory overhaul life;

e) the current status of the aeroplane's compliance with the maintenance programme; and

f) the detailed maintenance records to show that all requirements for signing a maintenance release have been met.

8.2.2 The records referred to in 8.2.1 a) to e) shall be kept for a minimum period of 90 days after the unit to which they refer has been permanently withdrawn from service, and the records in 8.2.1 f) for a minimum period of one year after the signing of the maintenance release.

8.2.3 The lessee of an aeroplane shall comply with the requirements of 8.2.1 and 8.2.2, as applicable, while the aeroplane is leased.

Note.— Maintenance records or related documents, other than a valid certificate of airworthiness, need not be carried in the aeroplane during international flights.

8.3 Continuing airworthiness information

The owner of an aeroplane over 5 700 kg maximum certificated take-off mass, or in the case where it is leased, the lessee, shall, as prescribed by the State of Registry, ensure that the information resulting from maintenance and operational experience with respect to continuing airworthiness, is transmitted as required by Annex 8, Part II, 4.2.3 f) and 4.2.4.

8.4 Modifications and repairs

All modifications and repairs shall comply with airworthiness requirements acceptable to the State of Registry. Procedures shall be established to ensure that the substantiating data supporting compliance with the airworthiness requirements are retained.

8.5 Maintenance release

8.5.1 A maintenance release shall be completed and signed, as prescribed by the State of Registry, to certify that the maintenance work performed has been completed satisfactorily.

8.5.2 A maintenance release shall contain a certification including:

a) basic details of the maintenance carried out;

b) date such maintenance was completed;

c) when applicable, the identity of the approved maintenance organization; and

d) the identity of the person or persons signing the release.

International Standards
and Recommended Practices

Annex 6
to the Convention on
International Civil Aviation

Operation of Aircraft

Part III
International Operations — Helicopters

This edition incorporates all amendments adopted by the Council prior to 15 March 2007 and supersedes, on 22 November 2007, all previous editions of Part III of Annex 6.

For information regarding the applicability of the Standards and Recommended Practices, *see* Foreword.

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TRANSMITTAL NOTE

NEW EDITIONS OF ANNEXES TO THE CONVENTION ON INTERNATIONAL CIVIL AVIATION

It has come to our attention that when a new edition of an Annex is published, users have been discarding, along with the previous edition of the Annex, the **Supplement** to the previous edition. Please note that the Supplement to the previous edition should be retained until a new Supplement is issued.

International Standards
and Recommended Practices

Annex 6
to the Convention on
International Civil Aviation

Operation of Aircraft

Part III
International Operations — Helicopters

This edition incorporates all amendments
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For information regarding the applicability
of the Standards and Recommended Practices,
see Foreword.

Sixth Edition
July 2007

International Civil Aviation Organization

AMENDMENTS

The issue of amendments is announced regularly in the *ICAO Journal* and in the supplements to the *Catalogue of ICAO Publications and Audio-visual Training Aids*, which holders of this publication should consult. The space below is provided to keep a record of such amendments.

RECORD OF AMENDMENTS AND CORRIGENDA

AMENDMENTS			
No.	Date applicable	Date entered	Entered by
1–12	Incorporated in this Edition		

CORRIGENDA			
No.	Date of issue	Date entered	Entered by

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APPENDICES

ATTACHMENTS

ABBREVIATIONS AND SYMBOLS
(used in this Annex)

Abbreviations

ACAS	Airborne collision avoidance systems
ADS-C	Automatic dependent surveillance — contract
AFCS	Automatic flight control system
AIG	Accident investigation and prevention
AOC	Aeronautical operational control
AOC	Air operator certificate
ATC	Air traffic control
ATM	Air traffic management
ATS	Air traffic services
CAA	Civil Aviation Authority
CAT I	Category I
CAT II	Category II
CAT III	Category III
CAT IIIA	Category IIIA
CAT IIIB	Category IIIB
CAT IIIC	Category IIIC
CDL	Configuration deviation list
CFIT	Controlled flight into terrain
cm	Centimetre
CPDLC	Controller-pilot data link communications
CVR	Cockpit voice recorder
DA	Decision altitude
DA/H	Decision altitude/height
D-FIS	Data link-flight information services
DH	Decision height
Distance DR	The horizontal distance that the helicopter has travelled from the end of the take-off distance available
DME	Distance measuring equipment
ECAM	Electronic centralized aircraft monitor
EFIS	Electronic flight instrument system
EGT	Exhaust gas temperature
EICAS	Engine indication and crew alerting system
ELT	Emergency locator transmitter
ELT(AF)	Automatic fixed ELT
ELT(AP)	Automatic portable ELT
ELT(AD)	Automatic deployable ELT
ELT(S)	Survival ELT
EUROCAE	European Organization for Civil Aviation Equipment
EPR	Engine pressure ratio
FATO	Final approach and take-off area
FDAU	Flight data acquisition unit
FDR	Flight data recorder
FM	Frequency modulation
ft	Foot

g	Normal acceleration
hPa	Hectopascal
HUMS	Health and usage monitor system
IFR	Instrument flight rules
ILS	Instrument landing system
IMC	Instrument meteorological conditions
in Hg	Inch of mercury
kg	Kilogram
km	Kilometre
kN	Kilonewton
kt	Knot
LDAH	Landing distance available
LDP	Landing decision point
LDRH	Landing distance required
m	Metre
mb	Millibar
MDA	Minimum descent altitude
MDA/H	Minimum descent altitude/height
MDH	Minimum descent height
MEL	Minimum equipment list
MHz	Megahertz
MLS	Microwave landing system
MMEL	Master minimum equipment list
MOPS	Minimum operational performance specification
NAV	Navigation
N_1	Low pressure compressor speed (two-stage compressor); fan speed (three-stage compressor)
NM	Nautical mile
NVIS	Night vision imaging systems
OCA	Obstacle clearance altitude
OCA/H	Obstacle clearance altitude/height
OCH	Obstacle clearance height
PANS	Procedures for Air Navigation Services
PNR	Point of no return
psi	Pound per square inch
R	Rotor radius
RCP	Required communication performance
RNP	Required navigation performance
RTODR	Rejected take-off distance required
RVR	Runway visual range
SI	International System of Units
SICASP	Secondary Surveillance Radar Improvements and Collision Avoidance Systems Panel
SOP	Standard operating procedures

T_4	Engine exhaust gas temperature
TDP	Take-off decision point
TIT	Turbine inlet temperature
TLOF	Touchdown and lift-off area
TODAH	Take-off distance available
TODRH	Take-off distance required
UTC	Coordinated universal time
VFR	Visual flight rules
VMC	Visual meteorological conditions
V_{TOSS}	Take-off safety speed. The minimum speed at which climb shall be achieved with the critical power-unit inoperative, the remaining power-units operating within approved operating limits
V_y	Best rate of climb speed
WXR	Weather

Symbols

°C	Degrees Celsius
%	Per cent

PUBLICATIONS
(referred to in this Annex)

Convention on International Civil Aviation (Doc 7300)

European Organization for Civil Aviation Equipment (EUROCAE) Documents ED55 and ED56A

Policy and Guidance Material on the Economic Regulation of International Air Transport (Doc 9587)

Protocol Relating to an Amendment to the Convention on International Civil Aviation (Article 83 bis*)* (Doc 9318)

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Manual of Aircraft Ground De-icing/Anti-icing Operations (Doc 9640)

Manual of Procedures for Operations Inspection, Certification and Continued Surveillance (Doc 8335)

Manual of Procedures for the Establishment of a State's Personnel Licensing System (Doc 9379)

Manual on Required Communications Performance (RCP) (Doc 9869)

Manual on Required Navigation Performance (RNP) (Doc 9613)

Preparation of an Operations Manual (Doc 9376)

Safety Management Manual (SMM) (Doc 9859)

Safety Oversight Manual (Doc 9734)
Part A — *The Establishment and Management of a State's Safety Oversight System*

Training Manual (Doc 7192)
Part D-3 — *Flight Operations Officers/Flight Dispatchers*

Circular

Guidance on the Implementation of Article 83 bis *of the Convention on International Civil Aviation* (Cir 295)

ANNEX 6 — PART III
INTERNATIONAL OPERATIONS — HELICOPTERS

FOREWORD

Historical background

Standards and Recommended Practices for the Operation of Aircraft were first adopted by the Council, pursuant to the provisions of Article 37 of the Convention on International Civil Aviation (Chicago 1944), on 10 December 1948 for International Air Transport and on 2 December 1968 for International General Aviation. The documents containing these Standards and Recommenced Practices are now designated as Annex 6, Parts I and II, respectively, to the Convention. In general, Parts I and II address aeroplane operations; neither part is specifically applicable to helicopter operations.

Therefore, Part III was introduced as a means of including provisions for helicopter operations. Initially, provisions related to flight data recorders and cockpit voice recorders for helicopters were developed by the Air Navigation Commission following Recommendation 10/1 of the Accident Prevention and Investigation Meeting AIG (1979) and adopted by the Council on 14 March 1986. They became effective on 27 July 1986 and applicable on 20 November 1986. Subsequently, proposals for comprehensive Standards and Recommended Practices covering other aspects of helicopter operations were developed with the assistance of the Helicopter Operations Panel; these provisions, incorporated in Amendment 1, were adopted by the Council on 21 March 1990. The amendment became effective on 30 July 1990 and applicable on 15 November 1990.

Table A shows the origin of subsequent amendments together with a list of the principal subjects involved and the dates on which the Annex and the amendments were adopted by the Council, when they became effective and when they became applicable.

Applicability

The Standards and Recommended Practices included in Annex 6 — *Operation of Aircraft*, Parts I and II, cover the operation of all aeroplanes in international civil aviation, except where specifically excluded. Similarly, the Standards and Recommended Practices in Annex 6, Part III, cover the operation of all helicopters in international civil aviation, general aviation as well as commercial air transport operations.

Action by Contracting States

Notification of differences. The attention of Contracting States is drawn to the obligation imposed by Article 38 of the Convention by which Contracting States are required to notify the Organization of any differences between their national regulations and practices and the International Standards contained in this Annex and any amendments thereto. Contracting States are invited to extend such notification to any differences from the Recommended Practices contained in this Annex, and any amendments thereto when the notification of such differences is important for the safety of air navigation. Further, Contracting States are invited to keep the Organization currently informed of any differences which may subsequently occur or of the withdrawal of any differences previously notified. A specific request for notification of differences will be sent to Contracting States immediately after the adoption of each Amendment to this Annex.

Attention of States is also drawn to the provision of Annex 15 related to the publication of differences between their national regulations and practices and the related ICAO Standards and Recommended Practices through the Aeronautical Information Service, in addition to the obligation of States under Article 38 of the Convention.

Promulgation of information. The establishment and withdrawal of and changes to facilities, services and procedures affecting aircraft operations provided in accordance with the Standards and Recommended Practices specified in this Annex should be notified and take effect in accordance with the provisions of Annex 15.

Status of Annex components

An Annex is made up of the following component parts, not all of which, however, are necessarily found in every Annex; they have the status indicated.

1. — *Material comprising the Annex proper*

a) *Standards* and *Recommended Practices* adopted by the Council under the provisions of the Convention. They are defined as follows:

Standard: Any specification for physical characteristics, configuration, matériel, performance, personnel or procedure, the uniform application of which is recognized as necessary for the safety or regularity of international air navigation and to which Contracting States will conform in accordance with the Convention; in the event of impossibility of compliance, notification to the Council is compulsory under Article 38.

Recommended Practice: Any specification for physical characteristics, configuration, matériel, performance, personnel or procedure, the uniform application of which is recognized as desirable in the interest of safety, regularity or efficiency of international air navigation, and to which Contracting States will endeavour to conform in accordance with the Convention.

b) *Appendices* comprising material grouped separately for convenience but forming part of the Standards and Recommended Practices adopted by the Council.

c) *Definitions* of terms used in the Standards and Recommended Practices which are not self-explanatory in that they do not have accepted dictionary meanings. A definition does not have an independent status but is an essential part of each Standard and Recommended Practice in which the term is used, since a change in the meaning of the term would affect the specification.

d) *Tables* and *Figures* which add to or illustrate a Standard or Recommended Practice and which are referred to therein, form part of the associated Standard or Recommended Practice and have the same status.

It is to be noted that some Standards in this Annex may incorporate, by reference, other specifications having the status of Recommended Practices. In such case, the text of the Recommended Practice becomes part of the Standard.

2. — *Material approved by the Council for publication in association with the Standards and Recommended Practices*

a) *Forewords* comprising historical and explanatory material based on the action of the Council and including an explanation of the obligations of States with regard to the application of the Standards and Recommended Practices ensuing from the Convention and the Resolution of Adoption;

b) *Introductions* comprising explanatory material introduced at the beginning of parts, chapters or sections of the Annex to assist in the understanding of the application of the text;

c) *Notes* included in the text, where appropriate, to give factual information or references bearing on the Standards or Recommended Practices in question but not constituting part of the Standards or Recommended Practices;

d) *Attachments* comprising material supplementary to the Standards and Recommended Practices or included as a guide to their application.

Selection of language

This Annex has been adopted in six languages — English, Arabic, Chinese, French, Russian and Spanish. Each Contracting State is requested to select one of those texts for the purpose of national implementation and for other effects provided for in the Convention, either through direct use or through translation into its own national language, and to notify the Organization accordingly.

Editorial practices

The following practice has been adhered to in order to indicate at a glance the status of each statement: *Standards* have been printed in light face roman; *Recommended Practices* have been printed in light face italics, the status being indicated by the prefix **Recommendation**; *Notes* have been printed in light face italics, the status being indicated by the prefix *Note.*

The following editorial practice has been followed in the writing of specifications: for Standards the operative verb "shall" is used, and for Recommended Practices the operative verb "should" is used.

The units of measurement used in this document are in accordance with the International System of Units (SI) as specified in Annex 5 to the Convention on International Civil Aviation. Where Annex 5 permits the use of non-SI alternative units, these are shown in parentheses following the basic units. Where two sets of units are quoted it must not be assumed that the pairs of values are equal and interchangeable. It may, however, be inferred that an equivalent level of safety is achieved when either set of units is used exclusively.

Any reference to a portion of this document, which is identified by a number and/or title, includes all subdivisions of that portion.

Throughout this Annex, the use of the male gender should be understood to include male and female persons.

Table A. Amendments to Annex 6, Part III

Amendment	*Source*	*Subject(s)*	*Adopted Effective Applicable*
1st Edition	Accident Prevention and Investigation Divisional Meeting AIG (1979)	Provisions for flight recorders in helicopters.	14 March 1986 27 July 1986 20 November 1986
1 (2nd Edition)	Fourth meeting of the Helicopter Operations Panel. Amendments consequential to 1990 amendments to Annex 6, Parts I and II. Air Navigation Commission — directed studies	a) Introduction of provisions pertaining to helicopter operations, similar in scope to those contained in Annex 6, Parts I and II, for aeroplanes. These provisions, together with the flight recorder provisions previously introduced in the First Edition of Annex 6, Part III, complete the initial development of Standards and Recommended Practices for helicopter operations; b) introduction of provisions pertaining to the air operator certificate, minimum equipment lists, the operations manual, and some new definitions. These provisions serve to preserve the parallelism among the three parts of Annex 6; c) introduction of guidance material concerning recording on FDRs of operational flight information for those helicopters equipped with electronic displays.	21 March 1990 30 July 1990 15 November 1990
2	Fifth meeting of the Operations Panel, Eighth meeting of the Review of the General Concept of Separation Panel, Accident Investigation Divisional Meeting (AIG/1992), Air Navigation Commission studies	a) Revision of definitions of heliport operating minima, decision altitude/height, minimum descent altitude/height and introduction of definition of obstacle clearance altitude/height; b) introduction of new definitions for emergency locator transmitters (ELTs), required navigation performance (RNP) and RNP type; c) introduction of a requirement concerning the use of engraving metal foil flight data recorders; d) introduction of carriage requirements for emergency locator transmitters (ELTs) to replace provisions regarding survival radio equipment and emergency location beacon; e) introduction of a requirement that the navigation equipment carried shall enable the aircraft to proceed in accordance with RNP types prescribed for the intended route(s) or areas(s).	21 March 1994 25 July 1994 10 November 1994
3 (3rd Edition)	Air Navigation Commission studies, Fourteenth meeting of the Dangerous Goods Panel, editorial amendment, text alignment with Annex 6, Part I and/or Part II, consequential amendment	a) Introduction of new and revised definitions; b) new provisions concerning accident prevention and flight safety programmes; c) revision of the provisions concerning operating facilities, in-flight simulation of emergency situations, minimum flight altitudes, flight time, flight duty periods and rest periods for crew members, flight preparation, oxygen supply, flight crew members at duty stations, duties of flight operations officers and new provisions for carry-on baggage; d) revision of provisions concerning mass limitations and medical supplies; e) new provisions related to oxygen equipment, revision of the provisions for helicopters operated in accordance with the visual flight rules (VFR) and the instrument flight rules (IFR);	10 March 1995 24 July 1995 9 November 1995

Amendment	*Source*	*Subject(s)*	*Adopted Effective Applicable*
		f) new requirements for the flight crew training programme concerning knowledge and skills related to human performance and limitations; g) revision of the denomination of flight operations officers to align with Annex 1; h) revision of the contents of the operations manual; new provisions concerning heliport operating minima, oxygen supply, flight and duty time limitations, procedures and checklists used by flight crew, specifications for the operational flight plan, the flight crew training programme, the cabin attendant duties training programme, security instruction and guidance, accident prevention and flight safety programme, departure contingency procedures and instructions for mass and balance control; i) new provisions on flight time, flight duty periods and rest periods for cabin attendants and revision of the provisions concerning training; j) revision of the provisions concerning first-aid medical supplies; and k) new provisions concerning the minimum equipment list (MEL).	
4	Fourth meeting of the Secondary Surveillance Radar Improvements and Collision Avoidance Systems Panel (SICASP/4)	Requirement for helicopters to be equipped with pressure-altitude reporting transponders.	19 February 1996 15 July 1996 7 November 1996
5 (4th Edition)	First meeting of the Flight Recorder Panel, ICAO and Industry CFIT Task Force, Air Navigation Commission studies, Amendment 162 to Annex 1, Amendment 38 to Annex 11, editorial amendment	a) Introduction of new and revised definitions for aircraft operating manual, configuration deviation list, Human Factors principles, human performance, master minimum equipment list, psychoactive substances and required navigation performance; b) revision of the notes concerning lease and interchange; c) introduction of a note concerning the use of psychoactive substances; d) new and revised requirements concerning flight recorders; e) new and revised provisions concerning the content of an operations manual relocated in an appendix; f) new provisions concerning the responsibility of States with regard to supervision of operations subject to an air operator certificate, acceptance of an operations manual and establishment of a system for certification and continued surveillance of the operator; g) new provisions related to the de/anti-icing of aircraft on the ground, aeroplane performance operating limitations, mass limitations, sensitive pressure altimeters and recent experience of the co-pilot; h) revised provisions concerning pressure-altitude reporting transponders; and i) new provisions concerning Human Factors.	20 March 1998 20 July 1998 5 November 1998

Amendment	*Source*	*Subject(s)*	*Adopted* *Effective* *Applicable*
6	Second meeting of the Flight Recorder Panel, 32nd Session of the Assembly, Air Navigation Commission studies	a) Change of terminology from "cabin attendant" to "cabin crew"; b) revised definitions; and c) new provisions concerning the mandatory carriage of ELTs operating on 406 MHz and 121.5 MHz, pressure-altitude reporting transponders and the introduction of an implementation date for the recording of digital communications.	15 March 1999 19 July 1999 4 November 1999
7	Air Navigation Commission studies	a) Revised definitions and introduction of the definition for instrument approach and landing operations; and b) introduction of requirements for the provision of RVR information and criteria for instrument approach operations, revision of the duties of the pilot-in-command.	15 March 2000 17 July 2000 2 November 2000
8 (5th Edition)	Second meeting of the Flight Recorder Panel, Third meeting of the Global Navigation Satellite System Panel, Fifth meeting of the Continuing Airworthiness Panel, Air Navigation Commission studies	a) Update the provisions concerning flight recorders, including the recording of digital communications; FDR requirements for new aircraft; revised parameter listings; introduction of two-hour-duration CVRs; b) amendment of the classification of instrument approach and landing operations; c) new provisions pertaining to approach with vertical guidance (APV) operations; d) new definitions and update of provisions pertaining to maintenance-related requirements; and e) translation in the English language for documents attesting noise certification.	12 March 2001 16 July 2001 1 November 2001
9	Separation and Airspace Safety Panel and Air Navigation Commission studies	a) New provisions concerning language proficiency requirements; b) new definition and provision concerning an operator's flight safety documents system; c) new definition and provisions concerning the safety aspects of ground handling arrangements; and d) authorization by the State of Operator or State of Registry for en-route operations in RNP airspace.	13 March 2003 14 July 2003 27 November 2003
10	Sixth meeting of the Committee on Aviation Environmental Protection	New provisions concerning references to noise certification.	9 March 2005 11 July 2005 24 November 2005
11	Second meeting of the Flight Crew Licensing and Training Panel, Fourteenth meeting of the Obstacle Clearance Panel, a proposal by the United States, Council request, 35th Session of the Assembly, and the Eleventh Air Navigation Conference	a) Pilot recent experience and proficiency check requirements, cross-crew qualification and cross-crediting of experience, evaluation of competency, threat and error management, and the biannual pilot proficiency check; b) pilot awareness of operational requirements determined by procedure design; c) qualifications for flight operations officers/flight dispatchers and the critical elements of a State regulatory system; d) the carriage of a copy of the air operator certificate in aircraft; and e) safety management provisions and references to new guidance material on the concept of acceptable level of safety.	14 March 2006 17 July 2006 23 November 2006

Amendment	*Source*	*Subject(s)*	*Adopted Effective Applicable*
12 (6th Edition)	Air Navigation Commission study, First meeting of the Operational Data Link Panel (OPLINKP/1), and Secretariat study assisted by the Helicopter Tilt-Rotor Study Group	a) amendments to Standards to facilitate implementation of the available technology in relation to the use of automatic dependant surveillance — contract (ADS-C) and to the introduction of required communication performance (RCP) in the provision of air traffic services (ATS); b) a closer alignment of the provisions of Annex 6, Part III, with recognized regulatory practices; c) a change to the definitions of performance classes; d) a change to permit appropriate consideration for achieving a safe forced landing in the event of an engine failure for operations in performance Classes 2 and 3; e) the addition of new provisions relating to commercial operations under instrument meteorological conditions; f) a new definition of the term “operation”; g) the introduction of the concept of “offshore operations”; and h) mandatory carriage requirements for emergency locator transmitters (ELTs) as of 1 July 2008).	14 March 2007 16 July 2007 22 November 2007 1 July 2008

ANNEX 6 — PART III

SECTION I

GENERAL

INTERNATIONAL STANDARDS AND RECOMMENDED PRACTICES

CHAPTER 1. DEFINITIONS

When the following terms are used in the Standards and Recommended Practices for international operations with helicopters, they have the following meanings:

Aerial work. An aircraft operation in which an aircraft is used for specialized services such as agriculture, construction, photography, surveying, observation and patrol, search and rescue, aerial advertisement, etc.

Aircraft. Any machine that can derive support in the atmosphere from the reactions of the air other than the reactions of the air against the earth's surface.

Aircraft operating manual. A manual, acceptable to the State of the Operator, containing normal, abnormal and emergency procedures, checklists, limitations, performance information, details of the aircraft systems and other material relevant to the operation of the aircraft.

Note.— The aircraft operating manual is part of the operations manual.

Air operator certificate (AOC). A certificate authorizing an operator to carry out specified commercial air transport operations.

Alternate heliport. A heliport to which a helicopter may proceed when it becomes either impossible or inadvisable to proceed to or to land at the heliport of intended landing. Alternate heliports include the following:

Take-off alternate. An alternate heliport at which a helicopter can land should this become necessary shortly after take-off and it is not possible to use the heliport of departure.

En-route alternate. A heliport at which a helicopter would be able to land after experiencing an abnormal or emergency condition while en route.

Destination alternate. An alternate heliport to which a helicopter may proceed should it become either impossible or inadvisable to land at the heliport of intended landing.

Note.— The heliport from which a flight departs may be an en-route or a destination alternate heliport for that flight.

Approach and landing operations using instrument approach procedures. Instrument approach and landing operations are classified as follows:

Non-precision approach and landing operations. An instrument approach and landing which utilizes lateral guidance but does not utilize vertical guidance.

Approach and landing operations with vertical guidance. An instrument approach and landing which utilizes lateral and vertical guidance but does not meet the requirements established for precision approach and landing operations.

Precision approach and landing operations. An instrument approach and landing using precision lateral and vertical guidance with minima as determined by the category of operation.

Note.— Lateral and vertical guidance refers to the guidance provided either by:

a) a ground-based navigation aid; or

b) computer generated navigation data.

Categories of precision approach and landing operations:

Category I (CAT I) operation. A precision instrument approach and landing with a decision height not lower than 60 m (200 ft) and with either a visibility not less than 800 m or a runway visual range not less than 550 m.

Category II (CAT II) operation. A precision instrument approach and landing with a decision height lower than 60 m (200 ft), but not lower than 30 m (100 ft), and a runway visual range not less than 350 m.

Category IIIA (CAT IIIA) operation. A precision instrument approach and landing with:

a) a decision height lower than 30 m (100 ft) or no decision height; and

b) a runway visual range not less than 200 m.

Category IIIB (CAT IIIB) operation. A precision instrument approach and landing with:

a) a decision height lower than 15 m (50 ft) or no decision height; and

b) a runway visual range less than 200 m but not less than 50 m.

Category IIIC (CAT IIIC) operation. A precision instrument approach and landing with no decision height and no runway visual range limitations.

Note.— Where decision height (DH) and runway visual range (RVR) fall into different categories of operation, the instrument approach and landing operation would be conducted in accordance with the requirements of the most demanding category (e.g. an operation with a DH in the range of CAT IIIA but with an RVR in the range of CAT IIIB would be considered a CAT IIIB operation or an operation with a DH in the range of CAT II but with an RVR in the range of CAT I would be considered a CAT II operation).

Approach and landing phase — helicopters. That part of the flight from 300 m (1 000 ft) above the elevation of the FATO, if the flight is planned to exceed this height, or from the commencement of the descent in the other cases, to landing or to the balked landing point.

Cabin crew member. A crew member who performs, in the interest of safety of passengers, duties assigned by the operator or the pilot-in-command of the aircraft, but who shall not act as a flight crew member.

Commercial air transport operation. An aircraft operation involving the transport of passengers, cargo or mail for remuneration or hire.

Configuration deviation list (CDL). A list established by the organization responsible for the type design with the approval of the State of Design which identifies any external parts of an aircraft type which may be missing at the commencement of a flight, and which contains, where necessary, any information on associated operating limitations and performance correction.

Congested area. In relation to a city, town or settlement, any area which is substantially used for residential, commercial or recreational purposes.

Congested hostile environment. A hostile environment within a congested area.

Crew member. A person assigned by an operator to duty on an aircraft during a flight duty period.

Dangerous goods. Articles or substances which are capable of posing a risk to health, safety, property or the environment and which are shown in the list of dangerous goods in the Technical Instructions or which are classified according to those Instructions.

Note.— Dangerous goods are classified in Annex 18, Chapter 3.

Decision altitude (DA) *or* ***decision height (DH).*** A specified altitude or height in the precision approach or approach with vertical guidance at which a missed approach must be initiated if the required visual reference to continue the approach has not been established.

Note 1.— Decision altitude (DA) is referenced to mean sea level and decision height (DH) is referenced to the threshold elevation.

Note 2.— The required visual reference means that section of the visual aids or of the approach area which should have been in view for sufficient time for the pilot to have made an assessment of the aircraft position and rate of change of position, in relation to the desired flight path. In Category III operations with a decision height the required visual reference is that specified for the particular procedure and operation.

Note 3.— For convenience where both expressions are used they may be written in the form "decision altitude/height" and abbreviated "DA/H".

Defined point after take-off (DPATO). The point, within the take-off and initial climb phase, before which the helicopter's ability to continue the flight safely, with one engine inoperative, is not assured and a forced landing may be required.

Note.— Defined points apply to helicopters operating in performance Class 2 only.

Defined point before landing (DPBL). The point, within the approach and landing phase, after which the helicopter's ability to continue the flight safely, with one engine inoperative, is not assured and a forced landing may be required.

Note.— Defined points apply to helicopters operating in performance Class 2 only.

Elevated heliport. A heliport located on a raised structure on land.

Emergency locator transmitter (ELT). A generic term describing equipment which broadcast distinctive signals on designated frequencies and, depending on application, may be automatically activated by impact or be manually activated. An ELT may be any of the following:

Automatic fixed ELT (ELT(AF)). An automatically activated ELT which is permanently attached to an aircraft.

Automatic portable ELT (ELT(AP)). An automatically activated ELT which is rigidly attached to an aircraft but readily removable from the aircraft.

Automatic deployable ELT (ELT(AD)). An ELT which is rigidly attached to an aircraft and which is automatically deployed and activated by impact, and, in some cases, also by hydrostatic sensors. Manual deployment is also provided.

Survival ELT (ELT(S)). An ELT which is removable from an aircraft, stowed so as to facilitate its ready use in an emergency, and manually activated by survivors.

En-route phase. That part of the flight from the end of the take-off and initial climb phase to the commencement of the approach and landing phase.

Note.— Where adequate obstacle clearance cannot be guaranteed visually, flights must be planned to ensure that obstacles can be cleared by an appropriate margin. In the event of failure of the critical power-unit, operators may need to adopt alternative procedures.

Final approach and take-off area (FATO). A defined area over which the final phase of the approach manoeuvre to hover or landing is completed and from which the take-off manoeuvre is commenced. Where the FATO is to be used by helicopters operating in performance Class 1, the defined area includes the rejected take-off area available.

Flight crew member. A licensed crew member charged with duties essential to the operation of an aircraft during a flight duty period.

Flight duty period. The total time from the moment a flight crew member commences duty, immediately subsequent to a rest period and prior to making a flight or a series of flights, to the moment the flight crew member is relieved of all duties having completed such flight or series of flights.

Flight manual. A manual, associated with the certificate of airworthiness, containing limitations within which the aircraft is to be considered airworthy, and instructions and information necessary to the flight crew members for the safe operation of the aircraft.

Flight operations officer/flight dispatcher. A person designated by the operator to engage in the control and supervision of flight operations, whether licensed or not, suitably qualified in accordance with Annex 1, who supports, briefs and/or assists the pilot-in-command in the safe conduct of the flight.

Flight plan. Specified information provided to air traffic services units, relative to an intended flight or portion of a flight of an aircraft.

Flight recorder. Any type of recorder installed in the aircraft for the purpose of complementing accident/incident investigation.

Flight safety documents system. A set of interrelated documentation established by the operator, compiling and organizing information necessary for flight and ground operations, and comprising, as a minimum, the operations manual and the operator's maintenance control manual.

Flight simulation training device. Any one of the following three types of apparatus in which flight conditions are simulated on the ground:

A flight simulator, which provides an accurate representation of the flight deck of a particular aircraft type to the extent that the mechanical, electrical, electronic, etc. aircraft systems control functions, the normal environment of flight crew members, and the performance and flight characteristics of that type of aircraft are realistically simulated;

A flight procedures trainer, which provides a realistic flight deck environment, and which simulates instrument responses, simple control functions of mechanical, electrical, electronic, etc. aircraft systems, and the performance and flight characteristics of aircraft of a particular class;

A basic instrument flight trainer, which is equipped with appropriate instruments, and which simulates the flight deck environment of an aircraft in flight in instrument flight conditions.

Flight time — helicopters. The total time from the moment a helicopter's rotor blades start turning until the moment the helicopter finally comes to rest at the end of the flight, and the rotor blades are stopped.

Note 1.— The State may provide guidance in those cases where the definition of flight time does not describe or permit normal practices. Examples are: crew change without stopping the rotors; and rotors running engine wash procedure following a flight. In any case, the time when rotors are running between sectors of a flight is included within the calculation of flight time.

Note 2.— This definition is intended only for the purpose of flight and duty time regulations.

General aviation operation. An aircraft operation other than a commercial air transport operation or an aerial work operation.

Ground handling. Services necessary for an aircraft's arrival at, and departure from, an airport, other than air traffic services.

Helicopter. A heavier-than-air aircraft supported in flight chiefly by the reactions of the air on one or more power-driven rotors on substantially vertical axes.

Note.— Some States use the term "rotorcraft" as an alternative to "helicopter".

Helideck. A heliport located on a floating or fixed offshore structure.

Heliport. An aerodrome or a defined area on a structure intended to be used wholly or in part for the arrival, departure and surface movement of helicopters.

Note 1.— Throughout this Part, when the term "heliport" is used, it is intended that the term also applies to aerodromes primarily meant for the use of aeroplanes.

Note 2.— Helicopters may be operated to and from areas other than heliports.

Heliport operating minima. The limits of usability of a heliport for:

a) take-off, expressed in terms of runway visual range and/or visibility and, if necessary, cloud conditions;

b) landing in precision approach and landing operations, expressed in terms of visibility and/or runway visual range and decision altitude/height (DA/H) as appropriate to the category of the operation;

c) landing in approach and landing operations with vertical guidance, expressed in terms of visibility and/or runway visual range and decision altitude/height (DA/H); and

d) landing in non-precision approach and landing operations, expressed in terms of visibility and/or runway visual range, minimum descent altitude/height (MDA/H) and, if necessary, cloud conditions.

Hostile environment. An environment in which:

a) a safe forced landing cannot be accomplished because the surface and surrounding environment are inadequate; or

b) the helicopter occupants cannot be adequately protected from the elements; or

c) search and rescue response/capability is not provided consistent with anticipated exposure; or

d) there is an unacceptable risk of endangering persons or property on the ground.

Human Factors principles. Principles which apply to aeronautical design, certification, training, operations and maintenance and which seek safe interface between the human and other system components by proper consideration to human performance.

Human performance. Human capabilities and limitations which have an impact on the safety and efficiency of aeronautical operations.

Instrument meteorological conditions (IMC). Meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling*, less than the minima specified for visual meteorological conditions.

Note.— The specified minima for visual meteorological conditions are contained in Chapter 4 of Annex 2.

Integrated survival suit. A survival suit which meets the combined requirements of the survival suit and life jacket.

Landing decision point (LDP). The point used in determining landing performance from which, a power-unit failure occurring at this point, the landing may be safely continued or a balked landing initiated.

Note.— LDP applies only to helicopters operating in performance Class 1.

Maintenance. The performance of tasks required to ensure the continuing airworthiness of an aircraft, including any one or combination of overhaul, inspection, replacement, defect rectification, and the embodiment of a modification or repair.

Maintenance organization's procedures manual. A document endorsed by the head of the maintenance organization which details the maintenance organization's structure and management responsibilities, scope of work, description of facilities, maintenance procedures and quality assurance or inspection systems.

Maintenance programme. A document which describes the specific scheduled maintenance tasks and their frequency of completion and related procedures, such as a reliability programme, necessary for the safe operation of those aircraft to which it applies.

Maintenance release. A document which contains a certification confirming that the maintenance work to which it relates has been completed in a satisfactory manner, either in accordance with the approved data and the procedures described in the maintenance organization's procedures manual or under an equivalent system.

Master minimum equipment list (MMEL). A list established for a particular aircraft type by the organization responsible for the type design with the approval of the State of Design containing items, one or more of which is permitted to be unserviceable at the commencement of a flight. The MMEL may be associated with special operating conditions, limitations or procedures.

Maximum mass. Maximum certificated take-off mass.

Minimum descent altitude (MDA) or ***minimum descent height (MDH).*** A specified altitude or height in a non-precision approach or circling approach below which descent must not be made without the required visual reference.

Note 1.— Minimum descent altitude (MDA) is referenced to mean sea level and minimum descent height (MDH) is referenced to the aerodrome elevation or to the threshold elevation if that is more than 2 m (7 ft) below the aerodrome elevation. A minimum descent height for a circling approach is referenced to the aerodrome elevation.

Note 2.— The required visual reference means that section of the visual aids or of the approach area which should have been in view for sufficient time for the pilot to have made an assessment of the aircraft position and rate of change of position, in relation to the desired flight path. In the case of a circling approach the required visual reference is the runway environment.

Note 3.— For convenience when both expressions are used they may be written in the form "minimum descent altitude/height" and abbreviated "MDA/H".

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* As defined in Annex 2.

Minimum equipment list (MEL). A list which provides for the operation of aircraft, subject to specified conditions, with particular equipment inoperative, prepared by an operator in conformity with, or more restrictive than, the MMEL established for the aircraft type.

Night. The hours between the end of evening civil twilight and the beginning of morning civil twilight or such other period between sunset and sunrise, as may be prescribed by the appropriate authority.

Note.— Civil twilight ends in the evening when the centre of the sun's disc is 6 degrees below the horizon and begins in the morning when the centre of the sun's disc is 6 degrees below the horizon.

Non-congested hostile environment. A hostile environment outside a congested area.

Non-hostile environment. An environment in which:

a) a safe forced landing can be accomplished because the surface and surrounding environment are adequate;

b) the helicopter occupants can be adequately protected from the elements;

c) search and rescue response/capability is provided consistent with anticipated exposure; and

d) the assessed risk of endangering persons or property on the ground is acceptable.

Note.— Those parts of a congested area satisfying the above requirements are considered non-hostile.

Obstacle clearance altitude (OCA) or ***obstacle clearance height (OCH).*** The lowest altitude or the lowest height above the elevation of the relevant runway threshold or the aerodrome elevation as applicable, used in establishing compliance with appropriate obstacle clearance criteria.

Note 1.— Obstacle clearance altitude is referenced to mean sea level and obstacle clearance height is referenced to the threshold elevation or in the case of non-precision approaches to the aerodrome elevation or the threshold elevation if that is more than 2 m (7 ft) below the aerodrome elevation. An obstacle clearance height for a circling approach is referenced to the aerodrome elevation.

Note 2.— For convenience when both expressions are used they may be written in the form "obstacle clearance altitude/height" and abbreviated "OCA/H".

Offshore operations. Operations which routinely have a substantial proportion of the flight conducted over sea areas to or from offshore locations. Such operations include, but are not limited to, support of offshore oil, gas and mineral exploitation and sea-pilot transfer.

Operation. An activity or group of activities which are subject to the same or similar hazards and which require a set of equipment to be specified, or the achievement and maintenance of a set of pilot competencies, to eliminate or mitigate the risk of such hazards.

Note.— Such activities could include, but would not be limited to, offshore operations, heli-hoist operations or emergency medical service.

Operational control. The exercise of authority over the initiation, continuation, diversion or termination of a flight in the interest of the safety of the aircraft and the regularity and efficiency of the flight.

Operational flight plan. The operator's plan for the safe conduct of the flight based on considerations of helicopter performance, other operating limitations and relevant expected conditions on the route to be followed and at the heliports concerned.

Operations in performance Class 1. Operations with performance such that, in the event of a critical power-unit failure, performance is available to enable the helicopter to safely continue the flight to an appropriate landing area, unless the failure occurs prior to reaching the take-off decision point (TDP) or after passing the landing decision point (LDP), in which cases the helicopter must be able to land within the rejected take-off or landing area.

Operations in performance Class 2. Operations with performance such that, in the event of critical power-unit failure, performance is available to enable the helicopter to safely continue the flight to an appropriate landing area, except when the failure occurs early during the take-off manoeuvre or late in the landing manoeuvre, in which cases a forced landing may be required.

Operations in performance Class 3. Operations with performance such that, in the event of a power-unit failure at any time during the flight, a forced landing will be required.

Operations manual. A manual containing procedures, instructions and guidance for use by operational personnel in the execution of their duties.

Operator. A person, organization or enterprise engaged in or offering to engage in an aircraft operation.

Operator's maintenance control manual. A document which describes the operator's procedures necessary to ensure that all scheduled and unscheduled maintenance is performed on the operator's aircraft on time and in a controlled and satisfactory manner.

Pilot-in-command. The pilot designated by the operator, or in the case of general aviation, the owner, as being in command and charged with the safe conduct of a flight.

Psychoactive substances. Alcohol, opioids, cannabinoids, sedatives and hypnotics, cocaine, other psychostimulants, hallucinogens, and volatile solvents, whereas coffee and tobacco are excluded.

Repair. The restoration of an aeronautical product to an airworthy condition to ensure that the aircraft continues to comply with the design aspects of the appropriate airworthiness requirements used for the issuance of the type certificate for the respective aircraft type, after it has been damaged or subjected to wear.

Required communication performance (RCP). A statement of the performance requirements for operational communication in support of specific ATM functions.

Required communication performance type (RCP type). A label (e.g. RCP 240) that represents the values assigned to RCP parameters for communication transaction time, continuity, availability and integrity.

Required navigation performance (RNP). A statement of the navigation performance necessary for operation within a defined airspace.

Note.— Navigation performance and requirements are defined for a particular RNP type and/or application.

Rest period. Any period of time on the ground during which a flight crew member is relieved of all duties by the operator.

RNP type. A containment value expressed as a distance in nautical miles from the intended position within which flights would be for at least 95 per cent of the total flying time.

Example.— RNP 4 represents a navigation accuracy of plus or minus 7.4 km (4 NM) on a 95 per cent containment basis.

Runway visual range (RVR). The range over which the pilot of an aircraft on the centre line of a runway can see the runway surface markings or the lights delineating the runway or identifying its centre line.

Safe forced landing. Unavoidable landing or ditching with a reasonable expectancy of no injuries to persons in the aircraft or on the surface.

Safety management system. A systematic approach to managing safety, including the necessary organizational structures, accountabilities, policies and procedures.

Safety programme. An integrated set of regulations and activities aimed at improving safety.

Series of flights. Series of flights are consecutive flights that:

a) begin and end within a period of 24 hours; and

b) are all conducted by the same pilot-in-command.

State of Registry. The State on whose register the aircraft is entered.

Note.— In the case of the registration of aircraft of an international operating agency on other than a national basis, the States constituting the agency are jointly and severally bound to assume the obligations which, under the Chicago Convention, attach to a State of Registry. See, in this regard, the Council Resolution of 14 December 1967 on Nationality and Registration of Aircraft Operated by International Operating Agencies which can be found in Policy and Guidance Material on the Economic Regulation of International Air Transport *(Doc 9587).*

State of the Operator. The State in which the operator's principal place of business is located or, if there is no such place of business, the operator's permanent residence.

Take-off and initial climb phase. That part of the flight from the start of take-off to 300 m (1 000 ft) above the elevation of the FATO, if the flight is planned to exceed this height, or to the end of the climb in the other cases.

Take-off decision point (TDP). The point used in determining take-off performance from which, a power-unit failure occurring at this point, either a rejected take-off may be made or a take-off safely continued.

Note.— TDP applies only to helicopters operating in performance Class 1.

Visual meteorological conditions (VMC). Meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling,* equal to or better than specified minima.

Note.— The specified minima are contained in Chapter 4 of Annex 2.

$\boldsymbol{V_{TOSS}}$**.** The minimum speed at which climb shall be achieved with the critical power-unit inoperative, the remaining power-units operating within approved operating limits.

Note.— The speed referred to above may be measured by instrument indications or achieved by a procedure specified in the flight manual.

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* As defined in Annex 2.

CHAPTER 2. APPLICABILITY

The Standards and Recommended Practices contained in Annex 6, Part III, shall be applicable to all helicopters engaged in international commercial air transport operations or in international general aviation operations, except that these Standards and Recommended Practices are not applicable to helicopters engaged in aerial work.

Note 1.— Standards and Recommended Practices applicable to the operation of aeroplanes by operators authorized to conduct international commercial air transport operations are to be found in Annex 6, Part I.

Note 2.— Standards and Recommended Practices applicable to international general aviation operations with aeroplanes are to be found in Annex 6, Part II.

ANNEX 6 — PART III

SECTION II

INTERNATIONAL COMMERCIAL AIR TRANSPORT

CHAPTER 1. GENERAL

Note 1.— Although the Convention on International Civil Aviation allocates to the State of Registry certain functions which that State is entitled to discharge, or obligated to discharge, as the case may be, the Assembly recognized, in Resolution A23-13 that the State of Registry may be unable to fulfil its responsibilities adequately in instances where aircraft are leased, chartered or interchanged — in particular without crew — by an operator of another State and that the Convention may not adequately specify the rights and obligations of the State of an operator in such instances until such time as Article 83 bis *of the Convention enters into force. Accordingly, the Council urged that if, in the above-mentioned instances, the State of Registry finds itself unable to discharge adequately the functions allocated to it by the Convention, it delegate to the State of the Operator, subject to acceptance by the latter State, those functions of the State of Registry that can more adequately be discharged by the State of the Operator. It was understood that pending entry into force of Article 83* bis *of the Convention the foregoing action would only be a matter of practical convenience and would not affect either the provisions of the Chicago Convention prescribing the duties of the State of Registry or any third State. However, as Article 83* bis *of the Convention entered into force on 20 June 1997, such transfer agreements will have effect in respect of Contracting States which have ratified the related Protocol (Doc 9318) upon fulfilment of the conditions established in Article 83* bis*.*

Note 2.— In the case of international operations effected jointly with helicopters not all of which are registered in the same Contracting State, nothing in this Part of the Annex prevents the States concerned entering into an agreement for the joint exercise of the functions placed upon the State of Registry by the provisions of the relevant Annexes.

1.1 Compliance with laws, regulations and procedures

1.1.1 Operators shall ensure that their employees when abroad know that they must comply with the laws, regulations and procedures of the States in which their helicopters are operated.

1.1.2 Operators shall ensure that all pilots are familiar with the laws, regulations and procedures, pertinent to the performance of their duties, prescribed for the areas to be traversed, the heliports to be used and the air navigation facilities relating thereto. The operator shall ensure that other members of the flight crew are familiar with such of these regulations and procedures as are pertinent to the performance of their respective duties in the operation of the helicopter.

Note.— Information for pilots and flight operations personnel on flight procedure parameters and operational procedures is contained in PANS-OPS (Doc 8168), Volume I. Criteria for the construction of visual and instrument flight procedures are contained in PANS-OPS (Doc 8168), Volume II. Obstacle clearance criteria and procedures used in certain States may differ from PANS-OPS, and knowledge of these differences is important for safety reasons.

1.1.3 Operators shall ensure that flight crew members demonstrate the ability to speak and understand the language used for radiotelephony communications as specified in Annex 1.

1.1.4 An operator or a designated representative shall have responsibility for operational control.

Note.— The rights and obligations of a State in respect to the operation of helicopters registered in that State are not affected by this provision.

1.1.5 Responsibility for operational control shall be delegated only to the pilot-in-command and to a flight operations officer/flight dispatcher if an operator's approved method of control and supervision of flight operations requires the use of flight operations officer/flight dispatcher personnel.

Note.— Guidance on the operational control organization and the role of the flight operations officer/flight dispatcher is contained in the Manual of Procedures for Operations Inspection, Certification and Continued Surveillance *(Doc 8335). Detailed guidance on the authorization, duties and responsibilities of the flight operations officer/flight dispatcher is contained in the manual* Preparation of an Operations Manual *(Doc 9376). The requirements for age, skill, knowledge and experience for licensed flight operations officers/flight dispatchers are contained in Annex 1.*

1.1.6 If an emergency situation which endangers the safety of the helicopter or persons becomes known first to the flight operations officer/flight dispatcher, action by that person in accordance with 2.6.1 shall include, where necessary, notification to the appropriate authorities of the nature of the situation without delay, and requests for assistance if required.

1.1.7 If an emergency situation which endangers the safety of the helicopter or persons necessitates the taking of action which involves a violation of local regulations or procedures, the pilot-in-command shall notify the appropriate local authority without delay. If required by the State in which the incident occurs, the pilot-in-command shall submit a report on any such violation to the appropriate authority of such State; in that event, the pilot-in-command shall also submit a copy of it to the State of the Operator. Such reports shall be submitted as soon as possible and normally within ten days.

1.1.8 Operators shall ensure that pilots-in-command have available on board the helicopter all the essential information concerning the search and rescue services in the area over which the helicopter will be flown.

Note.— This information may be made available to the pilot by means of the operations manual or such other means as is considered appropriate.

1.1.9 An operator shall establish and maintain an accident prevention and flight safety programme.

Note.— Guidance on accident prevention is contained in the Accident Prevention Manual *(Doc 9422) and in the* Preparation of an Operations Manual *(Doc 9376).*

1.1.10 **Recommendation.—** *An operator of a helicopter of a certificated take-off mass in excess of 7 000 kg or having a passenger seating configuration of more than 9 and fitted with a flight data recorder should establish and maintain a flight data analysis programme as part of its accident prevention and flight safety programme.*

Note.— An operator may contract the operation of a flight data analysis programme to another party while retaining overall responsibility for the maintenance of such a programme.

1.1.11 Any flight data analysis programme shall be non-punitive and contain adequate safeguards to protect the source(s) of the data.

1.2 Safety management

1.2.1 States shall establish a safety programme in order to achieve an acceptable level of safety in the operation of aircraft.

1.2.2 The acceptable level of safety to be achieved shall be established by the State(s) concerned.

Note.— Guidance on safety programmes is contained in the Safety Management Manual (SMM) *(Doc 9859), and the definition of acceptable levels of safety is contained in Attachment E to Annex 11.*

1.2.3 **Recommendation.—** *States should require, as part of their safety programme, that an operator implement a safety management system acceptable to the State of the Operator that, as a minimum:*

a) identifies safety hazards;

b) ensures that remedial action necessary to maintain an acceptable level of safety is implemented;

c) provides for continuous monitoring and regular assessment of the safety level achieved; and

d) aims to make continuous improvement to the overall level of safety.

1.2.4 From 1 January 2009, States shall require, as part of their safety programme, that an operator implement a safety management system acceptable to the State of the Operator that, as a minimum:

a) identifies safety hazards;

b) ensures that remedial action necessary to maintain an acceptable level of safety is implemented;

c) provides for continuous monitoring and regular assessment of the safety level achieved; and

d) aims to make continuous improvement to the overall level of safety.

1.2.5 A safety management system shall clearly define lines of safety accountability throughout the operator's organization, including a direct accountability for safety on the part of senior management.

Note.— Guidance on safety management systems is contained in the Safety Management Manual (SMM) *(Doc 9859).*

1.2.6 An operator shall establish a flight safety documents system, for the use and guidance of operational personnel, as part of its safety management system.

Note.— Guidance on the development and organization of a flight safety documents system is provided in Attachment G.

1.3 Dangerous goods

Note 1.— Provisions for carriage of dangerous goods are contained in Annex 18.

Note 2.— Article 35 of the Convention refers to certain classes of cargo restrictions.

1.4 Use of psychoactive substances

Note.— Provisions concerning the use of psychoactive substances are contained in Annex 1, 1.2.7 and Annex 2, 2.5.

CHAPTER 2. FLIGHT OPERATIONS

2.1 Operating facilities

2.1.1 An operator shall ensure that a flight will not be commenced unless it has been ascertained by every reasonable means available that the ground and/or water facilities available and directly required on such flight, for the safe operation of the helicopter and the protection of the passengers, are adequate for the type of operation under which the flight is to be conducted and are adequately operated for this purpose.

Note.— "Reasonable means" in this Standard is intended to denote the use, at the point of departure, of information available to the operator either through official information published by the aeronautical information services or readily obtainable from other sources.

2.1.2 An operator shall ensure that any inadequacy of facilities observed in the course of operations is reported to the authority responsible for them, without undue delay.

2.2 Operational certification and supervision

2.2.1 The air operator certificate

2.2.1.1 An operator shall not engage in commercial air transport operations unless in possession of a valid air operator certificate issued by the State of the Operator.

2.2.1.2 The air operator certificate shall authorize the operator to conduct commercial air transport operations in accordance with specified authorizations, conditions and limitations.

Note.— Guidance on the air operator certificate and associated authorizations, conditions and limitations, which may be contained in operations specifications, is contained in the Manual of Procedures for Operations Inspection, Certification and Continued Surveillance *(Doc 8335).*

2.2.1.3 Contracting States shall recognize as valid an air operator certificate issued by another Contracting State provided that the requirements under which the certificate was issued are at least equal to the applicable Standards specified in this Annex.

2.2.1.4 The issue of an air operator certificate by the State of the Operator shall be dependent upon the operator demonstrating an adequate organization, method of control and supervision of flight operations, training programme as well as ground handling and maintenance arrangements consistent with the nature and extent of the operations specified.

Note.— Attachment F to Part I of Annex 6 contains guidance on the issue of an air operator certificate.

2.2.1.5 The continued validity of an air operator certificate shall depend upon the operator maintaining the requirements of 2.2.1.4 under the supervision of the State of the Operator.

2.2.1.6 The air operator certificate shall contain at least the following:

a) operator's identification (name, location);

b) date of issue and period of validity;

c) description of the types of operations authorized;

d) the type(s) of aircraft authorized for use; and

e) authorized areas of operation or routes.

2.2.1.7 The State of the Operator shall establish a system for both the certification and the continued surveillance of the operator in accordance with Appendix 1 to ensure that the required standards of operations established in 2.2 are maintained.

2.2.2 Operations manual

2.2.2.1 An operator shall make available, for the use and guidance of operations personnel concerned, an operations manual constructed using the guidance contained in Attachment H. The operations manual shall be amended or revised as is necessary to ensure that the information contained therein is kept up to date. All such amendments or revisions shall be notified to all personnel that are required to use this manual.

2.2.2.2 The State of the Operator shall establish a requirement for the operator to provide a copy of the operations manual together with all amendments and/or revisions, for review and acceptance and, where required, approval. The operator shall incorporate in the operations manual such mandatory material as the State of the Operator may require.

Note 1.— Guidance for the organization and contents of an operations manual is provided in Attachment H.

Note 2.— Specific items in an operations manual require the approval of the State of the Operator in accordance with the Standards in 2.2.7, 4.1.3, 7.3.1 and 10.3.

2.2.3 Operating instructions — general

2.2.3.1 An operator shall ensure that all operations personnel are properly instructed in their particular duties and responsibilities and the relationship of such duties to the operation as a whole.

2.2.3.2 A helicopter rotor shall not be turned under power, for the purpose of flight, without a qualified pilot at the controls. The operator shall provide appropriately specific training and procedures to be followed for all personnel, other than qualified pilots, who are likely to carry out the turning of a rotor under power for purposes other than flight.

2.2.3.3 **Recommendation.—** *The operator should issue operating instructions and provide information on helicopter climb performance with all engines operating to enable the pilot-in-command to determine the climb gradient that can be achieved during the take-off and initial climb phase for the existing take-off conditions and intended take-off technique. This information should be based on the helicopter manufacturer's or other data, acceptable to the State of the Operator, and should be included in the operations manual*.

2.2.4 In-flight simulation of emergency situations

An operator shall ensure that when passengers or cargo are being carried, no emergency or abnormal situations shall be simulated.

2.2.5 Checklists

The checklists provided in accordance with 4.1.4 shall be used by flight crews prior to, during and after all phases of operations, and in emergency, to ensure compliance with the operating procedures contained in the aircraft operating manual, the flight manual or other documents associated with the certificate of airworthiness and otherwise in the operations manual. The design and utilization of checklists shall observe Human Factors principles.

Note.— Guidance material on the application of Human Factors principles can be found in the Human Factors Training Manual *(Doc 9683).*

2.2.6 Minimum flight altitudes (operations under IFR)

2.2.6.1 An operator shall be permitted to establish minimum flight altitudes for those routes flown for which minimum flight altitudes have been established by the State flown over or the responsible State, provided that they shall not be less than those established by that State, unless specifically approved.

2.2.6.2 An operator shall specify the method by which it is intended to determine minimum flight altitudes for operations conducted over routes for which minimum flight altitudes have not been established by the State flown over, or the responsible State, and shall include this method in the operations manual. The minimum flight altitudes determined in accordance with the above method shall not be lower than specified in Annex 2.

2.2.6.3 **Recommendation.—** *The method for establishing the minimum flight altitudes should be approved by the State of the Operator.*

2.2.6.4 **Recommendation.—** *The State of the Operator should approve such method only after careful consideration of the probable effects of the following factors on the safety of the operation in question:*

a) the accuracy and reliability with which the position of the helicopter can be determined;

b) the inaccuracies in the indications of the altimeters used;

c) the characteristics of the terrain (e.g. sudden changes in the elevation);

d) the probability of encountering unfavourable meteorological conditions (e.g. severe turbulence and descending air currents);

e) possible inaccuracies in aeronautical charts; and

f) airspace restrictions.

2.2.7 Heliport operating minima (operations under IFR)

2.2.7.1 The State of the Operator shall require that the operator establish heliport operating minima for each heliport to be used in operations and shall approve the method of determination of such minima. Such minima shall not be lower than any that may be established for such heliports by the State in which the heliport is located, except when specifically approved by that State.

Note.— This Standard does not require the State in which the heliport is located to establish heliport operating minima.

2.2.7.2 The State of the Operator shall require that in establishing the heliport operating minima which will apply to any particular operation, full account shall be taken of:

a) the type, performance and handling characteristics of the helicopter;

b) the composition of the flight crew, their competence and experience;

c) the physical characteristics of the heliport, and direction of approach;

d) the adequacy and performance of the available visual and non-visual ground aids;

e) the equipment available on the helicopter for the purpose of navigation and/or control of the flight path during the approach to landing and the missed approach;

f) the obstacles in the approach and missed approach areas and the obstacle clearance altitude/height for the instrument approach procedures;

g) the means used to determine and report meteorological conditions; and

h) the obstacles in the climb-out areas and necessary clearance margins.

2.2.7.3 Category II and Category III instrument approach and landing operations shall not be authorized unless RVR information is provided.

2.2.7.4 **Recommendation.—** *For instrument approach and landing operations, heliport operating minima below 800 m visibility should not be authorized unless RVR information or an accurate measurement or observation of visibility is provided.*

Note.— Guidance on the operationally desirable and currently attainable accuracy of measurement or observation is given in Annex 3, Attachment B.

2.2.8 Fuel and oil records

2.2.8.1 An operator shall maintain fuel and oil records to enable the State of the Operator to ascertain that, for each flight, the requirements of 2.3.6 have been complied with.

2.2.8.2 Fuel and oil records shall be retained by the operator for a period of three months.

2.2.9 Crew

2.2.9.1 *Pilot-in-command.* For each flight, the operator shall designate one pilot to act as pilot-in-command.

2.2.9.2 *Flight time, flight duty periods and rest periods.* An operator shall formulate rules to limit flight time and flight duty periods and for the provision of adequate rest periods for all its crew members. These rules shall be in accordance with the regulations established by the State of the Operator, or approved by that State, and included in the operations manual.

2.2.9.3 An operator shall maintain current records of the flight time, flight duty periods and rest periods of all its crew members.

Note.— Guidance on the establishment of limitations is given in Attachment C.

2.2.10 Passengers

2.2.10.1 An operator shall ensure that passengers are made familiar with the location and use of:

a) seat belts or harnesses;

b) emergency exits;

c) life jackets, if the carriage of life jackets is prescribed;

d) oxygen dispensing equipment, if the provision of oxygen for the use of passengers is prescribed; and

e) other emergency equipment provided for individual use, including passenger emergency briefing cards.

2.2.10.2 The operator shall ensure that the passengers are informed of the location and general manner of use of the principal emergency equipment carried for collective use.

2.2.10.3 In an emergency during flight, passengers shall be instructed in such emergency action as may be appropriate to the circumstances.

2.2.10.4 The operator shall ensure that, during take-off and landing and whenever considered necessary by reason of turbulence or any emergency occurring during flight, all passengers on board a helicopter shall be secured in their seats by means of the seat belts or harnesses provided.

2.2.11 Over-water flights

All helicopters on flights over water in a hostile environment in accordance with 4.5.1 shall be certificated for ditching. Sea state shall be an integral part of ditching information.

2.3 Flight preparation

2.3.1 A flight, or series of flights, shall not be commenced until flight preparation forms have been completed certifying that the pilot-in-command is satisfied that:

a) the helicopter is airworthy;

b) the instruments and equipment prescribed in Chapter 4, for the particular type of operation to be undertaken, are installed and are sufficient for the flight;

c) a maintenance release as prescribed in 6.7 has been issued in respect of the helicopter;

d) the mass of the helicopter and centre of gravity location are such that the flight can be conducted safely, taking into account the flight conditions expected;

e) any load carried is properly distributed and safely secured;

f) a check has been completed indicating that the operating limitations of Chapter 3 can be complied with for the flight to be undertaken; and

g) the Standards of 2.3.3 relating to operational flight planning have been complied with.

Note.— Series of flights are consecutive flights that:

a) begin and end within a period of 24 hours; and

b) *are all conducted by the same pilot-in-command.*

2.3.2 Completed flight preparation forms shall be kept by an operator for a period of three months.

2.3.3 Operational flight planning

2.3.3.1 An operational flight plan shall be completed for every intended flight or series of flights, and approved by the pilot-in-command, and shall be lodged with the appropriate authority. The operator shall determine the most efficient means of lodging the operational flight plan.

2.3.3.2 The operations manual shall describe the content and use of the operational flight plan.

2.3.4 Alternate heliports

2.3.4.1 *Take-off alternate heliport*

2.3.4.1.1 A take-off alternate heliport shall be selected and specified in the operational flight plan if the weather conditions at the heliport of departure are at or below the applicable heliport operating minima.

2.3.4.1.2 For a heliport to be selected as a take-off alternate, the available information shall indicate that, at the estimated time of use, the conditions will be at or above the heliport operating minima for that operation.

2.3.4.2 *Destination alternate heliport*

2.3.4.2.1 For a flight to be conducted in accordance with IFR, at least one destination alternate shall be specified in the operational flight plan and the flight plan, unless:

a) the duration of the flight and the meteorological conditions prevailing are such that there is reasonable certainty that, at the estimated time of arrival at the heliport of intended landing, and for a reasonable period before and after such time, the approach and landing may be made under visual meteorological conditions as prescribed by the State of the Operator; or

b) the heliport of intended landing is isolated and no suitable alternate is available. A point of no return (PNR) shall be determined.

2.3.4.2.2 For a heliport to be selected as a destination alternate, the available information shall indicate that, at the estimated time of use, the conditions will be at or above the heliport operating minima for that operation.

2.3.4.2.3 **Recommendation.—** *For a flight departing to a destination which is forecast to be below the heliport operating minima, two destination alternates should be selected. The first destination alternate should be at or above the heliport operating minima for destination and the second at or above the heliport operating minima for alternate.*

2.3.4.3 Suitable offshore alternates shall be specified subject to the following:

a) the offshore alternates shall be used only after a PNR. Prior to a PNR, onshore alternates shall be used;

b) mechanical reliability of critical control systems and critical components shall be considered and taken into account when determining the suitability of the alternates;

c) one engine inoperative performance capability shall be attainable prior to arrival at the alternate;

d) to the extent possible, deck availability shall be guaranteed; and

e) weather information must be reliable and accurate.

Note.— The landing technique specified in the flight manual following control system failure may preclude the nomination of certain helidecks as alternate heliports.

2.3.4.4 **Recommendation.—** *Offshore alternates should not be used when it is possible to carry enough fuel to have an onshore alternate. Offshore alternates should not be used in a hostile environment.*

2.3.5 Weather conditions

2.3.5.1 A flight to be conducted in accordance with VFR shall not be commenced unless current meteorological reports or a combination of current reports and forecasts indicate that the meteorological conditions along the route or that part of the route to be flown or in the intended area of operations under VFR will, at the appropriate time, be such as to render compliance with these rules possible.

Note.— When a flight is conducted in accordance with VFR, the use of night vision imaging systems (NVIS) or other vision enhancing systems does not diminish the requirement to comply with the provisions of 2.3.5.1.

2.3.5.2 A flight to be conducted in accordance with IFR shall not be commenced unless the information is available which indicates that conditions at the heliport of intended landing or, when an alternate is required, at least one alternate heliport will, at the estimated time of arrival, be at or above the heliport operating minima.

Note.— It is the practice in some States to declare, for flight planning purposes, higher minima for a heliport when nominated as an alternate than for the same heliport when planned as that of intended landing.

2.3.5.3 A flight to be operated in known or expected icing conditions shall not be commenced unless the helicopter is certificated and equipped to cope with such conditions.

2.3.5.4 A flight to be planned or expected to operate in suspected or known ground icing conditions shall not be commenced unless the helicopter has been inspected for icing and, if necessary, has been given appropriate de-icing/anti-icing treatment. Accumulation of ice or other naturally occurring contaminants shall be removed so that the helicopter is kept in an airworthy condition prior to take-off.

Note.— Guidance material is given in the Manual of Aircraft Ground De-icing/Anti-icing Operations *(Doc 9640).*

2.3.6 Fuel and oil supply

2.3.6.1 *All helicopters.* A flight shall not be commenced unless, taking into account both the meteorological conditions and any delays that are expected in flight, the helicopter carries sufficient fuel and oil to ensure that it can safely complete the flight. In addition, a reserve shall be carried to provide for contingencies.

2.3.6.2 *VFR operations.* The fuel and oil carried in order to comply with 2.3.6.1 shall, in the case of VFR operations, be at least the amount sufficient to allow the helicopter:

a) to fly to the heliport to which the flight is planned;

b) to fly thereafter for a period of 20 minutes at best-range speed; and

c) to have an additional amount of fuel, sufficient to provide for the increased consumption on the occurrence of any of the potential contingencies specified by the operator to the satisfaction of the State of the Operator.

2.3.6.3 *IFR operations.* The fuel and oil carried in order to comply with 2.3.6.1 shall, in the case of IFR operations, be at least the amount sufficient to allow the helicopter:

2.3.6.3.1 When an alternate is not required, in terms of 2.3.4.2.1 a), to fly to the heliport to which the flight is planned, and thereafter:

a) to fly 30 minutes at holding speed at 450 m (1 500 ft) above the destination heliport under standard temperature conditions and approach and land; and

b) to have an additional amount of fuel, sufficient to provide for the increased consumption on the occurrence of any of the potential contingencies specified by the operator to the satisfaction of the State of the Operator.

2.3.6.3.2 When an alternate is required, to fly to and execute an approach, and a missed approach, at the heliport to which the flight is planned, and thereafter:

a) to fly to the alternate specified in the flight plan; and then

b) to fly for 30 minutes at holding speed at 450 m (1 500 ft) above the alternate under standard temperature conditions, and approach and land; and

c) to have an additional amount of fuel, sufficient to provide for the increased consumption on the occurrence of any of the potential contingencies specified by the operator to the satisfaction of the State of the Operator.

2.3.6.3.3 When no suitable alternate is available, in terms of 2.3.4.2.1 (e.g. the destination is isolated), sufficient fuel shall be carried to enable the helicopter to fly to the destination to which the flight is planned and thereafter for a period that will, based on geographic and environmental considerations, enable a safe landing to be made.

2.3.6.4 In computing the fuel and oil required in 2.3.6.1, at least the following shall be considered:

a) meteorological conditions forecast;

b) expected air traffic control routings and traffic delays;

c) for IFR flight, one instrument approach at the destination heliport, including a missed approach;

d) the procedures prescribed in the operations manual for loss of pressurization, where applicable, or failure of one power-unit while en route; and

e) any other conditions that may delay the landing of the helicopter or increase fuel and/or oil consumption.

Note.— Nothing in 2.3.6 precludes amendment of a flight plan in flight in order to replan the flight to another heliport, provided that the requirements of 2.3.6 can be complied with from the point where the flight has been replanned.

2.3.7 Refuelling with passengers on board or rotors turning

Recommendation.— *A helicopter should not be refuelled when passengers are embarking, on board, disembarking or when the rotor is turning unless the operator is granted specific authorization by the State of the Operator setting forth the conditions under which such fuelling may be carried out.*

Note 1.— Provisions concerning aircraft refuelling are contained in Annex 14, Volume I, and guidance on safe refuelling practices is contained in the Airport Services Manual *(Doc 9137), Parts 1 and 8.*

Note 2.— Additional precautions are required when refuelling with fuels other than aviation kerosene or when refuelling results in a mixture of aviation kerosene with other aviation turbine fuels, or when an open line is used.

2.3.8 Oxygen supply

Note.— Approximate altitudes in the Standard Atmosphere corresponding to the values of absolute pressure used in the text are as follows:

Absolute pressure	Metres	Feet
700 hPa	*3 000*	*10 000*
620 hPa	*4 000*	*13 000*
376 hPa	*7 600*	*25 000*

2.3.8.1 A flight to be operated at flight altitudes at which the atmospheric pressure in personnel compartments will be less than 700 hPa shall not be commenced unless sufficient stored breathing oxygen is carried to supply:

a) all crew members and 10 per cent of the passengers for any period in excess of 30 minutes that the pressure in compartments occupied by them will be between 700 hPa and 620 hPa;

b) the crew and passengers for any period that the atmospheric pressure in compartments occupied by them will be less than 620 hPa.

2.3.8.2 A flight to be operated with a pressurized helicopter shall not be commenced unless a sufficient quantity of stored breathing oxygen is carried to supply all the crew members and passengers, as is appropriate to the circumstances of the flight being undertaken, in the event of loss of pressurization, for any period that the atmospheric pressure in any compartment occupied by them would be less than 700 hPa. In addition, when the helicopter is operated at flight altitudes at which the atmospheric pressure is more than 376 hPa and cannot descend safely to a flight altitude at which the atmospheric pressure is equal to 620 hPa within four minutes, there shall be no less than a 10-minute supply for the occupants of the passenger compartment.

2.4 In-flight procedures

2.4.1 Heliport operating minima

2.4.1.1 A flight shall not be continued towards the heliport of intended landing, unless the latest available information indicates that at the expected time of arrival, a landing can be effected at that heliport, or at least one alternate heliport, in compliance with the operating minima established in accordance with 2.2.7.1.

2.4.1.2 An instrument approach shall not be continued beyond the outer marker fix in case of precision approach, or below 300 m (1 000 ft) above the heliport in case of non-precision approach, unless the reported visibility or controlling RVR is above the specified minimum.

2.4.1.3 If, after passing the outer marker fix in case of precision approach, or after descending below 300 m (1 000 ft) above the heliport in case of non-precision approach, the reported visibility or controlling RVR falls below the specified minimum, the approach may be continued to DA/H or MDA/H. In any case, a helicopter shall not continue its approach-to-land at any heliport beyond a point at which the limits of the operating minima specified for that heliport would be infringed.

2.4.2 Meteorological observations

Note.— The procedures for making meteorological observations on board aircraft in flight and for recording and reporting them are contained in Annex 3, the PANS-ATM (Doc 4444) and the appropriate Regional Supplementary Procedures *(Doc 7030).*

2.4.3 Hazardous flight conditions

Hazardous flight conditions encountered, other than those associated with meteorological conditions, shall be reported to the appropriate aeronautical station as soon as possible. The reports so rendered shall give such details as may be pertinent to the safety of other aircraft.

2.4.4 Flight crew members at duty stations

2.4.4.1 *Take-off and landing.* All flight crew members required to be on flight deck duty shall be at their stations.

2.4.4.2 *En route.* All flight crew members required to be on flight deck duty shall remain at their stations except when their absence is necessary for the performance of duties in connection with the operation of the helicopter or for physiological needs.

2.4.4.3 *Seat belts.* All flight crew members shall keep their seat belt fastened when at their stations.

2.4.4.4 *Safety harness.* Any flight crew member occupying a pilot's seat shall keep the safety harness fastened during the take-off and landing phases; all other flight crew members shall keep their safety harness fastened during the take-off and landing phases unless the shoulder straps interfere with the performance of their duties, in which case the shoulder straps may be unfastened but the seat belt must remain fastened.

Note.— Safety harness includes shoulder straps and a seat belt which may be used independently.

2.4.5 Use of oxygen

All flight crew members, when engaged in performing duties essential to the safe operation of a helicopter in flight, shall use breathing oxygen continuously whenever the circumstances prevail for which its supply has been required in 2.3.8.1 or 2.3.8.2.

2.4.6 Safeguarding of cabin crew and passengers in pressurized aircraft in the event of loss of pressurization

Recommendation.— *Cabin crew should be safeguarded so as to ensure reasonable probability of their retaining consciousness during any emergency descent which may be necessary in the event of loss of pressurization and, in addition, they should have such means of protection as will enable them to administer first aid to passengers during stabilized flight following the emergency. Passengers should be safeguarded by such devices or operational procedures as will ensure reasonable probability of their surviving the effects of hypoxia in the event of loss of pressurization.*

Note.— It is not envisaged that cabin crew will always be able to provide assistance to passengers during emergency descent procedures which may be required in the event of loss of pressurization.

2.4.7 Instrument flight procedures

2.4.7.1 One or more instrument approach procedures to serve each final approach and take-off area or heliport utilized for instrument flight operations shall be approved and promulgated by the State in which the heliport is located, or by the State which is responsible for the heliport when located outside the territory of any State.

2.4.7.2 All helicopters operated in accordance with IFR shall comply with the instrument approach procedures approved by the State in which the heliport is located, or by the State which is responsible for the heliport when located outside the territory of any State.

Note 1.— Operational procedures recommended for the guidance of operations personnel involved in instrument flight operations are described in PANS-OPS (Doc 8168), Volume I.

Note 2.— Criteria for the construction of instrument flight procedures for the guidance of procedure specialists are provided in PANS-OPS (Doc 8168), Volume II.

2.4.8 Helicopter operating procedures for noise abatement

Recommendation.— *An operator should ensure that take-off and landing procedures take into account the need to minimize the effect of helicopter noise.*

2.5 Duties of pilot-in-command

2.5.1 The pilot-in-command shall be responsible for the operation and safety of the helicopter and for the safety of all crew members, passengers and cargo on board, from the moment the engine(s) are started until the helicopter finally comes to rest at the end of the flight, with the engine(s) shut down and the rotor blades stopped.

2.5.2 The pilot-in-command shall ensure that the checklists specified in 2.2.5 are complied with in detail.

2.5.3 The pilot-in-command shall be responsible for notifying the nearest appropriate authority by the quickest available means of any accident involving the helicopter, resulting in serious injury or death of any person or substantial damage to the helicopter or property.

Note.— A definition of the term "serious injury" is contained in Annex 13.

2.5.4 The pilot-in-command shall be responsible for reporting all known or suspected defects in the helicopter, to the operator, at the termination of the flight.

2.5.5 The pilot-in-command shall be responsible for the journey log book or the general declaration containing the information listed in 9.4.1.

Note.— By virtue of Resolution A10-36 of the Tenth Session of the Assembly (Caracas, June–July 1956) "the general declaration, [described in Annex 9] when prepared so as to contain all the information required by Article 34 [of the Convention on International Civil Aviation] with respect to the journey log book, may be considered by Contracting States to be an acceptable form of journey log book".

2.6 Duties of flight operations officer/flight dispatcher

2.6.1 A flight operations officer/flight dispatcher in conjunction with a method of control and supervision of flight operations in accordance with 2.2.1.4 shall:

a) assist the pilot-in-command in flight preparation and provide the relevant information;

b) assist the pilot-in-command in preparing the operational and ATS flight plans, sign when applicable and file the ATS flight plan with the appropriate ATS unit; and

c) furnish the pilot-in-command while in flight, by appropriate means, with information which may be necessary for the safe conduct of the flight.

2.6.2 In the event of an emergency, a flight operations officer/flight dispatcher shall:

a) initiate such procedures as outlined in the operations manual while avoiding taking any action that would conflict with ATC procedures; and

b) convey safety-related information to the pilot-in-command that may be necessary for the safe conduct of the flight, including information related to any amendments to the flight plan that become necessary in the course of the flight.

Note.— It is equally important that the pilot-in-command also convey similar information to the flight operations officer/flight dispatcher during the course of a flight, particularly in the context of emergency situations.

2.7 Carry-on baggage

The operator shall ensure that all baggage carried onto a helicopter and taken into the passenger cabin is adequately and securely stowed.

CHAPTER 3. HELICOPTER PERFORMANCE OPERATING LIMITATIONS

3.1 General

3.1.1 Helicopters shall be operated in accordance with a code of performance established by the State of the Operator, in compliance with the applicable Standards of this chapter.

Note 1.— The code of performance reflects, for the conduct of operations, both the various phases of flight and the operational environment. Attachment A provides guidance to assist States in establishing a code of performance.

Note 2.— Concerning compliance with codes of performance, Chapter 1 of this Section requires operators to comply with the laws, regulations and procedures of the States in which their helicopters are operated. Article 11 of the Convention forms the basis for this requirement.

3.1.2 In conditions where the safe continuation of flight is not ensured in the event of a critical power-unit failure, helicopter operations shall be conducted in a manner that gives appropriate consideration for achieving a safe forced landing.

Note.— Guidance on "appropriate consideration" is contained in Attachment A, 2.4.

3.1.2.1 Where the State of the Operator permits IMC operations in performance Class 3, such operations shall be conducted in accordance with the provisions of 3.4.

3.1.3 **Recommendation.—** *For helicopters for which Part IV of Annex 8 is not applicable because of the exemption provided for in Article 41 of the Convention, the State of the Operator should ensure that the level of performance specified in 3.2 is met as far as practicable.*

3.1.4 Where helicopters are operated to or from heliports in a congested hostile environment, the competent authority of the State in which the heliport is situated shall specify the requirements to enable these operations to be conducted in a manner that gives appropriate consideration for the risk associated with a power-unit failure.

Note.— Guidance on "appropriate consideration" is contained in Attachment A, 2.4.

3.2 Applicable to helicopters certificated in accordance with Part IV of Annex 8

3.2.1 The Standards contained in 3.2.2 to 3.2.7 inclusive are applicable to the helicopters to which Part IV of Annex 8 is applicable.

Note.— The following Standards do not include quantitative specifications comparable to those found in national airworthiness codes. In accordance with 3.1.1, they are to be supplemented by national requirements prepared by Contracting States.

3.2.2 The level of performance defined by the appropriate parts of the code of performance referred to in 3.1.1 for the helicopters designated in 3.2.1 shall be consistent with the overall level embodied in the Standards of this chapter.

Note.— Attachment A contains guidance material which indicates, by an Example, the level of performance intended by the Standards and Recommended Practices of this chapter.

3.2.3 A helicopter shall be operated in compliance with the terms of its certificate of airworthiness and within the approved operating limitations contained in its flight manual.

3.2.4 The State of the Operator shall take such precautions as are reasonably possible to ensure that the general level of safety contemplated by these provisions is maintained under all expected operating conditions, including those not covered specifically by the provisions of this chapter.

3.2.5 A flight shall not be commenced unless the performance information provided in the flight manual indicates that the Standards of 3.2.6 and 3.2.7 can be complied with for the flight to be undertaken.

3.2.6 In applying the Standards of this chapter, account shall be taken of all factors that significantly affect the performance of the helicopter (such as: mass, operating procedures, the pressure-altitude appropriate to the elevation of the operating site, temperature, wind and condition of the surface). Such factors shall be taken into account directly as operational parameters or indirectly by means of allowances or margins, which may be provided in the scheduling of performance data or in the code of performance in accordance with which the helicopter is being operated.

3.2.7 Mass limitations

a) The mass of the helicopter at the start of take-off shall not exceed the mass at which the code of performance referred to in 3.1.1 is complied with, allowing for expected reductions in mass as the flight proceeds and for such fuel jettisoning as is appropriate.

b) In no case shall the mass at the start of take-off exceed the maximum take-off mass specified in the helicopter flight manual taking into account the factors specified in 3.2.6.

c) In no case shall the estimated mass for the expected time of landing at the destination and at any alternate exceed the maximum landing mass specified in the helicopter flight manual taking into account the factors specified in 3.2.6.

d) In no case shall the mass at the start of take-off, or at the expected time of landing at the destination and at any alternate, exceed the relevant maximum mass at which compliance has been demonstrated with the applicable noise certification Standards in Annex 16, Volume I, unless otherwise authorized in exceptional circumstances for a certain operating site where there is no noise disturbance problem, by the competent authority of the State in which the operating site is situated.

3.2.7.1 In developing a code of performance, the State of the Operator shall either apply a risk assessment methodology in accordance with the guidance in Attachment A or, for those States that choose not to apply a risk assessment methodology, the Standards of 3.2.7.2, 3.2.7.3 and 3.2.7.4 shall apply.

3.2.7.2 *Take-off and initial climb phase*

3.2.7.2.1 *Operations in performance Class 1*. The helicopter shall be able, in the event of the failure of the critical power-unit being recognized at or before the take-off decision point, to discontinue the take-off and stop within the rejected take-off area available or, in the event of the failure of the critical power-unit being recognized at or after the take-off decision point, to continue the take-off, clearing all obstacles along the flight path by an adequate margin until the helicopter is in a position to comply with 3.2.7.3.1.

3.2.7.2.2 *Operations in performance Class 2*. The helicopter shall be able, in the event of the failure of the critical power-unit at any time after reaching DPATO, to continue the take-off, clearing all obstacles along the flight path by an adequate margin until the helicopter is in a position to comply with 3.2.7.3.1. Before the DPATO, failure of the critical power-unit may cause the helicopter to force-land; therefore the conditions stated in 3.1.2 shall apply.

3.2.7.2.3 *Operations in performance Class 3.* At any point of the flight path, failure of a power-unit will cause the helicopter to force-land; therefore the conditions stated in 3.1.2 shall apply.

3.2.7.3 *En-route phase*

3.2.7.3.1 *Operations in performance Classes 1 and 2.* The helicopter shall be able, in the event of the failure of the critical power-unit at any point in the en-route phase, to continue the flight to a site at which the conditions of 3.2.7.4.1 for operations in performance Class 1, or the conditions of 3.2.7.4.2 for operations in performance Class 2 can be met, without flying below the appropriate minimum flight altitude at any point.

Note.— When the en-route phase is conducted over a hostile environment and the diversion time to an alternate would exceed two hours, it is recommended that the State of the Operator assess the risks associated with a second power-unit failure.

3.2.7.3.2 *Operations in performance Class 3.* The helicopter shall be able, with all power-units operating, to continue along its intended route or planned diversions without flying at any point below the appropriate minimum flight altitude. At any point of the flight path, failure of a power-unit will cause the helicopter to force-land; therefore the conditions stated in 3.1.2 shall apply.

3.2.7.4 *Approach and landing phase*

3.2.7.4.1 *Operations in performance Class 1*. In the event of the failure of the critical power-unit being recognized at any point during the approach and landing phase, before the landing decision point, the helicopter shall, at the destination and at any alternate, after clearing all obstacles in the approach path, be able to land and stop within the landing distance available or to perform a balked landing and clear all obstacles in the flight path by an adequate margin equivalent to that specified in 3.2.7.2.1. In case of the failure occurring after the landing decision point, the helicopter shall be able to land and stop within the landing distance available.

3.2.7.4.2 *Operations in performance Class 2.* In the event of the failure of the critical power-unit before the DPBL, the helicopter shall, at the destination and at any alternate, after clearing all obstacles in the approach path, be able either to land and stop within the landing distance available or to perform a balked landing and clear all obstacles in the flight path by an adequate margin equivalent to that specified in 3.2.7.2.2. After the DPBL, failure of a power-unit may cause the helicopter to force-land; therefore the conditions stated in 3.1.2 shall apply.

3.2.7.4.3 *Operations in performance Class 3.* At any point of the flight path, failure of a power-unit will cause the helicopter to force-land; therefore the conditions stated in 3.1.2 shall apply.

3.3 Obstacle data

The operator shall use available obstacle data to develop procedures to comply with the take-off, initial climb, approach and landing phases detailed in the code of performance established by the State of the Operator.

3.4 Additional requirements for operations of helicopters in performance Class 3 in IMC, except special VFR flights

3.4.1 Operations in performance Class 3 in IMC shall be conducted only over a surface environment acceptable to the competent authority of the State over which the operations are performed.

3.4.2 In approving operations by helicopters operating in performance Class 3 in IMC, the State of the Operator shall ensure that the helicopter is certificated for flight under IFR and that the overall level of safety intended by the provisions of Annexes 6 and 8 is provided by:

a) the reliability of the engines;

b) the operator's maintenance procedures, operating practices and crew training programmes; and

c) equipment and other requirements provided in accordance with Appendix 2.

Note.— Guidance on additional requirements for operations of helicopters in performance Class 3 in IMC is contained in Appendix 2.

3.4.3 Operators of helicopters operating in performance Class 3 in IMC shall have a programme for engine trend monitoring and shall utilize the engine and helicopter manufacturers' recommended instruments, systems and operational/ maintenance procedures to monitor the engines.

3.4.4 **Recommendation**.— *In order to minimize the occurrence of mechanical failures, helicopters operating in IMC in performance Class 3 should utilize vibration health monitoring for the tail-rotor drive system.*

CHAPTER 4. HELICOPTER INSTRUMENTS, EQUIPMENT, AND FLIGHT DOCUMENTS

Note.— Specifications for the provision of helicopter communication and navigation equipment are contained in Chapter 5.

4.1 General

4.1.1 In addition to the minimum equipment necessary for the issuance of a certificate of airworthiness, the instruments, equipment and flight documents prescribed in the following paragraphs shall be installed or carried, as appropriate, in helicopters according to the helicopter used and to the circumstances under which the flight is to be conducted. The prescribed instruments and equipment, including their installation, shall be approved or accepted by the State of Registry.

4.1.2 A helicopter shall carry a certified true copy of the air operator certificate specified in 2.2.1, and a copy of the authorizations, conditions and limitations relevant to the helicopter type, issued in conjunction with the certificate. When the certificate and the associated authorizations, conditions and limitations are issued by the State of the Operator in a language other than English, an English translation shall be included.

Note.— Guidance on the air operator certificate and associated authorizations, conditions and limitations, which may be contained in operations specifications, is contained in the Manual of Procedures for Operations Inspection, Certification and Continued Surveillance *(Doc 8335).*

4.1.3 The operator shall include in the operations manual a minimum equipment list (MEL), approved by the State of the Operator which will enable the pilot-in-command to determine whether a flight may be commenced or continued from any intermediate stop should any instrument, equipment or systems become inoperative. Where the State of the Operator is not the State of Registry, the State of the Operator shall ensure that the MEL does not affect the helicopter's compliance with the airworthiness requirements applicable in the State of Registry.

Note.— Attachment E contains guidance on the minimum equipment list.

4.1.4 The operator shall make available to operations staff and crew members an aircraft operating manual, for each aircraft type operated, containing the normal, abnormal and emergency procedures relating to the operation of the aircraft. The manual shall include details of the aircraft systems and of the checklists to be used. The design of the manual shall observe Human Factors principles. The manual shall be easily accessible to the flight crew during all flight operations.

Note.— Guidance material on the application of Human Factors principles can be found in the Human Factors Training Manual *(Doc 9683).*

4.2 All helicopters on all flights

4.2.1 A helicopter shall be equipped with instruments that will enable the flight crew to control the flight path of the helicopter, carry out any required procedural manoeuvres and observe the operating limitations of the helicopter in the expected operating conditions.

4.2.2 A helicopter shall be equipped with:

a) one or more first-aid kits as appropriate to the number of passengers the helicopter is authorized to carry;

Note.— Guidance on the contents of first-aid kits is given in Attachment D.

b) portable fire extinguishers of a type which, when discharged, will not cause dangerous contamination of the air within the helicopter. At least one shall be located in:

1) the pilot's compartment; and

2) each passenger compartment that is separate from the pilot's compartment and that is not readily accessible to the flight crew.

Note.— Any portable fire extinguisher so fitted in accordance with the certificate of airworthiness of the helicopter may count as one prescribed.

c) 1) a seat or berth for each person over an age to be determined by the State of the Operator;

2) a seat belt for each seat and restraining belts for each berth; and

3) a safety harness for each flight crew seat. The safety harness for each pilot seat shall incorporate a device which will automatically restrain the occupant's torso in the event of rapid deceleration.

Recommendation.— *When dual controls are fitted, the safety harness for each pilot seat should incorporate a restraining device to prevent the upper body of an incapacitated occupant from interfering with the flight controls.*

Note 1.— Depending on the design, the lock on an inertia reel device may suffice for this purpose.

Note 2.— Safety harness includes shoulder straps and a seat belt which may be used independently.

d) means of ensuring that the following information and instructions are conveyed to passengers:

1) when seat belts or harnesses are to be fastened;

2) when and how oxygen equipment is to be used if the carriage of oxygen is required;

3) restrictions on smoking;

4) location and use of life jackets or equivalent individual flotation devices where their carriage is required; and

5) location and method of opening emergency exits; and

e) if fuses are used, spare electrical fuses of appropriate ratings for replacement of those accessible in flight.

4.2.3 A helicopter shall carry:

a) the operations manual prescribed in 2.2.2, or those parts of it that pertain to flight operations;

b) the helicopter flight manual for the helicopter, or other documents containing performance data required for the application of Chapter 3 and any other information necessary for the operation of the helicopter within the terms of its certificate of airworthiness, unless these data are available in the operations manual; and

c) current and suitable charts to cover the route of the proposed flight and any route along which it is reasonable to expect that the flight may be diverted.

4.2.4 Marking of break-in points

4.2.4.1 If areas of the fuselage suitable for break-in by rescue crews in an emergency are marked on a helicopter, such areas shall be marked as shown below (see figure following). The colour of the markings shall be red or yellow, and if necessary they shall be outlined in white to contrast with the background.

4.2.4.2 If the corner markings are more than 2 m apart, intermediate lines 9 cm × 3 cm shall be inserted so that there is no more than 2 m between adjacent markings.

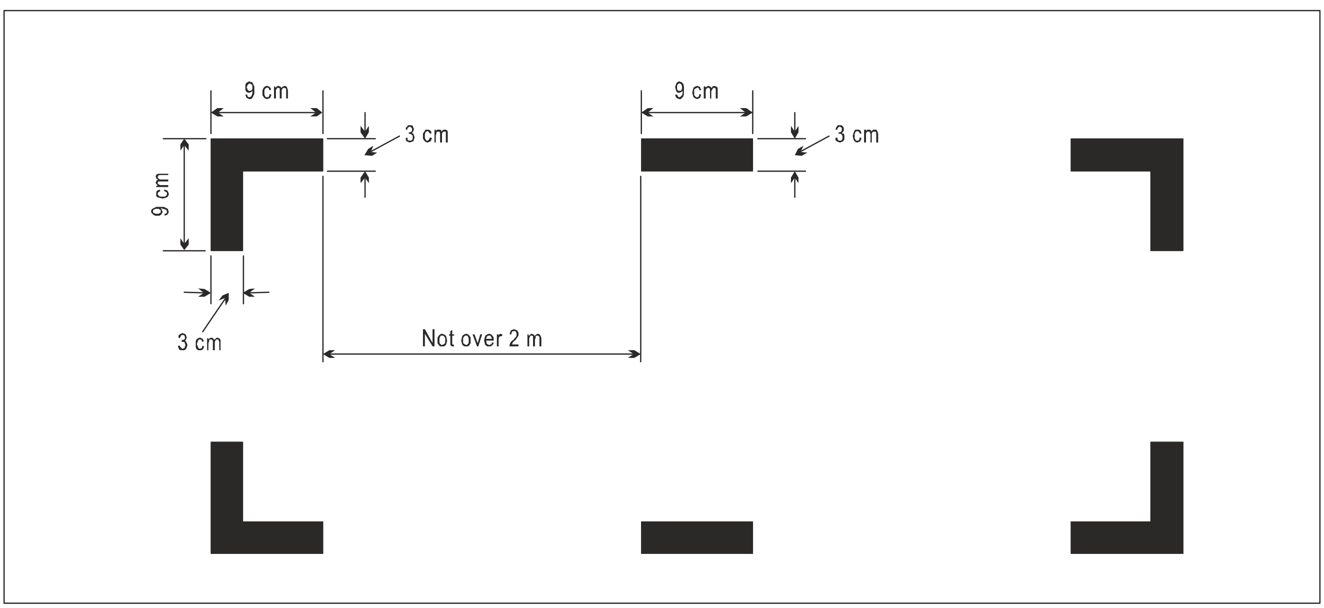
Note.— This Standard does not require any helicopter to have break-in areas.

4.3 Flight recorders

Note 1.— Flight recorders comprise two systems, a flight data recorder (FDR) and a cockpit voice recorder (CVR).

Note 2.— Combination recorders (FDR/CVR) can only be used to meet the flight recorder equipage requirements as specifically indicated in this Annex.

Note 3.— Detailed guidance on flight recorders is contained in Attachment B.



MARKING OF BREAK-IN POINTS (see 4.2.4)

4.3.1 Flight data recorders — types

4.3.1.1 *Type IV FDRs*

4.3.1.1.1 A Type IV FDR shall record the parameters required to determine accurately the helicopter flight path, speed, attitude, engine power and operation.

4.3.1.1.2 A Type IVA FDR shall record the parameters required to determine accurately the helicopter flight path, speed, attitude, engine power, operation and configuration.

4.3.1.2 A Type V FDR shall record the parameters required to determine accurately the helicopter flight path, speed, attitude and engine power.

4.3.1.3 The use of engraving metal foil FDRs shall be discontinued by 1 January 1995.

4.3.1.4 **Recommendation.—** *The use of analogue FDRs using frequency modulation (FM) should be discontinued by 5 November 1998.*

4.3.1.4.1 The use of photographic film FDRs shall be discontinued from 1 January 2003.

4.3.1.5 All helicopters for which the individual certificate of airworthiness is first issued after 1 January 2005, that utilize data link communications and are required to carry a CVR shall record, on a flight recorder, all data link communications to and from the helicopter. The minimum recording duration shall be equal to the duration of the CVR, and shall be correlated to the recorded cockpit audio.

4.3.1.5.1 From 1 January 2007, all helicopters that utilize data link communications and are required to carry a CVR shall record, on a flight recorder, all data link communications to and from the helicopter. The minimum recording duration shall be equal to the duration of the CVR, and shall be correlated to the recorded cockpit audio.

4.3.1.5.2 Sufficient information to derive the content of the data link communications message and, whenever practical, the time the message was displayed to or generated by the crew shall be recorded.

Note.— Data link communications include, but are not limited to, automatic dependent surveillance — contract (ADS-C), controller-pilot data link communications (CPDLC), data link-flight information services (D-FIS) and aeronautical operational control (AOC) messages.

4.3.1.6 **Recommendation.—** *All helicopters of a maximum certificated take-off mass over 2 700 kg, required to be equipped with an FDR and/or a CVR, may alternatively be equipped with one combination recorder (FDR/CVR).*

4.3.2 Flight data recorders — duration

Types IV and V FDRs shall be capable of retaining the information recorded during at least the last ten hours of their operation.

4.3.3 Flight data recorders — helicopters for which the individual certificate of airworthiness is first issued on or after 1 January 1989

4.3.3.1 All helicopters of a maximum certificated take-off mass of over 7 000 kg shall be equipped with a Type IV FDR.

4.3.3.2 **Recommendation.—** *All helicopters of a maximum certificated take-off mass of over 2 730 kg, up to and including 7 000 kg, should be equipped with a Type V FDR.*

4.3.4 Flight data recorders — helicopters for which the individual certificate of airworthiness is first issued after 1 January 2005

All helicopters of a maximum certificated take-off mass of over 3 175 kg shall be equipped with a Type IVA FDR with a recording duration of at least 10 hours.

Note.— A single, combination CVR/FDR is acceptable.

4.3.5 Cockpit voice recorders — helicopters for which the individual certificate of airworthiness is first issued on or after 1 January 1987

4.3.5.1 All helicopters of a maximum certificated take-off mass of over 7 000 kg shall be equipped with a CVR, the objective of which is the recording of the aural environment on the flight deck during flight time. For helicopters not equipped with an FDR, at least main rotor speed shall be recorded on one track of the CVR.

4.3.5.2 All helicopters of a maximum certificated take-off mass of over 3 175 kg, up to and including 7 000 kg, shall be equipped with a CVR, the objective of which is the recording of the aural environment on the flight deck during flight time. For helicopters not equipped with an FDR, at least main rotor speed shall be recorded on one track of the CVR.

4.3.6 Cockpit voice recorders — helicopters for which the individual certificate of airworthiness was first issued before 1 January 1987

All helicopters of a maximum certificated take-off mass of over 7 000 kg shall be equipped with a CVR, the objective of which is the recording of the aural environment on the flight deck during flight time. For helicopters not equipped with an FDR, at least main rotor speed shall be recorded on one track of the CVR.

Note.— CVR performance requirements are as contained in the Minimum Operational Performance Specification (MOPS) document for Flight Recorder Systems of the European Organization for Civil Aviation Equipment (EUROCAE) or equivalent documents.

4.3.7 Cockpit voice recorders — duration

4.3.7.1 A CVR shall be capable of retaining the information recorded during at least the last 30 minutes of its operation.

4.3.7.2 **Recommendation.—** *A CVR, installed in helicopters for which the individual certificate of airworthiness is first issued on or after 1 January 1990, should be capable of retaining the information recorded during at least the last two hours of its operation.*

4.3.7.3 A CVR, installed in helicopters for which the individual certificate of airworthiness is first issued after 1 January 2003, shall be capable of retaining the information recorded during at least the last two hours of its operation.

4.3.8 Flight recorders — construction and installation

Flight recorders shall be constructed, located and installed so as to provide maximum practical protection for the recordings in order that the recorded information may be preserved, recovered and transcribed. Flight recorders shall meet the prescribed crashworthiness and fire protection specifications.

Note.— Industry crashworthiness and fire protection specifications can be found in documents such as the European Organization for Civil Aviation Equipment (EUROCAE) documents ED55 and ED56A.

4.3.9 Flight recorders — operation

4.3.9.1 Flight recorders shall not be switched off during flight time.

4.3.9.2 To preserve flight recorder records, flight recorders shall be deactivated upon completion of flight time following an accident or incident. The flight recorders shall not be reactivated before their disposition as determined in accordance with Annex 13.

Note 1.— The need for removal of the flight recorder records from the aircraft will be determined by the investigation authority in the State conducting the investigation with due regard to the seriousness of an occurrence and the circumstances, including the impact on the operation.

Note 2.— The operator's responsibilities regarding the retention of flight recorder records are contained in 9.6.

4.3.10 Flight recorders — continued serviceability

Operational checks and evaluations of recordings from the FDR and CVR systems shall be conducted to ensure the continued serviceability of the recorders.

Note.— Procedures for the inspections of the flight data and CVR systems are given in Attachment B.

4.4 Instruments and equipment for flights operated under VFR and IFR — by day and night

Note.— The flight instruments requirements in 4.4.1, 4.4.2 and 4.4.3 may be met by combinations of instruments or by electronic displays.

4.4.1 All helicopters when operating in accordance with VFR by day shall be equipped with:

a) a magnetic compass;

b) an accurate timepiece indicating the time in hours, minutes and seconds;

c) a sensitive pressure altimeter;

d) an airspeed indicator; and

e) such additional instruments or equipment as may be prescribed by the appropriate authority.

4.4.2 All helicopters when operating in accordance with VFR at night shall be equipped with:

a) the equipment specified in 4.4.1;

b) an attitude indicator (artificial horizon) for each required pilot and one additional attitude indicator;

c) a slip indicator;

d) a heading indicator (directional gyrosope);

e) a rate of climb and descent indicator;

f) such additional instruments or equipment as may be prescribed by the appropriate authority;

and the following lights:

g) the lights required by Annex 2 for aircraft in flight or operating on the movement area of a heliport;

Note.— The general characteristics of lights are specified in Annex 8. Detailed specifications for lights meeting the requirements of Annex 2 for aircraft in flight or operating on the movement area of a heliport are contained in the Airworthiness Manual *(Doc 9760).*

h) two landing lights;

i) illumination for all instruments and equipment that are essential for the safe operation of the helicopter that are used by the flight crew;

j) lights in all passenger compartments; and

k) a flashlight for each crew member station.

4.4.2.1 **Recommendation.—** *One of the landing lights should be trainable, at least in the vertical plane.*

4.4.3 All helicopters when operating in accordance with IFR, or when the helicopter cannot be maintained in a desired attitude without reference to one or more flight instruments, shall be equipped with:

a) a magnetic compass;

b) an accurate timepiece indicating the time in hours, minutes and seconds;

c) two sensitive pressure altimeters;

d) an airspeed indicating system with means of preventing malfunctioning due to either condensation or icing;

e) a slip indicator;

f) an attitude indicator (artificial horizon) for each required pilot and one additional attitude indicator;

g) a heading indicator (directional gyroscope);

h) a means of indicating whether the power supply to the gyroscope instrument is adequate;

i) a means of indicating in the flight crew compartment the outside air temperature;

j) a rate of climb and descent indicator;

k) a stabilization system, unless it has been demonstrated to the satisfaction of the certificating authority that the helicopter possesses, by nature of its design, adequate stability without such a system;

l) such additional instruments or equipment as may be prescribed by the appropriate authority; and

m) if operated at night, the lights specified in 4.4.2 g) to k) and 4.4.2.1.

4.4.3.1 All helicopters when operating in accordance with IFR shall be fitted with an emergency power supply, independent of the main electrical generating system, for the purpose of operating and illuminating, for a minimum period of

30 minutes, an attitude indicating instrument (artificial horizon), clearly visible to the pilot-in-command. The emergency power supply shall be automatically operative after the total failure of the main electrical generating system and clear indication shall be given on the instrument panel that the attitude indicator(s) is being operated by emergency power.

4.4.4 **Recommendation.—** *A helicopter when operating in accordance with IFR and which has a maximum certificated take-off mass in excess of 3 175 kg or a maximum passenger seating configuration of more than 9 should be equipped with a ground proximity warning system which has a forward-looking terrain avoidance function.*

4.5 All helicopters on flights over water

4.5.1 Means of flotation

All helicopters intended to be flown over water shall be fitted with a permanent or rapidly deployable means of flotation so as to ensure a safe ditching of the helicopter when:

a) engaged in offshore operations, or other overwater operations as prescribed by the State of the Operator; or

b) flying over water in a hostile environment at a distance from land corresponding to more than 10 minutes at normal cruise speed when operating in performance Class 1 or 2; or

Note.— When operating in a hostile environment, a safe ditching requires a helicopter to be designed for landing on water or certificated in accordance with ditching provisions.

c) flying over water in a non-hostile environment at a distance from land specified by the appropriate authority of the responsible State when operating in performance Class 1; or

Note.— When considering the distance beyond which flotation equipment is required, the State should take into consideration the certification standard of the helicopter.

d) flying over water beyond autorotational or safe forced landing distance from land when operating in performance Class 3.

4.5.2 Emergency equipment

4.5.2.1 Helicopters operating in performance Class 1 or 2 and operating in accordance with the provisions of 4.5.1 shall be equipped with:

a) one life jacket, or equivalent individual flotation device, for each person on board, stowed in a position easily accessible from the seat or berth of the person for whose use it is provided. For offshore operations the life jacket shall be worn constantly unless the occupant is wearing an integrated survival suit that includes the functionality of the life jacket;

b) life-saving rafts in sufficient numbers to carry all persons on board, stowed so as to facilitate their ready use in emergency, provided with such life-saving equipment including means of sustaining life as is appropriate to the flight to be undertaken; and

Recommendation.— *When two life rafts are fitted, each should be able to carry all occupants in the overload state.*

Note.— The overload state is a design safety margin of 1.5 times the maximum capacity.

c) equipment for making the pyrotechnical distress signals described in Annex 2.

4.5.2.2 Helicopters operating in performance Class 3 when operating beyond autorotational distance from land but within a distance from land specified by the appropriate authority of the responsible State shall be equipped with one life jacket, or equivalent individual flotation device, for each person on board, stowed in a position easily accessible from the seat or berth of the person for whose use it is provided.

Note.— When determining the distance from land referred to in 4.5.2.2, consideration should be given to environmental conditions and the availability of search and rescue facilities.

4.5.2.2.1 For offshore operations, when operating beyond autorotational distance from land, the life jacket shall be worn unless the occupant is wearing an integrated survival suit that includes the functionality of the life jacket**.**

4.5.2.3 Helicopters operating in performance Class 3 when operating beyond the distance specified in 4.5.2.2 shall be equipped as in 4.5.2.1.

4.5.2.4 In the case of helicopters operating in performance Class 2 or 3, when taking off or landing at a heliport where, in the opinion of the State of the Operator, the take-off or approach path is so disposed over water that in the event of a mishap there would be likelihood of a ditching, at least the equipment required in 4.5.2.1 a) shall be carried.

4.5.2.5 Each life jacket and equivalent individual flotation device, when carried in accordance with 4.5, shall be equipped with a means of electric illumination for the purpose of facilitating the location of persons.

4.5.2.6 **Recommendation.—** *On any helicopter for which the individual certificate of airworthiness is first issued on or after 1 January 1991, at least 50 per cent of the life rafts carried in accordance with the provisions of 4.5.2 should be deployable by remote control.*

4.5.2.7 **Recommendation.—** *Rafts which are not deployable by remote control and which have a mass of more than 40 kg should be equipped with some means of mechanically assisted deployment.*

4.5.2.8 **Recommendation.—** *On any helicopter for which the individual certificate of airworthiness was first issued before 1 January 1991, the provisions of 4.5.2.6 and 4.5.2.7 should be complied with no later than 31 December 1992.*

4.5.3 All helicopters on flights over designated sea areas

4.5.3.1 Helicopters, when operating over sea areas which have been designated by the State concerned as areas in which search and rescue would be especially difficult, shall be equipped with life-saving equipment (including means of sustaining life) as may be appropriate to the area overflown.

4.5.3.2 **Recommendation.—** *For offshore operations, a survival suit should be worn by all occupants when the sea temperature is less than 10°C or when the estimated rescue time exceeds the calculated survival time. When the elevation and strength of the sun results in a high temperature hazard on the flight deck, consideration should be given to alleviating the flight crew from this recommendation.*

Note.— When establishing rescue time, the sea state and the ambient light conditions should be taken into consideration.

4.6 All helicopters on flights over designated land areas

Helicopters, when operated across land areas which have been designated by the State concerned as areas in which search and rescue would be especially difficult, shall be equipped with such signalling devices and life-saving equipment (including means of sustaining life) as may be appropriate to the area overflown.

4.7 Emergency locator transmitter (ELT)

Applicable until 30 June 2008

4.7.1 Performance Class 1 and 2 helicopters for which the individual certificate of airworthiness is first issued after 1 January 2002, operating on flights over water as described in 4.5.1 a) and performance Class 3 helicopters for which the individual certificate of airworthiness is first issued after 1 January 2002, operating as described in 4.5.1 b) shall be equipped with at least one automatic ELT and at least one ELT(S) in a raft.

4.7.2 From 1 January 2005, all performance Class 1 and 2 helicopters operating on flights over water as described in 4.5.1 a) and performance Class 3 helicopters operating as described in 4.5.1 b) shall be equipped with at least one automatic ELT and at least one ELT(S) in a raft.

4.7.3 Helicopters for which the individual certificate of airworthiness is first issued after 1 January 2002, on flights over designated land areas as described in 4.6 shall be equipped with at least one automatic ELT.

4.7.4 From 1 January 2005, helicopters on flights over designated land areas as described in 4.6 shall be equipped with at least one automatic ELT.

4.7.5 **Recommendation.—** *All helicopters should carry an automatic ELT.*

4.7.6 ELT equipment carried to satisfy the requirements of 4.7.1, 4.7.2, 4.7.3, 4.7.4 and 4.7.5 shall operate in accordance with the relevant provisions of Annex 10, Volume III.

Applicable from 1 July 2008

4.7.7 From 1 July 2008, all helicopters operating in performance Class 1 and 2 shall be equipped with at least one automatic ELT and, when operating on flights over water as described in 4.5.1 a), with at least one automatic ELT and one ELT(S) in a raft or life jacket.

4.7.8 From 1 July 2008, all helicopters operating in performance Class 3 shall be equipped with at least one automatic ELT and, when operating on flights over water as described in 4.5.1 b), with at least one automatic ELT and one ELT(S) in a raft or life jacket.

4.7.9 ELT equipment carried to satisfy the requirements of 4.7.7 and 4.7.8 shall operate in accordance with the relevant provisions of Annex 10, Volume III.

Note.— The judicious choice of numbers of ELTs, their type and placement on aircraft and associated floatable life support systems will ensure the greatest chance of ELT activation in the event of an accident for aircraft operating over water or land, including areas especially difficult for search and rescue. Placement of transmitter units is a vital factor in ensuring optimal crash and fire protection. The placement of the control and switching devices (activation monitors) of automatic fixed ELTs and their associated operational procedures will also take into consideration the need for rapid detection of inadvertent activation and convenient manual switching by crew members.

4.8 All helicopters on high altitude flights

Note.— Approximate altitude in the Standard Atmosphere corresponding to the value of absolute pressure used in this text is as follows:

Absolute pressure	Metres	Feet
700 hPa	*3 000*	*10 000*
620 hPa	*4 000*	*13 000*
376 hPa	*7 600*	*25 000*

4.8.1 A helicopter intended to be operated at flight altitudes at which the atmospheric pressure is less than 700 hPa in personnel compartments shall be equipped with oxygen storage and dispensing apparatus capable of storing and dispensing the oxygen supplies required in 2.3.8.1.

4.8.2 A helicopter intended to be operated at flight altitudes at which the atmospheric pressure is less than 700 hPa but which is provided with means of maintaining pressures greater than 700 hPa in personnel compartments shall be provided with oxygen storage and dispensing apparatus capable of storing and dispensing the oxygen supplies required in 2.3.8.2.

4.8.3 A helicopter intended to be operated at flight altitudes at which the atmospheric pressure is more than 376 hPa which cannot descend safely within four minutes to a flight altitude at which the atmospheric pressure is equal to 620 hPa, and for which the individual certificate of airworthiness was issued on or after 9 November 1998, shall be provided with automatically deployable oxygen equipment to satisfy the requirements of 2.3.8.2. The total number of oxygen dispensing units shall exceed the number of passenger and cabin crew seats by at least 10 per cent.

4.8.4 **Recommendation.—** *A helicopter intended to be operated at flight altitudes at which the atmospheric pressure is more than 376 hPa which cannot descend safely within four minutes to a flight altitude at which the atmospheric pressure is equal to 620 hPa, and for which the individual certificate of airworthiness was issued before 9 November 1998, should be provided with automatically deployable oxygen equipment to satisfy the requirements of 2.3.8.2. The total number of oxygen dispensing units should exceed the number of passenger and cabin crew seats by at least 10 per cent.*

4.9 All helicopters in icing conditions

All helicopters shall be equipped with suitable anti-icing and/or de-icing devices when operated in circumstances in which icing conditions are reported to exist or are expected to be encountered.

4.10 Helicopters when carrying passengers — significant-weather detection

Recommendation.— *Helicopters when carrying passengers should be equipped with operative weather radar or other significant-weather detection equipment whenever such helicopters are being operated in areas where thunderstorms or other potentially hazardous weather conditions, regarded as detectable, may be expected to exist along the route either at night or under instrument meteorological conditions.*

4.11 All helicopters required to comply with the noise certification Standards in Annex 16, Volume I

All helicopters required to comply with the noise certification Standards of Annex 16, Volume I, shall carry a document attesting noise certification. When the document, or a suitable statement attesting noise certification as contained in another document approved by the State of Registry, is issued in a language other than English, it shall include an English translation.

Note 1.— The attestation may be contained in any document, carried on board, approved by the State of Registry in accordance with the relevant provisions of Annex 16, Volume I.

Note 2.— The various noise certification Standards of Annex 16, Volume I, which are applicable to helicopters are determined according to the date of application for a type certificate, or the date of acceptance of an application under an equivalent prescribed procedure by the certificating authority. Some helicopters are not required to comply with any noise certification Standard. For details see Annex 16, Volume I, Part II, Chapters 8 and 11.

4.12 Helicopters carrying passengers — cabin crew seats

4.12.1 All helicopters shall be equipped with a forward or rearward facing (within 15 degrees of the longitudinal axis of the helicopter) seat, fitted with a safety harness for the use of each cabin crew member required to satisfy the intent of 10.1 in respect of emergency evacuation.

Note 1.— In accordance with the provisions of 4.2.2 c) 1), a seat and seat belt shall be provided for the use of each additional cabin crew member.

Note 2.— Safety harness includes shoulder straps and a seat belt which may be used independently.

4.12.2 Cabin crew seats shall be located near floor level and other emergency exits as required by the State of Registry for emergency evacuation.

4.13 Helicopters required to be equipped with a pressure-altitude reporting transponder

Except as may be otherwise authorized by the appropriate authority, all helicopters shall be equipped with a pressure-altitude reporting transponder which operates in accordance with the provisions of Annex 10, Volume IV.

Note.— This provision is intended to support the effectiveness of ACAS as well as to improve the effectiveness of air traffic services. The intent is also for aircraft not equipped with pressure-altitude reporting transponders to be operated so as not to share airspace used by aircraft equipped with airborne collision avoidance systems.

4.14 Microphones

All flight crew members required to be on flight deck duty shall communicate through boom or throat microphones.

4.15 Vibration health monitoring system

Recommendation.— *A helicopter which has a maximum certificated take-off mass in excess of 3 175 kg or a maximum passenger seating configuration of more than 9 should be equipped with a vibration health monitoring system.*

CHAPTER 5. HELICOPTER COMMUNICATION AND NAVIGATION EQUIPMENT

5.1 Communication equipment

5.1.1 A helicopter shall be provided with radio communication equipment capable of:

a) conducting two-way communication for heliport control purposes;

b) receiving meteorological information at any time during flight;

c) conducting two-way communication at any time during flight with at least one aeronautical station and with such other aeronautical stations and on such frequencies as may be prescribed by the appropriate authority.

Note.— The requirements of 5.1.1 are considered fulfilled if the ability to conduct the communications specified therein is established during radio propagation conditions which are normal for the route.

5.1.2 The radio communication equipment required in accordance with 5.1.1 shall provide for communications on the aeronautical emergency frequency.

5.1.3 For flights in defined portions of airspace or on routes where an RCP type has been prescribed, a helicopter shall, in addition to the requirements specified in 5.1.1:

a) be provided with communication equipment which will enable it to operate in accordance with the prescribed RCP type(s); and

b) be authorized by the State of the Operator for operations in such airspace.

Note.— Information on RCP and associated procedures, and guidance concerning the approval process, are contained in the Manual on Required Communications Performance (RCP) *(Doc 9869)*[*]*. This document also contains references to other documents produced by States and international bodies concerning communication systems and RCP.*

5.2 Navigation equipment

5.2.1 A helicopter shall be provided with navigation equipment which will enable it to proceed:

a) in accordance with its operational flight plan; and

b) in accordance with the requirements of air traffic services;

except when, if not so precluded by the appropriate authority, navigation for flights under VFR is accomplished by visual reference to landmarks.

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* In preparation.

5.2.2 For flights in defined portions of airspace or on routes where an RNP type has been prescribed, a helicopter shall, in addition to the requirements specified in 5.2.1:

a) be provided with navigation equipment which will enable it to operate in accordance with the prescribed RNP type(s); and

b) be authorized by the State of the Operator for operations in such airspace.

Note.— Information on RNP and associated procedures, and guidance concerning the approval process, are contained in the Manual on Required Navigation Performance (RNP) *(Doc 9613). This document also contains a comprehensive list of references to other documents produced by States and international bodies concerning navigation systems and RNP.*

5.2.3 The helicopter shall be sufficiently provided with navigation equipment to ensure that, in the event of the failure of one item of equipment at any stage of the flight, the remaining equipment will enable the helicopter to navigate in accordance with 5.2.1 and, where applicable, 5.2.2.

5.2.4 On flights in which it is intended to land in instrument meteorological conditions, a helicopter shall be provided with appropriate navigation equipment providing guidance to a point from which a visual landing can be effected. This equipment shall be capable of providing such guidance at each heliport at which it is intended to land in instrument meteorological conditions and at any designated alternate heliports.

5.3 Installation

The equipment installation shall be such that the failure of any single unit required for either communications or navigation purposes or both will not result in the failure of another unit required for communications or navigation purposes.

CHAPTER 6. HELICOPTER MAINTENANCE

Note 1.— For the purpose of this chapter "helicopter" includes: powerplants, power transmissions, rotors, components, accessories, instruments, equipment and apparatus including emergency equipment.

Note 2.— Reference is made throughout this chapter to the requirements of the State of Registry. When the State of the Operator is not the same as the State of Registry, it may be necessary to consider any additional requirements of the State of the Operator.

Note 3.— Guidance on continuing airworthiness requirements is contained in the Airworthiness Manual *(Doc 9760).*

6.1 Operator's maintenance responsibilities

6.1.1 Operators shall ensure that, in accordance with procedures acceptable to the State of Registry:

a) each helicopter they operate is maintained in an airworthy condition;

b) the operational and emergency equipment necessary for the intended flight is serviceable; and

c) the certificate of airworthiness of the helicopter they operate remains valid.

6.1.2 An operator shall not operate a helicopter unless it is maintained and released to service by an organization approved in accordance with Annex 6, Part I, 8.7, or under an equivalent system, either of which shall be acceptable to the State of Registry.

6.1.3 When the State of Registry accepts an equivalent system, the person signing the maintenance release shall be licensed in accordance with Annex 1.

6.1.4 An operator shall employ a person or group of persons to ensure that all maintenance is carried out in accordance with the maintenance control manual.

6.1.5 The operator shall ensure that the maintenance of its helicopters is performed in accordance with the maintenance programme approved by the State of Registry.

6.2 Operator's maintenance control manual

6.2.1 The operator shall provide, for the use and guidance of maintenance and operational personnel concerned, a maintenance control manual, acceptable to the State of Registry, in accordance with the requirements of 9.2. The design of the manual shall observe Human Factors principles.

Note.— Guidance material on the application of Human Factors principles can be found in the Human Factors Training Manual *(Doc 9683).*

6.2.2 The operator shall ensure that the maintenance control manual is amended as necessary to keep the information contained therein up to date.

6.2.3 Copies of all amendments to the operator's maintenance control manual shall be furnished promptly to all organizations or persons to whom the manual has been issued.

6.2.4 The operator shall provide the State of the Operator and the State of Registry with a copy of the operator's maintenance control manual, together with all amendments and/or revisions to it and shall incorporate in it such mandatory material as the State of the Operator or the State of Registry may require.

6.3 Maintenance programme

6.3.1 The operator shall provide, for the use and guidance of maintenance and operational personnel concerned, a maintenance programme, approved by the State of Registry, containing the information required by 9.3. The design and application of the operator's maintenance programme shall observe Human Factors principles.

Note.— Guidance material on the application of Human Factors principles can be found in the Human Factors Training Manual *(Doc 9683).*

6.3.2 Copies of all amendments to the maintenance programme shall be furnished promptly to all organizations or persons to whom the maintenance programme has been issued.

6.4 Maintenance records

6.4.1 An operator shall ensure that the following records are kept for the periods mentioned in 6.4.2:

a) the total time in service (hours, calendar time and cycles, as appropriate) of the helicopter and all life-limited components;

b) the current status of compliance with all mandatory continuing airworthiness information;

c) appropriate details of modifications and repairs to the helicopter and its major components;

d) the time in service (hours, calendar time and cycles, as appropriate) since last overhaul of the helicopter or its components subject to a mandatory overhaul life;

e) the current status of the helicopter's compliance with the maintenance programme; and

f) the detailed maintenance records to show that all requirements for a maintenance release have been met.

6.4.2 The records in 6.4.1 a) to e) shall be kept for a minimum period of 90 days after the unit to which they refer has been permanently withdrawn from service, and the records in 6.4.1 f) for a minimum period of one year after the signing of the maintenance release.

6.4.3 In the event of a temporary change of operator, the records shall be made available to the new operator. In the event of any permanent change of operator, the records shall be transferred to the new operator.

6.5 Continuing airworthiness information

6.5.1 The operator of a helicopter over 3 175 kg maximum mass shall monitor and assess maintenance and operational experience with respect to continuing airworthiness and provide the information as prescribed by the State of Registry and report through the system specified in Annex 8, Part II, 4.2.3 f) and 4.2.4.

6.5.2 The operator of a helicopter over 3 175 kg maximum mass shall obtain and assess continuing airworthiness information and recommendations available from the organization responsible for the type design and shall implement resulting actions considered necessary in accordance with a procedure acceptable to the State of Registry.

Note.— Guidance on interpretation of "the organization responsible for the type design" is contained in the Airworthiness Manual *(Doc 9760).*

6.6 Modifications and repairs

All modifications and repairs shall comply with airworthiness requirements acceptable to the State of Registry. Procedures shall be established to ensure that the substantiating data supporting compliance with the airworthiness requirements are retained.

6.7 Maintenance release

6.7.1 A maintenance release shall be completed and signed to certify that the maintenance work has been completed satisfactorily and in accordance with approved data and the procedures described in the maintenance organization's procedures manual.

6.7.2 A maintenance release shall contain a certification including:

a) basic details of the maintenance carried out including detailed reference of the approved data used;

b) date such maintenance was completed;

c) when applicable, the identity of the approved maintenance organization; and

d) the identity of the person or persons signing the release.

6.8 Records

6.8.1 An operator shall ensure that the following records are kept:

a) in respect of the entire helicopter: the total time in service;

b) in respect of the major components of the helicopter:

   1) the total time in service;

   2) the date of the last overhaul;

   3) the date of the last inspection;

c) in respect of those instruments and equipment, the serviceability and operating life of which are determined by their time in service:

   1) such records of the time in service as are necessary to determine their serviceability or to compute their operating life;

2) the date of the last inspection.

6.8.2 These records shall be kept for a period of 90 days after the end of the operating life of the unit to which they refer.

CHAPTER 7. HELICOPTER FLIGHT CREW

7.1 Composition of the flight crew

7.1.1 The number and composition of the flight crew shall not be less than that specified in the operations manual. The flight crews shall include flight crew members in addition to the minimum numbers specified in the flight manual or other documents associated with the certificate of airworthiness, when necessitated by considerations related to the type of helicopter used, the type of operation involved and the duration of flight between points where flight crews are changed.

7.1.2 The flight crew shall include at least one member authorized by the State of Registry to operate the type of radio transmitting equipment to be used.

Note.— Some States have dispensed with the system of issuing radio licences.

7.2 Flight crew member emergency duties

An operator shall, for each type of helicopter, assign to all flight crew members the necessary functions they are to perform in an emergency or in a situation requiring emergency evacuation. Annual training in accomplishing these functions shall be contained in the operator's training programme and shall include instruction in the use of all emergency and life-saving equipment required to be carried, and drills in the emergency evacuation of the helicopter.

7.3 Flight crew member training programmes

7.3.1 An operator shall establish and maintain a ground and flight training programme, approved by the State of the Operator, which ensures that all flight crew members are adequately trained to perform their assigned duties. The training programme shall:

a) include ground and flight training facilities and properly qualified instructors as determined by the State of the Operator;

b) consist of ground and flight training for the type(s) of helicopter on which the flight crew member serves;

c) include proper flight crew coordination and training for all types of emergency and abnormal situations or procedures caused by powerplant, transmission, rotor, airframe or systems malfunctions, fire or other abnormalities;

d) include training in knowledge and skills related to the visual and instrument flight procedures for the intended area of operation, human performance and threat and error management, the transport of dangerous goods and, where applicable, procedures specific to the environment in which the helicopter is to be operated;

e) ensure that all flight crew members know the functions for which they are responsible and the relation of these functions to the functions of other crew members, particularly in regard to abnormal or emergency procedures; and

f) be given on a recurrent basis, as determined by the State of the Operator and shall include an assessment of competence.

Note 1.— Paragraph 2.2.4 prohibits the in-flight simulation of emergency or abnormal situations when passengers or cargo are being carried.

Note 2.— Flight training may, to the extent deemed appropriate by the State of the Operator, be given in flight simulation training devices approved by the State for that purpose.

Note 3.— The scope of the recurrent training required by 7.2 and 7.3 may be varied and need not be as extensive as the initial training given in a particular type of helicopter.

Note 4.— The use of correspondence courses and written examinations as well as other means may, to the extent deemed feasible by the State of the Operator, be utilized in meeting the requirements for periodic ground training.

Note 5.— Provisions for training in the transport of dangerous goods are contained in Annex 18.

Note 6.— Guidance material to design training programmes to develop knowledge and skills in human performance can be found in the Human Factors Training Manual *(Doc 9683).*

Note 7.— Information for pilots and flight operations personnel on flight procedure parameters and operational procedures is contained in PANS-OPS (Doc 8168), Volume I. Criteria for the construction of visual and instrument flight procedures are contained in PANS-OPS (Doc 8168), Volume II. Obstacle clearance criteria and procedures used in certain States may differ from PANS-OPS, and knowledge of these differences is important for safety reasons.

Note 8.— Guidance material to design flight crew training programmes can be found in the manual Preparation of an Operations Manual *(Doc 9376).*

Note 9.— Guidance material on the different means used to assess competence can be found in the Attachment to Chapter 2 of the PANS-TRG (Doc 9868).

7.3.2 The requirement for recurrent flight training in a particular type of helicopter shall be considered fulfilled by:

a) the use, to the extent deemed feasible by the State of the Operator, of flight simulation training devices approved by that State for that purpose; or

b) the completion within the appropriate period of the proficiency check required by 7.4.4 in that type of helicopter.

7.4 Qualifications

Note.— See the Manual of Procedures for the Establishment of a State's Personnel Licensing System *(Doc 9379) for guidance of a general nature on cross-crew qualification, mixed-fleet flying and cross-credit.*

7.4.1 Recent experience — pilot-in-command

7.4.1.1 An operator shall not assign a pilot to act as pilot-in-command of a type or variant of a type of helicopter unless, on the same type of helicopter within the preceding 90 days, that pilot has made at least three take-offs and landings.

7.4.1.2 When a pilot-in-command is flying several variants of the same type of helicopter or different types of helicopters with similar characteristics in terms of operating procedures, systems and handling, the State shall decide under which conditions the requirements of 7.4.1.1 for each variant or each type of helicopter can be combined.

7.4.2 Recent experience — co-pilot

7.4.2.1 An operator shall not assign a co-pilot to operate at the flight controls during take-off and landing of a type or variant of a type of helicopter unless, on the same type of helicopter within the preceding 90 days, that co-pilot has operated the flight controls, as pilot-in-command or as co-pilot, during three take-offs and landings or has otherwise demonstrated competence to act as co-pilot on a flight simulation training device approved for the purpose.

7.4.2.2 When a co-pilot is flying several variants of the same type of helicopter or different types of helicopters with similar characteristics in terms of operating procedures, systems and handling, the State shall decide under which conditions the requirements of 7.4.2.1 for each variant or each type of helicopter can be combined.

7.4.3 Pilot-in-command operational qualification

7.4.3.1 An operator shall not utilize a pilot as pilot-in-command of a helicopter on an operation for which that pilot is not currently qualified until such pilot has complied with 7.4.3.2 and 7.4.3.3.

7.4.3.2 Each such pilot shall demonstrate to the operator an adequate knowledge of:

a) the operation to be flown. This shall include knowledge of:

    1) the terrain and minimum safe altitudes;

    2) the seasonal meteorological conditions;

    3) the meteorological, communication and air traffic facilities, services and procedures;

    4) the search and rescue procedures; and

    5) the navigation facilities and procedures associated with the route or area in which the flight is to take place; and

b) procedures applicable to flight paths over heavily populated areas and areas of high air traffic density, obstructions, physical layout, lighting, approach aids and arrival, departure, holding and instrument approach procedures, and applicable operating minima.

Note.— That portion of the demonstration relating to arrival, departure, holding and instrument approach procedures may be accomplished in an appropriate training device which is adequate for this purpose.

7.4.3.3 A pilot-in-command shall have made a flight, representative of the operation with which the pilot is to be engaged which must include a landing at a representative heliport, as a member of the flight crew and accompanied by a pilot who is qualified for the operation.

7.4.3.4 The operator shall maintain a record, sufficient to satisfy the State of the Operator of the qualification of the pilot and of the manner in which such qualification has been achieved.

7.4.3.5 An operator shall not continue to utilize a pilot as a pilot-in-command on an operation unless, within the preceding 12 months, the pilot has made at least one representative flight as a pilot member of the flight crew, or as a check pilot, or as an observer on the flight deck. In the event that more than 12 months elapse in which a pilot has not made such a representative flight, prior to again serving as a pilot-in-command on that operation, that pilot must requalify in accordance with 7.4.3.2 and 7.4.3.3.

7.4.4 Pilot proficiency checks

7.4.4.1 An operator shall ensure that piloting technique and the ability to execute emergency procedures is checked in such a way as to demonstrate the pilot's competence on each type or variant of a type of helicopter. Where the operation may be conducted under IFR, an operator shall ensure that the pilot's competence to comply with such rules is demonstrated to either a check pilot of the operator or to a representative of the State of the Operator. Such checks shall be performed twice within any period of one year. Any two such checks which are similar and which occur within a period of four consecutive months shall not alone satisfy this requirement.

Note.— Flight simulation training devices approved by the State of the Operator may be used for those parts of the checks for which they are specifically approved.

7.4.4.2 When an operator schedules flight crew on several variants of the same type of helicopter or different types of helicopters with similar characteristics in terms of operating procedures, systems and handling, the State shall decide under which conditions the requirements of 7.4.4.1 for each variant or each type of helicopter can be combined.

7.5 Flight crew equipment

A flight crew member assessed as fit to exercise the privileges of a licence, subject to the use of suitable correcting lenses, shall have a spare set of the correcting lenses readily available when exercising those privileges.

7.6 Flight time, flight duty periods and rest periods

The State of the Operator shall establish regulations specifying the limitations applicable to the flight time and flight duty periods for flight crew members. These regulations shall also make provision for adequate rest periods and shall be such as to ensure that fatigue occurring either in a flight or successive flights or accumulated over a period of time due to these and other tasks does not endanger the safety of a flight.

Note.— Guidance on the establishment of limitations is given in Attachment A.

CHAPTER 8. FLIGHT OPERATIONS OFFICER/FLIGHT DISPATCHER

8.1 When the State of the Operator requires that a flight operations officer/flight dispatcher, employed in conjunction with an approved method of control and supervision of flight operations be licensed, that flight operations officer/flight dispatcher shall be licensed in accordance with the provisions of Annex 1.

8.2 In accepting proof of qualifications other than the option of holding of a flight operations officer/flight dispatcher licence, the State of the Operator, in accordance with the approved method of control and supervision of flight operations, shall require that, as a minimum, such persons meet the requirements specified in Annex 1 for the flight operations officer/flight dispatcher licence.

8.3 A flight operations officer/flight dispatcher shall not be assigned to duty unless that person has:

a) satisfactorily completed an operator-specific training course that addresses all the specific components of its approved method of control and supervision of flight operations specified in 2.2.1.4;

Note.— Guidance on the composition of such training syllabi is provided in the Training Manual *(Doc 7192), Part D-3 —* Flight Operations Officers/Flight Dispatchers.

b) made within the preceding 12 months, at least a one-way qualification flight in a helicopter over any area for which that person is authorized to exercise flight supervision. The flight shall include landings at as many heliports as practicable;

Note.— For the purpose of the qualification flight, the flight operations officer/flight dispatcher must be able to monitor the flight crew intercommunication system and radio communications, and be able to observe the actions of the flight crew.

c) demonstrated to the operator a knowledge of:

1) the contents of the operations manual described in Attachment H;

2) the radio equipment in the helicopters used; and

3) the navigation equipment in the helicopters used;

d) demonstrated to the operator a knowledge of the following details concerning operations for which the officer is responsible and areas in which that individual is authorized to exercise flight supervision:

1) the seasonal meteorological conditions and the sources of meteorological information;

2) the effects of meteorological conditions on radio reception in the helicopters used;

3) the peculiarities and limitations of each navigation system which is used by the operation; and

4) the helicopter loading instructions;

e) satisfied the operator as to knowledge and skills related to human performance as they apply to dispatch duties; and

f) demonstrated to the operator the ability to perform the duties specified in 2.6.

8.4 **Recommendation.—** *A flight operations officer/flight dispatcher assigned to duty should maintain complete familiarization with all features of the operations which are pertinent to such duties, including knowledge and skills related to human performance.*

Note.— Guidance material to design training programmes to develop knowledge and skills in human performance can be found in the Human Factors Training Manual *(Doc 9683).*

8.5 **Recommendation.—** *A flight operations officer/flight dispatcher should not be assigned to duty after 12 consecutive months of absence from such duty, unless the provisions of 8.3 are met.*

CHAPTER 9. MANUALS, LOGS AND RECORDS

Note.— The following additional manuals, logs and records are associated with this Annex but are not included in this chapter:

Fuel and oil records — see 2.2.8

Maintenance records — see 6.8

Flight time, flight duty periods and rest periods records — see 2.2.9.3

Flight preparation forms — see 2.3

Operational flight plan — see 2.3.3

Pilot-in-command operational qualification records — see 7.4.3.4.

9.1 Flight manual

Note.— The flight manual contains the information specified in Annex 8.

The flight manual shall be updated by implementing changes made mandatory by the State of Registry.

9.2 Operator's maintenance control manual

The operator's maintenance control manual provided in accordance with 6.2, which may be issued in separate parts, shall contain the following information:

a) a description of the procedures required by 6.1.1 including, when applicable:

  1) a description of the administrative arrangements between the operator and the approved maintenance organization;

  2) a description of the maintenance procedures and the procedures for completing and signing a maintenance release when maintenance is based on a system other than that of an approved maintenance organization;

b) names and duties of the person or persons required by 6.1.4;

c) a reference to the maintenance programme required by 6.3.1;

d) a description of the methods used for the completion and retention of the operator's maintenance records required by 6.4;

e) a description of the procedures for monitoring, assessing and reporting maintenance and operational experience required by 6.5.1;

f) a description of the procedures for complying with the service information reporting requirements of Annex 8, Part II, 4.2.3 f) and 4.2.4;

g) a description of procedures for assessing continuing airworthiness information and implementing any resulting actions, as required by 6.5.2;

h) a description of the procedures for implementing action resulting from mandatory continuing airworthiness information;

i) a description of establishing and maintaining a system of analysis and continued monitoring of the performance and efficiency of the maintenance programme, in order to correct any deficiency in that programme;

j) a description of helicopter types and models to which the manual applies;

k) a description of procedures for ensuring that unserviceabilities affecting airworthiness are recorded and rectified;

l) a description of the procedures for advising the State of Registry of significant in-service occurrences;

m) a description of procedures to control the leasing of aircraft and related aeronautical products; and

n) a description of the maintenance control manual amendment procedures.

9.3 Maintenance programme

9.3.1 A maintenance programme for each helicopter as required by 6.3 shall contain the following information:

a) maintenance tasks and the intervals at which these are to be performed, taking into account the anticipated utilization of the helicopter;

b) when applicable, a continuing structural integrity programme;

c) procedures for changing or deviating from a) and b) above; and

d) when applicable, condition monitoring and reliability programme descriptions for helicopter systems, components, power transmissions, rotors and powerplants.

9.3.2 Maintenance tasks and intervals that have been specified as mandatory in approval of the type design shall be identified as such.

9.3.3 **Recommendation.—** *The maintenance programme should be based on maintenance programme information made available by the State of Design or by the organization responsible for the type design, and any additional applicable experience.*

9.4 Journey log book

9.4.1 **Recommendation.—** *The helicopter journey log book should contain the following items and the corresponding Roman numerals:*

I — Helicopter nationality and registration.

II — Date.

III — Names of crew members.

IV — Duty assignments of crew members.

V — Place of departure.

VI — Place of arrival.

VII — Time of departure.

VIII — Time of arrival.

IX — Hours of flight.

X — Nature of flight (private, scheduled or non-scheduled).

XI — Incidents, observations, if any.

XII — Signature of person in charge.

9.4.2 **Recommendation.—** *Entries in the journey log book should be made currently and in ink or indelible pencil.*

9.4.3 **Recommendation.—** *Completed journey log books should be retained to provide a continuous record of the last six months' operations.*

9.5 Records of emergency and survival equipment carried

Operators shall at all times have available for immediate communication to rescue coordination centres, lists containing information on the emergency and survival equipment carried on board any of their helicopters engaged in international air navigation. The information shall include, as applicable, the number, colour and type of life rafts and pyrotechnics, details of emergency medical supplies, water supplies and the type and frequencies of the emergency portable radio equipment.

9.6 Flight recorder records

An operator shall ensure, to the extent possible, in the event the helicopter becomes involved in an accident or incident, the preservation of all related flight recorder records, and if necessary the associated flight recorders, and their retention in safe custody pending their disposition as determined in accordance with Annex 13.

CHAPTER 10. CABIN CREW

10.1 Assignment of emergency duties

An operator shall establish, to the satisfaction of the State of the Operator, the minimum number of cabin crew required for each type of helicopter, based on seating capacity or the number of passengers carried, in order to effect a safe and expeditious evacuation of the helicopter, and the necessary functions to be performed in an emergency or a situation requiring emergency evacuation. The operator shall assign these functions for each type of helicopter.

10.2 Protection of cabin crew during flight

Each cabin crew member shall be seated with seat belt or, when provided, safety harness fastened during take-off and landing and whenever the pilot-in-command so directs.

Note.— The foregoing does not preclude the pilot-in-command from directing the fastening of the seat belt only, at times other than during take-off and landing.

10.3 Training

An operator shall establish and maintain a training programme, approved by the State of the Operator, to be completed by all persons being assigned as a cabin crew member. Cabin crew shall complete a recurrent training programme annually. These training programmes shall ensure that each person is:

a) competent to execute those safety duties and functions that the cabin attendant is assigned to perform in the event of an emergency or in a situation requiring emergency evacuation;

b) drilled and capable in the use of emergency and life-saving equipment required to be carried, such as life jackets, life rafts, evacuation slides, emergency exits, portable fire extinguishers, oxygen equipment and first-aid kits;

c) when serving on helicopters operated above 3 000 m (10 000 ft), knowledgeable as regards the effect of lack of oxygen and, in the case of pressurized helicopters, as regards physiological phenomena accompanying a loss of pressurization;

d) aware of other crew members' assignments and functions in the event of an emergency so far as is necessary for the fulfilment of the cabin crew member's own duties;

e) aware of the types of dangerous goods which may, and may not, be carried in a passenger cabin and has completed the dangerous goods training programme required by Annex 18; and

f) knowledgeable about human performance as related to passenger cabin safety duties and including flight crew-cabin crew coordination.

Note.— Guidance material to design training programmes to develop knowledge in human performance and crew coordination can be found in the Human Factors Training Manual *(Doc 9683).*

10.4 Flight time, flight duty periods and rest periods

The State of the Operator shall establish regulations specifying the limits applicable to flight time, flight duty periods and rest periods for cabin crew.

Note.— Guidance on the establishment of limitations is given in Attachment A.

CHAPTER 11. SECURITY*

11.1 Helicopter search procedure checklist

An operator shall ensure that there is on board a checklist of the procedures to be followed in searching for a bomb in case of suspected sabotage. The checklist shall be supported by guidance on the course of action to be taken should a bomb or suspicious object be found.

11.2 Training programmes

11.2.1 An operator shall establish and maintain a training programme which enables crew members to act in the most appropriate manner to minimize the consequences of acts of unlawful interference.

11.2.2 An operator shall also establish and maintain a training programme to acquaint appropriate employees with preventive measures and techniques in relation to passengers, baggage, cargo, mail, equipment, stores and supplies intended for carriage on a helicopter so that they contribute to the prevention of acts of sabotage or other forms of unlawful interference.

11.3 Reporting acts of unlawful interference

Following an act of unlawful interference the pilot-in-command shall submit, without delay, a report of such an act to the designated local authority.

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* In the context of this Chapter, the word ‘‘security’’ is used in the sense of prevention of illicit acts against civil aviation.

ANNEX 6 — PART III

SECTION III

INTERNATIONAL GENERAL AVIATION

CHAPTER 1. GENERAL

Note 1.— Although the Convention on International Civil Aviation allocates to the State of Registry certain functions which that State is entitled to discharge, or obligated to discharge, as the case may be, the Assembly recognized, in Resolution A23-13 that the State of Registry may be unable to fulfil its responsibilities adequately in instances where aircraft are leased, chartered or interchanged — in particular without crew — by an operator of another State and that the Convention may not adequately specify the rights and obligations of the State of an operator in such instances until such time as Article 83 bis *of the Convention enters into force. Accordingly, the Council urged that if, in the above-mentioned instances, the State of Registry finds itself unable to discharge adequately the functions allocated to it by the Convention, it delegate to the State of the Operator, subject to acceptance by the latter State, those functions of the State of Registry that can more adequately be discharged by the State of the Operator. It was understood that pending entry into force of Article 83* bis *of the Convention the foregoing action would only be a matter of practical convenience and would not affect either the provisions of the Chicago Convention prescribing the duties of the State of Registry or any third State. However, as Article 83* bis *of the Convention entered into force on 20 June 1997, such transfer agreements will have effect in respect of Contracting States which have ratified the related Protocol (Doc 9318) upon fulfilment of the conditions established in Article 83* bis.

Note 2.— In the case of international operations effected jointly with helicopters not all of which are registered in the same Contracting State, nothing in this Part of the Annex prevents the States concerned entering into an agreement for the joint exercise of the functions placed upon the State of Registry by the provisions of the relevant Annexes.

1.1 Compliance with laws, regulations and procedures

1.1.1 The pilot-in-command shall comply with the relevant laws, regulations and procedures of the States in which the helicopter is operated.

Note 1.— Compliance with more restrictive measures, not in contravention of the provisions of 1.1.1, may be required by the State of Registry.

Note 2.— Rules covering flight over the high seas are contained in Annex 2.

Note 3.— Information for pilots on flight procedure parameters and operational procedures is contained in PANS-OPS (Doc 8168), Volume I. Criteria for the construction of visual and instrument flight procedures are contained in PANS-OPS (Doc 8168), Volume II. Obstacle Clearance criteria and procedures used in certain States may differ from PANS-OPS, and knowledge of these differences is important for safety reasons

1.1.2 The pilot-in-command shall be responsible for the operation and safety of the helicopter and for the safety of all crew members, passengers and cargo on board, from the moment the engine(s) are started until the helicopter finally comes to rest at the end of the flight, with the engine(s) shut down and the rotor blades stopped.

1.1.3 If an emergency situation which endangers the safety of the helicopter or persons necessitates the taking of action which involves a violation of local regulations or procedures, the pilot-in-command shall notify the appropriate local authority without delay. If required by the State in which the incident occurs, the pilot-in-command shall submit a report on any such violation to the appropriate authority of such State; in that event, the pilot-in-command shall also submit a copy of it to the State of Registry. Such reports shall be submitted as soon as possible and normally within ten days.

1.1.4 The pilot-in-command shall be responsible for notifying the nearest appropriate authority by the quickest available means of any accident involving the helicopter, resulting in serious injury or death of any person or substantial damage to the helicopter or property.

Note.— A definition of the term "serious injury" is contained in Annex 13.

1.1.5 **Recommendation.—** *The pilot-in-command should have available on board the helicopter essential information concerning the search and rescue services in the areas over which it is intended the helicopter will be flown.*

1.2 Dangerous goods

Note 1.— Provisions for carriage of dangerous goods are contained in Annex 18.

Note 2.— Article 35 of the Convention refers to certain classes of cargo restrictions.

1.3 Use of psychoactive substances

Note.— Provisions concerning the use of psychoactive substances are contained in Annex 1, 1.2.7 and Annex 2, 2.5.

CHAPTER 2. FLIGHT OPERATIONS

2.1 Adequacy of operating facilities

The pilot-in-command shall not commence a flight unless it has been ascertained by every reasonable means available that the ground and/or water facilities available and directly required for such flight and for the safe operation of the helicopter are adequate including communication facilities and navigation aids.

Note.— "Reasonable means" in this Standard is intended to denote the use, at the point of departure, of information available to the pilot-in-command either through official information published by the aeronautical information services or readily obtainable from other sources.

2.2 Heliport operating minima

The pilot-in-command shall not operate to or from a heliport using operating minima lower than those which may be established for that heliport by the State in which it is located, except with the specific approval of that State.

Note.— It is the practice in some States to declare, for flight planning purposes, higher minima for a heliport when nominated as an alternate, than for the same heliport when planned as that of intended landing.

2.3 Briefing

2.3.1 The pilot-in-command shall ensure that crew members and passengers are made familiar, by means of an oral briefing or by other means, with the location and the use of:

a) seat belts or harnesses; and, as appropriate,

b) emergency exits;

c) life jackets;

d) oxygen dispensing equipment; and

e) other emergency equipment provided for individual use, including passenger emergency briefing cards.

2.3.2 The pilot-in-command shall ensure that all persons on board are aware of the location and general manner of use of the principal emergency equipment carried for collective use.

2.4 Helicopter airworthiness and safety precautions

A flight shall not be commenced until the pilot-in-command is satisfied that:

a) the helicopter is airworthy, duly registered and that appropriate certificates with respect thereto are aboard the helicopter;

b) the instruments and equipment installed in the helicopter are appropriate, taking into account the expected flight conditions;

c) any necessary maintenance has been performed in accordance with Chapter 6;

d) the mass of the helicopter and centre of gravity location are such that the flight can be conducted safely, taking into account the flight conditions expected;

e) any load carried is properly distributed and safely secured; and

f) the helicopter operating limitations contained in the flight manual, or its equivalent, will not be exceeded.

2.5 Weather reports and forecasts

Before commencing a flight the pilot-in-command shall be familiar with all available meteorological information appropriate to the intended flight. Preparation for a flight away from the vicinity of the place of departure, and for every flight under IFR, shall include: 1) a study of available current weather reports and forecasts; and 2) the planning of an alternative course of action to provide for the eventuality that the flight cannot be completed as planned, because of weather conditions.

Note.— The requirements for flight plans are contained in Annex 2 and the PANS-ATM (Doc 4444).

2.6 Limitations imposed by weather conditions

2.6.1 Flight in accordance with VFR

A flight, except one of purely local character in visual meteorological conditions, to be conducted in accordance with VFR shall not be commenced unless available current meteorological reports, or a combination of current reports and forecasts, indicate that the meteorological conditions along the route, or that part of the route to be flown under VFR, will, at the appropriate time, be such as to render compliance with these rules possible.

2.6.2 Flight in accordance IFR

2.6.2.1 *When an alternate is required.* A flight to be conducted in accordance with IFR shall not be commenced unless the available information indicates that conditions, at the heliport of intended landing and at least one alternate heliport will, at the estimated time of arrival, be at or above the heliport operating minima.

Note.— It is the practice in some States to declare, for flight planning purposes, higher minima for a heliport when nominated as an alternate than for the same heliport when planned as that of intended landing.

2.6.2.2 *When no alternate is required.* A flight to be conducted in accordance with IFR to a heliport when no alternate heliport is required shall not be commenced unless available current meteorological information indicates that the following meteorological conditions will exist from two hours before to two hours after the estimated time of arrival, or from the actual time of departure to two hours after the estimated time of arrival, whichever is the shorter period:

a) a cloud base of at least 120 m (400 ft) above the minimum associated with the instrument approach procedure; and

b) visibility of at least 1.5 km more than the minimum associated with the procedure.

Note.— These should be considered as minimum values where a reliable and continuous meteorological watch is maintained. When only an "area" type forecast is available these values should be increased accordingly.

2.6.3 Heliport operating minima

2.6.3.1 A flight shall not be continued towards the heliport of intended landing unless the latest available meteorological information indicates that conditions at that heliport, or at least one alternate heliport, will, at the estimated time of arrival, be at or above the specified heliport operating minima.

2.6.3.2 An instrument approach shall not be continued beyond the outer marker fix in case of precision approach, or below 300 m (1 000 ft) above the heliport in case of non-precision approach, unless the reported visibility or controlling RVR is above the specified minimum.

2.6.3.3 If, after passing the outer marker fix in case of precision approach, or after descending below 300 m (1 000 ft) above the heliport in case of non-precision approach, the reported visibility or controlling RVR falls below the specified minimum, the approach may be continued to DA/H or MDA/H. In any case, a helicopter shall not continue its approach-to-land beyond a point at which the limits of the heliport operating minima would be infringed.

2.6.4 Flight in icing conditions

A flight to be operated in known or expected icing conditions shall not be commenced unless the helicopter is certificated and equipped to cope with such conditions.

2.7 Alternate heliports

2.7.1 For a flight to be conducted in accordance with IFR, at least one suitable alternate shall be specified in the operational flight plan and the flight plan, unless:

a) the weather conditions in 2.6.2.2 prevail; or

b) 1) the heliport of intended landing is isolated and no suitable alternate is available; and

   2) an instrument approach procedure is prescribed for the isolated heliport of intended landing; and

   3) a point of no return (PNR) is determined in case of an offshore destination.

2.7.2 Suitable offshore alternates may be specified subject to the following:

a) the offshore alternates shall be used only after passing a PNR. Prior to a PNR, onshore alternates shall be used;

b) mechanical reliability of critical control systems and critical components shall be considered and taken into account when determining the suitability of the alternate;

c) one engine inoperative performance capability shall be attainable prior to arrival at the alternate;

d) to the extent possible, deck availability shall be guaranteed; and

e) weather information must be reliable and accurate.

Note.— The landing technique specified in the flight manual following control system failure may preclude the nomination of certain helidecks as alternate heliports.

2.7.3 ***Recommendation.****—Offshore alternates should not be used when it is possible to carry enough fuel to have an onshore alternate. Offshore alternates should not be used in a hostile environment.*

2.8 Fuel and oil supply

2.8.1 *All helicopters.* A flight shall not be commenced unless, taking into account both the meteorological conditions and any delays that are expected in flight, the helicopter carries sufficient fuel and oil to ensure that it can safely complete the flight. In addition, a reserve shall be carried to provide for contingencies.

2.8.2 *VFR operations.* The fuel and oil carried in order to comply with 2.8.1 shall, in the case of VFR operations, be at least the amount sufficient to allow the helicopter:

a) to fly to the heliport to which the flight is planned;

b) to fly thereafter for a period of 20 minutes at best-range speed; and

c) to have an additional amount of fuel, sufficient to provide for the increased consumption on the occurrence of potential contingencies, as determined by the State and specified in the State regulations governing general aviation.

2.8.3 *IFR operations.* The fuel and oil carried in order to comply with 2.8.1 shall, in the case of IFR operations, be at least the amount sufficient to allow the helicopter:

2.8.3.1 When no alternate is required, in terms of 2.6.2.2, to fly to the heliport to which the flight is planned, and thereafter:

a) to fly 30 minutes at holding speed at 450 m (1 500 ft) above the destination heliport under standard temperature conditions and approach and land; and

b) to have an additional amount of fuel, sufficient to provide for the increased consumption on the occurrence of potential contingencies.

2.8.3.2 When an alternate is required, in terms of 2.6.2.1, to fly to and execute an approach, and a missed approach, at the heliport to which the flight is planned, and thereafter:

a) to fly to the alternate specified in the flight plan; and then

b) to fly for 30 minutes at holding speed at 450 m (1 500 ft) above the alternate under standard temperature conditions, and approach and land; and

c) to have an additional amount of fuel, sufficient to provide for the increased consumption on the occurrence of potential contingencies.

2.8.3.3 When no suitable alternate is available (i.e. the heliport of intended landing is isolated and no suitable alternate is available), to fly to the heliport to which the flight is planned and thereafter for a period as specified by the State of the Operator.

2.8.4 In computing the fuel and oil required in 2.8.1, at least the following shall be considered:

a) meteorological conditions forecast;

b) expected air traffic control routings and traffic delays;

c) for IFR flight, one instrument approach at the destination heliport, including a missed approach;

d) the procedures for loss of pressurization, where applicable, or failure of one power-unit while en route; and

e) any other conditions that may delay the landing of the helicopter or increase fuel and/or oil consumption.

Note.— Nothing in 2.8 precludes amendment of a flight plan in flight in order to replan the flight to another heliport, provided that the requirements of 2.8 can be complied with from the point where the flight has been replanned.

2.9 Oxygen supply

Note.— Approximate altitudes in the Standard Atmosphere corresponding to the values of absolute pressure used in the text are as follows:

Absolute pressure	Metres	Feet
700 hPa	*3 000*	*10 000*
620 hPa	*4 000*	*13 000*

2.9.1 A flight to be operated at altitudes at which the atmospheric pressure in personnel compartments will be less than 700 hPa shall not be commenced unless sufficient stored breathing oxygen is carried to supply:

a) all crew members and 10 per cent of the passengers for any period in excess of 30 minutes that the pressure in compartments occupied by them will be between 700 hPa and 620 hPa;

b) the crew and passengers for any period that the atmospheric pressure in compartments occupied by them will be less than 620 hPa.

2.9.2 A flight to be operated with a pressurized helicopter shall not be commenced unless a sufficient quantity of stored breathing oxygen is carried to supply all the crew members and a proportion of the passengers, as is appropriate to the circumstances of the flight being undertaken, in the event of loss of pressurization, for any period that the atmospheric pressure in any compartment occupied by them would be less than 700 hPa.

2.10 Use of oxygen

All flight crew members, when engaged in performing duties essential to the safe operation of a helicopter in flight, shall use breathing oxygen continuously whenever the circumstances prevail for which its supply has been required in 2.9.1 or 2.9.2.

2.11 In-flight emergency instruction

In an emergency during flight, the pilot-in-command shall ensure that all persons on board are instructed in such emergency action as may be appropriate to the circumstances.

2.12 Weather reporting by pilots

Recommendation.— *When weather conditions likely to affect the safety of other aircraft are encountered, they should be reported as soon as possible.*

2.13 Hazardous flight conditions

Recommendation.— *Hazardous flight conditions, other than those associated with meteorological conditions, encountered en route should be reported as soon as possible. The reports so rendered should give such details as may be pertinent to the safety of other aircraft.*

2.14 Fitness of flight crew members

The pilot-in-command shall be responsible for ensuring that a flight:

a) will not be commenced if any flight crew member is incapacitated from performing duties by any cause such as injury, sickness, fatigue, the effects of alcohol or drugs; and

b) will not be continued beyond the nearest suitable heliport when flight crew members' capacity to perform functions is significantly reduced by impairment of faculties from causes such as fatigue, sickness, lack of oxygen.

2.15 Flight crew members at duty stations

2.15.1 Take-off and landing

All flight crew members required to be on flight deck duty shall be at their stations.

2.15.2 En route

All flight crew members required to be on flight deck duty shall remain at their stations except when their absence is necessary for the performance of duties in connection with the operation of the helicopter, or for physiological needs.

2.15.3 Seat belts

All flight crew members shall keep their seat belt fastened when at their stations.

2.15.4 Safety harness

Recommendation.— *When safety harnesses are provided, any flight crew member occupying a pilot's seat should keep the safety harness fastened during the take-off and landing phases; all other flight crew members should keep their safety harness fastened during the take-off and landing phases unless the shoulder straps interfere with the performance of their duties, in which case the shoulder straps may be unfastened but the seat belt must remain fastened.*

Note.— Safety harness includes shoulder strap(s) and a seat belt which may be used independently.

2.16 Instrument flight procedures

2.16.1 One or more instrument approach procedures shall be approved and promulgated by the State in which the heliport is located, or by the State which is responsible for the heliport when located outside the territory of any State, to serve each final approach and take-off area or heliport utilized for instrument flight operations.

2.16.2 All helicopters operated in accordance with IFR shall comply with the instrument approach procedures approved by the State in which the heliport is located, or by the State which is responsible for the heliport when located outside the territory of any State.

Note 1.— Operational procedures recommended for the guidance of operations personnel involved in instrument flight operations are described in PANS-OPS (Doc 8168), Volume I.

Note 2.— Criteria for the construction of instrument flight procedures for the guidance of procedure specialists are provided in PANS-OPS (Doc 8168), Volume II.

2.17 Instruction — general

A helicopter rotor shall not be turned under power for the purpose of flight without a qualified pilot at the controls.

2.18 Refuelling with passengers on board or rotors turning

2.18.1 **Recommendation.—** *A helicopter should not be refuelled when passengers are embarking, on board or disembarking or when the rotor is turning unless it is attended by the pilot-in-command or other qualified personnel ready to initiate and direct an evacuation of the helicopter by the most practical and expeditious means available.*

2.18.2 **Recommendation.—** *When refuelling with passengers embarking, on board or disembarking, two-way communications should be maintained by helicopter inter-communications system or other suitable means between the ground crew supervising the refuelling and the pilot-in-command or other qualified personnel required by 2.18.1.*

Note 1.— Provisions concerning aircraft refuelling are contained in Annex 14, Volume I, and guidance on safe refuelling practices is contained in the Airport Services Manual *(Doc 9137), Parts 1 and 8.*

Note 2.— Additional precautions are required when refuelling with fuels other than aviation kerosene or when refuelling results in a mixture of aviation kerosene with other aviation turbine fuels, or when an open line is used.

2.19 Over-water flights

All helicopters on flights over water in a hostile environment in accordance with 4.3.1 shall be certificated for ditching. Sea state shall be an integral part of ditching information.

CHAPTER 3. HELICOPTER PERFORMANCE OPERATING LIMITATIONS

3.1 A helicopter shall be operated:

a) in compliance with the terms of its airworthiness certificate or equivalent approved document;

b) within the operating limitations prescribed by the certificating authority of the State of Registry; and

c) within the mass limitations imposed by compliance with the applicable noise certification Standards in Annex 16, Volume I, unless otherwise authorized, in exceptional circumstances for a certain heliport where there is no noise disturbance problem, by the competent authority of the State in which the heliport is situated.

3.2 Placards, listings, instrument markings, or combinations thereof, containing those operating limitations prescribed by the certificating authority of the State of Registry for visual presentation, shall be displayed in the helicopter.

Note.— The Standards of Annex 8, Part IV, apply to all helicopters intended for the carriage of passengers or cargo or mail in international air navigation.

3.3 Where helicopters are operating to or from heliports in a congested hostile environment, the competent authority of the State in which the heliport is situated shall take such precautions as are necessary to control the risk associated with a power-unit failure.

Note.— Guidance is provided in Attachment A, 2.4.

CHAPTER 4. HELICOPTER INSTRUMENTS, EQUIPMENT AND FLIGHT DOCUMENTS

Note.— Specifications for the provision of helicopter communication and navigation equipment are contained in Chapter 5.

4.1 All helicopters on all flights

4.1.1 General

In addition to the minimum equipment necessary for the issuance of a certificate of airworthiness, the instruments, equipment and flight documents prescribed in the following paragraphs shall be installed or carried, as appropriate, in helicopters according to the helicopter used and to the circumstances under which the flight is to be conducted. The prescribed instruments and equipment, including their installation, shall be approved or accepted by the State of Registry.

4.1.2 Instruments

A helicopter shall be equipped with instruments which will enable the flight crew to control the flight path of the helicopter, carry out any required procedural manoeuvre, and observe the operating limitations of the helicopter in the expected operating conditions.

4.1.3 Equipment

4.1.3.1 All helicopters on all flights shall be equipped with:

a) an accessible first-aid kit;

b) portable fire extinguishers of a type which, when discharged, will not cause dangerous contamination of the air within the helicopter. At least one shall be located in:

   1) the pilot's compartment; and

   2) each passenger compartment that is separate from the pilot's compartment and not readily accessible to the pilot or co-pilot;

c) 1) a seat or berth for each person over an age to be determined by the State of Registry; and

   2) a seat belt for each seat and restraining belts for each berth;

d) the following manuals, charts and information:

   1) the flight manual or other documents or information concerning any operating limitations prescribed for the helicopter by the certificating authority of the State of Registry, required for the application of Chapter 3;

2) current and suitable charts for the route of the proposed flight and all routes along which it is reasonable to expect that the flight may be diverted;

3) procedures, as prescribed in Annex 2, for pilots-in-command of intercepted aircraft; and

4) a list of visual signals for use by intercepting and intercepted aircraft, as contained in Annex 2; and

e) if fuses are used, spare electrical fuses of appropriate ratings for replacement of those accessible in flight.

4.1.3.2 **Recommendation.—** *All helicopters on all flights should be equipped with the ground-air signal codes for search and rescue purposes.*

4.1.3.3 **Recommendation.—** *All helicopters on all flights should be equipped with a safety harness for each flight crew member seat.*

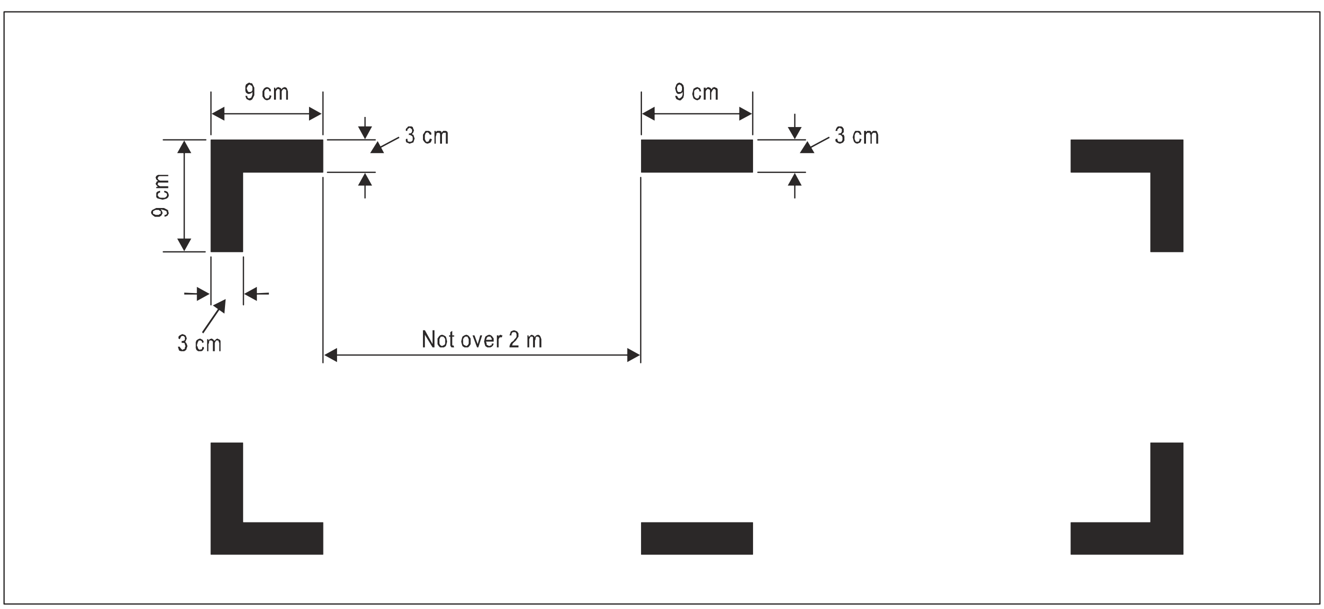
Note.— Safety harness includes shoulder strap(s) and a seat belt which may be used independently.

4.1.4 Marking of break-in points

4.1.4.1 If areas of the fuselage suitable for break-in by rescue crews in an emergency are marked on a helicopter, such areas shall be marked as shown below (see figure following). The colour of the markings shall be red or yellow, and if necessary they shall be outlined in white to contrast with the background.

4.1.4.2 If the corner markings are more than 2 m apart, intermediate lines 9 cm × 3 cm shall be inserted so that there is no more than 2 m between adjacent markings.

Note.— This Standard does not require any helicopter to have break-in areas.



MARKING OF BREAK-IN POINTS (see 4.1.4)

4.2 Instruments and equipment for flights operated under VFR and IFR — by day and night

Note.— The flight instrument requirements in 4.2.1, 4.2.2 and 4.2.3 may be met by combinations of instruments or by electronic displays.

4.2.1 All helicopters when operating in accordance with VFR by day shall be equipped with:

a) a magnetic compass;

b) an accurate timepiece indicating the time in hours, minutes and seconds;

c) a sensitive pressure altimeter;

d) an airspeed indicator; and

e) such additional instruments or equipment as may be prescribed by the appropriate authority.

4.2.2 All helicopters when operating in accordance with VFR at night shall be equipped with:

a) the equipment specified in 4.2.1;

b) an attitude indicator (artificial horizon) for each required pilot;

c) a slip indicator;

d) a heading indicator (directional gyroscope);

e) a rate of climb and descent indicator;

f) such additional instruments or equipment as may be prescribed by the appropriate authority;

and the following lights:

g) the lights required by Annex 2 for aircraft in flight or operating on the movement area of a heliport;

Note.— The general characteristics of the lights are specified in Annex 8. Detailed specification for lights meeting the requirements of Annex 2 for aircraft in flight or operating on the movement area of a heliport are contained in the Airworthiness Manual *(Doc 9760).*

h) a landing light;

i) illumination for all flight instruments and equipment that are essential for the safe operation of the helicopter;

j) lights in all passenger compartments; and

k) a flashlight for each crew member station.

4.2.2.1 **Recommendation**.— *The landing light should be trainable, at least in the vertical plane.*

4.2.3 All helicopters, when operating in accordance with IFR, or when the helicopter cannot be maintained in a desired attitude without reference to one or more flight instruments, shall be equipped with:

a) a magnetic compass;

b) an accurate timepiece indicating the time in hours, minutes and seconds;

c) a sensitive pressure altimeter;

Note.— Due to the long history of misreadings, the use of drum-pointer altimeters is not recommended.

d) an airspeed indicating system with a means of preventing malfunctioning due to either condensation or icing;

e) a slip indicator;

f) an attitude indicator (artificial horizon) for each required pilot and one additional attitude indicator;

g) a heading indicator (directional gyroscope);

h) means of indicating whether the supply of power to the gyroscopic instruments is adequate;

i) a means of indicating in the flight crew compartment the outside air temperature;

j) a rate of climb and descent indicator;

k) such additional instruments or equipment as may be prescribed by the appropriate authority; and

l) if operated by night, the lights specified in 4.2.2 g) to k) and 4.2.2.1.

4.3 All helicopters on flights over water

4.3.1 Means of flotation

All helicopters intended to be flown over water shall be fitted with a permanent or rapidly deployable means of flotation so as to ensure a safe ditching of the helicopter when:

a) engaged in offshore operations or other over-water operations as prescribed by the State of Registry; or

b) flying at a distance from land specified by the appropriate State authority.

Note.— When determining the distance from land referred to in 4.3.1, consideration should be given to environmental conditions and the availability of search and rescue facilities.

4.3.2 Emergency equipment

4.3.2.1 Helicopters operating in accordance with the provisions of 4.3.1 shall be equipped with:

a) one life jacket, or equivalent individual flotation device, for each person on board, stowed in a position easily accessible from the seat of the person for whose use it is provided;

b) when not precluded by consideration related to the type of helicopter used, life-saving rafts in sufficient numbers to carry all persons on board, stowed so as to facilitate their ready use in emergency, provided with such life-saving equipment including means of sustaining life as is appropriate to the flight to be undertaken; and

c) equipment for making the pyrotechnical distress signals described in Annex 2.

4.3.2.2 When taking off or landing at a heliport where, in the opinion of the State of the Operator, the take-off or approach path is so disposed over water that in the event of a mishap there would be likelihood of a ditching, at least the equipment required in 4.3.2.1 a) shall be carried.

4.3.2.3 Each life jacket and equivalent individual flotation device, when carried in accordance with this 4.3, shall be equipped with a means of electric illumination for the purpose of facilitating the location of persons.

4.3.2.4 **Recommendation.—** *On any helicopter for which the individual certificate of airworthiness is first issued on or after 1 January 1991, at least 50 per cent of the life rafts carried in accordance with the provisions of 4.3.2 should be deployable by remote control.*

4.3.2.5 **Recommendation.—** *Rafts which are not deployable by remote control and which have a mass of more than 40 kg should be equipped with some means of mechanically assisted deployment.*

4.3.2.6 **Recommendation.—** *On any helicopter for which the individual certificate of airworthiness was first issued before 1 January 1991, the provisions of 4.3.2.4 and 4.3.2.5 should be complied with no later than 31 December 1992.*

4.4 All helicopters on flights over designated land areas

Helicopters, when operated across land areas which have been designated by the State concerned as areas in which search and rescue would be especially difficult, shall be equipped with such signalling devices and life-saving equipment (including means of sustaining life) as may be appropriate to the area overflown.

4.5 All helicopters on high altitude flights

4.5.1 Unpressurized helicopters

Unpressurized helicopters intended to be operated at high altitudes shall carry equipment for storing and dispensing the oxygen supplies required in 2.9.1.

4.5.2 Pressurized helicopters

Recommendation.— *Pressurized helicopters intended to be operated at high altitudes should carry emergency oxygen storage and dispensing equipment capable of storing and dispensing the oxygen supplies required in 2.9.2.*

4.6 All helicopters required to comply with the noise certification Standards in Annex 16, Volume I

All helicopters required to comply with the noise certification Standards of Annex 16, Volume I, shall carry a document attesting noise certification. When the document, or a suitable statement attesting noise certification as contained in another document approved by the State of Registry, is issued in a language other than English, it shall include an English translation.

Note 1.— The attestation may be contained in any document, carried on board, approved by the State of Registry in accordance with the relevant provisions of Annex 16, Volume I.

Note 2.— The various noise certification Standards of Annex 16, Volume I, which are applicable to helicopters are determined according to the date of application for a type certificate, or the date of acceptance of an application under an equivalent prescribed procedure by the certificating authority. Some helicopters are not required to comply with any noise certification Standard. For details see Annex 16, Volume I, Part II, Chapters 8 and 11.

4.7 Flight recorders

Note 1.— Flight recorders comprise two systems — a flight data recorder (FDR) and a cockpit voice recorder (CVR).

Note 2.— Combination recorders (FDR/CVR) can only be used to meet the flight recorder equipage requirements as specifically indicated in this Annex.

Note 3.— Detailed guidance on flight recorders is contained in Attachment B.

4.7.1 Flight data recorders — types

4.7.1.1 *Type IV FDRs*

4.7.1.1.1 A Type IV FDR shall record the parameters required to determine accurately the helicopter flight path, speed, attitude, engine power and operation.

4.7.1.1.2 A Type IVA FDR shall record the parameters required to determine accurately the helicopter flight path, speed, attitude, engine power, operation and configuration.

4.7.1.2 A Type V FDR shall record the parameters required to determine accurately the helicopter flight path, speed, attitude and engine power.

4.7.1.3 The use of engraving metal foil FDRs shall be discontinued by 1 January 1995.

4.7.1.4 **Recommendation.—** *The use of analogue FDRs using frequency modulation (FM) should be discontinued by 5 November 1998.*

4.7.1.4.1 The use of photographic film FDRs shall be discontinued from 1 January 2003.

4.7.1.5 All helicopters for which the individual certificate of airworthiness is first issued after 1 January 2005, which utilize data link communications and are required to carry a CVR, shall record on a flight recorder all data link communications to and from the helicopter. The minimum recording duration shall be equal to the duration of the CVR and shall be correlated to the recorded cockpit audio.

4.7.1.5.1 From 1 January 2007, all helicopters which utilize data link communications and are required to carry a CVR, shall record on a flight recorder, all data link communications to and from the helicopter. The minimum recording duration shall be equal to the duration of the CVR and shall be correlated to the recorded cockpit audio.

4.7.1.5.2 Sufficient information to derive the content of the data link communications message and, whenever practical, the time the message was displayed to or generated by the crew shall be recorded.

Note.— Data link communications include, but are not limited to, automatic dependent surveillance — contract (ADS-C), controller-pilot data link communications (CPDLC), data link-flight information services (D-FIS) and aeronautical operational control (AOC) messages.

4.7.1.6 **Recommendation.—** *All helicopters of a maximum certificated take-off mass over 2 730 kg, required to be equipped with an FDR and/or a CVR, may alternatively be equipped with one combination recorder (FDR/CVR)*

4.7.2 Flight data recorders — duration

Types IV and V FDRs shall be capable of retaining the information recorded during at least the last ten hours of their operation.

4.7.3 Flight data recorders — helicopters for which the individual certificate of airworthiness is first issued on or after 1 January 1989

4.7.3.1 All helicopters of a maximum certificated take-off mass of over 7 000 kg shall be equipped with a Type IV FDR.

4.7.3.2 **Recommendation.—** *All helicopters of a maximum certificated take-off mass of over 2 730 kg, up to and including 7 000 kg, should be equipped with a Type V FDR.*

4.7.4 Flight data recorders — helicopters for which the individual certificate of airworthiness is first issued after 1 January 2005

All helicopters of a maximum certificated take-off mass of over 3 175 kg shall be equipped with a Type IVA FDR with a recording duration of at least 10 hours.

Note.— A single, combination CVR/FDR is acceptable.

4.7.5 Cockpit voice recorders — helicopters for which the individual certificate of airworthiness is first issued on or after 1 January 1987

Note.— CVR performance requirements are as contained in the Minimum Operational Performance Specification (MOPS) document for Flight Recorder Systems of the European Organization for Civil Aviation Equipment (EUROCAE) or equivalent documents.

4.7.5.1 All helicopters of a maximum certificated take-off mass of over 7 000 kg shall be equipped with a CVR, the objective of which is the recording of the aural environment on the flight deck during flight time. For helicopters not equipped with an FDR, at least main rotor speed shall be recorded on one track of the CVR.

4.7.5.2 **Recommendation.—** *All helicopters of a maximum certificated take-off mass of over 3 175 kg, up to and including 7 000 kg, should be equipped with a CVR, the objective of which is the recording of the aural environment on the flight deck during flight time. For helicopters not equipped with an FDR, at least main rotor speed should be recorded on one track of the CVR.*

4.7.6 Cockpit voice recorders — duration

4.7.6.1 A CVR shall be capable of retaining the information recorded during at least the last 30 minutes of its operation.

4.7.6.2 **Recommendation.—** *A CVR, installed in helicopters for which the individual certificate of airworthiness is first issued on or after 1 January 1990, should be capable of retaining the information recorded during at least the last two hours of its operation.*

4.7.6.3 A CVR, installed in helicopters for which the individual certificate of airworthiness is first issued after 1 January 2003, shall be capable of retaining the information recorded during at least the last two hours of its operation.

4.7.7 Flight recorders — construction and installation

Flight recorders shall be constructed, located and installed so as to provide maximum practical protection for the recordings in order that the recorded information may be preserved, recovered and transcribed.

4.7.8 Flight recorders — operation

4.7.8.1 Flight recorders shall not be switched off during flight time.

4.7.8.2 To preserve flight recorder records, flight recorders shall be deactivated upon completion of flight time following an accident or incident. The flight recorders shall not be reactivated before their disposition as determined in accordance with Annex 13.

Note 1.— The need for removal of the flight recorder records from the aircraft is to be determined by the investigation authority in the State conducting the investigation with due regard to the seriousness of an occurrence and the circumstances, including the impact on the operation.

Note 2.— The operator's responsibilities regarding the retention of flight recorder records are contained in Section II, 9.6.

4.7.9 Flight recorders — continued serviceability

Operational checks and evaluations of recordings from the FDR and CVR systems shall be conducted to ensure the continued serviceability of the recorders.

Note.— Procedures for the inspections of the flight data and CVR systems are given in Attachment B.

4.8 Emergency locator transmitter (ELT)

Applicable until 30 June 2008

4.8.1 Performance Class 1 and 2 helicopters for which the individual certificate of airworthiness is first issued after 1 January 2002, operating on flights over water as described in 4.3.1 a) and performance Class 3 helicopters for which the individual certificate of airworthiness is first issued after 1 January 2002, operating as described in 4.3.1 b) shall be equipped with at least one automatic ELT and one ELT(S) in a raft.

4.8.2 From 1 January 2005, all performance Class 1 and 2 helicopters operating on flights over water as described in 4.3.1 a) and performance Class 3 helicopters operating as described in 4.3.1 b) shall be equipped with at least one automatic ELT and one ELT(S) in a raft.

4.8.3 Helicopters for which the individual certificate of airworthiness is first issued after 1 January 2002, on flights over designated land areas as described in 4.4 shall be equipped with at least one automatic ELT.

4.8.4 From 1 January 2005, helicopters on flights over designated land areas as described in 4.4 shall be equipped with at least one automatic ELT.

4.8.5 **Recommendation.—** *All helicopters should carry an automatic ELT.*

4.8.6 ELT equipment carried to satisfy the requirements of 4.8.1, 4.8.2, 4.8.3, 4.8.4 and 4.8.5 shall operate in accordance with the relevant provisions of Annex 10, Volume III.

Applicable from 1 July 2008

4.8.7 From 1 July 2008, all helicopters operating in performance Class 1 and 2 shall be equipped with at least one automatic ELT and, when operating on flights over water as described in 4.3.1 a), with at least one automatic ELT and one ELT(S) in a raft or life jacket.

4.8.8 From 1 July 2008, all helicopters operating in performance Class 3 shall be equipped with at least one automatic ELT and, when operating on flights over water as described in 4.3.1 b), with at least one automatic ELT and one ELT(S) in a raft or life jacket.

4.8.9 ELT equipment carried to satisfy the requirements of 4.8.7 and 4.8.8 shall operate in accordance with the relevant provisions of Annex 10, Volume III.

Note.— The judicious choice of numbers of ELTs, their type and placement on aircraft and associated floatable life support systems will ensure the greatest chance of ELT activation in the event of an accident for aircraft operating over water or land, including areas especially difficult for search and rescue. Placement of transmitter units is a vital factor in ensuring optimal crash and fire protection. The placement of the control and switching devices (activation monitors) of automatic fixed ELTs and their associated operational procedures will also take into consideration the need for rapid detection of inadvertent activation and convenient manual switching by crew members.

4.9 Helicopters required to be equipped with a pressure-altitude reporting transponder

4.9.1 From 1 January 2003, unless exempted by the appropriate authorities, all helicopters shall be equipped with a pressure-altitude reporting transponder which operates in accordance with the relevant provisions of Annex 10, Volume IV.

4.9.2 **Recommendation.—** *All helicopters should be equipped with a pressure-altitude reporting transponder which operates in accordance with the relevant provisions of Annex 10, Volume IV.*

Note.— The provisions in 4.9.1 and 4.9.2 are intended to support the effectiveness of ACAS as well as to improve the effectiveness of air traffic services. Effective dates for carriage requirements of ACAS are contained in Annex 6, Part I, 6.18.1 and 6.18.2. The intent is also for aircraft not equipped with pressure-altitude reporting transponders to be operated so as not to share airspace used by aircraft equipped with airborne collision avoidance systems. To this end, exemptions from the carriage requirement for pressure-altitude reporting transponders could be given by designating airspace where such carriage is not required.

4.10 Microphones

Recommendation.— *All flight crew members required to be on flight deck duty should communicate through boom or throat microphones*

CHAPTER 5. HELICOPTER COMMUNICATION AND NAVIGATION EQUIPMENT

5.1 Communication equipment

5.1.1 A helicopter to be operated in accordance with IFR or at night shall be provided with radio communication equipment. Such equipment shall be capable of conducting two-way communication with those aeronautical stations and on those frequencies prescribed by the appropriate authority.

Note.— The requirements of 5.1.1 are considered fulfilled if the ability to conduct the communications specified therein is established during radio propagation conditions which are normal for the route.

5.1.2 When compliance with 5.1.1 requires that more than one communication equipment unit be provided, each shall be independent of the other or others to the extent that a failure in any one will not result in failure of any other.

5.1.3 A helicopter to be operated in accordance with VFR, but as a controlled flight, shall, unless exempted by the appropriate authority, be provided with radio communication equipment capable of conducting two-way communication at any time during flight with such aeronautical stations and on such frequencies as may be prescribed by the appropriate authority.

5.1.4 A helicopter to be operated on a flight to which the provisions of 4.3 or 4.4 apply shall, unless exempted by the appropriate authority, be provided with radio communication equipment capable of conducting two-way communication at any time during flight with such aeronautical stations and on such frequencies as may be prescribed by the appropriate authority.

5.1.5 **Recommendation.—** *The radio communication equipment required in accordance with 5.1.1 to 5.1.4 should provide for communication on the aeronautical emergency frequency.*

5.1.6 For flights in defined portions of airspace or on routes where an RCP type has been prescribed, a helicopter shall, in addition to the requirements specified in 5.1.1 to 5.1.5:

a) be provided with communication equipment which will enable it to operate in accordance with the prescribed RCP type(s); and

b) be authorized by the State of Registry for operations in such airspace.

Note.— Information on RCP and associated procedures, and guidance concerning the approval process, are contained in the Manual on Required Communications Performance (RCP) *(Doc 9869)*[*]*. This document also contains references to other documents produced by States and international bodies concerning communication systems and RCP.*

5.2 Navigation equipment

5.2.1 A helicopter shall be provided with navigation equipment which will enable it to proceed:

* In preparation.

a) in accordance with its flight plan; and

b) in accordance with the requirements of air traffic services;

except when, if not so precluded by the appropriate authority, navigation for flights under VFR is accomplished by visual reference to landmarks. For international general aviation, landmarks shall be located at least every 110 km (60 NM).

5.2.2 For flights in defined portions of airspace or on routes where an RNP type has been prescribed, a helicopter shall, in addition to the requirements specified in 5.2.1:

a) be provided with navigation equipment which will enable it to operate in accordance with the prescribed RNP type(s); and

b) be authorized by the State of Registry for operations in such airspace.

Note.— Information on RNP and associated procedures, and guidance concerning the approval process, are contained in the Manual on Required Navigation Performance (RNP) *(Doc 9613). This document also contains a comprehensive list of references to other documents produced by States and international bodies concerning navigation systems and RNP.*

5.2.3 The helicopter shall be sufficiently provided with navigation equipment to ensure that, in the event of the failure of one item of equipment at any stage of the flight, the remaining equipment will enable the helicopter to navigate in accordance with 5.2.1 and, where applicable, 5.2.2.

Note.— For international general aviation, this requirement may be met by means other than the duplication of equipment.

5.2.4 On flights in which it is intended to land in instrument meteorological conditions, a helicopter shall be provided with appropriate navigation equipment providing guidance to a point from which a visual landing can be effected. This equipment shall be capable of providing such guidance at each heliport at which it is intended to land in instrument meteorological conditions and at any designated alternate heliports.

CHAPTER 6. HELICOPTER MAINTENANCE

Note 1.— For the purpose of this chapter "helicopter" includes: powerplants, power transmissions, rotors, components, accessories, instruments, equipment and apparatus including emergency equipment.

Note 2.— Guidance on continuing airworthiness requirements is contained in the Airworthiness Manual *(Doc 9760).*

6.1 Maintenance responsibilities

6.1.1 The owner of a helicopter, or in the case where it is leased, the lessee, shall ensure that:

a) the helicopter is maintained in an airworthy condition;

b) the operational and emergency equipment necessary for the intended flight is serviceable;

c) the certificate of airworthiness of the helicopter remains valid; and

d) the maintenance of the helicopter is performed in accordance with a maintenance programme acceptable to the State of Registry.

6.1.2 The helicopter shall not be operated unless it is maintained and released to service under a system acceptable to the State of Registry.

6.1.3 When the maintenance release is not issued by an organization approved in accordance with Annex 6, Part I, 8.7, the person signing the maintenance release shall be licensed in accordance with Annex 1.

6.2 Maintenance records

6.2.1 The owner shall ensure that the following records are kept for the periods mentioned in 6.2.2:

a) the total time in service hours, calendar time and cycles, as appropriate of the helicopter and all life-limited components;

b) the current status of compliance with all mandatory continuing airworthiness information;

c) appropriate details of modifications and repairs to the helicopter;

d) the time in service (hours, calendar time and cycles, as appropriate) since last overhaul of the helicopter or its components subject to a mandatory overhaul life;

e) the current status of the helicopter's compliance with the maintenance programme; and

f) the detailed maintenance records to show that all requirements for signing of a maintenance release have been met.

6.2.2 The records in 6.2.1 a) to e) shall be kept for a minimum period of 90 days after the unit to which they refer has been permanently withdrawn from service, and the records in 6.2.1 f) for a minimum period of one year after the signing of the maintenance release.

6.2.3 The lessee of a helicopter shall comply with the requirements of 6.2.1 and 6.2.2, as applicable, while the helicopter is leased.

6.3 Continuing airworthiness information

The owner of a helicopter over 3 175 kg maximum certificated take-off mass, or in the case where it is leased, the lessee, shall, as required by the State of Registry, ensure that the information resulting from maintenance and operational experience with respect to continuing airworthiness is transmitted as required by Annex 8, Part II, 4.2.3 f) and 4.2.4.

6.4 Modifications and repairs

All modifications and repairs shall comply with airworthiness requirements acceptable to the State of Registry. Procedures shall be established to ensure that the substantiating data supporting compliance with the airworthiness requirements are retained.

6.5 Maintenance release

6.5.1 A maintenance release shall be completed and signed, as prescribed by the State of Registry, to certify that the maintenance work performed has been completed satisfactorily.

6.5.2 A maintenance release shall contain a certification including:

a) basic details of the maintenance carried out;

b) the date such maintenance was completed;

c) when applicable, the identity of the approved maintenance organization; and

d) the identity of the person or persons signing the release.

CHAPTER 7. HELICOPTER FLIGHT CREW

7.1 Qualifications

The pilot-in-command shall ensure that the licences of each flight crew member have been issued or rendered valid by the State of Registry, and are properly rated and of current validity, and shall be satisfied that flight crew members have maintained competence.

Note.— Information for pilots on flight procedure parameters and operational procedures is contained in PANS-OPS (Doc 8168), Volume I. Criteria for the construction of visual and instrument flight procedures are contained in PANS-OPS (Doc 8168), Volume II. Obstacle Clearance criteria and procedures used in certain States may differ from PANS-OPS, and knowledge of these differences is important for safety reasons.

7.2 Composition of the flight crew

The number and composition of the flight crew shall not be less than that specified in the flight manual or other documents associated with the certificate of airworthiness.

ANNEX 6 — PART III

APPENDICES

APPENDIX 1. SAFETY OVERSIGHT OF AIR OPERATORS

(See Section II, Chapter 2, 2.2.1.7)

1. Primary aviation legislation

1.1 The State of the Operator shall enact and implement laws that enable the State to regulate civil aviation through a Civil Aviation Authority or equivalent organization established for that purpose. The legislation shall empower the Authority to discharge the oversight responsibilities of the State. The legislation shall provide for the making of regulations, the certification and continued supervision of air operators, and the resolution of safety issues identified by the Authority.

Note.— The term Authority as used in this Appendix refers to the Civil Aviation Authority as well as equivalent organizations, including inspectors and staff.

1.2 The State of the Operator shall ensure that the laws of the State require air operators to provide the Authority with access to their personnel records, aircraft, operations and facilities and associated records for the purpose of certification and continued surveillance.

Note.— Guidance on the critical elements of a system that enables a State to discharge its responsibility for inspection, certification and continued surveillance of operations is contained in the Safety Oversight Manual *(Doc 9734),* Part A — The Establishment and Management of a State's Safety Oversight System, *the* Manual of Procedures for Operations Inspection, Certification and Continued Surveillance *(Doc 8335), and the* Airworthiness Manual *(Doc 9760).*

2. Specific operating regulations

2.1 The State of the Operator shall adopt regulations that provide for the certification and continued surveillance of aircraft operations and the maintenance of aircraft in conformity with the Annexes to the Convention on International Civil Aviation.

2.2 The State of the Operator shall ensure that its regulations are sufficiently comprehensive, detailed, and current with respect to changes in technology and the operating environment to ensure that satisfactory compliance will result in an acceptable level of safety for the operations undertaken.

3. CAA structure and safety oversight functions

3.1 The State of the Operator shall ensure that the Authority is responsible for the safety oversight of air operators and that it has resources appropriate to the size and complexity of civil air operations under the jurisdiction of the State, to effectively discharge the responsibilities of the State.

3.2 The State of the Operator shall ensure that Authority inspectors have adequate support, credentials, and transportation to accomplish, independently, their certification and continued surveillance tasks.

4. Technical guidance

4.1 The State of the Operator shall ensure that Authority inspectors are provided with technical guidance manuals containing the policies, procedures, and standards to be used in the certification and continued surveillance of air operators.

4.2 The State of the Operator shall ensure that Authority inspectors are provided with technical guidance containing the policies, procedures, and standards to be used in the resolution of safety issues, including enforcement.

4.3 The State of the Operator shall ensure that Authority inspectors are provided with guidance that addresses ethics, personal conduct, and the avoidance of actual or perceived conflicts of interest in the performance of official duties.

5. Qualified technical personnel

5.1 The State of the Operator shall use a methodology to determine its inspector staffing requirements according to the size and complexity of civil air operations in that State.

5.2 **Recommendation.** *The methodology in 5.1 should be documented.*

5.3 The State of the Operator shall establish qualification requirements to ensure that its inspector personnel have operational or technical work experience and training compatible with those activities they are required to certificate or inspect.

Note.— Guidance on experience and training for inspectors is contained in the Manual of Procedures for Operations Inspection, Certification and Continued Surveillance *(Doc 8335), Chapter 9, 9.4.*

5.4 The State of the Operator shall require Authority inspectors to complete initial and recurrent training in relevant technical subjects (including aircraft-specific subjects) and in skills necessary to effectively accomplish their certification and continued surveillance tasks.

5.5 **Recommendation.—** *The State of the Operator should take the necessary measures, such as conditions of service, to ensure that qualified inspectors are recruited and retained.*

6. Licensing and certification obligations

6.1 The State of the Operator shall use a documented process for the certification of air operators that includes thorough technical evaluations that lead to approval or acceptance of procedures, documents and operations as specified in Section II.

6.2 The State of the Operator shall require, prior to commencement of new commercial air transport operations, air operators to demonstrate that they can safely conduct the proposed operations.

7. Continued surveillance obligations

7.1 The State of the Operator shall use a documented process for the continued surveillance of air operators to verify the continued validity of the air operator certificates issued by the Authority.

7.2 The State of the Operator shall use an ongoing surveillance plan to confirm that operators continue to meet the relevant requirements for initial certification and that each air operator is functioning satisfactorily.

8. Resolution of safety issues

8.1 The State of the Operator shall use a documented process to take appropriate corrective actions, up to and including enforcement measures, to resolve identified safety issues.

8.2 The State of the Operator shall ensure that identified safety issues are resolved in a timely manner through a system which monitors and records progress, including actions taken by the air operator, in resolving such issues.

APPENDIX 2. ADDITIONAL REQUIREMENTS FOR OPERATIONS OF HELICOPTERS IN PERFORMANCE CLASS 3 IN INSTRUMENT METEOROLOGICAL CONDITIONS (IMC)

(See Section II, Chapter 3, 3.4.1)

Airworthiness and operations requirements provided in accordance with Section II, Chapter 3, 3.4.1, shall satisfy the following**:**

1. Engine reliability

1.1 Attaining and maintaining approval for engines used by helicopters operating in performance Class 3 in IMC:

1.1.1 In order to attain initial approval for existing in-service engine types, reliability shall be shown to have a nominal power loss rate of less than 1 per 100 000 engine hours based on a risk management process.

Note.— Power loss in this context is defined as any significant loss of power, the cause of which may be traced to engine or engine component, design, maintenance or installation, including design or installation of the fuel ancillary or engine control systems. (See Attachment I.)

1.1.2 In order to attain initial approval for new engine types, the State of Design shall assess engine models for acceptance for operations in performance Class 3 in IMC on a case-by-case basis.

1.1.3 In order to maintain approval, the State of Design shall, through the continuing airworthiness process, ensure that engine reliability remains consistent with the intent of the Standard contained in 1.1.1.

1.2 The operator shall be responsible for a programme for ongoing engine trend monitoring.

1.3 To minimize the probability of in-flight engine failure, the engine shall be equipped with:

a) for turbine engines: a re-ignition system that activates automatically or a manually selectable continuous ignition system unless the engine certification has determined that such a system is not required, taking into consideration the likely environmental conditions in which the engine is to be operated;

b) a magnetic particle detection, or equivalent, system that monitors the engine, accessories gearbox, and reduction gearbox, and which includes a flight deck caution indication; and

c) a means that would permit continuing operation of the engine through a sufficient power range to safely complete the flight in the event of any reasonably probable failure of the fuel control unit.

2. Systems and equipment

Helicopters operating in performance Class 3 in IMC shall be equipped with the following systems and equipment intended to ensure continued safe flight or to assist in achieving a safe forced landing after an engine failure, under all allowable operating conditions:

a) either two separate electrical generating systems, each one capable of supplying all probable combinations of continuous in-flight electrical loads for instruments, equipment and systems required in IMC; or a primary electrical source and a standby battery or other alternate source of electric power that is capable of supplying 150 per cent of electrical loads of all required instruments and equipment necessary for safe emergency operations of the helicopter for at least one hour; and

b) an emergency electrical supply system of sufficient capacity and endurance, following loss of all normally generated power to, as a minimum:

Note.— If a battery is used to satisfy the requirement for a second power source (see 2 a) above), an additional electrical power supply may not be required.

1) maintain the operation of all essential flight instruments, communication and navigation systems during a descent from the maximum certificated altitude in an autorotational configuration to the completion of a landing;

2) maintain the operation of the stabilization system, if applicable;

3) lower the landing gear, if applicable;

4) where required, provide power to one pitot heater, which must serve an airspeed indicator clearly visible to the pilot;

5) provide for the operation of the landing light;

6) provide for one engine restart, if applicable; and

7) provide for the operation of the radio altimeter;

c) a radio altimeter;

d) an autopilot if intended as a substitute for a second pilot. In these cases, the State of Operator shall ensure the operator's approval clearly states any conditions or limitations on its use;

e) a means to provide for at least one attempt at engine re-start;

f) an area navigation system approved for use in IFR, capable of being used to locate suitable landing areas in the event of an emergency;

g) a landing light that is independent of retractable landing gear and is capable of adequately illuminating the touchdown area in a night forced landing; and

h) an engine fire warning system.

3. Minimum serviceability requirements — operating equipment

The State of the Operator shall specify the minimum serviceability requirements for operating equipment in helicopters operating in performance Class 3 in IMC.

4. Operations manual information

The operations manual shall include limitations, procedures, approval status and other information relevant to operations in performance Class 3 in IMC.

5. Event reporting

5.1 An operator approved to conduct operations by helicopters in performance Class 3 in IMC shall report all significant failures, malfunctions or defects to the State of the Operator who in turn shall notify the State of Design.

5.2 The State of the Operator shall monitor operations in performance Class 3 in IMC so as to be able to take any actions necessary to ensure that the intended safety level is maintained. The State of the Operator shall notify major events or trends of particular concern to the appropriate type certificate holder and the State of Design.

6. Operator planning

Operator route planning shall take account of all relevant information in the assessment of intended routes or areas of operations, including the following:

a) the nature of the terrain to be overflown, including the potential for carrying out a safe forced landing in the event of an engine failure or major malfunction;

b) weather information, including seasonal and other adverse meteorological influences that may affect the flight; and

c) other criteria and limitations as specified by the State of the Operator.

7. Flight crew experience, training and checking

7.1 The State of the Operator shall prescribe the minimum flight crew experience for helicopters operating in performance Class 3 in IMC.

7.2 An operator's flight crew training and checking programme shall be appropriate to operations in performance Class 3 in IMC, covering normal, abnormal and emergency procedures and, in particular, detection of engine failure including descent to a forced landing in IMC and, for single engine helicopters, entry into a stabilized autorotation.

8. Operator certification or validation

The operator shall demonstrate the ability to conduct operations in performance Class 3 in IMC through a certification and approval process specified by the State of the Operator.

Note.— Guidance on the airworthiness and operational requirements is contained in Attachment I.

ANNEX 6 — PART III

ATTACHMENTS

ATTACHMENT A. HELICOPTER PERFORMANCE AND OPERATING LIMITATIONS

Supplementary to Section II, Chapter 3, and Section III, Chapter 3

Purpose and scope

This attachment comprises material supplementary to Chapter 3 of Sections II and III that is provided for the purpose of guidance. A State may use this material as a basis for establishing its code of performance, but may introduce alternatives or alleviations that would meet the safety objectives of Annex 6.

Note.— Quantitative specifications can be found in the Example provided below.

1. Definitions

Category A. With respect to helicopters, means a multi-engined helicopter designed with engine and system isolation features specified in Annex 8, Part IVB, and capable of operations using take-off and landing data scheduled under a critical engine failure concept which assures adequate designated surface area and adequate performance capability for continued safe flight or safe rejected take-off.

Category B. With respect to helicopters, means a single engine or multi-engined helicopter which does not meet Category A standards. Category B helicopters have no guaranteed capability to continue safe flight in the event of an engine failure, and a forced landing is assumed.

2. General

2.1 Helicopters operating in performance Classes 1 and 2 should be certificated in Category A.

2.2 Helicopters operating in performance Class 3 should be certificated in either Category A or Category B (or equivalent).

2.3 Except as permitted by the appropriate authority:

2.3.1 Take-off or landing from/to heliports in a congested hostile environment should only be conducted in performance Class 1.

2.3.2 Operations in performance Class 2 should only be conducted with a safe forced landing capability during take-off and landing.

2.3.3 Operations in performance Class 3 should only be conducted in a non-hostile environment.

2.4 In order to permit variations from 2.3.1, 2.3.2 and 2.3.3, the Authority should undertake a risk assessment, considering factors such as:

a) the type of operation and the circumstances of the flight;

b) the area/terrain over which the flight is being conducted;

c) the probability of a critical power-unit failure and the consequence of such an event;

d) the procedures to maintain the reliability of the power-unit(s);

e) the training and operational procedures to mitigate the consequences of the critical power-unit failure; and

f) installation and utilization of a usage monitoring system.

Note 1.— It is recognized that there may be instances in which a safe forced landing may not be possible due to environmental or other factors. Many States have already applied risk management and permitted variations to specific operations such as operations to helidecks where exposure to an engine failure is present without a safe forced landing. Permitting variations based on risk assessment is a normal part of the process of a State developing a code of performance. When operations without suitable areas for safe forced landings are being considered, all relevant factors should be evaluated. These may include the likelihood of the event, the possible consequences, any mitigating measures as well as the potential benefits and costs of the operation. The specific process for conducting this evaluation is to be decided by the State. In any case, appropriate consideration of a safe forced landing should be either implicit or explicit to a performance code's construction. Accident history and other relevant safety data and analysis are crucial to the development of operational regulations in this area. The resulting requirements may take many forms, such as designation of approved operational areas, routes of flight and obstacle clearance requirements.

Note 2.— If there are routes with access to suitable forced landing areas, these should be used for flights into and out of the congested area. Where no such routes exist, evaluation of the operation could include consideration of mitigating factors such as the reliability of the propulsion system in the short periods when flight over a suitable forced landing area is not possible.

— — — — — — — —

Example

Purpose and Scope

The following example provides *quantitative specifications* to illustrate a level of performance intended by the provisions of Section II, Chapter 3. A State may use this example as a basis for establishing its code of performance, but may introduce variations provided such variations meet the safety objectives of Section II, Chapter 3 and Attachment A.

Abbreviations Specific to Helicopter Operations

Abbreviations

D	Maximum dimension of helicopter
DPBL	Defined point before landing
DPATO	Defined point after take-off
DR	Distance travelled (helicopter)
FATO	Final approach and take-off area
HFM	Helicopter flight manual
LDP	Landing decision point
LDAH	Landing distance available (helicopter)
LDRH	Landing distance required (helicopter)
R	Rotor radius of helicopter
RTODR	Rejected take-off distance required (helicopter)
TDP	Take-off decision point
TLOF	Touchdown and lift-off area
TODAH	Take-off distance available (helicopter)
TODRH	Take-off distance required (helicopter)
V_{TOSS}	Take-off safety speed

1. Definitions

1.1 Only applicable to operations in performance Class 1

Landing distance required (LDRH). The horizontal distance required to land and come to a full stop from a point 15 m (50 ft) above the landing surface.

Rejected take-off distance required (RTODR). The horizontal distance required from the start of the take-off to the point where the helicopter comes to a full stop following a power-unit failure and rejection of the take-off at the take-off decision point.

Take-off distance required (TODRH). The horizontal distance required from the start of the take-off to the point at which V_{TOSS}, a selected height and a positive climb gradient are achieved, following failure of the critical power-unit being recognized at TDP, the remaining power-units operating within approved operating limits.

Note.— The selected height stated above is to be determined with reference to either:

a) the take-off surface; or

b) a level defined by the highest obstacle in the take-off distance required.

1.2 Applicable to operations in all performance classes

D. The maximum dimension of the helicopter.

Distance DR. DR is the horizontal distance that the helicopter has travelled from the end of the take-off distance available.

Landing distance available (LDAH). The length of the final approach and take-off area plus any additional area declared available and suitable for helicopters to complete the landing manoeuvre from a defined height.

R. The rotor radius of the helicopter.

Take-off distance available (TODAH). The length of the final approach and take-off area plus the length of helicopter clearway (if provided) declared available and suitable for helicopters to complete the take-off.

Take-off flight path. The vertical and horizontal path, with the critical power-unit inoperative, from a specified point in the take-off to 300 m (1 000 ft) above the surface.

Touchdown and lift-off area (TLOF). A load bearing area on which a helicopter may touch down or lift off.

V_{TOSS}. Take-off safety speed for helicopters certificated in Category A.

V_y. Best rate of climb speed.

2. General

2.1 Applicability

2.1.1 Helicopters with a passenger seating configuration of more than 19, or helicopters operating to or from a heliport in a congested hostile environment should be operating in performance Class 1.

2.1.2 Helicopters with a passenger seating configuration of 19 or less but more than 9 should be operating in performance Class 1 or 2, unless operating to or from a congested hostile environment in which case the helicopters should be operating in performance Class 1.

2.1.3 Helicopters with a passenger seating configuration of 9 or less should be operating in performance Class 1, 2 or 3, unless operating to or from a congested hostile environment in which case the helicopters should be operating in performance Class 1.

2.2 Significant performance factors

To determine the performance of the helicopter, account should be taken of at least the following factors:

a) mass of the helicopter;

b) elevation or pressure-altitude and temperature; and

c) wind; for take-off and landing, accountability for wind should be no more than 50 per cent of any reported steady headwind component of 5 knots or more. Where take-off and landing with a tailwind component is permitted in the flight manual, not less than 150 per cent of any reported tailwind component should be allowed. Where precise wind measuring equipment enables accurate measurement of wind velocity over the point of take-off and landing, these values may be varied.

2.3 Operating conditions

2.3.1 For helicopters operating in performance Class 2 or 3 in any flight phase where a power-unit failure may cause the helicopter to force-land:

a) a minimum visibility should be defined by the operator, taking into account the characteristics of the helicopter, but should not be less than 800 m for helicopters operating in performance Class 3; and

b) the operator should verify that the surface below the intended flight path permits the pilot to execute a safe forced landing.

2.3.2 Performance Class 3 operations are not to be performed:

a) out of the sight of the surface; or

b) at night; or

c) when the cloud ceiling is less than 180 m (600 ft).

Note.— The text of 2.3 contains an interpretation of the principle of "appropriate consideration" for a safe forced landing (contained in Section II, Chapter 3, 3.1.2). For States which take advantage of Section II, Chapter 3, 3.4, or which have risk assessed exposure and/or permitted night VFR operations, 2.3 should be replaced with an appropriately constructed alternative text.

2.4 Obstacle accountability area

2.4.1 For the purpose of the obstacle clearance requirements in 4 below, an obstacle should be considered if its lateral distance from the nearest point on the surface below the intended flight path is not further than:

a) for VFR operations:

   1) half of the minimum width of the FATO (or the equivalent term used in the helicopter flight manual) defined in the helicopter flight manual (or when no width is defined, 0.75 D), plus 0.25 times D (or 3 m, whichever is greater), plus:

      — 0.10 DR for VFR day operations
      — 0.15 DR for VFR night operations

b) for IFR operations:

   1) 1.5 D (or 30 m, whichever is greater), plus:

      — 0.10 DR for IFR operations with accurate course guidance
      — 0.15 DR for IFR operations with standard course guidance
      — 0.30 DR for IFR operations without course guidance

c) for operations with initial take-off conducted visually and converted to IFR/IMC at a transition point, the criteria required in 2.4.1 a) apply up to the transition point then the criteria required in 2.4.1 b) apply after the transition point.

2.4.2 For a take-off using a backup take-off procedure (or with lateral transition), for the purpose of the obstacle clearance requirements in 4 below, an obstacle located below the backup flight path (lateral flight path) should be considered if its lateral distance from the nearest point on the surface below the intended flight path is not further than half of the minimum width of the FATO (or the equivalent term used in the helicopter flight manual) defined in the helicopter flight manual (when no width is defined, 0.75 D plus 0.25 times D, or 3 m, whichever is greater) plus:

a) 0.10 distance travelled from the back edge of the FATO for VFR day operations;

b) 0.15 distance travelled from the back edge of the FATO for VFR night operations.

2.4.3 Obstacles may be disregarded if they are situated beyond:

a) 7 R for day operations if it is assured that navigational accuracy can be achieved by reference to suitable visual cues during the climb;

b) 10 R for night operations if it is assured that navigational accuracy can be achieved by reference to suitable visual cues during the climb;

c) 300 m if navigational accuracy can be achieved by appropriate navigation aids; and

d) 900 m in the other cases.

Note.— Standard course guidance includes ADF and VOR guidance. Accurate course guidance includes ILS, MLS, or other course guidance providing an equivalent navigational accuracy.

2.4.4 The transition point should not be located before the end of TODRH for helicopters operating in performance Class 1 and before the DPATO for helicopters operating in performance Class 2.

2.4.5 When considering the missed approach flight path, the divergence of the obstacle accountability area should only apply after the end of the take-off distance available.

2.5 Source of performance data

An operator should ensure that the approved performance data contained in the helicopter flight manual is used to determine compliance with this Example, supplemented as necessary with other data acceptable to the State of the Operator.

3. Operating area considerations

3.1 FATO

For operations in performance Class 1, the dimensions of the FATO should be at least equal to the dimensions specified in the helicopter flight manual.

Note.— A FATO that is smaller than the dimensions specified in the helicopter flight manual may be accepted if the helicopter is capable of a hover out of ground effect with one engine inoperative (HOGE OEI), and the conditions of 4.1 below can be met.

4. Limitations resulting from performance

4.1 Operations in performance Class 1

4.1.1 *Take-off*

4.1.1.1 The take-off mass of the helicopter should not exceed the maximum take-off mass specified in the flight manual for the procedure to be used and to achieve a rate of climb of 100 ft/min at 60 m (200 ft) and 150 ft/min at 300 m (1 000 ft) above the level of the heliport with the critical engine inoperative and the remaining power-units operating at an appropriate power rating, taking into account the parameters specified in 2.2 (Figure A-1).

4.1.1.2 Rejected take-off

The take-off mass should be such that the rejected take-off distance required does not exceed the rejected take-off distance available.

4.1.1.3 Take-off distance

The take-off mass should be such that the take-off distance required does not exceed the take-off distance available.

Note 1.— As an alternative, the requirement above may be disregarded provided that the helicopter with the critical power-unit failure recognized at TDP can, when continuing the take-off, clear all obstacles from the end of the take-off distance available to the end of the take-off distance required by a vertical margin of not less than 10.7 m (35 ft) (Figure A-2).

Note 2.— For elevated heliports, the airworthiness code provides appropriate clearance from the elevated heliport edge (Figure A-3).

4.1.1.4 Backup procedures (or procedures with lateral transition)

An operator should ensure that, with the critical power-unit inoperative, all obstacles below the backup flight path (the lateral flight path) are cleared by an adequate margin. Only the obstacles specified in 2.4.2 should be considered.

4.1.2 *Take-off flight path*

From the end of the take-off distance required with the critical power-unit inoperative:

4.1.2.1 The take-off mass should be such that the climb path provides a vertical clearance of not less than 10.7 m (35 ft) for VFR operations and 10.7 m (35 ft) plus 0.01 DR for IFR operations above all obstacles located in the climb path. Only obstacles as specified in 2.4 should be considered.

4.1.2.2 Where a change of direction of more than 15 degrees is made, obstacle clearance requirements should be increased by 5 m (15 ft) from the point at which the turn is initiated. This turn should not be initiated before reaching a height of 60 m (200 ft) above the take-off surface, unless permitted as part of an approved procedure in the flight manual.

4.1.3 *En route*

The take-off mass is such that it is possible, in case of the critical power-unit failure occurring at any point of the flight path, to continue the flight to an appropriate landing site and achieve the minimum flight altitudes for the route to be flown.

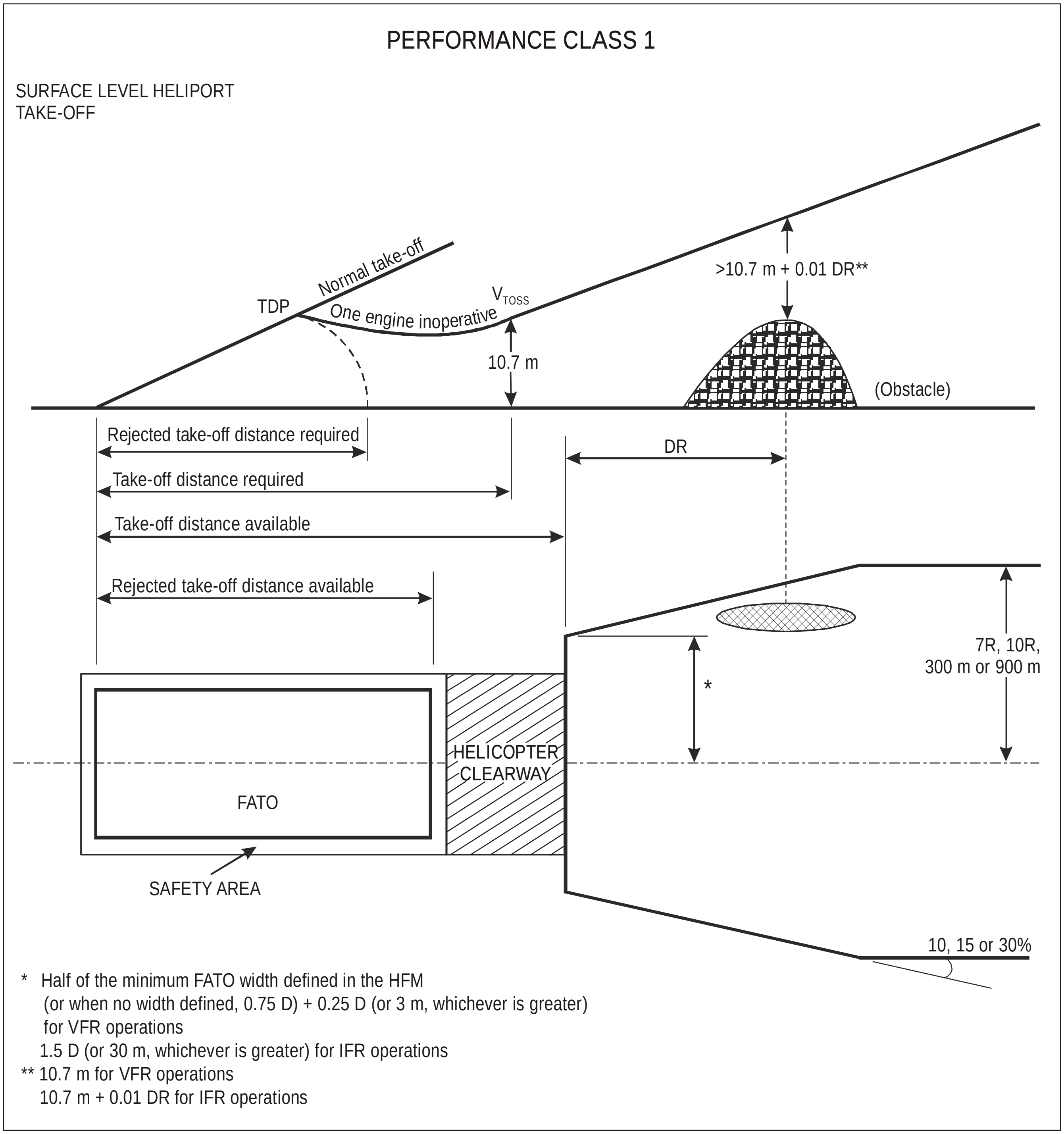
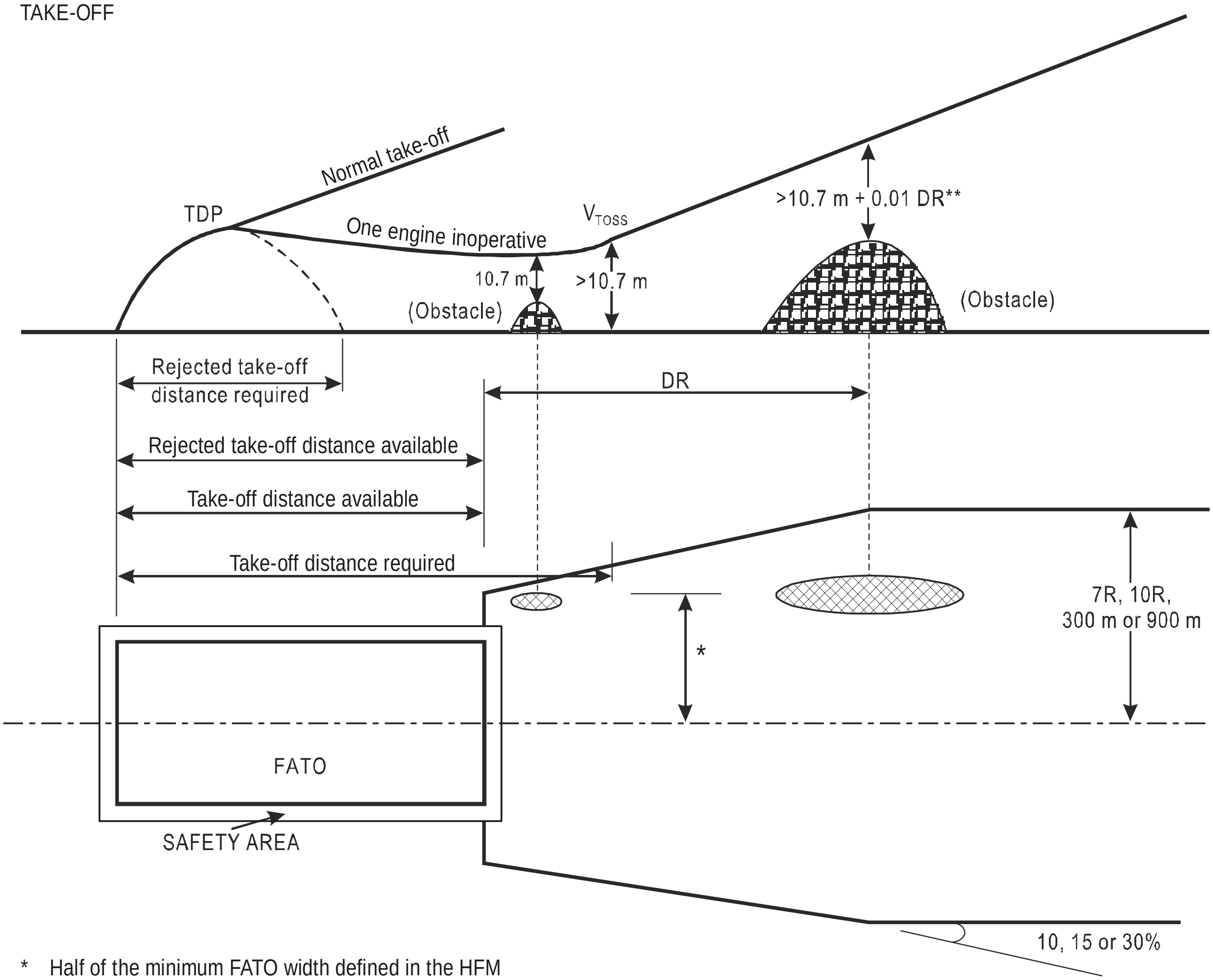

PERFORMANCE CLASS 1
SURFACE LEVEL HELIPORT
TAKE-OFF
Normal take-off
TDP
One engine inoperative
VTOSS
10.7 m
>10.7 m + 0.01 DR**
(Obstacle)
Rejected take-off distance required
DR
Take-off distance required
Take-off distance available
Rejected take-off distance available
7R, 10R,
300 m or 900 m
*
HELICOPTER
CLEARWAY
FATO
SAFETY AREA
10, 15 or 30%
* Half of the minimum FATO width defined in the HFM
(or when no width defined, 0.75 D) + 0.25 D (or 3 m, whichever is greater)
for VFR operations
1.5 D (or 30 m, whichever is greater) for IFR operations
** 10.7 m for VFR operations
10.7 m + 0.01 DR for IFR operations

Figure A-1

PERFORMANCE CLASS 1

SURFACE LEVEL HELIPORT
(Alternative presented in Note 1 to 4.1.1.3)
TAKE-OFF



* Half of the minimum FATO width defined in the HFM
(or when no width defined, 0.75 D) + 0.25 D (or 3 m, whichever is greater)
for VFR operations
1.5 D (or 30 m, whichever is greater) for IFR operations
** 10.7 m for VFR operations
10.7 m + 0.01 DR for IFR operations

Figure A-2

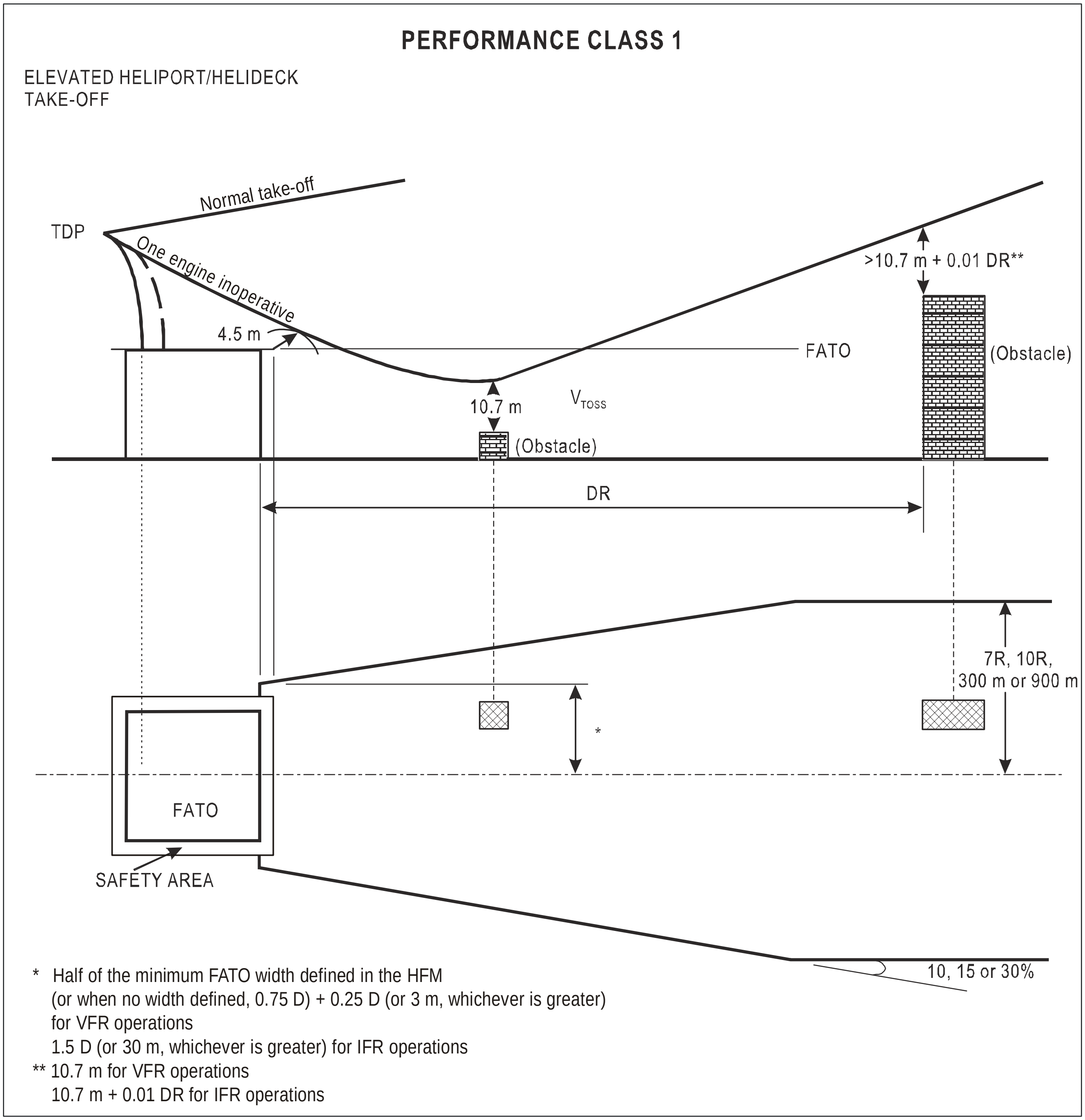

PERFORMANCE CLASS 1
ELEVATED HELIPORT/HELIDECK
TAKE-OFF
Normal take-off
TDP
One engine inoperative
4.5 m
FATO
>10.7 m + 0.01 DR**
(Obstacle)
10.7 m
V TOSS
(Obstacle)
DR
7R, 10R,
300 m or 900 m
*
FATO
SAFETY AREA
10, 15 or 30%
* Half of the minimum FATO width defined in the HFM
(or when no width defined, 0.75 D) + 0.25 D (or 3 m, whichever is greater)
for VFR operations
1.5 D (or 30 m, whichever is greater) for IFR operations
** 10.7 m for VFR operations
10.7 m + 0.01 DR for IFR operations

Figure A-3

4.1.4 *Approach, landing and balked landing* (Figures A-4 and A-5)

The estimated landing mass at the destination or alternate should be such that:

a) it does not exceed the maximum landing mass specified in the flight manual for the procedure to be used and to achieve a rate of climb of 100 ft/min at 60 m (200 ft) and 150 ft/min at 300 m (1 000 ft) above the level of the heliport with the critical engine inoperative and the remaining power-units operating at an appropriate power rating, taking into account the parameters specified in 2.2;

b) the landing distance required does not exceed the landing distance available unless the helicopter, with the critical power-unit failure recognized at LDP can, when landing, clear all obstacles in the approach path;

c) in case of the critical power-unit failure occurring at any point after the LDP, it is possible to land and stop within the FATO; and

d) in the event of the critical power-unit failure being recognized at the LDP or at any point before the LDP, it is possible either to land and stop within the FATO or to overshoot, meeting the conditions of 4.1.2.1 and 4.1.2.2.

Note.— For elevated heliports, the airworthiness code provides appropriate clearance from the elevated heliport edge.

4.2 Operations in performance Class 2

4.2.1 *Take-off* (Figures A-6 and A-7)

The mass of the helicopter at take-off should not exceed the maximum take-off mass specified in the flight manual for the procedures to be used and to achieve a rate of climb of 150 ft/min at 300 m (1 000 ft) above the level of the heliport with the critical power-unit inoperative and the remaining power-units operating at an appropriate power rating, taking into account the parameters specified in 2.2.

4.2.2 *Take-off flight path*

From DPATO or, as an alternative, no later than 60 m (200 ft) above the take-off surface with the critical power-unit inoperative, the conditions of 4.1.2.1 and 4.1.2.2 should be met.

4.2.3 *En route*

The requirements of 4.1.3 should be met.

4.2.4 *Approach, landing and balked landing* (Figures A-8 and A-9)

The estimated landing mass at the destination or alternate should be such that:

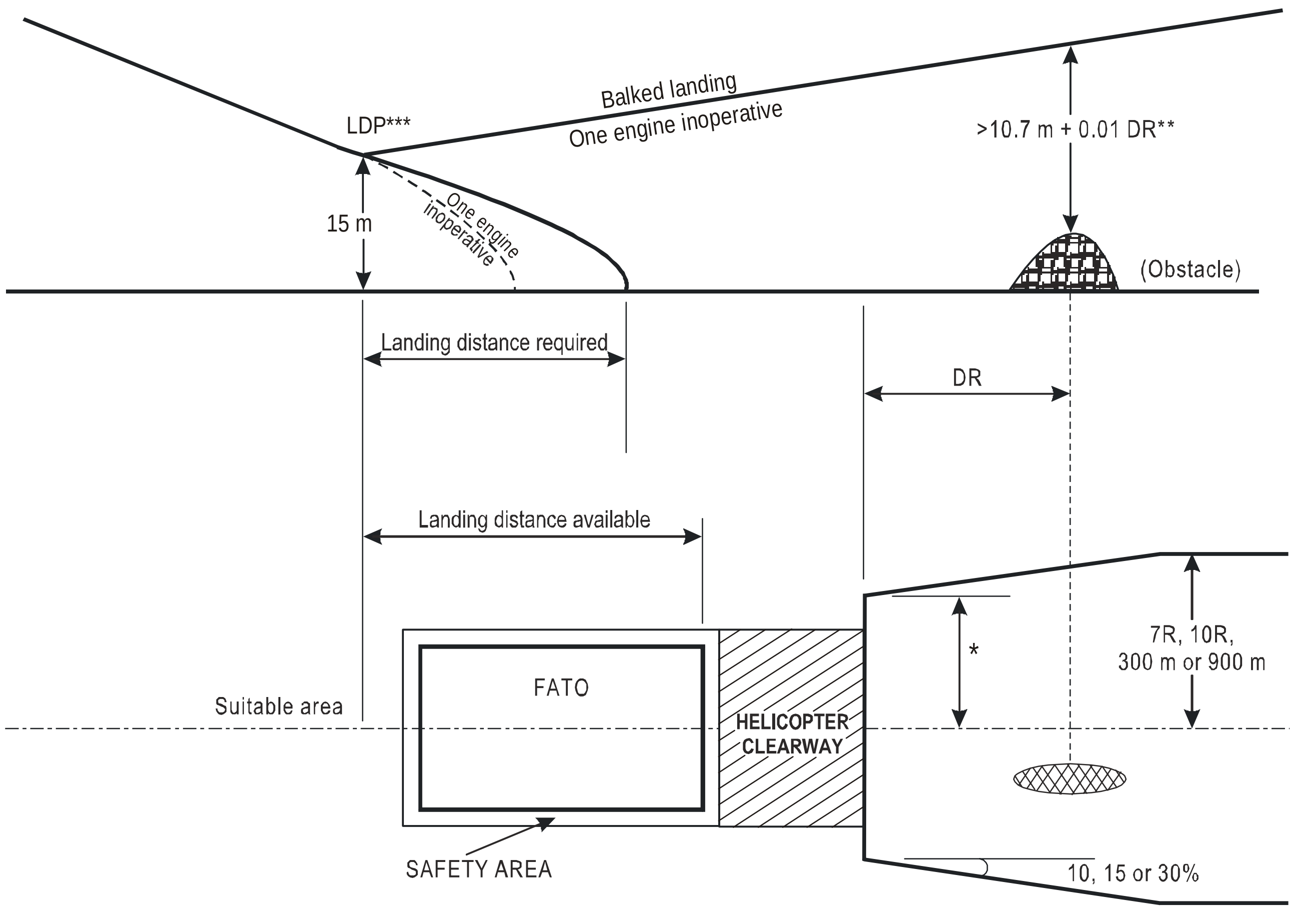
a) it does not exceed the maximum landing mass specified in the flight manual for a rate of climb of 150 ft/min at 300 m (1 000 ft) above the level of the heliport with the critical power-unit inoperative and the remaining power-units operating at an appropriate power rating, taking into account the parameters specified in 2.2;

b) it is possible, in case of the critical power-unit failure occurring at or before the DPBL, either to perform a safe forced landing or to overshoot, meeting the requirements of 4.1.2.1 and 4.1.2.2.

Only obstacles as specified in 2.4 should be considered.

PERFORMANCE CLASS 1

SURFACE LEVEL HELIPORT
LANDING



*   Half of the minimum FATO width defined in the HFM (or when no width defined, 0.75 D) + 0.25 D
(or 3 m, whichever is greater) for VFR operations
1.5 D (or 30 m, whichever is greater) for IFR operations

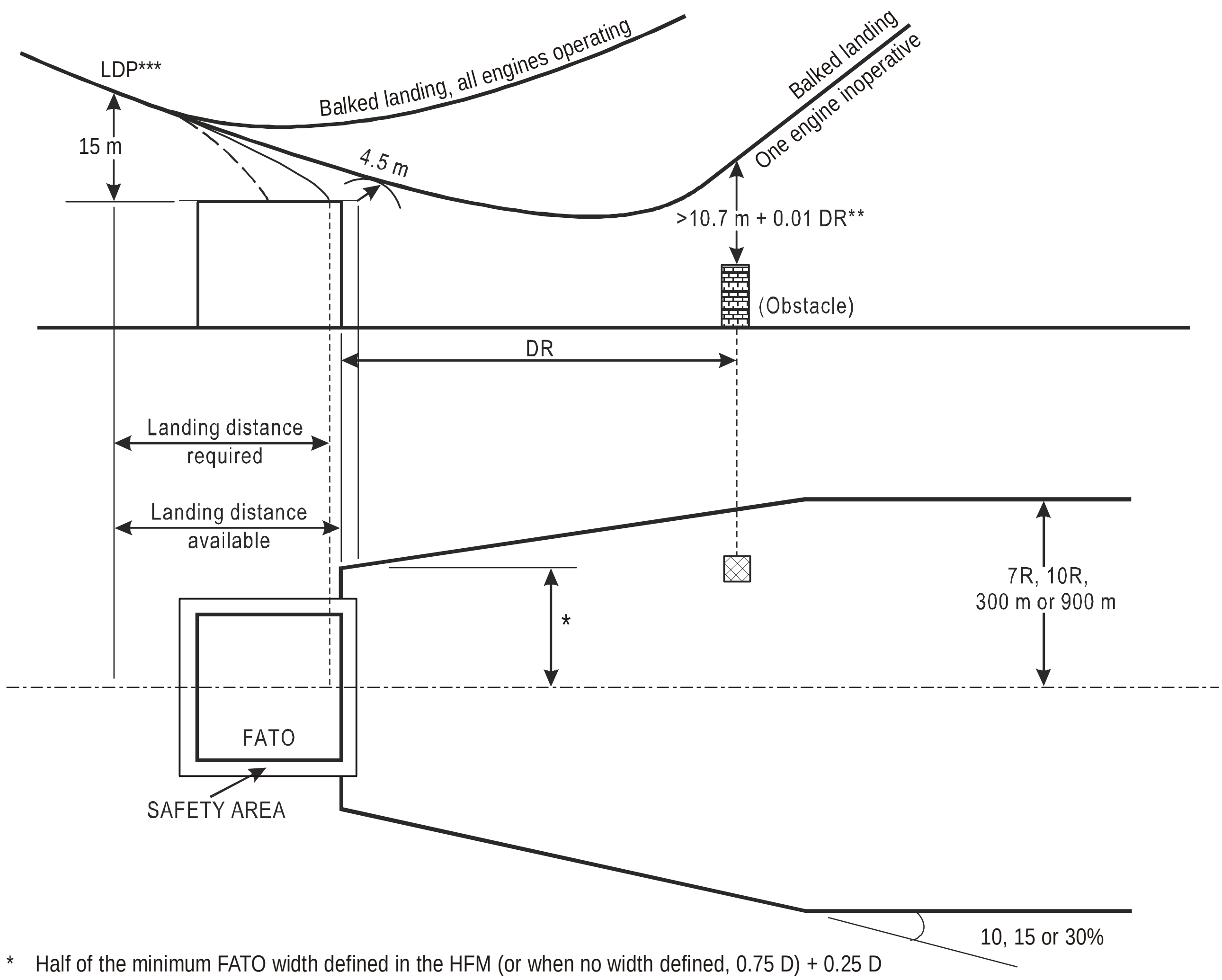
** 10.7 m for VFR operations
10.7 m + 0.01 DR for IFR operations

*** For the purposes of the diagram, all paths and distances emanate from 50 ft (15 m).
The actual height of this point and position of the LDP should be obtained from the HFM.

Figure A-4

PERFORMANCE CLASS 1

ELEVATED HELIPORT/HELIDECK
LANDING



* Half of the minimum FATO width defined in the HFM (or when no width defined, 0.75 D) + 0.25 D
(or 3 m, whichever is greater) for VFR operations
1.5 D (or 30 m, whichever is greater) for IFR operations

** 10.7 m for VFR operations
10.7 m + 0.01 DR for IFR operations

*** For the purposes of the diagram, all paths and distances emanate from 50 ft (15 m).
The actual height of this point and position of the LDP should be obtained from the HFM.

Figure A-5

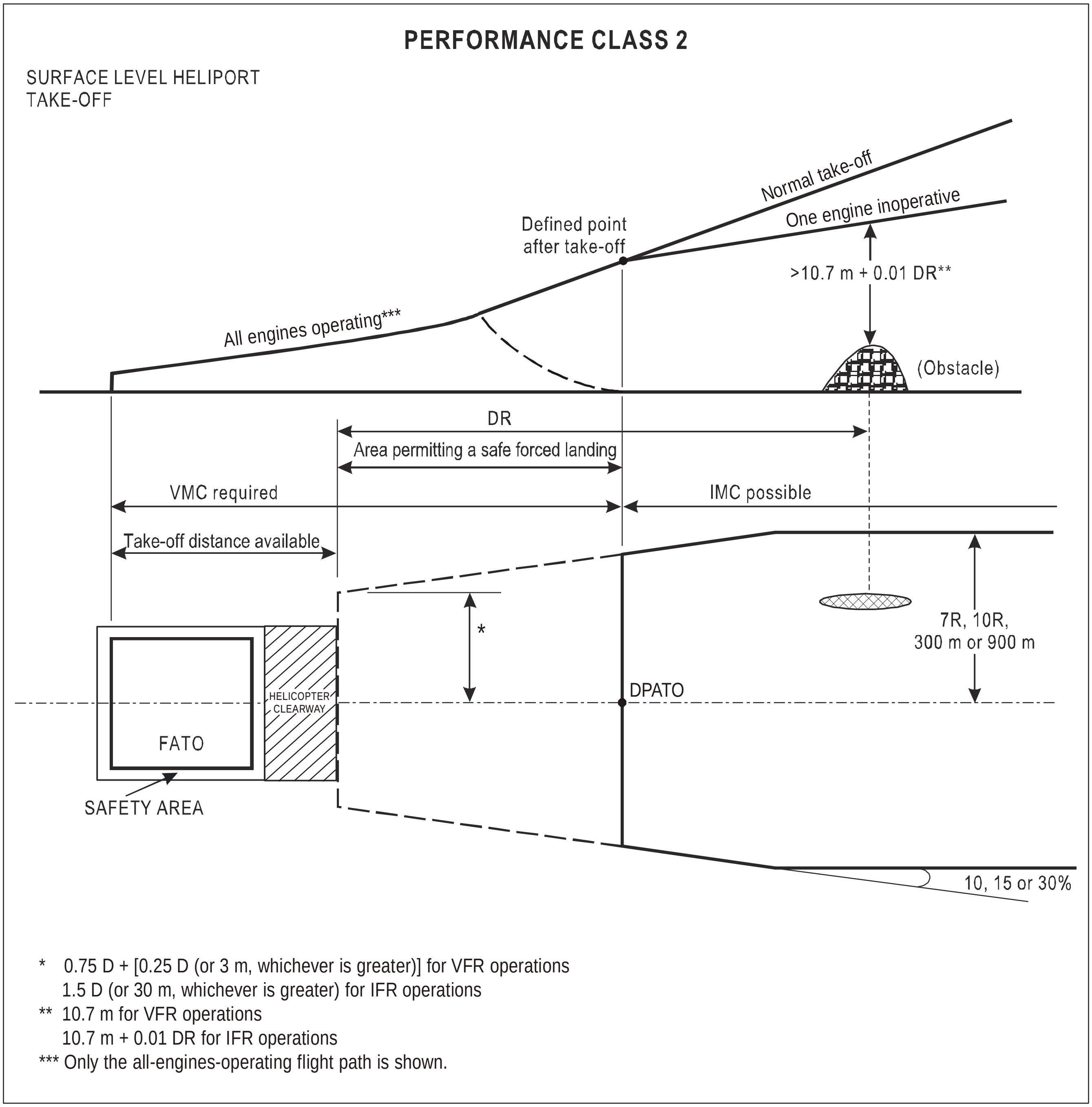

PERFORMANCE CLASS 2
SURFACE LEVEL HELIPORT
TAKE-OFF
Normal take-off
One engine inoperative
Defined point
after take-off
>10.7 m + 0.01 DR**
All engines operating***
(Obstacle)
DR
Area permitting a safe forced landing
VMC required
IMC possible
Take-off distance available
*
7R, 10R,
300 m or 900 m
DPATO
HELICOPTER
CLEARWAY
FATO
SAFETY AREA
10, 15 or 30%
* 0.75 D + [0.25 D (or 3 m, whichever is greater)] for VFR operations
1.5 D (or 30 m, whichever is greater) for IFR operations
** 10.7 m for VFR operations
10.7 m + 0.01 DR for IFR operations
*** Only the all-engines-operating flight path is shown.

Figure A-6

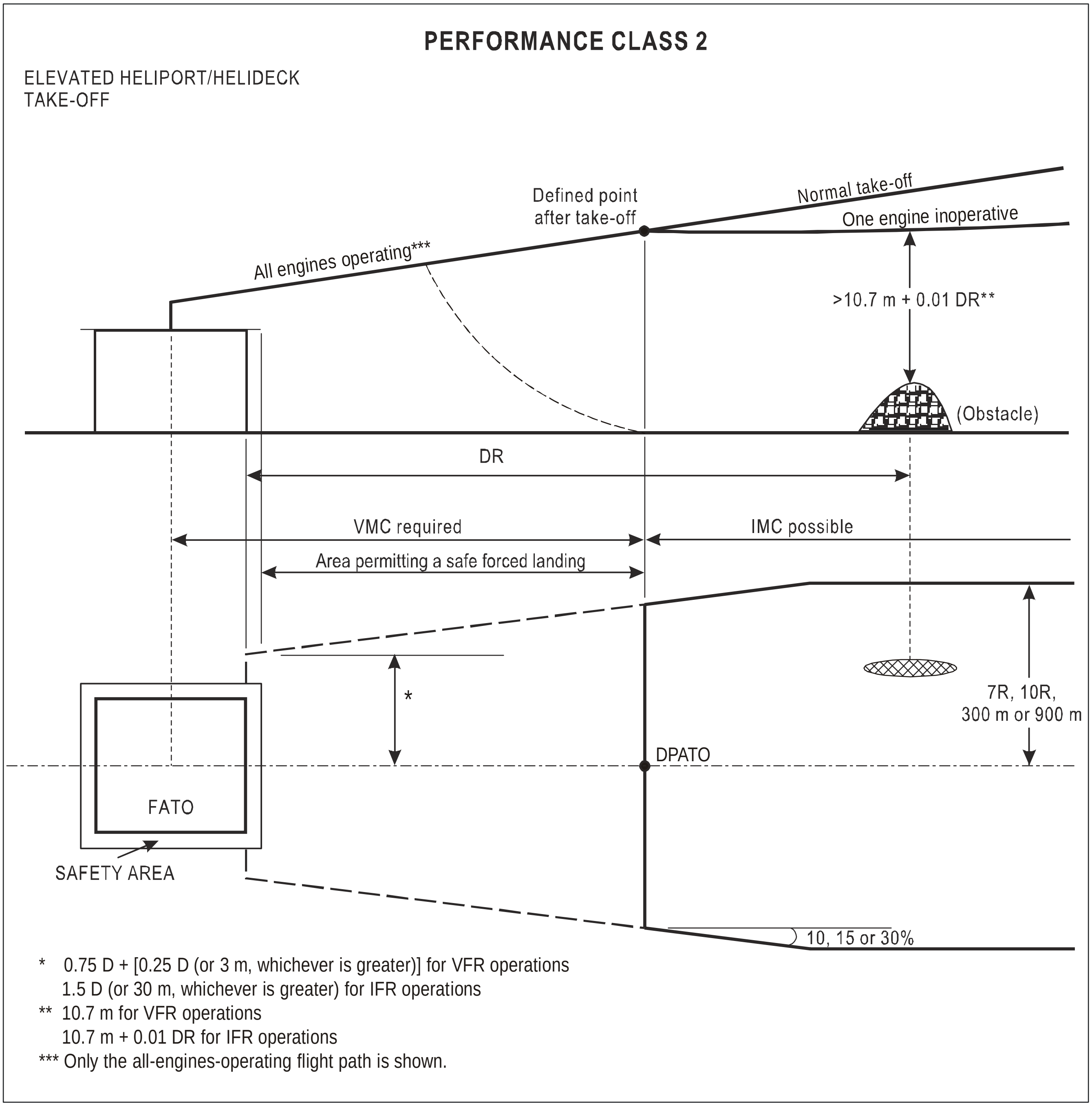
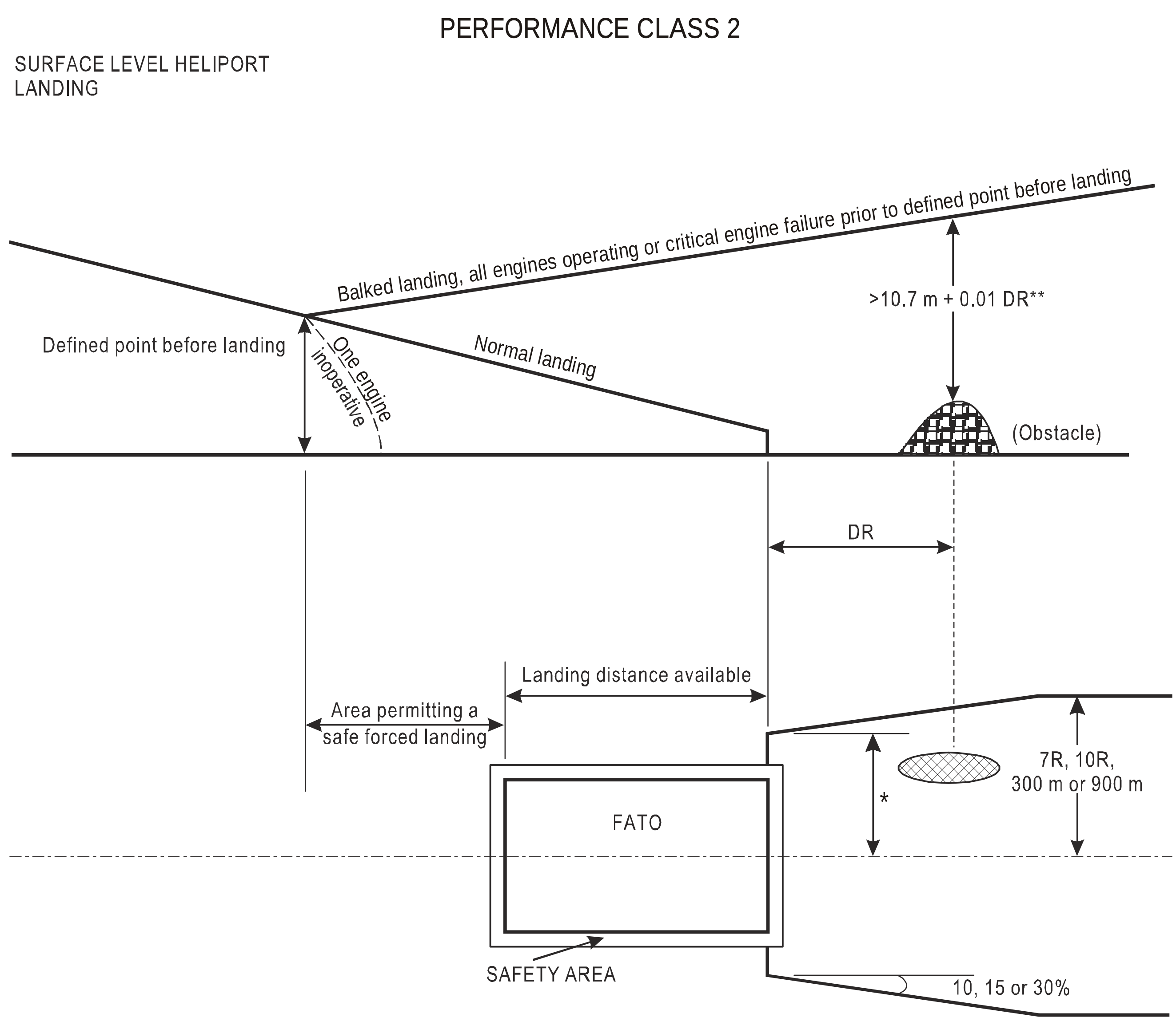

PERFORMANCE CLASS 2
ELEVATED HELIPORT/HELIDECK
TAKE-OFF
Defined point
after take-off
Normal take-off
One engine inoperative
All engines operating***
>10.7 m + 0.01 DR**
(Obstacle)
DR
VMC required
IMC possible
Area permitting a safe forced landing
*
7R, 10R,
300 m or 900 m
DPATO
FATO
SAFETY AREA
10, 15 or 30%
* 0.75 D + [0.25 D (or 3 m, whichever is greater)] for VFR operations
1.5 D (or 30 m, whichever is greater) for IFR operations
** 10.7 m for VFR operations
10.7 m + 0.01 DR for IFR operations
*** Only the all-engines-operating flight path is shown.

Figure A-7



* 0.75 D + [0.25 D (or 3 m, whichever is greater)] for VFR operations
1.5 D (or 30 m, whichever is greater) for IFR operations
** 10.7 m for VFR operations
10.7 m + 0.01 DR for IFR operations

Figure A-8

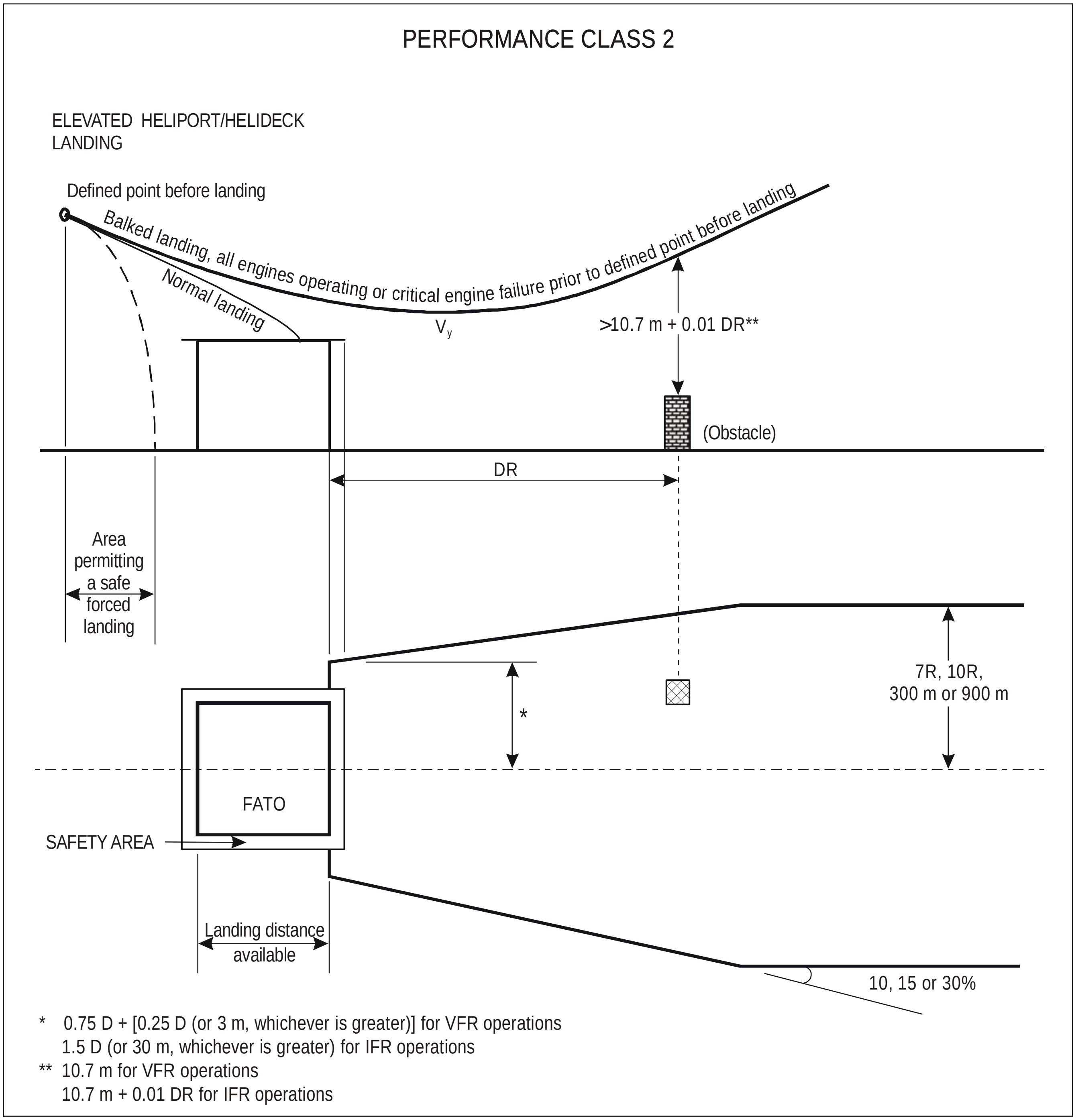

PERFORMANCE CLASS 2
ELEVATED HELIPORT/HELIDECK
LANDING
Defined point before landing
Balked landing, all engines operating or critical engine failure prior to defined point before landing
Normal landing
Vy
>10.7 m + 0.01 DR**
(Obstacle)
DR
Area
permitting
a safe
forced
landing
7R, 10R,
300 m or 900 m
*
FATO
SAFETY AREA
Landing distance
available
10, 15 or 30%
* 0.75 D + [0.25 D (or 3 m, whichever is greater)] for VFR operations
1.5 D (or 30 m, whichever is greater) for IFR operations
** 10.7 m for VFR operations
10.7 m + 0.01 DR for IFR operations

Figure A-9

4.3 Operations in performance Class 3

4.3.1 *Take-off*

The mass of the helicopter at take-off should not exceed the maximum take-off mass specified in the flight manual for a hover in ground effect with all power-units operating at take-off power, taking into account the parameters specified in 2.2. If conditions are such that a hover in ground effect is not likely to be established, the take-off mass should not exceed the maximum mass specified for a hover out of ground effect with all power-units operating at take-off power, taking into account the parameters specified in 2.2.

4.3.2 *Initial climb*

The take-off mass should be such that the climb path provides adequate vertical clearance above all obstacles located along the climb path, all engines operating.

4.3.3 *En route*

The take-off mass is such that it is possible to achieve the minimum flight altitudes for the route to be flown, all engines operating.

4.3.4 *Approach and landing*

The estimated landing mass at the destination or alternate should be such that:

a) it does not exceed the maximum landing mass specified in the flight manual for a hover in ground effect with all power-units operating at take-off power, taking into account the parameters specified in 2.2. If conditions are such that a hover in ground effect is not likely to be established, the take-off mass should not exceed the maximum mass specified for a hover out of ground effect with all power-units operating at take-off power, taking into account the parameters specified in 2.2;

b) it is possible to perform a balked landing, all engines operating, at any point of the flight path and clear all obstacles by an adequate vertical interval.

ATTACHMENT B.   FLIGHT RECORDERS

Supplementary to Section II, Chapter 4, 4.3 and Section III, Chapter 4, 4.7

Introduction

The material in this Attachment concerns flight recorders intended for installation in helicopters engaged in international air navigation. Flight recorders comprise two systems — a flight data recorder and a cockpit voice recorder. Flight data recorders for helicopters are classified as Type IV, IVA and Type V depending upon the number of parameters to be recorded.

1.   Flight data recorder (FDR)

1.1   General requirements

1.1.1   The FDR is to record continuously during flight time.

1.1.2   The FDR container is to:

a)   be painted a distinctive orange or yellow colour;

b)   carry reflective material to facilitate its location; and

c)   have securely attached an automatically activated underwater locating device.

1.1.3   The FDR is to be installed so that:

a)   the probability of damage to the recording is minimized;

b)   it receives its electrical power from a bus that provides the maximum reliability for operation of the FDR without jeopardizing service to essential or emergency loads; and

c)   there is an aural or visual means for pre-flight checking that the FDR is operating properly.

1.2   Parameters to be recorded

1.2.1   *Type IVA FDR.* This FDR will be capable of recording, as appropriate to the helicopter, at least the forty-eight parameters in Table B-1. The parameters without an asterisk (*) are mandatory parameters which should be recorded. In addition, the parameters designated by an asterisk (*) should be recorded if an information data source for the parameter is used by helicopter systems or the flight crew to operate the helicopter. However, other parameters may be substituted with due regard to the helicopter type and the characteristics of the recording equipment.

1.2.2   *Type IV FDR.* This FDR will be capable of recording, as appropriate to the helicopter, at least the first thirty parameters in Table B-1. However, other parameters may be substituted with due regard to the helicopter type and the characteristics of the recording equipment.

1.2.3 *Type V FDR.* This FDR will be capable of recording, as appropriate to the helicopter, at least the first fifteen parameters in Table B-1. However, other parameters may be substituted with due regard to the helicopter type and the characteristics of the recording equipment.

1.2.4 If further recording capacity is available, recording of the following additional information should be considered:

a) additional operational information from electronic displays, such as electronic flight information systems (EFIS), electronic centralized aircraft monitor (ECAM) and engine indication and crew alerting system (EICAS);

b) additional engine parameters (EPR, N_1, fuel flow, etc.).

1.3 Additional information

1.3.1 The measurement range, recording interval and accuracy of parameters on installed equipment is usually verified by methods approved by the appropriate certificating authority.

1.3.2 The manufacturer usually provides the national certificating authority with the following information in respect of the FDR:

a) manufacturer's operating instructions, equipment limitations and installation procedures;

b) parameter origin or source and equations which relate counts to units of measurement; and

c) manufacturer's test reports.

1.3.3 Documentation concerning parameter allocation, conversion equations, periodic calibration and other serviceability/maintenance information should be maintained by the operator. The documentation must be sufficient to ensure that accident investigation authorities have the necessary information to read out the data in engineering units.

2. Cockpit voice recorder (CVR)

2.1 General requirements

2.1.1 The CVR is to be designed so that it will record at least the following:

a) voice communication transmitted from or received in the aircraft by radio;

b) aural environment on the flight deck;

c) voice communication of flight crew members on the flight deck using the interphone system;

d) voice or audio signals identifying navigation or approach aids introduced in the headset or speaker;

e) voice communication of flight crew members using the passenger address system, if installed; and

f) digital communications with ATS, unless recorded by the FDR.

2.1.2 The CVR container is to:

a) be painted a distinctive orange or yellow colour;

b) carry reflective material to facilitate its location; and

c) have securely attached an automatically activated underwater locating device.

2.1.3 To aid in voice and sound discrimination, microphones in the cockpit are to be located in the best position for recording voice communications originating at the pilot and co-pilot stations and voice communications of other crew members on the flight deck when directed to those stations. This can best be achieved by wiring suitable boom microphones to record continuously on separate channels.

2.1.4 The CVR is to be installed so that:

a) the probability of damage to the recording is minimized;

b) it receives its electrical power from a bus that provides the maximum reliability for operation of the CVR without jeopardizing service to essential or emergency loads;

c) there is an aural or visual means for pre-flight checking of the CVR for proper operation; and

d) if the CVR has a bulk erasure device, the installation should be designed to prevent operation of the device during flight time or crash impact.

2.2 Performance requirements

2.2.1 The CVR will be capable of recording on at least four tracks simultaneously. To ensure accurate time correlation between tracks, the CVR is to record in an in-line format. If a bi-directional configuration is used, the in-line format and track allocation should be retained in both directions.

2.2.2 The preferred track allocation is as follows:

Track 1 — co-pilot headphones and live boom microphone

Track 2 — pilot headphones and live boom microphone

Track 3 — area microphone

Track 4 — time reference, main rotor speed or the flight deck vibration environment, the third and fourth crew member’s headphone and live microphone, if applicable.

Note 1.— Track 1 is located closest to the base of the recording head.

Note 2.— The preferred track allocation presumes use of current conventional magnetic tape transport mechanisms and is specified because the outer edges of the tape have a higher risk of damage than the middle. It is not intended to preclude use of alternative recording media where such constraints may not apply.

2.2.3 The CVR, when tested by methods approved by the appropriate certificating authority, will be demonstrated to be suitable for the environmental extremes over which it is designed to operate.

2.2.4 Means will be provided for an accurate time correlation between the FDR and CVR.

Note.— One method of achieving this is by superimposing the FDR time signal on the CVR.

2.3 Additional information

The manufacturer usually provides the national certificating authority with the following information in respect of the CVR:

a) manufacturer's operating instructions, equipment limitations and installation procedures; and

b) manufacturer's test reports.

3. Inspections of FDR and CVR systems

3.1 Prior to the first flight of the day the built-in test features on the flight deck for the CVR, FDR and flight data acquisition unit (FDAU), when installed, should be monitored.

3.2 Annual inspections should be carried out as follows:

a) the readout of the recorded data from the FDR and CVR should ensure that the recorder operates correctly for the nominal duration of the recording;

b) the analysis of the FDR should evaluate the quality of the recorded data to determine if the bit error rate is within acceptable limits and to determine the nature and distribution of the errors;

c) a complete flight from the FDR should be examined in engineering units to evaluate the validity of all recorded parameters. Particular attention should be given to parameters from sensors dedicated to the FDR. Parameters taken from the aircraft's electrical bus system need not be checked if their serviceability can be detected by other aircraft systems;

d) the readout facility should have the necessary software to accurately convert the recorded values to engineering units and to determine the status of discrete signals;

e) an annual examination of the recorded signal on the CVR should be carried out by replay of the CVR recording. While installed in the aircraft the CVR should record test signals from each aircraft source and from relevant external sources to ensure that all required signals meet intelligibility standards; and

f) where practicable, during the annual examination, a sample of in-flight recordings of the CVR should be examined for evidence that the intelligibility of the signal is acceptable.

3.3 Flight recorder systems should be considered unserviceable if there is a significant period of poor quality data, unintelligible signals, or if one or more of the mandatory parameters is not recorded correctly.

3.4 A report of the annual inspection should be made available on request to the State's regulatory authority for monitoring purposes.

3.5 Calibration of the FDR system:

a) the FDR system should be re-calibrated at least every five years to determine any discrepancies in the engineering conversion routines for the mandatory parameters and to ensure that parameters are being recorded within the calibration tolerances; and

b) when the parameters of altitude and airspeed are provided by sensors that are dedicated to the FDR system, there should be a re-calibration performed as recommended by the sensor manufacturer, or at least every two years.

Table B-1
Helicopters – Parameters for Flight Data Recorders

Serial number	*Parameter*	*Measurement range*	*Maximum sampling and recording interval (seconds)*	*Accuracy limits (sensor input compared to FDR readout)*	*Recording resolution*	*Remarks*
1	Time (UTC when available, otherwise elapsed time)	24 hours (UTC) or 0 to 4095 (elapsed time)	4	±0.125% per hour	1 s	Elapsed time counter increments every 4 seconds of system operation.
2	Pressure altitude	–300 m (–1 000 ft) to maximum certificated altitude of aircraft +1 500 m (+5 000 ft)	1	±30 m to ±200 m (±100 ft to ±700 ft)	5 ft	
3	Indicated airspeed	As the installed pilot display measuring system	1	±3%	1 kt	
4	Heading	360°	1	±2°	0.5°	
5	Normal acceleration	–3 g to +6 g	0.125	±0.09 g excluding a datum error of ±0.045 g	0.004 g	
6	Pitch attitude	±75° or 100% of useable range whichever is greater	0.5	±2°	0.5°	
7	Roll attitude	±180°	0.5	±2°	0.5°	
8	Radio transmission keying	On-off (one discrete)	1	—	—	
9	Power on each engine	Full range	1 (per engine)	±2%	0.1% of full range	Sufficient parameters should be recorded to enable engine power to be determined.
10	Main rotor: Main rotor speed Rotor brake	 50–130% Discrete	 0.51	 ±2% —	 0.3% of full range —	 If signals readily available.
11	Pilot input and/or control surface position — primary controls (collective pitch, longitudinal cyclic pitch, lateral cyclic pitch, tail rotor pedal)	Full range	0.5 (0.25 recommended)	±2% unless higher accuracy uniquely required	0.5% of operating range	For helicopters with conventional control systems "or" applies. For helicopters with non-mechanical control systems "and" applies.
12	Hydraulics, each system (low pressure and selection)	Discrete	1	—	—	

Serial number	*Parameter*	*Measurement range*	*Maximum sampling and recording interval (seconds)*	*Accuracy limits (sensor input compared to FDR readout)*	*Recording resolution*	*Remarks*
13	Outside air temperature	Sensor range	2	±2°C	0.3°C	
14*	Autopilot/ autothrottle/AFCS mode and engagement status	A suitable combination of discretes	1	—	—	Discretes should show which systems are engaged.
15*	Stability augmentation system engagement	Discrete	1	—	—	Discretes should show which systems are engaged.
Note.— The preceding 15 parameters satisfy the requirements for a Type V FDR.						
16*	Main gearbox oil pressure	As installed	1	As installed	6.895 kN/m^2 (1 psi)	
17*	Main gearbox oil temperature	As installed	2	As installed	1°C	
18	Yaw rate	±400°/second	0.25	±1.5% maximum range excluding datum error of ±5%	±2°/s	An equivalent yaw acceleration is an acceptable alternative.
19*	Sling load force	0 to 200% of certified load	0.5	±3% of maximum range	0.5% for maximum certified load	If signals readily available.
20	Longitudinal acceleration	±1 g	0.25	±0.015 g excluding a datum error of ±0.05 g	0.004 g	
21	Lateral acceleration	±1 g	0.25	±0.015 g excluding a datum error of ±0.05 g	0.004 g	
22*	Radio altitude	–6 m to 750 m (–20 ft to 2 500 ft)	1	±0.6 m (±2 ft) or ±3% whichever is greater below 150 m (500 ft) and ±5% above 150 m (500 ft)	0.3 m (1 ft) below 150 m (500 ft), 0.3 m (1 ft) + 0.5% of full range above 150 m (500 ft)	
23*	Vertical beam deviation	Signal range	1	±3%	0.3% of full range	
24*	Horizontal beam deviation	Signal range	1	±3%	0.3% of full range	
25	Marker beacon passage	Discrete	1	—	—	One discrete is acceptable for all markers.

Serial number	*Parameter*	*Measurement range*	*Maximum sampling and recording interval (seconds)*	*Accuracy limits (sensor input compared to FDR readout)*	*Recording resolution*	*Remarks*
26	Warnings	Discrete(s)	1	—	—	A discrete should be recorded for the master warning, gearbox low oil pressure and SAS failure. Other "red" warnings should be recorded where the warning condition cannot be determined from other parameters or from the cockpit voice recorder.
27	Each navigation receiver frequency selection	Sufficient to determine selected frequency	4	As installed	—	If signal available in digital form.
28*	DME 1 and 2 distances	0–200 NM	4	As installed	1 NM	If signal available in digital form. Recording of latitude and longitude from INS or other navigation system is a preferred alternative.
29*	Navigation data (latitude/longitude, ground speed, drift angle, wind speed, wind direction)	As installed	2	As installed	As installed	
30*	Landing gear or gear selector position	Discrete	4	—	—	
Note.— The preceding 30 parameters satisfy the requirements for a Type IV FDR.						
31*	Engine exhaust gas temperature (T_4)	As installed	1	As installed		
32*	Turbine inlet temperature (TIT/ITT)	As installed	1	As installed		
33*	Fuel contents	As installed	4	As installed		
34*	Altitude rate	As installed	1	As installed		Only necessary when available from cockpit instruments.
35*	Ice detection	As installed	4	As installed		A suitable combination of discretes to determine the status of each sensor.
36*	Helicopter health and usage monitor system	As installed	—	As installed	—	
37	Engine control modes	Discrete	1	—	—	

Serial number	*Parameter*	*Measurement range*	*Maximum sampling and recording interval (seconds)*	*Accuracy limits (sensor input compared to FDR readout)*	*Recording resolution*	*Remarks*
38*	Selected barometric setting (pilot and first officer)	As installed	64 (4 recommended)	As installed	0.1 mb (0.01 in Hg)	To be recorded for helicopters where electronic displays are fitted.
39*	Selected altitude (all pilot selectable modes of operation)	As installed	1	As installed	Sufficient to determine crew selection	To be recorded for helicopters where electronic displays are fitted.
40*	Selected speed (all pilot selectable modes of operation)	As installed	1	As installed	Sufficient to determine crew selection	To be recorded for helicopters where electronic displays are fitted.
41*	Selected Mach (all pilot selectable modes of operation)	As installed	1	As installed	Sufficient to determine crew selection	To be recorded for helicopters where electronic displays are fitted.
42*	Selected vertical speed (all pilot selectable modes of operation)	As installed	1	As installed	Sufficient to determine crew selection	To be recorded for helicopters where electronic displays are fitted.
43*	Selected heading (all pilot selectable modes of operation)	As installed	1	As installed	Sufficient to determine crew selection	To be recorded for helicopters where electronic displays are fitted.
44*	Selected flight path (all pilot selectable modes of operation)	As installed	1	As installed	Sufficient to determine crew selection	To be recorded for helicopters where electronic displays are fitted.
45*	Selected decision height	As installed	4	As installed	Sufficient to determine crew selection	To be recorded for helicopters where electronic displays are fitted.
46*	EFIS display format (pilot and first officer)	Discrete(s)	4	—	—	Discretes should show the display system status, e.g. off, normal, fail, composite, sector, plan, rose, navaids, WXR, range, copy.
47*	Multi-function/engine/ alerts display format	Discrete(s)	4	—	—	Discretes should show the display system status, e.g. off, normal, fail and the identity of display pages for emergency procedures, checklists. Information in checklists and procedures need not be recorded.
48*	Event marker	Discrete	1	—	—	

Note.— The preceding 48 parameters satisfy the requirements for a Type IVA FDR.

ATTACHMENT C. FLIGHT TIME AND FLIGHT DUTY PERIOD LIMITATIONS

Supplementary to Section II, Chapter 2, 2.2.9.3

1. Purpose and scope

1.1 Flight time and flight duty period limitations are established for the sole purpose of reducing the probability that fatigue of flight crew members may adversely affect the safety of flight.

1.2 In order to guard against this, two types of fatigue must be taken into account, namely, transient fatigue and cumulative fatigue. Transient fatigue may be described as fatigue which is normally experienced by a healthy individual following a period of work, exertion or excitement, and it is normally dispelled by a single sufficient period of sleep. On the other hand cumulative fatigue may occur after delayed or incomplete recovery from transient fatigue or as the after- effect of more than a normal amount of work, exertion or excitement without sufficient opportunity for recuperation.

1.3 Limitations based on the provisions of Part III, Section II, of the Annex will provide safeguards against both kinds of fatigue because they will recognize:

1.3.1 The necessity to limit flight time in such a way as to guard against both kinds of fatigue.

1.3.2 The necessity to limit time spent on duty on the ground immediately prior to a flight or at intermediate points during a series of flights in such a way as to guard particularly against transient fatigue.

1.3.3 The necessity to provide flight crew members with adequate opportunity to recover from fatigue.

1.3.4 The necessity of taking into account other related tasks the flight crew member may be required to perform in order to guard particularly against cumulative fatigue.

2. General

2.1 The responsibility rests with the pilot, not to exercise the privileges of the licence and related ratings at any time when aware of any decrease in medical fitness which might render the pilot unable to safely exercise these privileges, including any decrease in medical fitness through fatigue.

2.2 The limitations laid down in the following paragraphs are to be considered as minimum requirements and it is the responsibility of the operator to adjust them in certain cases, having regard to the factors mentioned below. Specific factors to be taken into consideration are:

a) the crew composition of the aircraft;

b) the probability of operational delays;

c) the type of aircraft and route complexities such as traffic density, navigation aids, standard of equipment carried, communication difficulties, and high altitude flying in unpressurized aircraft, or flying with high cabin altitudes in pressurized aircraft;

d) the proportion of night flying involved;

e) the extent to which the accommodation at layovers is such as to permit crews to secure real rest;

f) the number of landings and take-offs;

g) the need for an orderly scheduling system, giving a high degree of stability (for this, provision of adequate reserves is an important factor);

h) the sleep deprivation arising from interruption of the normal sleep/wake cycle; and

i) the cockpit environment.

2.3 For reasons of flight safety, the operator has the responsibility to ensure that crew members engaged in duties other than flight duties performed on behalf of the employer are provided with at least the minimum required rest periods before engaging in flight duties.

3. Definitions

Deadheading crew. A crew member positioned by the operator in flight or by surface transport.

Duty period. The time during which a flight crew member carries out any duty at the behest of the flight crew member's employer.

Flight duty period. The total time from the moment a flight crew member commences duty, immediately subsequent to a rest period and prior to making a flight or a series of flights, to the moment the flight crew member is relieved of all duties having completed such flight or series of flights.

Flight sector. A flight or one of a series of flights which commences at a parking place of the aircraft and terminates at a parking place of the aircraft.

It is composed of:

— flight preparation,

— flight time,

— post-flight period after the flight sector or series of flight sectors.

***Flight time* — helicopters.** The total time from the moment a helicopter's rotor blades start turning until the moment the helicopter finally comes to rest at the end of the flight, and the rotor blades are stopped.

Rest period. Any period of time on the ground during which a flight crew member is relieved of all duties by the operator.

Series of flights. Two or more flight sectors accomplished in between two rest periods.

Standby. A defined period during which a crew member may be called for duty with minimum notice.

Turnaround time. The time spent on the ground during a flight duty period between two flight sectors.

4. Comments about the definitions

4.1 Flight time

The definition of flight time is of necessity very general but in the context of limitations it is, of course, intended to apply to flight crew members in accordance with the relevant definition of a flight crew member. Pursuant to that latter definition, licensed crew personnel travelling as passengers cannot be considered flight crew members, although this should be taken into account in arranging rest periods.

4.2 Flight duty periods

4.2.1 The definition of flight duty period is intended to cover a continuous period of duty which always includes a flight or a series of flights. It is meant to include all duties a flight crew member may be required to carry out from the moment the flight crew member reports at the place of employment on the day of a flight until relieved of duties, having completed the flight or series of flights. It is considered necessary that this period should be subject to limitations because a flight crew member's activities within the limits of such period would eventually induce fatigue — transient or cumulative — which could endanger the safety of a flight. There is on the other hand (from the point of view of flight safety) insufficient reason to establish limitations for any other time during which a flight crew member is performing a task assigned by the operator. Such task should, therefore, only be taken into account when making provisions for rest periods as one among many factors which could lead to fatigue.

4.2.2 The definition does not imply the inclusion of such periods as time taken for a flight crew member to travel from the flight crew member's home to the place of employment.

4.2.3 An important safeguard may be established if States and operators recognize the right of a crew member to refuse further flight duty when suffering from fatigue of such a nature as to affect adversely the safety of flight.

4.3 Rest periods

The definition of rest period implies an absence of duty and is intended to be for the purpose of recovering from fatigue; the way in which this recovery is achieved is the responsibility of the individual.

5. Types of limitations

5.1 Limitations are broadly divided by time; for example, the majority of States reporting to ICAO prescribe daily, monthly and yearly flight time limitations, and a considerable number also prescribe quarterly flight time limitations. It will probably be sufficient to prescribe flight duty period limitations on a daily basis. It must be understood, however, that these limitations will vary considerably taking into account a variety of situations.

5.2 In formulating regulations or rules governing flight time limitations the size of the crew complement and the extent to which the various tasks to be performed can be divided among the crew members should be taken into account; and in the case where adequate facilities for relief are provided in the aircraft in such a way that a crew member may have horizontal rest and a degree of privacy, flight duty periods could be extended. Adequate rest facilities on the ground are required at places where relief periods are to be given. Also States or operators should give due weight to the following factors: traffic density; navigational and communication facilities; rhythm of work/sleep cycle; number of landings and take-offs; aircraft handling and performance characteristics and weather conditions.

6. Pro forma table

The following pro forma table is provided to illustrate one of many forms in which the Standard at Section II, 2.2.9.3, may be implemented.

	Maximum flight duty period in 24 hours	*Maximum flight time (hours)*				*Rest periods*	
Crew		*Daily 24 hours*	*Monthly*	*Quarterly*	*Annually*	*Daily*	*Per week*
Pilot-in-command 1st Officer							

ATTACHMENT D. MEDICAL SUPPLIES

Supplementary to Section II, Chapter 4, 4.2.2 a)

The following is suggested as being typical contents of a first-aid kit for carriage aboard a helicopter:

— a handbook on first aid
— "ground-air visual signal code for use by survivors" as contained in Annex 12
— materials for treating injuries
— ophthalmic ointment
— a decongestant nasal spray
— insect repellent
— emollient eye drops
— sunburn cream
— water-miscible antiseptic/skin cleanser
— materials for treatment of extensive burns
— oral drugs as follows:
analgesic, antispasmodic, central nervous system stimulant, circulatory stimulant, coronary vasodilator, antidiarrhoeic and motion sickness medications.
— an artificial plastic airway and splints.

ATTACHMENT E. MINIMUM EQUIPMENT LIST (MEL)

Supplementary to Section II, Chapter 4, 4.1.3

1. If deviations from the requirements of States in the certification of aircraft were not permitted an aircraft could not be flown unless all systems and equipment were operable. Experience has proved that some unserviceability can be accepted in the short term when the remaining operative systems and equipment provide for continued safe operations.

2. The State should indicate through approval of a minimum equipment list those systems and items of equipment that may be inoperative for certain flight conditions with the intent that no flight can be conducted with inoperative systems and equipment other than those specified.

3. A minimum equipment list, approved by the State of the Operator, is therefore necessary for each aircraft, based on the master minimum equipment list established for the aircraft type by the organization responsible for the type design in conjunction with the State of Design.

4. The State of the Operator should require the operator to prepare a minimum equipment list designed to allow the operation of an aircraft with certain systems or equipment inoperative provided an acceptable level of safety is maintained.

5. The minimum equipment list is not intended to provide for operation of the aircraft for an indefinite period with inoperative systems or equipment. The basic purpose of the minimum equipment list is to permit the safe operation of an aircraft with inoperative systems or equipment within the framework of a controlled and sound programme of repairs and parts replacement.

6. Operators are to ensure that no flight is commenced with multiple minimum equipment list items inoperative without determining that any interrelationship between inoperative systems or components will not result in an unacceptable degradation in the level of safety and/or undue increase in the flight crew workload.

7. The exposure to additional failures during continued operation with inoperative systems or equipment must also be considered in determining that an acceptable level of safety is being maintained. The minimum equipment list may not deviate from requirements of the flight manual limitations section, emergency procedures or other airworthiness requirements of the State of Registry or of the State of the Operator unless the appropriate airworthiness authority or the flight manual provides otherwise.

8. Systems or equipment accepted as inoperative for a flight should be placarded where appropriate and all such items should be noted in the aircraft technical log to inform the flight crew and maintenance personnel of the inoperative system or equipment.

9. For a particular system or item of equipment to be accepted as inoperative, it may be necessary to establish a maintenance procedure, for completion prior to flight, to deactivate or isolate the system or equipment. It may similarly be necessary to prepare an appropriate flight crew operating procedure.

10. The responsibilities of the pilot-in-command in accepting a helicopter for operation with deficiencies in accordance with a minimum equipment list are specified in Section II, Chapter 2, 2.3.1.

ATTACHMENT F. AIR OPERATOR CERTIFICATION AND VALIDATION

Supplementary to Section II, Chapter 2, 2.2.1

1. Purpose and scope

1.1 Introduction

The purpose of this Attachment is to provide guidance concerning the actions required by States in connection with the operator certification requirements in Chapter 2, 2.2.1, particularly the means of accomplishing and recording those actions.

1.2 Prior certification required

In accordance with Standard 2.2.1.4, the issuance of an air operator certificate (AOC) is "dependent upon the operator demonstrating" to the State that its organization, training, flight operations and maintenance arrangements are adequate considering the nature and extent of the operations to be conducted. The certification process involves the State's evaluation of each operator and a determination that the operator is capable of conducting safe operations before initial issuance of an AOC or the addition of any subsequent authorizations to an AOC.

1.3 Standard certification practices

The State of the Operator is required by Standard 2.2.1.7 to establish a certification system to ensure compliance with the required standards for the type of operation to be conducted. Several States have developed policies and procedures to comply with this certification requirement as industry capabilities evolve. While those States did not develop their certification practices in coordination with each other, their practices are remarkably similar and consistent in their requirements. The effectiveness of their practices has been validated over many years, resulting in improved safety records of operators throughout the world. Many of these certification practices have been incorporated by reference in ICAO provisions.

2. Required technical safety evaluations

2.1 Approval and acceptance actions

2.1.1 The certification and continued surveillance of an air operator includes actions taken by a State on matters submitted for its review. The actions can be categorized as approvals or acceptances depending on the nature of the response by the State to the matter submitted for its review.

2.1.2 An approval is an active response by the State to a matter submitted for its review. An approval constitutes a finding or determination of compliance with the applicable standards. An approval will be evidenced by the signature of the approving official, the issuance of a document or certificate, or some other formal action taken by the State.

2.1.3 An acceptance does not necessarily require an active response by the State to a matter submitted for its review. A State may accept a matter submitted to it for review as being in compliance with the applicable standards if the State does not specifically reject all or a portion of the matter under review, usually after some defined period of time after submission.

2.1.4 The phrase "approved by the State" or similar phrases using the word "approval" are frequently used in Part III, Section II. Provisions indicating a review and implying approval or at least "acceptance" by the State occur even more frequently in Part III, Section II. In addition to these specific phrases, Part III, Section II, contains numerous references to requirements which would, as a minimum, create the need for at least a technical review by the State. This Attachment groups and outlines those specific Standards and Recommended Practices for ease of use by States.

2.1.5 The State should make or arrange for a technical safety evaluation before issuing the approval or acceptance. The evaluation should:

a) be accomplished by a person with specific qualifications to make such a technical evaluation;

b) be in accordance with written, standardized methodology; and

c) where necessary to safety, include a practical demonstration of the air operator's actual ability to conduct such an operation.

2.2 Demonstrations necessary prior to some approvals

2.2.1 Standard 2.2.1.4 obligates the State of the Operator, prior to certification of an operator, to require sufficient demonstrations by the operator to enable the State to evaluate the adequacy of the operator's organization, method of control and supervision of flight operations and maintenance arrangements. These demonstrations should be in addition to the review or inspections of manuals, records, facilities and equipment. Some of the approvals required by Part III, Section II, such as approval for Category III operations, have significant safety implications and should be validated by demonstration before the State approves such operations.

2.2.2 While the specific methodology and extent of the required demonstrations and evaluations vary between States, the certification processes of States whose operators have good safety records are generally consistent. In these States, technically qualified inspectors evaluate a representative sample of the actual training, maintenance and operations prior to the issuance of an AOC or additional authorizations to the AOC.

2.3 Recording of certification actions

2.3.1 It is important that the certification, approval and acceptance actions of the State are adequately documented. The State should issue a written instrument, such as a letter or formal document, as an official record of the action. These written instruments should be retained as long as the operator continues to exercise the authorizations for which the approval or acceptance action was issued. These instruments are unambiguous evidence of the authorities held by an operator and provide proof in the event that the State and the operator disagree on the operations that the operator is authorized to conduct.

2.3.2 Some States collect certification records such as inspections, demonstrations, approvals and acceptance instruments into a single file which is retained as long as the operator is active. Other States retain these records in files according to the certification action performed, and revise the file as the approvals or acceptance instruments are updated. Regardless of the method used, these certification records are persuasive evidence that a State is complying with its ICAO obligations regarding operator certification.

2.4 Coordination of operations and airworthiness evaluations

Some of the references to approval or acceptance in Part III, Section II, will require an operations evaluation and an airworthiness evaluation. Low minima approvals for the conduct of Category II and III ILS approaches, for example, require coordinated prior evaluation by operations and airworthiness specialists. Flight operations specialists should evaluate the operational procedures, training and qualifications. Airworthiness specialists should evaluate the aircraft, equipment reliability and maintenance procedures. These evaluations may be accomplished separately, but should be coordinated to ensure that all aspects necessary for safety have been addressed before any approval is issued.

2.5 State of the Operator and State of Registry responsibilities

2.5.1 Annex 6, Part III, Section II, places the responsibility for initial certification, issuance of the AOC, and ongoing surveillance of an air operator on the State of the Operator. Annex 6, Part III, also requires the State of the Operator to consider or act in accordance with various approvals and acceptances by the State of Registry. Under these provisions, the State of the Operator should ensure that its actions are consistent with the approvals and acceptances of the State of Registry and that the air operator is in compliance with State of Registry requirements.

2.5.2 It is essential that the State of the Operator be satisfied with the arrangements by which its air operators use aircraft on the register of another State, particularly for maintenance and crew training. The State of the Operator should review such arrangements in coordination with the State of Registry. Where appropriate, an agreement transferring oversight responsibilities from the State of Registry to the State of the Operator pursuant to Article 83 *bis* to the Convention on International Civil Aviation should be arranged to preclude any misunderstandings regarding which State is responsible for specific oversight responsibilities.

Note.— Guidance concerning the responsibilities of the State of the Operator and the State of Registry in connection with lease, charter and interchange operations is contained in the Manual of Procedures for Operations Inspection, Certification and Continued Surveillance *(Doc 8335). Guidance concerning the transfer of State of Registry responsibilities to the State of the Operator in accordance with Article 83* bis *is contained in* Guidance on the Implementation of Article 83 *bis* of the Convention on International Civil Aviation *(Cir 295).*

3. Approval actions

3.1 Approvals

The term "approval" implies a more formal action on the part of the State with respect to a certification matter than does the term "acceptance". Some States require the Director of the CAA or a designated lower level CAA official to issue a formal written instrument for every "approval" action taken. Other States allow a variety of documents to be issued as evidence of an approval. The approval document issued and the matter addressed by the approval will depend on the delegated authority of the official. In such States, authority to sign routine approvals, such as operator minimum equipment lists for specific aircraft, is delegated to technical inspectors. More complex or significant approvals are normally issued by higher level officials.

3.2 Air operator certificate (AOC)

3.2.1 The AOC required by Annex 6, Part III, Section II, 2.2.1, is a formal instrument which, as stated by 2.2.1.6, should include approvals for at least the following:

a) operator's identification (name, location);

b) date of issue and period of validity;

c) description of the types of operations authorized;

d) the type(s) of aircraft authorized for use; and

e) authorized areas of operations or routes.

3.2.2 Some States use the AOC and associated documents, such as operations specifications, to document the other approvals required by Part III, Section II.

3.3 Provisions that require an approval

The following provisions require or encourage approval by specified States. The approval of the State of the Operator is required in all of the certification actions listed below that are not preceded by one or more asterisks. Certification actions listed below that are preceded by one or more asterisks require approval by the State of Registry (single asterisk or “*”), or by the State of Design (double asterisk or “**”). However, the State of the Operator should take the necessary steps to ensure that operators for which it is responsible comply with any applicable approvals issued by the State of Registry and/or State of Design, in addition to its own requirements.

a) **Configuration deviation list (CDL) (Definitions);

b) **Master minimum equipment list (MMEL) (Definitions);

c) The method for establishing minimum flight altitudes (2.2.6.3);

d) The method of determining heliport operating minima (2.2.7.1);

e) Flight time, flight duty periods and rest periods (2.2.9.2);

f) Helicopter-specific minimum equipment list (MEL) (4.1.3);

g) RNP operations (5.2.2 b));

h) *Approved maintenance organization (6.1.2);

i) *Helicopter-specific maintenance programme (6.3.1);

j) Flight crew training programmes (7.3.1);

k) Training in the transport of dangerous goods (7.3.1, Note 5);

l) Use of flight simulation training devices (7.3.2 a), 7.4.2 and 7.4.4.1, Note);

m) Method of control and supervision of flight operations (2.2.1.4 and 8.1);

n) **Mandatory maintenance tasks and intervals (9.3.2); and

o) Cabin attendant training programmes (10.3).

3.4 Provisions that require a technical evaluation

Other provisions of Part III, Section II, require the State to have made a technical evaluation. These provisions contain the phrases “acceptable to the State”, “satisfactory to the State”, “determined by the State”, “deemed acceptable by the State”, and “prescribed by the State”. While not necessarily requiring an approval by the State, these Standards do require the State to at least accept the matter at issue after it conducts a specific review or evaluation. These provisions are:

a) details of the helicopter-specific checklists (Definition: aircraft operating manual and 4.1.4);

b) details of the aircraft-specific systems (Definition: aircraft operating manual and 4.1.4);

c) mandatory material for the operations manual (2.2.2.2 and Attachment H);

d) *operator's aircraft-specific maintenance responsibilities (6.1.1);

e) *method of maintenance and release (6.1.2);

f) *maintenance control manual (6.2.1);

g) *mandatory material for the maintenance control manual (6.2.4);

h) *reporting of maintenance experience information (6.5.1);

i) *implementing necessary maintenance corrective actions (6.5.2);

j) *modification and repair requirements (6.6);

k) training facilities (7.3.1);

l) qualifications of instructors (7.3.1);

m) need for recurrent training (7.3.l);

n) use of correspondence courses and written examinations (7.3.1, Note 4);

o) use of flight simulation training devices (7.3.2);

p) flight crew qualification records (7.4.3.4);

q) designated representative of the State of the Operator (7.4.4.1);

r) *flight manual changes (9.1); and

s) minimum number of flight attendants assigned to a specific aircraft (10.1).

4. Acceptance actions

4.1 Acceptance

4.1.1 The actual extent of the State’s technical evaluation of an operator’s readiness to conduct certain flight operations should be much broader than just those Standards which require or imply approval. During certification, the State should ensure that an operator will be in compliance with all requirements of Part III, Section II, prior to conducting international commercial air transport operations.

4.1.2 The concept of “acceptance” is used by some States as a formal method of ensuring that all critical aspects of operator certification are reviewed by the State prior to the formal issuance of the AOC. Using this concept, these States exercise their prerogative to have technical inspectors review all operators' policies and procedures impacting operational safety. The actual execution of an instrument to reflect this acceptance (assuming such a document is issued) may be delegated to the technical inspector assigned to the certification.

4.1.3 The act of "acceptance" is in addition to the issuance of a specific approval. For example, certain portions of the operations manual may be "accepted" by formal instrument, while other portions such as the aircraft-specific minimum equipment list are "approved" by a separate formal instrument.

4.2 Conformance report

Some States use a conformance report to document the acceptances it makes with regard to a particular operator. This is a document submitted by the operator detailing how, with specific references to operations or maintenance manuals, it will comply with all applicable State regulations. This type of document is referenced in Doc 8335, 3.3.2 e) and Doc 9760, Volume I, 6.2.1 c) 4). Such a conformance report should be actively used during the certification process and revised as necessary to reflect modifications required by the State in the operator's policies and procedures. Then a final conformance report is included in the State's certification records, along with other records of certification. The conformance report is an excellent method of demonstrating that the operator was properly certificated with respect to all applicable regulatory requirements.

4.3 Operations and maintenance manuals

4.3.1 Operations and maintenance manuals, and any subsequent amendments should be submitted to the State (2.2.2.2, 6.1.1, 6.2.4, 6.3.2). The State also establishes minimum contents for these manuals (9.2, 9.3, 9.4 and Attachment H). The pertinent portions of an operator's manual for evaluation should be identified in the State's technical guidance, e.g. operations policy manual, aircraft operating manual, cabin crew manual, route guide, and training manual. Some States issue a formal instrument accepting each manual and any subsequent amendments.

4.3.2 The State's technical evaluation should, in addition to ensuring that all required contents are addressed, consider if the specific policies and procedures would result in the desired outcome. For example, the specifications for the operational flight plan (Attachment H, 2.1.15) should provide the step-by-step completion guidance necessary for compliance with 2.3 concerning the content and retention of these plans.

4.3.3 Proven industry practices, such as an example of an actual completed operational flight plan for reference by the flight crew and dispatchers (although not a Standard), may also be required by a State's technical evaluator during certification. This aspect of the technical evaluation should be conducted by inspectors experienced in operator certification. A major consideration with respect to evaluating for proven industry practices that are aircraft-specific, equipment-specific or have limited applications is the employment of evaluators who are currently qualified in the practice to be evaluated.

5. Other approval or acceptance considerations

Some States provide for approval or acceptance of certain critical documents, records or procedures specified in Part III, Section II, although the relevant Annex 6 Standards do not require approval or acceptance by the State of the Operator. The following are some examples:

a) safety programme (1.1.9);

b) method for obtaining aeronautical data (2.1.1);

c) adequacy of the fuel and oil records (2.2.8);

d) adequacy of flight time, flight duty and rest period records (2.2.9.3, 7.6, 10.4);

e) adequacy of the aircraft maintenance logbook (2.3.1 a), b), and c));

f) adequacy of the load manifest (2.3.1 d), e) and f));

g) adequacy of the operational plan (2.3.1 g));

h) method for obtaining weather data (2.3.5.1 and 2.3.5.2);

i) method of compliance with carry-on baggage stowage (2.7);

j) helicopter performance operating limitations (3.2.4);

k) method of obtaining and applying heliport obstacle data (3.3);

l) adequacy of passenger information cards (4.2.2 d));

m) procedures for long-range navigation (5.2.1 b));

n) contents of the journey log book (9.4); and

o) content of the security training programme (11.2).

6. Validation of standards of operations

Standard 2.2.1.5 requires that the validity of an AOC shall depend upon the operator maintaining the original certification standards (2.2.1.4) under the supervision of the State of the Operator. This supervision requires that a system of continued surveillance be established to ensure the required standards of operations are maintained (2.2.1.7). A good starting point in the development of such a system is to require annual or semi-annual inspections, observations and tests to validate the required certification approval and acceptance actions.

7. Amendment of air operator certificates

The certification of an operator is an ongoing process. Few operators will be satisfied over time with the initial authorizations issued with their AOC. Evolving market opportunities will cause an operator to change aircraft models and seek approval for new operational areas requiring other additional capabilities. Additional technical evaluations should be required by the State before issuing the formal written instruments approving any changes to the original AOC and other authorizations. Where possible, each request should be "bridged", using the original authorization as the foundation to determine the extent of the State's impending evaluation before issuing the formal instrument.

ATTACHMENT G. FLIGHT SAFETY DOCUMENTS SYSTEM

Supplementary to Section II, Chapter 1, 1.1.10

1. Introduction

1.1 The following material provides guidance on the organization and development of an operator's flight safety documents system. It should be understood that the development of a flight safety documents system is a complete process, and changes to each document comprising the system may affect the entire system. Guidelines applicable to the development of operational documents have been produced by government and industry sources and are available to operators. Nevertheless, it may be difficult for operators to make the best use of these guidelines, since they are distributed across a number of publications.

1.2 Furthermore, guidelines applicable to operational documents development tend to focus on a single aspect of documents design, for example, formatting and typography. Guidelines rarely cover the entire process of operational documents development. It is important for operational documents to be consistent with each other, and consistent with regulations, manufacturer requirements and Human Factors principles. It is also necessary to ensure consistency across departments as well as consistency in application. Hence the emphasis on an integrated approach, based on the notion of the operational documents as a complete system.

1.3 The guidelines in this Attachment address the major aspects of an operator's flight safety documents system development process, with the aim of ensuring compliance with Section II, Chapter 1, 1.1.10. The guidelines are based not only upon scientific research, but also upon current industry best practices, with an emphasis on a high degree of operational relevance.

2. Organization

2.1 A flight safety documents system should be organized according to criteria which ensure easy access to information required for flight and ground operations contained in the various operational documents comprising the system and which facilitate management of the distribution and revision of operational documents.

2.2 Information contained in a flight safety documents system should be grouped according to the importance and use of the information, as follows:

a) time-critical information, e.g. information that can jeopardize the safety of the operation if not immediately available;

b) time-sensitive information, e.g. information that can affect the level of safety or delay the operation if not available in a short time period;

c) frequently used information;

d) reference information, e.g. information that is required for the operation but does not fall under b) or c) above; and

e) information that can be grouped based on the phase of operation in which it is used.

2.3 Time-critical information should be placed early and prominently in the flight safety documents system.

2.4 Time-critical information, time-sensitive information, and frequently used information should be placed in cards and quick-reference guides.

3. Validation

The flight safety documents system should be validated before deployment, under realistic conditions. Validation should involve the critical aspects of the information use, in order to verify its effectiveness. Interactions among all groups that can occur during operations should also be included in the validation process.

4. Design

4.1 A flight safety documents system should maintain consistency in terminology and in the use of standard terms for common items and actions.

4.2 Operational documents should include a glossary of terms, acronyms and their standard definition, updated on a regular basis to ensure access to the most recent terminology. All significant terms, acronyms and abbreviations included in the flight documents system should be defined.

4.3 A flight safety documents system should ensure standardization across document types, including writing style, terminology, use of graphics and symbols, and formatting across documents. This includes a consistent location of specific types of information, consistent use of units of measurement and consistent use of codes.

4.4 A flight safety documents system should include a master index to locate, in a timely manner, information included in more than one operational document.

Note.— The master index must be placed in the front of each document and consist of no more than three levels of indexing. Pages containing abnormal and emergency information must be tabbed for direct access.

4.5 A flight safety documents system should comply with the requirements of the operator's quality system, if applicable.

5. Deployment

Operators should monitor deployment of the flight safety documents system, to ensure appropriate and realistic use of the documents, based on the characteristics of the operational environment and in a way which is both operationally relevant and beneficial to operational personnel. This monitoring should include a formal feedback system for obtaining input from operational personnel.

6. Amendment

6.1 Operators should develop an information gathering, review, distribution and revision control system to process information and data obtained from all sources relevant to the type of operation conducted, including, but not limited to, the State of the Operator, State of Design, State of Registry, manufacturers and equipment vendors.

Note.— Manufacturers provide information for the operation of specific aircraft that emphasizes the aircraft systems and procedures under conditions that may not fully match the requirements of operators. Operators should ensure that such information meets their specific needs and those of the local authority.

6.2 Operators should develop an information gathering, review and distribution system to process information resulting from changes that originate within the operator, including:

a) changes resulting from the installation of new equipment;

b) changes in response to operating experience;

c) changes in an operator's policies and procedures;

d) changes in an operator certificate; and

e) changes for purposes of maintaining cross-fleet standardization.

Note.— Operators should ensure that crew coordination philosophy, policies and procedures are specific to their operation.

6.3 A flight safety documents system should be reviewed:

a) on a regular basis (at least once a year);

b) after major events (mergers, acquisitions, rapid growth, downsizing, etc.);

c) after technology changes (introduction of new equipment); and

d) after changes in safety regulations.

6.4 Operators should develop methods of communicating new information. The specific methods should be responsive to the degree of communication urgency.

Note.— As frequent changes diminish the importance of new or modified procedures, it is desirable to minimize changes to the flight safety documents system.

6.5 New information should be reviewed and validated considering its effects on the entire flight safety documents system.

6.6 The method of communicating new information should be complemented by a tracking system to ensure currency by operational personnel. The tracking system should include a procedure to verify that operational personnel have the most recent updates.

ATTACHMENT H. CONTENTS OF AN OPERATIONS MANUAL

Supplementary to Section II, Chapter 2, 2.2.2.1

1. Organization

1.1 An operations manual, which may be issued in separate parts corresponding to specific aspects of operations, provided in accordance with Section II, Chapter 2, 2.2.2.1, should contain at least the following:

a) General;

b) Aircraft operating information;

c) Routes and aerodromes; and

d) Training.

1.2 From 1 January 2006, an operations manual, which may be issued in separate parts corresponding to specific aspects of operations, provided in accordance with Chapter 2, 2.2.2.1, should be organized with the following structure:

a) General;

b) Aircraft operating information;

c) Routes and aerodromes; and

d) Training.

2. Contents

The operations manual referred to in 1.1 and 1.2 should contain at the least the following:

2.1 General

2.1.1 Instructions outlining the responsibilities of operations personnel pertaining to the conduct of flight operations.

2.1.2 Rules limiting the flight time and flight duty periods and providing for adequate rest periods for flight crew members and cabin crew.

2.1.3 A list of the navigation equipment to be carried.

2.1.4 The circumstances in which a radio listening watch is to be maintained.

2.1.5 The method for determining minimum flight altitudes.

2.1.6 The methods for determining heliport operating minima.

2.1.7 Safety precautions during refuelling with passengers on board.

2.1.8 Ground handling arrangements and procedures.

2.1.9 Procedures, as prescribed in Annex 12, for pilots-in-command observing an accident.

2.1.10 The flight crew for each type of operation including the designation of the succession of command.

2.1.11 Specific instructions for the computation of the quantities of fuel and oil to be carried, having regard to all circumstances of the operation including the possibility of loss of pressurization and the failure of one or more power-units while en route.

2.1.12 The conditions under which oxygen shall be used and the amount of oxygen determined in accordance with Section II, Chapter 2, 2.3.8.2.

2.1.13 Instructions for mass and balance control.

2.1.14 Instructions for the conduct and control of ground de-icing/anti-icing operations.

2.1.15 The specifications for the operational flight plan.

2.1.16 Standard operating procedures (SOP) for each phase of flight.

2.1.17 Instructions on the use of normal checklists and the timing of their use.

2.1.18 Departure contingency procedures.

2.1.19 Instructions on the maintenance of altitude awareness.

2.1.20 Instructions on the clarification and acceptance of ATC clearances, particularly where terrain clearance is involved.

2.1.21 Departure and approach briefings.

2.1.22 Route and destination familiarization.

2.1.23 Conditions required to commence or to continue an instrument approach.

2.1.24 Instructions for the conduct of precision and non-precision instrument approach procedures.

2.1.25 Allocation of flight crew duties and procedures for the management of crew workload during night and IMC instrument approach and landing operations.

2.1.26 Information and instructions relating to the interception of civil aircraft including:

a) procedures, as prescribed in Annex 2, for pilots-in-command of intercepted aircraft; and

b) visual signals for use by intercepting and intercepted aircraft, as contained in Annex 2.

2.1.27 Details of the accident prevention and flight safety programme provided in accordance with Section II, Chapter 1, 1.1.9, including a statement of safety policy and the responsibility of personnel.

2.1.28 Information and instructions on the carriage of dangerous goods, including action to be taken in the event of an emergency.

Note.— Guidance material on the development of policies and procedures for dealing with dangerous goods incidents on board aircraft is contained in Emergency Response Guidance for Aircraft Incidents involving Dangerous Goods (Doc 9481).

2.1.29 Security instructions and guidance.

2.1.30 The search procedure checklist provided in accordance with Section II, Chapter 11, 11.1.

2.2 Aircraft operating information

2.2.1 Certification limitations and operating limitations.

2.2.2 The normal, abnormal and emergency procedures to be used by the flight crew and the checklists relating thereto as required by Section II, Chapter 4, 4.1.4.

2.2.3 Flight planning data for pre-flight and in-flight planning with different thrust/power and speed settings.

2.2.4 Instructions and data for mass and balance calculations.

2.2.5 Instructions for aircraft loading and securing of load.

2.2.6 Aircraft systems, associated controls and instructions for their use, as required by Section II, Chapter 4, 4.1.4.

2.2.7 The minimum equipment list for the helicopter types operated and specific operations authorized.

2.2.8 Checklist of emergency and safety equipment and instructions for its use.

2.2.9 Emergency evacuation procedures, including type-specific procedures, crew coordination, assignment of crew's emergency positions and the emergency duties assigned to each crew member.

2.2.10 The normal, abnormal and emergency procedures to be used by the cabin crew, the checklists relating thereto and aircraft systems information as required, including a statement related to the necessary procedures for the coordination between flight and cabin crew.

2.2.11 Survival and emergency equipment for different routes and the necessary procedures to verify its normal functioning before take-off, including procedures to determine the required amount of oxygen and the quantity available.

2.2.12 The ground-air visual signal code for use by survivors, as contained in Annex 12.

2.3 Routes and aerodromes

2.3.1 A route guide to ensure that the flight crew will have, for each flight, information relating to communication facilities, navigation aids, aerodromes, instrument approaches, instrument arrivals and instrument departures as applicable for the operation, and such other information as the operator may deem necessary for the proper conduct of flight operations.

2.3.2 The minimum flight altitudes for each route to be flown.

2.3.3 Heliport operating minima for each of the heliports that are likely to be used as heliports of intended landing or as alternate heliports.

2.3.4 The increase of heliport operating minima in case of degradation of approach or heliport facilities.

2.4 Training

2.4.1 Details of the flight crew training programme and requirements, as required by Section II, Chapter 7, 7.3.

2.4.2 Details of the cabin crew duties training programme as required by Section II, Chapter 10, 10.3.

2.4.3 Details of the flight operations officer/flight dispatcher training programme when employed in conjunction with a method of flight supervision in accordance with Section II, Chapter 2, 2.2.

Note.— Details of the flight operations officer/flight dispatcher training programme are contained in Section II, Chapter 8, 8.3.

ATTACHMENT I. ADDITIONAL GUIDANCE FOR OPERATIONS OF HELICOPTERS IN PERFORMANCE CLASS 3 IN INSTRUMENT METEOROLOGICAL CONDITIONS (IMC)

Supplementary to Section II, Chapter 3, 3.4 and Appendix 2

1. Purpose and scope

The purpose of this attachment is to give additional guidance on the airworthiness and operational requirements described in Section II, Chapter 3, 3.4 and Appendix 2, which have been designed to meet the overall level of safety intended for approved operations in performance Class 3 in IMC.

2. Engine reliability

2.1 The power loss rate required in Chapter 3, 3.4.1 and Appendix 2, paragraph 1 should be established based on data from commercial air transport operations supplemented by suitable data from other operations in similar theatres of operations. Service experience is needed on which to base the judgement, and this should include a number of hours, acceptable to the State of Design, on the actual helicopter/engine combination unless additional testing has been carried out or experience on sufficiently similar variants of the engine is available.

2.2 In assessing engine reliability, evidence should be derived from a world fleet database covering as large a sample as possible of operations considered to be representative, compiled by the appropriate type certificate holders and reviewed by the States of Design. Since flight hour reporting is not mandatory for many types of operators, appropriate statistical estimates may be used to develop the engine reliability data. Data for individual operators approved for these operations including trend monitoring and event reports should also be monitored and reviewed by the State of the Operator to ensure that there is no indication that the operator’s experience is unsatisfactory.

2.2.1 Engine trend monitoring should include the following:

a) an oil consumption monitoring programme based on the manufacturer’s recommendations; and

b) an engine condition monitoring programme describing the parameters to be monitored, the method of data collection and the corrective action process; this should be based on the manufacturer’s recommendations. The monitoring is intended to detect engine deterioration at an early stage to allow for corrective action before safe operation is affected.

2.2.2 A reliability programme should be established covering the engine and associated systems. The engine programme should include engine hours flown in the period and the power loss rate for all causes established on an appropriate statistical basis. The event reporting process should cover all items relevant to the ability to operate safely in IMC. The data should be available for use by the type certificate holder and the State of Design so as to establish that the intended reliability levels are being achieved. Any sustained adverse trend should result in an immediate evaluation by the operator in consultation with the State(s) of Design and type certificate holders with a view to determining actions to restore the intended safety level.

Note.— The actual period selected should reflect the global utilization and the relevance of the experience included (e.g. early data may not be relevant due to subsequent mandatory modifications which affected the power loss rate). After the introduction of a new engine variant and while global utilization is relatively low, the total available experience may have to be used to try to achieve a statistically meaningful average.

2.3 Power loss rate should be determined as a moving average over an appropriate period. Power loss rate, rather than in-flight shutdown rate, has been used as it is considered to be more appropriate for a helicopter operating in performance Class 3. If a failure occurs on a helicopter operating in performance Class 1 or 2 that causes a major, but not total, loss of power on one engine, it is likely that the engine will be shut down since positive engine-out performance is still available, whereas on a helicopter operating in performance Class 3 it may well be decided to make use of the residual power to stretch the glide distance.

3. Operations manual

The operations manual should include all necessary information relevant to operations by helicopters operating in performance Class 3 in IMC. This should include all of the additional equipment, procedures and training required for such operations, route and/or area of operation and likely landing area (including planning and operating minima).

4. Operator certification or validation

The operator certification or validation process specified by the State of the Operator should ensure the adequacy of the operator's procedures for normal, abnormal and emergency operations, including actions following engine, systems or equipment failures. In addition to the normal requirements for operator certification or validation, the following items should be addressed in relation to operations by helicopters operating in performance Class 3 in IMC:

a) confirmation of the achieved engine reliability of the helicopter engine combination (see Appendix 2, paragraph 1);

b) specific and appropriate training and checking procedures as described in Appendix 2, paragraph 7;

c) a maintenance programme which is extended to address the equipment and systems referred to in Appendix 2, paragraph 2;

d) a MEL modified to address the equipment and systems necessary for operations in IMC;

e) planning and operating minima appropriate to operations in IMC;

f) departure and arrival procedures and any route/area limitations;

g) pilot qualifications and experience; and

h) the operations manual, including limitations, emergency procedures, routes or areas of operation, the MEL and normal procedures related to the equipment referred to in Appendix 2, paragraph 2.

5. Operational approval and maintenance programme requirements

5.1 Approval to undertake operations by helicopters in performance Class 3 in IMC specified in an air operator certificate or equivalent document should include the particular airframe/engine combinations, including the current type design standard for such operations, the specific helicopters approved, and the areas or routes of such operations.

5.2 The operator's maintenance control manual should include a statement of certification of the additional equipment required, and of the maintenance and reliability programme for such equipment, including the engine.

— END —

ICAO TECHNICAL PUBLICATIONS

The following summary gives the status, and also describes in general terms the contents of the various series of technical publications issued by the International Civil Aviation Organization. It does not include specialized publications that do not fall specifically within one of the series, such as the Aeronautical Chart Catalogue *or the* Meteorological Tables for International Air Navigation.

International Standards and Recommended Practices are adopted by the Council in accordance with Articles 54, 37 and 90 of the Convention on International Civil Aviation and are designated, for convenience, as Annexes to the Convention. The uniform application by Contracting States of the specifications contained in the International Standards is recognized as necessary for the safety or regularity of international air navigation while the uniform application of the specifications in the Recommended Practices is regarded as desirable in the interest of safety, regularity or efficiency of international air navigation. Knowledge of any differences between the national regulations or practices of a State and those established by an International Standard is essential to the safety or regularity of international air navigation. In the event of non-compliance with an International Standard, a State has, in fact, an obligation, under Article 38 of the Convention, to notify the Council of any differences. Knowledge of differences from Recommended Practices may also be important for the safety of air navigation and, although the Convention does not impose any obligation with regard thereto, the Council has invited Contracting States to notify such differences in addition to those relating to International Standards.

Procedures for Air Navigation Services (PANS) are approved by the Council for worldwide application. They contain, for the most part, operating procedures regarded as not yet having attained a sufficient degree of maturity for adoption as International Standards and Recommended Practices, as well as material of a more permanent character which is considered too detailed for incorporation in an Annex, or is susceptible to frequent amendment, for which the processes of the Convention would be too cumbersome.

Regional Supplementary Procedures (SUPPS) have a status similar to that of PANS in that they are approved by the Council, but only for application in the respective regions. They are prepared in consolidated form, since certain of the procedures apply to overlapping regions or are common to two or more regions.

The following publications are prepared by authority of the Secretary General in accordance with the principles and policies approved by the Council.

Technical Manuals provide guidance and information in amplification of the International Standards, Recommended Practices and PANS, the implementation of which they are designed to facilitate.

Air Navigation Plans detail requirements for facilities and services for international air navigation in the respective ICAO Air Navigation Regions. They are prepared on the authority of the Secretary General on the basis of recommendations of regional air navigation meetings and of the Council action thereon. The plans are amended periodically to reflect changes in requirements and in the status of implementation of the recommended facilities and services.

ICAO Circulars make available specialized information of interest to Contracting States. This includes studies on technical subjects.

COVER SHEET TO AMENDMENT 20

INTERNATIONAL STANDARDS
AND RECOMMENDED PRACTICES

FACILITATION

ANNEX 9
TO THE CONVENTION ON INTERNATIONAL CIVIL AVIATION

TWELFTH EDITION — JULY 2005

INTERNATIONAL CIVIL AVIATION ORGANIZATION

Checklist of Amendments to Annex 9

	Date of applicability
Twelfth Edition (incorporates Amendments 1 to 19)	24 November 2005
Amendment 20 (adopted by the Council on 20 November 2006) Replacement pages (iv), 1-2 to 1-4, 2-1, 6-6, 8-2 to 8-4, APP 1-1, APP 11-1, APP 12-2, APP 13-1.	15 July 2007

Transmittal note

Amendment 20

to the

International Standards and
Recommended Practices

FACILITATION

(Annex 9 to the Convention on International Civil Aviation)

1. Insert the following new and replacement pages in Annex 9 (Twelfth Edition) to incorporate Amendment 20 which becomes applicable on 15 July 2007:

a) Page (iv)	—	Table of Contents
b) Pages 1-2 to 1-4	—	Chapter 1
c) Page 2-1	—	Chapter 2
d) Page 6-6	—	Chapter 6
e) Pages 8-2 to 8-4	—	Chapter 8
f) Page APP 1-1	—	Appendix 1
g) Page APP 11-1	—	Appendix 11
h) Page APP 12-2	—	Appendix 12
i) Page APP 13-1	—	Appendix 13

2. Record the entry of this amendment on page (ii).

Disembarkation. The leaving of an aircraft after a landing, except by crew or passengers continuing on the next stage of the same through-flight.

Disinsection. The operation in which measures are taken to control or kill insects present in aircraft and in containers.

Embarkation. The boarding of an aircraft for the purpose of commencing a flight, except by such crew or passengers as have embarked on a previous stage of the same through-flight.

Flight crew member. A licensed crew member charged with duties essential to the operation of an aircraft during a flight duty period.

Free zone. A part of the territory of a Contracting State where any goods introduced are generally regarded, insofar as import duties and taxes are concerned, as being outside the customs territory.

General aviation operation. An aircraft operation other than a commercial air transport operation or an aerial work operation.

Ground equipment. Articles of a specialized nature for use in the maintenance, repair and servicing of an aircraft on the ground, including testing equipment and cargo- and passenger-handling equipment.

Immigration control. Measures adopted by States to control the entry into, transit through and departure from their territories of persons travelling by air.

Import duties and taxes. Customs duties and all other duties, taxes or charges, which are collected on or in connection with the importation of goods. Not included are any charges which are limited in amount to the approximate cost of services rendered or collected by the customs on behalf of another national authority.

Improperly documented person. A person who travels, or attempts to travel: (a) with an expired travel document or an invalid visa; (b) with a counterfeit, forged or altered travel document or visa; (c) with someone else's travel document or visa; (d) without a travel document; or (e) without a visa, if required.

Inadmissible person. A person who is or will be refused admission to a State by its authorities.

Infected area. (for human health purposes) Defined as geographical areas where human and/or animal vector-borne diseases are actively transmitted, as reported by local or national public health authorities or by the World Health Organization.

Note.— A list of infected areas notified by health administrations is published in the World Health Organization's Weekly Epidemiological Record.

International airport. Any airport designated by the Contracting State in whose territory it is situated as an airport of entry and departure for international air traffic, where the formalities incident to customs, immigration, public health, animal and plant quarantine and similar procedures are carried out.

Lading. The placing of cargo, mail, baggage or stores on board an aircraft to be carried on a flight.

Mail. Dispatches of correspondence and other items tendered by and intended for delivery to postal services in accordance with the rules of the Universal Postal Union (UPU).

Mishandled baggage. Baggage involuntarily, or inadvertently, separated from passengers or crew.

Narcotics control. Measures to control the illicit movement of narcotics and psychotropic substances by air.

Person with disabilities. Any person whose mobility is reduced due to a physical incapacity (sensory or locomotor), an intellectual deficiency, age, illness or any other cause of disability when using transport and whose situation needs special attention and the adaptation to the person's needs of the services made available to all passengers.

Pilot-in-command. The pilot responsible for the operation and safety of the aircraft during flight time.

Public authorities. The agencies or officials of a Contracting State responsible for the application and enforcement of the particular laws and regulations of that State which relate to any aspect of these Standards and Recommended Practices.

Public health emergency of international concern. An extraordinary event which is determined, as provided in the *International Health Regulations* (2005) of the World Health Organization: (i) to constitute a public health risk to other States through the international spread of disease and (ii) to potentially require a coordinated international response.

Public health risk. A likelihood of an event that may affect adversely the health of human populations, with an emphasis on one which may spread internationally or may present a serious and direct danger.

Release of goods. The action by the customs authorities to permit goods undergoing clearance to be placed at the disposal of the persons concerned.

Relief flights. Flights operated for humanitarian purposes which carry relief personnel and relief supplies such as food, clothing, shelter, medical and other items during or after an emergency and/or disaster and/or are used to evacuate persons from a place where their life or health is threatened by such emergency and/or disaster to a safe haven in the same State or another State willing to receive such persons.

Removal of a person. Action by the public authorities of a State, in accordance with its laws, to direct a person to leave that State.

Removal order. A written order served by a State on the operator on whose flight an inadmissible person travelled into that State, directing the operator to remove that person from its territory.

Risk assessment. An assessment by a deporting State of a deportee's suitability for escorted or unescorted removal via commercial air services. The assessment should take into account all pertinent factors, including medical, mental and physical fitness for carriage on a commercial flight, willingness or unwillingness to travel, behavioural patterns and any history of violence.

Risk management. The systematic application of management procedures and practices which provide border inspection agencies with the necessary information to address movements or consignments which represent a risk.

Security equipment. Devices of a specialized nature for use, individually or as part of a system, in the prevention or detection of acts of unlawful interference with civil aviation and its facilities.

Spare parts. Articles, including engines and propellers, of a repair or replacement nature for incorporation in an aircraft.

State of Registry. The State on whose register the aircraft is entered.

Stores (Supplies). a) Stores (supplies) for consumption; and b) Stores (supplies) to be taken away.

Stores (Supplies) for consumption. Goods, whether or not sold, intended for consumption by the passengers and the crew on board aircraft, and goods necessary for the operation and maintenance of aircraft, including fuel and lubricants.

Stores (Supplies) to be taken away. Goods for sale to the passengers and the crew of aircraft with a view to being landed.

Temporary admission. The customs procedure under which certain goods can be brought into a customs territory conditionally relieved totally or partially from payment of import duties and taxes; such goods must be imported for a specific purpose and must be intended for re-exportation within a specified period and without having undergone any change except normal depreciation due to the use made of them.

Through-flight. A particular operation of aircraft, identified by the operator by the use throughout of the same symbol, from point of origin via any intermediate points to point of destination.

Travel document. A passport or other official document of identity issued by a State or organization, which may be used by the rightful holder for international travel.

Unaccompanied baggage. Baggage that is transported as cargo and may or may not be carried on the same aircraft with the person to whom it belongs.

Unclaimed baggage. Baggage that arrives at an airport and is not picked up or claimed by a passenger.

Unidentified baggage. Baggage at an airport, with or without a baggage tag, which is not picked up by or identified with a passenger.

Unlading. The removal of cargo, mail, baggage or stores from an aircraft after a landing.

Visitor. Any person who disembarks and enters the territory of a Contracting State other than that in which that person normally resides; remains there lawfully as prescribed by that Contracting State for legitimate non-immigrant purposes, such as touring, recreation, sports, health, family reasons, religious pilgrimages, or business; and does not take up any gainful occupation during his stay in the territory visited.

B. General Principles

1.1 The Standards and Recommended Practices in this Annex shall apply to all categories of aircraft operation except where a particular provision refers specifically to only one type of operation.

1.2 Contracting States shall take necessary measures to ensure that:

a) the time required for the accomplishment of border controls in respect of persons and aircraft and for the release/clearance of goods is kept to the minimum;

b) minimum inconvenience is caused by the application of administrative and control requirements;

c) exchange of relevant information between Contracting States, operators and airports is fostered and promoted to the greatest extent possible; and

d) optimal levels of security, and compliance with the law, are attained.

1.3 Contracting States shall use risk management in the application of border control procedures for the release/clearance of goods.

1.4 Contracting States shall develop effective information technology to increase the efficiency and effectiveness of their procedures at airports.

1.5 Contracting States shall develop procedures for the pre-arrival lodgement of data so as to enable expeditious release/clearance.

1.6 The provisions of this Annex shall not preclude the application of national legislation with regard to aviation security measures or other necessary controls.

CHAPTER 2. ENTRY AND DEPARTURE OF AIRCRAFT

A. General

2.1 Contracting States shall adopt appropriate measures for the clearance of aircraft arriving from or departing to another Contracting State and shall implement them in such a manner as to prevent unnecessary delays.

2.2 In developing procedures aimed at the efficient clearance of entering or departing aircraft, Contracting States shall take into account the application of aviation security and narcotics control measures, where appropriate.

2.3 **Recommended Practice.—** *The appropriate public authorities of Contracting States should enter into Memoranda of Understanding with the airlines providing international services to that State and with the operators of its international airports, setting out guidelines for their mutual cooperation in countering the threat posed by international trafficking in narcotics and psychotropic substances. Such Memoranda of Understanding should be patterned after the applicable models developed by the World Customs Organization for this purpose. In addition, Contracting States are encouraged to conclude Memoranda of Understanding amongst themselves.*

2.4 **Recommended Practice.—** *In accordance with the International Health Regulations of the World Health Organization, Contracting States should not interrupt air transport services for health reasons. In cases where, in exceptional circumstances, such service suspensions are under consideration, Contracting States should first consult with the World Health Organization and the health authorities of the State of occurrence of the disease before taking any decision as to the suspension of air transport services.*

B. Documents — requirements and use

2.5 Contracting States shall not require any documents, other than those provided for in this Chapter, for the entry and departure of aircraft.

2.6 Contracting States shall not require a visa nor shall any visa or other fee be collected in connection with the use of any documentation required for the entry or departure of aircraft.

2.7 **Recommended Practice.—** *Documents for entry and departure of aircraft should be accepted if furnished in Arabic, English, French, Russian or Spanish. Any Contracting State may require an oral or written translation into its own language.*

2.8 Subject to the technological capabilities of the Contracting State, documents for the entry and departure of aircraft shall be accepted when presented:

a) in electronic form, transmitted to an information system of the public authorities;

b) in paper form, produced or transmitted electronically; or

c) in paper form, completed manually following the formats depicted in this Annex.

2.9 When a particular document is transmitted by or on behalf of the aircraft operator and received by the public authorities in electronic form, the Contracting State shall not require the presentation of the same document in paper form.

2.10 A Contracting State requiring a General Declaration shall limit its information requirements to the elements indicated in Appendix 1. The information shall be accepted in either electronic or paper form.

2.11 When a Contracting State requires the General Declaration only for the purposes of attestation, it shall adopt measures by which that attestation requirement may be satisfied by a statement added, either manually or by use of a rubber stamp containing the required text, to one page of the Cargo Manifest. Such attestation shall be signed by the authorized agent or the pilot-in-command.

2.12 Contracting States shall not normally require the presentation of a Passenger Manifest. On those occasions when a Passenger Manifest is required, the information requirements shall be limited to the elements indicated in Appendix 2. The information shall be accepted in either electronic or paper form.

2.13 When a Contracting State requires the presentation of the Cargo Manifest in paper form, it shall accept either:

a) the form shown in Appendix 3, completed according to the instructions; or

b) the form shown in Appendix 3, partially completed, with a copy of each air waybill representing the cargo on board the aircraft.

6.57 There shall be maintained at international airports facilities for first aid attendance on site, and appropriate arrangements shall be available for expeditious referral of the occasional more serious case to pre-arranged competent medical attention.

D. Facilities required for clearance controls and operation of control services

6.58 **Recommended Practice.—** *Space and facilities for the authorities in charge of clearance controls should, as far as possible, be provided at public expense.*

6.59 If the space and facilities referred to in 6.58 are not provided at public expense, Contracting States shall ensure that such space and facilities are provided on terms not less favourable than those which apply to the operators of other means of transportation entering the State and requiring space and facilities on a comparable scale.

6.60 Contracting States shall provide sufficient services of the public authorities concerned, without charge, to operators during working hours established by those authorities.

Note.— Where traffic, volume and available space and facilities warrant, Contracting States may wish to provide clearance controls for passengers and their baggage at more than one location.

6.60.1 Contracting States shall provide sufficient services of the public authorities concerned in such a way as to respond to real needs and thus to the flow of traffic during working hours established by those authorities.

Note 1.— Paragraphs 6.60 and 6.60.1 should be applied in accordance with Article 82 of the International Health Regulations (1969)*, Third Annotated Edition (1983) which provides that no charge shall be made by a health authority for any medical examination provided for in the* International Health Regulations (IHR) *or for any vaccination of a person on arrival and any certificate thereof. The IHR specify that it is not permissible to exact or receive payment for medical examination carried out at any time of the day or night. Article 24 provides that health measures shall be initiated forthwith and completed without delay.*

Note 2.— Under Annex 15 — Aeronautical Information Services, *States are obligated to publish the types and hours of clearance services (customs, immigration, health) at their international airports.*

6.61 Outside of the working hours established to cover any periods of substantial workload at international airports referred to in 6.60 and 6.60.1 Contracting States shall provide services of such authorities on terms not less favourable to operators of aircraft than those which apply to operators of other means of transportation entering the State.

6.62 **Recommended Practice.—** *Contracting States should make arrangements whereby one State will permit another State to station representatives of the public authorities concerned in its territory to examine aircraft, passengers, crew, baggage, cargo and documentation for customs, immigration, public health and animal and plant quarantine purposes, prior to departure for the other State concerned, when such action will facilitate clearance upon arrival in that State. Alternatively, Contracting States may by agreement enter into electronic forms of pre-clearance for any of the functions listed above to facilitate clearance upon arrival in the other State.*

E. Monetary exchange facilities

6.63 Contracting States shall make arrangements to display at their international airports their regulations governing the exchange of funds of other States against national funds.

6.64 Contracting States that maintain exchange controls with respect to funds of other States shall make arrangements:

a) to publish the current legal rates of exchange for such funds;

b) to display or otherwise make available at their international airports such rates as may be of principal interest at the respective airports.

6.65 Contracting States that do not maintain exchange controls with respect to some or all funds of other States shall make arrangements to display information to that effect at their international airports.

6.66 **Recommended Practice.—** *With respect to those funds of other States for which no controlled exchange rates have been established by the Contracting State concerned, it should make such arrangements as may be feasible to make information available at its international airports as to the prevailing open market rates.*

6.67 Contracting States shall provide, at such times as to meet the needs of the travelling public, adequate facilities at international airports for the legal exchange of funds of other States through governmental agencies or shall authorize private agencies to do so. These facilities shall be available to arriving and departing passengers.

Note.— In giving effect to this provision, the use of vending machines at international airports, enabling a departing engaged in relief flights performed by or on behalf of international organizations recognized by the UN or by or on behalf of States themselves and shall take all possible measures to ensure their safe operation. Such relief flights are those undertaken in response to natural and man-made disasters which seriously endanger human health or the environment, as well as similar emergency situations where UN assistance is required. Such flights shall be commenced as quickly as possible after obtaining agreement with the recipient State.

Note 1.— According to its Internationally Agreed Glossary of Basic Terms, the United Nations Department of Humanitarian Affairs considers an emergency to be "a sudden and usually unforeseen event that calls for immediate measures to minimize its adverse consequences", and a disaster to be "a serious disruption of the functioning of society, causing widespread human, material or environmental losses which exceed the ability of the affected society to cope using only its own resources".

Note 2.— With respect to the application of measures to ensure the safe operation of relief flights, attention is drawn to Annex 11 — Air Traffic Services, *the* Manual Concerning Safety Measures Relating to Military Activities Potentially Hazardous to Civil Aircraft Operations *(Doc 9554) and the* Manual concerning Interception of Civil Aircraft *(Doc 9433).*

8.9 Contracting States shall ensure that personnel and articles arriving on relief flights referred to in 8.8 are cleared without delay.

D. Marine pollution and safety emergency operations

8.10 In cases of emergency, Contracting States shall facilitate the entry, transit and departure of aircraft engaged in the combatting or prevention of marine pollution, or other operations necessary to ensure maritime safety, safety of the population or protection of the marine environment.

8.11 In cases of emergency, Contracting States shall, to the greatest extent possible, facilitate the entry, transit and departure of persons, cargo, material and equipment required to deal with the marine pollution and safety operations described in 8.10.

E. Implementation of international health regulations and related provisions

8.12 Contracting States shall comply with the pertinent provisions of the *International Health Regulations* (2005) of the World Health Organization.

8.13 Contracting States shall take all possible measures to have vaccinators use the Model International Certificate of Vaccination or Prophylaxis, in accordance with Article 36 and Annex 6 of the *International Health Regulations* (2005), in order to assure uniform acceptance.

8.14 Each Contracting State shall make arrangements to enable all aircraft operators and agencies concerned to make available to passengers, sufficiently in advance of departure, information concerning the vaccination requirements of the countries of destination, as well as the Model International Certificate of Vaccination or Prophylaxis conforming to Article 36 and Annex 6 of the *International Health Regulations* (2005).

8.15 The pilot-in-command of an aircraft shall ensure that a suspected communicable disease is reported promptly to air traffic control, in order to facilitate provision for the presence of any special medical personnel and equipment necessary for the management of public health risks on arrival.

Note 1.— A communicable disease could be suspected and require further evaluation if a person has a fever (temperature 38°C/100°F or greater) that is associated with certain signs or symptoms: e.g. appearing obviously unwell; persistent coughing; impaired breathing; persistent diarrhoea; persistent vomiting; skin rash; bruising or bleeding without previous injury; or, confusion of recent onset.

Note 2.— In the event of a case of suspected communicable disease on board an aircraft, the pilot-in-command may need to follow his operator's protocols and procedures, in addition to health-related legal requirements of the countries of departure and/or destination. The latter would normally be found in the Aeronautical Information Publications (AIPs) of the States concerned.

8.15.1 ***Recommended Practice.—*** *When a public health threat has been identified, and when the public health authorities of a Contracting State require information concerning passengers' and/or crews' travel itineraries or contact information for the purposes of tracing persons who may have been exposed to a communicable disease, that Contracting State should accept the "Public Health Passenger Locator Card" reproduced in Appendix 13 as the sole document for this purpose.*

Note.— It is suggested that States make available adequate stocks of the Passenger Locator Card, for use at their international airports and for distribution to aircraft operators, for completion by passengers and crew.

F. Communicable disease outbreak national aviation plan

8.16 A Contracting State shall establish a national aviation plan in preparation for an outbreak of a communicable disease posing a public health risk or public health emergency of international concern.

Note.— Guidance in developing a national aviation plan may be found on the ICAO website on the Aviation Medicine page.

G. Establishment of national facilitation programmes

8.17 Each Contracting State shall establish a national air transport facilitation programme based on the facilitation requirements of the Convention and of Annex 9 thereto.

8.18 Each Contracting State shall ensure that the objective of its national air transport facilitation programme shall be to adopt all practicable measures to facilitate the movement of aircraft, crews, passengers, cargo, mail and stores, by removing unnecessary obstacles and delays.

8.18.1 **Recommended Practice.—** *In establishing a national air transport facilitation programme, States should use the guidance material outlined in Appendix 12.*

8.19 Each Contracting State shall establish a National Air Transport Facilitation Committee, and Airport Facilitation Committees as required, or similar coordinating bodies, for the purpose of coordinating facilitation activities between departments, agencies, and other organizations of the State concerned with, or responsible for, various aspects of international civil aviation as well as with airport and aircraft operators.

8.20 **Recommended Practice.—** *Contracting States should endeavour to establish close coordination, adapted to circumstances, between civil aviation security and facilitation programmes. To this end, certain members of Facilitation Committees should also be members of Security Committees.*

8.21 **Recommended Practice.—** *In establishing and operating National Air Transport and Airport Facilitation Committees, States should use the guidance material outlined in Appendices 11 and 12.*

H. Facilitation of the transport of passengers requiring special assistance

I. General

8.22 **Recommended Practice.—** *When travelling, persons with disabilities should be provided with special assistance in order to ensure that they receive services customarily available to the general public. Such assistance includes the offering of information and directions in media that can be understood by travellers with cognitive or sensory disabilities.*

8.23 **Recommended Practice.—** *Contracting States should cooperate with a view to taking the necessary measures to make accessible to persons with disabilities all the elements of the chain of the person's journey, from beginning to end.*

8.24 **Recommended Practice.—** *Contracting States should take the necessary steps with aircraft operators, airports and ground handling operators to establish minimum uniform standards of accessibility with respect to transportation services for persons with disabilities, from arrival at the airport of departure to leaving the airport of destination.*

8.25 **Recommended Practice.—** *Contracting States should take the necessary steps with aircraft operators, airports, ground handling operators and travel agencies to ensure that persons with disabilities are given the information they need, and should take the necessary steps to ensure that airlines, airports, ground handling operators and travel agencies are in a position to give those passengers the assistance necessary for them, depending on their needs, to help them in their travel.*

8.26 **Recommended Practice.—** *Contracting States should take all necessary steps to secure the cooperation of aircraft operators, airports and ground handling operators in order to establish and coordinate training programmes to ensure that trained personnel are available to assist persons with disabilities.*

II. Access to airports

8.27 Contracting States shall take the necessary steps to ensure that airport facilities and services are adapted to the needs of persons with disabilities.

8.28 **Recommended Practice.—** *Contracting States should ensure that lifting systems or any other appropriate devices are made available in order to facilitate the movement of elderly and disabled passengers between the aircraft and the terminal on both arrival and departure as required where telescopic passageways are not used.*

8.29 **Recommended Practice.—** *Measures should be taken to ensure that the hearing- and vision-impaired are able to obtain flight information.*

8.30 **Recommended Practice.—** *For elderly and disabled persons being set down or picked up at a terminal building, reserved points should be located as close as possible to main entrances. To facilitate movement to the various areas of the airport, access routes should be free of obstacles.*

8.31 **Recommended Practice.—** *Where access to public services is limited, every effort should be made to provide accessible and reasonably priced ground transportation services by adapting current and planned public transit systems or by providing special transport services for people with mobility needs.*

8.32 **Recommended Practice.—** *Adequate parking facilities should be provided for people with mobility needs and appropriate measures taken to facilitate their movement between parking areas and the terminal buildings.*

8.33 **Recommended Practice.—** *Direct transfer from one aircraft to another of passengers, particularly elderly and disabled passengers, should be authorized, where necessary and possible, whenever this is warranted by deadlines in making connecting flights or by other circumstances.*

III. Access to air services

8.34 Contracting States shall take the necessary steps to ensure that persons with disabilities have adequate access to air services.

8.35 **Recommended Practice.—** *Contracting States should introduce provisions by which aircraft coming newly into service or after major refurbishment should conform to minimum uniform standards of accessibility with respect to equipment on board aircraft which would include movable armrests, on-board wheelchairs, lavatories and suitable lighting and signs.*

8.36 **Recommended Practice.—** *Wheelchairs, special apparatus and equipment required by persons with disabilities should be carried free of charge in the cabin where, in the view of the aircraft operator, space and safety requirements permit or should be designated as priority baggage. Service animals accompanying passengers with disabilities should also be carried free of charge in the cabin, subject to the application of any relevant national or aircraft operator regulations.*

8.37 **Recommended Practice.—** *In principle, persons with disabilities should be permitted to determine whether or not they need an escort and to travel without the requirement for a medical clearance. However, advance notice should be mandatory where assistance or lifting is required. Aircraft operators should only be permitted to require passengers with disabilities to obtain a medical clearance in cases of medical condition where it is clear that their safety or well-being or that of other passengers cannot be guaranteed. Furthermore, aircraft operators should only be permitted to require an escort when it is clear that a person with disabilities is not self-reliant and, as such, the safety or well-being of that person or that of another passenger cannot be guaranteed.*

8.38 **Recommended Practice.—** *If the presence of an escort is required, Contracting States should encourage aircraft operators to offer discounts for the carriage of that accompanying person.*

I. Assistance to aircraft accident victims and their families

8.39 The State of Occurrence of an aircraft accident and adjacent States shall make arrangements to facilitate the entry into their territory on a temporary basis of family members of victims of an aircraft accident.

8.40 The State of Occurrence and adjacent States shall also make arrangements to facilitate the entry into their territory, on a temporary basis, of authorized representatives of the operator whose aircraft has met with the accident, or of the operator's alliance partner, in order to enable them to provide assistance to survivors and their family members, the family members of the deceased victims of the accident and the relevant authorities in these States.

Note.— Code-sharing and similar alliance agreements sometimes require alliance partners to act as "first responder" on behalf of an affected operator in case the alliance partner can get to the location of the accident quicker than the affected operator.

8.41 **Recommended Practice.—** *In arranging for the entry of the persons referred to in 8.39, the State of Occurrence and adjacent States should not require any other travel document than a passport, or an emergency travel document issued specifically to such persons, to enable them to travel to these States. In cases where the State of Occurrence of the accident or an adjacent State requires entrance visas for persons referred to in 8.39 and 8.40 above, it should expedite the issuance of such visas.*

8.42 Contracting States shall make arrangements to issue emergency travel documents, if required, to their nationals who have survived the accident.

8.43 Contracting States shall extend all necessary assistance, such as arranging transport and clearing customs, in the repatriation of human remains to their countries of origin, on request by family members of the deceased or the operator whose aircraft met with the accident.

APPENDIX 1. GENERAL DECLARATION

GENERAL DECLARATION

(Outward/Inward)

Operator . . . .

Marks of Nationality and Registration . . . . Flight No. . . . . Date . . . .

Departure from. . . . . (Place) Arrival at . . . . (Place)

FLIGHT ROUTING

("Place" Column always to list origin, every en-route stop and destination)

PLACE	NAMES OF CREW*	NUMBER OF PASSENGERS ON THIS STAGE**
		Departure Place: Embarking . . . . Through on same flight . . . . *Arrival Place:* Disembarking . . . . Through on same flight . . . .

Declaration of Health	For official use only
Name and seat number or function of persons on board with illnesses other than airsickness or the effects of accidents, who may be suffering from a communicable disease (a fever — temperature 38°C/100°F or greater — associated with one or more of the following signs or symptoms, e.g. appearing obviously unwell; persistent coughing; impaired breathing; persistent diarrhoea; persistent vomiting; skin rash; bruising or bleeding without previous injury; or confusion of recent onset, increases the likelihood that the person is suffering a communicable disease) as well as such cases of illness disembarked during a previous stop . . . . Details of each disinsecting or sanitary treatment (place, date, time, method) during the flight. If no disinsecting has been carried out during the flight, give details of most recent disinsecting . . . . Signed, if required, with time and date ______________________________ Crew member concerned	

I declare that all statements and particulars contained in this General Declaration, and in any supplementary forms required to be presented with this General Declaration, are complete, exact and true to the best of my knowledge and that all through passengers will continue/have continued on the flight.

SIGNATURE ______________________________
Authorized Agent or Pilot-in-command

297 mm (or 11 3/4 inches)

Size of document to be 210 mm × 297 mm (or 8 1/4 × 11 3/4 inches).
* To be completed when required by the State.
** Not to be completed when passenger manifests are presented and to be completed only when required by the State.

210 mm (or 8 1/4 inches)

APPENDIX 11. MODEL AIRPORT FACILITATION (FAL) PROGRAMME

1. PURPOSE OF AN AIRPORT FAL PROGRAMME

The purpose of an airport FAL programme is to pursue the objectives of Annex 9 at the operational level, to facilitate the completion of border clearance formalities at the airport with respect to aircraft, crews, passengers and cargo.

2. SCOPE OF AN AIRPORT FAL PROGRAMME

The airport FAL programme encompasses all of the provisions of Annex 9 concerning border clearance processes at the airport, as well as the planning for and management of those processes. A representative list of tasks to be performed and the Standard(s) or Recommended Practice(s) (SARPs) applicable to each one are provided in the table below.

3. ORGANIZATION AND MANAGEMENT

3.1 The recommended vehicle to conduct the facilitation programme at the operational level is the Airport Facilitation Committee. Although such committees should be encouraged by the National FAL Committee and keep it informed of their problems and progress, they are not necessarily supervised by the national body. Their principal concern is day-to-day problem-solving and implementation of Annex 9.

3.2 It is recommended that the airport manager take charge of the committee and convene regular meetings. Membership should consist of the senior officers in charge of their respective inspection agencies at the airport, e.g. customs, immigration, health, quarantine, etc., as well as the station managers of the aircraft operators with international operations at the airport concerned. The participation of all parties is necessary to make the airport FAL programme a success.

Airport FAL programme task	*Annex 9 (12th Edition) SARPs*
Establish, review and amend, as necessary, procedures for entry and clearance of flights at the airport concerned.	Standards 6.1.1, 8.16
Review regularly all parties' performance with respect to meeting the 45-minute goal for processing inbound passengers and the 60-minute goal for processing outbound passengers. Use time studies and queue analysis to determine where adjustments should be made.	Recommended Practices 3.36 and 3.39
Establish modern systems for immigration and customs inspection, using applicable technology. Collaborate in setting up automated passenger clearance systems.	Standards 3.40, 3.51 and 6.26
Make necessary changes in traffic flows and checkpoints in the airport to cope with rising traffic volumes.	Standard 6.3
Improve the quality and quantity of signage in the inspection facilities in order to reduce customer confusion.	Recommended Practices 6.9 and 6.12.1
Review staffing of inspection stations – work shifts, overtime, etc. – and seek adjustments to meet traffic demands.	Recommended Practice 6.3.1
Provide input on behalf of resident aircraft operators and inspection agencies to the design of new airports or new inspection facilities.	Standards 6.2, 6.7 and 6.57
Monitor and improve delivery of baggage to the customs inspection area.	Standard 6.28
Bring to the attention of appropriate authorities any service problems related to currency exchange. Recommend installation of ATMs in the arrivals area.	Standards 6.63, 6.64 and 6.65
Coordinate facilitation, narcotics control, aviation security and dangerous goods handling procedures so that the objectives of all four programmes are met.	Standard 8.19
Do not forget cargo! Coordinate the activities and requirements of the various inspection agencies in order to assure prompt clearance and delivery of air cargo shipments. Provide adequate facilities for loading/unloading and for secure storage of cargo while awaiting customs clearance.	Standard 4.25; Recommended Practices 4.28 and 4.29 and 6.38 to 6.50 incl.
Set up and maintain electronic systems for cargo manifesting, customs clearance, and delivery.	Standards 4.15 and 4.4

Chicago Convention mandate	*Implementing tasks*
Article 10 – *Landing at customs airport* ... every aircraft which enters the territory of a contracting State shall, if the regulations of that State so require, land at an airport designated by that State for the purpose of customs and other examination. On departure from the territory of a contracting State, such aircraft shall depart from a similarly designated customs airport. ...	— Establish customs airports and open new ones as appropriate. — Develop procedures by which operators of scheduled and non-scheduled services may request permission to land or depart from customs airports. — Arrange for border inspection services at customs airports.
Article 13 – *Entry and clearance regulations* The laws and regulations of a contracting State as to the admission to or departure from its territory of passengers, crew or cargo of aircraft, such as regulations relating to entry, clearance, immigration, passports, customs, and quarantine shall be complied with by or on behalf of such passengers, crew or cargo upon entrance into or departure from, or while within the territory of that State.	— Support the interested border control agencies in the establishment and maintenance of effective inspection systems at airports, and in their efforts to rationalize their respective procedures. — Develop programmes for control of security problems such as document fraud, illegal migration and smuggling. — Coordinate preparations for clearing large numbers of international visitors for special events, e.g. international athletics competitions.
Article 14 – *Prevention of spread of disease* Each contracting State agrees to take effective measures to prevent the spread by means of air navigation of cholera, typhus (epidemic), smallpox, yellow fever, plague, and such other communicable diseases as the contracting States shall from time to time decide to designate, ...	— Establish, review and amend as necessary the national policies regarding prevention of the spread of contagious diseases by air, for example, aircraft disinsection, disinfection, public health-related quarantine programmes, and screening measures to be applied in a health emergency.
Article 22 – *Facilitation of formalities* Each contracting State agrees to adopt all practicable measures, through the issuance of special regulations or otherwise, to facilitate and expedite navigation by aircraft between the territories of contracting States, and to prevent unnecessary delays to aircraft, crews, passengers and cargo, especially in the administration of the laws relating to immigration, quarantine, customs and clearance.	— Establish, review and amend as necessary the national regulations which implement the State's customs, immigration and quarantine laws pertaining to international movements by air.
Article 23 – *Customs and immigration procedures* Each contracting States undertakes, so far as it may find practicable, to establish customs and immigration procedures affecting international air navigation in accordance with the practices which may be established or recommended from time to time, pursuant to this Convention. ...	— Establish and amend as appropriate, customs and immigration procedures carried out at airports, to harmonize them with the standards and recommended practices set forth in Annex 9. — Support and advocate the national issuance of passports and other travel documents in accordance with ICAO specifications in Doc 9303 – *Machine Readable Travel Documents*.
Article 37 – *Adoption of international standards and procedures* Each contracting State undertakes to collaborate in securing the highest practicable degree of uniformity in regulations, standards, procedures, and organization in relation to aircraft, personnel, airways and auxiliary services in all matters in which such uniformity will facilitate and improve air navigation. ... (j) Customs and immigration procedures ...	— Participate in ICAO development of Annex 9. — Review national procedures periodically in order to ensure harmonization with the provisions of Annex 9.
Article 38 – *Departures from international standards and procedures* Any State which finds it impracticable to comply in all respects with any such international standard or procedure, or to bring its own regulations or practices into full accord with any international standard or procedure after amendment of the latter, or which deems it necessary to adopt regulations or practices differing in any particular respect from those established by an international standard, shall give immediate notification to the International Civil Aviation Organization of the differences between its own practice and that established in the international standard. ...	— Periodically review conformity by all relevant agencies with the provisions of Annex 9 and notify ICAO of differences between national practices and the relevant standards.

APPENDIX 13. PUBLIC HEALTH PASSENGER LOCATOR CARD

PUBLIC HEALTH PASSENGER LOCATOR CARD

Public Health Passenger Locator Card to be completed when public health authorities suspect the presence of a communicable disease. The information you provide will assist the public health authorities to manage the public health event by enabling them to trace passengers who may have been exposed to communicable disease. The information is intended to be held by the public health authorities in accordance with applicable law and to be used only for public health purposes.

Flight Information

1. Airline and Flight Number — Airline | Flight Number

2. Date of arrival — DD | MM | YYYY

3. Seat Number where you actually sat on the aircraft

Personal Information

4. Name

Family Name | Given Name(s)

Your Current Home Address (including country)

Street Name and Number | City | State/Province

Country | ZIP/Postal Code

Your Contact Phone Number (Residential or Business or Mobile)

Country code | Area code | Phone Number | E-mail address

Pasport or Travel Document Number | Issuing Country/Organization

Contact Information

5. Address and phone number where you can be contacted during your stay or, if visiting many places, your cell phone and initial address

Street Name and Number | City | State/Province

Country | ZIP/Postal Code | Telephone Number (including country code) or mobile phone number

6. Contact information for the person who will best know where you are for the next 31 days, in case of emergency or to provide critical health information to you. Please provide the name of a close personal contact or a work contact. This must NOT be you.

a. Name

Family Name | Given Name(s)

b. Telephone Number

Country Code | Area Code | Phone Number | E-mail address

c. Address

Street Name and Number | City | State/Province

Country | ZIP/Postal Code

7. Are you traveling with anyone else? *YES/NO Circle appropriate response. If so, who?* *(name of Individual(s) or Group)*

— END —

COVER SHEET TO AMENDMENT 82

INTERNATIONAL STANDARDS
AND RECOMMENDED PRACTICES

AERONAUTICAL TELECOMMUNICATIONS

ANNEX 10
TO THE CONVENTION ON INTERNATIONAL CIVIL AVIATION

VOLUME I
RADIO NAVIGATION AIDS

SIXTH EDITION — JULY 2006

INTERNATIONAL CIVIL AVIATION ORGANIZATION

Checklist of Amendments to Annex 10, Volume I

	Effective date	*Date of applicability*
Sixth Edition (incorporates Amendments 1 to 81)	17 July 2006	23 November 2006
Amendment 82 (adopted by the Council on 26 February 2007) Replacement pages (xviii), C-109, ATT C-73, ATT C-75 and ATT C-76	16 July 2007	22 November 2007

Transmittal note

Amendment 82

to the

International Standards and
Recommended Practices

AERONAUTICAL TELECOMMUNICATIONS

(Annex 10, Volume I, to the Convention on International Civil Aviation)

1. Insert the following replacement pages in Annex 10, Volume I (Sixth Edition) to incorporate Amendment 82 which becomes applicable on 22 November 2007:

   a) Page (xviii) — Foreword

   b) Page 3-109 — Chapter 3

   c) Pages ATT C-73, ATT C-75, ATT C-76 — Attachment C

2. Record the entry of this amendment on page (ii).

Amendment	*Source(s)*	*Subject(s)*	*Adopted* *Effective* *Applicable*
70	ANC; Third Meeting of the Aeronautical Fixed Service Systems Planning for Data Interchange Panel; 34th Meeting of the European Air Navigation Planning Group	Restructuring of Annex 10 into five volumes; deletion of obsolete specifications and guidance material on manual Morse code procedures and teletypewriter systems; inclusion of material on common ICAO data interchange network (CIDIN).	20 March 1995 24 July 1995 9 November 1995
71	ANC; Special COM/OPS Divisional Meeting (1995); 12th, 13th and 14th Meetings of the All Weather Operations Panel; Secretariat proposals for deletion of obsolete material	Finalization of SARPs and guidance material for the microwave landing system (MLS), incorporation of a new strategy for introduction and application of non-visual aids to approach and landing in place of the ILS/MLS transition plan; relocation of material to Volumes III, IV and V, as appropriate; deletion of obsolete specifications for Consol and Loran-A systems and guidance material on the utilization of facilities, research, development and evaluation.	12 March 1996 15 July 1996 7 November 1996
72	—	No change.	—
73	Air Navigation Commission	Introduction of Human Factors-related material.	19 March 1998 20 July 1998 5 November 1998
74	Sixteenth Meeting of the All Weather Operations Panel; Air Navigation Commission	Introduction of: a) required navigation performance (RNP) for approach, landing and departure operation; b) updating of specifications for instrument landing system (ILS) and microwave landing system (MLS); and c) associated guidance material.	18 March 1999 19 July 1999 4 November 1999
75	—	No change.	—
76	Third meeting of the Global Navigation Satellite System Panel (GNSSP); proposal by the United Kingdom for continuity of service requirements for ILS and MLS	Global navigation satellite system (GNSS); continuity of service requirements for ILS localizers and MLS azimuth facilities used in support of Category IIIA operations; updating of references to the ITU Radio Regulations.	12 March 2001 16 July 2001 1 November 2001
77	Global Navigation Satellite System Panel (GNSSP)	Incorporation of GLONASS-related technical specifications in the satellite-based augmentation system (SBAS) and ground-based augmentation system (GBAS) sections of GNSS requirements; provision for use of GBAS positioning service in support of terminal area navigation (RNAV) operations; provision for use of new Message Type 28 to enhance performance of SBAS; and incorporation of additional guidance material and clarifications/editorial corrections to SARPs and guidance material.	27 February 2002 15 July 2002 28 November 2002
78	—	No change.	—

Amendment	*Source(s)*	*Subject(s)*	*Adopted Effective Applicable*
79	Fourth meeting of the Global Navigation Satellite System Panel	Changes to GNSS SARPs and related guidance material concerning performance specifications for approach with vertical guidance (APV); global positioning system (GPS) selective availability (SA) discontinuation and clarification of signal power level; specifications for modernized GLObal NAvigation Satellite System (GLONASS-M); frequency planning criteria for ground-based augmentation system (GBAS) and a number of other enhancements.	23 February 2004 12 July 2004 25 November 2004
80	Eleventh Air Navigation Conference	Updates to the strategy for introduction and application of non-visual aids to approach and landing.	25 February 2005 11 July 2005 24 November 2005
81	Navigation Systems Panel (NSP)	a) Introduction of ground-based regional augmentation system (GRAS) Standards and Recommended Practices (SARPs); b) amendments to SARPs for instrument landing system (ILS), distance measuring equipment (DME) and microwave landing system (MLS).	24 February 2006 17 July 2006 23 November 2006
82	Aeronautical Communications Panel (ACP)	Identification of the universal access transceiver (UAT) operating frequency.	26 February 2007 16 July 2007 22 November 2007

* Did not affect any Standards or Recommended Practices.

Channel pairing				DME parameters					
				Interrogation				Reply	
					Pulse codes				
						DME/P mode			
DME channel number	VHF frequency MHz	MLS angle frequency MHz	MLS channel number	Frequency MHz	DME/N µs	Initial approach µs	Final approach µs	Frequency MHz	Pulse codes µs
120X	117.30	–	–	1 144	12	–	–	1 207	12
120Y	117.35	–	–	1 144	36	–	–	1 081	30
121X	117.40	–	–	1 145	12	–	–	1 208	12
121Y	117.45	–	–	1 145	36	–	–	1 082	30
122X	117.50	–	–	1 146	12	–	–	1 209	12
122Y	117.55	–	–	1 146	36	–	–	1 083	30
123X	117.60	–	–	1 147	12	–	–	1 210	12
123Y	117.65	–	–	1 147	36	–	–	1 084	30
124X	117.70	–	–	1 148	12	–	–	1 211	12
**124Y	117.75	–	–	1 148	36	–	–	1 085	30
125X	117.80	–	–	1 149	12	–	–	1 212	12
**125Y	117.85	–	–	1 149	36	–	–	1 086	30
126X	117.90	–	–	1 150	12	–	–	1 213	12
**126Y	117.95	–	–	1 150	36	–	–	1 087	30

* These channels are reserved exclusively for national allotments.

** These channels may be used for national allotment on a secondary basis.
The primary reason for reserving these channels is to provide protection for the secondary surveillance radar (SSR) system.

∇ 108.0 MHz is not scheduled for assignment to ILS service. The associated DME operating channel No. 17X may be assigned for emergency use. The reply frequency of channel No. 17X (i.e. 978 MHz) is also utilized for the operation of the universal access transceiver (UAT). Standards and Recommended Practices for UAT are found in Annex 10, Volume III, Part I, Chapter 12.

Table B. Allowable DME/P errors

Location	Standard	Mode	PFE	CMN
37 km (20 NM) to 9.3 km (5NM) from MLS approach reference datum	1 and 2	1A	±250 m (±820 ft) reducing linearly to ±85 m (±279 ft)	±68 m (±223 ft) reducing linearly to ±34 m (±111 ft)
9.3 km (5 NM) to MLS approach reference datum	1	FA	±85 m (±279 ft) reducing linearly to ±30 m (±100 ft)	±18 m (±60 ft)
	2	FA	±85 m (±279 ft) reducing linearly to ±12 m (±40 ft)	±12 m (±40 ft)
	see Note	IA	±100 m (±328 ft)	±68 m (±223 ft)
At MLS approach reference datum and through runway coverage	1	FA	±30 m (±100 ft)	±18 m (±60 ft)
	2	FA	±12 m (±40 ft)	±12 m (±40 ft)
Throughout back azimuth coverage volume	1 and 2	FA	±100 m (±328 ft)	±68 m (±223 ft)
	see Note	IA	±100 m (±328 ft)	±68 m (±223 ft)

Note.— At distances from 9.3 km (5 NM) to the MLS approach reference datum and throughout the back azimuth coverage, the IA mode may be used when the FA mode is not operative.

7.1.13 *Considerations for the universal access transceiver (UAT)*

7.1.13.1 Frequency planning criteria to ensure compatibility between DME and the UAT are contained in Part II of the *Manual on the Universal Access Transceiver (UAT)* (Doc 9861)*.

7.2 Guidance material concerning DME/N only

7.2.1 *Effective radiated power (ERP) of DME/N facilities*

7.2.1.1 The power density figure prescribed in 3.5.4.1.5.1 of Chapter 3 is on the following assumptions:

Airborne receiver sensitivity	–112 dBW
Airborne transmission line loss	+3 dB
Airborne polar pattern loss relative to an isotopic antenna	+4 dB
Necessary power at antenna	–105 dBW

Minus 105 dBW at the antenna corresponds to minus 83 dBW/m^2 at the mid-band frequency.

Note.— The power density for the case of an isotropic antenna may be computed in the following manner:

$$P_d = P_a - 10 \log \frac{\lambda^2}{4\pi}$$

where P_d = *power density in dBW/m^2;*

P_a = *power at receiving point in dBW;*

λ = *wavelength in metres.*

7.2.1.2 Nominal values of the necessary ERP to achieve a power density of minus 83 dBW/m^2 are given in Figure C-20. For coverage under difficult terrain and siting conditions it may be necessary to make appropriate increases in the ERP. Conversely, under favourable siting conditions, the stated power density may be achieved with a lower ERP.

7.2.1.3 The use of Figure C-20 is illustrated by the following examples. In order to achieve the necessary nominal power density at slant range/levels of 342 km (185 NM)/12 000 m (40 000 ft), 263 km (142 NM)/12 000 m (40 000 ft) and 135 km (73 NM)/6 000 m (20 000 ft), ERPs of the order of plus 42 dBW, plus 36 dBW and plus 30 dBW respectively would be required.

7.3 Guidance material concerning DME/P only

7.3.1 *DME/P system description*

7.3.1.1 The DME/P is an integral element of the microwave landing system described in Chapter 3, 3.11. The DME/P signal format defines two operating modes, initial approach (IA) and final approach (FA). The IA mode is compatible and interoperable with DME/N and is designed to provide improved accuracies for the initial stages of approach and landing.

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* In preparation.

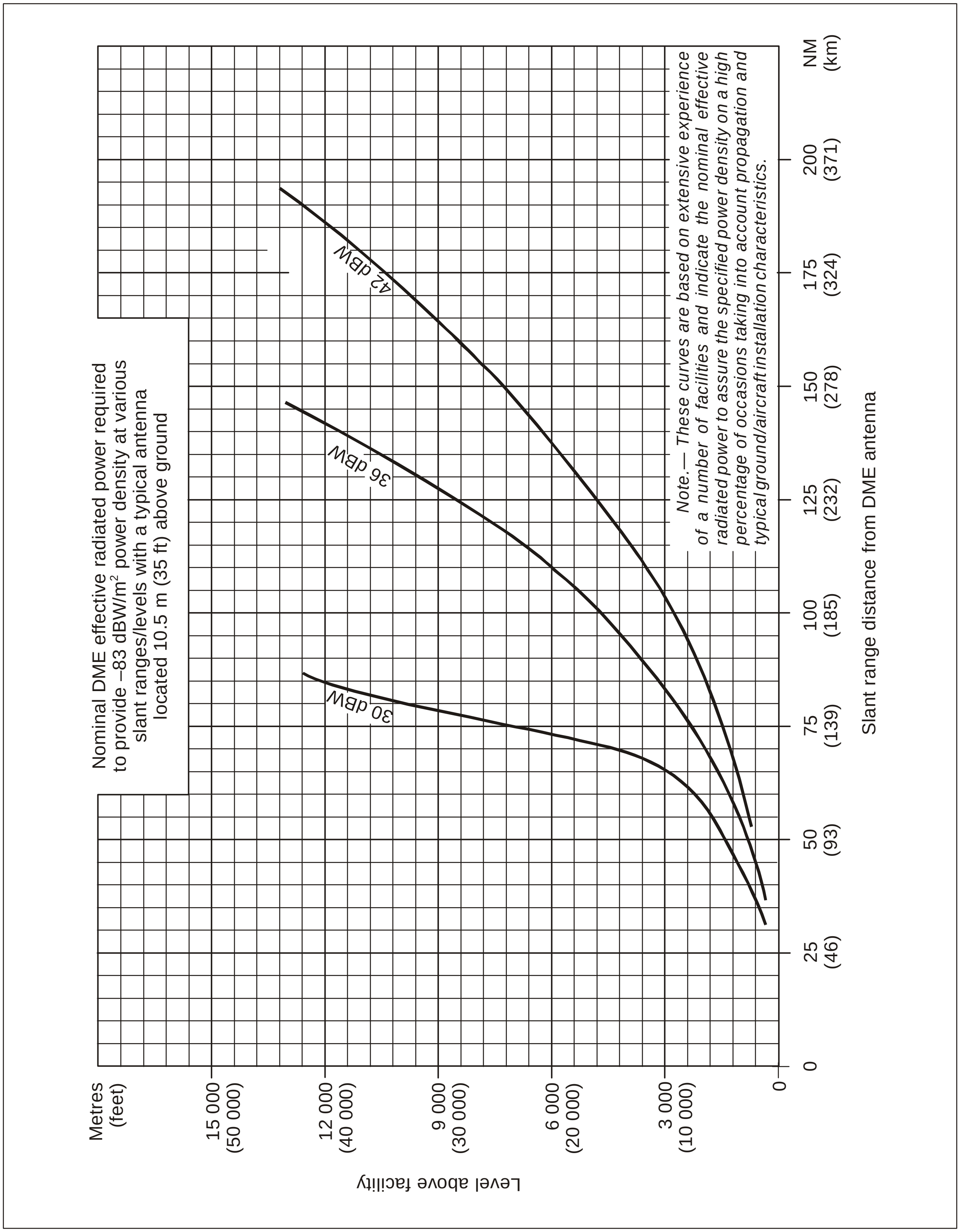
Nominal DME effective radiated power required to provide –83 dBW/m² power density at various slant ranges/levels with a typical antenna located 10.5 m (35 ft) above ground
Note.— These curves are based on extensive experience of a number of facilities and indicate the nominal effective radiated power to assure the specified power density on a high percentage of occasions taking into account propagation and typical ground/aircraft installation characteristics.
42 dBW
36 dBW
30 dBW
Metres (feet)
15 000 (50 000)
12 000 (40 000)
9 000 (30 000)
6 000 (20 000)
3 000 (10 000)
0
Level above facility
0
25 (46)
50 (93)
75 (139)
100 (185)
125 (232)
150 (278)
175 (324)
200 (371)
NM (km)
Slant range distance from DME antenna

Figure C-20

The FA mode provides substantially improved accuracy in the final approach area. Both modes are combined into a single DME/P ground facility and the system characteristics are such that DME/N and DME/P functions can be combined in a single interrogator. The IA and FA modes are identified by pulse codes which are specified in Chapter 3, 3.5.4.4. In the MLS approach sector, the DME/P coverage is at least 41 km (22 NM) from the ground transponder. It is intended that the interrogator does not operate in the FA mode at ranges greater than 13 km (7 NM) from the transponder site, although the transition from the IA mode may begin at 15 km (8 NM) from the transponder. These figures were selected on the assumption that the transponder is installed beyond the stop end of the runway at a distance of approximately 3 600 m (2 NM) from the threshold.

7.3.1.2 A major potential cause of accuracy degradation encountered in the final phases of the approach and landing operation is multipath (signal reflection) interference. DME/P FA mode minimizes these effects by using wideband signal processing of pulses having fast rise time leading edges, and by measuring the time of arrival at a low point on the received pulse where it has not been significantly corrupted by multipath. This is in contrast to the slower rise time pulses and higher thresholding at the 50 per cent level used in DME/N.

7.3.1.3 Because the FA mode is used at ranges less than 13 km (7 NM), the transmitter can provide an adequate signal level to meet the required accuracy without the fast rise time pulse violating the transponder pulse spectrum requirements. Use of the 50 per cent threshold and a narrow receiver bandwidth in the IA mode permits an adequate but less demanding performance to the coverage limits. The transponder determines the interrogation mode in use by the interrogation code in order to time the reply delay from the proper measurement reference. The IA mode is interoperable with DME/N permitting a DME/N interrogator to be used with a DME/P transponder to obtain at least the accuracy with a DME/N transponder. Similarly, a DME/P interrogator may be used with a DME/N transponder.

7.3.2 *DME/P system accuracy requirements*

7.3.2.1 *DME/P accuracy requirements*

7.3.2.1.1 When considering the DME/P accuracy requirement, the operations that can be performed in the service volume of the final approach mode tend to fall into one of two groups. This has led to two accuracy standards being defined for the final approach mode:

a) *accuracy standard 1:* this is the least demanding and is designed to cater for most CTOL operations;

b) *accuracy standard 2:* this gives improved accuracy that may be necessary for VTOL and STOL operations, CTOL flare manoeuvres using MLS flare elevation guidance and CTOL high-speed turnoffs.

7.3.2.1.2 Table C-5 shows applications of DME and typical accuracy requirements. This will assist in selecting the appropriate accuracy standard to meet the operational requirement. The calculations are based on a distance of 1 768 m (5 800 ft) between the DME antenna and the runway threshold. The following paragraphs refer to Table C-5.

7.3.2.1.3 It is intended that the DME/P accuracy approximately corresponds to the azimuth function PFE at a distance of 37 km (20 NM) from the MLS reference datum both along the extended runway centre line and at an azimuth angle of 40 degrees. Also the DME/N error at the limits of MLS coverage is consistent with the 0.37 km (0.2 NM) system accuracy in Chapter 3, 3.5.3.1.3.3. The CMN is the linear equivalent of the plus or minus 0.1 degree CMN specified for the azimuth angle function.

7.3.2.1.4 PFE corresponds to azimuth angular error; CMN is approximately the linear equivalent of the plus or minus 0.1 degree CMN specified for the azimuth angle system.

7.3.2.1.5 The plus or minus 30 m PFE corresponds to a plus or minus 1.5 m vertical error for a 3-degree elevation angle.

7.3.2.1.6 Flare initiation begins in the vicinity of the MLS approach reference datum; MLS elevation and DME/P provide vertical guidance for automatic landing when the terrain in front of the runway threshold is uneven.

7.3.2.1.7 Sensitivity modification or autopilot gain scheduling requirements are not strongly dependent on accuracy.

Table C-5.

Function	Typical distance from the threshold	PFE (95% probability)	CMN (95% probability)
Approach (7.3.2.1.3)			
— extended runway centre line	37 km (20 NM)	±250 m (±820 ft)	±68 m (±223 ft)
— at 40° azimuth	37 km (20 NM)	±375 m (±1 230 ft)	±68 m (±223 ft)
Approach (7.3.2.1.4)			
— extended runway centre line	9 km (5 NM)	±85 m (±279 ft)	±34 m (±111 ft)
— at 40° azimuth	9 km (5 NM)	±127 m (±417 ft)	±34 m (±111 ft)
Marker replacement			
— outer marker	9 km (5 NM)	±800 m (±2 625 ft)	not applicable
— middle marker	1 060 m (0.57 NM)	±400 m (±1 312 ft)	not applicable
30 m decision height determination (100 ft) (7.3.2.1.5)			
— 3° glide path (CTOL)	556 m (0.3 NM)	±30 m (±100 ft)	not applicable
— 6° glide path (STOL)	556 m (0.3 NM)	±15 m (±50 ft)	not applicable
Flare initiation over uneven terrain (7.3.2.1.6)			
— 3° glide path (CTOL)	0	±30 m (±100 ft)	±18 m (±60 ft)
— 6° glide path (STOL)	0	±12 m (±40 ft)	±12 m (±40 ft)
Sensitivity modifications (7.3.2.1.7) (autopilot gain scheduling)	37 km (20 NM) to 0	±250 m (±820 ft)	not applicable
Flare manoeuvre with MLS flare elevation (7.3.2.1.8)			
— CTOL	0	±30 m (±100 ft)	±12 m (±40 ft)
— STOL	0	±12 m (±40 ft)	±12 m (±40 ft)
Long flare alert (7.3.2.1.9)	Runway region	±30 m (±100 ft)	not applicable
CTOL high speed roll-out/turnoffs (7.3.2.1.10)	Runway region	±12 m (±40 ft)	±30 m (±100 ft)
Departure climb and missed approach	0 to 9 km (5 NM)	±100 m (±328 ft)	±68 m (±223 ft)
VTOL approaches (7.3.2.1.11)	925 m (0.5 NM) to 0	±12 m (±40 ft)	±12 m (±40 ft)
Coordinate translations (7.3.2.1.12)	—	±12 m to ±30 m (±40 ft to ±100 ft)	±12 m (±40 ft)

COVER SHEET TO AMENDMENT 82

INTERNATIONAL STANDARDS,
RECOMMENDED PRACTICES AND
PROCEDURES FOR AIR NAVIGATION SERVICES

AERONAUTICAL TELECOMMUNICATIONS

ANNEX 10
TO THE CONVENTION ON INTERNATIONAL CIVIL AVIATION

VOLUME II
COMMUNICATION PROCEDURES
including those with PANS status

SIXTH EDITION OF VOLUME II — JULY 2001

INTERNATIONAL CIVIL AVIATION ORGANIZATION

Checklist of Amendments to Annex 10, Volume II

	Effective date	*Date of applicability*
Sixth Edition (incorporates Amendments 1 to 76)	16 July 2001	1 November 2001
Amendment 77 (did not affect Volume II)	—	—
Amendment 78 (adopted by the Council on 5 March 2003)	14 July 2003	27 November 2003
Amendment 79 (did not affect Volume II)	—	—
Amendment 80 (adopted by the Council on 25 February 2005)	11 July 2005	24 November 2005
Amendment 81 (did not affect Volume II)	—	—
Amendment 82 (adopted by the Council on 26 February 2007) Replacement pages (iv), (xii), 4-3, 4-8, 4-11, 4-22, 4-24, 5-5, 5-6, 5-7, 5-9, 5-10, 5-15, 8-2, 8-3, 8-5, 8-6, 8-7	16 July 2007	22 November 2007

Transmittal note

Amendment 82

to the

International Standards,
Recommended Practices and
Procedures for Air Navigation Services

AERONAUTICAL TELECOMMUNICATIONS

(Annex 10, Volume II, to the Convention on International Civil Aviation)

1. Insert the following replacement pages in Annex 10, Volume II (Sixth Edition) to incorporate Amendment 82 which becomes applicable on 22 November 2007:

   a) Page (iv) — Table of Contents

   b) Page (xii) — Foreword

   c) Pages 4-3, 4-8, 4-11, 4-22 and 4-24 — Chapter 4

   d) Pages 5-5, 5-6, 5-7, 5-9, 5-10 and 5-15 — Chapter 5

   e) Pages 8-2, 8-3, 8-5, 8-6, 8-7 — Chapter 8

2. Please amend by hand the date on the Cover and Flyleaf to read July 2001.

3. Record the entry of this amendment on page (ii).

16/7/07

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Amendment	*Source(s)*	*Subject(s)*	*Adopted Effective Applicable*
62	Eighth Meeting of the Automated Data Interchange Systems Panel	Changes and additions to the provisions related to service messages, multiple lines of address and stripped address procedure; changes and additions to the provisions related to channel-check transmissions and the use of controlled circuit protocols; changes and additions to the provisions related to the detection of mutilated messages; addition of provisions related to the transfer of AFTN messages over code and byte independent circuits and networks.	14 December 1981 14 April 1982 25 November 1982
63	Ninth Meeting of the Automated Data Interchange Systems Panel	Changes to the provisions related to message priority and priority indicators.	13 December 1982 13 April 1983 24 November 1983
64	Air Navigation Commission	Introduction of new and revised radiotelephony procedures for use in the Aeronautical Mobile Service.	30 March 1983 29 July 1983 7 June 1984
65	Recommendations of the ANC relating to the method of referencing date/time; COM/MET Divisional Meeting (1982); Third Meeting of the ATS Data Acquisition, Processing and Transfer Panel; 10th Meeting of the Automated Data Interchange Systems Panel	Coordinated universal time (UTC); changes to AFTN message text length, and priorities for movement and control messages; test procedures on AFTN channels; new material on AFTN address stripping in Attachment C.	6 December 1984 6 April 1985 21 November 1985
66	—	No change.	—
67	Eighth Meeting, 104th Session of Council; COM/MET Divisional Meeting (1982); Air Navigation Commission	Changes and editorial rearrangement of AFTN procedures resulting from the new ICAO three-letter designator; changes related to predetermined distribution system for the AFTN; introduction of new procedures concerning transmission of whole hundreds in radiotelephony; introduction of new procedures for use on VHF air-to-air communications channel; editorial rearrangement to present English language radiotelephony phraseology in all language versions of Annex 10, Volume II.	16 March 1987 27 July 1987 22 October 1987
68	Air Navigation Commission	New procedures for the formulation of aircraft radiotelephony call signs; changes to safeguard aircraft against acts of unlawful interference; new procedures related to the maintenance of guard on 121.5 MHz.	29 March 1990 30 July 1990 15 November 1990
69	COM/MET Divisional Meeting (1982); COM/MET/OPS Divisional Meeting (1990)	Changes to AFTN message procedures and addition of material related to the world area forecast system (WAFS) telecommunications requirements; addition of material related to VHF air-ground data link communications and changes to material concerning VHF off-set carrier systems.	22 March 1993 26 July 1993 11 November 1993
70 (5th Edition)	Air Navigation Commission	New phraseology for the transmission of numbers in radiotelephony. A number of changes in the AFTN procedures related to the acceptance and transmission of messages, categories of messages and removal of obsolete material related to radiotelephony.	20 March 1995 24 July 1995 9 November 1995
71	Air Navigation Commission; first meeting of the Aeronautical Telecommunication Network Panel (ATNP)	Changes to aeronautical fixed telecommunications network procedures.	12 March 1996 15 July 1996 7 November 1996
72	Air Navigation Commission; fourth meeting of the Aeronautical Mobile Communications Panel (AMCP)	Modification of R/T procedures concerning the introduction of 8.33 kHz channel spacing; deletion of definition for VDL.	12 March 1997 21 July 1997 6 November 1997

Amendment	*Source(s)*	*Subject(s)*	*Adopted* *Effective* *Applicable*
73	Air Navigation Commission; second meeting of the Aeronautical Telecommunication Network Panel (ATNP)	Changes to the composition of meteorological messages sent via the AFTN; introduction of Human Factors related material.	19 March 1998 20 July 1998 5 November 1998
74	Air Navigation Commission	Introduction of interpilot air-to-air channel.	18 March 1999 19 July 1999 4 November 1999
75	—	No change.	—
76 (6th Edition)	Third meeting of the Aeronautical Telecommunication Network Panel (ATNP); the Secretariat on the basis of proposals by the Multi-Agency Air Traffic Services Procedures Coordination Group (MAPCOG); fifth meeting of the Automatic Dependent Surveillance Panel (ADSP); seventh meeting of the Aeronautical Mobile Communication Panel (AMCP); Secretariat	Aeronautical fixed service (AFS) procedural provisions for voice and data communications elements; consequential changes resulting from the introduction of a single interpilot air-to-air frequency; deletion of references to obsolete radiotelegraphy techniques; radiotelephony speech and standard phraseology; technology in relation to a number of data link applications; update of references to the ITU Radio Regulations.	12 March 2001 16 July 2001 1 November 2001
77	—	No change.	—
78	Air Navigation Commission	Language proficiency requirements.	5 March 2003 14 July 2003 27 November 2003
79	—	No change.	—
80	European Air Navigation Planning Group (EANPG); Aeronautical Communications Panel (ACP)	Changes to the procedures for indication of the transmitting channels in VHF radiotelephony communications.	25 February 2005 11 July 2005 24 November 2005
81	—	No change.	—
82	Aeronautical Communications Panel (ACP); Operational Data Link Panel (OPLINKP); Secretariat	Update of aeronautical fixed telecommunication network (AFTN)/common ICAO data interchange network (CIDIN) provisions, communication procedures related to radiotelephony (R/T) reply procedures and voice communication failure; use of controller-pilot data link communications (CPDLC).	26 February 2007 16 July 2007 22 November 2007

1. Did not affect any Standards or Recommended Practices.

4.4 Aeronautical fixed telecommunication network (AFTN)

4.4.1 General

4.4.1.1 *Categories of messages.* Subject to the provisions of 3.3, the following categories of message shall be handled by the aeronautical fixed telecommunication network:

a) distress messages;

b) urgency messages;

c) flight safety messages;

d) meteorological messages;

e) flight regularity messages;

f) aeronautical information services (AIS) messages;

g) aeronautical administrative messages;

h) service messages.

4.4.1.1.1 *Distress messages (priority indicator SS).* This message category shall comprise those messages sent by mobile stations reporting that they are threatened by grave and imminent danger and all other messages relative to the immediate assistance required by the mobile station in distress.

4.4.1.1.2 *Urgency messages (priority indicator DD).* This category shall comprise messages concerning the safety of a ship, aircraft or other vehicles, or of some person on board or within sight.

4.4.1.1.3 Flight safety messages (priority indicator FF) shall comprise:

a) movement and control messages as defined in PANS-ATM (Doc 4444), Chapter 11;

b) messages originated by an aircraft operating agency of immediate concern to aircraft in flight or preparing to depart;

c) meteorological messages restricted to SIGMET information, special air-reports, AIRMET messages, volcanic ash and tropical cyclone advisory information and amended forecasts.

4.4.1.1.4 Meteorological messages (priority indicator GG) shall comprise:

a) messages concerning forecasts, e.g. terminal aerodrome forecasts (TAFs), area and route forecasts;

b) messages concerning observations and reports, e.g. METAR, SPECI.

4.4.1.1.5 Flight regularity messages (priority indicator GG) shall comprise:

a) aircraft load messages required for weight and balance computation;

b) messages concerning changes in aircraft operating schedules;

c) messages concerning aircraft servicing;

d) messages concerning changes in collective requirements for passengers, crew and cargo covered by deviation from normal operating schedules;

e) messages concerning non-routine landings;

f) messages concerning pre-flight arrangements for air navigation services and operational servicing for non-scheduled aircraft operations, e.g. overflight clearance requests;

g) messages originated by aircraft operating agencies reporting an aircraft arrival or departure;

h) messages concerning parts and materials urgently required for the operation of aircraft.

4.4.1.1.6 Aeronautical information services (AIS) messages (priority indicator GG) shall comprise:

a) messages concerning NOTAMs;

b) messages concerning SNOWTAMs.

4.4.1.1.7 Aeronautical administrative messages (priority indicator KK) shall comprise:

a) messages regarding the operation or maintenance of facilities provided for the safety or regularity of aircraft operations;

b) messages concerning the functioning of aeronautical telecommunication services;

c) messages exchanged between civil aviation authorities relating to aeronautical services.

4.4.1.1.8 Messages requesting information shall take the same priority indicator as the category of message being requested except where a higher priority is warranted for flight safety.

4.4.1.1.9 *Service messages (priority indicator as appropriate).* This category shall comprise messages originated by aeronautical fixed stations to obtain information or verification concerning other messages which appear to have been transmitted incorrectly by the aeronautical fixed service, confirming channel-sequence numbers, etc.

4.4.1.1.9.1 Service messages shall be prepared in the format prescribed in 4.4.2 or 4.4.15. In applying the provisions of 4.4.3.1.2 or 4.4.15.2.1.3 to service messages addressed to an aeronautical fixed station identified only by a location indicator, this indicator shall be immediately followed by the ICAO three-letter designator YFY, followed by an appropriate 8th letter.

4.4.1.1.9.2 Service messages shall be assigned the appropriate priority indicator.

4.4.1.1.9.2.1 **Recommendation.—** *When service messages refer to messages previously transmitted, the priority indicator assigned should be that used for the message(s) to which they refer.*

4.4.1.1.9.3 Service messages correcting errors in transmission shall be addressed to all the addressees that will have received the incorrect transmission.

4.4.1.1.9.4 A reply to a service message shall be addressed to the station which originated the initial service message.

4.4.1.1.9.5 **Recommendation.—** *The text of all service messages should be as concise as possible.*

4.4.1.1.9.6 A service message, other than one acknowledging receipt of SS messages, shall be further identified by the use of the abbreviation SVC as the first item in the text.

4.4.1.1.9.7 When a service message refers to a message previously handled, reference to the previous message shall be made by use of the appropriate transmission identification (*see* 4.4.2.1.1 b) and 4.4.15.1.1 b)) or the filing time and originator indicator groups (*see* 4.4.4 and 4.4.15.2.2) identifying the reference message.

4.4.1.2 *Order of priority*

4.4.1.2.1 The order of priority for the transmission of messages in the aeronautical fixed telecommunication network shall be as follows:

Transmission priority	*Priority indicator*
1	SS
2	DD FF
3	GG KK

4.4.1.2.2 **Recommendation.—** *Messages having the same priority indicator should be transmitted in the order in which they are received for transmission.*

4.4.1.3 *Routing of messages*

4.4.1.3.1 All communications shall be routed by the most expeditious route available to effect delivery to the addressee.

4.4.1.3.2 Predetermined diversion routing arrangements shall be made, when necessary, to expedite the movement of communication traffic. Each communication centre shall have the appropriate diversion routing lists, agreed to by the Administration(s) operating the communication centres affected and shall use them when necessary.

4.4.1.3.2.1 **Recommendation.—** *Diversion routing should be initiated:*

1) *in a fully automatic communication centre:*

   a) *immediately after detection of the circuit outage, when the traffic is to be diverted via a fully automatic communication centre;*

   b) *within a 10-minute period after detection of the circuit outage, when the traffic is to be diverted via a non-fully automatic communication centre;*

2) *in a non-fully automatic communication centre within a 10-minute period after detection of the circuit outage.*

Service message notification of the diversion requirement should be provided where no bilateral or multilateral prearranged agreements exist.

4.4.1.3.3 As soon as it is apparent that it will be impossible to dispose of traffic over the aeronautical fixed service within a reasonable period, and when the traffic is held at the station where it was filed, the originator shall be consulted regarding further action to be taken, unless:

a) otherwise agreed between the station concerned and the originator; or

b) arrangements exist whereby delayed traffic is automatically diverted to commercial telecommunication services without reference to the originator.

Note.— The expression "reasonable period" means a period of time such that it seems probable that the traffic will not be delivered to the addressee within any fixed transit period applicable to the category of traffic concerned, or, alternatively, any predetermined period agreed between originators and the telecommunication station concerned.

4.4.1.4 *Supervision of message traffic*

4.4.1.4.1 *Continuity of message traffic.* The receiving station shall check the transmission identification of incoming transmissions to ensure the correct sequence of channel-sequence numbers of all messages received over that channel.

4.4.1.7.2 In cases where acknowledgement is made between AFTN communication centres, a relay centre shall be considered as having no further responsibility for retransmission or repetition of a message for which it has received positive acknowledgement, and it may be deleted from its records.

Note.— Provisions relating to long-term retention of AFTN traffic records in AFTN communication centres are contained in 4.4.1.6.

4.4.1.8 *Test procedures on AFTN channels*

4.4.1.8.1 **Recommendation.—** *Test messages transmitted on AFTN channels for the purpose of testing and repairing lines should consist of the following:*

1) the start-of-message signal;

2) the procedure signal QJH;

3) the originator indicator;

*4) three page-copy lines of the sequence of characters RY in ITA-2 or U(5/5) *(2/10) in IA-5; and*

5) the end-of-message signal.

4.4.2 Message format — International Telegraph Alphabet No. 2 (ITA-2)

All messages, other than those prescribed in 4.4.1.8 and 4.4.9.3, shall comprise the components specified in 4.4.2.1 to 4.4.6.1 inclusive.

Note 1.— An illustration of the ITA-2 message format is given in Figure 4-1.

Note 2.— In the subsequent Standards relative to message format the following symbols have been used in making reference to the functions assigned to certain signals in the International Telegraph Alphabet No. 2 (see Volume III, Part I, 8.2.1 and Table 8-1):

Symbol	*Signification*
<	CARRIAGE RETURN *(signal no. 27)*
≡	LINE FEED *(signal no. 28)*
↓	LETTER SHIFT *(signal no. 29)*
↑	FIGURE SHIFT *(signal no. 30)*
→	SPACE *(signal no. 31)*

4.4.2.1 *Heading*

4.4.2.1.1 The heading shall comprise:

a) start-of-message signal, the characters ZCZC;

b) transmission identification comprising:

1) circuit identification;

2) channel-sequence number.

c) additional service information (if necessary) comprising:

1) one SPACE;

2) no more than ten characters.

d) spacing signal.

4.4.2.1.1.1 The circuit identification shall consist of three letters selected and assigned by the transmitting station; the first letter identifying the transmitting, the second letter the receiving end of the circuit and the third letter to identify the channel; where there is only one channel between the transmitting and receiving stations, channel letter A shall be assigned; where more than one channel between stations is provided, the channels shall be identified as A, B, C, etc. in respective order.

4.4.2.1.1.2 Three-digit channel-sequence numbers from 001 to 000 (representing 1 000) shall be assigned sequentially by telecommunication stations to all messages transmitted directly from one station to another. A separate series of these numbers shall be assigned for each channel and a new series shall be started daily at 0000 hours.

4.4.2.1.1.2.1 **Recommendation.—** *The use of the 4-digit channel-sequence number, to preclude duplication of the same numbers during the 24-hour period, is permitted subject to agreement between the authorities responsible for the operation of the circuit.*

4.4.2.1.1.3 The transmission identification shall be sent over the circuit in the following sequence:

a) SPACE [→];

b) transmitting-terminal letter;

c) receiving-terminal letter;

d) channel-identification letter;

e) FIGURE SHIFT [↑];

f) channel-sequence number (3 digits).

Message part		*Component of the message part*	*Element of the component*	*Teletypewriter signal*
HEADING (*see* 4.4.2.1)		Start-of-Message Signal	—	ZCZC
		Transmission Identification	a) One SPACE b) Transmitting-terminal letter c) Receiving-terminal letter d) Channel-Identification letter e) One FIGURE SHIFT f) Channel-sequence number (3 digits) (*Example:* NRA062)	→ …↑…
		(If necessary) Additional Service Indication	a) One SPACE b) No more than 10 characters (*Example:* 270930)	
		Spacing Signal	Five SPACES One LETTER SHIFT	→→→→→↓
ADDRESS (*see* 4.4.3)	THE PERMANENT PART OF A MESSAGE	Alignment Function	One CARRIAGE RETURN, one LINE FEED	<≡
		Priority Indicator	The relevant 2-letter group	..
		Addressee Indicator(s)	One SPACE, An 8-letter group — given in sequence for each addressee (*Example:* →EGLLZRZX→EDLLYKYX→EGLLACAM)	
		Alignment Function(s)	One CARRIAGE RETURN, one LINE FEED	<≡
ORIGIN (*see* 4.4.4)		Filing Time	One FIGURE SHIFT The 6-digit date-time group specifying when the message was filed for transmission One LETTER SHIFT	↑ …… ↓
		Originator Indicator	One SPACE The 8-letter group identifying the message originator	→ ……
		Priority Alarm *(used only in teletypewriter operation for Distress Messages)*	One FIGURE SHIFT Five Signal No. 10 of Telegraph Alphabet No. 2 One LETTER SHIFT	↑ Attention ↓ Signal(s)
		Optional Heading Information	a) One SPACE b) Additional data not to exceed the remainder of the line. See 4.4.4.4.	
		Alignment Function	One CARRIAGE RETURN, one LINE FEED	<≡
TEXT (*see* 4.4.5)		Beginning of the Text	Specific identification of Addressee(s) *(if necessary) with* each followed by one CARRIAGE RETURN, one LINE FEED *(if necessary)* The English word FROM *(if necessary)* (*see* 4.4.5.2.3) Specific identification of Originator *(if necessary)* The English word STOP followed by one CARRIAGE RETURN, one LINE FEED *(if necessary)* (*see* 4.4.5.2.3); *and/or* Originator's reference *(if used)*	
		Message Text	Message Text with one CARRIAGE RETURN, one LINE FEED at the end of each printed line of the Text except for the last one (*see* 4.4.5.3)	
		Confirmation *(if necessary)*	a) One CARRIAGE RETURN, one LINE FEED b) The abbreviation CFM followed by the portion of the Text being confirmed	
		Correction *(if necessary)*	a) One CARRIAGE RETURN, one LINE FEED b) The abbreviation COR followed by the correction of an error made in the preceding Text	
		End-of-Text Signal	a) One LETTER SHIFT b) One CARRIAGE RETURN, one LINE FEED	↓<≡
ENDING (*see* 4.4.6)		Page-Feed Sequence	Seven LINE FEEDS	≡≡≡≡≡≡≡
		End-of-Message Signal	Four of the letter case of N (Signal No. 14)	NNNN
		Message-Separation Signal *(used only on message traffic transmitted to a "torn-tape" station)*	Twelve LETTER SHIFTS	↓↓↓↓↓↓↓↓↓↓↓↓
		Tape Feed (*see* 4.4.7)	Additional LETTER SHIFTS will appear at this point in instances where prior arrangements have been made for tape-feed transmissions to be employed on an incoming circuit (*see* 4.4.7).	

Legend: ↑ FIGURE SHIFT *(Signal No. 30)* ≡ LINE FEED *(Signal No. 28)* ↓ LETTER SHIFT *(Signal No. 29)*
→ SPACE *(Signal No. 31)* < CARRIAGE RETURN *(Signal No. 27)*

Figure 4-1. Message format ITA-2

(the above illustrates the teletypewriter message format prescribed in 4.4.2 to 4.4.9.1 inclusive)

transferring the message to the AFTN, followed immediately by the ICAO three-letter designator ZZZ followed by the filler letter X. The identification of the aircraft shall then be included in the first item in the text of the message.

4.4.4.2.3 Messages relayed over the AFTN that have been originated in other networks shall use a valid AFTN originator indicator that has been agreed for use by the relay or gateway function linking the AFTN with the external network.

Note.— The following illustrates the application of 4.4.4.2.2 procedure as it would appear with a message from aircraft KLM153 addressed to the Area Control Centre at CZEG, the message being handled via aeronautical station CYCB. The heading and ending of the message are not shown in this example of teletypewriter page-copy form:

(Address)	*FF CZEGZRZX*
(Origin)	*031821 CYCBZZZX*
(Text)	*KLM153 [remainder of text as received from aircraft]*

4.4.4.3 The priority alarm shall be used only for distress messages. When used, it shall consist of the following, in the order stated:

a) FIGURE SHIFT [↑];

b) FIVE transmissions of signal no. 10 (figure case);

c) LETTER SHIFT [↓].

Note 1.— The figure case of signal no. 10 of the International Telegraph Alphabet No. 2 generally corresponds to the figure case of J of teletypewriter equipment in use on aeronautical fixed service circuits.

Note 2.— Use of the priority alarm will actuate a bell (attention) signal at the receiving teletypewriter station, other than at those fully automatic stations which may provide a similar alarm on receipt of priority indicator SS, thereby alerting supervisory personnel at relay centres and operators at tributary stations, so that immediate attention may be given to the message.

4.4.4.4 The inclusion of optional data in the origin line shall be permitted provided a total of 69 characters is not exceeded and subject to agreement between the authorities concerned. The presence of the optional data field shall be indicated by one occurrence of the SPACE character immediately preceding optional data.

4.4.4.4.1 **Recommendation.—** *When additional addressing information in a message needs to be exchanged between source and destination addresses, it should be conveyed in the optional data field (ODF), using the following specific format:*

a) characters one and full stop (1.) to indicate the parameter code for the additional address function;

b) three modifier characters, followed by an equal sign [=] and the assigned 8-character ICAO address; and

c) the character hyphen (-) to terminate the additional address parameter field.

4.4.4.4.1.1 **Recommendation.—** *When a separate address for service messages or inquiries is different from the originator indicator, the modifier SVC should be used.*

4.4.4.5 The origin line shall be concluded by an alignment function [<≡].

4.4.5 Text

4.4.5.1 The text of messages shall be drafted in accordance with 4.1.2.

4.4.5.2 When an originator's reference is used, it shall appear at the beginning of the text, except as provided in 4.4.5.2.1 and 4.4.5.2.2.

4.4.5.2.1 When the ICAO three-letter designators YXY, YYY or ZZZ comprise the second element of the addressee indicator (*see* 4.4.3.1.2.1 and 4.4.3.1.2.2) and it, therefore, becomes necessary to identify in the text the specific addressee of the message, such identification group will precede the originator's reference (if used) and become the first item of the text.

4.4.5.2.2 When the ICAO three-letter designators YXY, YYY or ZZZ comprise the second element of the originator indicator (*see* 4.4.4.2.1 and 4.4.4.2.2) and it thus becomes necessary to identify in the text the name of the organization (or military service), or the aircraft, which originated the message, such identification shall be inserted in the first item of the text of the message.

4.4.5.2.3 When applying the provisions of 4.4.5.2.1 and 4.4.5.2.2 to messages where the ICAO three-letter designator(s) YXY, YYY or ZZZ is (are) used to refer to two or more different organizations (or military services), the sequence of further identification in the text shall correspond to the complete sequence used in the address and origin of the message. In such instance, each addressee identification shall be followed immediately by an alignment function. The name of the (YXY, YYY or ZZZ) organization originating the message shall then be preceded with "FROM". "STOP" followed by an alignment function shall then be included in the text at the end of these identifications to precede the remainder of the text wording.

4.4.5.3 An alignment function [<≡] shall be transmitted at the end of each printed line of the text except for the last (*see* 4.4.5.6).

4.4.5.4 When it is desired to confirm a portion of the text of a message in teletypewriter operation, such confirmation shall be separated from the last text group by an alignment function [<≡], and shall be indicated by the abbreviation CFM followed by the portion being confirmed.

4.4.5.5 When it is discovered that an error has been made in the text, the correction shall be separated from the last text group or confirmation, if any, by an alignment function [<≡] in the case of teletypewriter circuits. This shall be followed by the abbreviation COR and the correction.

4.4.5.5.1 Stations shall make all indicated corrections on the page-copy prior to local delivery.

4.4.5.6 At the end of the text the following end-of-text signal shall be transmitted:

1 LETTER SHIFT [↓], alignment function [<≡].

4.4.5.7 The text of the messages entered by the AFTN origin station shall not exceed 1 800 characters in length.

Note 1.— Where it is desired that a communication with a text exceeding 1 800 characters be transmitted over the aeronautical fixed telecommunication network, 4.4.5.7 requires that such a communication be entered by the AFTN origin station in the form of separate messages, each text of which does not exceed 1 800 characters. Guidance material for forming separate messages from a single long message is given in Attachment B to Volume II.

Note 2.— The character count includes all printing and non-printing characters in the message from, but not including, the alignment function preceding the beginning of the text to, but not including, the end-of-text signal.

4.4.6 Ending

4.4.6.1 The ending shall comprise:

a) the page-feed sequence consisting of 7 LINE FEEDS [≡≡≡≡≡≡≡];

   Note.— This, together with the 1 LINE FEED of the preceding alignment function, will provide sufficient separation between messages when appearing in page-copy form.

b) the end-of-message signal, consisting of the letter N (letter case of signal no. 14), appearing FOUR times in undivided sequence.

   Note.— This component, transmitted intact from the moment of the first transmission of the message until ultimate delivery, is required so that connections set up for cross-office transmission, at a semi-automatic or fully automatic relay installation, can be cleared for following message traffic.

And in addition, on message traffic transmitted to "torn-tape" relay stations only:

c) the message-separation signal, consisting of a LETTER SHIFT [↓] transmitted 12 times in uninterrupted sequence.

Note 1.— Nothing but letter shifts are to be transmitted in message traffic between the end-of-message signal of one message and the start-of-message signal of the next.

Note 2.— The following illustrates the procedures specified in 4.4.2 to 4.4.6.1 inclusive for a message in page-copy form:

(Heading)	**ZCZC LPA183*
(Address)	*GG LGGGZRZX LGATKLMW*
(Origin)	*201838 EGLLKLMW*
(Text)	*As required*
(Ending)	*(Page feed)*
	*NNNN***

**Note 2A.— If this message had been one of a series and there had been no manual paper-feed action between messages by the operator attending the receiving page teletypewriter, the "NNNN" of the preceding message would have appeared here.*

***Note 2B.— In the circumstances described in Note 2A, the heading of the next message received would be printed on page-copy at this position.*

Note 2C.— In actual station practice, messages would be separated on page-copy by tearing through the page-feed sequence. The end-of-message signal would then appear to have become a component part of the next message. This apparent misplacement is, however, unlikely to give rise to any misunderstanding on the part of communicators or addressees since, in practice, the end-of-message signal has no significance on page-copy.

4.4.6.2 AFTN messages entered by the AFTN origin station shall not exceed 2 100 characters in length.

Note.— The character count includes all printing and non-printing characters in the message from and including the start-of-message signal (ZCZC) to and including the end-of-message signal (NNNN).

4.4.7 Tape feed

4.4.7.1 **Recommendation.—** *In "torn-tape" installations, and in "semi-automatic" installations using continuous tape technique, when signals additional to those prescribed in 4.4.6.1 are required to ensure that the tape is*

4.4.15 Message format — International Alphabet No. 5 (IA-5)

When it has been agreed between the Administrations concerned to use International Alphabet No. 5 (IA-5) the format described in 4.4.15 through 4.4.15.3 shall be used. It shall be the responsibility of Administrations using IA-5 to accommodate adjacent AFTN stations employing ITA-2 code in the format described in 4.4.2.

All messages, other than those prescribed in 4.4.1.8 and 4.4.9.3 shall comprise the components specified in 4.4.15.1 to 4.4.15.6 inclusive.

Note 1.— An illustration of the IA-5 message format is given in Figure 4-4.

*Note 2.— In the subsequent standards relative to message format the following symbols have been used in making reference to the functions assigned to certain signals in IA-5. (*See *Volume III, Part I, 8.6.1 and Tables 8-2 and 8-3.)*

Symbol	*Signification*
<	CARRIAGE RETURN (character position 0/13)
≡	LINE FEED (character position 0/10)
→	SPACE (character position 2/0).

4.4.15.1 *Heading*

4.4.15.1.1 The heading shall comprise:

a) start-of-heading (SOH) character 0/1;

b) transmission identification comprising:

   1) circuit or link identification;

   2) channel-sequence number;

c) additional service information (if necessary) comprising:

   1) one SPACE;

   2) no more than 10 characters.

4.4.15.1.1.1 On point-to-point circuits or links, the identification shall consist of three letters selected and assigned by the transmitting station; the first letter identifying the transmitting, the second letter the receiving end of the circuit, and the third letter the channel. Where only one channel exists, the letter A shall be assigned. Where more than one channel between stations is provided, the channels shall be identified as A, B, C, etc., in respective order. On multipoint channels, the identification shall consist of three letters selected and assigned by the circuit control or master station.

4.4.15.1.1.2 Except as provided in 4.4.15.1.1.3 three-digit channel-sequence numbers from 001 to 000 (representing 1 000) shall be assigned sequentially by telecommunication stations to all messages transmitted directly from one station to another. A separate series of these numbers shall be assigned for each channel and a new series shall be started daily at 0000 hours.

4.4.15.1.1.3 **Recommendation.—** *The expansion of the channel-sequence number to preclude duplication of the same numbers during the 24-hour period should be permitted subject to agreement between the Authorities responsible for the operation of the circuit.*

4.4.15.1.1.4 The transmission identification shall be sent over the circuit in the following sequence:

a) transmitting-terminal letter;

b) receiving-terminal letter;

c) channel-identification letter;

d) channel-sequence number.

4.4.15.1.1.5 Additional service information shall be permitted to be inserted following the transmission identification subject to agreement between the Authorities responsible for the operation of the circuit. Such additional service information shall be preceded by a SPACE (→) followed by not more than 10 characters inserted into the heading of message immediately following the last digit of the channel-sequence number and shall not contain any alignment functions. When no such additional service information is added the information in 4.4.15.1.1.4 shall be followed immediately by that of 4.4.15.2.

4.4.15.2 *Address*

4.4.15.2.1 The address shall comprise:

a) alignment function [<≡];

b) priority indicator;

c) addressee indicator(s);

d) alignment function [<≡].

4.4.15.2.1.1 The priority indicator shall consist of the appropriate two-letter group assigned by the originator in accordance with the following:

Message part		*Component of the message part*	*Elements of the component*	*Teletypewriter character*
THE HEADING	HEADING LINE (see 4.4.15.1.1)	Start-of-Heading Character	One Character (0/1)	SOH
		Transmission Identification	a) Transmitting-terminal letter b) Receiving-terminal letter c) Channel-identification letter d) Channel-sequence number (*Example:* NRA062)	……
		(*If necessary*) Additional Service Indication	a) One SPACE b) No more than the remainder of the line (*Example:* 270930)	→
	ADDRESS (see 4.4.15.2.1)	Alignment Function	One CARRIAGE RETURN, one LINE FEED	<≡
		Priority Indicator	The relevant 2-letter group	··
		Addressee Indicator(s)	One SPACE An 8-letter group given in sequence for each addressee (*Example:* EGLLZRZX→EGLLYKYX→EGLLACAD)	
		Alignment Function(s)	One CARRIAGE RETURN, one LINE FEED	<≡
	ORIGIN (see 4.4.15.2.2)	Filing Time	6-digit date-time group specifying when the message was filed for transmission	……
		Originator Indicator	a) One SPACE b) 8-letter group identifying the message originator	→……
		Priority Alarm (*used only in teletypewriter operation for Distress Messages*)	Five characters (0/7)(BEL)	
		Optional Heading Information	a) One SPACE b) Additional data not to exceed the remainder of the line. See 4.4.15.2.2.6.	
		Alignment Function	One CARRIAGE RETURN, one LINE FEED	<≡
		Start-of-Text Character	One character (0/2)	STX
TEXT (see 4.4.15.3)		Beginning of the Text	Specific identification of Addressee(s) *(if necessary)* *with* each followed by one CARRIAGE RETURN, one LINE FEED *(if necessary)* The English word FROM *(if necessary)*(see 4.4.15.3.5) Specific identification of Originator *(if necessary)* The English word STOP followed by one CARRIAGE RETURN, one LINE FEED *(if necessary)* (see 4.4.15.3.5) *and/or* Originator's reference *(if used)*	
		Message Text	Message Text with one CARRIAGE RETURN, one LINE FEED at the end of each printed line of the Text except for the last one (see 4.4.15.3.6)	
		Confirmation *(if necessary)*	a) One CARRIAGE RETURN, one LINE FEED b) The abbreviation CFM followed by the portion of the Text being confirmed.	
		Correction *(if necessary)*	a) One CARRIAGE RETURN, one LINE FEED b) The abbreviation COR followed by the correction of an error made in the preceding Text	
ENDING (see 4.4.15.3.12.1)		Alignment Function	One CARRIAGE RETURN, one LINE FEED	<≡
		Page-feed Sequence	One character (0/11)	VT
		End-of-Text character	One character (0/3)	ETX

Figure 4-4. Message format International Alphabet No. 5 (IA-5)
(the above illustrates the teletypewriter message format described in 4.4.15)

Priority indicator	*Message category*
SS	distress messages
DD	urgency messages (*see* 4.4.1.1.2)
FF	flight safety messages (*see* 4.4.1.1.3)
GG	meteorological messages (*see* 4.4.1.1.4)
GG	flight regularity messages (*see* 4.4.1.1.5)
GG	aeronautical information services messages (*see* 4.4.1.1.6)
KK	aeronautical administrative messages (*see* 4.4.1.1.7)
as appropriate	service messages (*see* 4.4.1.1.9)

4.4.15.2.1.2 The order of priority shall be the same as specified in 4.4.1.2.

4.4.15.2.1.3 An addressee indicator, which shall be immediately preceded by a SPACE, except when it is the first address indicator of the second or third line of addresses, shall comprise:

a) the four-letter location indicator of the place of destination;

b) the three-letter designator identifying the organization/ function (aeronautical authority, service or aircraft operating agency) addressed;

c) an additional letter, which shall represent a department, division or process within the organization/function addressed. The letter X shall be used to complete the address when explicit identification is not required.

4.4.15.2.1.3.1 Where a message is to be addressed to an organization that has not been allocated an ICAO three-letter designator of the type prescribed in 4.4.15.2.1.3 the location indicator of the place of destination shall be followed by the ICAO three-letter designator YYY (or the ICAO three-letter designator YXY in the case of a military service or organization). The name of the addressee organization shall then be included in the first item in the text of the message. The eighth position letter following the ICAO three-letter designator YYY or YXY shall be the filler letter X.

4.4.15.2.1.3.2 Where a message is to be addressed to an aircraft in flight and, therefore, requires handling over the AFTN for part of its routing before retransmission over the Aeronautical Mobile Service, the location indicator of the aeronautical station which is to relay the message to the aircraft shall be followed by the ICAO three-letter designator ZZZ. The identification of the aircraft shall then be included in the first item of the text of the message. The eighth position letter following the ICAO three-letter designator ZZZ shall be the filler letter X.

4.4.15.2.1.4 The complete address shall be restricted to three lines of page-printing copy, and, except as provided in 4.4.16, a separate addressee indicator shall be used for each addressee whether at the same or different locations.

4.4.15.2.1.5 The completion of the addressee indicator group(s) in the address of a message shall be immediately followed by the alignment function.

4.4.15.2.1.6 Where messages are offered in page-copy form for transmission and contain more addressee indicators than can be accommodated on three lines of a page copy, such messages shall be converted, before transmission, into two or more messages, each of which shall conform with the provisions of 4.4.15.2.1.5. During such conversion, the addressee indicators shall, in so far as practicable, be positioned in the sequence which will ensure that the minimum number of retransmissions will be required at subsequent communication centres.

4.4.15.2.2 *Origin*

The origin shall comprise:

a) filing time;

b) originator indicator;

c) priority alarm (when necessary);

d) optional heading information;

e) alignment function [<≡];

f) start-of-text character, character 0/2 (STX).

4.4.15.2.2.1 The filing time shall comprise the 6-digit date-time group indicating the date and time of filing the message for transmission (*see* 3.4.2).

4.4.15.2.2.2 The originator indicator, which shall be immediately preceded by a SPACE, shall comprise:

a) the four-letter location indicator of the place at which the message is originated;

b) the three-letter designator identifying the organization/ function (aeronautical authority, service or aircraft operating agency) which originated the message;

c) an additional letter which shall represent a department, division or process within the organization/function of the originator. The letter X shall be used to complete the address when explicit identification is not required.

4.4.15.2.2.3 Where a message is originated by an organization that has not been allocated an ICAO three-letter designator of the type prescribed in 4.4.15.2.2.2, the location indicator of the place at which the message is originated shall be followed immediately by the ICAO three-letter designator YYY followed by the filler letter X (or the ICAO three-letter designator YXY followed by the filler letter X in the case of a military service or organization). The name of the organization (or military service) shall then be included in the first item in the text of the message.

4.4.15.2.2.3.1 Messages relayed over the AFTN that have been originated in other networks shall use a valid AFTN originator indicator that has been agreed for use by the relay or gateway function linking the AFTN with the external network.

4.4.15.2.2.4 Where a message originated by an aircraft in flight requires handling on the AFTN for part of its routing before delivery, the originator indicator shall comprise the location indicator of the aeronautical station responsible for transferring the message to the AFTN, followed immediately by the ICAO three-letter designator ZZZ followed by the filler letter X. The identification of the aircraft shall then be included in the first item in the text of the message.

4.4.15.2.2.5 The priority alarm shall be used only for distress messages. When used it shall consist of five successive BEL (0/7) characters.

Note.— Use of the priority alarm will actuate a bell (attention) signal at the receiving teletypewriter station, other than at those fully automatic stations which may provide a similar alarm on receipt of priority indicator SS, thereby alerting supervisory personnel at relay centres and operators at tributary stations, so that immediate attention may be given to the message.

4.4.15.2.2.6 The inclusion of optional data in the origin line shall be permitted provided a total of 69 characters is not exceeded and subject to agreement between the Administrations concerned. The presence of the optional data field shall be indicated by one occurrence of the SPACE character immediately preceding optional data.

4.4.15.2.2.6.1 **Recommendation.—** *When additional addressing information in a message needs to be exchanged between source and destination addresses, it should be conveyed in the optional data field (ODF), using the following specific format:*

a) characters one and full stop (1.) to indicate the parameter code for the additional address function;

b) three modifier characters, followed by an equal sign (=) and the assigned 8-character ICAO address; and

c) the character hyphen (-) to terminate the additional address parameter field.

4.4.15.2.2.6.1.1 **Recommendation.—** *When a separate address for service messages or inquiries is different from the originator indicator, the modifier SVC should be used.*

4.4.15.2.2.7 The origin line shall be concluded by an alignment function [<≡] and the start-of-text (STX) (0/2) character.

4.4.15.3 *Text*

4.4.15.3.1 The text of messages shall be drafted in accordance with 4.1.2 and shall consist of all data between STX and ETX.

Note.— When message texts do not require conversion to the ITA-2 code and format and do not conflict with ICAO message types or formats in PANS-ATM (Doc 4444), Administrations may make full use of the characters available in International Alphabet No. 5 (IA-5).

4.4.15.3.2 When an originator's reference is used, it shall appear at the beginning of the text, except as provided in 4.4.15.3.3 and 4.4.15.3.4.

4.4.15.3.3 When the ICAO three-letter designators YXY, YYY or ZZZ comprise the second element of the addressee indicator (*see* 4.4.15.2.1.3.1 and 4.4.15.2.1.3.2) and it, therefore, becomes necessary to identify in the text the specific addressee of the message, such identification group shall precede the originator's reference (if used) and become the first item of the text.

4.4.15.3.4 When the ICAO three-letter designators YXY, YYY or ZZZ comprise the second element of the originator indicator (*see* 4.4.15.2.2.3 and 4.4.15.2.2.4) and it thus becomes necessary to identify in the text the name of the organization (or military service) or the aircraft which originated the message, such identification shall be inserted in the first item of the text of the message.

4.4.15.3.5 When applying the provisions of 4.4.15.3.3 and 4.4.15.3.4 to messages where the ICAO three-letter designator(s) YXY, YYY, ZZZ refer to two or more different organizations (or military services), the sequence of further identification in the text shall correspond to the complete sequence used in the address and originator indicator of the message. In such instance, each addressee identification shall be followed immediately by an alignment function. The name of the (YXY, YYY or ZZZ) organization originating the message shall then be preceded with "FROM". "STOP" followed by an alignment function shall then be included in the text at the end of this identification and preceding the remainder of text.

4.4.15.3.6 An alignment function shall be transmitted at the end of each printed line of the text. When it is desired to confirm a portion of the text of a message in teletypewriter operation, such confirmation shall be separated from the last text group by an alignment function [<≡], and shall be indicated by the abbreviation CFM followed by the portion being confirmed.

altitude	*transmitted as*
800	**eight hundred**
3 400	**three thousand four hundred**
12 000	**one two thousand**
cloud height	*transmitted as*
2 200	**two thousand two hundred**
4 300	**four thousand three hundred**
visibility	*transmitted as*
1 000	visibility **one thousand**
700	visibility **seven hundred**
runway visual range	*transmitted as*
600	RVR **six hundred**
1 700	RVR **one thousand seven hundred**

5.2.1.4.1.3 Numbers containing a decimal point shall be transmitted as prescribed in 5.2.1.4.1.1 with the decimal point in appropriate sequence being indicated by the word DECIMAL.

Note 1.— The following examples illustrate the application of this procedure:

Number	*Transmitted as*
100.3	ONE ZERO ZERO DECIMAL THREE
38 143.9	THREE EIGHT ONE FOUR THREE DECIMAL NINE

Note 2.— For identification of VHF frequencies the number of digits used after the decimal point are determined on the basis of the channel spacing (5.2.1.7.3.4.3 refers to frequencies separated by 25 kHz, 5.2.1.7.3.4.4 refers to frequencies separated by 8.33 kHz).

Note 3.— The channelling/frequency pairing relationship for 8.33 kHz and 25 kHz is found in Table 4-1 (bis)*, Volume V.*

5.2.1.4.1.4 **PANS.—** *When transmitting time, only the minutes of the hour should normally be required. Each digit should be pronounced separately. However, the hour should be included when any possibility of confusion is likely to result.*

Note.— The following example illustrates the application of this procedure when applying the provisions of 5.2.1.2.2:

Time	*Statement*
0920 *(9:20 A.M.)*	TOO ZE-RO *or* ZE-RO NIN-er TOO ZE-RO
1643 *(4:43 P.M.)*	FOW-er TREE *or* WUN SIX FOW-er TREE

5.2.1.4.2 *Verification of numbers*

5.2.1.4.2.1 When it is desired to verify the accurate reception of numbers the person transmitting the message shall request the person receiving the message to read back the numbers.

5.2.1.4.3 *Pronunciation of numbers*

5.2.1.4.3.1 When the language used for communication is English, numbers shall be transmitted using the following pronunciation:

Numeral or numeral element	*Pronunciation*
0	ZE-RO
1	WUN
2	TOO
3	TREE
4	FOW-er
5	FIFE
6	SIX
7	SEV-en
8	AIT
9	NIN-er
Decimal	DAY-SEE-MAL
Hundred	HUN-dred
Thousand	TOU-SAND

Note.— The syllables printed in capital letters in the above list are to be stressed; for example, the two syllables in ZE-RO are given equal emphasis, whereas the first syllable of FOW-er is given primary emphasis.

5.2.1.5 *Transmitting technique*

5.2.1.5.1 **PANS.—** *Each written message should be read prior to commencement of transmission in order to eliminate unnecessary delays in communications.*

5.2.1.5.2 Transmissions shall be conducted concisely in a normal conversational tone.

Note.—See the language proficiency requirements in the Appendix to Annex 1.

5.2.1.5.3 **PANS.—** *Speech transmitting technique should be such that the highest possible intelligibility is incorporated in each transmission. Fulfilment of this aim requires that air crew and ground personnel should:*

a) *enunciate each word clearly and distinctly;*

b) *maintain an even rate of speech not exceeding 100 words per minute. When a message is transmitted to an aircraft and its contents need to be recorded the speaking rate should be at a slower rate to allow for the writing process. A slight pause preceding and following numerals makes them easier to understand;*

c) *maintain the speaking volume at a constant level;*

d) *be familiar with the microphone operating techniques particularly in relation to the maintenance of a constant distance from the microphone if a modulator with a constant level is not used;*

e) *suspend speech temporarily if it becomes necessary to turn the head away from the microphone.*

5.2.1.5.4 **Recommendation.—** *Speech transmitting technique should be adapted to the prevailing communications conditions.*

5.2.1.5.5 **PANS.—** *Messages accepted for transmission should be transmitted in plain language or ICAO phraseologies without altering the sense of the message in any way. Approved ICAO abbreviations contained in the text of the message to be transmitted to aircraft should normally be converted into the unabbreviated words or phrases which these abbreviations represent in the language used, except for those which, owing to frequent and common practice, are generally understood by aeronautical personnel.*

Note.— The abbreviations which constitute the exceptions mentioned in 5.2.1.5.5 are specifically identified in the abbreviation encode sections of the PANS-ABC (Doc 8400).

5.2.1.5.6 **PANS.—** *To expedite communication, the use of phonetic spelling should be dispensed with, if there is no risk of this affecting correct reception and intelligibility of the message.*

5.2.1.5.7 **PANS.—** *The transmission of long messages should be interrupted momentarily from time to time to permit the transmitting operator to confirm that the frequency in use is clear and, if necessary, to permit the receiving operator to request repetition of parts not received.*

5.2.1.5.8 The following words and phrases shall be used in radiotelephony communications as appropriate and shall have the meaning ascribed hereunder:

Phrase	*Meaning*
ACKNOWLEDGE	"Let me know that you have received and understood this message."
AFFIRM	"Yes."
APPROVED	"Permission for proposed action granted."
BREAK	"I hereby indicate the separation between portions of the message." *(To be used where there is no clear distinction between the text and other portions of the message.)*
BREAK BREAK	"I hereby indicate the separation between messages transmitted to different aircraft in a very busy environment."
CANCEL	"Annul the previously transmitted clearance."
CHECK	"Examine a system or procedure." *(Not to be used in any other context. No answer is normally expected.)*
CLEARED	"Authorized to proceed under the conditions specified."
CONFIRM	"I request verification of: (*clearance, instruction, action, information*)."
CONTACT	"Establish communications with..."
CORRECT	"True" or "Accurate".
CORRECTION	"An error has been made in this transmission (*or* message indicated). The correct version is..."
DISREGARD	"Ignore."
HOW DO YOU READ	"What is the readability of my transmission?" (*see* 5.2.1.8.4.)
I SAY AGAIN	"I repeat for clarity or emphasis."
MAINTAIN	"Continue in accordance with the condition(s) specified" or in its literal sense, e.g. "Maintain VFR".
MONITOR	"Listen out on (frequency)."
NEGATIVE	"No" *or* "Permission not granted" *or* "That is not correct" *or* "Not capable".
OVER	"My transmission is ended, and I expect a response from you." *Note.— Not normally used in VHF communications.*
OUT	"This exchange of transmissions is ended and no response is expected."

Note.— Not normally used in VHF communications.

READ BACK	"Repeat all, or the specified part, of this message back to me exactly as received."
RECLEARED	"A change has been made to your last clearance and this new clearance supersedes your previous clearance or part thereof."
REPORT	"Pass me the following information..."
REQUEST	"I should like to know..." *or* "I wish to obtain..."
ROGER	"I have received all of your last transmission." *Note.— Under no circumstances to be used in reply to a question requiring "READ BACK" or a direct answer in the affirmative (AFFIRM) or negative (NEGATIVE).*
SAY AGAIN	"Repeat all, or the following part, of your last transmission."
SPEAK SLOWER	"Reduce your rate of speech." *Note.— For normal rate of speech,* see *5.2.1.5.3 b).*
STANDBY	"Wait and I will call you." *Note.— The caller would normally re-establish contact if the delay is lengthy. STANDBY is not an approval or denial.*
UNABLE	"I cannot comply with your request, instruction, or clearance." *Note.— UNABLE is normally followed by a reason.*
WILCO	*(Abbreviation for "will comply".)* "I understand your message and will comply with it."
WORDS TWICE	a) *As a request:* "Communication is difficult. Please send every word, or group of words, twice." b) *As information:* "Since communication is difficult, every word, or group of words, in this message will be sent twice."

5.2.1.6 *Composition of messages*

5.2.1.6.1 Messages handled entirely by the aeronautical mobile service shall comprise the following parts in the order stated:

a) call indicating the addressee and the originator (*see* 5.2.1.7.3);

b) text (*see* 5.2.1.6.2.1.1).

Note.— The following examples illustrate the application of this procedure:

(call)	NEW YORK RADIO SWISSAIR ONE ONE ZERO
(text)	REQUEST SELCAL CHECK

or

(call)	SWISSAIR ONE ONE ZERO NEW YORK RADIO
(text)	CONTACT SAN JUAN ON FIVE SIX

5.2.1.6.2 Messages requiring handling by the AFTN for part of their routing and similarly messages which are not handled in accordance with predetermined distribution arrangements (*see* 3.3.7.1) shall be composed as follows:

5.2.1.6.2.1 *When originated in an aircraft:*

1) call (*see* 5.2.1.7.3);

2) the word FOR;

3) the name of the organization addressed;

4) the name of the station of destination;

5) the text.

5.2.1.6.2.1.1 The text shall be as short as practicable to convey the necessary information; full use shall be made of ICAO phraseologies.

Note.— The following example illustrates the application of this procedure:

(call)	BOSTON RADIO SWISSAIR ONE TWO EIGHT
(address)	FOR SWISSAIR BOSTON
(text)	NUMBER ONE ENGINE CHANGE REQUIRED

5.2.1.6.2.2 *When addressed to an aircraft.* When a message, prepared in accordance with 4.4.2, is retransmitted by an aeronautical station to an aircraft in flight, the heading and address of the AFTN message format shall be omitted during the retransmission on the aeronautical mobile service.

5.2.1.6.2.2.1 When the provisions of 5.2.1.6.2.2 are applied, the aeronautical mobile service message transmission shall comprise:

a) the text [incorporating any corrections (COR) contained in the AFTN message];

b) the word FROM;

c) the name of the originating organization and its location (taken from the origin section of the AFTN message).

5.2.1.6.2.2.2 **PANS.—** *When the text of a message to be transmitted by an aeronautical station to an aircraft in flight contains approved ICAO abbreviations, these abbreviations should normally be converted during the transmission of the message into the unabbreviated words or phrases which the abbreviations represent in the language used, except for those which, owing to frequent or common practice, are generally understood by aeronautical personnel.*

Note.— The abbreviations which constitute the exceptions mentioned in 5.2.1.6.2.2.2 are specifically identified in the abbreviations encode sections of the PANS-ABC (Doc 8400).

5.2.1.7 *Calling*

5.2.1.7.1 *Radiotelephony call signs for aeronautical stations*

Note.— The formation of call signs as specified in ITU Radio Regulations S19 Section III and Section VII.

5.2.1.7.1.1 Aeronautical stations in the aeronautical mobile service shall be identified by:

a) the name of the location; and

b) the unit or service available.

5.2.1.7.1.2 The unit or service shall be identified in accordance with the table below except that the name of the location or the unit/service may be omitted provided satisfactory communication has been established.

Unit/service available	*Call sign suffix*
area control centre	CONTROL
approach control	APPROACH
approach control radar arrivals	ARRIVAL
approach control radar departures	DEPARTURE
aerodrome control	TOWER
surface movement control	GROUND
radar (in general)	RADAR
precision approach radar	PRECISION
direction-finding station	HOMER
flight information service	INFORMATION
clearance delivery	DELIVERY
apron control	APRON
company dispatch	DISPATCH
aeronautical station	RADIO

5.2.1.7.2 *Radiotelephony call signs for aircraft*

5.2.1.7.2.1 *Full call signs*

5.2.1.7.2.1.1 An aircraft radiotelephony call sign shall be one of the following types:

Type a) — the characters corresponding to the registration marking of the aircraft; or

Type b) — the telephony designator of the aircraft operating agency, followed by the last four characters of the registration marking of the aircraft;

Type c) — the telephony designator of the aircraft operating agency, followed by the flight identification.

*Note 1.— The name of the aircraft manufacturer or of the aircraft model may be used as a radiotelephony prefix to the Type a) call sign (*see *Table 5-1).*

Note 2.— The telephony designators referred to in Types b) and c) are contained in Doc 8585 — Designators for Aircraft Operating Agencies, Aeronautical Authorities and Services.

Note 3.— Any of the foregoing call signs may be inserted in field 7 of the ICAO flight plan as the aircraft identification. Instructions on the completion of the flight plan form are contained in PANS-ATM, Doc 4444.

5.2.1.7.2.2 *Abbreviated call signs*

5.2.1.7.2.2.1 The aircraft radiotelephony call signs shown in 5.2.1.7.2.1.1, with the exception of Type c), may be abbreviated in the circumstances prescribed in 5.2.1.7.3.3.1. Abbreviated call signs shall be in the following form:

Type a) — the first character of the registration and at least the last two characters of the call sign;

Type b) — the telephony designator of the aircraft operating agency, followed by at least the last two characters of the call sign;

Table 5-1. Examples of full call signs and abbreviated call signs
(*see* 5.2.1.7.2.1 and 5.2.1.7.2.2)

		Type a)		*Type b)*	*Type c)*
Full call sign	N 57826	*CESSNA FABCD	*CITATION FABCD	VARIG PVMA	SCANDINAVIAN 937
Abbreviated call sign	N26 or N826	CESSNA CD or CESSNA BCD	CITATION CD or CITATION BCD	VARIG MA or VARIG VMA	(no abbreviated form)

* Examples illustrate the application of Note 1 to 5.2.1.7.2.1.1.

Type c) — no abbreviated form.

Note.— Either the name of the aircraft manufacturer or of the aircraft model may be used in place of the first character in Type a).

5.2.1.7.3 *Radiotelephony procedures*

5.2.1.7.3.1 An aircraft shall not change the type of its radiotelephony call sign during flight, except temporarily on the instruction of an air traffic control unit in the interests of safety.

5.2.1.7.3.1.1 Except for reasons of safety no transmission shall be directed to an aircraft during take-off, during the last part of the final approach or during the landing roll.

5.2.1.7.3.2 *Establishment of radiotelephony communications*

5.2.1.7.3.2.1 Full radiotelephony call signs shall always be used when establishing communication. The calling procedure of an aircraft establishing communication shall be in accordance with Table 5-2.

5.2.1.7.3.2.2 **PANS.—** *Stations having a requirement to transmit information to all stations likely to intercept should preface such transmission by the general call ALL STATIONS, followed by the identification of the calling station.*

Note.— No reply is expected to such general calls unless individual stations are subsequently called to acknowledge receipt.

5.2.1.7.3.2.3 The reply to the above calls shall be in accordance with Table 5-3. The use of the calling aeronautical station's call sign followed by the answering aeronautical station's call sign shall be considered the invitation to proceed with transmission by the station calling.

5.2.1.7.3.2.4 **PANS.—** *When a station is called but is uncertain of the identification of the calling station, it should reply by transmitting the following:*

STATION CALLING . . . (station called) SAY AGAIN YOUR CALL SIGN

Note.— The following example illustrates the application of this procedure:

(CAIRO station replying)

STATION CALLING CAIRO *(pause)* SAY AGAIN YOUR CALL SIGN

5.2.1.7.3.2.5 Communications shall commence with a call and a reply when it is desired to establish contact, except that, when it is certain that the station called will receive the call, the calling station may transmit the message, without waiting for a reply from the station called.

5.2.1.7.3.2.6 Interpilot air-to-air communication shall be established on the air-to-air channel 123.45 MHz by either a directed call to a specific aircraft station or a general call, taking into account conditions pertaining to use of this channel.

Note.— For conditions on use of air-to-air channels see *Annex 10, Volume V, 4.1.3.2.1, also Volume II, 5.2.2.1.1.4.*

5.2.1.7.3.2.6.1 **PANS.—** *As the aircraft may be guarding more than one frequency, the initial call should include the distinctive channel identification "INTERPILOT".*

Note.— The following examples illustrate the application of this calling procedure.

CLIPPER 123 — SABENA 901 — INTERPILOT — DO YOU READ

or

ANY AIRCRAFT VICINITY OF 30 NORTH 160 EAST — JAPANAIR 401 — INTERPILOT — OVER

Table 5-2. Radiotelephony calling procedure* (*see* 5.2.1.7.3.2.1)

	Type a)	*Type b)*	*Type c)*
Designation of the station called	NEW YORK RADIO	NEW YORK RADIO	NEW YORK RADIO
Designation of the station calling	GABCD**	SPEEDBIRD ABCD**	AEROFLOT 321**

* *In certain cases where the call is initiated by the aeronautical station, the call may be effected by transmission of coded tone signals.*

** *With the exception of the telephony designators and the type of aircraft, each character in the call sign shall be spoken separately. When individual letters are spelled out, the radiotelephony spelling alphabet prescribed in 5.2.1.3 shall be used. Numbers are to be spoken in accordance with 5.2.1.4.*

Table 5-3. Radiotelephony reply procedure (*see* 5.2.1.7.3.2.3)

	Type a)	*Type b)*	*Type c)*
Designation of the station called	GABCD*	SPEEDBIRD ABCD*	AEROFLOT 321*
Designation of the answering station	NEW YORK RADIO	NEW YORK RADIO	NEW YORK RADIO

* *With the exception of the telephony designators and the type of aircraft, each character in the call sign shall be spoken separately. When individual letters are spelled out, the radiotelephony spelling alphabet prescribed in 5.2.1.3 shall be used. Numbers are to be spoken in accordance with 5.2.1.4.*

5.2.1.7.3.3 *Subsequent radiotelephony communications*

5.2.1.7.3.3.1 Abbreviated radiotelephony call signs, as prescribed in 5.2.1.7.2.2, shall be used only after satisfactory communication has been established and provided that no confusion is likely to arise. An aircraft station shall use its abbreviated call sign only after it has been addressed in this manner by the aeronautical station.

5.2.1.7.3.3.2 After contact has been established, continuous two-way communication shall be permitted without further identification or call until termination of the contact.

5.2.1.7.3.3.3 In order to avoid any possible confusion, when issuing ATC clearances and reading back such clearances, controllers and pilots shall always add the call sign of the aircraft to which the clearance applies.

5.2.1.7.3.4 *Indication of transmitting channel*

5.2.1.7.3.4.1 **PANS.—** *As the aeronautical station operator generally guards more than one frequency, the call should be followed by an indication of the frequency used, unless other suitable means of identifying the frequency are known to exist.*

5.2.1.7.3.4.2 **PANS.—** *When no confusion is likely to arise, only the first two digits of the High Frequency (in kHz) need be used to identify the transmitting channel.*

Note.— The following example illustrates the application of this procedure:

(PAA 325 calling Kingston on 8 871 kHz)

KINGSTON CLIPPER THREE TWO FIVE — ON EIGHT EIGHT

5.2.1.7.3.4.3 **PANS.—** *Except as specified in 5.2.1.7.3.4.4 all six digits of the numerical designator should be used to identify the transmitting channel in VHF radiotelephony communications, except in the case of both the fifth and sixth digits being zeros, in which case only the first four digits should be used.*

Note 1.— The following examples illustrate the application of the procedure in 5.2.1.7.3.4.3:

Channel	*Transmitted as*
118.000	*ONE ONE EIGHT DECIMAL ZERO*
118.005	*ONE ONE EIGHT DECIMAL ZERO ZERO FIVE*

5.2.2.5.2 **PANS.—** *In the case of transfer from one network to another, the transfer should preferably take place while the aircraft is in communication with a station operating in both networks to ensure continuity of communications. If, however, the change of network must take place concurrently with the transfer of communication to another network station, the transfer should be coordinated by the two network stations prior to advising or authorizing the frequency change. The aircraft should also be advised of the primary and secondary frequencies to be used after the transfer.*

5.2.2.5.3 An aircraft station which has transferred communications watch from one radio frequency to another shall, when so required by the appropriate ATS Authority, inform the aeronautical station concerned that communications watch has been established on the new frequency.

5.2.2.5.4 **PANS.—** *When entering a network after take-off, an aircraft station should transmit its take-off time or time over the last check-point, to the appropriate regular station.*

5.2.2.5.5 **PANS.—** *When entering a new network, an aircraft station should transmit the time over the last checkpoint, or of its last reported position, to the appropriate regular station.*

5.2.2.5.6 **PANS.—** *Before leaving the network, an aircraft station should in all cases advise the appropriate regular station of its intention to do so by transmitting one of the following phrases, as appropriate:*

a) *when transferring to a pilot-to-controller channel:*
   Aircraft: CHANGING TO . . . *(air traffic services unit concerned)*

b) *after landing:*
   Aircraft: LANDED . . . *(location)* . . . *(time)*

5.2.2.6 *Transfer of VHF communications*

5.2.2.6.1 An aircraft shall be advised by the appropriate aeronautical station to transfer from one radio frequency to another in accordance with agreed procedures. In the absence of such advice, the aircraft station shall notify the appropriate aeronautical station before such a transfer takes place.

5.2.2.6.2 When establishing initial contact on, or when leaving, a VHF frequency, an aircraft station shall transmit such information as may be prescribed by the appropriate Authority.

5.2.2.7 *Voice communications failure*

5.2.2.7.1 *Air-ground*

5.2.2.7.1.1 When an aircraft station fails to establish contact with the appropriate aeronautical station on the designated channel, it shall attempt to establish contact on the previous channel used and, if not successful, on another channel appropriate to the route. If these attempts fail, the aircraft station shall attempt to establish communication with the appropriate aeronautical station, other aeronautical stations or other aircraft using all available means and advise the aeronautical station that contact on the assigned channel could not be established. In addition, an aircraft operating within a network shall monitor the appropriate VHF channel for calls from nearby aircraft.

5.2.2.7.1.2 If the attempts specified under 5.2.2.7.1.1 fail, the aircraft station shall transmit its message twice on the designated channel(s), preceded by the phrase "TRANSMITTING BLIND" and, if necessary, include the addressee(s) for which the message is intended.

5.2.2.7.1.2.1 **PANS**.— *In network operation, a message which is transmitted blind should be transmitted twice on both primary and secondary channels. Before changing channel, the aircraft station should announce the channel to which it is changing.*

5.2.2.7.1.3 *Receiver failure*

5.2.2.7.1.3.1 When an aircraft station is unable to establish communication due to receiver failure, it shall transmit reports at the scheduled times, or positions, on the channel in use, preceded by the phrase "TRANSMITTING BLIND DUE TO RECEIVER FAILURE". The aircraft station shall transmit the intended message, following this by a complete repetition. During this procedure, the aircraft shall also advise the time of its next intended transmission.

5.2.2.7.1.3.2 An aircraft which is provided with air traffic control or advisory service shall, in addition to complying with 5.2.2.7.1.3.1, transmit information regarding the intention of the pilot-in-command with respect to the continuation of the flight of the aircraft.

5.2.2.7.1.3.3 When an aircraft is unable to establish communication due to airborne equipment failure it shall, when so equipped, select the appropriate SSR code to indicate radio failure.

Note.— General rules which are applicable in the event of communications failure are contained in Annex 2 to the Convention.

5.2.2.7.2 *Ground-to-air*

5.2.2.7.2.1 When an aeronautical station has been unable to establish contact with an aircraft station after calls on the frequencies on which the aircraft is believed to be listening, it shall:

a) request other aeronautical stations to render assistance by calling the aircraft and relaying traffic, if necessary;

b) request aircraft on the route to attempt to establish communication with the aircraft and relay traffic, if necessary.

5.2.2.7.2.2 The provisions of 5.2.2.7.2.1 shall also be applied:

a) on request of the air traffic services unit concerned;

b) when an expected communication from an aircraft has not been received within a time period such that the occurrence of a communication failure is suspected.

Note.— A specific time period may be prescribed by the appropriate ATS Authority.

5.2.2.7.2.3 **Recommendation.—** *If the attempts specified in 5.2.2.7.2.1 fail, the aeronautical station should transmit messages addressed to the aircraft, other than messages containing air traffic control clearances, by blind transmission on the frequency(ies) on which the aircraft is believed to be listening.*

5.2.2.7.2.4 Blind transmission of air traffic control clearances shall not be made to aircraft, except at the specific request of the originator.

5.2.2.7.3 *Notification of communications failure.* The air-ground control radio station shall notify the appropriate air traffic services unit and the aircraft operating agency, as soon as possible, of any failure in air-ground communication.

5.2.3 HF message handling

5.2.3.1 *General*

5.2.3.1.1 **PANS.—** *When operating within a network, an aircraft station should, in principle, whenever communications conditions so permit, transmit its messages to the stations of the network from which they can be most readily delivered to their ultimate destinations. In particular, aircraft reports required by air traffic services should be transmitted to the network station serving the flight information centre or area control centre in whose area the aircraft is flying. Conversely, messages to aircraft in flight should, whenever possible, be transmitted directly to the aircraft by the network station serving the location of the originator.*

Note.— Exceptionally, an aircraft may need to communicate with an aeronautical station outside the network appropriate to its particular route segment. This is permissible, provided it can be done without interrupting the continuous watch with the communication network appropriate to the route segment, when such watch is required by the appropriate ATS Authority, and provided it does not cause undue interference with the operation of other aeronautical stations.

5.2.3.1.2 **PANS.—** *Messages passed from an aircraft to a network station should, whenever possible, be intercepted and acknowledged by other stations of the network, which serve locations where the information is also required.*

Note 1.— Determination of the arrangements for dissemination of air-ground messages without address will be a matter for multilateral or local agreement.

Note 2.— In principle, the number of stations required to intercept are to be kept to a minimum consistent with the operational requirement.

5.2.3.1.2.1 **PANS.—** *Acknowledgement of intercept should be made immediately after the acknowledgement of receipt by the station to which the message was passed.*

5.2.3.1.2.2 **PANS.—** *Acknowledgement of an intercept message should be made by transmitting the radio call sign of the station having intercepted the message, followed by the word ROGER, if desired, and the call sign of the station having transmitted the message.*

5.2.3.1.2.3 **PANS.—** *In the absence of acknowledgement of intercept within one minute, the station accepting the message from the aircraft should forward it, normally over the aeronautical fixed service, to the station(s) which have failed to acknowledge intercept.*

5.2.3.1.2.3.1 **PANS.—** *If, in abnormal circumstances, forwarding is necessary using the air-ground channels, the provisions of 5.2.2.3.4 should be observed.*

5.2.3.1.2.4 **PANS.—** *When such forwarding is done over the aeronautical fixed telecommunication network, the messages should be addressed to the network station(s) concerned.*

5.2.3.1.2.5 **PANS.—** *The station(s) to which the messages have been forwarded should carry out local distribution of them in the same way as if they had been received directly from the aircraft over the air-ground channel.*

5.2.3.1.2.6 The aeronautical station receiving an air-report or a message containing meteorological information transmitted by an aircraft in flight shall forward the message without delay:

1) to the air traffic services unit and meteorological offices associated with the station;

2) to the aircraft operating agency concerned or its representative when that agency has made a specific request to receive such messages.

5.2.3.1.3 **PANS.—** *The provisions of 5.2.3.1.2 should also be applied, if practicable, in non-network operation.*

CHAPTER 8. AERONAUTICAL MOBILE SERVICE — DATA LINK COMMUNICATIONS

8.1 General

Note 1.— While the provisions of Chapter 8 are based primarily on the use of controller-pilot data link communications (CPDLC), the provisions of 8.1 would apply to other data link applications, where applicable, including Data link—flight information services (e.g. D-ATIS, D-VOLMET, etc.).

Note 2.— For the purposes of these provisions, the communication procedures applicable to the aeronautical mobile service, as appropriate, also apply to the aeronautical mobile satellite service.

8.1.1 Composition of data link messages

8.1.1.1 The text of messages shall be composed in standard message format (e.g. CPDLC message set), in plain language or in abbreviations and codes, as prescribed in 3.7. Plain language shall be avoided when the length of the text can be reduced by using appropriate abbreviations and codes. Non-essential words and phrases, such as expressions of politeness, shall not be used.

8.1.1.2 The following characters are allowed in the composition of messages:

Letters: ABCDEFGHIJKLMNOPQRSTUVWXYZ (upper case only)

Figures: 1 2 3 4 5 6 7 8 9 0

Other signs:		
	-	(hyphen)
	?	(question mark)
	:	(colon)
	(	(open bracket)
	)	(close bracket)
	.	(full stop, period, or decimal point)
	,	(comma)
	’	(apostrophe)
	=	(double hyphen or equal sign)
	/	(oblique)
	+	(plus sign)

and the space character.

Characters other than those listed above shall not be used in messages.

8.1.1.3 Roman numerals shall not be employed. If the originator of a message wishes the addressee to be informed that Roman figures are intended, the Arabic figure or figures shall be written and preceded by the word ROMAN.

8.1.2 Display of data link messages

8.1.2.1 Ground and airborne systems shall allow for messages to be appropriately displayed, printed when required, and stored in a manner that permits timely and convenient retrieval should such action be necessary.

8.1.2.2 Whenever textual presentation is required, the English language shall be displayed as a minimum.

8.2 CPDLC procedures

Note.— The CPDLC message set referred to in this section can be found in the PANS-ATM, Appendix 5.

8.2.1 In all communications the highest standard of discipline shall be observed at all times.

8.2.1.1 **Recommendation.—** *Consequences of human performance, which could affect the accurate reception and comprehension of messages, should be taken into consideration when composing a message.*

Note.— Guidance material on human performance can be found in the Human Factors Training Manual *(Doc 9683) and* Human Factors Guidelines for Air Traffic Management (ATM) Systems *(Doc 9758).*

8.2.2 Ground and airborne systems shall provide controllers and pilots with the capability to review and validate any operational messages they send.

8.2.3 Ground and airborne systems shall provide controllers and pilots with the capability to review, validate and when applicable, acknowledge any operational messages they receive.

8.2.4 The controller shall be provided with the capability to respond to messages, including emergencies, to issue clearances, instructions and advisories, and to request and provide information, as appropriate.

8.2.5 The pilot shall be provided with the capability to respond to messages, to request clearances and information, to report information, and to declare or cancel an emergency.

8.2.6 The pilot and the controller shall be provided with the capability to exchange messages which do not conform to defined formats (i.e. free text messages).

8.2.7 Unless specified by the appropriate ATS authority, voice read-back of CPDLC messages shall not be required.

8.2.8 Establishment of CPDLC

8.2.8.1 The controller and the pilot shall be informed when CPDLC has been successfully established.

8.2.8.2 **PANS.—** *CPDLC shall be established in sufficient time to ensure that the aircraft is communicating with the appropriate ATC unit.*

8.2.8.3 The controller and pilot shall be informed when CPDLC is available for operational use, at initial establishment, as well as on resumption of CPDLC after a failure.

8.2.8.4 The pilot shall be able to identify the air traffic control unit providing the air traffic control service at any time while the service is being provided.

8.2.8.5 When the airborne system detects that CPDLC is available for operational use, it shall send the CPDLC downlink message element CURRENT DATA AUTHORITY.

8.2.8.6 *Airborne-initiated CPDLC*

8.2.8.6.1 **PANS.—** *When an ATC unit receives an unexpected request for CPDLC from an aircraft, the circumstances leading to the request shall be obtained from the aircraft to determine further action.*

8.2.8.6.2 **PANS.—** *When the ATC unit rejects a request for CPDLC, it shall provide the pilot with the reason for the rejection using an appropriate CPDLC message.*

8.2.8.7 *ATC unit-initiated CPDLC*

8.2.8.7.1 An ATC unit shall only establish CPDLC with an aircraft if the aircraft has no CPDLC link established, or when authorized by the ATC unit currently having CPDLC established with the aircraft.

8.2.8.7.2 When a request for CPDLC is rejected by an aircraft, the reason for the rejection shall be provided using CPDLC downlink message element NOT CURRENT DATA AUTHORITY or message element NOT AUTHORIZED NEXT DATA AUTHORITY, as appropriate. Local procedures shall dictate whether the reason for rejection is presented to the controller. No other reasons for airborne rejection of ATC unit-initiation of CPDLC shall be permitted.

8.2.9 Exchange of operational CPDLC messages

8.2.9.1 Controllers and pilots shall construct CPDLC messages using the defined message set, a free text message or a combination of both.

8.2.9.1.1 **PANS.—** *When CPDLC is being used, and the intent of the message is included in the CPDLC message set contained in the PANS-ATM, Appendix 5, the associated message shall be used.*

8.2.9.1.2 **PANS.—** *Except as provided by 8.2.12.1, when a controller or pilot communicates via CPDLC, the response should be via CPDLC. When a controller or pilot communicates via voice, the response should be via voice.*

8.2.9.1.3 **PANS.—** *Whenever a correction to a message sent via CPDLC is deemed necessary or the contents of a message needs to be clarified, the controller or pilot shall use the most appropriate means available for issuing the correct details or for providing clarification.*

Note.— The following procedures may be applied by the controller, in terms of correcting clearances, instructions or information, or by a pilot, in terms of correcting a reply to an uplink message or correcting previously advised requests or information.

8.2.9.1.3.1 **PANS.—** *When voice communications are used to correct a CPDLC message for which no operational response has yet been received, the controller's or pilot's transmission shall be prefaced by the phrase: "DISREGARD CPDLC (message type) MESSAGE, BREAK" — followed by the correct clearance, instruction, information or request.*

Note.— It is possible that, at the time the voice communicated clarification is transmitted, the CPDLC message being referred to has not yet reached the recipient, or has reached the recipient but has not been acted upon, or has reached the recipient and has been acted upon.

8.2.9.1.3.2 **PANS.—** *When referring to and identifying the CPDLC message to be disregarded, caution should be exercised in its phrasing so as to avoid any ambiguity with the issuance of the accompanying corrected clearance, instruction, information or request.*

Note.— For example, if SAS445, maintaining FL290, had been instructed via CPDLC to climb to FL350, and the controller needs to correct the clearance utilizing voice communications, the following phrase might be used:

SAS445 DISREGARD CPDLC CLIMB CLEARANCE MESSAGE, BREAK, CLIMB TO FL310.

8.2.9.1.3.3 **PANS.—** *If a CPDLC message that requires an operational response is subsequently negotiated via voice, an appropriate CPDLC message closure response shall be sent to ensure proper synchronization of the CPDLC dialogue. This could be achieved either by explicitly instructing the recipient of the message via voice to close the dialogue or by allowing the system to automatically close the dialogue.*

8.2.9.2 The composition of a CPDLC message shall not exceed five message elements, only two of which may contain the route clearance variable.

8.2.9.2.1 **PANS.—** *The use of long messages or messages with multiple clearance elements, multiple clearance request elements or messages with a combination of clearances and information should be avoided where possible.*

Note.— Guidance material on the development of local operating procedures and CPDLC good operating technique can be found in the Human Factors Guidelines for Air Traffic Management (ATM) Systems *(Doc 9758).*

8.2.9.3 CPDLC ground systems and airborne systems shall be capable of using the CPDLC message urgency and alert attributes to alter presentations in order to draw attention to higher priority messages.

Note.— Message attributes dictate certain message handling requirements for the CPDLC user receiving a message. Each CPDLC message has three attributes: urgency, alert and response attributes. When a message contains multiple message elements, the highest precedence message element attribute type becomes the attribute type for the entire message.

8.2.9.3.1 The urgency attribute shall delineate the queuing requirements for received messages that are displayed to the end-user. Urgency types are presented in Table 8-1.

8.2.9.3.2 The alert attribute shall delineate the type of alerting required upon message receipt. Alert types are presented in Table 8-2.

8.2.9.3.3 The response attribute shall delineate valid responses for a given message element. Response types are presented in Table 8-3 for uplink messages and Table 8-4 for downlink messages.

8.2.9.3.3.1 **PANS.—** *When a multi-element message requires a response, and the response is in the form of a single message element, the response shall apply to all message elements.*

Note.— For example, a multi-element message containing CLIMB TO FL310 MAINTAIN MACH.84, *a* WILCO *response applies to, and indicates compliance with, both elements of the message.*

8.2.9.3.3.2 **PANS.—** *When a single message element clearance or any part of a multi-element clearance message cannot be complied with, the pilot shall send an UNABLE response for the whole message.*

8.2.9.3.3.3 **PANS.—** *The controller shall respond with an UNABLE message that applies to all elements of the request when no element(s) of a single or multi-element clearance request can be approved. The current clearance(s) shall not be restated.*

8.2.9.3.3.4 **PANS.—** *When a multi-element clearance request can only be partially accommodated, the controller shall respond with an UNABLE message applying to all the message elements of the request and, if appropriate, include a reason and/or information on when a clearance may be expected.*

Table 8-1. Urgency Attribute (Uplink and Downlink)

Type	*Description*	*Precedence*
D	Distress	1
U	Urgent	2
N	Normal	3
L	Low	4

Table 8-2. Alert Attribute (Uplink and Downlink)

Type	*Description*	*Precedence*
H	High	1
M	Medium	2
L	Low	3
N	No alerting required	4

Table 8-3. Response Attribute (Uplink)

Type	*Response required*	*Valid responses*	*Precedence*
W/U	Yes	WILCO, UNABLE, STANDBY, NOT CURRENT DATA AUTHORITY, NOT AUTHORIZED NEXT DATA AUTHORITY, LOGICAL ACKNOWLEDGEMENT (only if required), ERROR	1
A/N	Yes	AFFIRM, NEGATIVE, STANDBY, NOT CURRENT DATA AUTHORITY, NOT AUTHORIZED NEXT DATA AUTHORITY, LOGICAL ACKNOWLEDGEMENT (only if required), ERROR	2
R	Yes	ROGER, UNABLE, STANDBY, NOT CURRENT DATA AUTHORITY, NOT AUTHORIZED NEXT DATA AUTHORITY, LOGICAL ACKNOWLEDGEMENT (only if required), ERROR	3
Y	Yes	Any CPDLC downlink message, LOGICAL ACKNOWLEDGEMENT (only if required)	4
N	No, unless logical acknowledgement required	LOGICAL ACKNOWLEDGEMENT (only if required), NOT CURRENT DATA AUTHORITY, NOT AUTHORIZED NEXT DATA AUTHORITY, ERROR	5

Table 8-4. Response Attribute (Downlink)

Type	*Response required*	*Valid responses*	*Precedence*
Y	Yes	Any CPDLC uplink message, LOGICAL ACKNOWLEDGEMENT (only if required)	1
N	No, unless logical acknowledgement required	LOGICAL ACKNOWLEDGEMENT (only if required), SERVICE UNAVAILABLE, FLIGHT PLAN NOT HELD, ERROR	2

Note.— A separate CPDLC message (or messages) may subsequently be transmitted to respond to those elements that can be accommodated.

8.2.9.3.3.5 **PANS.—** *When all elements of a single or multi-element clearance request can be accommodated, the controller shall respond with clearances corresponding to each element of the request. This response should be a single uplink message.*

Note.— For example, while messages containing multi-element clearance requests are to be avoided, a multi-element downlink message containing the indicated message elements:

REQUEST CLEARANCE YQM YYG YYT YQX TRACK X EINN EDDF
REQUEST CLIMB TO FL350
REQUEST MACH 0.84

could be responded to with

CLEARED YQM YYG YYT YQX TRACK X EINN EDDF
CLIMB TO FL350
REPORT MAINTAINING
CROSS YYG AT OR AFTER 1150
NO SPEED RESTRICTION.

8.2.9.3.3.6 **PANS.—** *When a CPDLC message contains more than one message element and the response attribute for the message is Y, when utilized, the single response message shall contain the corresponding number of replies in the same order.*

Note.— For example, a multi-element uplink message containing

CONFIRM SQUAWK
WHEN CAN YOU ACCEPT FL410

could be responded to with

SQUAWKING 5525
WE CAN ACCEPT FL410 AT 1636Z

8.2.9.4 When a ground or airborne system generates the CPDLC message ERROR, the reason for the error shall be included in the message.

8.2.9.5 The appropriate ATS authority shall select those message elements contained in PANS-ATM, Appendix 5 that support operations in their airspace. Should an ATS authority choose to select a subset of the message elements, and a received message does not belong to this subset, the ATC unit shall respond by uplinking the message element SERVICE UNAVAILABLE.

Note.— Further processing of the received message is not required.

8.2.9.5.1 **Recommendation.—** *Only the uplink messages appropriate to a particular control sector's operations should be provided to the controller.*

Note.— The CPDLC message set contained in PANS-ATM, Appendix 5 was developed to encompass different air traffic management environments.

8.2.9.5.2 When considered necessary by the appropriate ATS authority, additional pre-formatted free text messages shall be made available to the controller for those occasions where the CPDLC message set contained in the PANS-ATM does not provide for specific requirements. In such cases, a list of pre-formatted free text messages shall be established by the appropriate ATS authority, in consultation with operators and other ATS authorities that may be concerned.

8.2.9.5.3 Information concerning CPDLC message element subsets utilized and, if applicable, any additional pre-formatted free text messages, shall be published in aeronautical information publications.

8.2.9.6 *Transfer of CPDLC*

Note.— Details on CPDLC transfer can be found in the Manual of Air Traffic Services Data Link Applications *(Doc 9694).*

8.2.9.6.1 **PANS.—** *When CPDLC is transferred, the transfer of voice communications and CPDLC shall commence concurrently.*

8.2.9.6.2 **PANS.—** *When an aircraft is transferred from an ATC unit where CPDLC is available to an ATC unit where CPDLC is not available, CPDLC termination shall commence concurrent with the transfer of voice communications.*

8.2.9.6.3 When a transfer of CPDLC results in a change of data authority, and there are still messages for which the closure response has not been received (i.e. messages outstanding), the controller transferring the CPDLC shall be informed.

8.2.9.6.3.1 If the controller needs to transfer the aircraft without replying to any downlink message(s) outstanding, the system shall have the capability to automatically send the appropriate closure response message(s). In such cases, the contents of any automatically sent closure response message(s) shall be promulgated in local instructions.

8.2.9.6.3.2 When the controller decides to transfer the aircraft without receiving pilot responses to any uplink message(s) outstanding, the ground system shall have the capability to automatically end the dialogue for each message prior to the transfer.

8.2.9.6.3.2.1 **PANS.—** *The controller should revert to voice communications to clarify any ambiguity associated with the message(s) outstanding.*

8.2.9.6.4 When a transfer of CPDLC does not result in a change of data authority, and there are still messages outstanding, these messages shall either be forwarded to the appropriate controller or shall be closed in accordance with local instructions and, if necessary, letters of agreement.

8.2.10 Display of CPDLC messages

Recommendation.— *ATC units utilizing a CPDLC message contained in the PANS-ATM should display the associated text pertaining to that message as presented in the PANS-ATM, Appendix 5.*

8.2.11 Free text messages

PANS.— *The use of free text messages by controllers or pilots, other than pre-formatted free text messages referred to in paragraph 8.2.9.5.2, should be avoided.*

Note.— Whilst it is recognized that non-routine and emergency situations may necessitate the use of free text, particularly when voice communication has failed, the avoidance of utilizing free text messages is intended to reduce the possibility of misinterpretation and ambiguity.

8.2.12 Emergencies, hazards and equipment failure procedures

8.2.12.1 **PANS.—** *When a CPDLC emergency message is received, the controller shall acknowledge receipt of the message by the most efficient means available.*

8.2.12.2 **PANS.—** *When responding via CPDLC to a report indicating unlawful interference, uplink message* ROGER 7500 *shall be used.*

8.2.12.3 **PANS.—** *When responding via CPDLC to all other emergency or urgency messages, uplink message* ROGER *shall be used.*

8.2.12.4 When a CPDLC message requires a logical acknowledgement and/or an operational response, and such a response is not received, the pilot or controller, as appropriate, shall be alerted.

8.2.12.5 *Failure of CPDLC*

Note.— Action to be taken in the event of the failure of a single CPDLC message is covered in 8.2.12.7.

8.2.12.5.1 **Recommendation.—** *A CPDLC failure should be detected in a timely manner.*

8.2.12.5.2 The controller and pilot shall be alerted to a failure of CPDLC as soon as a failure has been detected.

8.2.12.5.3 **PANS.—** *When a controller or pilot is alerted that CPDLC has failed, and the controller or pilot needs to communicate prior to CPDLC being restored, the controller or pilot should revert to voice, if possible, and preface the information with the phrase:*

CPDLC FAILURE.

8.2.12.5.4 **PANS.—** *Controllers having a requirement to transmit information concerning a complete CPDLC ground system failure to all stations likely to intercept should preface such a transmission by the general call ALL STATIONS CPDLC FAILURE, followed by the identification of the calling station.*

Note.— No reply is expected to such general calls unless individual stations are subsequently called to acknowledge receipt.

8.2.12.5.5 **PANS.—** *When CPDLC fails and communications revert to voice, all CPDLC messages outstanding should be considered not delivered and the entire dialogue involving the messages outstanding should be recommenced by voice.*

8.2.12.5.6 **PANS.—** *When CPDLC fails but is restored prior to a need to revert to voice communications, all messages outstanding should be considered not delivered and the entire dialogue involving the messages outstanding should be recommenced via CPDLC.*

8.2.12.6 *Intentional shutdown of CPDLC*

8.2.12.6.1 When a system shutdown of the communications network or the CPDLC ground system is planned, a NOTAM shall be published to inform all affected parties of the shutdown period and if necessary, the details of the voice communication frequencies to be used.

8.2.12.6.2 Aircraft currently in communication with the ATC unit shall be informed by voice or CPDLC of any imminent loss of CPDLC service.

8.2.12.6.3 The controller and pilot shall be provided with the capability to abort CPDLC.

8.2.12.7 *Failure of a single CPDLC message*

PANS.— *When a controller or pilot is alerted that a single CPDLC message has failed, the controller or pilot shall take one of the following actions, as appropriate:*

a) via voice, confirm the actions that will be undertaken with respect to the related dialogue, prefacing the information with the phrase:

CPDLC MESSAGE FAILURE*;*

b) via CPDLC, reissue the CPDLC message that failed.

8.2.12.8 *Discontinuation of the use of CPDLC pilot requests*

8.2.12.8.1 **PANS.—** *When a controller requires all stations or a specific flight to avoid sending CPDLC requests for a limited period of time, the following phrase shall be used:*

(*(call sign) or* ALL STATIONS) STOP SENDING CPDLC REQUESTS [UNTIL ADVISED] [*(reason)*]

Note.— Under these circumstances, CPDLC remains available for the pilot to, if necessary, respond to messages, report information, and declare and cancel an emergency.

8.2.12.8.2 **PANS.—** *The resumption of the normal use of CPDLC shall be advised by using the following phrase:*

(*(call sign) or* ALL STATIONS) RESUME NORMAL CPDLC OPERATIONS

8.2.13 Where the testing of CPDLC with an aircraft could affect the air traffic services being provided to the aircraft, coordination shall be effected prior to such testing.

8.2.14 Downstream clearance delivery service

8.2.14.1 The appropriate ATS authority shall determine whether an ATC unit supports downstream clearance delivery service.

8.2.14.2 *Establishment of downstream clearance delivery service*

8.2.14.2.1 Downstream clearance delivery service shall only be initiated by the airborne system. The initiation shall indicate that this communication is only to receive a downstream clearance.

8.2.14.2.2 When an ATC unit rejects a request for downstream clearance delivery service, it shall provide the pilot with the reason for the rejection using the CPDLC message SERVICE UNAVAILABLE.

8.2.14.3 *Operation of downstream clearance delivery service*

8.2.14.3.1 The controller and pilot shall be informed when downstream clearance delivery service is available for operational communication.

8.2.14.3.2 The controller and pilot shall be informed of the failure of downstream clearance delivery service.

8.2.14.3.3 The CPDLC message elements that are permitted for downstream clearance delivery service shall be established by regional air navigation agreement.

8.2.14.3.4 A clearance request issued as a downstream clearance request shall be clearly identifiable as such to the controller.

8.2.14.3.5 A clearance issued as a downstream clearance shall be clearly identifiable as such to the pilot.

8.2.14.4 *Termination of downstream clearance delivery service*

8.2.14.4.1 Termination of downstream clearance delivery service shall only be initiated by the airborne system.

8.2.14.4.2 Downstream clearance delivery service with an ATC unit shall be terminated whenever the downstream data authority becomes the current data authority.

International Standards
and Recommended Practices

Annex 10
to the Convention on
International Civil Aviation

Aeronautical Telecommunications

Volume III
Communication Systems

(Part I — Digital Data Communication Systems
Part II — Voice Communication Systems)

This edition incorporates all amendments adopted by the Council prior to 27 February 2007 and supersedes, on 22 November 2007, all previous editions of Annex 10, Volume III.

For information regarding the applicability of the Standards and Recommended Practices, *see* Foreword.

Second Edition
July 2007

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TRANSMITTAL NOTE

NEW EDITIONS OF ANNEXES TO THE CONVENTION ON INTERNATIONAL CIVIL AVIATION

It has come to our attention that when a new edition of an Annex is published, users have been discarding, along with the previous edition of the Annex, the **Supplement** to the previous edition. Please note that the Supplement to the previous edition should be retained until a new Supplement is issued.

International Standards
and Recommended Practices

Annex 10
to the Convention on
International Civil Aviation

Aeronautical Telecommunications

Volume III
Communication Systems
(Part I — Digital Data Communication Systems
Part II — Voice Communication Systems)

This edition incorporates all amendments adopted by the Council prior to 27 February 2007 and supersedes, on 22 November 2007, all previous editions of Annex 10, Volume III.

For information regarding the applicability of the Standards and Recommended Practices, *see* Foreword.

Second Edition
July 2007

International Civil Aviation Organization

AMENDMENTS

The issue of amendments is announced regularly in the *ICAO Journal* and in the monthly *Supplement to the Catalogue of ICAO Publications and Audio-visual Training Aids*, which holders of this publication should consult. The space below is provided to keep a record of such amendments.

RECORD OF AMENDMENTS AND CORRIGENDA

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70-82	Incorporated in this edition		

CORRIGENDA			
No.	Date of issue	Date entered	Entered by

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FOREWORD

Historical background

Standards and Recommended Practices for Aeronautical Telecommunications were first adopted by the Council on 30 May 1949 pursuant to the provisions of Article 37 of the Convention on International Civil Aviation (Chicago 1944) and designated as Annex 10 to the Convention. They became effective on 1 March 1950. The Standards and Recommended Practices were based on recommendations of the Communications Division at its Third Session in January 1949.

Up to and including the Seventh Edition, Annex 10 was published in one volume containing four Parts together with associated attachments: Part I — Equipment and Systems, Part II — Radio Frequencies, Part III — Procedures, and Part IV — Codes and Abbreviations.

By Amendment 42, Part IV was deleted from the Annex; the codes and abbreviations contained in that Part were transferred to a new document, Doc 8400.

As a result of the adoption of Amendment 44 on 31 May 1965, the Seventh Edition of Annex 10 was replaced by two volumes: Volume I (First Edition) containing Part I — Equipment and Systems, and Part II — Radio Frequencies, and Volume II (First Edition) containing Communication Procedures.

As a result of the adoption of Amendment 70 on 20 March 1995, Annex 10 was restructured to include five volumes: Volume I — Radio Navigation Aids; Volume II — Communication Procedures; Volume III — Communication Systems; Volume IV — Surveillance Radar and Collision Avoidance Systems; and Volume V — Aeronautical Radio Frequency Spectrum Utilization. By Amendment 70, Volumes III and IV were published in 1995 and Volume V was planned for publication with Amendment 71.

Table A shows the origin of Annex 10, Volume III subsequent to Amendment 70, together with a summary of the principal subjects involved and the dates on which the Annex and the amendments were adopted by Council, when they became effective and when they became applicable.

Action by Contracting States

Notification of differences. The attention of Contracting States is drawn to the obligation imposed by Article 38 of the Convention by which Contracting States are required to notify the Organization of any differences between their national regulations and practices and the International Standards contained in this Annex and any amendments thereto. Contracting States are invited to extend such notification to any differences from the Recommended Practices contained in this Annex and any amendments thereto, when the notification of such differences is important for the safety of air navigation. Further, Contracting States are invited to keep the Organization currently informed of any differences which may subsequently occur, or of the withdrawal of any differences previously notified. A specific request for notification of differences will be sent to Contracting States immediately after the adoption of each amendment to this Annex.

The attention of States is also drawn to the provisions of Annex 15 related to the publication of differences between their national regulations and practices and the related ICAO Standards and Recommended Practices through the Aeronautical Information Service, in addition to the obligation of States under Article 38 of the Convention.

Promulgation of information. The establishment and withdrawal of and changes to facilities, services and procedures affecting aircraft operations provided in accordance with the Standards, Recommended Practices and Procedures specified in Annex 10 should be notified and take effect in accordance with the provisions of Annex 15.

Use of the text of the Annex in national regulations. The Council, on 13 April 1948, adopted a resolution inviting the attention of Contracting States to the desirability of using in their own national regulations, as far as practicable, the precise language of those ICAO Standards that are of a regulatory character and also of indicating departures from the Standards, including any additional national regulations that were important for the safety or regularity of air navigation. Wherever possible, the provisions of this Annex have been deliberately written in such a way as would facilitate incorporation, without major textual changes, into national legislation.

Status of Annex components

An Annex is made up of the following component parts, not all of which, however, are necessarily found in every Annex; they have the status indicated:

1.— *Material comprising the Annex proper*:

a) *Standards* and *Recommended Practices* adopted by the Council under the provisions of the Convention. They are defined as follows:

   Standard: Any specification for physical characteristics, configuration, matériel, performance, personnel or procedure, the uniform application of which is recognized as necessary for the safety or regularity of international air navigation and to which Contracting States will conform in accordance with the Convention; in the event of impossibility of compliance, notification to the Council is compulsory under Article 38.

   Recommended Practice: Any specification for physical characteristics, configuration, matériel, performance, personnel or procedure, the uniform application of which is recognized as desirable in the interest of safety, regularity or efficiency of international air navigation, and to which Contracting States will endeavour to conform in accordance with the Convention.

b) *Appendices* comprising material grouped separately for convenience but forming part of the Standards and Recommended Practices adopted by the Council.

c) *Definitions* of terms used in the Standards and Recommended Practices which are not self-explanatory in that they do not have accepted dictionary meanings. A definition does not have independent status but is an essential part of each Standard and Recommended Practice in which the term is used, since a change in the meaning of the term would affect the specification.

d) *Tables* and *Figures* which add to or illustrate a Standard or Recommended Practice and which are referred to therein, form part of the associated Standard or Recommended Practice and have the same status.

2.— *Material approved by the Council for publication in association with the Standards and Recommended Practices*:

a) *Forewords* comprising historical and explanatory material based on the action of the Council and including an explanation of the obligations of States with regard to the application of the Standards and Recommended Practices ensuing from the Convention and the Resolution of Adoption;

b) *Introductions* comprising explanatory material introduced at the beginning of parts, chapters or sections of the Annex to assist in the understanding of the application of the text;

c) *Notes* included in the text, where appropriate, to give factual information or references bearing on the Standards or Recommended Practices in question, but not constituting part of the Standards or Recommended Practices;

d) *Attachments* comprising material supplementary to the Standards and Recommended Practices, or included as a guide to their application.

Disclaimer regarding patents

Attention is drawn to the possibility that certain elements of Standards and Recommended Practices in this Annex may be the subject of patents or other intellectual property rights. ICAO shall not be responsible or liable for not identifying any or all such rights. ICAO takes no position regarding the existence, validity, scope or applicability of any claimed patents or other intellectual property rights, and accepts no responsibility or liability therefore or relating thereto.

Selection of language

This Annex has been adopted in four languages — English, French, Russian and Spanish. Each Contracting State is requested to select one of those texts for the purpose of national implementation and for other effects provided for in the Convention, either through direct use or through translation into its own national language, and to notify the Organization accordingly.

Editorial practices

The following practice has been adhered to in order to indicate at a glance the status of each statement: *Standards* have been printed in light face roman; *Recommended Practices* have been printed in light face italics, the status being indicated by the prefix Recommendation; *Notes* have been printed in light face italics, the status being indicated by the prefix *Note*.

The following editorial practice has been followed in the writing of specifications: for Standards the operative verb "shall" is used, and for Recommended Practices the operative verb "should" is used.

The units of measurement used in this document are in accordance with the International System of Units (SI) as specified in Annex 5 to the Convention on International Civil Aviation. Where Annex 5 permits the use of non-SI alternative units these are shown in parentheses following the basic units. Where two sets of units are quoted it must not be assumed that the pairs of values are equal and interchangeable. It may, however, be inferred that an equivalent level of safety is achieved when either set of units is used exclusively.

Any reference to a portion of this document, which is identified by a number and/or title, includes all subdivisions of that portion.

Table A. Amendments to Annex 10, Volume III

Amendment	*Source(s)*	*Subject(s)*	*Adopted Effective Applicable*
70	Air Navigation Commission, Third Meeting of the Aeronautical Mobile Communications Panel (AMCP)	Introduction of new Volume III and SARPs related to the Aeronautical Mobile-Satellite Service (AMSS)	20 March 1995 24 July 1995 9 November 1995
71	Air Navigation Commission; SP COM/OPS/95 Divisional Meeting (1995); fifth meeting of the Secondary Surveillance Radar Improvements and Collision Avoidance Systems Panel (SICASP); third meeting of the Aeronautical Mobile Communications Panel (AMCP)	Addition of specifications for the Mode S subnetwork of ATN; addition of material relating to the introduction of 8.33 kHz channel spacing; changes to material related to the protection of air-ground communications in the VHF band; addition of technical specifications relating to the RF characteristics for the VHF digital link (VDL).	12 March 1996 15 July 1996 7 November 1996
72	Air Navigation Commission; fourth meeting of the Aeronautical Mobile Communications Panel (AMCP)	Introduction of SARPs and guidance material for VHF digital link (VDL); definition for VDL and deletion of obsolete material on air/ground data interchange.	12 March 1997 21 July 1997 6 November 1997
73	Air Navigation Commission; second meeting of the Aeronautical Telecommunication Network Panel (ATNP); sixth meeting of the Secondary Surveillance Radar Improvements and Collision Avoidance Systems Panel (SICASP)	Introduction of material relating to the ATN; changes to specifications of the Mode S subnetwork.	19 March 1998 20 July 1998 5 November 1998
74	Fifth meeting of the Aeronautical Mobile Communications Panel (AMCP); Air Navigation Commission	Introduction of: a) specifications for HF data link; and b) changes to the specifications for emergency locator transmitters.	18 March 1999 19 July 1999 4 November 1999
75	Sixth meeting of the Aeronautical Mobile Communications Panel (AMCP); Air Navigation Commission	Changes to the AMSS SARPs introducing a new antenna type, a new voice channel type and enhanced provisions for interoperability among AMSS systems; changes to the VDL SARPs to reduce potential interference to current VHF voice communication systems caused by VDL transmitters; changes to the VHF voice communication SARPs to enhance immunity to interference from VDL transmitters on board the same aircraft.	13 March 2000 17 July 2000 2 November 2000
76	Third meeting of the Aeronautical Telecommunication Network Panel (ATNP); seventh meeting of the Aeronautical Mobile Communications Panel (AMCP); the Secretariat assisted by the ATS Voice Switching and Signalling Study Group (AVSSSG)	Aeronautical telecommunication network (ATN) system management, security and directory services; removal of detailed material relating to CIDIN; integrated voice and data link system (VDL Mode 3); data link satisfying surveillance applications (VDL Mode 4); deletion of all the provisions for VDL Mode 1; removal of the detailed technical specifications for VDL Mode 2; aeronautical speech circuits; update of references to the ITU Radio Regulations.	12 March 2001 16 July 2001 1 November 2001

Amendment	*Source(s)*	*Subject(s)*	*Adopted Effective Applicable*
77	Secondary Surveillance Radar Improvements and Collision Avoidance Systems Panel (SICASP)	Mode S subnetwork (Part I), aircraft addressing system (Part I).	27 February 2002 15 July 2002 28 November 2002
78	Air Navigation Commission	Changes to technical specifications relating to radio frequency channels; introduction of registration requirement for ELTs; incorporation of VDL Modes 3 and 4 in the table of ATN subnetwork priorities (Table 3-3); editorial amendments.	5 March 2003 14 July 2003 27 November 2003
79	Eighth meeting of the Aeronautical Mobile Communications Panel (AMCP)	Changes to technical specifications relating to high frequency data link (HFDL) to align them with relevant provisions of ITU RR; introduction of FM immunity characteristics for VDL Mode 4; deletion of the note indicating that VDL Mode 4 SARPs apply to surveillance applications.	23 February 2004 12 July 2004 25 November 2004
80	Air Navigation Commission	Provisions for the location protocols for use in emergency locator transmitters (ELTs) operating on the 406 MHz frequency.	25 February 2005 11 July 2005 24 November 2005
81	—	No change.	—
82	Aeronautical Communications Panel (ACP); Surveillance and Conflict Resolution Systems Panel (SCRSP); Operational Data Link Panel (OPLINKP)	Updating ATN provisions on AMHS; revision of AMS(R)S SARPs; introduction of UAT; updating of material on SSR Mode S data link and use of Mode S extended squitter for ADS-B; relocation of Mode S and extended squitter ADS-B data formats to separate manuals.	26 February 2007 16 July 2007 22 November 2007

INTERNATIONAL STANDARDS AND RECOMMENDED PRACTICES

PART I — DIGITAL DATA COMMUNICATION SYSTEMS

CHAPTER 1. DEFINITIONS

Note 1.— All references to "Radio Regulations" are to the Radio Regulations published by the International Telecommunication Union (ITU). Radio Regulations are amended from time to time by the decisions embodied in the Final Acts of World Radiocommunication Conferences held normally every two to three years. Further information on the ITU processes as they relate to aeronautical radio system frequency use is contained in the Handbook on Radio Frequency Spectrum Requirements for Civil Aviation including statement of approved ICAO policies *(Doc 9718).*

Note 2.— This Part of Annex 10 includes Standards and Recommended Practices for certain forms of equipment for communication systems. While the Contracting State will determine the necessity for specific installations in accordance with the conditions prescribed in the relevant Standard or Recommended Practice, review of the need for specific installation and the formulation of ICAO opinion and recommendations to Contracting States concerned, is carried out periodically by Council, ordinarily on the basis of recommendations of Regional Air Navigation Meetings (Doc 8144, Directives to Regional Air Navigation Meetings and Rules of Procedure for their Conduct*).*

Note 3.— This chapter contains general definitions relevant to communication systems. Definitions specific to each of the systems included in this volume are contained in the relevant chapters.

Note 4.— Material on secondary power supply and guidance material concerning reliability and availability for communication systems is contained in Annex 10, Volume I, 2.9 and Volume I, Attachment F, respectively.

Aeronautical telecommunication network (ATN). An internetwork architecture that allows ground, air-ground and avionic data subnetworks to interoperate by adopting common interface services and protocols based on the International Organization for Standardization (ISO) Open Systems Interconnection (OSI) reference model.

Aircraft address. A unique combination of twenty-four bits available for assignment to an aircraft for the purpose of air-ground communications, navigation and surveillance.

Aircraft earth station (AES). A mobile earth station in the aeronautical mobile-satellite service located on board an aircraft (see also "GES").

Bit error rate (BER). The number of bit errors in a sample divided by the total number of bits in the sample, generally averaged over many such samples.

Carrier-to-multipath ratio (C/M). The ratio of the carrier power received directly, i.e. without reflection, to the multipath power, i.e. carrier power received via reflection.

Carrier-to-noise density ratio (C/N_o). The ratio of the total carrier power to the average noise power in a 1 Hz bandwidth, usually expressed in dBHz.

Channel rate. The rate at which bits are transmitted over the RF channel. These bits include those bits used for framing and error correction, as well as the information bits. For burst transmission, the channel rate refers to the instantaneous burst rate over the period of the burst.

Channel rate accuracy. This is relative accuracy of the clock to which the transmitted channel bits are synchronized. For example, at a channel rate of 1.2 kbits/s, maximum error of one part in 10^6 implies the maximum allowed error in the clock is $\pm 1.2 \times 10^{-3}$ Hz.

Circuit mode. A configuration of the communications network which gives the appearance to the application of a dedicated transmission path.

Doppler shift. The frequency shift observed at a receiver due to any relative motion between transmitter and receiver.

End-to-end. Pertaining or relating to an entire communication path, typically from (1) the interface between the information source and the communication system at the transmitting end to (2) the interface between the communication system and the information user or processor or application at the receiving end.

End-user. An ultimate source and/or consumer of information.

Energy per symbol to noise density ratio (E_s/N_o). The ratio of the average energy transmitted per channel symbol to the average noise power in a 1 Hz bandwidth, usually expressed in dB. For A-BPSK and A-QPSK, one channel symbol refers to one channel bit.

Equivalent isotropically radiated power (e.i.r.p.). The product of the power supplied to the antenna and the antenna gain in a given direction relative to an isotropic antenna *(absolute or isotropic gain).*

Forward error correction (FEC). The process of adding redundant information to the transmitted signal in a manner which allows correction, at the receiver, of errors incurred in the transmission.

Gain-to-noise temperature ratio. The ratio, usually expressed in dB/K, of the antenna gain to the noise at the receiver output of the antenna subsystem. The noise is expressed as the temperature that a 1 ohm resistor must be raised to produce the same noise power density.

Ground earth station (GES). An earth station in the fixed satellite service, or, in some cases, in the aeronautical mobile-satellite service, located at a specified fixed point on land to provide a feeder link for the aeronautical mobile-satellite service.

Note.— This definition is used in the ITU's Radio Regulations under the term "aeronautical earth station". The definition herein as "GES" for use in the SARPs is to clearly distinguish it from an aircraft earth station (AES), which is a mobile station on an aircraft.

Mode S subnetwork. A means of performing an interchange of digital data through the use of secondary surveillance radar (SSR) Mode S interrogators and transponders in accordance with defined protocols.

Packet. The basic unit of data transfer among communications devices within the network layer.

Packet layer protocol (PLP). A protocol to establish and maintain a connection between peer level entities at the network layer, and to transfer data packets between them. In the context of this standard, the term refers to the protocol defined by the ISO 8208 standard used in this document.

Point-to-point. Pertaining or relating to the interconnection of two devices, particularly end-user instruments. A communication path of service intended to connect two discrete end-users; as distinguished from broadcast or multipoint service.

Slotted aloha. A random access strategy whereby multiple users access the same communications channel independently, but each communication must be confined to a fixed time slot. The same timing slot structure is known to all users, but there is no other coordination between the users.

Switched virtual circuit (SVC). The primary circuit management technique provided within the ISO 8208 protocol. The network resources are dynamically allocated when needed and released when no longer required.

Time division multiple access (TDMA). A multiple access scheme based on time-shared use of an RF channel employing: (1) discrete contiguous time slots as the fundamental shared resource; and (2) a set of operating protocols that allows users to interact with a master control station to mediate access to the channel.

Time division multiplex (TDM). A channel sharing strategy in which packets of information from the same source but with different destinations are sequenced in time on the same channel.

Transit delay. In packet data systems, the elapsed time between a request to transmit an assembled data packet and an indication at the receiving end that the corresponding packet has been received and is ready to be used or forwarded.

VHF digital link (VDL). A constituent mobile subnetwork of the aeronautical telecommunication network (ATN), operating in the aeronautical mobile VHF frequency band. In addition, the VDL may provide non-ATN functions such as, for instance, digitized voice.

CHAPTER 2. GENERAL

[to be developed]

CHAPTER 3. AERONAUTICAL TELECOMMUNICATION NETWORK

3.1 DEFINITIONS

Note 1.— The following definitions were taken from ISO/IEC 7498-1, Information technology — Open Systems Interconnection — Basic Reference Model *(Reference: ITU-T Rec. X.200 (1994)) and from ICAO Doc 9705* — Manual of Technical Provisions for the Aeronautical Telecommunication Network (ATN).

Note 2.— ICAO Doc 9705 has evolved through multiple editions. Each sub-volume of that document indicates the evolution of the provisions between successive editions.

Note 3.— Sub-volume I of ICAO Doc 9705 provides a cross-reference chart between versions (i.e. embedded software capabilities) and editions (i.e. technical provisions).

Accounting management. An ATN systems management facility to monitor users for use of network resources and to limit the use of those resources.

ADS application. An ATN application that provides ADS data from the aircraft to the ATS unit(s) for surveillance purposes.

Aeronautical administrative communication (AAC). Communication used by aeronautical operating agencies related to the business aspects of operating their flights and transport services. This communication is used for a variety of purposes, such as flight and ground transportation, bookings, deployment of crew and aircraft or any other logistical purposes that maintain or enhance the efficiency of overall flight operation.

Aeronautical operational control (AOC). Communication required for the exercise of authority over the initiation, continuation, diversion or termination of flight for safety, regularity and efficiency reasons.

Aeronautical passenger communication (APC). Communication relating to the non-safety voice and data services to passengers and crew members for personal communication.

AIDC application. An ATN application dedicated to exchanges between ATS units (ATSUs) of air traffic control (ATC) information in support of flight notification, flight coordination, transfer of control, transfer of communication, transfer of surveillance data and transfer of general data.

Air traffic service. A generic term meaning variously, flight information service, alerting service, air traffic advisory service, air traffic control service (area control service, approach control service or aerodrome control service).

Application. The ultimate use of an information system, as distinguished from the system itself.

Application entity (AE). Part of an application process that is concerned with communication within the OSI environment. The aspects of an application process that need to be taken into account for the purposes of OSI are represented by one or more AEs.

Application information. Refers to the application names (e.g. AE qualifiers such as ADS and CPC), version numbers, and addresses (the long or short TSAP, as required) of each application.

ATIS application. A FIS application that supports the D-ATIS.

ATN directory services (DIR). A service which provides the capability for an application entity or user in the ATN community to query a distributed directory database and retrieve addressing, security and technical capabilities information relating to other users or entities within the ATN community.

ATN security services. A set of information security provisions allowing the receiving end system or intermediate system to unambiguously identify (i.e. authenticate) the source of the received information and to verify the integrity of that information.

ATN systems management (SM). A collection of facilities to control, coordinate and monitor the resources which allow communications to take place in the ATN environment. These facilities include fault management, accounting management, configuration management, performance management and security management.

ATSC class. The ATSC class parameter enables the ATSC user to specify the quality of service expected for the offered data. The ATSC class value is specified in terms of ATN end-to-end transit delay at 95 per cent probability.

ATS communications (ATSC). Communication related to air traffic services including air traffic control, aeronautical and meteorological information, position reporting and services related to safety and regularity of flight. This communication involves one or more air traffic service administrations. This term is used for purposes of address administration.

ATS interfacility data communication (AIDC). Automated data exchange between air traffic services units, particularly in regard to coordination and transfer of flights.

ATS message handling service (ATSMHS). An ATN application consisting of procedures used to exchange ATS messages in store-and-forward mode over the ATN such that the conveyance of an ATS message is in general not correlated with the conveyance of another ATS message by the service provider.

ATS message handling system (AMHS). The set of computing and communication resources implemented by ATS organizations to provide the ATS message handling service.

ATS unit (ATSU). A generic term meaning variously, air traffic control unit, flight information centre or air traffic services reporting office.

Authentication**.** A process used to ensure the identity of a person/user/network entity.

Authorized path. A communication path that the administrator(s) of the routing domain(s) has pre-defined as suitable for a given traffic type and category.

Automatic dependent surveillance (ADS). A surveillance technique in which aircraft automatically provide, via a data link, data derived from on-board navigation and position-fixing systems, including aircraft identification, four-dimensional position, and additional data as appropriate.

Automatic terminal information service (ATIS). The automatic provision of current, routine information to arriving and departing aircraft throughout 24 hours or a specified portion thereof.

Data link-automatic terminal information service (D-ATIS). The provision of ATIS via data link.

Voice-automatic terminal information service (Voice-ATIS). The provision of ATIS by means of continuous and repetitive voice broadcasts.

Configuration management. An ATN systems management facility for managers to change the configuration of remote elements.

Context management (CM) application. An ATN application that provides a log-on service allowing initial aircraft introduction into the ATN and a directory of all other data link applications on the aircraft. It also includes functionality to forward addresses between ATS units.

Note.— Context management is a recognized OSI presentation layer term. The OSI use and the ATN use have nothing in common.

Context management (CM) server. An ATS facility that is capable of providing application information relating to other ATSUs to requesting aircraft or ATSUs.

Controller pilot data link communication (CPDLC). A means of communication between controller and pilot, using data link for ATC communications.

CPDLC application**.** An ATN application that provides a means of ATC data communication between controlling, receiving or downstream ATS units and the aircraft, using air-ground and ground-ground subnetworks, and which is consistent with the ICAO phraseology for the current ATC voice communication.

Data integrity. The probability that data has not been altered or destroyed.

D-METAR. The symbol used to designate data link aviation weather report service.

End system (ES)**.** A system that contains the OSI seven layers and contains one or more end user application processes.

End-to-end. Pertaining or relating to an entire communication path, typically from (1) the interface between the information source and the communication system at the transmitting end to (2) the interface between the communication system and the information user or processor or application at the receiving end.

Entity. An active element in any layer which can be either a software entity (such as a process) or a hardware entity (such as an intelligent I/O chip).

Fault management. An ATN systems management facility to detect, isolate and correct problems.

FIS application. An ATN application that provides to aircraft information and advice useful for the safe and efficient conduct of flights.

Flight information service (FIS). A service provided for the purpose of giving advice and information useful for the safe and efficient conduct of flights.

Inter-centre communications (ICC). ICC is data communication between ATS units to support ATS, such as notification, coordination, transfer of control, flight planning, airspace management and air traffic flow management.

Intermediate system (IS). A system which performs relaying and routing functions and comprises the lowest three layers of the OSI reference model.

Internet communications service. The internet communications service is an internetwork architecture which allows ground, air-to-ground and avionics data subnetworks to interoperate by adopting common interface services and protocols based on the ISO/OSI reference model.

METAR application**.** A FIS application that supports the D-METAR.

Open systems interconnection (OSI) reference model. A model providing a standard approach to network design introducing modularity by dividing the complex set of functions into seven more manageable, self-contained, functional layers. By convention these are usually depicted as a vertical stack.

Note.— The OSI reference model is defined by ISO/IEC 7498-1.

Performance management. An ATN systems management facility to monitor and evaluate the performance of the systems.

Security management. An ATN systems management facility for access control, authentication and data integrity.

Subnetwork. An actual implementation of a data network that employs a homogeneous protocol and addressing plan and is under control of a single authority.

System level requirement. The system level requirement is a high-level technical requirement that has been derived from operational requirements, technological constraints and regulatory constraints (administrative and institutional). The system level requirements are the basis for the functional requirements and lower-level requirements.

Transit delay. In packet data systems, the elapsed time between a request to transmit an assembled data packet and an indication at the receiving end that the corresponding packet has been received and is ready to be used or forwarded.

Upper layers (UL) communications service. A term pertaining to the session, presentation and application layers of the OSI reference model.

3.2 INTRODUCTION

3.2.1 The aeronautical telecommunication network (ATN) comprises application entities and communication services which allow ground, air-to-ground and avionics data subnetworks to interoperate by adopting common interface services and protocols based on the International Organization for Standardization (ISO) open systems interconnection (OSI) reference model. The conceptual model of the ATN is shown in Figure 3-1.*

3.2.2 The ATN and the associated application processes have been designed in support of the communications, navigation, surveillance and air traffic management (CNS/ATM) systems. The ATN:

a) is specifically and exclusively intended to provide data communications services to air traffic service provider organizations and aircraft operating agencies supporting the following types of communications traffic:

   1) air traffic services communication (ATSC);

   2) aeronautical operational control (AOC);

   3) aeronautical administrative communication (AAC); and

   4) aeronautical passenger communication (APC);

b) provides, in a manner transparent to the user, a reliable end-to-end communications service essential to support the provision of safe and efficient air traffic services, between:

   1) airborne systems and ground systems; and

   2) multiple ground systems;

c) provides a data communication service which is capable of meeting the security and safety requirements of the users;

* This figure is located at the end of this chapter.

d) is based on internationally recognized data communications standards which will facilitate the development of compliant systems and encourage the competitive provision of network services;

e) accommodates differing types/categories/classes of service (including preferred/selected air-ground subnetwork) required by the various applications;

f) defines an architecture that enables the integration of public and private subnetworks, both air-ground and ground-ground. This allows the use of existing/planned infrastructure and network technologies, as well as giving implementors the freedom to scale the network to meet the increasing needs of the users; and

g) efficiently uses the bandwidth limited air-ground subnetworks and consequently reduces the associated costs.

3.2.3 The ATN applications presently defined have been developed to provide aeronautical communication, surveillance, and information services. These applications are intended to support the following air traffic management services:

a) air traffic services (ATS);

    1) air traffic control service;

    2) flight information service (FIS); and

    3) alerting service;

b) air traffic flow management (ATFM); and

c) airspace management.

3.2.4 This chapter contains broad and general provisions for the ATN. The detailed technical provisions are found in Doc 9705. The remainder of this chapter is organized to address the following requirements and functions:

a) general;

b) system level requirements;

c) ATN applications requirements;

d) ATN communications service requirements;

e) ATN naming and addressing;

f) ATN systems management requirements; and

g) ATN security requirements.

3.3 GENERAL

3.3.1 The aeronautical telecommunication network (ATN) shall provide data communication services and application entities in support of:

a) the delivery of air traffic services (ATS) to aircraft;

b) the exchange of ATS information between ATS units; and

c) other applications such as aeronautical operational control (AOC) and aeronautical administrative communication (AAC).

Note 1.— Provisions have been made to accommodate the exchange of information such as weather, flight plans, notices to airmen and dynamic real-time air traffic flow management between aircraft operating agencies' ground-based systems and ATS units.

Note 2.— Provisions have also been made to accommodate aeronautical passenger communication (APC).

3.3.2 When the ATN is used in support of air traffic services, it shall conform with the provisions of this chapter.

3.3.3 Requirements for use of the ATN shall be made on the basis of regional air navigation agreements.

3.3.4 **Recommendation.—** *Civil aviation authorities should coordinate, with national authorities and aeronautical industry, those implementation aspects of the ATN which will permit its worldwide safety, interoperability and efficient use, as appropriate.*

3.4 SYSTEM LEVEL REQUIREMENTS

Note.— The system level requirements are high-level technical requirements that have been derived from operational requirements, technological constraints and regulatory constraints (administrative and institutional). These system level requirements are the basis for the functional requirements and lower-level requirements.

3.4.1 The ATN shall use International Organization for Standardization (ISO) communication standards for open systems interconnection (OSI).

3.4.2 The ATN shall provide a means to facilitate migration to future versions of application entities and/or the communication services.

Note.— It is an objective that the evolution towards future versions facilitates the backward compatibility with previous versions.

3.4.3 The ATN shall enable the transition of existing AFTN/CIDIN users and systems into the ATN architecture.

Note.— The transition from the AFTN or from the CIDIN to the ATN is handled by AFTN/AMHS and CIDIN/AMHS gateways respectively, which are defined in Doc 9705, Sub-volume III.

3.4.4 The ATN shall make provisions whereby only the controlling ATS unit may provide ATC instructions to aircraft operating in its airspace.

Note.— This is achieved through the current and next data authority aspects of the controller-pilot data link communications (CPDLC) application entity.

3.4.5 The ATN shall accommodate routing based on a pre-defined routing policy.

3.4.6 The ATN shall provide means to define data communications that can be carried only over authorized paths for the traffic type and category specified by the user.

3.4.7 The ATN shall offer ATSC classes in accordance with the criteria in Table 3-1.*

Note 1.— When an ATSC class is specified by an ATN application, packets will be forwarded in the ATN internet communications service on a best effort basis. Best effort basis means that when a route is available of the requested ATSC class, the packet is forwarded on that route. When no such route is available, the packet will be forwarded on the first known route of the ATSC class higher than that requested, or if there is no such route, first known route of the ATSC class lower than that requested.

Note 2.— The ATN communications service will not inform application entities if the requested ATSC class was not achieved. It is the responsibility of the application entity to determine the actual transit delay achieved by local means such as time stamping.

3.4.8 The ATN shall operate in accordance with the communication priorities defined in Table 3-2 and Table 3-3.

3.4.9 The ATN shall enable exchange of application information when one or more authorized paths exist.

3.4.10 The ATN shall notify the appropriate application processes when no authorized path exists.

3.4.11 The ATN shall provide means to unambiguously address all ATN end and intermediate systems.

3.4.12 The ATN shall enable the recipient of a message to identify the originator of that message.

3.4.13 The ATN addressing and naming plans shall allow States and organizations to assign addresses and names within their own administrative domains.

3.4.14 The ATN shall support data communications to fixed and mobile systems.

3.4.15 The ATN shall accommodate ATN mobile subnetworks as defined in this Annex.

3.4.16 The ATN shall make provisions for the efficient use of limited bandwidth subnetworks.

3.4.17 The ATN shall enable an aircraft intermediate system to be connected to a ground intermediate system via concurrent mobile subnetworks.

3.4.18 The ATN shall enable an aircraft intermediate system to be connected to multiple ground intermediate systems.

3.4.19 The ATN shall enable the exchange of address information between application entities.

3.4.20 The ATN shall support the context management (CM) application when any of the other air-ground applications are supported.

3.4.21 The ATN shall be capable of establishing, maintaining, releasing and aborting peer-to-peer application associations for the context management (CM) application.

3.4.22 The ATN shall be capable of establishing, maintaining, releasing and aborting peer-to-peer application associations for the automatic dependent surveillance (ADS) application.

3.4.23 The ATN shall be capable of establishing, maintaining, releasing and aborting peer-to-peer application associations for the controller-pilot data link communications (CPDLC) application.

* All tables are located at the end of this chapter.

3.4.24 The ATN shall be capable of establishing, maintaining, releasing and aborting peer-to-peer application associations for the automatic terminal information service (ATIS) application.

3.4.25 The ATN shall be capable of establishing, maintaining, releasing and aborting application associations for the ATS message handling service (ATSMHS) application.

3.4.26 The ATN shall be capable of establishing, maintaining, releasing and aborting peer-to-peer application associations for the ATS interfacility data communication (AIDC) application.

3.4.27 Where the absolute time of day is used within the ATN, it shall be accurate to within 1 second of coordinated universal time (UTC).

Note.— A time accuracy value may result in synchronization errors of up to two times the stated accuracy value.

3.4.28 The end system shall make provisions to ensure that the probability of not detecting a 255-octet message being mis-delivered, non-delivered or corrupted by the internet communication service is less than or equal to 10^{-8} per message.

Note.— It is assumed that ATN subnetworks will ensure data integrity consistent with this system level requirement.

3.4.29 ATN end systems supporting ATN security services shall be capable of authenticating the identity of peer end systems, authenticating the source of application messages and ensuring the data integrity of the application messages.

Note.— Application messages in this context include messages related to ATS, systems management and directory services.

3.4.30 ATN ground and air-ground boundary intermediate systems supporting ATN security services shall be capable of authenticating the identity of peer boundary intermediate systems, authenticating the source of routing information and ensuring the data integrity of routing information.

3.4.31 The ATN shall be capable of establishing, maintaining, releasing and aborting peer-to-peer application associations for the exchange of directory information.

3.4.32 ATN systems supporting ATN systems management shall facilitate enhanced continuity of ATN operations, including the monitoring and maintenance of the quality of the communications service.

3.4.33 The ATN shall be capable of establishing, maintaining, releasing and aborting peer-to-peer application associations for the systems management (SM) application.

3.4.34 The ATN shall be capable of establishing, maintaining, releasing and aborting peer-to-peer application associations for the aviation routine weather report service (METAR) application.

3.5 ATN APPLICATIONS REQUIREMENTS

Note 1.— Implementation of ATN application(s) within a State or region does not imply implementation of all of the ATN applications defined below.

Note 2.— The implementation of pre-defined subsets of the ATN application technical provisions are allowed as detailed in Doc 9705.

3.5.1 System applications

Note.— System applications provide services that are necessary for operation of the ATN air-ground applications, ground-ground applications and/or ATN communication services.

3.5.1.1 CONTEXT MANAGEMENT (CM) APPLICATION

Note.— The CM application provides the capability for an aircraft to log on with an ATS ground system; in some instances the ground system will request the aircraft to contact a specific ground system. Once an appropriate connection is established, CM provides for the exchange of information on each supported ATN application including the network address of each, as appropriate. For ATN systems supporting security services, CM also obtains and exchanges key and key usage information. CM also provides the capability to update log-on information and the capability for an ATS ground system to forward log-on information to another ATS ground system. The registration function of the CM allows the sharing of information with other applications on the ground or on the aircraft.

3.5.1.1.1 The ATN shall be capable of supporting the following CM application functions:

a) log-on;

b) contact;

c) update;

d) CM server query;

e) CM server update;

f) ground forwarding; and

g) registration.

Note.— The technical provisions for the CM application are defined in Doc 9705, Sub-volume II.

3.5.1.2 ATN DIRECTORY SERVICES (DIR)

3.5.1.2.1 The ATN shall be capable of supporting the following DIR application functions:

a) directory bind;

b) directory information retrieval; and

c) directory information change.

Note 1.— The ATN Directory Service provides a capability for an application or user to query a distributed directory database and to retrieve addressing, security and technical capabilities information. Directory Service provides a capability to special, authorized users to add, delete and modify parts of the directory database for which they are responsible. The Directory Service is offered over the ATN to all applications and users complying with the technical provisions of Doc 9705, Sub-volume VII .

Note 2.— Directory bind is the function of establishing an association between two directory components that support other directory functions. Directory bind sets up the application contexts and underlying communications connections for use in other directory functions.

3.5.1.3 OTHER SYSTEM APPLICATIONS

(to be developed)

3.5.2 Air-ground applications

Note.— The ground components of air-ground applications include functionality to support the forwarding of the contents of air-to-ground messages along ground-ground communications paths.

3.5.2.1 AUTOMATIC DEPENDENT SURVEILLANCE (ADS) APPLICATION

Note.— The ADS application comprises an airborne and ground component. The airborne ADS application component is capable of automatically providing, via the ATN communications service, to the ground component data derived from on-board navigation systems (e.g. aircraft identification, four-dimensional position, intent, and additional data as appropriate). The ADS application provides service based on contracts established between its air and ground components (i.e. demand contract, periodic contract, event contract and emergency contract) and between two ADS ground components (i.e. forward contract).

3.5.2.1.1 The ATN shall be capable of supporting the following ADS application functions:

a) demand contracts;

b) periodic contracts;

c) event contracts;

d) emergency contracts; and

e) forward contracts.

Note.— The technical provisions for the ADS application are defined in Doc 9705, Sub-volume II.

3.5.2.2 CONTROLLER-PILOT DATA LINK COMMUNICATIONS (CPDLC) APPLICATION

Note.— The CPDLC application, comprising an airborne and ground component, provides capability for data link communications between ATS units and aircraft under their control and/or aircraft about to come under their control. The CPDLC application has the capability to establish, manage and terminate CPDLC dialogues for controller-pilot message exchange and for ground message forwarding.

3.5.2.2.1 The ATN shall be capable of supporting the following CPDLC application functions:

a) controller-pilot message exchange;

b) transfer of data authority;

c) downstream clearance; and

d) ground forward.

Note.— The technical provisions for the CPDLC application are defined in Doc 9880, Manual on Detailed Technical Specifications for the Aeronautical Telecommunication Network (ATN) *(in preparation).*

3.5.2.3 FLIGHT INFORMATION SERVICE (FIS) APPLICATIONS

Note.— FIS applications provide flight information services to airspace users from ground FIS systems.

3.5.2.3.1 *AUTOMATIC TERMINAL INFORMATION SERVICE (ATIS) APPLICATION*

3.5.2.3.1.1 The ATN shall be capable of supporting the following ATIS application functions:

a) aircraft-initiated FIS demand contracts;

b) aircraft-initiated FIS update contracts; and

c) both an aircraft- and ground-initiated FIS cancellation of contracts.

Note.— The technical provisions for the ATIS application are defined in Doc 9705, Sub-volume II.

3.5.2.3.2 *AVIATION ROUTINE WEATHER REPORT SERVICE (METAR) APPLICATION*

3.5.2.3.2.1 The ATN shall be capable of supporting the METAR application function for aircraft-initiated FIS demand contracts.

Note.— The technical provisions for the METAR application are defined in Doc 9705, Sub-volume II.

3.5.2.3.3 *OTHER FIS APPLICATIONS*

(to be developed)

3.5.2.4 OTHER AIR-GROUND APPLICATIONS

(to be developed)

3.5.3 Ground-ground applications

Note.— Ground-ground applications are defined as those ATN applications resident in ground-based systems which solely exchange information with peer applications also resident in ground-based systems.

3.5.3.1 INTER-CENTRE COMMUNICATIONS (ICC)

Note.— The inter-centre communications applications set enables the exchange of information between air traffic service units.

3.5.3.1.1 *ATS INTERFACILITY DATA COMMUNICATION (AIDC)*

Note.— AIDC is an ATN application that is used by two air traffic service units to enable the exchange of ATS information for active flights related to flight notification, flight coordination, transfer of control, surveillance data and free (i.e. unstructured) text data.

3.5.3.1.1.1 The ATN shall be capable of supporting the following AIDC application functions:

a) flight notification;

b) flight coordination;

c) transfer of control;

d) transfer of communications;

e) transfer of surveillance data; and

f) transfer of general data.

Note.— The technical provisions for the AIDC application are defined in Doc 9705, Sub-volume III.

3.5.3.2 ATS MESSAGE HANDLING SERVICE (ATSMHS) APPLICATION

Note.— The ATS message handling service (ATSMHS) application enables ATS messages to be exchanged between service users through the provision of generic message services. The ATSMHS application includes the definition of AFTN/ATN and CIDIN/ATN gateways.

3.5.3.2.1 The ATN shall be capable of supporting the ATS message handling service (ATSMHS) application.

Note.— The technical provisions for the ATSMHS application are defined in Doc 9705, Sub-volume III.

3.5.3.3 OTHER GROUND-GROUND APPLICATIONS

(to be developed)

3.6 ATN COMMUNICATION SERVICE REQUIREMENTS

Note.— The ATN communication service requirements define the requirements for layers 3 through 6, as well as part of layer 7, of the OSI reference model. These services take information produced by one of the individual ATN applications and perform the end-to-end communication service using standard protocols. These communication service requirements are divided into two parts. The upper layer communications service defines the standards for layers 5 through 7. The Internet communications service defines standards for layers 3 and 4. The requirements for layers 1 and 2 are outside the scope of ATN SARPs.

3.6.1 Upper layer communications service

3.6.1.1 The upper layer communications service shall include the:

a) session layer;

b) presentation layer;

c) application entity structure;

d) association control service element (ACSE);

e) security application service object (ASO), for ATN systems supporting security services; and

f) control function (CF).

Note 1.— The technical provisions for the upper layer communications service for all ATN applications, except the ATS message service function of the ATSMHS application, are defined in Doc 9705, Sub-volume IV.

Note 2.— The technical provisions for the upper layer communications service for the ATS message service function of the ATSMHS application are defined in Doc 9705, Sub-volume III.

3.6.2 ATN Internet communications service

Note.— The ATN Internet communications service requirements are applicable to the end system and intermediate system functional entities which together provide the ATN Internet communications service. The ATN Internet communications service is provided to its user (i.e. the upper layers) via the transport layer service interface.

3.6.2.1 An ATN end system (ES) shall be capable of supporting the ATN Internet including the:

a) transport layer; and

b) network layer.

3.6.2.2 An ATN intermediate system (IS) shall support the ATN network layer provisions as appropriate to the class of ATN IS under consideration.

Note.— A number of different classes of ATN intermediate systems for which network layer profiles are defined are contained in Doc 9705, Sub-volume V.

3.7 ATN NAMING AND ADDRESSING REQUIREMENTS

Note.— The ATN naming and addressing scheme supports the principles of unambiguous identification of information objects and global address standardization.

3.7.1 The ATN shall provide provisions for application entity naming.

3.7.2 The ATN shall provide provisions for network and transport addressing.

Note.— The technical provisions for ATN application entity naming are defined in Doc 9705, Sub-volume IV, the provisions for network and transport addressing are defined in Sub-volume V, and the provisions for registration services are defined in Sub-volume IX of the same document.

3.8 ATN SYSTEMS MANAGEMENT REQUIREMENTS

Note 1.— The ATN systems management (SM) application provides the capability for an SM manager to exchange information with an SM agent and/or another SM manager.

Note 2.— Support for the ATN SM services technical provisions may be required on a State or regional basis.

3.8.1 The ATN shall be capable of supporting the following systems management application functions:

a) fault management;

b) configuration management;

c) accounting management;

d) performance management; and

e) security management.

Note.— The technical provisions for ATN Systems Management are defined in Doc 9705, Sub-volume VI.

3.8.1.1 ATN end systems and intermediate systems that support the ATN systems management application and SM managers shall support access to managed objects.

Note.— The SM application managed object definitions and access provisions are defined in Doc 9705, Sub-volume VI.

3.9 ATN SECURITY REQUIREMENTS

3.9.1 The security of the ATN shall be achieved based on a combination of technical provisions, local physical security measures, and procedural security measures.

Note 1.— The technical provisions for ATN security are defined in Doc 9705, and the physical and procedural security measures are defined in Annex 17 and the Security Manual.

Note 2.— Support for the ATN security services technical provisions may be required on a State or regional basis.

3.9.1.1 **Recommendation.—** *The following physical and procedural techniques should be used to provide security for ATN end systems, intermediate systems, network managers, directory servers and subnetworks:*

a) restricted physical access to ATN end systems, intermediate systems, SM workstations, directory servers and subnetwork switches, network managers, and other essential network subsystems;

b) restricted user access to ATN end systems, intermediate systems, directory servers and SM workstations to only authorized personnel; and

c) non-use, or restricted use, of remote access to ATN ground end system, intermediate systems and SM workstations.

3.9.2 ATN security policy

Note.— Communication monitoring and third party traffic analysis do not constitute safety hazards and are not considered security threats for the ATSC. However, some ATS and/or non-ATS users and applications may have local, or *organizational, policies wherein communication monitoring and third party traffic analysis would be considered security threats based on other concerns, such as economic considerations.*

3.9.2.1 ATS messages shall be protected from masquerade, modification and replay.

Note 1. — This means that for data messages exchanged among ATN entities there will be a high level of assurance that a message comes from where it claims, has not been tampered with, and is not a repeat of an obsolete message.

Note 2. — The level of protection may vary by the type of security threat and by the level of ATN security service selected by the user or application process.

3.9.2.2 A request for protection of ATS messages shall be honoured.

Note.— A request for non-use of protection may be honoured. This means that the use of security is the default and negotiation to non-use is based on local policy.

3.9.2.3 The ATN services that support messages to and from the aircraft shall be protected against denial of service attacks to a level of probability consistent with the required application service availability as determined by local policies.

Note 1.— The term "denial of service" describes a condition where legitimate access to information or other ATN resources is deliberately impeded.

Note 2.— This may mean having alternative communications paths available in case one path is subject to denial of service.

TABLES FOR CHAPTER 3

Table 3-1. Transit delays for ATSC classes

Maximum one-way ATN end-to-end transit delay at 95% probability (seconds)	*ATSC class*
Reserved	A
4.5	B
7.2	C
13.5	D
18	E
27	F
50	G
100	H
No value specified	no preference

Note 1.— The value for the ATN end-to-end transit delay represents approximately 90% of the value for the total end-to-end transit delay between the ultimate users of the system.

Note 2.— The 95% probability is based on the availability of a route conforming to the requested ATSC class.

Table 3-2. Mapping of ATN communication priorities

Message categories	*ATN application*	*Corresponding protocol priority*	
		Transport layer priority	*Network layer priority*
Network/systems management	SM	0	14
Distress communications		1	13
Urgent communications		2	12
High-priority flight safety messages	CPDLC, ADS	3	11
Normal-priority flight safety messages	AIDC, ATIS	4	10
Meteorological communications	METAR	5	9
Flight regularity communications	CM, ATSMHS	6	8
Aeronautical information service messages		7	7
Network/systems administration	SM, DIR	8	6
Aeronautical administrative messages		9	5
<unassigned>		10	4
Urgent-priority administrative and U.N. Charter communications		11	3
High-priority administrative and State/Government communications		12	2
Normal-priority administrative communications		13	1
Low-priority administrative communications and aeronautical passenger communications		14	0

Note.— The network layer priorities shown in the table apply only to connectionless network priority and do not apply to subnetwork priority.

Table 3-3. Mapping of ATN network priority to mobile subnetwork priority

Message categories	*ATN network layer priority*	*Corresponding mobile subnetwork priority (see Note 4)*					
		AMSS	*VDL Mode 2*	*VDL Mode 3*	*VDL Mode 4 (see Note 5)*	*SSR Mode S*	*HFDL*
Network/systems management	14	14	see Note 1	3	high	high	14
Distress communications	13	14	see Note 1	2	high	high	14
Urgent communications	12	14	see Note 1	2	high	high	14
High-priority flight safety messages	11	11	see Note 1	2	high	high	11
Normal-priority flight safety messages	10	11	see Note 1	2	high	high	11
Meteorological communications	9	8	see Note 1	1	medium	low	8
Flight regularity communications	8	7	see Note 1	1	medium	low	7
Aeronautical information service messages	7	6	see Note 1	0	medium	low	6
Network/systems administration	6	5	see Note 1	0	medium	low	5
Aeronautical administrative messages	5	5	not allowed	not allowed	not allowed	not allowed	not allowed
<unassigned>	4	unassigned	unassigned	unassigned	unassigned	unassigned	unassigned
Urgent-priority administrative and U.N. Charter communications	3	3	not allowed	not allowed	not allowed	not allowed	not allowed
High-priority administrative and State/Government communications	2	2	not allowed	not allowed	not allowed	not allowed	not allowed
Normal-priority administrative communications	1	1	not allowed	not allowed	not allowed	not allowed	not allowed
Low-priority administrative communications and aeronautical passenger communications	0	0	not allowed	not allowed	not allowed	not allowed	not allowed

Note 1.— VDL Mode 2 has no specific subnetwork priority mechanisms.

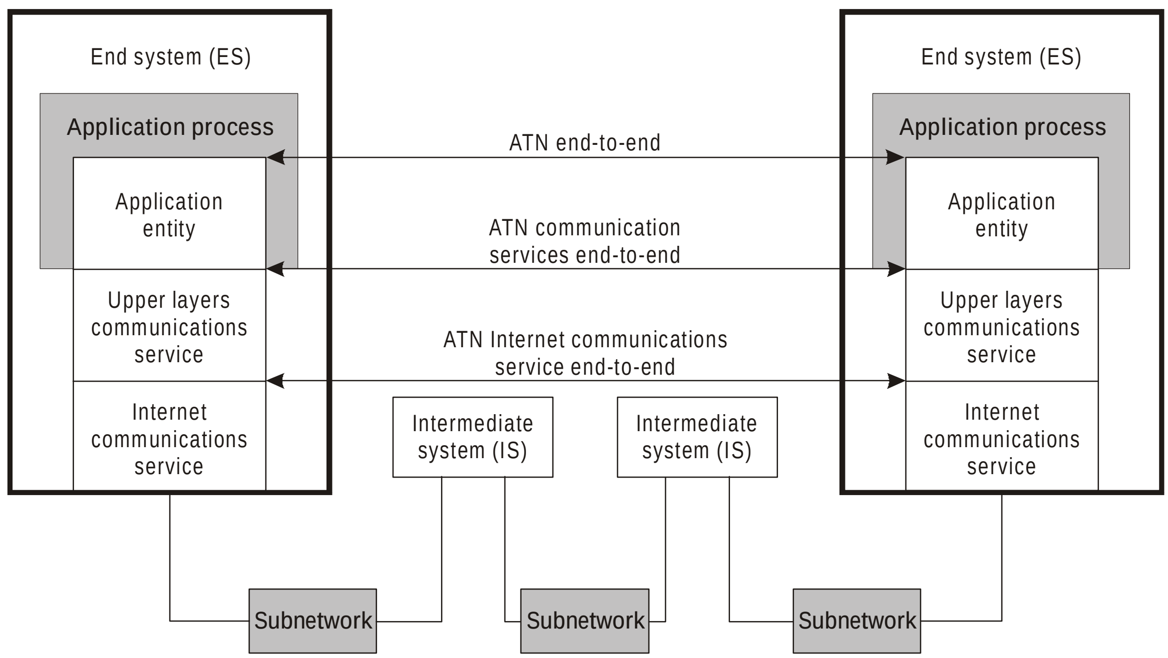
Note 2.— The AMSS SARPs specify mapping of message categories to subnetwork priority without explicitly referencing ATN network layer priority.

Note 3.— The term "not allowed" means that only communications related to safety and regularity of flight are authorized to pass over this subnetwork as defined in the subnetwork SARPs.

Note 4.— Only those mobile subnetworks are listed for which subnetwork SARPs exist and for which explicit support is provided by the ATN boundary intermediate system (BIS) technical provisions.

Note 5.— The VDL Mode 4 subnetwork provides support for surveillance applications (e.g. ADS).

FIGURE FOR CHAPTER 3



Note 1.— Shading indicates elements outside the scope of these SARPs. User requirements define the interface between the application entity and the user and ensure the functionality and interoperability of the ATN.

Note 2.— The figure represents a simplified model of the ATN and does not depict all of its capabilities (e.g. the store and forward capability which is provided for ATS message handling service).

Note 3.— Various end-to-end points have been defined within the ATN to specify certain end-to-end performance requirements. It may be necessary, however, to define different end-to-end points to facilitate the qualification of implementations to those performance requirements. In such cases, the end-to-end points should be clearly defined and correlated with the end-to-end points shown in the figure.

Note 4.— An IS is a conceptual representation of functionality and does not correspond precisely to a router. A router which implements the system management application requires the protocols of an end system and when using the system management application is also acting as an end system.

Figure 3-1. Conceptual model of the ATN

CHAPTER 4. AERONAUTICAL MOBILE-SATELLITE (ROUTE) SERVICE (AMS(R)S)

Note 1.— This chapter contains Standards and Recommended Practices applicable to the use of Aeronautical Mobile-Satellite (R) Service communications technologies. The Standards and Recommended Practices in this chapter are service- and performance-oriented and are not tied to a specific technology or technique.

Note 2.— Detailed Technical Specifications of AMS(R)S Systems are contained in the manual on AMS(R)S. This document also provides a detailed description of the AMS(R)S, including details on the Standards and Recommended Practices below.

4.1 DEFINITIONS

Connection establishment delay. Connection establishment delay, as defined in ISO 8348, includes a component, attributable to the called subnetwork (SN) service user, which is the time between the SN-CONNECT indication and the SN-CONNECT response. This user component is due to actions outside the boundaries of the satellite subnetwork and is therefore excluded from the AMS(R)S specifications.

Data transfer delay (95th percentile). The 95th percentile of the statistical distribution of delays for which transit delay is the average.

Data transit delay. In accordance with ISO 8348, the average value of the statistical distribution of data delays. This delay represents the subnetwork delay and does not include the connection establishment delay.

Network (N). The word "network" and its abbreviation "N" in ISO 8348 are replaced by the word "subnetwork" and its abbreviation "SN", respectively, wherever they appear in relation to the subnetwork layer packet data performance.

Residual error rate. The ratio of incorrect, lost and duplicate subnetwork service data units (SNSDUs) to the total number of SNSDUs that were sent.

Spot beam. Satellite antenna directivity whose main lobe encompasses significantly less than the earth's surface that is within line-of-sight view of the satellite. May be designed so as to improve system resource efficiency with respect to geographical distribution of user earth stations.

Subnetwork (SN). See ***Network (N).***

Subnetwork service data unit (SNSDU). An amount of subnetwork user data, the identity of which is preserved from one end of a subnetwork connection to the other.

Total voice transfer delay. The elapsed time commencing at the instant that speech is presented to the AES or GES and concluding at the instant that the speech enters the interconnecting network of the counterpart GES or AES. This delay includes vocoder processing time, physical layer delay, RF propagation delay and any other delays within an AMS(R)S subnetwork.

Note.— The following terms used in this chapter are defined in Annex 10 as follows:

- *Aeronautical telecommunication network (ATN): Volume III, Chapter 1.*
- *Aeronautical mobile-satellite (route) service (AMS(R)S): Volume II, Chapter 1.1.*
- *Aircraft earth station (AES): Volume III, Chapter 1.*
- *Ground earth station (GES): Volume III, Chapter 1.*
- *Subnetwork layer: Volume III, Chapter 6.1.*

4.2 GENERAL

4.2.1 Any mobile-satellite system intended to provide AMS(R)S shall conform to the requirements of this chapter.

4.2.1.1 An AMS(R)S system shall support packet data service, or voice service, or both.

4.2.2 Requirements for mandatory carriage of AMS(R)S system equipment including the level of system capability shall be made on the basis of regional air navigation agreements which specify the airspace of operation and the implementation timescales for the carriage of equipment. A level of system capability shall include the performance of the AES, the satellite and the GES.

4.2.3 The agreements indicated in 4.2.2 shall provide at least two years' notice of mandatory carriage of airborne systems.

4.2.4 **Recommendation.—** *Civil aviation authorities should coordinate with national authorities and service providers those implementation aspects of an AMS(R)S system that will permit its worldwide interoperability and optimum use, as appropriate*.

4.3 RF CHARACTERISTICS

4.3.1 Frequency bands

Note.— ITU Radio Regulations permit systems providing mobile-satellite service to use the same spectrum as AMS(R)S without requiring such systems to offer safety services. This situation has the potential to reduce the spectrum available for AMS(R)S. It is critical that States consider this issue in frequency planning and in the establishment of national or regional spectrum requirements.

4.3.1.1 When providing AMS(R)S communications, an AMS(R)S system shall operate only in frequency bands which are appropriately allocated to AMS(R)S and protected by the ITU Radio Regulations.

4.3.2 Emissions

4.3.2.1 The total emissions of the AES necessary to meet designed system performance shall be controlled to avoid harmful interference to other systems necessary to support safety and regularity of air navigation, installed on the same or other aircraft.

Note 1.— Harmful interference can result from radiated and/or conducted emissions that include harmonics, discrete spurious, intermodulation product and noise emissions, and are not necessarily limited to the "transmitter on" state.

Note 2.— Protection requirements for GNSS are contained in Annex 10, Volume I.

4.3.2.2 INTERFERENCE TO OTHER AMS(R)S EQUIPMENT

4.3.2.2.1 Emissions from an AMS(R)S system AES shall not cause harmful interference to an AES providing AMS(R)S on a different aircraft.

Note.— One method of complying with 4.3.2.2.1 is by limiting emissions in the operating band of other AMS(R)S equipment to a level consistent with the intersystem interference requirements such as contained in RTCA document DO-215. RTCA and EUROCAE may establish new performance standards for future AMS(R)S which may describe methods of compliance with this requirement.

4.3.3 Susceptibility

4.3.3.1 The AES equipment shall operate properly in an interference environment causing a cumulative relative change in its receiver noise temperature ($\Delta T/T$) of 25 per cent.

4.4 PRIORITY AND PRE-EMPTIVE ACCESS

4.4.1 Every aircraft earth station and ground earth station shall be designed to ensure that messages transmitted in accordance with Annex 10, Volume II, 5.1.8, including their order of priority, are not delayed by the transmission and/or reception of other types of messages. If necessary, as a means to comply with the above requirement, message types not defined in Annex 10, Volume II, 5.1.8 shall be terminated even without warning, to allow Annex 10, Volume II, 5.1.8 type messages to be transmitted and received.

4.4.2 All AMS(R)S data packets and all AMS(R)S voice calls shall be identified as to their associated priority.

4.4.3 Within the same message category, the system shall provide voice communications priority over data communications.

4.5 SIGNAL ACQUISITION AND TRACKING

4.5.1 The AES, GES and satellites shall properly acquire and track service link signals when the aircraft is moving at a ground speed of up to 1 500 km/h (800 knots) along any heading.

4.5.1.1 **Recommendation.—** *The AES, GES and satellites should properly acquire and track service link signals when the aircraft is moving at a ground speed of up to 2 800 km/h (1 500 knots) along any heading.*

4.5.2 The AES, GES and satellites shall properly acquire and track service link signals when the component of the aircraft acceleration vector in the plane of the satellite orbit is up to 0.6 g.

4.5.2.1 **Recommendation.—** *The AES, GES and satellites should properly acquire and track service link signals when the component of the aircraft acceleration vector in the plane of the satellite orbit is up to 1.2 g.*

4.6 PERFORMANCE REQUIREMENTS

4.6.1 Designated operational coverage

4.6.1.1 An AMS(R)S system shall provide AMS(R)S throughout its designated operational coverage (DOC).

4.6.2 Failure notification

4.6.2.1 In the event of a service failure, an AMS(R)S system shall provide timely predictions of the time, location and duration of any resultant outages until full service is restored.

Note.— Service outages may, for example, be caused by the failure of a satellite, satellite spot beam, or GES. The geographic areas affected by such outages may be a function of the satellite orbit and system design, and may vary with time.

4.6.2.2 The system shall annunciate a loss of communications capability within 30 seconds of the time when it detects such a loss.

4.6.3 AES requirements

4.6.3.1 The AES shall meet the relevant performance requirements contained in 4.6.4 and 4.6.5 for aircraft in straight and level flight throughout the designated operational coverage of the satellite system.

4.6.3.1.1 **Recommendation.—** *The AES should meet the relevant performance requirements contained in 4.6.4 and 4.6.5 for aircraft attitudes of +20/-5 degrees of pitch and +/-25 degrees of roll throughout the DOC of the satellite system*.

4.6.4 Packet data service performance

4.6.4.1 If the system provides AMS(R)S packet data service, it shall meet the standards of the following subparagraphs.

Note.— System performance standards for packet data service may also be found in RTCA Document DO-270.

4.6.4.1.1 An AMS(R)S system providing a packet data service shall be capable of operating as a constituent mobile subnetwork of the ATN.

Note.— In addition, an AMS(R)S may provide non-ATN data functions.

4.6.4.1.2 *DELAY PARAMETERS*

Note.— The term "highest priority service" denotes the priority which is reserved for distress, urgency and certain infrequent network system management messages. The term "lowest priority service" denotes the priority used for regularity of flight messages. All delay parameters are under peak-hour traffic loading conditions.

4.6.4.1.2.1 *Connection establishment delay*. Connection establishment delay shall not be greater than 70 seconds.

4.6.4.1.2.1.1 **Recommendation.—** *Connection establishment delay should not be greater than 50 seconds.*

4.6.4.1.2.2 In accordance with ISO 8348, data transit delay values shall be based on a fixed subnetwork service data unit (SNSDU) length of 128 octets. Data transit delays shall be defined as average values.

4.6.4.1.2.3 *Data transit delay, from-aircraft, highest priority*. From-aircraft data transit delay shall not be greater than 40 seconds for the highest priority data service.

4.6.4.1.2.3.1 **Recommendation.—** *Data transit delay, from-aircraft, highest priority. From-aircraft data transit delay should not be greater than 23 seconds for the highest priority data service.*

4.6.4.1.2.3.2 **Recommendation.—** *Data transit delay, from-aircraft, lowest priority. From-aircraft data transit delay should not be greater than 28 seconds for the lowest priority data service.*

4.6.4.1.2.4 *Data transit delay, to-aircraft, highest priority*. To-aircraft data transit delay shall not be greater than 12 seconds for the highest priority data service.

4.6.4.1.2.4.1 **Recommendation.—** *Data transit delay, to-aircraft, lowest priority. To-aircraft data transit delay should not be greater than 28 seconds for the lowest priority data service.*

4.6.4.1.2.5 *Data transfer delay (95th percentile), from-aircraft, highest priority*. From-aircraft data transfer delay (95th percentile), shall not be greater than 80 seconds for the highest priority data service.

4.6.4.1.2.5.1 **Recommendation.—** *Data transfer delay (95th percentile), from-aircraft, highest priority. From-aircraft data transfer delay (95th percentile), should not be greater than 40 seconds for the highest priority data service.*

4.6.4.1.2.5.2 **Recommendation.—** *Data transfer delay (95th percentile), from-aircraft, lowest priority. From-aircraft data transfer delay (95th percentile), should not be greater than 60 seconds for the lowest priority data service.*

4.6.4.1.2.6 *Data transfer delay (95th percentile), to-aircraft, highest priority*. To-aircraft data transfer delay (95th percentile), shall not be greater than 15 seconds for the highest priority data service.

4.6.4.1.2.6.1 **Recommendation.—** *Data transfer delay (95th percentile), to-aircraft, lowest priority. To-aircraft data transfer delay (95th percentile), should not be greater than 30 seconds for the lowest priority data service.*

4.6.4.1.2.7 *Connection release delay (95th percentile)*. The connection release delay (95th percentile) shall not be greater than 30 seconds in either direction.

4.6.4.1.2.7.1 **Recommendation.—** *The connection release delay (95th percentile) should not be greater than 25 seconds in either direction.*

4.6.4.1.3 *INTEGRITY*

4.6.4.1.3.1 *Residual error rate, from-aircraft*. The residual error rate in the from-aircraft direction shall not be greater than 10^{-4} per SNSDU.

4.6.4.1.3.1.1 **Recommendation.—** *The residual error rate in the from-aircraft direction should not be greater than 10^{-6} per SNSDU.*

4.6.4.1.3.2 *Residual error rate, to-aircraft*. The residual error rate in the to-aircraft direction shall not be greater than 10^{-6} per SNSDU.

4.6.4.1.3.3 *Connection resilience*. The probability of a subnetwork connection (SNC) provider-invoked SNC release shall not be greater than 10^{-4} over any one-hour interval.

Note.— Connection releases resulting from GES-to-GES handover, AES log-off or virtual circuit pre-emption are excluded from this specification.

4.6.4.1.3.4 The probability of an SNC provider-invoked reset shall not be greater than 10^{-1} over any one-hour interval.

4.6.5 Voice service performance

4.6.5.1 If the system provides AMS(R)S voice service, it shall meet the requirements of the following subparagraphs.

Note.— ICAO is currently considering these provisions in the light of the introduction of new technologies.

4.6.5.1.1 *CALL PROCESSING DELAY*

4.6.5.1.1.1 *AES origination*. The 95th percentile of the time delay for a GES to present a call origination event to the terrestrial network interworking interface after a call origination event has arrived at the AES interface shall not be greater than 20 seconds.

4.6.5.1.1.2 *GES origination*. The 95th percentile of the time delay for an AES to present a call origination event at its aircraft interface after a call origination event has arrived at the terrestrial network interworking interface shall not be greater than 20 seconds.

4.6.5.1.2 *VOICE QUALITY*

4.6.5.1.2.1 The voice transmission shall provide overall intelligibility performance suitable for the intended operational and ambient noise environment.

4.6.5.1.2.2 The total allowable transfer delay within an AMS(R)S subnetwork shall not be greater than 0.485 seconds.

4.6.5.1.2.3 **Recommendation.—** *Due account should be taken of the effects of tandem vocoders and/or other analog/digital conversions.*

4.6.5.1.3 *VOICE CAPACITY*

4.6.5.1.3.1 The system shall have sufficient available voice traffic channel resources such that an AES- or GES-originated AMS(R)S voice call presented to the system shall experience a probability of blockage of no more than 10^{-2}.

Note.— Available voice traffic channel resources include all pre-emptable resources, including those in use by non-AMS(R)S communications.

4.6.6 Security

4.6.6.1 The system shall provide features for the protection of messages in transit from tampering.

4.6.6.2 The system shall provide features for protection against denial of service, degraded performance characteristics, or reduction of system capacity when subjected to external attacks.

Note.— Possible methods of such attack include intentional flooding with spurious messages, intentional corruption of system software or databases, or physical destruction of the support infrastructure.

4.6.6.3 The system shall provide features for protection against unauthorized entry.

Note.— These features are intended to provide protection against spoofing and "phantom controllers".

4.7 SYSTEM INTERFACES

4.7.1 An AMS(R)S system shall allow subnetwork users to address AMS(R)S communications to specific aircraft by means of the ICAO 24-bit aircraft address.

Note.— Provisions on the allocation and assignment of ICAO 24-bit addresses are contained in the Appendix to Chapter 9.

4.7.2 Packet data service interfaces

4.7.2.1 If the system provides AMS(R)S packet data service, it shall provide an interface to the ATN.

Note.— The detailed technical specifications related to provisions of the ATN-compliant subnetwork service are contained in Section 5.2.5 and Section 5.7.2 of Doc 9880 — Manual on Detailed Technical Specifications for the Aeronautical Telecommunication Network (ATN) *(in preparation).*

4.7.2.2 If the system provides AMS(R)S packet data service, it shall provide a connectivity notification (CN) function.

CHAPTER 5. SSR MODE S AIR-GROUND DATA LINK

Note.— The SSR Mode S air-ground data link is also referred to as the Mode S subnetwork in the context of the aeronautical telecommunication network (ATN).

5.1 DEFINITIONS RELATING TO THE MODE S SUBNETWORK

Aircraft. The term aircraft may be used to refer to Mode S emitters (e.g. aircraft/vehicles), where appropriate.

Aircraft address. A unique combination of 24 bits available for assignment to an aircraft for the purpose of air-ground communications, navigation and surveillance.

Aircraft data circuit-terminating equipment (ADCE). An aircraft specific data circuit-terminating equipment that is associated with an airborne data link processor (ADLP). It operates a protocol unique to Mode S data link for data transfer between air and ground.

Aircraft data link processor (ADLP). An aircraft-resident processor that is specific to a particular air-ground data link (e.g. Mode S) and which provides channel management, and segments and/or reassembles messages for transfer. It is connected to one side of aircraft elements common to all data link systems and on the other side to the air-ground link itself.

Aircraft/vehicle. May be used to describe either a machine or device capable of atmospheric flight, or a vehicle on the airport surface movement area (i.e. runways and taxiways).

Air-initiated protocol. A procedure initiated by a Mode S aircraft installation for delivering a standard length or extended length downlink message to the ground.

BDS Comm-B Data Selector. The 8-bit BDS code determines the register whose contents are to be transferred in the MB field of a Comm-B reply. It is expressed in two groups of 4 bits each, BDS1 (most significant 4 bits) and BDS2 (least significant 4 bits).

Broadcast. The protocol within the Mode S system that permits uplink messages to be sent to all aircraft in coverage area, and downlink messages to be made available to all interrogators that have the aircraft wishing to send the message under surveillance.

Capability report. Information identifying whether the transponder has a data link capability as reported in the capability (CA) field of an all-call reply or squitter transmission (see "data link capability report").

Close-out. A command from a Mode S interrogator that terminates a Mode S link layer communication transaction.

Cluster of interrogators. Two or more interrogators with the same interrogator identifier (II) code, operating cooperatively to ensure that there is no interference to the required surveillance and data link performance of each of the interrogators, in areas of common coverage.

Comm-A. A 112-bit interrogation containing the 56-bit MA message field. This field is used by the uplink standard length message (SLM) and broadcast protocols.

Comm-B. A 112-bit reply containing the 56-bit MB message field. This field is used by the downlink SLM, ground-initiated and broadcast protocols.

Comm-C. A 112-bit interrogation containing the 80-bit MC message field. This field is used by the uplink extended length message (ELM) protocol.

Comm-D. A 112-bit reply containing the 80-bit MD message field. This field is used by the downlink ELM protocol.

Connection. A logical association between peer-level entities in a communication system.

Data link capability report. Information in a Comm-B reply identifying the complete Mode S communications capabilities of the aircraft installation.

Downlink. A term referring to the transmission of data from an aircraft to the ground. Mode S air-to-ground signals are transmitted on the 1 090 MHz reply frequency channel.

Extended length message (ELM). A series of Comm-C interrogations (uplink ELM) transmitted without the requirement for intervening replies, or a series of Comm-D replies (downlink ELM) transmitted without intervening interrogations.

Uplink ELM (UELM). A term referring to extended length uplink communication by means of 112-bit Mode S Comm-C interrogations, each containing the 80-bit Comm-C message field (MC).

Downlink ELM (DELM). A term referring to extended length downlink communication by means of 112-bit Mode S Comm-D replies, each containing the 80-bit Comm-D message field (MD).

Frame. The basic unit of transfer at the link level. In the context of Mode S subnetwork, a frame can include from one to four Comm-A or Comm-B segments, from two to sixteen Comm-C segments, or from one to sixteen Comm-D segments.

General formatter/manager (GFM). The aircraft function responsible for formatting messages to be inserted in the transponder registers. It is also responsible for detecting and handling error conditions such as the loss of input data.

Ground data circuit-terminating equipment (GDCE). A ground specific data circuit-terminating equipment associated with a ground data link processor (GDLP). It operates a protocol unique to Mode S data link for data transfer between air and ground.

Ground data link processor (GDLP). A ground-resident processor that is specific to a particular air-ground data link (e.g. Mode S), and which provides channel management, and segments and/or reassembles messages for transfer. It is connected on one side (by means of its DCE) to ground elements common to all data link systems, and on the other side to the air-ground link itself.

Ground-initiated Comm-B (GICB). The ground-initiated Comm-B protocol allows the interrogator to extract Comm-B replies containing data from a defined source in the MB field.

Ground-initiated protocol. A procedure initiated by a Mode S interrogator for delivering standard length or extended length messages to a Mode S aircraft installation.

Mode S air-initiated Comm-B (AICB) protocol. A procedure initiated by a Mode S transponder for transmitting a single Comm-B segment from the aircraft installation.

Mode S broadcast protocols**.** Procedures allowing standard length uplink or downlink messages to be received by more than one transponder or ground interrogator respectively.

Mode S ground-initiated Comm-B (GICB) protocol**.** A procedure initiated by a Mode S interrogator for eliciting a single Comm-B segment from a Mode S aircraft installation, incorporating the contents of one of 255 Comm-B registers within the Mode S transponder.

Mode S multisite-directed protocol**.** A procedure to ensure that extraction and close-out of a downlink standard length or extended length message is affected only by the particular Mode S interrogator selected by the aircraft.

Mode S packet**.** A packet conforming to the Mode S subnetwork standard, designed to minimize the bandwidth required from the air-ground link. ISO 8208 packets may be transformed into Mode S packets and vice-versa.

Mode S specific protocol (MSP)**.** A protocol that provides restricted datagram service within the Mode S subnetwork.

Mode S specific services**.** A set of communication services provided by the Mode S system which are not available from other air-ground subnetworks, and therefore not interoperable.

Mode S specific services entity (SSE)**.** An entity resident within an XDLP to provide access to the Mode S specific services.

Packet**.** The basic unit of data transfer among communication devices within the network layer (e.g. an ISO 8208 packet or a Mode S packet).

Segment**.** A portion of a message that can be accommodated within a single MA/MB field in the case of a standard length message, or MC/MD field in the case of an extended length message. This term is also applied to the Mode S transmissions containing these fields.

Standard length message (SLM)**.** An exchange of digital data using selectively addressed Comm-A interrogations and/or Comm-B replies (see “Comm-A” and “Comm-B”).

Subnetwork**.** An actual implementation of a data network that employs a homogeneous protocol and addressing plan, and is under the control of a single authority.

Subnetwork management entity (SNME)**.** An entity resident within a GDLP that performs subnetwork management and communicates with peer entities in intermediate or end-systems.

Timeout**.** The cancellation of a transaction after one of the participating entities has failed to provide a required response within a pre-defined period of time.

Uplink**.** A term referring to the transmission of data from the ground to an aircraft. Mode S ground-to-air signals are transmitted on the 1 030 MHz interrogation frequency channel.

XDCE**.** A general term referring to both the ADCE and the GDCE.

XDLP**.** A general term referring to both the ADLP and the GDLP.

5.2 MODE S CHARACTERISTICS

5.2.1 General provisions

Note 1.— Reference ISO document. When the term "ISO 8208" is referred to in this standard, it means the ISO Standard "Information technology — Data communications — X.25 Packet Layer Protocol for Data Terminal Equipment, Reference Number ISO/IEC 8208: 1990(E)".

Note 2.— The overall architecture of the Mode S subnetwork is presented in the diagram on the following page.

Note 3.— The processing splits into three different paths. The first consists of the processing of switched virtual circuits (SVCs), the second consists of the processing of Mode S specific services, and the third consists of the processing of subnetwork management information. SVCs utilize the reformatting process and the ADCE or GDCE function. Mode S specific services utilize the Mode S specific services entity (SSE) function.

5.2.1.1 *Message categories.* The Mode S subnetwork shall only carry aeronautical communications classified under categories of flight safety and flight regularity as specified in Annex 10, Volume II, Chapter 5, 5.1.8.4 and 5.1.8.6.

5.2.1.2 *Signals in space.* The signal-in-space characteristics of the Mode S subnetwork shall conform to the provisions contained in Annex 10, Volume IV, Chapter 3, 3.1.2.

5.2.1.3 *Code and byte independency.* The Mode S subnetwork shall be capable of code and byte independent transmission of digital data.

5.2.1.4 *Data transfer.* Data shall be conveyed over the Mode S data link in segments using either standard length message (SLM) protocols or extended length message (ELM) protocols as defined in 3.1.2.6.11 and 3.1.2.7 of Annex 10, Volume IV.

Note 1.— An SLM segment is the contents of one 56-bit MA or MB field. An ELM segment is the contents of one 80-bit MC or MD field.

Note 2.— An SLM frame is the contents of up to four linked MA or MB fields. An ELM frame is the contents of 2 to 16 MC or 1 to 16 MD fields.

5.2.1.5 *Bit numbering.* In the description of the data exchange fields, the bits shall be numbered in the order of their transmission, beginning with bit 1. Bit numbers shall continue through the second and higher segments of multi-segment frames. Unless otherwise stated, numerical values encoded by groups (fields) of bits shall be encoded using positive binary notation and the first bit transmitted shall be the most significant bit (MSB) (3.1.2.3.1.3 of Annex 10, Volume IV).

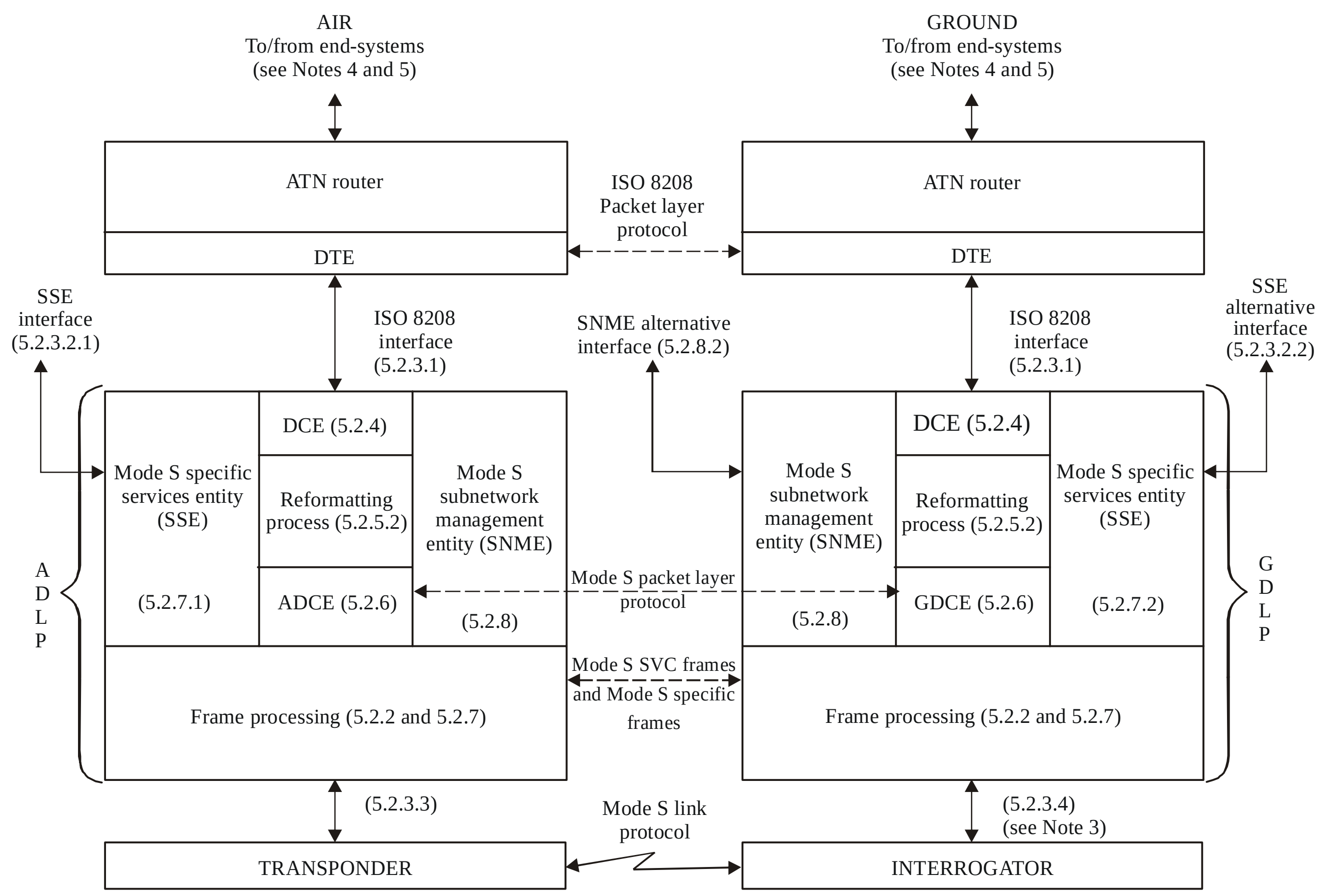
5.2.1.6 *Unassigned bits.* When the length of the data is not sufficient to occupy all bit positions within a message field or subfield, the unassigned bit positions shall be set to 0.

5.2.2 Frames

5.2.2.1 UPLINK FRAMES

5.2.2.1.1 *SLM frame.* An uplink SLM frame shall be composed of up to four selectively addressed Comm-A segments.

Functional elements of the Mode S subnetwork



Key

: physical (RF) connection

: peer level association

: interfaces

Notes:

1. Relevant Mode S subnetwork SARPs paragraph numbers are given in parenthesis.
2. The ADLP/transponder interface is also specified in Annex 10, Volume IV, 3.1.
3. A GDLP may be interfaced to more than one Mode S interrogator.
4. DTEs may be directly associated with end-systems.
5. ATN router access to end-systems may be made via other intermediate systems.

Note.— Each Comm-A segment (MA field) received by the ADLP is accompanied by the first 32 bits of the interrogation that delivered the segment (3.1.2.10.5.2.1.1 of Annex 10, Volume IV). Within these 32 bits is the 16-bit special designator (SD) field (3.1.2.6.1.4 of Annex 10, Volume IV).

5.2.2.1.1.1 *SD field.* When the designator identification (DI) field (bits 14-16) has a code value of 1 or 7, the special designator (SD) field (bits 17-32) of each Comm-A interrogation shall be used to obtain the interrogator identifier subfield (IIS, bits 17-20) and the linked Comm-A subfield (*LAS*, bits 30-32). The action to be taken shall depend on the value of *LAS*. The contents of *LAS* and IIS shall be retained and shall be associated with the Comm-A message segment for use in assembling the frame as indicated below. All fields other than the *LAS* field shall be as defined in 3.1.2 of Annex 10, Volume IV.

Note.— The SD field structure is shown in Figure 5-1[*].

5.2.2.1.1.2 *LAS coding.* The 3-bit *LAS* subfield shall be coded as follows:

LAS	*MEANING*
0	single segment
1	linked, 1st segment
2	linked, 2nd but not final segment
3	linked, 3rd but not final segment
4	linked, 4th and final segment
5	linked, 2nd and final segment
6	linked, 3rd and final segment
7	unassigned

5.2.2.1.1.3 *Single segment SLM frame.* If *LAS* = 0, the data in the MA field shall be considered a complete frame and shall be made available for further processing.

5.2.2.1.1.4 *Multiple segment SLM frame.* The ADLP shall accept and assemble linked 56-bit Comm-A segments associated with all sixteen possible interrogator identifier (II) codes. Correct linking of Comm-A segments shall be achieved by requiring that all Comm-A segments have the same value of IIS. If *LAS* = 1 through 6, the frame shall consist of two to four Comm-A segments as specified in the following paragraphs.

5.2.2.1.1.4.1 *Initial segment.* If *LAS* = 1, the MA field shall be assembled as the initial segment of an SLM frame. The initial segment shall be stored until all segments of the frame have been received or the frame is cancelled.

5.2.2.1.1.4.2 *Intermediate segment.* If *LAS* = 2 or 3, the MA field shall be assembled in numerical order as an intermediate segment of the SLM frame. It shall be associated with previous segments containing the same value of IIS.

5.2.2.1.1.4.3 *Final segment.* If *LAS* = 4, 5 or 6, the MA field shall be assembled as the final segment of the SLM frame. It shall be associated with previous segments containing the same value of IIS.

5.2.2.1.1.4.4 *Frame completion.* The frame shall be considered complete and shall be made available for further processing as soon as all segments of the frame have been received.

5.2.2.1.1.4.5 *Frame cancellation.* An incomplete SLM frame shall be cancelled if one or more of the following conditions apply:

[*] All figures and tables are located at the end of this chapter.

a) a new initial segment (*LAS* = 1) is received with the same value of IIS. In this case, the new initial segment shall be retained as the initial segment of a new SLM frame;

b) the sequence of received *LAS* codes (after the elimination of duplicates) is not contained in the following list:

1) *LAS* = 0
2) *LAS* = 1,5
3) *LAS* = 1,2,6
4) *LAS* = 1,6,2
5) *LAS* = 1,2,3,4
6) *LAS* = 1,3,2,4
7) *LAS* = 1,2,4,3
8) *LAS* = 1,3,4,2
9) *LAS* = 1,4,2,3
10) *LAS* = 1,4,3,2

c) *Tc* seconds have elapsed since the last Comm-A segment with the same value of IIS was received (Table 5-1).

5.2.2.1.1.4.6 *Segment cancellation.* A received segment for an SLM frame shall be discarded if it is an intermediate or final segment and no initial segment has been received with the same value of IIS.

5.2.2.1.1.4.7 *Segment duplication.* If a received segment duplicates a currently received segment number with the same value of IIS, the new segment shall replace the currently received segment.

Note.— The action of the Mode S subnetwork protocols may result in the duplicate delivery of Comm-A segments.

5.2.2.1.2 *ELM frame.* An uplink ELM frame shall consist of from 20 to 160 bytes and shall be transferred from the interrogator to the transponder using the protocol defined in 3.1.2.7 of Annex 10, Volume IV. The first 4 bits of each uplink ELM segment (MC field) shall contain the interrogator identifier (II) code of the Mode S interrogator transmitting the ELM. The ADLP shall check the II code of each segment of a completed uplink ELM. If all of the segments contain the same II code, the II code in each segment shall be deleted and the remaining message bits retained as user data for further processing. If all of the segments do not contain the same II code, the entire uplink ELM shall be discarded.

Note.— An uplink ELM frame consists of two to sixteen associated Comm-C segments, each of which contains the 4-bit II code. Therefore, the capacity for packet transfer is 19 to 152 bytes per uplink ELM frame.

5.2.2.2 DOWNLINK FRAMES

5.2.2.2.1 *SLM frame.* A downlink SLM frame shall be composed of up to 4 Comm-B segments. The MB field of the first Comm-B segment of the frame shall contain a 2-bit linked Comm-B subfield (LBS, bits 1 and 2 of the MB field). This subfield shall be used to control linking of up to four Comm-B segments.

Note.— The LBS uses the first 2-bit positions in the first segment of a multi or single segment downlink SLM frame. Hence, 54 bits are available for Mode S packet data in the first segment of a downlink SLM frame. The remaining segments of the downlink SLM frame, if any, have 56 bits available.

5.2.2.2.1.1 *LBS coding.* Linking shall be indicated by the coding of the LBS subfield of the MB field of the initial Comm-B segment of the SLM frame.

The coding of LBS shall be as follows:

LBS	*MEANING*
0	single segment
1	initial segment of a two-segment SLM frame
2	initial segment of a three-segment SLM frame
3	initial segment of a four-segment SLM frame

5.2.2.2.1.2 *Linking protocol*

5.2.2.2.1.2.1 In the Comm-B protocol, the initial segment shall be transmitted using the air-initiated or multisite-directed protocols. The LBS field of the initial segment shall indicate to the ground the number of additional segments to be transferred (if any). Before the transmission of the initial segment to the transponder, the remaining segments of the SLM frame (if any) shall be transferred to the transponder for transmission to the interrogator using the ground-initiated Comm-B protocol. These segments shall be accompanied by control codes that cause the segments to be inserted in ground-initiated Comm-B registers 2, 3 or 4, associated respectively with the second, third, or fourth segment of the frame.

5.2.2.2.1.2.2 Close-out of the air-initiated segment that initiated the protocol shall not be performed until all segments have been successfully transferred.

Note.— The linking procedure including the use of the ground-initiated Comm-B protocol is performed by the ADLP.

5.2.2.2.1.3 *Directing SLM frames.* If the SLM frame is to be multisite-directed, the ADLP shall determine the II code of the Mode S interrogator or cluster of interrogators (5.2.8.1.3) that shall receive the SLM frame.

5.2.2.2.2 *ELM FRAME*

Note.— A downlink ELM consists of one to sixteen associated Comm-D segments.

5.2.2.2.2.1 *Procedure*. Downlink ELM frames shall be used to deliver messages greater than or equal to 28 bytes and shall be formed using the protocol defined in 3.1.2.7 of Annex 10, Volume IV.

5.2.2.2.2.2 *Directing ELM frames.* If the ELM frame is to be multisite-directed, the ADLP shall determine the II code of the Mode S interrogator or cluster of interrogators (5.2.8.1.3) that shall receive the ELM frame.

5.2.2.3 *XDLP frame processing.* Frame processing shall be performed on all Mode S packets (except for the MSP packet) as specified in 5.2.2.3 to 5.2.2.5. Frame processing for Mode S specific services shall be performed as specified in 5.2.7.

5.2.2.3.1 *Packet length*. All packets (including a group of packets multiplexed into a single frame) shall be transferred in a frame consisting of the smallest number of segments needed to accommodate the packet. The user data field shall be an integral multiple of bytes in length. A 4-bit parameter (LV) shall be provided in the Mode S DATA, CALL REQUEST, CALL ACCEPT, CLEAR REQUEST and INTERRUPT packet headers so that during unpacking no additional bytes are added to the user data field. The LV field shall define the number of full bytes used in the last segment of a frame. During LV calculations, the 4-bit II code in the last segment of an uplink ELM message shall be (1) ignored for uplink ELM frames with an odd number of Comm-C segments and (2) counted for uplink ELM frames with an even number of Comm-C segments. The value contained in the LV field shall be ignored if the packet is multiplexed.

Note.— A specific length field is used to define the length of each element of a multiplexed packet. Therefore the LV field value is not used. LV field error handling is described in Tables 5-16 and 5-19.

5.2.2.3.2 *Multiplexing.* When multiplexing multiple Mode S packets into single SLM on ELM frame, the following procedures shall be used. Multiplexing of the packets within the ADLP shall not be applied to packets associated with SVCs of different priorities.

Note.— Multiplexing is not performed on MSP packets.

5.2.2.3.2.1 *Multiplexing optimization*

Recommendation.— *When multiple packets are awaiting transfer to the same XDLP, they should be multiplexed into a single frame in order to optimize throughput, provided that packets associated with SVCs of different priorities are not multiplexed together.*

5.2.2.3.2.2 *Structure.* The structure of the multiplexed packets shall be as follows:

HEADER:6 or 8	LENGTH:8	1ST PACKET:v	LENGTH:8	2ND PACKET:v

Note.— A number in the field signifies the field length in bits; "v" signifies that the field is of variable length.

5.2.2.3.2.2.1 *Multiplexing header.* The header for the multiplexed packets shall be as follows:

DP:1	MP:1	SP:2	ST:2	FILL2:0 or 2

Where,

Data packet type (DP) = 0

MSP packet type (MP) = 1

Supervisory packet (SP) = 3

Supervisory type (ST) = 2

Note.— See Figure 5-23 for a definition for the field structure used in the multiplexing header.

5.2.2.3.2.2.2 *Length.* This field shall contain the length of the following packet in bytes. Any error detected in a multiplexed DATA packet, such as inconsistency between length as indicated in the LENGTH field and the length of the frame hosting that packet, shall result in the discarding of the packet unless the error can be determined to be limited to the LENGTH field, in which case a REJECT packet with the expected PS value can be sent.

5.2.2.3.2.2.2.1 **Recommendation.—** *For multiplex packets, if the entire packet cannot be de-multiplexed, then the first constituent packet should be treated as a format error, and the remainder should be discarded.*

5.2.2.3.2.3 *Termination.* The end of a frame containing a sequence of multiplexed packets shall be determined by one of the following events:

a) a length field of all zeros; or

b) less than eight bits left in the frame.

5.2.2.3.3 *MODE S CHANNEL SEQUENCE PRESERVATION*

5.2.2.3.3.1 *Application.* In the event that multiple Mode S frames from the same SVC are awaiting transfer to the same XDLP, the following procedure shall be used.

5.2.2.3.3.2 *Procedure*

Note 1.— SLM and ELM transactions can occur independently.

Note 2.— Uplink and downlink transactions can occur independently.

5.2.2.3.3.2.1 *SLM frames.* SLM frames awaiting transfer shall be transmitted in the order received.

5.2.2.3.3.2.2 *ELM frames.* ELM frames awaiting transfer shall be transmitted in the order received.

5.2.2.4 GDLP FRAME PROCESSING

5.2.2.4.1 GENERAL PROVISIONS

5.2.2.4.1.1 The GDLP shall determine the data link capability of the ADLP/transponder installation from the data link capability report (5.2.9) before performing any data link activity with that ADLP.

5.2.2.4.1.2 GDLP frame processing shall provide to the interrogator all data for the uplink transmission that are not provided directly by the interrogator.

5.2.2.4.2 *Delivery status.* GDLP frame processing shall accept an indication from the interrogator function that a specified uplink frame that was previously transferred to the interrogator has been successfully delivered over the ground-to-air link.

5.2.2.4.3 *Aircraft address.* GDLP frame processing shall receive from the interrogator along with the data in each downlink SLM or ELM frame, the 24-bit address of the aircraft that transmitted the frame. GDLP frame processing shall be capable of transferring to the interrogator the 24-bit address of the aircraft that is to receive an uplink SLM or ELM frame.

5.2.2.4.4 *Mode S protocol type identification.* GDLP frame processing shall indicate to the interrogator the protocol to be used to transfer the frame: standard length message protocol, extended length message protocol or broadcast protocol.

5.2.2.4.5 *Frame determination.* A Mode S packet (including multiplexed packets but excluding MSP packets) intended for uplink and less than or equal to 28 bytes shall be sent as an SLM frame. A Mode S packet greater than 28 bytes shall be sent as an uplink ELM frame for transponders with ELM capability, using M-bit processing as necessary (5.2.5.1.4.1). If the transponder does not have ELM capability, packets greater than 28 bytes shall be sent using the M-bit or S-bit (5.2.5.1.4.2) assembly procedures as necessary and multiple SLM frames.

Note.— The Mode S DATA, CALL REQUEST, CALL ACCEPT, CLEAR REQUEST and INTERRUPT packets are the only Mode S packets that use M-bit or S-bit sequencing.

5.2.2.5 ADLP FRAME PROCESSING

5.2.2.5.1 *General provisions.* With the possible exception of the last 24 bits (address/parity), ADLP frame processing shall accept from the transponder the entire content of both 56-bit and 112-bit received uplink transmissions, excluding all-call and ACAS interrogations. ADLP frame processing shall provide to the transponder all data for the downlink transmission that is not provided directly by the transponder (5.2.3.3).

5.2.2.5.2 *Delivery status.* ADLP frame processing shall accept an indication from the transponder that a specified downlink frame that was previously transferred to the transponder has been closed out.

5.2.2.5.3 *Interrogator identifier.* ADLP frame processing shall accept from the transponder, along with the data in each uplink SLM and ELM, the interrogator identifier (II) code of the interrogator that transmitted the frame. ADLP frame processing shall transfer to the transponder the II code of the interrogator or cluster of interrogators that shall receive a multisite-directed frame.

5.2.2.5.4 *Mode S protocol type identification.* ADLP frame processing shall indicate to the transponder the protocol to be used to transfer the frame: ground-initiated, air-initiated, broadcast, multisite-directed, standard length or extended length.

5.2.2.5.5 *Frame cancellation.* ADLP frame processing shall be capable of cancelling downlink frames previously transferred to the transponder for transmission but for which a close-out has not been indicated. If more than one frame is stored within the transponder, the cancellation procedure shall be capable of cancelling the stored frames selectively.

5.2.2.5.6 *Frame determination.* A Mode S packet (including multiplexed packets but excluding MSP packets) intended for downlink and less than or equal to 222 bits shall be sent as an SLM frame. A Mode S packet greater than 222 bits shall be sent as a downlink ELM frame for transponders with ELM capability using M-bit processing as necessary (5.2.5.1.4.1). When M-bit processing is used, all ELM frames containing M = 1 shall contain the maximum number of ELM segments that the transponder is capable of transmitting in response to one requesting interrogation (UF = 24) (5.2.9.1). If the transponder does not have ELM capability, packets greater than 222 bits shall be sent using the M-bit or S-bit (5.2.5.1.4.2) assembly procedures and multiple SLM frames.

Note.— The maximum length of a downlink SLM frame is 222 bits. This is equal to 28 bytes (7 bytes for 4 Comm-B segments) minus the 2-bit linked Comm-B subfield (5.2.2.2.1.1).

5.2.2.6 PRIORITY MANAGEMENT

5.2.2.6.1 *ADLP priority management.* Frames shall be transferred from the ADLP to the transponder in the following order of priority (highest first):

a) Mode S specific services;

b) search requests (5.2.8.1);

c) frames containing only high priority SVC packets; and

d) frames containing only low priority SVC packets.

5.2.2.6.2 *GDLP PRIORITY MANAGEMENT*

Recommendation.— *Uplink frames should be transferred in the following order of priority (highest first):*

a) Mode S specific services;

b) frames containing at least one Mode S ROUTE packet (5.2.8.1);

c) frames containing at least one high priority SVC packet; and

d) frames containing only low priority SVC packets.

5.2.3 Data exchange interfaces

5.2.3.1 THE DTE ISO 8208 INTERFACE

5.2.3.1.1 *General provisions.* The interface between the XDLP and the DTE(s) shall conform to ISO 8208 packet layer protocol (PLP). The XDLP shall support the procedures of the DTE as specified in ISO 8208. As such, the XDLP shall contain a DCE (5.2.4).

5.2.3.1.2 *Physical and link layer requirements for the DTE/DCE interface.* The requirements are:

a) the interface shall be code and byte independent and shall not impose restrictions on the sequence, order, or pattern of the bits transferred within a packet; and

b) the interface shall support the transfer of variable length network layer packets.

5.2.3.1.3 *DTE ADDRESS*

5.2.3.1.3.1 *Ground DTE address.* The ground DTE address shall have a total length of 3 binary coded decimal (BCD) digits, as follows:

$X_0X_1X_2$

X_0 shall be the most significant digit. Ground DTE addresses shall be decimal numbers in the range of 0 through 255 coded in BCD. Assignment of the DTE address shall be a local issue. All DTEs connected to GDLPs having overlapping coverage shall have unique addresses. GDLPs which have a flying time less than T_r (Table 5-1) between their coverage areas shall be regarded as having overlapping coverage.

5.2.3.1.3.2 *Mobile DTE address.* The mobile DTE address shall have a total length of 10 BCD digits, as follows:

$X_0X_1X_2X_3X_4X_5X_6X_7X_8X_9$

X_0 shall be the most significant digit. The digits X_0 to X_7 shall contain the octal representation of the aircraft address coded in BCD. The digits X_8X_9 shall identify a sub-address for specific DTEs on board an aircraft. This sub-address shall be a decimal number in the range of 0 and 15 coded in BCD. The following sub-address assignments shall be used:

00 ATN router

01 to 15 Unassigned

5.2.3.1.3.3 *Illegal DTE addresses.* DTE addresses outside of the defined ranges or not conforming to the formats for the ground and mobile DTE addresses specified in 5.2.3.1.3.1 and 5.2.3.1.3.2 shall be defined to be illegal DTE addresses. The detection of an illegal DTE address in a CALL REQUEST packet shall lead to a rejection of the call as specified in 5.2.5.1.5.

5.2.3.1.4 *PACKET LAYER PROTOCOL REQUIREMENTS OF THE DTE/DCE INTERFACE*

5.2.3.1.4.1 *Capabilities.* The interface between the DTE and the DCE shall conform to ISO 8208 with the following capabilities:

a) expedited data delivery, i.e. the use of INTERRUPT packets with a user data field of up to 32 bytes;

b) priority facility (with two levels, 5.2.5.2.1.1.6);

c) fast select (5.2.5.2.1.1.13, 5.2.5.2.1.1.16); and

d) called/calling address extension facility, if required by local conditions (i.e. the XDLP is connected to the DTE via a network protocol that is unable to contain the Mode S address as defined).

Other ISO 8208 facilities and the D-bit and the Q-bit shall not be invoked for transfer over the Mode S packet layer protocol.

5.2.3.1.4.2 *Parameter values.* The timer and counter parameters for the DTE/DCE interface shall conform to the default ISO 8208 values.

5.2.3.2 MODE S SPECIFIC SERVICES INTERFACE

Note.— Mode S specific services consist of the broadcast Comm-A and Comm-B, GICB and MSP.

5.2.3.2.1 *ADLP*

5.2.3.2.1.1 *General provisions.* The ADLP shall support the accessing of Mode S specific services through the provision of one or more separate ADLP interfaces for this purpose.

5.2.3.2.1.2 *Functional capability.* Message and control coding via this interface shall support all of the capabilities specified in 5.2.7.1.

5.2.3.2.2 *GDLP*

5.2.3.2.2.1 *General provisions.* The GDLP shall support the accessing of Mode S specific services through the provision of a separate GDLP interface for this purpose and/or by providing access to these services through the DTE/DCE interface.

5.2.3.2.2.2 *Functional capability.* Message and control coding via this interface shall support all of the capabilities specified in 5.2.7.2.

5.2.3.3 ADLP/TRANSPONDER INTERFACE

5.2.3.3.1 *TRANSPONDER TO ADLP*

5.2.3.3.1.1 The ADLP shall accept an indication of protocol type from the transponder in connection with data transferred from the transponder to the ADLP. This shall include the following types of protocols:

a) surveillance interrogation;

b) Comm-A interrogation;

c) Comm-A broadcast interrogation; and

d) uplink ELM.

The ADLP shall also accept the II code of the interrogator used to transmit the surveillance, Comm-A or uplink ELM.

Note.— Transponders will not output all-call and ACAS information on this interface.

5.2.3.3.1.2 The ADLP shall accept control information from the transponder indicating the status of downlink transfers. This shall include:

a) Comm-B close-out;

b) Comm-B broadcast timeout; and

c) downlink ELM close-out.

5.2.3.3.1.3 The ADLP shall have access to current information defining the communication capability of the Mode S transponder with which it is operating. This information shall be used to generate the data link capability report (5.2.9).

5.2.3.3.2 *ADLP TO TRANSPONDER*

5.2.3.3.2.1 The ADLP shall provide an indication of protocol type to the transponder in connection with data transferred from the ADLP to the transponder. This shall include the following types of protocols:

a) ground-initiated Comm-B;

b) air-initiated Comm-B;

c) multisite-directed Comm-B;

d) Comm-B broadcast;

e) downlink ELM; and

f) multisite-directed downlink ELM.

The ADLP shall also provide the II code for transfer of a multisite-directed Comm-B or downlink ELM and the Comm-B data selector (BDS) code (3.1.2.6.11.2 of Annex 10, Volume IV) for a ground-initiated Comm-B.

5.2.3.3.2.2 The ADLP shall be able to perform frame cancellation as specified in 5.2.2.5.5.

5.2.3.4 GDLP/MODE S INTERROGATOR INTERFACE

5.2.3.4.1 *INTERROGATOR TO GDLP*

5.2.3.4.1.1 The GDLP shall accept an indication of protocol type from the interrogator in connection with data transferred from the interrogator to the GDLP. This shall include the following types of protocols:

a) ground-initiated Comm-B;

b) air-initiated Comm-B;

c) air-initiated Comm-B broadcast; and

d) downlink ELM.

The GDLP shall also accept the BDS code used to identify the ground-initiated Comm-B segment.

5.2.3.4.1.2 The GDLP shall accept control information from the interrogator indicating the status of uplink transfers and the status of the addressed Mode S aircraft.

5.2.3.4.2 *GDLP to interrogator.* The GDLP shall provide an indication of protocol type to the interrogator in connection with data transferred from the GDLP to the interrogator. This shall include the following types of protocols:

a) Comm-A interrogation;

b) Comm-A broadcast interrogation;

c) uplink ELM; and

d) ground-initiated Comm-B request.

The GDLP shall also provide the BDS code for the ground-initiated Comm-B protocol.

5.2.4 DCE operation

Note.— The DCE process within the XDLP acts as a peer process to the DTE. The DCE supports the operations of the DTE with the capability specified in 5.2.3.1.4. The following requirements do not specify format definitions and flow control on the DTE/DCE interface. The specifications and definitions in ISO 8208 apply for these cases.

5.2.4.1 *State transitions.* The DCE shall operate as a state machine. Upon entering a state, the DCE shall perform the actions specified in Table 5-2. State transitions and additional action(s) shall be as specified in Table 5-3 through Table 5-12.

Note.— The next state transition (if any) that occurs when the DCE receives a packet from the DTE is specified by Table 5-3 through Table 5-8. These tables are organized according to the hierarchy illustrated in Figure 5-2. The same transitions are defined in Table 5-9 through Table 5-12 when the DCE receives a packet from the XDCE (via the reformatting process).

5.2.4.2 DISPOSITION OF PACKETS

5.2.4.2.1 Upon receipt of a packet from the DTE, the packet shall be forwarded or not forwarded to the XDCE (via the reformatting process) according to the parenthetical instructions contained in Tables 5-3 to 5-8. If no parenthetical instruction is listed or if the parenthetical instruction indicates “do not forward”, the packet shall be discarded.

5.2.4.2.2 Upon receipt of a packet from the XDCE (via the reformatting process), the packet shall be forwarded or not forwarded to the DTE according to the parenthetical instructions contained in Tables 5-9 to 5-12. If no parenthetical instruction is listed or if the parenthetical instruction indicates “do not forward”, the packet shall be discarded.

5.2.5 Mode S packet layer processing

5.2.5.1 GENERAL REQUIREMENTS

5.2.5.1.1 *BUFFER REQUIREMENTS*

5.2.5.1.1.1 *ADLP buffer requirements*

5.2.5.1.1.1.1 The following requirements apply to the entire ADLP and shall be interpreted as necessary for each of the main processes (DCE, reformatting, ADCE, frame processing and SSE).

5.2.5.1.1.1.2 The ADLP shall be capable of maintaining sufficient buffer space for fifteen SVCs:

a) maintain sufficient buffer space to hold fifteen Mode S subnetwork packets of 152 bytes each in the uplink direction per SVC for a transponder with uplink ELM capability or 28 bytes otherwise;

b) maintain sufficient buffer space to hold fifteen Mode S subnetwork packets of 160 bytes each in the downlink direction per SVC for a transponder with downlink ELM capability or 28 bytes otherwise;

c) maintain sufficient buffer space for two Mode S subnetwork INTERRUPT packets of 35 bytes each (user data field plus control information), one in each direction, for each SVC;

d) maintain sufficient resequencing buffer space for storing thirty-one Mode S subnetwork packets of 152 bytes each in the uplink direction per SVC for a transponder with uplink ELM capability or 28 bytes otherwise; and

e) maintain sufficient buffer space for the temporary storage of at least one Mode S packet of 160 bytes undergoing M-bit or S-bit processing in each direction per SVC.

5.2.5.1.1.1.3 The ADLP shall be capable of maintaining a buffer of 1 600 bytes in each direction to be shared among all MSPs.

5.2.5.1.1.2 *GDLP buffer requirements*

5.2.5.1.1.2.1 **Recommendation.—** *The GDLP should be capable of maintaining sufficient buffer space for an average of 4 SVCs for each Mode S aircraft in the coverage area of the interrogators connected to it, assuming all aircraft have ELM capability.*

Note.— Additional buffer space may be required if DTEs associated with end-systems are supported.

5.2.5.1.2 *CHANNEL NUMBER POOLS*

5.2.5.1.2.1 The XDLP shall maintain several SVC channel number pools; the DTE/DCE (ISO 8208) interface uses one set. Its organization, structure and use shall be as defined in the ISO 8208 standard. The other channel pools shall be used on the ADCE/GDCE interface.

5.2.5.1.2.2 The GDLP shall manage a pool of temporary channel numbers in the range of 1 to 3, for each ground DTE/ADLP pair. Mode S CALL REQUEST packets generated by the GDLP shall contain the ground DTE address and a temporary channel number allocated from the pool of that ground DTE. The GDLP shall not reuse a temporary channel number allocated to an SVC that is still in the CALL REQUEST state.

Note 1.— The use of temporary channel numbers allows the GDLP to have up to three call requests in process at the same time for a particular ground DTE and ADLP combination. It also allows the GDLP or ADLP to clear a channel before the permanent channel number is assigned.

Note 2.— The ADLP may be in contact with multiple ground DTEs at any one time. All the ground DTEs use temporary channel numbers ranging from 1 to 3.

5.2.5.1.2.3 The ADLP shall use the ground DTE address to distinguish the temporary channel numbers used by the various ground DTEs. The ADLP shall assign a permanent channel number (in the range of 1 to 15) to all SVCs and shall inform the GDLP of the assigned number by including it in the Mode S CALL REQUEST by ADLP or Mode S CALL ACCEPT by ADLP packets. The temporary channel number shall be included in the Mode S CALL ACCEPT by ADLP together with the permanent channel number in order to define the association of these channel numbers. The ADLP shall continue to associate the temporary channel number with the permanent channel number of an SVC until the SVC is returned to the READY (*p*1) state, or else, while in the DATA TRANSFER (*p*4) state, a Mode S CALL REQUEST by GDLP packet is received bearing the same temporary channel number. A non-zero permanent channel number in the Mode S CLEAR REQUEST by ADLP, CLEAR REQUEST by GDLP, CLEAR CONFIRMATION by ADLP or CLEAR CONFIRMATION by GDLP packet shall indicate that the permanent channel number shall be used and the temporary channel number shall be ignored. In the event that an XDLP is required to send one of these packets in the absence of a permanent channel number, the permanent channel number shall be set to zero, which shall indicate to the peer XDLP that the temporary channel number is to be used.

Note.— The use of a zero permanent channel number allows the ADLP to clear an SVC when no permanent channel number is available, and allows the GDLP to do likewise before it has been informed of the permanent channel number.

5.2.5.1.2.4 The channel number used by the DTE/DCE interface and that used by the ADCE/GDCE interface shall be assigned independently. The reformatting process shall maintain an association table between the DTE/DCE and the ADCE/GDCE channel numbers.

5.2.5.1.3 *Receive ready and receive not ready conditions.* The ISO 8208 interface and the ADCE/GDCE interface management procedures shall be independent operations since each system must be able to respond to separate receive ready and receive not ready indications.

5.2.5.1.4 *PROCESSING OF M-BIT AND S-BIT SEQUENCES*

Note.— M-bit processing applies to the sequencing of the DATA packet. S-bit processing applies to the sequencing of Mode S CALL REQUEST, CALL ACCEPT, CLEAR REQUEST and INTERRUPT packets.

5.2.5.1.4.1 *M-bit processing*

Note.— The packet size used on the DTE/DCE interface can be different from that used on the ADCE/GDCE interface.

5.2.5.1.4.1.1 M-bit processing shall be used when DATA packets are reformatted (5.2.5.2). M-bit processing shall utilize the specifications contained in the ISO 8208 standard. The M-bit sequence processing shall apply on a per channel basis. The M-bit set to 1 shall indicate that a user data field continues in the subsequent DATA packet. Subsequent packets in an M-bit sequence shall use the same header format (i.e. the packet format excluding the user data field).

5.2.5.1.4.1.2 If the packet size for the XDCE (5.2.6.4.2) interface is larger than that used on the DTE/DCE interface, packets shall be combined to the extent possible as dictated by the M-bit, when transmitting a Mode S DATA packet. If the packet size is smaller on the XDCE interface than that defined on the DTE/DCE interface, packets shall be fragmented to fit into the smaller Mode S packet using M-bit assembly.

5.2.5.1.4.1.3 A packet shall be combined with subsequent packets if the packet is filled and more packets exist in the M-bit sequence (M-bit = 1). A packet smaller than the maximum packet size defined for this SVC (partial packet) shall only be allowed when the M-bit indicates the end of an M-bit sequence. A received packet smaller than the maximum packet size with M-bit equal to 1 shall cause a reset to be generated as specified in ISO 8208 and the remainder of the sequence should be discarded.

5.2.5.1.4.1.4 **Recommendation.—** *In order to decrease delivery delay, reformatting should be performed on the partial receipt of an M-bit sequence, rather than delay reformatting until the complete M-bit sequence is received.*

5.2.5.1.4.2 *S-bit processing.* S-bit processing shall apply only to Mode S CALL REQUEST, CALL ACCEPT, CLEAR REQUEST and INTERRUPT packets. This processing shall be performed as specified for M-bit processing (5.2.5.1.4.1) except that the packets associated with any S-bit sequence whose reassembly is not completed in *Tq* seconds (Tables 5-1 and 5-13) shall be discarded (5.2.6.3.6, 5.2.6.4.5.2 and 5.2.6.9), and receipt of a packet shorter than the maximum packet size with S = 1 shall cause the entire S-bit sequence to be treated as a format error in accordance with Table 5-16.

5.2.5.1.5 *MODE S SUBNETWORK ERROR PROCESSING FOR ISO 8208 PACKETS*

5.2.5.1.5.1 *D-bit.* If the XDLP receives a DATA packet with the D-bit set to 1, the XDLP shall send a RESET REQUEST packet to the originating DTE containing a cause code *(CC)* = 133 and a diagnostic code *(DC)* = 166. If the D-bit is set to 1 in a CALL REQUEST packet, the D-bit shall be ignored by the XDLP. The D-bit of the corresponding CALL ACCEPT packet shall always be set to 0. The use of CC is optional.

5.2.5.1.5.2 *Q-bit.* If the XDLP receives a DATA packet with the Q-bit set to 1, the XDLP shall send a RESET REQUEST packet to the originating DTE containing *CC* = 133 and *DC* = 83. The use of CC is optional.

5.2.5.1.5.3 *Invalid priority*. If the XDLP receives a call request with a connection priority value equal to 2 through 254, the XDLP shall clear the virtual circuit using *DC* = 66 and *CC* = 131. The use of CC is optional.

5.2.5.1.5.4 *Unsupported facility*. If the XDLP receives a call request with a request for a facility that it cannot support, the XDLP shall clear the virtual circuit using *DC* = 65 and *C* = 131. The use of CC is optional.

5.2.5.1.5.5 *Illegal calling DTE address.* If the XDLP receives a call request with an illegal calling DTE address (5.2.3.1.3.3), the XDLP shall clear the virtual circuit using *DC* = 68 and *CC* = 141. The use of CC is optional.

5.2.5.1.5.6 *Illegal called DTE address.* If the XDLP receives a call request with an illegal called DTE address (5.2.3.1.3.3), the XDLP shall clear the virtual circuit using *DC* = 67 and *CC* = 141. The use of CC is optional.

5.2.5.2 REFORMATTING PROCESS

Note.— The reformatting process is divided into two subprocesses: uplink formatting and downlink formatting. For the ADLP, the uplink process reformats Mode S packets into ISO 8208 packets and the downlink process reformats ISO 8208 packets into Mode S packets. For the GDLP, the uplink process reformats ISO 8208 packets into Mode S packets and the downlink process reformats Mode S packets into ISO 8208 packets.

5.2.5.2.1 *CALL REQUEST BY ADLP*

5.2.5.2.1.1 *Translation into Mode S packets*

5.2.5.2.1.1.1 *Translated packet format.* Reception by the ADLP reformatting process of an ISO 8208 CALL REQUEST packet from the local DCE shall result in the generation of corresponding Mode S CALL REQUEST by ADLP packet(s) (as determined by S-bit processing (5.2.5.1.4.2)) as follows:

DP:1	MP:1	SP:2	ST:2	FILL2:0 or 2	P:1	FILL:1	SN:6	CH:4	AM:4	AG:8	S:1	FS:2	F:1	LV:4	UD:v

5.2.5.2.1.1.2 *Data packet type (DP).* This field shall be set to 0.

5.2.5.2.1.1.3 *MSP packet type (MP).* This field shall be set to 1.

5.2.5.2.1.1.4 *Supervisory packet (SP).* This field shall be set to 1.

5.2.5.2.1.1.5 *Supervisory type (ST).* This field shall be set to 0.

5.2.5.2.1.1.6 *Priority (P).* This field shall be set to 0 for a low priority SVC and to 1 for a high priority SVC. The value for this field shall be obtained from the data transfer field of the priority facility of the ISO 8208 packet, and shall be set to 0 if the ISO 8208 packet does not contain the priority facility or if a priority of 255 is specified. The other fields of the priority facility shall be ignored.

5.2.5.2.1.1.7 *Sequence number (SN).* For a particular SVC, each packet shall be numbered (5.2.6.9.4).

5.2.5.2.1.1.8 *Channel number (CH).* The channel number shall be chosen from the pool of SVC channel numbers available to the ADLP. The pool shall consist of 15 values from 1 through 15. The highest available channel number shall be chosen from the pool. An available channel shall be defined as one in state *p*1. The correspondence between the channel number used by the Mode S subnetwork and the number used by the DTE/DCE interface shall be maintained while the channel is active.

Note.— Also refer to 5.2.5.1.2 on channel pool management.

5.2.5.2.1.1.9 *Address, mobile (AM).* This address shall be the mobile DTE sub-address (5.2.3.1.3.2) in the range of 0 to 15. The address shall be extracted from the two least significant digits of the calling DTE address contained in the ISO 8208 packet and converted to binary representation.

Note.— The 24-bit aircraft address is transferred within the Mode S link layer.

5.2.5.2.1.1.10 *Address, ground (AG).* This address shall be the ground DTE address (5.2.3.1.3.1) in the range of 0 to 255. The address shall be extracted from the called DTE address contained in the ISO 8208 packet and converted to binary representation.

5.2.5.2.1.1.11 *Fill field.* The fill field shall be used to align subsequent data fields on byte boundaries. When indicated as “FILL:n”, the fill field shall be set to a length of “n” bits. When indicated as “FILL1: 0 or 6”, the fill field shall be set to a length of 6 bits for a non-multiplexed packet in a downlink SLM frame and 0 bit for all other cases. When indicated as “FILL2: 0 or 2”, the fill field shall be set to a length of 0 bit for a non-multiplexed packet in a downlink SLM frame or for a multiplexing header and 2 bits for all other cases.

5.2.5.2.1.1.12 *S field (S).* A value of 1 shall indicate that the packet is part of an S-bit sequence with more packets in the sequence to follow. A value of 0 shall indicate that the sequence ends with this packet. This field shall be set as specified in 5.2.5.1.4.2.

5.2.5.2.1.1.13 *FS field (FS).* A value of 0 shall indicate that the packet does not contain fast select data. A value of 2 or 3 shall indicate that the packet contains fast select data. A value of 2 shall indicate normal fast select operation. A value of 3 shall indicate fast select with restricted response. An FS value of 1 shall be undefined.

5.2.5.2.1.1.14 *First packet flag (F).* This field shall be set to 0 in the first packet of an S-bit sequence and in a packet that is not part of an S-bit sequence. Otherwise it shall be set to 1.

5.2.5.2.1.1.15 *User data length (LV).* This field shall indicate the number of full bytes used in the last SLM or ELM segment as defined in 5.2.2.3.1.

5.2.5.2.1.1.16 *User data field (UD).* This field shall only be present if optional CALL REQUEST user data (maximum 16 bytes) or fast select user data (maximum 128 bytes) is contained in the ISO 8208 packet. The user data field shall be transferred from ISO 8208 packet unchanged using S-bit processing as specified in 5.2.5.1.4.2.

5.2.5.2.1.2 *Translation into ISO 8208 packets*

5.2.5.2.1.2.1 *Translation.* Reception by the GDLP reformatting process of a Mode S CALL REQUEST by ADLP packet (or an S-bit sequence of packets) from the GDCE shall result in the generation of a corresponding ISO 8208 CALL REQUEST packet to the local DCE. The translation from the Mode S packet to the ISO 8208 packet shall be the inverse of the processing defined in 5.2.5.2.1.1 with the exceptions as specified in 5.2.5.2.1.2.2.

5.2.5.2.1.2.2 *Called DTE, calling DTE address and length fields.* The calling DTE address shall be composed of the aircraft address and the value contained in the AM field of the Mode S packet, converted to BCD (5.2.3.1.3.2). The called DTE address shall be the ground DTE address contained in the AG field of the Mode S packet, converted to BCD. The length field shall be as defined in ISO 8208.

5.2.5.2.2 *CALL REQUEST BY GDLP*

5.2.5.2.2.1 *Translation into Mode S packets*

5.2.5.2.2.1.1 *General.* Reception by the GDLP reformatting process of an ISO 8208 CALL REQUEST packet from the local DCE shall result in the generation of corresponding Mode S CALL REQUEST by GDLP packet(s) (as determined by S-bit processing (5.2.5.1.4.2)) as follows:

DP:1	MP:1	SP:2	ST:2	FILL:2	P:1	FILL:1	SN:6	FILL:2	TC:2	AM:4	AG:8	S:1	FS:2	F:1	LV:4	UD:v

Fields shown in the packet format and not specified in the following paragraphs shall be set as specified in 5.2.5.2.1.

5.2.5.2.2.1.2 *Data packet type (DP).* This field shall be set to 0.

5.2.5.2.2.1.3 *MSP packet type (MP).* This field shall be set to 1.

5.2.5.2.2.1.4 *Supervisory packet (SP).* This field shall be set to 1.

5.2.5.2.2.1.5 *Supervisory type (ST).* This field shall be set to 0.

5.2.5.2.2.1.6 *Temporary channel number field (TC).* This field shall be used to distinguish multiple call requests from a GDLP. The ADLP reformatting process, upon receipt of a temporary channel number, shall assign a channel number from those presently in the READY state, *p*1.

5.2.5.2.2.1.7 *Address, ground (AG).* This address shall be the ground DTE address (5.2.3.1.3.1) in the range of 0 to 255. The address shall be extracted from the calling DTE address contained in the ISO 8208 packet and converted to binary representation.

5.2.5.2.2.1.8 *Address, mobile (AM).* This address shall be the mobile DTE sub-address (5.2.3.1.3.2) in the range of 0 to 15. The address shall be extracted from the two least significant digits of the called DTE address contained in the ISO 8208 packet and converted to binary representation.

5.2.5.2.2.2 *Translation into ISO 8208 packets*

5.2.5.2.2.2.1 *Translation.* Reception by the ADLP reformatting process of a Mode S CALL REQUEST by GDLP packet (or an S-bit sequence of packets) from the ADCE shall result in the generation of a corresponding ISO 8208 CALL REQUEST packet to the local DCE. The translation from the Mode S packet to the ISO 8208 packet shall be the inverse of the processing defined in 5.2.5.2.2.1 with the exceptions as specified in 5.2.5.2.2.2.2.

5.2.5.2.2.2.2 *Called DTE, calling DTE address and length fields.* The called DTE address shall be composed of the aircraft address and the value contained in the AM field of the Mode S packet, converted to BCD (5.2.3.1.3.2). The calling DTE address shall be the ground DTE address contained in the AG field of the Mode S packet, converted to BCD. The length field shall be as defined in ISO 8208.

5.2.5.2.3 *CALL ACCEPT BY ADLP*

5.2.5.2.3.1 *Translation into Mode S packets*

5.2.5.2.3.1.1 *Translated packet format.* Reception by the ADLP reformatting process of an ISO 8208 CALL ACCEPT packet from the local DCE shall result in the generation of corresponding Mode S CALL ACCEPT by ADLP packet(s) (as determined by S-bit processing (5.2.5.1.4.2)) as follows:

DP:1	MP:1	SP:2	ST:2	FILL2:0 or 2	TC:2	SN:6	CH:4	AM:4	AG:8	S:1	FILL:2	F:1	LV:4	UD:v

Fields shown in the packet format and not specified in the following paragraphs shall be set as specified in 5.2.5.2.1.

5.2.5.2.3.1.2 *Data packet type (DP).* This field shall be set to 0.

5.2.5.2.3.1.3 *MSP packet type (MP).* This field shall be set to 1.

5.2.5.2.3.1.4 *Supervisory packet (SP).* This field shall be set to 1.

5.2.5.2.3.1.5 *Supervisory type (ST).* This field shall be set to 1.

5.2.5.2.3.1.6 *Temporary channel number (TC).* The TC value in the originating Mode S CALL REQUEST by GDLP packet shall be returned to the GDLP along with the channel number (CH) assigned by the ADLP.

5.2.5.2.3.1.7 *Channel number (CH).* The field shall be set equal to the channel number assigned by the ADLP as determined during the CALL REQUEST procedures for the Mode S connection.

5.2.5.2.3.1.8 *Address, mobile and address, ground.* The AM and AG values in the originating Mode S CALL REQUEST by GDLP packet shall be returned in these fields. When present, DTE addresses in the ISO 8208 CALL ACCEPT packet shall be ignored.

5.2.5.2.3.2 *Translation into ISO 8208 packets*

5.2.5.2.3.2.1 *Translation.* Reception by the GDLP reformatting process of a Mode S CALL ACCEPT by ADLP packet (or an S-bit sequence of packets) from the GDCE shall result in the generation of a corresponding ISO 8208 CALL ACCEPT packet to the local DCE. The translation from the Mode S packet to the ISO 8208 packet shall be the inverse of the processing defined in 5.2.5.2.3.1 with the exceptions as specified in 5.2.5.2.3.2.2.

5.2.5.2.3.2.2 *Called DTE, calling DTE address and length fields.* Where present, the called DTE address shall be composed of the aircraft address and the value contained in the AM field of the Mode S packet, converted to BCD (5.2.3.1.3.2). Where present, the calling DTE address shall be the ground DTE address contained in the AG field of the Mode S packet, converted to BCD. The length field shall be as defined in ISO 8208.

Note.— The called and calling DTE addresses are optional in the corresponding ISO 8208 packet and are not required for correct operation of the Mode S subnetwork.

5.2.5.2.4 *CALL ACCEPT BY GDLP*

5.2.5.2.4.1 *Translation into Mode S packets*

5.2.5.2.4.1.1 *Translated packet format.* Reception by the GDLP reformatting process of an ISO 8208 CALL ACCEPT packet from the local DCE shall result in the generation of corresponding Mode S CALL ACCEPT by GDLP packet(s) (as determined by S-bit processing (5.2.5.1.4.2)) as follows:

DP:1	MP:1	SP:2	ST:2	FILL:2	FILL:2	SN:6	CH:4	AM:4	AG:8	S:1	FILL:2	F:1	LV:4	UD:v

Fields shown in the packet format and not specified in the following paragraphs shall be set as specified in 5.2.5.2.1.

5.2.5.2.4.1.2 *Data packet type (DP).* This field shall be set to 0.

5.2.5.2.4.1.3 *MSP packet type (MP).* This field shall be set to 1.

5.2.5.2.4.1.4 *Supervisory packet (SP).* This field shall be set to 1.

5.2.5.2.4.1.5 *Supervisory type (ST).* This field shall be set to 1.

5.2.5.2.4.1.6 *Address, mobile and address, ground.* The AM and AG values in the originating Mode S CALL REQUEST by ADLP packet shall be returned in these fields. When present, DTE addresses in the ISO 8208 CALL ACCEPT packet shall be ignored.

5.2.5.2.4.2 *Translation into ISO 8208 packets*

5.2.5.2.4.2.1 *Translation.* Reception by the ADLP reformatting process of a Mode S CALL ACCEPT by GDLP packet (or an S-bit sequence of packets) from the ADCE shall result in the generation of a corresponding ISO 8208 CALL ACCEPT packet to the local DCE. The translation from the Mode S packet to the ISO 8208 packet shall be the inverse of the processing defined in 5.2.5.2.4.1 with the exceptions as specified in 5.2.5.2.4.2.2.

5.2.5.2.4.2.2 *Called DTE, calling DTE address and length fields.* Where present, the calling DTE address shall be composed of the aircraft address and the value contained in the AM field of the Mode S packet, converted to BCD (5.2.3.1.3.2). Where present, the called DTE address shall be the ground DTE address contained in the AG field of the Mode S packet, converted to BCD. The length field shall be as defined in ISO 8208.

Note.— The called and calling DTE addresses are optional in the corresponding ISO 8208 packet and are not required for correct operation of the Mode S subnetwork.

5.2.5.2.5 *CLEAR REQUEST BY ADLP*

5.2.5.2.5.1 *Translation into Mode S packets*

5.2.5.2.5.1.1 *Translated packet format.* Reception by the ADLP reformatting process of an ISO 8208 CLEAR REQUEST packet from the local DCE shall result in the generation of a corresponding Mode S CLEAR REQUEST by ADLP packet(s) (as determined by S-bit processing (5.2.5.1.4.2)) as follows:

DP:1	MP:1	SP:2	ST:2	FILL2:0 or 2	TC:2	SN:6	CH:4	AM:4	AG:8	CC:8	DC:8	S:1	FILL:2	F:1	LV:4	UD:v

Fields shown in the packet format and not specified in the following paragraphs shall be set as specified in 5.2.5.2.1 and 5.2.5.2.2.

5.2.5.2.5.1.2 *Data packet type (DP).* This field shall be set to 0.

5.2.5.2.5.1.3 *MSP packet type (MP).* This field shall be set to 1.

5.2.5.2.5.1.4 *Supervisory packet (SP).* This field shall be set to 1.

5.2.5.2.5.1.5 *Channel number (CH)*: If a channel number has been allocated during the call acceptance phase, then CH shall be set to that value, otherwise it shall be set to zero.

5.2.5.2.5.1.6 *Temporary channel (TC)*: If a channel number has been allocated during the call acceptance phase, then TC shall be set to zero, otherwise it shall be set to the value used in the CALL REQUEST by GDLP.

5.2.5.2.5.1.7 *Supervisory type (ST).* This field shall be set to 2.

5.2.5.2.5.1.8 *Address, ground or address, mobile.* The AG and AM values in the originating Mode S CALL REQUEST by ADLP or CALL REQUEST by GDLP packets shall be returned in these fields. When present, DTE addresses in the ISO 8208 CLEAR REQUEST packet shall be ignored.

5.2.5.2.5.1.9 *Clearing cause (CC) and diagnostic code (DC) fields.* These fields shall be transferred without modification from the ISO 8208 packet to the Mode S packet when the DTE has initiated the clear procedure. If the XDLP has initiated the clear procedure, the clearing cause field and diagnostic field shall be as defined in the state tables for the DCE and XDCE (see also 5.2.6.3.3). The coding and definition of these fields shall be as specified in ISO 8208.

5.2.5.2.5.2 *Translation into ISO 8208 packets*

5.2.5.2.5.2.1 *Translation.* Reception by the GDLP reformatting process of a Mode S CLEAR REQUEST by ADLP packet (or an S-bit sequence of packets) from the local GDCE shall result in the generation of a corresponding ISO 8208 CLEAR REQUEST packet to the local DCE. The translation from the Mode S packet to the ISO 8208 packet shall be the inverse of the processing defined in 5.2.5.2.5.1 with the exceptions specified in 5.2.5.2.5.2.2 and 5.2.5.2.5.2.3.

5.2.5.2.5.2.2 *Called DTE, calling DTE and length fields.* These fields shall be omitted in the ISO 8208 CLEAR REQUEST packet.

5.2.5.2.5.2.3 *Clearing cause field.* This field shall be set taking account of 5.2.6.3.3.

5.2.5.2.6 *CLEAR REQUEST BY GDLP*

5.2.5.2.6.1 *Translation into Mode S packets*

5.2.5.2.6.1.1 *Translated packet format.* Reception by the GDLP reformatting process of an ISO 8208 CLEAR REQUEST packet from the local DCE shall result in the generation of corresponding Mode S CLEAR REQUEST by GDLP packet(s) (as determined by S-bit processing (5.2.5.1.4.2)) as follows:

DP:1	MP:1	SP:2	ST:2	FILL:2	TC:2	SN:6	CH:4	AM:4	AG:8	CC:8	DC:8	S:1	FILL:2	F:1	LV:4	UD:v

Fields shown in the packet format and not specified in the following paragraphs shall be set as specified in 5.2.5.2.1, 5.2.5.2.2 and 5.2.5.2.5.

5.2.5.2.6.1.2 *Data packet type (DP).* This field shall be set to 0.

5.2.5.2.6.1.3 *MSP packet type (MP).* This field shall be set to 1.

5.2.5.2.6.1.4 *Supervisory packet (SP).* This field shall be set to 1.

5.2.5.2.6.1.5 *Channel number (CH)*: If a channel number has been allocated during the call acceptance phase, then CH shall be set to that value, otherwise it shall be set to zero.

5.2.5.2.6.1.6 *Temporary channel (TC)*: If a channel number has been allocated during the call acceptance phase, then TC shall be set to zero, otherwise it shall be set to the value used in the CALL REQUEST by GDLP.

5.2.5.2.6.1.7 *Supervisory type (ST).* This field shall be set to 2.

5.2.5.2.6.2 *Translation into ISO 8208 packets*

5.2.5.2.6.2.1 *Translation.* Reception by the ADLP reformatting process of a Mode S CLEAR REQUEST by GDLP packet (or an S-bit sequence of packets) from the local ADCE shall result in the generation of a corresponding ISO 8208 CLEAR REQUEST packet to the local DCE. The translation from the Mode S packet to the ISO 8208 packet shall be the inverse of the processing defined in 5.2.5.2.6.1.

5.2.5.2.6.2.2 *Called DTE, calling DTE and length fields.* These fields shall be omitted in the ISO 8208 CLEAR REQUEST packet.

5.2.5.2.7 *DATA*

5.2.5.2.7.1 *Translation into Mode S packets*

5.2.5.2.7.1.1 *Translated packet format.* Reception by the XDLP reformatting process of ISO 8208 DATA packet(s) from the local DCE shall result in the generation of corresponding Mode S DATA packet(s) as determined by M-bit processing (5.2.5.1.4.1), as follows:

DP:1	M:1	SN:6	FILL1:0 or 6	PS:4	PR:4	CH:4	LV:4	UD:v

5.2.5.2.7.1.2 *Data packet type (DP).* This field shall be set to 1.

5.2.5.2.7.1.3 *M field (M).* A value of 1 shall indicate that the packet is part of an M-bit sequence with more packets in the sequence to follow. A value of 0 shall indicate that the sequence ends with this packet. The appropriate value shall be placed in the M-bit field of the Mode S packet.

Note.— See 5.2.5.1.4 and ISO 8208 for a complete explanation.

5.2.5.2.7.1.4 *Sequence number (SN).* The sequence number field shall be set as specified in 5.2.5.2.1.1.7.

5.2.5.2.7.1.5 *Packet send sequence number (PS).* The packet send sequence number field shall be set as specified in 5.2.6.4.4.

5.2.5.2.7.1.6 *Packet receive sequence number (PR).* The packet receive sequence number field shall be set as specified in 5.2.6.4.4.

5.2.5.2.7.1.7 *Channel number (CH).* The channel number field shall contain the Mode S channel number that corresponds to the incoming ISO 8208 DATA packet channel number.

5.2.5.2.7.1.8 *User data length (LV).* This field shall indicate the number of full bytes used in the last SLM or ELM segment as defined in 5.2.2.3.1.

5.2.5.2.7.1.9 *Fill (FILL1).* This field shall be set as specified in 5.2.5.2.1.1.11.

5.2.5.2.7.1.10 *User data (UD).* The user data shall be transferred from the ISO 8208 packet to the Mode S packet utilizing the M-bit packet assembly processing as required.

5.2.5.2.7.2 *Translation into ISO 8208 packets.* Reception by the XDLP reformatting process of Mode S DATA packet(s) from the local XDCE shall result in the generation of corresponding ISO 8208 DATA packet(s) to the local DCE. The translation from Mode S packet(s) to the ISO 8208 packet(s) shall be the inverse of the processing defined in 5.2.5.2.7.1.

5.2.5.2.8 *INTERRUPT*

5.2.5.2.8.1 *Translation into Mode S packets*

5.2.5.2.8.1.1 *Translated packet format.* Reception by the XDLP reformatting process of an ISO 8208 INTERRUPT packet from the local DCE shall result in the generation of corresponding Mode S INTERRUPT packet(s) (as determined by S-bit processing (5.2.5.1.4.2)) as follows:

DP:1	MP:1	SP:2	ST:2	FILL2:0 or 2	S:1	F:1	SN:6	CH:4	LV:4	UD:v

Fields shown in the packet format and not specified in the following paragraphs shall be set as specified in 5.2.5.2.1.

5.2.5.2.8.1.2 *Data packet type (DP).* This field shall be set to 0.

5.2.5.2.8.1.3 *MSP packet type (MP).* This field shall be set to 1.

5.2.5.2.8.1.4 *Supervisory packet (SP).* This field shall be set to 3.

5.2.5.2.8.1.5 *Supervisory type (ST).* This field shall be set to 1.

5.2.5.2.8.1.6 *User data length (LV).* This field shall be set as specified in 5.2.2.3.1.

5.2.5.2.8.1.7 *User data (UD).* The user data shall be transferred from the ISO 8208 packet to the Mode S packet using the S-bit packet reassembly processing as required. The maximum size of the user data field for an INTERRUPT packet shall be 32 bytes.

5.2.5.2.8.2 *Translation into ISO 8208 packets.* Reception by the XDLP reformatting process of Mode S INTERRUPT packet(s) from the local XDCE shall result in the generation of a corresponding ISO 8208 INTERRUPT packet to the local DCE. The translation from the Mode S packet(s) to the ISO 8208 packet shall be the inverse of the processing defined in 5.2.5.2.8.1.

5.2.5.2.9 *INTERRUPT CONFIRMATION*

5.2.5.2.9.1 *Translation into Mode S packets*

5.2.5.2.9.1.1 *Translated packet format.* Reception by the XDLP reformatting process of an ISO 8208 INTERRUPT CONFIRMATION packet from the local DCE shall result in the generation of a corresponding Mode S INTERRUPT CONFIRMATION packet as follows:

DP:1	MP:1	SP:2	ST:2	SS:2	FILL2:0 or 2	SN:6	CH:4	FILL:4

Fields shown in the packet format and not specified in the following paragraphs shall be set as specified in 5.2.5.2.1.

5.2.5.2.9.1.2 *Data packet type (DP).* This field shall be set to 0.

5.2.5.2.9.1.3 *MSP packet type (MP).* This field shall be set to 1.

5.2.5.2.9.1.4 *Supervisory packet (SP).* This field shall be set to 3.

5.2.5.2.9.1.5 *Supervisory type (ST).* This field shall be set to 3.

5.2.5.2.9.1.6 *Supervisory subset (SS).* This field shall be set to 0.

5.2.5.2.9.2 *Translation into ISO 8208 packets.* Reception by the XDLP reformatting process of a Mode S INTERRUPT CONFIRMATION packet from the local XDCE shall result in the generation of a corresponding ISO 8208 INTERRUPT CONFIRMATION packet to the local DCE. The translation from the Mode S packet to the ISO 8208 packet shall be the inverse of the processing defined in 5.2.5.2.9.1.

5.2.5.2.10 *RESET REQUEST*

5.2.5.2.10.1 *Translation into Mode S packets*

5.2.5.2.10.1.1 *Translated packet format.* Reception by the XDLP reformatting process of an ISO 8208 RESET REQUEST packet from the local DCE shall result in the generation of a corresponding Mode S RESET REQUEST packet as follows:

DP:1	MP:1	SP:2	ST:2	FILL2:0 or 2	FILL:2	SN:6	CH:4	FILL:4	RC:8	DC:8

Fields shown in the packet format and not specified in the following paragraphs shall be set as specified in 5.2.5.2.1.

5.2.5.2.10.1.2 *Data packet type (DP).* This field shall be set to 0.

5.2.5.2.10.1.3 *MSP packet type (MP).* This field shall be set to 1.

5.2.5.2.10.1.4 *Supervisory packet (SP).* This field shall be set to 2.

5.2.5.2.10.1.5 *Supervisory type (ST).* This field shall be set to 2.

5.2.5.2.10.1.6 *Reset cause code (RC) and diagnostic code (DC).* The reset cause and diagnostic codes used in the Mode S RESET REQUEST packet shall be as specified in the ISO 8208 packet when the reset procedure is initiated by the DTE. If the reset procedure originates with the DCE, the DCE state tables shall specify the diagnostic fields coding. In this case, bit 8 of the reset cause field shall be set to 0.

5.2.5.2.10.2 *Translation into ISO 8208 packets.* Reception by the XDLP reformatting process of a Mode S RESET packet from the local XDCE shall result in the generation of a corresponding ISO 8208 RESET packet to the local DCE. The translation from the Mode S packet to the ISO 8208 packet shall be the inverse of the processing defined in 5.2.5.2.10.1.

5.2.5.2.11 *ISO 8208 RESTART REQUEST to Mode S CLEAR REQUEST.* The receipt of an ISO 8208 RESTART REQUEST from the local DCE shall result in the reformatting process generating a Mode S CLEAR REQUEST by ADLP or Mode S CLEAR REQUEST by GDLP for all SVCs associated with the requesting DTE. The fields of the Mode S CLEAR REQUEST packets shall be set as specified in 5.2.5.2.5 and 5.2.5.2.6.

Note.— There are no restart states in the Mode S packet layer protocol.

5.2.5.3 PACKETS LOCAL TO THE MODE S SUBNETWORK

Note.— Packets defined in this section do not result in the generation of an ISO 8208 packet.

5.2.5.3.1 *MODE S RECEIVE READY*

5.2.5.3.1.1 *Packet format.* The Mode S RECEIVE READY packet arriving from an XDLP is not related to the control of the DTE/DCE interface and shall not cause the generation of an ISO 8208 packet. The format of the packet shall be as follows:

DP:1	MP:1	SP:2	ST:2	FILL2:0 or 2	FILL:2	SN:6	CH:4	PR:4

Fields shown in the packet format and not specified in the following paragraphs shall be set as specified in 5.2.5.2.1. The packet shall be processed as specified in 5.2.6.5.

5.2.5.3.1.2 *Data packet type (DP).* This field shall be set to 0.

5.2.5.3.1.3 *MSP packet type (MP).* This field shall be set to 1.

5.2.5.3.1.4 *Supervisory packet (SP).* This field shall be set to 2.

5.2.5.3.1.5 *Supervisory type (ST).* This field shall be set to 0.

5.2.5.3.1.6 *Packet receive sequence number (PR).* This field shall be set as specified in 5.2.6.4.4.

5.2.5.3.2 *MODE S RECEIVE NOT READY*

5.2.5.3.2.1 *Packet format.* The Mode S RECEIVE NOT READY packet arriving from an XDLP is not related to the control of the DTE/DCE interface and shall not cause the generation of an ISO 8208 packet. The format of the packet shall be as follows:

DP:1	MP:1	SP:2	ST:2	FILL2:0 or 2	FILL:2	SN:6	CH:4	PR:4

Fields shown in the packet format and not specified in the following paragraphs shall be set as specified in 5.2.5.2.1. The packet shall be processed as specified in 5.2.6.6.

5.2.5.3.2.2 *Data packet type (DP).* This field shall be set to 0.

5.2.5.3.2.3 *MSP packet type (MP).* This field shall be set to 1.

5.2.5.3.2.4 *Supervisory packet (SP).* This field shall be set to 2.

5.2.5.3.2.5 *Supervisory type (ST).* This field shall be set to 1.

5.2.5.3.2.6 *Packet receive sequence number (PR).* This field shall be set as specified in 5.2.6.4.4.

5.2.5.3.3 *MODE S ROUTE*

5.2.5.3.3.1 *Packet format.* The format for the packet shall be as follows:

DP:1	MP:1	SP:2	ST:2	OF:1	IN:1	RTL:8	RT:v	ODL:0 or 8	OD:v

Fields shown in the packet format and not specified in the following paragraphs shall be set as specified in 5.2.5.2.1. The packet shall only be generated by the GDLP. It shall be processed by the ADLP as specified in 5.2.8.1.2 and shall have a maximum size as specified in 5.2.6.4.2.1.

5.2.5.3.3.2 *Data packet type (DP).* This field shall be set to 0.

5.2.5.3.3.3 *MSP packet type (MP).* This field shall be set to 1.

5.2.5.3.3.4 *Supervisory packet (SP).* This field shall be set to 3.

5.2.5.3.3.5 *Supervisory type (ST).* This field shall be set to 0.

5.2.5.3.3.6 *Option flag (OF).* This field shall indicate the presence of the optional data length (ODL) and optional data (OD) fields. OF shall be set to 1 if ODL and OD are present. Otherwise it shall be set to 0.

5.2.5.3.3.7 *Initialization bit (IN).* This field shall indicate the requirement for subnetwork initialization. It shall be set by the GDLP as specified in 5.2.8.1.2 d).

Note.— Initialization causes the clearing of any open SVCs associated with the DTE addresses contained in the ROUTE packet. This is needed to assure that all channels are closed at acquisition and for initialization following recovery after a GDLP failure.

5.2.5.3.3.8 *Route table length (RTL).* This field shall indicate the size of the route table, expressed in bytes.

5.2.5.3.3.9 *Route table (RT)*

5.2.5.3.3.9.1 *Contents.* This table shall consist of a variable number of entries each containing information specifying the addition or deletion of entries in the II code-DTE cross-reference table (5.2.8.1.1).

5.2.5.3.3.9.2 *Entries.* Each entry in the route table shall consist of the II code, a list of up to 8 ground DTE addresses, and a flag indicating whether the resulting II code-DTE pairs shall be added or deleted from the II code-DTE cross-reference table. A route table entry shall be coded as follows:

II:4	AD:1	ND:3	DAL:v

5.2.5.3.3.9.3 *Interrogator identifier (II).* This field shall contain the 4-bit II code.

5.2.5.3.3.9.4 *Add/delete flag (AD).* This field shall indicate whether the II code-DTE pairs shall be added (*AD* = 1) or deleted (*AD* = 0) from the II code-DTE cross-reference table.

5.2.5.3.3.9.5 *Number of DTE addresses (ND).* This field shall be expressed in binary in the range from 0 to 7 and shall indicate the number of DTE addresses present in DAL minus 1 (in order to allow from 1 to 8 DTE addresses).

5.2.5.3.3.9.6 *DTE address list (DAL).* This list shall consist of up to 8 DTE addresses, expressed in 8-bit binary representation.

5.2.5.3.3.10 *Optional data length (ODL).* This field shall contain the length in bytes of the following OD field.

5.2.5.3.3.11 *Optional data (OD).* This variable length field shall contain optional data.

5.2.5.3.4 *MODE S CLEAR CONFIRMATION BY ADLP*

5.2.5.3.4.1 *Packet format.* The format for this packet shall be as follows:

DP:1	MP:1	SP:2	ST:2	FILL2:0 or 2	TC:2	SN:6	CH:4	AM:4	AG:8

Fields shown in the packet format and not specified in the following paragraphs shall be set as specified in 5.2.5.2.1 and 5.2.5.2.5. This packet shall be processed as specified in 5.2.6.3.

5.2.5.3.4.2 *Data packet type (DP).* This field shall be set to 0.

5.2.5.3.4.3 *MSP packet type (MP).* This field shall be set to 1.

5.2.5.3.4.4 *Supervisory packet (SP).* This field shall be set to 1.

5.2.5.3.4.5 *Channel number (CH)*: If a channel number has been allocated during the call acceptance phase, then CH shall be set to that value, otherwise it shall be set to zero.

5.2.5.3.4.6 *Temporary channel (TC)*: If a channel number has been allocated during the call acceptance phase, then TC shall be set to zero, otherwise it shall be set to the value used in the CALL REQUEST by GDLP.

5.2.5.3.4.7 *Supervisory type (ST).* This field shall be set to 3.

5.2.5.3.5 *MODE S CLEAR CONFIRMATION BY GDLP*

5.2.5.3.5.1 *Packet format.* The format for this packet shall be as follows:

DP:1	MP:1	SP:2	ST:2	FILL:2	TC:2	SN:6	CH:4	AM:4	AG:8

Fields shown in the packet format and not specified in the following paragraphs shall be set as specified in 5.2.5.2.1 and 5.2.5.2.6. This packet shall be processed as specified in 5.2.6.3.

5.2.5.3.5.2 *Data packet type (DP).* This field shall be set to 0.

5.2.5.3.5.3 *MSP packet type (MP).* This field shall be set to 1.

5.2.5.3.5.4 *Supervisory packet (SP).* This field shall be set to 1.

5.2.5.3.5.5 *Channel number (CH)*: If a channel number has been allocated during the call acceptance phase, then CH shall be set to that value, otherwise it shall be set to zero.

5.2.5.3.5.6 *Temporary channel (TC)*: If a channel number has been allocated during the call acceptance phase, then TC shall be set to zero, otherwise it shall be set to the value used in the CALL REQUEST by GDLP.

5.2.5.3.5.7 *Supervisory type (ST).* This field shall be set to 3.

5.2.5.3.6 *MODE S RESET CONFIRMATION*

5.2.5.3.6.1 *Packet format.* The format for this packet shall be as follows:

DP:1	MP:1	SP:2	ST:2	FILL2:0 or 2	FILL:2	SN:6	CH:4	FILL:4

Fields shown in the packet format and not specified in the following paragraphs shall be set as specified in 5.2.5.2.1. This packet shall be processed as specified in Table 5-14.

5.2.5.3.6.2 *Data packet type (DP).* This field shall be set to 0.

5.2.5.3.6.3 *MSP packet type (MP).* This field shall be set to 1.

5.2.5.3.6.4 *Supervisory packet (SP).* This field shall be set to 2.

5.2.5.3.6.5 *Supervisory type (ST).* This field shall be set to 3.

5.2.5.3.7 *MODE S REJECT*

5.2.5.3.7.1 *Packet format.* The format for this packet shall be as follows:

DP:1	MP:1	SP:2	ST:2	SS:2	FILL2:0 or 2	SN:6	CH:4	PR:4

Fields shown in the packet format and not specified in the following paragraphs shall be set as specified in 5.2.5.2.1. This packet shall be processed as specified in 5.2.6.8.

5.2.5.3.7.2 *Data packet type (DP).* This field shall be set to 0.

5.2.5.3.7.3 *MSP packet type (MP).* This field shall be set to 1.

5.2.5.3.7.4 *Supervisory packet (SP).* This field shall be set to 3.

5.2.5.3.7.5 *Supervisory type (ST).* This field shall be set to 3.

5.2.5.3.7.6 *Supervisory subset (SS).* This field shall be set to 1.

5.2.5.3.7.7 *Packet receive sequence number (PR).* This field shall be set as specified in 5.2.6.4.4.

5.2.6 XDCE operation

Note.— The ADCE process within the ADLP acts as a peer process to the GDCE process in the GDLP.

5.2.6.1 *State transitions.* The XDCE shall operate as a state machine. Upon entering a state, the XDCE shall perform the actions specified in Table 5-14. State transition and additional action(s) shall be as specified in Table 5-15 through Table 5-22.

Note 1.— The next state transition (if any) that occurs when the XDCE receives a packet from the peer XDCE is specified by Table 5-15 through Table 5-19. The same transitions are defined in Table 5-20 through Table 5-22 when the XDCE receives a packet from the DCE (via the reformatting process).

Note 2.— The XDCE state hierarchy is the same as for the DCE as presented in Figure 5-2, except that states r*2,* r*3 and* p*5 are omitted.*

5.2.6.2 DISPOSITION OF PACKETS

5.2.6.2.1 Upon receipt of a packet from the peer XDCE, the packet shall be forwarded or not forwarded to the DCE (via the reformatting process) according to the parenthetical instructions contained in Tables 5-15 to 5-19. If no parenthetical instruction is listed or if the parenthetical instruction indicates “do not forward” the packet shall be discarded.

5.2.6.2.2 Upon receipt of a packet from the DCE (via the reformatting process), the packet shall be forwarded or not forwarded to the peer XDCE according to the parenthetical instructions contained in Tables 5-20 to 5-22. If no parenthetical instruction is listed or if the parenthetical instruction indicates “do not forward” the packet shall be discarded.

5.2.6.3 SVC CALL SETUP AND CLEAR PROCEDURE

5.2.6.3.1 *Setup procedures.* Upon receipt of a CALL REQUEST from the DCE or peer XDCE, the XDLP shall determine if sufficient resources exist to operate the SVC. This shall include: sufficient buffer space (refer to 5.2.5.1.1 for buffer requirements) and an available *p*1 state SVC. Upon acceptance of the CALL REQUEST from the DCE (via the reformatting process), the Mode S CALL REQUEST packet shall be forwarded to frame processing. Upon acceptance of a Mode S CALL REQUEST from the peer XDCE (via frame processing), the Mode S CALL REQUEST shall be sent to the reformatting process.

5.2.6.3.2 *Aborting a call request.* If the DTE and/or the peer XDCE abort a call before they have received a CALL ACCEPT packet, they shall indicate this condition by issuing a CLEAR REQUEST packet. Procedures for handling these cases shall be as specified in Table 5-16 and Table 5-20.

5.2.6.3.3 *VIRTUAL CALL CLEARING*

5.2.6.3.3.1 If the XDCE receives a Mode S CALL REQUEST from the reformatting process that it cannot support, it shall initiate a Mode S CLEAR REQUEST packet that is sent to the DCE (via the reformatting process) for transfer to the DTE (the DCE thus enters the DCE CLEAR REQUEST to DTE state, *p*7).

5.2.6.3.3.2 If the XDCE receives a Mode S CALL REQUEST packet from the peer XDCE (via frame processing) which it cannot support, it shall enter the state *p*7.

5.2.6.3.3.3 A means shall be provided to advise the DTE whether an SVC has been cleared due to the action of the peer DTE or due to a problem within the subnetwork itself.

5.2.6.3.3.4 **Recommendation.**— *The requirement of 5.2.6.3.3.3 should be satisfied by setting bit 8 of the cause field to 1 to indicate that the problem originated in the Mode S subnetwork and not in the DTE. The diagnostic and cause codes should be set as follows:*

a) no channel number available, DC = 71, CC = 133;

b) buffer space not available, DC = 71, CC = 133;

c) DTE not operational, DC = 162, CC = 141; and

d) link failure, DC = 225, CC = 137.

5.2.6.3.3.5 If the ADLP receives a Mode S ROUTE packet with the IN bit set to ONE, the ADLP shall perform local initialization by clearing Mode S SVCs associated with the DTE addresses contained in the ROUTE packet. If the GDLP receives a search request (Table 5-23) from an ADLP, the GDLP shall perform local initialization by clearing Mode S SVCs associated with that ADLP. Local initialization shall be accomplished by:

a) releasing all allocated resources associated with these SVCs (including the resequencing buffers);

b) returning these SVCs to the ADCE ready state (*p*1); and

c) sending Mode S CLEAR REQUEST packets for these SVCs to the DCE (via the reformatting process) for transfer to the DTE.

*Note.— This action will allow all ISO 8208 SVCs attached to the Mode S SVCs to be cleared and return to their ready states (*p*1).*

5.2.6.3.4 *Clear confirmation.* When the XDCE receives a Mode S CLEAR CONFIRMATION packet, the remaining allocated resources to manage the SVC shall be released (including the resequencing buffers) and the SVC shall be returned to the *p*1 state. Mode S CLEAR CONFIRMATION packets shall not be transferred to the reformatting process.

5.2.6.3.5 *Clear collision.* A clear collision occurs at the XDCE when it receives a Mode S CLEAR REQUEST packet from the DCE (via the reformatting process) and then receives a Mode S CLEAR REQUEST packet from the peer XDCE (or vice versa). In this event, the XDCE does not expect to receive a Mode S CLEAR CONFIRMATION packet for this SVC and shall consider the clearing complete.

5.2.6.3.6 *Packet processing.* The XDCE shall treat an S-bit sequence of Mode S CALL REQUEST, CALL ACCEPT and CLEAR REQUEST packets as a single entity.

5.2.6.4 DATA TRANSFER AND INTERRUPT PROCEDURES

5.2.6.4.1 *GENERAL PROVISIONS*

5.2.6.4.1.1 Data transfer and interrupt procedures shall apply independently to each SVC. The contents of the user data field shall be passed transparently to the DCE or to the peer XDCE. Data shall be transferred in the order dictated by the sequence numbers assigned to the data packets.

5.2.6.4.1.2 To transfer DATA packets, the SVC shall be in a FLOW CONTROL READY state (*d*1).

5.2.6.4.2 *MODE S PACKET SIZE*

5.2.6.4.2.1 The maximum size of Mode S packets shall be 152 bytes in the uplink direction and 160 bytes in the downlink direction for installations that have full uplink and downlink ELM capability. The maximum downlink packet size for level four transponders with less than 16 segment downlink ELM capability shall be 10 bytes times the maximum number of downlink ELM segments that the transponder specifies in its data link capability report. If there is no ELM capability, the maximum Mode S packet size shall be 28 bytes.

5.2.6.4.2.2 The Mode S subnetwork shall allow packets of less than the maximum size to be transferred.

5.2.6.4.3 *FLOW CONTROL WINDOW SIZE*

5.2.6.4.3.1 The flow control window size of the Mode S subnetwork shall be independent of that used on the DTE/DCE interface. The Mode S subnetwork window size shall be 15 packets in the uplink and downlink directions.

5.2.6.4.4 *SVC FLOW CONTROL*

5.2.6.4.4.1 Flow control shall be managed by means of a sequence number for received packets (PR) and one for packets that have been sent (PS). A sequence number (PS) shall be assigned for each Mode S DATA packet generated by the XDLP for each SVC. The first Mode S DATA packet transferred by the XDCE to frame processing when the SVC has just entered the flow control ready state shall be numbered zero. The first Mode S packet received from the peer XDCE after an SVC has just entered the flow control ready state shall be numbered zero. Subsequent packets shall be numbered consecutively.

5.2.6.4.4.2 A source of Mode S DATA packets (the ADCE or GDCE) shall not send (without permission from the receiver) more Mode S DATA packets than would fill the flow control window. The receiver shall give explicit permission to send more packets.

5.2.6.4.4.3 The permission information shall be in the form of the next expected packet sequence number and shall be denoted PR. If a receiver wishes to update the window and it has data to transmit to the sender, a Mode S DATA packet shall be used for information transfer. If the window must be updated and no data are to be sent, a Mode S RECEIVE READY (RR) or Mode S RECEIVE NOT READY (RNR) packet shall be sent. At this point, the "sliding window" shall be moved to begin at the new PR value. The XDCE shall now be authorized to transfer more packets without acknowledgement up to the window limit.

5.2.6.4.4.4 When the sequence number (PS) of the next Mode S DATA packet to be sent is in the range $PR \leq PS \leq PR + 14$ (modulo 16), the sequence number shall be defined to be "in the window" and the XDCE shall be authorized to transmit the packet. Otherwise, the sequence number (PS) of the packet shall be defined to be "outside the window" and the XDCE shall not transmit the packet to the peer XDCE.

5.2.6.4.4.5 When the sequence number (PS) of the packet received is next in sequence and within the window, the XDCE shall accept this packet. Receipt of a packet with a PS:

a) outside the window; or

b) out of sequence; or

c) not equal to 0 for the first data packet after entering FLOW CONTROL READY state (*d*1);

shall be considered an error (5.2.6.8).

5.2.6.4.4.6 The receipt of a Mode S DATA packet with a valid PS number (i.e. the next PS in sequence) shall cause the lower window PR to be changed to that PS value plus 1. The packet receive sequence number (PR) shall be conveyed to the originating XDLP by a Mode S DATA, RECEIVE READY, RECEIVE NOT READY, or REJECT packet. A valid PR value shall be transmitted by the XDCE to the peer XDCE after the receipt of 8 packets provided that sufficient buffer space exists to store 15 packets. Incrementing the PR and PS fields shall be performed using modulo 16 arithmetic.

Note.— The loss of a packet which contains the PR value may cause the ADLP/GDLP operations for that SVC to cease.

5.2.6.4.4.7 A copy of a packet shall be retained until the user data has been successfully transferred. Following successful transfer, the PS value shall be updated.

5.2.6.4.4.8 The PR value for user data shall be updated as soon as the required buffer space for the window (as determined by flow control management) is available within the DCE.

5.2.6.4.4.9 Flow control management shall be provided between the DCE and XDCE.

5.2.6.4.5 *INTERRUPT PROCEDURES FOR SWITCHED VIRTUAL CIRCUITS*

5.2.6.4.5.1 If user data is to be sent via the Mode S subnetwork without following the flow control procedures, the interrupt procedures shall be used. The interrupt procedure shall have no effect on the normal data packet and flow control procedures. An interrupt packet shall be delivered to the DTE (or the transponder or interrogator interface) at or before the point in the stream of data at which the interrupt was generated. The processing of a Mode S INTERRUPT packet shall occur as soon as it is received by the XDCE.

Note.— The use of clear, reset, and restart procedures can cause interrupt data to be lost.

5.2.6.4.5.2 The XDCE shall treat an S-bit sequence of Mode S INTERRUPT packets as a single entity.

5.2.6.4.5.3 Interrupt processing shall have precedence over any other processing for the SVC occurring at the time of the interrupt.

5.2.6.4.5.4 The reception of a Mode S INTERRUPT packet before the previous interrupt of the SVC has been confirmed (by the receipt of a Mode S INTERRUPT CONFIRMATION packet) shall be defined as an error. The error results in a reset (see Table 5-18).

5.2.6.5 RECEIVE READY PROCEDURE

5.2.6.5.1 The Mode S RECEIVE READY packet shall be sent if no Mode S DATA packets (that normally contain the updated PR value) are available for transmittal and it is necessary to transfer the latest PR value. It also shall be sent to terminate a receiver not ready condition.

5.2.6.5.2 Receipt of the Mode S RECEIVE READY packet by the XDCE shall cause the XDCE to update its value of PR for the outgoing SVC. It shall not be taken as a demand for retransmission of packets that have already been transmitted and are still in the window.

5.2.6.5.3 Upon receipt of the Mode S RECEIVE READY packet, the XDCE shall go into the ADLP(GDLP) RECEIVE READY state (*g*1).

5.2.6.6 RECEIVE NOT READY PROCEDURE

5.2.6.6.1 The Mode S RECEIVE NOT READY packet shall be used to indicate a temporary inability to accept additional DATA packets for the given SVC. The Mode S RNR condition shall be cleared by the receipt of a Mode S RR packet or a Mode S REJECT packet.

5.2.6.6.2 When the XDCE receives a Mode S RECEIVE NOT READY packet from the peer XDCE, it shall update its value of PR for the SVC and stop transmitting Mode S DATA packets on the SVC to the XDLP. The XDCE shall go into the ADLP(GDLP) RECEIVE NOT READY state (*g*2).

5.2.6.6.3 The XDCE shall transmit a Mode S RECEIVE NOT READY packet to the peer XDCE if it is unable to receive from the peer XDCE any more Mode S DATA packets on the indicated SVC. Under these conditions, the XDCE shall go into the ADCE(GDCE) RECEIVE NOT READY state (*f*2).

5.2.6.7 RESET PROCEDURE

5.2.6.7.1 When the XDCE receives a Mode S RESET REQUEST packet from either the peer XDCE or the DCE (via the reformatting process) or due to an error condition performs its own reset, the following actions shall be taken:

a) those Mode S DATA packets that have been transmitted to the peer XDCE shall be removed from the window;

b) those Mode S DATA packets that are not transmitted to the peer XDCE but are contained in an M-bit sequence for which some packets have been transmitted shall be deleted from the queue of DATA packets awaiting transmission;

c) those Mode S DATA packets received from the peer XDCE that are part of an incomplete M-bit sequence shall be discarded;

d) the lower window edge shall be set to 0 and the next packet sent shall have a sequence number (PS) of 0;

e) any outstanding Mode S INTERRUPT packets to or from the peer XDCE shall be left unconfirmed;

f) any Mode S INTERRUPT packet awaiting transfer shall be discarded;

g) data packets awaiting transfer shall not be discarded (unless they are part of a partially transferred M-bit sequence); and

h) the transition to *d*1 shall also include a transition to *i*1, *j*1, *f*1 and *g*1.

5.2.6.7.2 The reset procedure shall apply to the DATA TRANSFER state (*p*4). The error procedure in Table 5-16 shall be followed. In any other state the reset procedure shall be abandoned.

5.2.6.8 REJECT PROCEDURE

5.2.6.8.1 When the XDCE receives a Mode S DATA packet from the peer XDCE with incorrect format or whose packet sequence number (PS) is not within the defined window (Table 5-19) or is out of sequence, it shall discard the received packet and send a Mode S REJECT packet to the peer XDCE via frame processing. The Mode S REJECT packet shall indicate a value of PR for which retransmission of the Mode S DATA packets is to begin. The XDCE shall discard subsequent out-of-sequence Mode S DATA packets whose receipt occurs while the Mode S REJECT packet response is still outstanding.

5.2.6.8.2 When the XDCE receives a Mode S REJECT packet from the peer XDCE, it shall update its lower window value with the new value of PR and begin to (re)transmit packets with a sequence number of PR.

5.2.6.8.3 Reject indications shall not be transferred to the DCE. If the ISO 8208 interface supports the reject procedures, the reject indications occurring on the ISO 8208 interface shall not be transferred between the DCE and the XDCE.

5.2.6.9 PACKET RESEQUENCING AND DUPLICATE SUPPRESSION

Note 1.— If the frames for an SVC include both types (SLM and ELM), the sequence of packets may be lost due to the different delivery times. The order may also be lost if multiple interrogators are used to deliver frames for the same SVC to a given XDLP. The following procedure will correct for a limited amount of desequencing.

Note 2.— This process serves as an interface between frame processing and the XDCE function.

5.2.6.9.1 *Resequencing.* Resequencing shall be performed independently for the uplink and downlink transfers of each Mode S SVC. The following variables and parameters shall be used:

*SNR*A 6-bit variable indicating the sequence number of a received packet on a specific SVC. It is contained in the SN field of the packet (5.2.5.2.1.1.7).

NESN The next expected sequence number following a series of consecutive sequence numbers.

HSNR The highest value of SNR in the resequencing window.

Tq Resequencing timers (see Tables 5-1 and 5-13) associated with a specific SVC.

All operations involving the sequence number (SN) shall be performed modulo 64.

5.2.6.9.2 *Duplication window.* The range of *SNR* values between *NESN* – 32 and *NESN* – 1 inclusive shall be denoted the duplication window.

5.2.6.9.3 *Resequencing window.* The range of *SNR* values between *NESN* + 1 and *NESN* + 31 inclusive shall be denoted the resequencing window. Received packets with a sequence number value in this range shall be stored in the resequencing window in sequence number order.

5.2.6.9.4 *TRANSMISSION FUNCTIONS*

5.2.6.9.4.1 For each SVC, the first packet sent to establish a connection (the first Mode S CALL REQUEST or first Mode S CALL ACCEPT packet) shall cause the value of the *SN* field to be initialized to zero. The value of the *SN* field shall be incremented after the transmission (or retransmission) of each packet.

5.2.6.9.4.2 The maximum number of unacknowledged sequence numbers shall be 32 consecutive *SN* numbers. Should this condition be reached, then it shall be treated as an error and the channel cleared.

Note.— A limit on the number of unacknowledged packets is required since the SN field is six bits long and therefore has a maximum of 64 different values before the values repeat.

5.2.6.9.5 *RECEIVE FUNCTIONS*

5.2.6.9.5.1 *Resequencing.* The resequencing algorithm shall maintain the variables *HSNR* and *NESN* for each SVC. *NESN* shall be initialized to 0 for all SVCs and shall be reset to 0 when the SVC re-enters the channel number pool (5.2.5.1.2).

5.2.6.9.5.2 *Processing of packets within the duplication window.* If a packet is received with a sequence number value within the duplication window, the packet shall be discarded.

5.2.6.9.5.3 *Processing of packets within the resequencing window.* If a packet is received with a sequence number within the resequencing window, it shall be discarded as a duplicate if a packet with the same sequence number has already been received and stored in the resequencing window. Otherwise, the packet shall be stored in the resequencing window. Then, if no *Tq* timers are running, *HSNR* shall be set to the value of *SNR* for this packet and a *Tq* timer shall be started with its initial value (Tables 5-1 and 5-13). If at least one *Tq* timer is running, and *SNR* is not in the window between *NESN* and *HSNR* + 1 inclusive, a new *Tq* timer shall be started and the value of *HSNR* shall be updated. If at least one *Tq* timer is running, and *SNR* for this packet is equal to *HSNR* + 1, the value of *HSNR* shall be updated.

5.2.6.9.5.4 *Release of packets to the XDCE.* If a packet is received with a sequence number equal to *NESN*, the following procedure shall be applied:

a) the packet and any packets already stored in the resequencing window up to the next missing sequence number shall be passed to the XDCE;

b) *NESN* shall be set to 1 + the value of the sequence number of the last packet passed to the XDCE; and

c) the *Tq* timer associated with any of the released packets shall be stopped.

5.2.6.9.6 *Tq timer expiration.* If a *Tq* timer expires, the following procedure shall be applied:

a) *NESN* shall be incremented until the next missing sequence number is detected after that of the packet associated with the *Tq* timer that has expired;

b) any stored packets with sequence numbers that are no longer in the resequencing window shall be forwarded to the XDCE except that an incomplete S-bit sequence shall be discarded; and

c) the *Tq* timer associated with any released packets shall be stopped.

5.2.7 Mode S specific services processing

Mode S specific services shall be processed by an entity in the XDLP termed the Mode S specific services entity (SSE). Transponder registers shall be used to convey the information specified in Table 5-24. The data structuring of the registers in Table 5-24 shall be implemented in such a way that interoperability is ensured.

Note 1.— The data formats and protocols for messages transferred via Mode S specific services are specified in the Technical Provisions for Mode S Services and Extended Squitter *(Doc 9871) (in preparation).*

Note 2.— Uniform implementation of the data formats and protocols for messages transferred via Mode S specific services will ensure interoperability.

Note 3.— This section describes the processing of control and message data received from the Mode S specific services interface.

Note 4.— Control data consists of *information permitting the determination of, for example, message length, BDS code used to access the data format for a particular register, and aircraft address.*

5.2.7.1 ADLP PROCESSING

5.2.7.1.1 *DOWNLINK PROCESSING*

5.2.7.1.1.1 *Specific services capability.* The ADLP shall be capable of receiving control and message data from the Mode S specific services interface(s) and sending delivery notices to this interface. The control data shall be processed to determine the protocol type and the length of the message data. When the message or control data provided at this interface are erroneous (i.e. incomplete, invalid or inconsistent), the ADLP shall discard the message and deliver an error report at the interface.

Note.— The diagnostic content and error reporting mechanism are a local issue.

5.2.7.1.1.2 *Broadcast processing.* The control and message data shall be used to format the Comm-B broadcast message as specified in 5.2.7.5 and transferred to the transponder.

5.2.7.1.1.3 *GICB processing.* The 8-bit BDS code shall be determined from the control data. The 7-byte register content shall be extracted from the received message data. The register content shall be transferred to the transponder, along with an indication of the specified register number. A request to address one of the air-initiated Comm-B registers or the airborne collision avoidance system (ACAS) active resolution advisories register shall be discarded. The assignment of registers shall be as specified in Table 5-24.

Note.— Provision of the data available in transponder registers 40, 50 and 60 {HEX} has been mandated in some ICAO Regions in support of ATM applications.

5.2.7.1.1.4 *MSP processing*

5.2.7.1.1.4.1 The MSP message length, channel number (M/CH) (5.2.7.3.1.3) and optionally the interrogator identifier (II) code shall be determined from the control data. The MSP message content shall be extracted from the received message data. If the message length is 26 bytes or less, the SSE shall format an air-initiated Comm-B message (5.2.7.1.1.4.2) for transfer to the transponder using the short form MSP packet (5.2.7.3.1). If the message length is 27 to 159 bytes and the transponder has adequate downlink ELM capability, the SSE shall format an ELM message for transfer using the short form MSP packet. If the message length is 27 to 159 bytes and the transponder has a limited downlink ELM capability, the SSE shall format multiple long form MSP packets (5.2.7.3.2) using ELM messages, as required utilizing the L-bit and M/SN fields for association of the packets. If the message length is 27 to 159 bytes and the transponder does not have downlink ELM capability, the SSE shall format multiple long form MSP packets (5.2.7.3.2) using air initiated Comm-B messages, as required utilizing the L-bit and M/SN fields for association of the packets. Different frame types shall never be used in the delivery of an MSP message. Messages longer than 159 bytes shall be discarded. The assignment of downlink MSP channel numbers shall be as specified in Table 5-25.

5.2.7.1.1.4.2 For an MSP, a request to send a packet shall cause the packet to be multisite-directed to the interrogator which II code is specified in control data. If no II code is specified, the packet shall be downlinked using the air-initiated protocol. A message delivery notice for this packet shall be provided to the Mode S specific interface when the corresponding close-out(s) have been received from the transponder. If a close-out has not been received from the transponder in *Tz* seconds, as specified in Table 5-1, the MSP packet shall be discarded. This shall include the cancellation in the transponder of any frames associated with this packet. A delivery failure notice for this message shall be provided to the Mode S specific services interface.

5.2.7.1.2 *UPLINK PROCESSING*

Note.— This section describes the processing of Mode S specific services messages received from the transponder.

5.2.7.1.2.1 *Specific services capability.* The ADLP shall be capable of receiving Mode S specific services messages from the transponder via frame processing. The ADLP shall be capable of delivering the messages and the associated control data at the specific services interface. When the resources allocated at this interface are insufficient to accommodate the output data, the ADLP shall discard the message and deliver an error report at this interface.

Note.— The diagnostic content and the error reporting mechanism are a local issue.

5.2.7.1.2.2 *Broadcast processing.* If the received message is a broadcast Comm-A, as indicated by control data received over the transponder/ADLP interface, the broadcast ID and user data (5.2.7.5) shall be forwarded to the Mode S specific services interface (5.2.3.2.1) along with the control data that identifies this as a broadcast message. The assignment of uplink broadcast identifier numbers shall be as specified in Table 5-23.

5.2.7.1.2.3 *MSP processing.* If the received message is an MSP, as indicated by the packet format header (5.2.7.3), the user data field of the received MSP packet shall be forwarded to the Mode S specific services interface (5.2.3.2.1) together with the MSP channel number (M/CH), the IIS subfield (5.2.2.1.1.1) together with control data that identifies this as an MSP message. L-bit processing shall be performed as specified in 5.2.7.4. The assignment of uplink MSP channel numbers shall be as specified in Table 5-25.

5.2.7.2 GDLP PROCESSING

5.2.7.2.1 *UPLINK PROCESSING*

5.2.7.2.1.1 *Specific services capability.* The GDLP shall be capable of receiving control and message data from the Mode S specific services interface(s) (5.2.3.2.2) and sending delivery notices to the interface(s). The control data shall be processed to determine the protocol type and the length of the message data.

5.2.7.2.1.2 *Broadcast processing.* The GDLP shall determine the interrogator(s), broadcast azimuths and scan times from the control data and format the broadcast message for transfer to the interrogator(s) as specified in 5.2.7.5.

5.2.7.2.1.3 *GICB processing.* The GDLP shall determine the register number and the aircraft address from the control data. The aircraft address and BDS code shall be passed to the interrogator as a request for a ground-initiated Comm-B.

5.2.7.2.1.4 *MSP processing.* The GDLP shall extract from the control data the message length, the MSP channel number (M/CH) and the aircraft address, and obtain the message content from the message data. If the message length is 27 bytes or less, the SSE shall format a Comm-A message for transfer to the interrogator using the short form MSP packet (5.2.7.3.1). If the message length is 28 to 151 bytes and the transponder has uplink ELM capability, the SSE shall format an ELM message for transfer to the interrogator using the short form MSP packet. If the message length is 28 to 151 bytes and the transponder does not have uplink ELM capability, the SSE shall format multiple long form MSP packets (5.2.7.3.2) utilizing the L-bit and the M/SN fields for association of the packets. Messages longer than 151 bytes shall be discarded. The interrogator shall provide a delivery notice to the Mode S specific services interface(s) indicating successful or unsuccessful delivery, for each uplinked packet.

5.2.7.2.2 *DOWNLINK PROCESSING*

5.2.7.2.2.1 *Specific services capability.* The GDLP shall be capable of receiving Mode S specific services messages from the interrogator via frame processing.

5.2.7.2.2.2 *Broadcast processing.* If the received message is a broadcast Comm-B, as indicated by the interrogator/GDLP interface, the GDLP shall:

a) generate control data indicating the presence of a broadcast message and the 24-bit address of the aircraft from which the message was received;

b) append the 7-byte MB field of the broadcast Comm-B; and

c) forward this data to the Mode S specific services interface(s) (5.2.3.2.2).

5.2.7.2.2.3 *GICB processing.* If the received message is a GICB, as indicated by the interrogator/GDLP interface, the GDLP shall:

a) generate control data indicating the presence of a GICB message, the register number and the 24-bit address of the aircraft from which the message was received;

b) append the 7-byte MB field of the GICB; and

c) forward this data to the Mode S specific services interface(s) (5.2.3.2.2).

5.2.7.2.2.4 *MSP processing.* If the received message is an MSP as indicated by the packet format header (5.2.7.3), the GDLP shall:

a) generate control data indicating the transfer of an MSP, the length of the message, the MSP channel number (M/CH) and the 24-bit address of the aircraft from which the message was received;

b) append the user data field of the received MSP packet; and

c) forward this data to the Mode S specific services interface(s) (5.2.3.2.2).

L-bit processing shall be performed as specified in 5.2.7.4.

5.2.7.3 MSP PACKET FORMATS

5.2.7.3.1 *Short form MSP packet.* The format for this packet shall be as follows:

DP:1	MP:1	M/CH:6	FILL1:0 or 6	UD:v

5.2.7.3.1.1 *Data packet type (DP).* This field shall be set to 0.

5.2.7.3.1.2 *MSP packet type (MP).* This field shall be set to 0.

5.2.7.3.1.3 *MSP channel number (M/CH).* The field shall be set to the channel number derived from the SSE control data.

5.2.7.3.1.4 *Fill field (FILL1:0 or 6).* The fill length shall be 6 bits for a downlink SLM frame. Otherwise the fill length shall be 0.

5.2.7.3.1.5 *User data (UD).* The user data field shall contain message data received from the Mode S specific services interface (5.2.3.2.2).

5.2.7.3.2 *Long form MSP packet.* The format for this packet shall be as follows:

DP:1	MP:1	SP:2	L:1	M/SN:3	FILL2:0 or 2	M/CH:6	UD:v

Fields shown in the packet format and not specified in the following paragraphs shall be set as specified in 5.2.5.2.1 and 5.2.7.3.1.

5.2.7.3.3 *Data packet type (DP).* This field shall be set to 0.

5.2.7.3.3.1 *MSP packet type (MP).* This field shall be set to 1.

5.2.7.3.3.2 *Supervisory packet (SP).* This field shall be set to 0.

5.2.7.3.3.3 *L field (L).* A value of 1 shall indicate that the packet is part of an L-bit sequence with more packets in the sequence to follow. A value of 0 shall indicate that the sequence ends with this packet.

5.2.7.3.3.4 *MSP sequence number field (M/SN).* This field shall be used to detect duplication in the delivery of L-bit sequences. The first packet in an L-bit sequence shall be assigned a sequence number of 0. Subsequent packets shall be numbered sequentially. A packet received with the same sequence number as the previously received packet shall be discarded.

5.2.7.4 *L-bit processing.* L-bit processing shall be performed only on the long form MSP packet and shall be performed as specified for M-bit processing (5.2.5.1.4.1) except as specified in the following paragraphs.

5.2.7.4.1 Upon receipt of a long form MSP packet, the XDLP shall construct the user data field by:

a) verifying that the packet order is correct using the M/SN field (5.2.7.3.2);

b) assuming that the user data field in the MSP packet is the largest number of integral bytes that is contained within the frame;

c) associating each user data field in an MSP packet received with a previous user data field in an MSP packet that has an L-bit value of 1; and

Note.— Truncation of the user data field is not permitted as this is treated as an error condition.

d) if an error is detected in the processing of an MSP packet, the packet shall be discarded.

5.2.7.4.2 In the processing of an L-bit sequence, the XDLP shall discard any MSP packets that have duplicate M/SN values. The XDLP shall discard the entire L-bit sequence if a long form MSP packet is determined to be missing by use of the M/SN field.

5.2.7.4.3 The packets associated with any L-bit sequence whose reassembly is not completed in *Tm* seconds (Tables 5-1 and 5-13) shall be discarded.

5.2.7.5 BROADCAST FORMAT

5.2.7.5.1 *Uplink broadcast*. The format of the broadcast Comm-A shall be as follows: The 83-bit uplink broadcast shall be inserted in an uplink Comm-A frame. The MA field of the Comm-A frame shall contain the broadcast identifier specified in Table 5-23 in the first 8 bits, followed by the first 48 user data bits of the broadcast message. The last 27 user data bits of the broadcast message shall be placed in the 27 bits immediately following the UF field of the Comm-A frame.

5.2.7.5.2 *Downlink broadcast.* The format of broadcast Comm-B shall be as follows: The 56-bit downlink broadcast message shall be inserted in the MB field of the broadcast Comm-B. The MB field shall contain the broadcast identifier specified in Table 5-23 in the first 8 bits, followed by the 48 user data bits.

5.2.8 Mode S subnetwork management

5.2.8.1 INTERROGATOR LINK DETERMINATION FUNCTION

Note.— The ADLP interrogator link determination function selects the II code of the Mode S interrogator through which a Mode S subnetwork packet may be routed to the desired destination ground DTE.

5.2.8.1.1 *II code-DTE address correlation.* The ADLP shall construct and manage a Mode S interrogator-data terminal equipment (DTE) cross-reference table whose entries are Mode S interrogator identifier (II) codes and ground DTE addresses associated with the ground ATN routers or other ground DTEs. Each entry of the II code-DTE cross-reference table shall consist of the 4-bit Mode S II code and the 8-bit binary representation of the ground DTE.

Note 1.— Due to the requirement for non-ambiguous addresses, a DTE address also uniquely identifies a GDLP.

Note 2.— An ATN router may have more than one ground DTE address.

5.2.8.1.2 *Protocol.* The following procedures shall be used:

a) when the GDLP initially detects the presence of an aircraft, or detects contact with a currently acquired aircraft through an interrogator with a new II code, the appropriate fields of the DATA LINK CAPABILITY report shall be examined to determine if, and to what level, the aircraft has the capability to participate in a data exchange. After positive determination of data link capability, the GDLP shall uplink one or more Mode S ROUTE packets as specified in 5.2.5.3.3. This information shall relate the Mode S II code with the ground DTE addresses accessible through that interrogator. The ADLP shall update the II code-DTE cross-reference table and then discard the Mode S ROUTE packet(s);

b) a II code-DTE cross-reference table entry shall be deleted when commanded by a Mode S ROUTE packet or when the ADLP recognizes that the transponder has not been selectively interrogated by a Mode S interrogator with a given II code for *Ts* seconds by monitoring the IIS subfield in Mode S surveillance or Comm-A interrogations (Table 5-1);

c) when the GDLP determines that modification is required to the Mode S interrogator assignment, it shall transfer one or more Mode S ROUTE packets to the ADLP. The update information contained in the Mode S ROUTE packet shall be used by the ADLP to modify its cross-reference table. Additions shall be processed before deletions;

d) when the GDLP sends the initial ROUTE packet after acquisition of a Mode S data link-equipped aircraft, the IN bit shall be set to ONE. This value shall cause the ADLP to perform the procedures as specified in 5.2.6.3.3.3. Otherwise, the IN bit shall be set to ZERO;

e) when the ADLP is initialized (e.g. after a power-up procedure), the ADLP shall issue a search request by sending a broadcast Comm-B message with broadcast identifier equal to 255 (FF_{16}, as specified in Table 5-23) and the remaining 6 bytes unused. On receipt of a search request, a GDLP shall respond with one or more Mode S ROUTE packets, clear all SVCs associated with the ADLP, as specified in 5.2.6.3.3, and discard the search request. This shall cause the ADLP to initialize the II code-DTE cross-reference table; and

f) on receipt of an update request (Table 5-23), a GDLP shall respond with one or more Mode S ROUTE packets and discard the update request. This shall cause the ADLP to update the II code-DTE cross-reference table.

Note.— The update request may be used by the ADLP under exceptional circumstances (e.g. changeover to standby unit) to verify the contents of its II codeDTE crossreference table.

5.2.8.1.3 *PROCEDURES FOR DOWNLINKING MODE S PACKETS*

5.2.8.1.3.1 When the ADLP has a packet to downlink, the following procedures shall apply:

a) *CALL REQUEST packet.* If the packet to be transferred is a Mode S CALL REQUEST, the ground DTE address field shall be examined and shall be associated with a connected Mode S interrogator using the II code-DTE cross-reference table. The packet shall be downlinked using the multisite-directed protocol. A request to transfer a packet to a DTE address not in the cross-reference table shall result in the action specified in 5.2.6.3.3.1.

b) *Other SVC packets.* For an SVC, a request to send a packet to a ground DTE shall cause the packet to be multisite-directed to the last Mode S interrogator used to successfully transfer (uplink or downlink) a packet to that DTE, provided that this Mode S interrogator is currently in the II code-DTE cross-reference table. Otherwise, an SVC packet shall be downlinked using the multisite-directed protocol to any other Mode S interrogator associated with the specified ground DTE address.

Level 5 transponders shall be permitted to use additional interrogators for downlink transfer as indicated in the II code-DTE cross-reference table.

5.2.8.1.3.2 A downlink frame transfer shall be defined to be successful if its Comm-B or ELM close-out is received from the transponder within *Tz* seconds as specified in Table 5-1. If the attempt is not successful and an SVC packet is to be sent, the II code-DTE cross-reference table shall be examined for another entry with the same called ground DTE address and a different Mode S II code. The procedure shall be retried using the multisite-directed protocol with the new Mode S interrogator. If there are no entries for the required called DTE, or all entries result in a failed attempt, a link failure shall be declared (5.2.8.3.1).

5.2.8.2 SUPPORT FOR THE DTE(S)

5.2.8.2.1 *GDLP connectivity reporting.* The GDLP shall notify the ground DTE(s) of the availability of a Mode S data link-equipped aircraft ("join event"). The GDLP shall also inform the ground DTEs when such an aircraft is no longer in contact via that GDLP ("leave event"). The GDLP shall provide for notification (on request) of all Mode S data link-equipped aircraft currently in contact with that GDLP. The notifications shall provide the ground ATN router with the subnetwork point of attachment (SNPA) address of the mobile ATN router, with the position of the aircraft and quality of service as optional parameters. The SNPA of the mobile ATN router shall be the DTE address formed by the aircraft address and a sub-address of 0 (5.2.3.1.3.2).

5.2.8.2.2 *ADLP connectivity reporting.* The ADLP shall notify all aircraft DTEs whenever the last remaining entry for a ground DTE is deleted from the II code-DTE cross-reference table (5.2.8.1.1). This notification shall include the address of this DTE.

5.2.8.2.3 *Communications requirements.* The mechanism for communication of changes in subnetwork connectivity shall be a confirmed service, such as the join/leave events that allow notification of the connectivity status.

5.2.8.3 ERROR PROCEDURES

5.2.8.3.1 *Link failure.* The failure to deliver a packet to the referenced XDLP after an attempt has been made to deliver this packet via all available interrogators shall be declared to be a link level failure. For an SVC, the XDCE shall enter the state *p*1 and release all resources associated with that channel. This shall include the cancellation in the transponder of any frames associated with this SVC. A Mode S CLEAR REQUEST packet shall be sent to the DCE via the reformatting process and shall be forwarded by the DCE as an ISO 8208 packet to the local DTE as described in 5.2.6.3.3. On the aircraft side, the channel shall not be returned to the ADCE channel pool, i.e. does not return to the state *p*1, until *Tr* seconds after the link failure has been declared (Table 5-1).

5.2.8.3.2 *ACTIVE CHANNEL DETERMINATION*

5.2.8.3.2.1 *Procedure for d1 state.* The XDLP shall monitor the activity of all SVCs, not in a READY state (*p*1). If an SVC is in the (XDCE) FLOW CONTROL READY state (*d*1) for more than *Tx* seconds (the active channel timer, Tables 5-1 and 5-13) without sending a Mode S RR, RNR, DATA, or REJECT packet, then:

a) if the last packet sent was a Mode S REJECT packet to which a response has not been received, then the XDLP shall resend that packet;

b) otherwise, the XDLP shall send a Mode S RR or RNR packet as appropriate to the peer XDLP.

5.2.8.3.2.2 *Procedure for other states.* If an XDCE SVC is in the *p*2, *p*3, *p*6, *p*7, *d*2 or *d*3 state for more than *Tx* seconds, the link failure procedure of 5.2.8.3.1 shall be performed.

5.2.8.3.2.3 Link failure shall be declared if either a failure to deliver, or a failure to receive, keep-alive packets has occurred. In which case the channel shall be cleared.

5.2.9 The data link capability report

The data link capability report shall be as specified in Annex 10, Volume IV, 3.1.2.6.10.2.

5.2.10 System timers

5.2.10.1 The values for timers shall conform to the values given in Tables 5-1 and 5-13.

5.2.10.2 Tolerance for all timers shall be plus or minus one per cent.

5.2.10.3 Resolution for all timers shall be one second.

5.2.11 System requirements

5.2.11.1 *Data integrity.* The maximum bit error rates for data presented at the ADLP/transponder interface or the GDLP/interrogator interface measured at the local DTE/XDLP interface (and vice versa) shall not exceed 10^{-9} for undetected errors and 10^{-7} for detected errors.

Note.— The maximum error rate includes all errors resulting from data transfers across the interfaces and from XDLP internal operation.

5.2.11.2 TIMING

5.2.11.2.1 *ADLP timing.* ADLP operations shall not take longer than 0.25 seconds for regular traffic and 0.125 seconds for interrupt traffic. This interval shall be defined as follows:

a) *Transponders with downlink ELM capability.* The time that the final bit of a 128-byte data packet is presented to the DCE for downlink transfer to the time that the final bit of the first encapsulating frame is available for delivery to the transponder.

b) *Transponders with Comm-B capability.* The time that the final bit of a user data field of 24 bytes is presented to the DCE for downlink transfer to the time that the final bit of the last of the four Comm-B segments that forms the frame encapsulating the user data is available for delivery to the transponder.

c) *Transponders with uplink ELM capability.* The time that the final bit of the last segment of an ELM of 14 Comm-C segments that contains a user data field of 128 bytes is received by the ADLP to the time that the final bit of the corresponding packet is available for delivery to the DTE.

d) *Transponders with Comm-A capability.* The time that the final bit of the last segment of four linked Comm-A segments that contains a user data field of 25 bytes is received by the ADLP to the time that the final bit of the corresponding packet is available for delivery to the DTE.

5.2.11.2.2 *GDLP TIMING*

Recommendation.— *The total time delay across the GDLP, exclusive of transmission delay, should not be greater than 0.125 seconds.*

5.2.11.3 *Interface rate.* The physical interface between the ADLP and the transponder shall have a minimum bit rate of 100 kilobits per second.

5.3 DCE AND XDCE STATE TABLES

5.3.1 *State table requirements.* The DCE and XDCE shall function as specified in state Tables 5-3 to 5-22. State Tables 5-15 through 5-22 shall be applied to:

a) ADLP state transitions when the XDCE or XDLP terms in parenthesis are omitted; and

b) GDLP state transitions when the terms in parenthesis are used and the XDCE or XDLP preceding them are omitted.

5.3.2 *Diagnostic and cause codes.* The table entries for certain conditions indicate a diagnostic code that shall be included in the packet generated when entering the state indicated. The term, "*D* = ," shall define the diagnostic code. When "*A* = *DIAG* ", the action taken shall be to generate an ISO 8208 DIAGNOSTIC packet and transfer it to the DTE; the diagnostic code indicated shall define the entry in the diagnostic field of the packet. The cause field shall be set as specified in 5.2.6.3.3. The reset cause field shall be set as specified in ISO 8208.

Note 1.— The tables provided below specify state requirements in the following order:

5-3 DCE special cases

5-4 DTE effect on DCE restart states

5-5 DTE effect on DCE call setup and clearing states

5-6 DTE effect on DCE reset states

5-7 DTE effect on DCE interrupt transfer states

5-8 DTE effect on DCE flow control transfer states

5-9 XDCE effect on DCE restart states

5-10 XDCE effect on DCE call setup and clearing states

5-11 XDCE effect on DCE reset states

5-12 XDCE effect on DCE interrupt transfer states

5-15 GDLP (ADLP) effect on ADCE (GDCE) packet layer ready states

5-16 GDLP (ADLP) effect on ADCE (GDCE) call setup and clearing states

5-17 GDLP (ADLP) effect on ADCE (GDCE) reset states

5-18 GDLP (ADLP) effect on ADCE (GDCE) interrupt transfer states

5-19 GDLP (ADLP) effect on ADCE (GDCE) flow control transfer states

5-20 DCE effect on ADCE (GDCE) call setup and clearing states

5-21 DCE effect on ADCE (GDCE) reset states

5-22 DCE effect on ADCE (GDCE) interrupt transfer states

Note 2.— All tables specify both ADLP and GDLP actions.

Note 3.— Within the Mode S subnetwork, states p6 *and* d2 *are transient states.*

Note 4.— References to "notes" in the state tables refer to table-specific notes that follow each state table.

Note 5.— All diagnostic and cause codes are interpreted as decimal numbers.

Note 6.— An SVC between an ADCE and a GDCE may be identified by a temporary and/or permanent channel number, as defined in 5.2.5.1.2.

5.4 MODE S PACKET FORMATS

5.4.1 *Formats.* The Mode S packet formats shall be as specified in Figures 5-3 to 5-22.

5.4.2 *Significance of control fields.* The structure of the format control fields used in Mode S packets shall be as specified in Figure 5-23. The significance of all control fields used in these packet formats shall be as follows:

Field symbol	*Definition*
AG	Address, Ground; the 8-bit binary representation of the ground DTE address (5.2.3.1.3.1)
AM	Address, Mobile; the 4-bit binary representation of the last two BCD digits of the mobile DTE address (5.2.3.1.3.2)
CC	Clearing cause as defined in ISO 8208
CH	Channel number (1 to 15)
DC	Diagnostic code as defined in ISO 8208
DP	Data packet type (Figure 5-23)
F	S-bit sequence, first packet flag
FILL	Fill field
FILL1	Has a length of 6 bits for a non-multiplexed packet in a downlink SLM frame; otherwise it is 0 bit
FILL2	Has a length of 0 bit for a non-multiplexed packet in a downlink SLM frame and for a multiplexing header; otherwise it is 2 bits
FIRST PACKET	The contents of the first of the multiplexed packets
FS	Fast select present
IN	Initialization bit
L	"More bit" for long-form MSP packets as specified in 5.2.7.4
LAST PACKET	The contents of the last of the multiplexed packets

LENGTH	The length of a multiplexed packet in bytes expressed as an unsigned binary number
LV	User data field length; number of user bytes as specified in 5.2.2.3.1
M	"More bit" for SVC DATA packets as specified in 5.2.5.1.4.1
M/CH	MSP channel number
MP	MSP packet type (Figure 5-23)
M/SN	Sequence number; the sequence number for the long form MSP packet
OD	Optional data
ODL	Optional data length
OF	Option flag
P	Priority field
PR	Packet receive sequence number
PS	Packet send sequence number
RC	Resetting cause code as defined in ISO 8208
RT	Route table as defined in 5.2.5.3.3.8
RTL	Route table length expressed in bytes
S	"More bit" for CALL REQUEST, CALL ACCEPT, CLEAR REQUEST and INTERRUPT packets as specified in 5.2.5.1.4.2
SN	Sequence number; the sequence number for this packet type
SP	Supervisory packet (Figure 5-23)
SS	Supervisory subset number (Figure 5-23)
ST	Supervisory type (Figure 5-23)
TC	Temporary channel number (1 to 3)
UD	User data field

TABLES FOR CHAPTER 5

Table 5-1. ADLP Mode S subnetwork timers

Timer name	*Timer label*	*Nominal value*	*Reference*
Channel retirement	*Tr*	600 s	5.2.8.3.1
Active channel-ADLP	*Tx*	420 s	5.2.8.3.2
Interrogator interrogation	*Ts*	60 s	5.2.8.1.2
Interrogator link	*Tz*	30 s	5.2.7.1.1.4.2, 5.2.8.1.3.2
Link frame cancellation	*Tc*	60 s	5.2.2.1.1.4.5
L-bit delivery-ADLP	*Tm*	120 s	5.2.7.4.3
Packet resequencing and S-bit delivery	*Tq*	60 s	5.2.6.9

Table 5-2. DCE actions at state transition

DCE state	*State definition*	*Action that shall be taken when entering the state*
*r*1	PACKET LEVEL READY	Return all SVCs to the *p*1 state (see *p*1 state explanation).
*r*2	DTE RESTART REQUEST	Return each SVC to the *p*1 state (see *p*1 state explanation). Issue a RESTART CONFIRMATION to the DTE.
*r*3	DCE RESTART REQUEST	Issue a RESTART REQUEST to the DTE. Unless entered via the *r*2 state, send a RESTART REQUEST to the reformatting process.
*p*1	READY	Release all resources assigned to SVC. Break the correspondence between the DTE/DCE SVC and the ADCE/GDCE SVC (the ADCE/GDCE SVC may not yet be in the *p*1 state).
*p*2	DTE CALL REQUEST	Determine if sufficient resources exist to support request; if so, allocate resources and forward CALL REQUEST packet to reformatting process; if not, enter DCE CLEAR REQUEST to DTE state (*p*7). Determination of resources and allocation is as defined in ISO 8208.
*p*3	DCE CALL REQUEST	Determine if sufficient resources exist to support request; if so allocate resources and forward CALL REQUEST packet to DTE; if not, send a CLEAR REQUEST packet to the reformatting process. Determination of resources and allocation is as defined in ISO 8208.
*p*4	DATA TRANSFER	No action.
*p*5	CALL COLLISION	Reassign outgoing call to another SVC (the DTE in its call collision state ignores the incoming call) and enter the DCE CALL REQUEST state (*p*3) for that new SVC. Enter the *p*2 state to process the CALL REQUEST from the DTE.
*p*6	DTE CLEAR REQUEST	Release all resources assigned to SVC, send a CLEAR CONFIRMATION packet to the DTE and enter *p*1 state.
*p*7	DCE CLEAR REQUEST to DTE	Forward CLEAR REQUEST packet to DTE.
*d*1	FLOW CONTROL READY	No action.
*d*2	DTE RESET REQUEST	Remove DATA packets transmitted to DTE from window; discard any DATA packets that represent partially transmitted M-bit sequences and discard any INTERRUPT packet awaiting transfer to the DTE; reset all window counters to 0; set any timers and retransmission parameters relating to DATA and INTERRUPT transfer to their initial value. Send RESET CONFIRMATION packet to DTE. Return SVC to *d*1 state.
*d*3	DCE RESET REQUEST to DTE	Remove DATA packets transmitted to DTE from window; discard any DATA packets that represent partially transmitted M-bit sequences and discard any INTERRUPT packet awaiting transfer to the DTE; reset all window counters to 0; set any timers and retransmission parameters relating to DATA and INTERRUPT transfer to their initial value. Forward RESET REQUEST packet to DTE.

DCE state	*State definition*	*Action that shall be taken when entering the state*
*i*1	DTE INTERRUPT READY	No action.
*i*2	DTE INTERRUPT SENT	Forward INTERRUPT packet received from DTE to reformatting process.
*j*1	DCE INTERRUPT READY	No action.
*j*2	DCE INTERRUPT SENT	Forward INTERRUPT packet received from reformatting process to DTE.
*f*1	DCE RECEIVE READY	No action.
*f*2	DCE RECEIVE NOT READY	No action.
*g*1	DTE RECEIVE READY	No action.
*g*2	DTE RECEIVE NOT READY	No action.

Table 5-3. DCE special cases

Received from DTE	*DCE special cases* *Any state*
Any packet less than 2 bytes in length (including a valid data link level frame containing no packet)	A=DIAG *D*=38
Any packet with an invalid general format identifier	A=DIAG *D*=40
Any packet with a valid general format identifier and an assigned logical channel identifier (includes a logical channel identifier of 0)	See Table 5-4

Table 5-4. DTE effect on DCE restart states

	DCE restart states (see Note 5)		
Packet received from DTE	PACKET LEVEL READY (see Note 1) *r*1	DTE RESTART REQUEST *r*2	DCE RESTART REQUEST *r*3
Packets having a packet type identifier shorter than 1 byte and logical channel identifier not equal to 0	See Table 5-5	*A*=*ERROR* *S*=*r*3 *D*=38 (see Note 4)	*A*=*DISCARD*
Any packet, except RESTART, REGISTRATION (if supported) with a logical channel identifier of 0	*A*=*DIAG* *D*=36	*A*=*DIAG* *D*=36	*A*=*DIAG* *D*=36
Packet with a packet type identifier which is undefined or not supported by DCE	See Table 5-5	*A*=*ERROR* *S*=*r*3 *D*=33 (see Note 4)	*A*=*DISCARD*
RESTART REQUEST, RESTART CONFIRMATION, or REGISTRATION (if supported) packet with a logical channel identifier unequal to 0	See Table 5-5	*A*=*ERROR* *S*=*r*3 *D*=41 (see Note 4)	*A*=*DISCARD*
RESTART REQUEST	*A*=*NORMAL* (forward) *S*=*r*2	*A*=*DISCARD*	*A*=*NORMAL* *S*=*p*1 or *d*1 (see Note 2)
RESTART CONFIRMATION	*A*=*ERROR* *S*=*r*3 *D*=17 (see Note 6)	*A*=*ERROR* *S*=*r*3 *D*=18 (see Note 4)	*A*=*NORMAL* *S*=*p*1 or *d*1 (see Note 2)
RESTART REQUEST OR RESTART CONFIRMATION packet with a format error	*A*=*DIAG* *D*=38, 39, 81 or 82	*A*=*DISCARD*	*A*=*ERROR* *D*=38, 39, 81 or 82
REGISTRATION REQUEST or REGISTRATION CONFIRMATION packets (see Note 3)	*A*=*NORMAL*	*A*=*NORMAL*	*A*=*NORMAL*
REGISTRATION REQUEST or REGISTRATION CONFIRMATION packet with a format error (see Note 3)	*A*=*DIAG* *D*=38, 39, 81 or 82	*A*=*ERROR* *S*=*r*3 *D*=38, 39, 81 or 82 (see Note 4)	*A*=*ERROR* *D*=38, 39, 81 or 82
Call setup, call clearing, DATA, interrupt, flow control, or reset packet	See Table 5-5	*A*=*ERROR* *S*=r3 *D*=18	*A*=*DISCARD*

NOTES:

1. *The Mode S subnetwork has no restart states. Receipt of a RESTART REQUEST causes the DCE to respond with a RESTART CONFIRMATION. The RESTART REQUEST packet is forwarded to the reformatting process, which issues clear requests for all SVCs associated with the DTE. The DCE enters the* r*3 state only as a result of an error detected on the DTE/DCE interface.*
2. *The SVC channels are returned to state* p*1, the permanent virtual circuits (PVC) channels are returned to state* d*1.*
3. *The use of the registration facility is optional on the DTE/DCE interface.*
4. *No action is taken within the Mode S subnetwork.*
5. *Table entries are defined as follows:* A = *action to be taken,* S = *the state to be entered,* D = *the diagnostic code to be used in packets generated as a result of this action,* DISCARD *indicates that the received packet is to be cleared for the XDLP buffers, and INVALID indicates that the packet/state combination cannot occur.*
6. *The error procedure consists of entering the* r*3 state, and sending a RESTART REQUEST to the reformatting process.*

Table 5-5. DTE effect on DCE call setup and clearing states

	DCE call setup and clearing states (see Note 5)						
Packet received from DTE	READY *p*1	DTE CALL REQUEST *p*2	DCE CALL REQUEST *p*3	DATA TRANSFER *p*4	CALL COLLISION *p*5 (see Notes 1 and 4)	DTE CLEAR REQUEST *p*6	DCE CLEAR REQUEST to DTE *p*7
Packets having a packet type identifier shorter than 1 byte	*A*=*ERROR* *S*=*p*7 *D*=38	*A*=*ERROR* *S*=*p*7 *D*=38 (see Note 2)	*A*=*ERROR* *S*=*p*7 *D*=38 (see Note 2)	See Table 5-6	*A*=*ERROR* *S*=*p*7 *D*=38 (see Note 2)	*A*=*ERROR* *S*=*p*7 *D*=38 (see Note 2)	*A*=*DISCARD*
Packets having a packet type identifier which is undefined or not supported by DCE	*A*=*ERROR* *S*=*p*7 *D*=33	*A*=*ERROR* *S*=*p*7 *D*=33 (see Note 2)	*A*=*ERROR* *S*=*p*7 *D*=33 (see Note 2)	See Table 5-6	*A*=*ERROR* *S*=*p*7 *D*=33 (see Note 2)	*A*=*ERROR* *S*=*p*7 *D*=33 (see Note 2)	*A*=*DISCARD*
RESTART REQUEST, RESTART CONFIRMATION or REGISTRATION packet with logical channel identifier unequal to 0	*A*=*ERROR* *S*=*p*7 *D*=41	*A*=*ERROR* *S*=*p*7 *D*=41 (see Note 2)	*A*=*ERROR* *S*=*p*7 *D*=41 (see Note 2)	See Table 5-6	*A*=*ERROR* *S*=*p*7 *D*=41 (see Note 2)	*A*=*ERROR* *S*=*p*7 *D*=41 (see Note 2)	*A*=*DISCARD*
CALL REQUEST	*A*=*NORMAL* *S*=*p*2 (forward)	*A*=*ERROR* *S*=*p*7 *D*=21 (see Note 2)	*A*=*NORMAL* *S*=*p*5	*A*=*ERROR* *S*=*p*7 *D*=23 (see Note 2)	*A*=*ERROR* *S*=*p*7 *D*=24 (see Note 2)	*A*=*ERROR* *S*=*p*7 *D*=25 (see Note 2)	*A*=*DISCARD*
CALL ACCEPT	*A*=*ERROR* *S*=*p*7 *D*=20	*A*=*ERROR* *S*=*p*7 *D*=21 (see Note 2)	*A*=*NORMAL* *S*=*p*4 (Forward) or *A*=*ERROR* *S*=*p*7 *D*=42 (see Notes 2 and 3)	*A*=*ERROR* *S*=*p*7 *D*=23 (see Note 2)	*A*=*ERROR* *S*=*p*7 *D*=24 (see Notes 2 and 4)	*A*=*ERROR* *S*=*p*7 *D*=25 (see Note 2)	*A*=*DISCARD*
CLEAR REQUEST	*A*=*NORMAL* *S*=*p*6	*A*=*NORMAL* *S*=*p*6 (forward)	*A*=*NORMAL* *S*=*p*6 (forward)	*A*=*NORMAL* *S*=*p*6 (forward)	*A*=*NORMAL* *S*=*p*6 (forward)	*A*=*DISCARD*	*A*=*NORMAL* *S*=*p*1 (do not forward)
CLEAR CONFIRMATION	*A*=*ERROR* *S*=*p*7 *D*=20	*A*=*ERROR* *S*=*p*7 *D*=21 (see Note 2)	*A*=*ERROR* *S*=*p*7 *D*=22 (see Note 2)	*A*=*ERROR* *S*=*p*7 *D*=23 (see Note 2)	*A*=*ERROR* *S*=*p*7 *D*=24 (see Note 2)	*A*=*ERROR* *S*=*p*7 *D*=25 (see Note 2)	*A*=*NORMAL* *S*=*p*1 (do not forward)
DATA, interrupt, flow control or reset packets	*A*=*ERROR* *S*=*p*7 *D*=20	*A*=*ERROR* *S*=*p*7 *D*=21 (see Note 2)	*A*=*ERROR* *S*=*p*7 *D*=22 (see Note 2)	See Table 5-6	*A*=*ERROR* *S*=*p*7 *D*=24 (see Note 2)	*A*=*ERROR* *S*=*p*7 *D*=25 (see Note 2)	*A*=*DISCARD*

Packet received from DTE	DCE call setup and clearing states (see Note 5)						
	READY *p*1	DTE CALL REQUEST *p*2	DCE CALL REQUEST *p*3	DATA TRANSFER *p*4	CALL COLLISION *p*5 (see Notes 1 and 4)	DTE CLEAR REQUEST *p*6	DCE CLEAR REQUEST to DTE *p*7

NOTES:

1. *On entering the* p5 *state, the DCE reassigns the outgoing call to the DTE to another channel (no CLEAR REQUEST is issued) and responds to incoming DTE call as appropriate with a CLEAR REQUEST or CALL ACCEPT packet.*
2. *The error procedure consists of performing the actions specified when entering the* p7 *state (including sending a CLEAR REQUEST packet to the DTE) and additionally sending a CLEAR REQUEST packet to the XDCE (via the reformatting process).*
3. *The use of the fast select facility with a restriction on the response prohibits the DTE from sending a CALL ACCEPT packet.*
4. *The DTE in the event of a call collision must discard the CALL REQUEST packet received from the DCE.*
5. *Table entries are defined as follows:* A = *action to be taken,* S = *the state to be entered,* D = *the diagnostic code to be used in packets generated as a result of this action,* DISCARD *indicates that the received packet is to be cleared from the XDLP buffers, and INVALID indicates that the packet/state combination cannot occur.*

Table 5-6. DTE effect on DCE reset states

Packet received from DTE	DCE reset states (see Note 2) FLOW CONTROL READY *d*1	RESET REQUEST by DTE *d*2	DCE RESET REQUEST to DTE *d*3
Packet with a packet type identifier shorter than 1 byte	*A=ERROR* *S=d*3 *D*=38 (see Note 1)	*A=ERROR* *S=d*3 *D*=38 (see Note 1)	*A=DISCARD*
Packet with a packet type identifier which is undefined or not supported by DCE	*A=ERROR* *S=d*3 *D*=33 (see Note 1)	*A=ERROR* *S=d*3 *D*=33 (see Note 1)	*A=DISCARD*
RESTART REQUEST, RESTART CONFIRMATION, or REGISTRATION (if supported) packet with logical channel identifier unequal to 0	*A=ERROR* *S=d*3 *D*=41 (see Note 1)	*A=ERROR* *S=d*3 *D*=41 (see Note 1)	*A=DISCARD*
RESET REQUEST	*A=NORMAL* *S=d*2 (forward)	*A=DISCARD*	*A=NORMAL* *S=d*1 (do not forward)
RESET CONFIRMATION	*A=ERROR* *S=d*3 *D*=27 (see Note 1)	*A=ERROR* *S=d*3 *D*=28 (see Note 1)	*A=NORMAL* *S=d*1 (do not forward)
INTERRUPT packet	See Table 5-7	*A=ERROR* *S=d*3 *D*=28 (see Note 1)	*A=DISCARD*
INTERRUPT CONFIRMATION packet	See Table 5-7	*A=ERROR* *S=d*3 *D*=28 (see Note 1)	*A=DISCARD*
DATA or flow control packet	See Table 5-8	*A=ERROR* *S=d*3 *D*=28 (see Note 1)	*A=DISCARD*
REJECT supported but not subscribed to	*A=ERROR* *S=d*3 *D*=37 (see Note 1)	*A=ERROR* *S=d*3 *D*=37 (see Note 1)	*A=DISCARD*

NOTES:

1. *The error procedure consists of performing the specified actions when entering the* d3 *state (which includes forwarding a RESET REQUEST packet to the DTE) and sending a RESET REQUEST packet to the XDCE (via the formatting function).*
2. *Table entries are defined as follows:* A = *action to be taken,* S = *the state to be entered,* D = *the diagnostic code to be used in packets generated as a result of this action,* DISCARD *indicates that the received packet is to be cleared for the XDLP buffers, and INVALID indicates that the packet/state combination cannot occur.*

Table 5-7. DTE effect on DCE interrupt transfer states

Packet received from DTE	DTE/DCE interrupt transfer states (see Note 2) DTE INTERRUPT READY *i*1	DTE/DCE interrupt transfer states (see Note 2) DTE INTERRUPT SENT *i*2
INTERRUPT (see Note 1)	*A=NORMAL* *S=i*2 (forward)	*A=ERROR* *S=d*3 *D*=44 (see Note 3)
Packet received from DTE	**DCE INTERRUPT READY *j*1**	**DCE INTERRUPT SENT *j*2**
INTERRUPT CONFIRMATION (see Note 1)	*A=ERROR* *S=d*3 *D*=43 (see Note 3)	*A=NORMAL* *S=j*1 (forward)

NOTES:

1. *If the packet has a format error, then the error procedure applies (see Note 3). Interrupt packets with user data greater than 32 bytes should be treated as a format error.*
2. *Table entries are defined as follows:* A = *action to be taken,* S = *the state to be entered,* D = *the diagnostic code to be used in packets generated as a result of this action,* DISCARD *indicates that the received packet is to be cleared from the XDLP buffers, and INVALID indicates that the packet/state combination cannot occur.*
3. *The error procedure consists of performing the specified actions when entering the* d*3 state (which includes forwarding a RESET REQUEST packet to the DTE) and sending a RESET REQUEST packet to the XDCE (via the reformatting process).*

Table 5-8. DTE effect on DCE flow control transfer states

Packet received from DTE	DCE flow control transfer states (see Notes 2 and 3) DCE RECEIVE READY *f*1	DCE RECEIVE NOT READY *f*2
DATA packet with less than 4 bytes when using modulo 128 numbering	*A=ERROR* *S=d*3 *D*=38 (see Note 4)	*A=DISCARD*
DATA packet with invalid PR	*A=ERROR* *S=d*3 *D*=2 (see Note 4)	*A=ERROR* *S=d*3 *D*=2 (see Note 4)
DATA packet with valid PR but invalid PS or user data field with improper format	*A=ERROR* *S=d*3 *D*=1 (invalid PS) *D*=39 (UD > max negotiated length) *D*=82 (UD unaligned) (see Note 4)	*A=DISCARD* (process PR data)
DATA packet with valid PR with M-bit set to 1 when the user data field is partially full	*A=ERROR* *S=d*3 *D*=165 (see Note 4)	*A=DISCARD* (process PR data)
DATA packet with valid PR, PS and user data field format	*A=NORMAL* (forward)	*A=DISCARD* (process PR data)
Packet received from DTE	**DCE flow control transfer states (see Notes 2 and 3) DTE RECEIVE READY *g*1**	**DTE RECEIVE NOT READY *g*2**
RR, RNR, or REJECT packet with less than 3 bytes when using modulo 128 numbering (see Note 1)	*A=DISCARD*	*A=DISCARD*
RR, RNR, or REJECT packet with an invalid PR	*A=ERROR* *S=d*3 *D*=2 (see Note 4)	*A=ERROR* *S=d*3 *D*=2 (see Note 4)
RR packet with a valid PR	*A=NORMAL*	*A=NORMAL* *S=g*1
RNR packet with a valid PR	*A=NORMAL* *S=g*2	*A=NORMAL*
REJECT packet with a valid PR	*A=NORMAL*	*A=NORMAL* *S=g*1

NOTES:

1. *The reject procedures are not required.*
2. *The RR, RNR and REJECT procedures are a local DTE/DCE matter and the corresponding packets are not forwarded to the XDCE.*
3. *Table entries are defined as follows:* A = *action to be taken,* S = *the state to be entered,* D = *the diagnostic code to be used in packets generated as a result of this action,* DISCARD *indicates that the received packet is to be cleared from the XDLP buffers, and INVALID indicates that the packet/state combination cannot occur.*
4. *The error procedure consists of performing the specified actions when entering the* d3 *state (which includes forwarding a RESET REQUEST packet to the DTE) and sending a RESET REQUEST packet to the XDCE (via the reformatting process).*

Table 5-9. XDCE effect on DCE restart states

Packet received from XDCE	DCE restart states (see Note) PACKET LEVEL READY *r*1	 DTE RESTART REQUEST *r*2	 DCE RESTART REQUEST *r*3
CALL REQUEST	See Table 5-10	Send CLEAR REQUEST to reformatting process with *D*=244	Send CLEAR REQUEST to reformatting process with *D*=244
CALL ACCEPT, CLEAR REQUEST, DATA, INTERRUPT, INTERRUPT CONFIRMATION, RESET REQUEST	See Table 5-10	*A=DISCARD*	*A=DISCARD*

Note.— Table entries are defined as follows: A *= action to be taken,* S *= the state to be entered,* D *= the diagnostic code to be used in packets generated as a result of this action,* DISCARD *indicates that the received packet is to be cleared from the XDLP buffers, and INVALID indicates that the packet/state combination cannot occur.*

Table 5-10. XDCE effect on DCE call setup and clearing states

Packet received from XDCE	DCE call setup and clearing states (see Note) READY *p*1	 DTE CALL REQUEST *p*2	 DCE CALL REQUEST *p*3	 DATA TRANSFER *p*4	 CALL COLLISION *p*5	 DTE CLEAR REQUEST *p*6	 DCE CLEAR REQUEST to DTE *p*7
CALL REQUEST	*A=NORMAL* *S=p*3 (forward)	INVALID	INVALID	INVALID	INVALID	INVALID	INVALID
CALL ACCEPT	*A=DISCARD*	*A=NORMAL* *S=p*4 (forward)	INVALID	INVALID	INVALID	*A=DISCARD*	*A=DISCARD*
CLEAR REQUEST	*A=DISCARD*	*A=NORMAL* *S=p*7 (forward)	*A=NORMAL* *S=p*7 (forward)	*A=NORMAL* *S=p*7 (forward)	INVALID	*A=DISCARD*	*A=DISCARD*
DATA, INTERRUPT, INTERRUPT CONFIRMATION, or RESET REQUEST	*A=DISCARD*	INVALID	INVALID	See Table 5-11	INVALID	*A=DISCARD*	*A=DISCARD*

Note.— Table entries are defined as follows: A *= action to be taken,* S *= the state to be entered,* D *= the diagnostic code to be used in packets generated as a result of this action,* DISCARD *indicates that the received packet is to be cleared from the XDLP buffers, and INVALID indicates that the packet/state combination cannot occur.*

Table 5-11. XDCE effect on DCE reset states

Packet received from XDCE	DCE reset states (see Note) FLOW CONTROL READY *d*1	 DTE RESET REQUEST *d*2	 DCE RESET REQUEST to DTE *d*3
RESET REQUEST	*A=NORMAL* *S=d*3 (forward)	*A=NORMAL* *S=d*1 (forward)	*A=DISCARD*
INTERRUPT	See Table 5-12	*A=DISCARD*	*A=DISCARD*
INTERRUPT CONFIRMATION	See Table 5-12	*A=DISCARD*	INVALID
DATA	*A=NORMAL* (forward)	*A=DISCARD*	*A=DISCARD*

Note.— Table entries are defined as follows: A = *action to be taken,* S = *the state to be entered,* D = *the diagnostic code to be used in packets generated as a result of this action,* DISCARD *indicates that the received packet is to be cleared from the XDLP buffers, and INVALID indicates that the packet/state combination cannot occur.*

Table 5-12. XDCE effect on DCE interrupt transfer states

Packet received from XDCE	DCE interrupt transfer states (see Note) DTE INTERRUPT READY *i*1	 DTE INTERRUPT SENT *i*2
INTERRUPT CONFIRMATION	INVALID	*A=NORMAL* *S=i*1 (forward)
Packet received from XDCE	**DCE interrupt transfer states (see Note) DCE INTERRUPT READY *j*1**	** DCE INTERRUPT SENT *j*2**
INTERRUPT	*A=NORMAL* *S=j*2 (forward)	INVALID

Note.— Table entries are defined as follows: A = *action to be taken,* S = *the state to be entered,* D = *the diagnostic code to be used in packets generated as a result of this action,* DISCARD *indicates that the received packet is to be cleared from the XDLP buffers, and INVALID indicates that the packet/state combination cannot occur.*

Table 5-13. GDLP Mode S subnetwork timers

Timer name	*Timer label*	*Nominal value*	*Reference*
Active channel-GDLP	*Tx*	300 s	5.2.8.3.2
L-bit delivery-GDLP	*Tm*	120 s	5.2.7.4.3
Packet resequencing and S-bit delivery	*Tq*	60 s	5.2.6.9

Table 5-14. XDCE actions at state transition

XDCE state	*State definition*	*Action that shall be taken when entering the state*
*r*1	PACKET LEVEL READY	Return all SVCs to the *p*1 state.
*p*1	READY	Release all resources assigned to the SVC. Break the correspondence between the ADCE/GDCE SVC and the DTE/DCE SVC (the DTE/DCE SVC may not yet be in a *p*1 state).
*p*2	GDLP(ADLP) CALL REQUEST	Determine if sufficient resources exist to support request; if so allocate resources and forward Mode S CALL REQUEST packet to reformatting process; if not, enter ADCE(GDCE) CLEAR REQUEST to GDLP(ADLP) state (*p*7).
*p*3	ADCE(GDCE) CALL REQUEST	Determine if sufficient resources exist to support request; if so, allocate resources and forward Mode S CALL REQUEST packet to frame processing; if not, send Mode S CLEAR REQUEST to reformatting process and go to state *p*1. Do not forward the Mode S CALL REQUEST to the peer XDCE.
*p*4	DATA TRANSFER	No action.
*p*6	GDLP(ADLP) CLEAR REQUEST	Release all resources, send a Mode S CLEAR CONFIRMATlON packet to the peer XDCE and enter the *p*1 state.
*p*7	ADCE(GDCE) CLEAR REQUEST to GDLP(ADLP)	Forward Mode S CLEAR REQUEST packet to the peer XDCE via frame processing.
*d*1	FLOW CONTROL READY	No action.
*d*2	GDLP(ADLP) RESET REQUEST	Remove Mode S DATA packets transmitted to peer XDCE from window; discard any DATA packets that represent partially transmitted M-bit sequences and discard any Mode S INTERRUPT packets awaiting transfer to the peer XDCE; reset all flow control window counters to 0 (5.2.6.7.1). Send Mode S RESET CONFIRMATION packet to the peer XDCE. Return SVC to *d*1 state. Forward Mode S RESET REQUEST packet to reformatting process.
*d*3	ADCE(GDCE) RESET REQUEST to GDLP(ADLP)	Remove Mode S DATA packets transmitted to peer XDCE from window; discard any DATA packets that represent partially transmitted M-bit sequences and discard any Mode S INTERRUPT packets awaiting transfer to the peer XDCE; reset all flow control window counters to 0 (5.2.6.7.1). Forward Mode S RESET REQUEST packet to peer XDCE via frame processing.
*i*1	GDLP(ADLP) INTERRUPT READY	No action.
*i*2	GDLP(ADLP) INTERRUPT SENT	Forward Mode S INTERRUPT packet received from peer XDCE to the reformatting process.
*j*1	ADCE(GDCE) INTERRUPT READY	No action.
*j*2	ADCE(GDCE) INTERRUPT SENT	Forward Mode S INTERRUPT packet received from the reformatting process.
*f*1	ADCE(GDCE) RECEIVE READY	No action.
*f*2	ADCE(GDCE) RECEIVE NOT READY	No action.
*g*1	GDLP(ADLP) RECEIVE READY	No action.
*g*2	GDLP(ADLP) RECEIVE NOT READY	No action.

Table 5-15. GDLP (ADLP) effect on ADCE (GDCE) packet layer ready states

Packet received from GDLP (ADLP) (see Note 2)	ADCE (GDCE) states (see Notes 1 and 3) PACKET LEVEL READY *r*1
CH=0 with no TC present (see Note 4) or CH=0 in a CALL ACCEPT by ADLP packet	*A=DISCARD*
Unassigned packet header	*A=DISCARD*
Call setup, call clearing, DATA, interrupt, flow control, or reset	See Table 5-16

NOTES:

1. *The XDCE state is not necessarily the same state as the DTE/DCE interface.*
2. *All packets from the peer XDLP have been checked for duplication before evaluation as represented by this table.*
3. *Table entries are defined as follows:* A *= action to be taken,* S *= the state to be entered,* D *= the diagnostic code to be used in packets generated as a result of this action,* DISCARD *indicates that the received packet is to be cleared from the XDLP buffers, and INVALID indicates that the packet/state combination cannot occur.*
4. *Where CH=0 and a valid TC is present in a CLEAR REQUEST by ADLP or GDLP packet or a CLEAR CONFIRMATION by ADLP or GDLP packet, it is handled as described in 5.2.5.1.2.3 and Table 5-16.*

Table 5-16. GDLP (ADLP) effect on ADCE (GDCE) call setup and clearing states

Packet received from GDLP (ADLP) (see Note 2)	ADCE (GDCE) call setup and clearing States (See Notes 1, 7 and 8) READY *p*1	 GDLP (ADLP) CALL REQUEST *p*2	 ADCE (GDCE) CALL REQUEST *p*3	 DATA TRANSFER *p*4	 GDLP (ADLP) CLEAR REQUEST *p*6	 ADCE (GDCE) CLEAR REQUEST to GDLP (ADLP) *p*7
Format error (see Note 3)	*A=ERROR* (see Note 10) *S=p*7 *D*=33 (see Note 9)	*A=ERROR* *S=p*7 *D*=33 (see Note 6)	*A=ERROR* *S=p*7 *D*=33 (see Notes 6 and 9)	See Table 5-17	*A=ERROR* *S=p*7 *D*=25 (see Note 6)	*A=DISCARD*
CALL REQUEST	*A=NORMAL* (5.2.6.3.1) *S=p*2 (forward request to DCE)	*A=ERROR* *S=p*7 *D*=21 (see Note 6)	Not applicable (see Note 4)	Not applicable (see Note 4)	*A=ERROR* *S=p*7 *D*=25 (see Note 6)	*A=DISCARD*
CALL ACCEPT	*A=ERROR* *S=p*7 *D*=20 (see Note 10)	*A=ERROR* *S=p*7 *D*=21 (see Note 6)	*A=NORMAL* (5.2.6.3.1) *S=p*4 (forward to DCE), or *A=ERROR* *S=p*7 *D*=42 (see Note 6)	*A=ERROR* *S=p*7 *D*=23 (see Note 6)	*A=ERROR* *S=p*7 *D*=25 (see Note 6)	*A=DISCARD*

Packet received from GDLP (ADLP) (see Note 2)	ADCE (GDCE) call setup and clearing States (See Notes 1, 7 and 8) READY *p*1	GDLP (ADLP) CALL REQUEST *p*2	ADCE (GDCE) CALL REQUEST *p*3	DATA TRANSFER *p*4	GDLP (ADLP) CLEAR REQUEST *p*6	ADCE (GDCE) CLEAR REQUEST to GDLP (ADLP) *p*7
CLEAR REQUEST	*A=NORMAL* (5.2.6.3.3) *S=p*6 (do not forward)	*A=NORMAL* (5.2.6.3.3) *S=p*6 (forward to DCE)	*A=NORMAL* (5.2.6.3.3) *S=p*6 (forward to DCE)	*A=NORMAL* (5.2.6.3.3) *S=p*6 (forward to DCE)	*A=DISCARD*	*A=NORMAL* (5.2.6.3.3) *S=p*1 (do not forward)
CLEAR CONFIRMATION	*A=ERROR* *S=p*7 *D*=20 (see Note 10)	*A=ERROR* *S=p*7 *D*=21 (see Note 6)	*A=ERROR* *S=p*7 *D*=22 (see Note 6)	*A=ERROR* *S=p*7 *D*=23 (see Note 6)	*A=ERROR* *S=p*7 *D*=25 (see Note 6)	*A=NORMAL* (5.2.6.3.3) *S=p*1 (do not forward)
DATA, interrupt, flow control or reset packets	*A=ERROR* *S=p*7 *D*=20 (see Note 10)	*A=ERROR* *S=p*7 *D*=21 (see Notes 6 and 9)	*A=ERROR* *S=p*7 *D*=22 (see Notes 5 and 6)	See Table 5-17	*A=ERROR* *S=p*7 *D*=25 (see Note 6)	*A=DISCARD*

NOTES:

1. *The XDCE is not necessarily in the same state as the DTE/DCE interface.*
2. *All packets from the peer XDLP have been checked for duplication before evaluation as represented by this table.*
3. *A format error may result from an S-bit sequence having a first or intermediate packet shorter than the maximum length, or else from an invalid LV field in a CALL REQUEST, CALL ACCEPT, CLEAR REQUEST or INTERRUPT packet. There are no other detectable Mode S format errors.*
4. *The ADCE assigns all channel numbers used between the ADLP and GDLP, hence call collisions are not possible. When a CALL REQUEST by GDLP packet is received bearing a temporary channel number associated with an SVC in the* p*4 state, the association of the temporary to permanent channel number is broken (5.2.5.1.2.3).*
5. *Not applicable to the GDLP.*
6. *The error procedure consists of performing the actions specified when entering the* p*7 state (including sending a CLEAR REQUEST packet to the peer XDLP) and additionally sending a CLEAR REQUEST packet to the DCE (via the reformatting process).*
7. *Table entries are defined as follows:* A = *action to be taken,* S = *the state to be entered,* D = *the diagnostic code to be used in packets generated as a result of this action,* DISCARD *indicates that the received packet is to be cleared from the XDLP buffers, and INVALID indicates that the packet/state combination cannot occur.*
8. *The number in parentheses below an "*A = NORMAL*" table entry is the paragraph number in this document that defines the actions to be taken to perform normal processing on the received packet. If no paragraph number is referenced, the normal processing is defined in the table entry.*
9. *An error condition is declared and transfer to the* p*7 state is possible only if the ground DTE address is known unambiguously. Otherwise the action is to discard the packet.*
10. *The error procedure consists of performing the action when entering the* p*7 state (including sending a CLEAR REQUEST packet to the XDLP) but without sending a CLEAR REQUEST packet to the local DCE.*

Table 5-17. GDLP (ADLP) effect on ADCE (GDCE) reset states

Packet received from GDLP (ADLP) (see Note 2)	ADCE (GDCE) reset states (see Notes 1, 4 and 5) FLOW CONTROL READY *d*1	 GDLP (ADLP) RESET REQUEST *d*2	 ADCE (GDCE) RESET REQUEST to GDLP (ADLP) *d*3
RESET REQUEST	*A=NORMAL* (5.2.6.7) *S=d*2 (forward to DCE)	*A=DISCARD*	*A=NORMAL* (5.2.6.7) *S=d*1 (do not forward)
RESET CONFIRMATION	*A=ERROR* *S=d*3 *D*=27 (see Note 3)	*A=ERROR* *S=d*3 *D*=28 (see Note 3)	*A=NORMAL* (5.2.6.7) *S=d*1 (do not forward)
INTERRUPT	See Table 5-18	*A=ERROR* *S=d*3 *D*=28 (see Note 3)	*A=DISCARD*
INTERRUPT CONFIRMATION	See Table 5-18	*A=ERROR* *S=d*3 *D*=28 (see Note 3)	*A=DISCARD*
DATA or flow control packet	See Table 5-19	*A=ERROR* *S=d*3 *D*=28 (see Note 3)	*A=DISCARD*
Format error (see Note 6)	*A=ERROR* *S=d*3 *D*=33 (see Note 3)	*A=ERROR* *S=d*3 *D*=33 (see Note 3)	*A=DISCARD*

NOTES:

1. *The XDCE is not necessarily in the same state as the DTE/DCE interface.*
2. *All packets from the peer XDLP have been checked for duplication before evaluation as represented by this table.*
3. *The error procedure consists of performing the specified actions when entering the* d3 *state (which includes forwarding a RESET REQUEST packet to the peer XDLP) and sending a RESET REQUEST packet to the DCE (via the formatting function).*
4. *Table entries are defined as follows:* A = *action to be taken,* S = *the state to be entered,* D = *the diagnostic code to be used in packets generated as a result of this action,* DISCARD *indicates that the received packet is to be cleared for the XDLP buffers, and INVALID indicates that the packet/state combination cannot occur.*
5. *The number in parentheses below an "*A = NORMAL*" table entry is the paragraph number in this document that defines the actions to be taken to perform normal processing on the received packet. If no paragraph number is referenced, the normal processing is defined in the table entry.*
6. *A format error may result from an S-bit sequence having a first or intermediate packet shorter than the maximum length, or else from an invalid LV field in a CALL REQUEST, CALL ACCEPT, CLEAR REQUEST, or INTERRUPT packet. There are no other detectable Mode S format errors.*

Table 5-18. GDLP (ADLP) effect on ADCE (GDCE) interrupt transfer states

Packet received from GDLP (ADLP) (see Note 2)	ADCE/GDCE interrupt transfer states (see Notes 1, 3 and 4) GDLP (ADLP) INTERRUPT READY *i*1	GDLP (ADLP) INTERRUPT SENT *i*2
INTERRUPT (see Note 6)	*A=NORMAL* (5.2.6.4.5) *S=i*2 (forward to DCE)	*A=ERROR* *S=d*3 *D*=44 (see Note 5)
Packet received from GDLP (ADLP) (see Note 2)	**ADCE (GDCE) interrupt transfer states (see Notes 1, 3 and 4) ADCE (GDCE) INTERRUPT READY *j*1**	**ADCE (GDCE) INTERRUPT SENT *j*2**
INTERRUPT CONFIRMATION	*A=ERROR* *S=d*3 *D*=43 (see Note 5)	*A=NORMAL* (5.2.6.4.5) *S=j*1 (forward confirmation to DCE)

NOTES:

1. *The XDCE is not necessarily in the same state as the DTE/DCE interface.*
2. *All packets from the peer XDLP have been checked for duplication before evaluation as represented by this table.*
3. *Table entries are defined as follows:* A = *action to be taken,* S = *the state to be entered,* D = *the diagnostic code to be used in packets generated as a result of this action,* DISCARD *indicates that the received packet is to be cleared for the XDLP buffers, and INVALID indicates that the packet/state combination cannot occur.*
4. *The number in parentheses below an "*A = NORMAL*" table entry is the paragraph number in this document that defines the actions to be taken to perform normal processing on the received packet. If no paragraph number is referenced, the normal processing is defined in the table entry.*
5. *The error procedure consists of performing the specified actions when entering the* d*3 state (which includes forwarding a RESET REQUEST packet to the peer XDLP) and sending a RESET REQUEST packet to the DCE (via the reformatting process).*
6. *User data length for INTERRUPT packets greater than 32 bytes, or an out of sequence INTERRUPT packet, are considered as errors.*

Table 5-19. GDLP (ADLP) effect on ADCE (GDCE) flow control transfer states

Packet received from GDLP (ADLP) (see Note 2)	ADCE (GDCE) flow control transfer states (see Notes 1, 6 and 7) ADCE (GDCE) RECEIVE READY *f*1	ADCE (GDCE) RECEIVE NOT READY *f*2
DATA packet with invalid PR (see Note 3)	*A=ERROR* *S=d*3 *D*=2 (see Note 8)	*A=ERROR* *S=d*3 *D*=2 (see Note 8)
DATA packet with valid PR, invalid PS or LV subfield (see Notes 4 and 5)	*A=DISCARD*, but process the PR value and send REJECT packet containing the expected PS value (see Note 5)	*A=DISCARD*, but process the PR value and send REJECT packet containing the expected PS value when busy condition ends

DATA packet with valid PR, PS and LV subfield	*A=NORMAL* (5.2.6.4.4) (forward)	*A=PROCESS*, if possible; or *A=DISCARD*, but process the PR value and send REJECT containing the expected PS value when busy condition ends

Packet received from GDLP (ADLP) (see Note 2)	ADCE (GDCE) flow control transfer states (see Notes 1, 6 and 7) GDLP (ADLP) RECEIVE READY *g*1	GDLP (ADLP) RECEIVE NOT READY *g*2
RR, RNR, REJECT packet with invalid PR (see Note 3)	*A=ERROR* *S=d*3 *D*=2 (see Note 8)	*A=ERROR* *S=d*3 *D*=2 (see Note 8)
RR with valid PR field (see Note 9)	*A=NORMAL* (5.2.6.5)	*A=NORMAL* (5.2.6.6) *S=g*1
RNR with valid PR value (see Note 9)	*A=NORMAL* (5.2.6.5) *S=g*2	*A=NORMAL* (5.2.6.6)
REJECT with valid PR (see Note 9)	*A=NORMAL* (5.2.6.5)	*A=NORMAL* (5.2.6.6) *S=g*1

NOTES:

1. *The XDCE is not necessarily in the same state as the DTE/DCE interface.*
2. *All packets from the peer XDLP have been checked for duplication before evaluation as represented by this table.*
3. *An invalid PR value is one which is less than the PR value (modulo 16) of the last packet sent by the peer XDLP, or greater than the PS value of the next data packet to be transmitted by the XDLP.*
4. *An invalid PS value is one which is different from the next expected value for PS.*
5. *An invalid LV subfield is one which represents a value that is too large for the size of the segment received. In the event of an LV field error which gives rise to a loss of confidence in the correctness of the other fields in the packet, the packet is discarded without any further action.*
6. *Table entries are defined as follows:* A = *action to be taken,* S = *the state to be entered,* D = *the diagnostic code to be used in packets generated as a result of this action,* DISCARD *indicates that the received packet is to be cleared from the XDLP buffers, and INVALID indicates that the packet/state combination cannot occur.*
7. *The number in parentheses below an "*A = NORMAL*" table entry is the paragraph number in this document that defines the actions to be taken to perform normal processing on the received packet. If no paragraph number is referenced, the normal processing is defined in the table entry.*
8. *The error procedure consists of performing the specified actions when entering the* d3 *state (which includes forwarding a RESET REQUEST packet to the peer XDLP) and sending a RESET REQUEST packet to the DCE (via the reformatting process).*
9. *RR, RNR, and REJECT packets have no end-to-end significance and are not forwarded to the DCE.*
10. *The receipt of a packet smaller than the maximum packet size with M-bit = 1 will cause a reset to be generated and the remainder of the sequence will be discarded.*

Table 5-20. DCE effect on ADCE (GDCE) call setup and clearing states

Packet received from DCE (see Notes 2 and 4)	ADCE (GDCE) call setup and clearing states (see Notes 1, 7 and 8)					
	READY *p*1	GDLP (ADLP) CALL REQUEST *p*2	ADCE (GDCE) CALL REQUEST *p*3	DATA TRANSFER *p*4	GDLP (ADLP) CLEAR REQUEST *p*6	ADCE (GDCE) to GDLP (ADLP) CLEAR REQUEST *p*7
CALL REQUEST (see Note 6)	*A=NORMAL* (5.2.6.3.1) *S=p*3 (forward)	INVALID (see Note 5)	INVALID (see Note 3)	INVALID (see Note 3)	INVALID (see Note 3)	INVALID (see Note 3)
CALL ACCEPT (see Note 4)	*A=DISCARD*	*A=NORMAL* *S=P*4 (forward)	INVALID (see Note 3)	INVALID (see Note 3)	*A=DISCARD*	*A=DISCARD*
CLEAR REQUEST (see Note 4)	*A=DISCARD*	*A=NORMAL* (5.2.6.3.3) *S=p*7 (forward)	*A=NORMAL* (5.2.6.3.3) *S=p*7 (forward)	*A=NORMAL* (5.2.6.3.3) *S=p*7 (forward)	*A=DISCARD*	*A=DISCARD*
DATA, INTERRUPT or RESET packets (see Note 4)	*A=DISCARD*	INVALID (see Note 3)	INVALID (see Note 3)	See Table 5-21	*A=DISCARD*	*A=DISCARD*

NOTES:

1. *The XDCE is not necessarily in the same state as the DTE/DCE interface.*
2. *This is the DTE packet received via the DCE after all DTE/DCE processing has occurred. Procedures local to the DTE/DCE interface (such as RR, RNR, and REJECT if in effect), do not affect the XDCE directly. All error procedures as documented in ISO 8208 have been performed. Hence certain packets are rejected by the interface and are not represented in this table.*
3. *The DCE in its protocol operation with the DTE will detect this error condition, hence the erroneous packet can be said never to "reach" the XDCE; see also Note 2.*
4. *The channel number for the DTE/DCE need not be the same channel number used for the ADCE/GDCE; a packet from the DTE which contains a channel number is associated with an air/ground channel by means of a previously established cross-reference table. If none exists then the DTE/DCE channel by definition references an air/ground channel in the* p1 *state.*
5. *The ADCE assigns all channel numbers used between the ADLP and GDLP; hence call collisions (denoted* p5 *ISO 8208) are not possible; see also Note 4.*
6. *A CALL REQUEST from the DTE can never be associated with an XDCE channel number which is not in the* p1 *state.*
7. *Table entries are defined as follows:* A = *action to be taken,* S = *the state to be entered,* D = *the diagnostic code to be used in packets generated as a result of this action,* DISCARD *indicates that the received packet is to be cleared from the XDLP buffers, and INVALID indicates that the packet/state combination cannot occur.*
8. *The number in parentheses below an "*A = NORMAL*" table entry is the paragraph number in this document that defines the actions to be taken to perform normal processing on the received packet. If no paragraph number is referenced, the normal processing is defined in the table entry.*

Table 5-21. DCE effect on ADCE (GDCE) reset states

Packet received from DCE	ADCE (GDCE) reset states (see Notes 1, 4 and 5) FLOW CONTROL READY *d*1	GDLP (ADLP) RESET REQUEST *d*2	ADCE (GDCE) RESET REQUEST to GDLP (ADLP) *d*3
RESET REQUEST	*A=NORMAL* (5.2.6.7) *S=d*3 (forward)	*A=NORMAL* (5.2.6.7) *S=d*1 (forward)	*A=DISCARD*
RESET CONFIRMATION	INVALID (see Note 3)	INVALID (see Note 3)	INVALID (see Note 3)
INTERRUPT	See Table 5-22	*A=DISCARD*	Hold interrupt until Mode S reset complete
INTERRUPT CONFIRMATION	See Table 5-22	*A=DISCARD*	INVALID (see Note 3)
DATA (see Note 2)	*A=NORMAL* (5.2.6.4) (forward)	*A=DISCARD*	Hold data until Mode S reset complete

NOTES:

1. *The XDCE is not necessarily in the same state as the DTE/DCE interface.*
2. *This is the DTE packet received via the DCE after all DTE/DCE processing has occurred. Procedures local to the DTE/DCE interface (such as RR, RNR, and REJECT if in effect), do not affect the XDCE directly. All error procedures as documented in ISO 8208 have been performed. Hence certain packets are rejected by the interface and are not represented in this table.*
3. *The DCE in its protocol operation with the DTE will detect this error condition, hence the erroneous packet can be said never to "reach" the XDCE; see also Note 2.*
4. *Table entries are defined as follows:* A = *action to be taken,* S = *the state to be entered,* D = *the diagnostic code to be used in packets generated as a result of this action,* DISCARD *indicates that the received packet is to be cleared from the XDLP buffers, and INVALID indicates that the packet/state combination cannot occur.*
5. *The number in parentheses below an "*A = NORMAL*" table entry is the paragraph number in this document that defines the actions to be taken to perform normal processing on the received packet. If no paragraph number is referenced, the normal processing is defined in the table entry.*

Table 5-22. DCE effect on ADCE (GDCE) interrupt transfer states

Packet received from DCE (see Note 2)	ADCE (GDCE) interrupt transfer state (see Notes 1, 4 and 5) GDLP (ADLP) INTERRUPT READY *i*1	GDLP (ADLP) INTERRUPT SENT *i*2
INTERRUPT CONFIRMATION	INVALID (See Note 3)	*A=NORMAL* (5.2.6.4.5) *S=i*1 (forward)

Packet received from DCE (see Note 2)	ADCE (GDCE) interrupt transfer states (see Notes 1, 4 and 5) ADCE (GDCE) INTERRUPT READY *j*1	ADCE (GDCE) INTERRUPT SENT *j*2
INTERRUPT	*A=NORMAL* (5.2.6.4.5) *S=j*2 (forward)	INVALID (see Note 3)

NOTES:

1. *The XDCE is not necessarily in the same state as the DTE/DCE interface.*
2. *This is the DTE packet received via the DCE after all DTE/DCE processing has occurred. Procedures local to the DTE/DCE interface (such as RR, RNR, and REJECT if in effect), do not affect the XDCE directly. All error procedures as documented in ISO 8208 have been performed. Hence certain packets are rejected by the interface and are not represented in this state.*
3. *The DCE in its protocol operation with the DTE will detect this error condition, hence the erroneous packet can be said never to "reach" the XDCE; see also Note 2.*
4. *Table entries are defined as follows:* A = *action to be taken,* S = *the state to be entered,* D = *the diagnostic code to be used in packets generated as a result of this action,* DISCARD *indicates that the received packet is to be cleared from the XDLP buffers, and INVALID indicates that the packet/state combination cannot occur.*
5. *The number in parentheses below an "*A = NORMAL*" table entry is the paragraph number in this document that defines the actions to be taken to perform normal processing on the received packet. If no paragraph number is referenced, the normal processing is defined in the table entry.*

Table 5-23. Broadcast identifier number assignments

Uplink broadcast identifier	*Assignment*
00_{16}	Not valid
01_{16}	Reserved (differential GNSS correction)
30_{16}	Not valid
31_{16}	Reserved for ACAS (RA broadcast)
32_{16}	Reserved for ACAS (ACAS broadcast)
Others	Unassigned
Downlink broadcast identifier	*Assignment*
00_{16}	Not valid
02_{16}	Reserved (traffic information service)
10_{16}	Data link capability report
20_{16}	Aircraft identification
FE_{16}	Update request
FF_{16}	Search request
Others	Unassigned

Table 5-24. Register number assignments

Transponder register No.	*Assignment*
00_{16}	Not valid
01_{16}	Unassigned
02_{16}	Linked Comm-B, segment 2
03_{16}	Linked Comm-B, segment 3
04_{16}	Linked Comm-B, segment 4
05_{16}	Extended squitter airborne position
06_{16}	Extended squitter surface position
07_{16}	Extended squitter status
08_{16}	Extended squitter identification and type
09_{16}	Extended squitter airborne velocity
$0A_{16}$	Extended squitter event-driven information
$0B_{16}$	Air/air information 1 (aircraft state)
$0C_{16}$	Air/air information 2 (aircraft intent)
$0D_{16}$-$0E_{16}$	Reserved for air/air state information
$0F_{16}$	Reserved for ACAS
10_{16}	Data link capability report
11_{16}-16_{16}	Reserved for extension to data link capability reports
17_{16}	Common usage GICB capability report
18_{16}-$1F_{16}$	Mode S specific services capability reports
20_{16}	Aircraft identification
21_{16}	Aircraft and airline registration markings
22_{16}	Antenna positions
23_{16}	Reserved for antenna position
24_{16}	Reserved for aircraft parameters
25_{16}	Aircraft type
26_{16}-$2F_{16}$	Unassigned
30_{16}	ACAS active resolution advisory
31_{16}-$3F_{16}$	Unassigned
40_{16}	Selected vertical intention
41_{16}	Next waypoint identifier
42_{16}	Next waypoint position
43_{16}	Next waypoint information
44_{16}	Meteorological routine air report

Transponder register No.	*Assignment*
45_{16}	Meteorological hazard report
46_{16}	Reserved for flight management system Mode 1
47_{16}	Reserved for flight management system Mode 2
48_{16}	VHF channel report
49_{16}-$4F_{16}$	Unassigned
50_{16}	Track and turn report
51_{16}	Position report coarse
52_{16}	Position report fine
53_{16}	Air-referenced state vector
54_{16}	Waypoint 1
55_{16}	Waypoint 2
56_{16}	Waypoint 3
57_{16}-$5E_{16}$	Unassigned
$5F_{16}$	Quasi-static parameter monitoring
60_{16}	Heading and speed report
61_{16}	Extended squitter emergency/priority status
62_{16}	Reserved for target state and status information
63_{16}	Reserved for extended squitter
64_{16}	Reserved for extended squitter
65_{16}	Aircraft operational status
66_{16}-$6F_{16}$	Reserved for extended squitter
70_{16}-75_{16}	Reserved for future aircraft downlink parameters
76_{16}-$E0_{16}$	Unassigned
$E1_{16}$-$E2_{16}$	Reserved for Mode S BITE
$E3_{16}$	Transponder type/part number
$E4_{16}$	Transponder software revision number
$E5_{16}$	ACAS unit part number
$E6_{16}$	ACAS unit software revision number
$E7_{16}$-$F0_{16}$	Unassigned
$F1_{16}$	Military applications
$F2_{16}$	Military applications
$F3_{16}$-FF_{16}	Unassigned

Note.— In the context of Table 5-24, the term “aircraft” can be understood as “transponder carrying aircraft”, “pseudo-aircraft (e.g. an obstacle)” or “vehicle”.

Table 5-25. MSP channel number assignments

Uplink channel number	*Assignment*
0	Not valid
1	Reserved (specific services management)
2	Reserved (traffic information service)
3	Reserved (ground-to-air alert)
4	Reserved (ground derived position)
5	ACAS sensitivity level control
6	Reserved (ground-to-air service request)
7	Reserved (air-to-ground service response)
8–63	Unassigned
Downlink channel number	*Assignment*
0	Not valid
1	Reserved (specific services management)
2	Unassigned
3	Reserved (data flash)
4	Reserved (position request)
5	Unassigned
6	Reserved (ground-to-air service response)
7	Reserved (air-to-ground service request)
8–63	Unassigned

FIGURES FOR CHAPTER 5

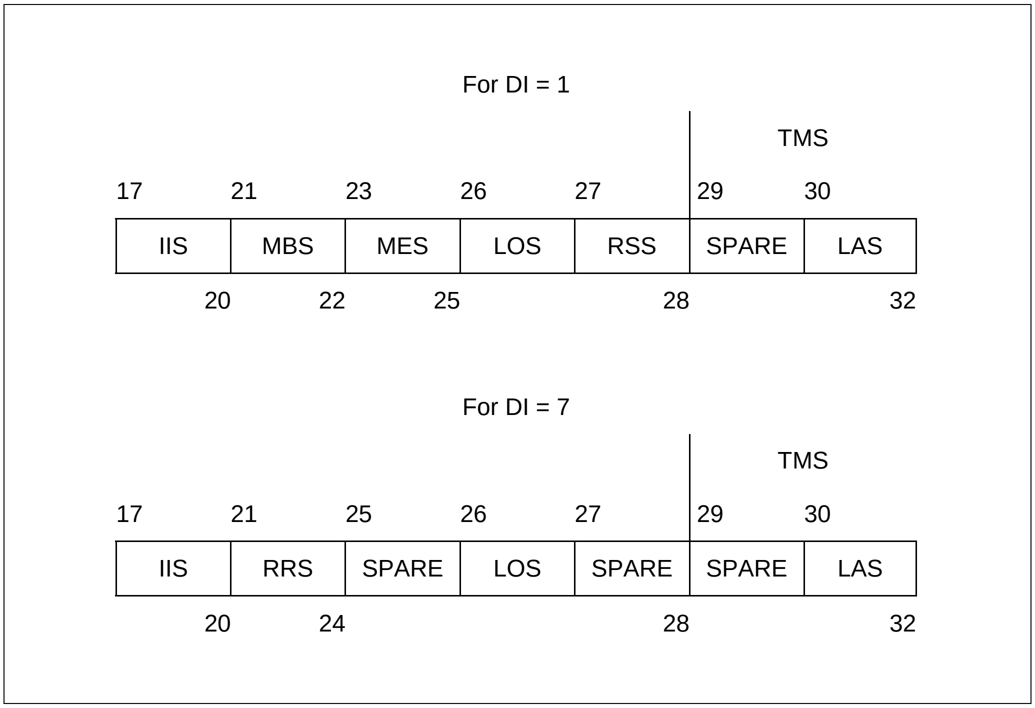
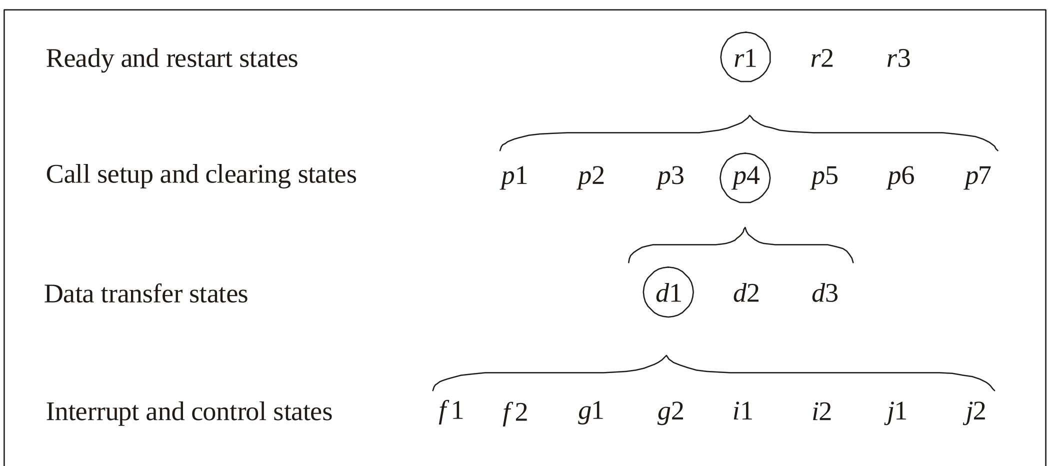


Figure 5-1. The SD field structure



Note.— States r1, p4 *and* d1 *(shown circled) are states that provide access to the lower levels of the DCE substate hierarchy.*

Figure 5-2. DCE substate hierarchy

1 2 3 4 5 6 7 8

<table>
<tr><td>DP=0</td><td>MP=1</td><td colspan="2">SP=1</td><td>ST=0</td><td>FILL2</td></tr>
<tr><td>P</td><td>FILL</td><td colspan="4">SN</td></tr>
<tr><td colspan="4">CH</td><td colspan="2">LAM</td></tr>
<tr><td colspan="6">AG</td></tr>
<tr><td>S</td><td colspan="2">FS</td><td>F</td><td colspan="2">LV</td></tr>
<tr><td colspan="6">UD</td></tr>
</table>

Figure 5-3. CALL REQUEST by ADLP packet

1 2 3 4 5 6 7 8

<table>
<tr><td>DP=0</td><td>MP=1</td><td colspan="2">SP=1</td><td>ST=0</td><td>FILL</td></tr>
<tr><td>P</td><td>FILL</td><td colspan="4">SN</td></tr>
<tr><td colspan="2">FILL</td><td colspan="2">TC</td><td colspan="2">AM</td></tr>
<tr><td colspan="6">AG</td></tr>
<tr><td>S</td><td colspan="2">FS</td><td>F</td><td colspan="2">LV</td></tr>
<tr><td colspan="6">UD</td></tr>
</table>

Figure 5-4. CALL REQUEST by GDLP packet

1 2 3 4 5 6 7 8

<table>
<tr><td>DP=0</td><td>MP=1</td><td colspan="2">SP=1</td><td>ST=1</td><td>FILL2</td></tr>
<tr><td colspan="2">TC</td><td colspan="4">SN</td></tr>
<tr><td colspan="4">CH</td><td colspan="2">AM</td></tr>
<tr><td colspan="6">AG</td></tr>
<tr><td>S</td><td colspan="2">FILL</td><td>F</td><td colspan="2">LV</td></tr>
<tr><td colspan="6">UD</td></tr>
</table>

Figure 5-5. CALL ACCEPT by ADLP packet

1 2 3 4 5 6 7 8

<table>
<tr><td>DP=0</td><td>MP=1</td><td colspan="2">SP=1</td><td>ST=1</td><td>FILL</td></tr>
<tr><td colspan="2">FILL</td><td colspan="4">SN</td></tr>
<tr><td colspan="4">CH</td><td colspan="2">AM</td></tr>
<tr><td colspan="6">AG</td></tr>
<tr><td>S</td><td colspan="2">FILL</td><td>F</td><td colspan="2">LV</td></tr>
<tr><td colspan="6">UD</td></tr>
</table>

Figure 5-6. CALL ACCEPT by GDLP packet

1 2 3 4 5 6 7 8

<table>
<tr><td>DP=0</td><td>MP=1</td><td colspan="2">SP=1</td><td>ST=2</td><td>FILL2</td></tr>
<tr><td colspan="2">TC</td><td colspan="4">SN</td></tr>
<tr><td colspan="4">CH</td><td colspan="2">AM</td></tr>
<tr><td colspan="6">AG</td></tr>
<tr><td colspan="6">CC</td></tr>
<tr><td colspan="6">DC</td></tr>
<tr><td>S</td><td colspan="2">FILL</td><td>F</td><td colspan="2">LV</td></tr>
<tr><td colspan="6">UD</td></tr>
</table>

Figure 5-7. CLEAR REQUEST by ADLP packet

1 2 3 4 5 6 7 8

<table>
<tr><td>DP=0</td><td>MP=1</td><td colspan="2">SP=1</td><td>ST=2</td><td>FILL</td></tr>
<tr><td colspan="2">TC</td><td colspan="4">SN</td></tr>
<tr><td colspan="4">CH</td><td colspan="2">AM</td></tr>
<tr><td colspan="6">AG</td></tr>
<tr><td colspan="6">CC</td></tr>
<tr><td colspan="6">DC</td></tr>
<tr><td>S</td><td colspan="2">FILL</td><td>F</td><td colspan="2">LV</td></tr>
<tr><td colspan="6">UD</td></tr>
</table>

Figure 5-8. CLEAR REQUEST by GDLP packet

1 2 3 4 5 6 7 8

<table>
<tr><td>DP=0</td><td>MP=1</td><td>SP=1</td><td>ST=3</td><td>FILL2</td></tr>
<tr><td colspan="2">TC</td><td colspan="3">SN</td></tr>
<tr><td colspan="3">CH</td><td colspan="2">AM</td></tr>
<tr><td colspan="5">AG</td></tr>
</table>

Figure 5-9. CLEAR CONFIRMATION by ADLP packet

1 2 3 4 5 6 7 8

<table>
<tr><td>DP=0</td><td>MP=1</td><td>SP=1</td><td>ST=3</td><td>FILL</td></tr>
<tr><td colspan="2">TC</td><td colspan="3">SN</td></tr>
<tr><td colspan="3">CH</td><td colspan="2">AM</td></tr>
<tr><td colspan="5">AG</td></tr>
</table>

Figure 5-10. CLEAR CONFIRMATION by GDLP packet

1 2 3 4 5 6 7 8

<table>
<tr><td>DP=1</td><td>M</td><td colspan="3">SN</td></tr>
<tr><td colspan="4">FILL1</td><td></td></tr>
<tr><td colspan="3">PS</td><td colspan="2">PR</td></tr>
<tr><td colspan="3">CH</td><td colspan="2">LV</td></tr>
<tr><td colspan="5">UD</td></tr>
</table>

Figure 5-11. DATA packet

1 2 3 4 5 6 7 8

<table>
<tr><td>DP=0</td><td>MP=1</td><td>SP=3</td><td>ST=1</td><td>FILL2</td></tr>
<tr><td>S</td><td>F</td><td colspan="3">SN</td></tr>
<tr><td colspan="3">CH</td><td colspan="2">LV</td></tr>
<tr><td colspan="5">UD</td></tr>
</table>

Figure 5-12. INTERRUPT packet

1 2 3 4 5 6 7 8

<table>
<tr><td>DP=0</td><td>MP=1</td><td>SP=3</td><td>ST=3</td><td>SS=0</td></tr>
<tr><td colspan="2">FILL2</td><td colspan="3">SN</td></tr>
<tr><td colspan="3">CH</td><td colspan="2">FILL</td></tr>
</table>

Figure 5-13. INTERRUPT CONFIRMATION packet

1 2 3 4 5 6 7 8

<table>
<tr><td>DP=0</td><td>MP=1</td><td>SP=3</td><td>ST=3</td><td>SS=1</td></tr>
<tr><td colspan="2">FILL2</td><td colspan="3">SN</td></tr>
<tr><td colspan="3">CH</td><td colspan="2">PR</td></tr>
</table>

Figure 5-14. REJECT packet

1 2 3 4 5 6 7 8

DP=0	MP=1	SP=2	ST=0	FILL2
FILL		SN		
CH			PR	

Figure 5-15. RECEIVE READY packet

1 2 3 4 5 6 7 8

DP=0	MP=1	SP=2	ST=1	FILL2
FILL		SN		
CH			PR	

Figure 5-16. RECEIVE NOT READY packet

1 2 3 4 5 6 7 8

DP=0	MP=1	SP=2	ST=2	FILL2
FILL		SN		
CH			FILL	
RC				
DC				

Figure 5-17. RESET REQUEST packet

1 2 3 4 5 6 7 8

DP=0	MP=1	SP=2	ST=3	FILL2
FILL		SN		
CH			FILL	

Figure 5-18. RESET CONFIRMATION packet

1	2	3	4 5	6 7	8
DP=0	MP=1	SP=3	ST=0	OF	IN
RTL					
RT					
ODL					
OD					

Figure 5-19. ROUTE packet

1	2	3	4 5	6 7 8
DP=0	MP=1	SP=3	ST=2	FILL2
LENGTH				
FIRST PACKET				
LENGTH				
LAST PACKET				
LENGTH = 0				

Figure 5-20. MULTIPLEX packet

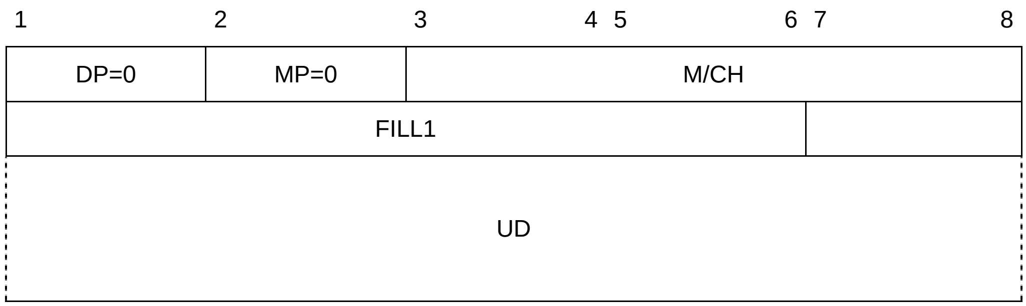


Figure 5-21. SHORT FORM MSP packet

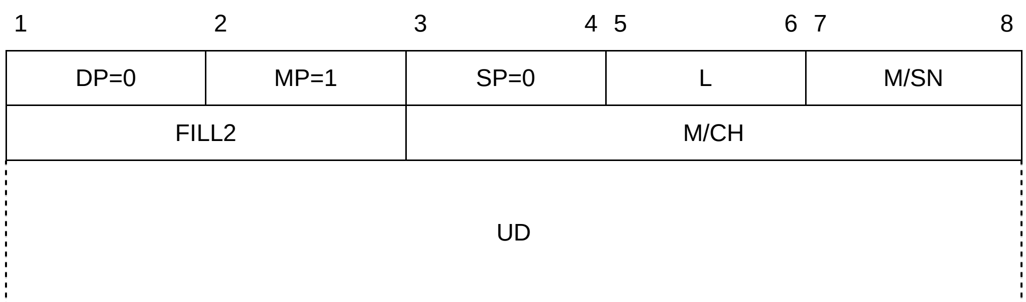
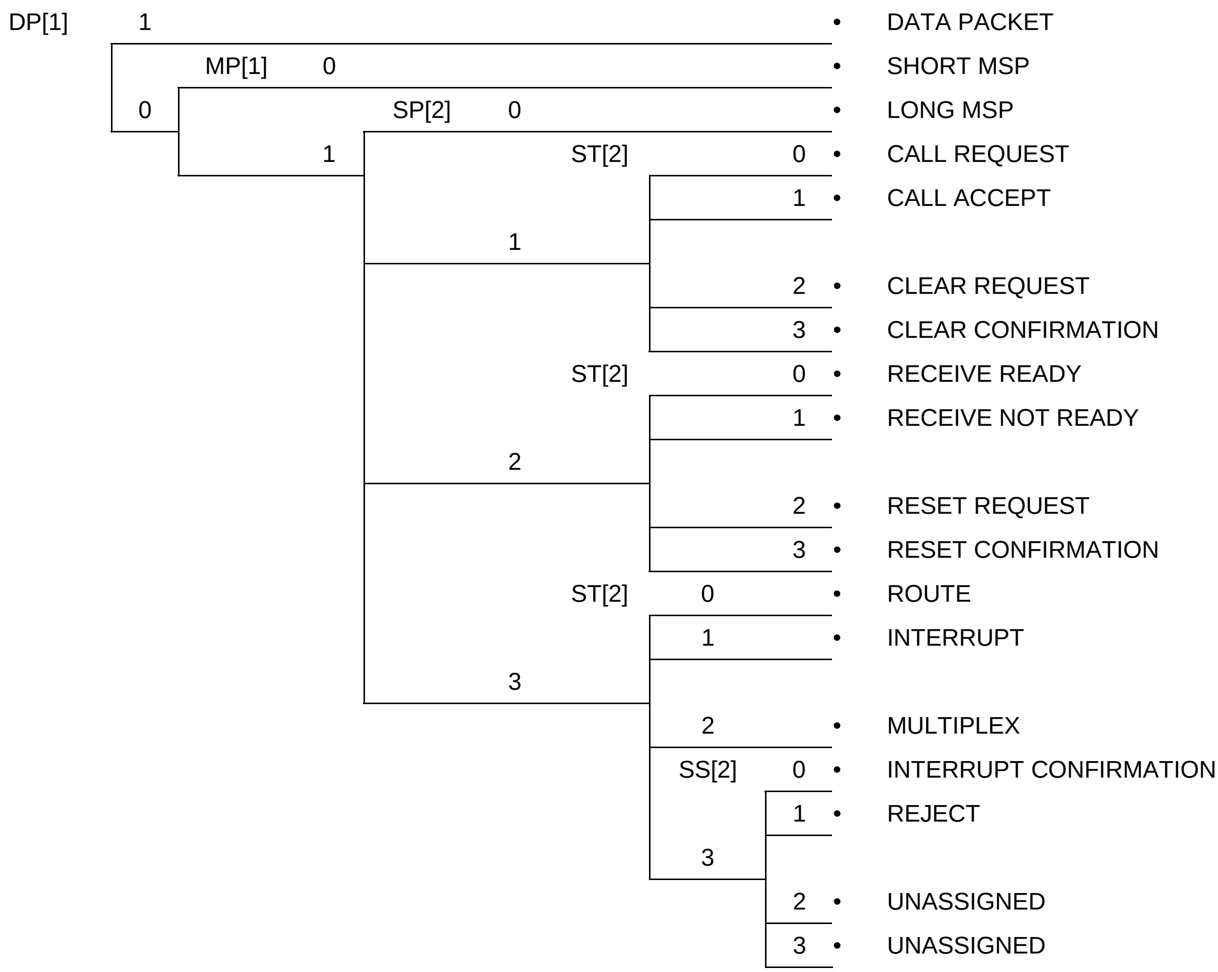


Figure 5-22. LONG FORM MSP packet



LEGEND:

DP = DATA packet type

MP = MSP packet type

SP = SUPERVISORY packet

ST = SUPERVISORY type

SS = SUPERVISORY subset

Figure 5-23. Control fields used in MODE S packets

CHAPTER 6. VHF AIR-GROUND DIGITAL LINK (VDL)

6.1 DEFINITIONS AND SYSTEM CAPABILITIES

Note 1.— The very high frequency (VHF) digital link (VDL) Mode 2 and the VDL Mode 4 provide data service capabilities. The VDL Mode 3 provides both voice and data service capabilities. The data capability is a constituent mobile subnetwork of the aeronautical telecommunication network (ATN). In addition, the VDL may provide non-ATN functions. Standards and Recommended Practices (SARPs) for the VDL are defined and referenced below.

Note 2.— Additional information on VDL is contained in the Manuals on VHF VDL Mode 2, VDL Mode 3 and VDL Mode 4 Technical Specifications (Docs 9776, 9805 and 9816).

Note 3.— Sections 6.1.2 to 6.8.2 contain Standards and Recommended Practices for VDL Modes 2 and 3. Section 6.9 contains Standards and Recommended Practices for VDL Mode 4.

6.1.1 Definitions

Automatic dependent surveillance-broadcast (ADS-B). A means by which aircraft, aerodrome vehicles and other objects can automatically transmit and/or receive data such as identification, position and additional data, as appropriate, in a broadcast mode via a data link.

Broadcast. A transmission of information relating to air navigation that is not addressed to a specific station or stations.

Burst. A time-defined, contiguous set of one or more related signal units which may convey user information and protocols, signalling, and any necessary preamble.

Current slot. The slot in which a received transmission begins.

Data circuit-terminating equipment (DCE). A DCE is a network provider equipment used to facilitate communications between DTEs.

Data link entity (DLE). A protocol state machine capable of setting up and managing a single data link connection.

Data link service (DLS) sublayer. The sublayer that resides above the MAC sublayer. For VDL Mode 4, the DLS sublayer resides above the VSS sublayer. The DLS manages the transmit queue, creates and destroys DLEs for connection-oriented communications, provides facilities for the LME to manage the DLS, and provides facilities for connectionless communications.

Data terminal equipment (DTE). A DTE is an endpoint of a subnetwork connection.

Extended Golay Code. An error correction code capable of correcting multiple bit errors.

Frame. The link layer frame is composed of a sequence of address, control, FCS and information fields. For VDL Mode 2, these fields are bracketed by opening and closing flag sequences, and a frame may or may not include a variable-length information field.

Gaussian filtered frequency shift keying (GFSK). A continuous-phase, frequency shift keying technique using two tones and a Gaussian pulse shape filter.

Global signalling channel (GSC). A channel available on a worldwide basis which provides for communication control.

Link. A link connects an aircraft DLE and a ground DLE and is uniquely specified by the combination of aircraft DLS address and the ground DLS address. A different subnetwork entity resides above every link endpoint.

Link layer. The layer that lies immediately above the physical layer in the Open Systems Interconnection protocol model. The link layer provides for the reliable transfer of information across the physical media. It is subdivided into the data link sublayer and the media access control sublayer.

Link management entity (LME). A protocol state machine capable of acquiring, establishing and maintaining a connection to a single peer system. An LME establishes data link and subnetwork connections, "hands-off" those connections, and manages the media access control sublayer and physical layer. An aircraft LME tracks how well it can communicate with the ground stations of a single ground system. An aircraft VME instantiates an LME for each ground station that it monitors. Similarly, the ground VME instantiates an LME for each aircraft that it monitors. An LME is deleted when communication with the peer system is no longer viable.

M burst. A management channel data block of bits used in VDL Mode 3. This burst contains signalling information needed for media access and link status monitoring.

Media access control (MAC). The sublayer that acquires the data path and controls the movement of bits over the data path.

Mode 2. A data-only VDL mode that uses D8PSK modulation and a carrier sense multiple access (CSMA) control scheme.

Mode 3. A voice and data VDL mode that uses D8PSK modulation and a TDMA media access control scheme.

Mode 4. A data-only VDL mode using a GFSK modulation scheme and self-organizing time division multiple access (STDMA).

Physical layer. The lowest level layer in the Open Systems Interconnection protocol model. The physical layer is concerned with the transmission of binary information over the physical medium (e.g. VHF radio).

Quality of service. The information relating to data transfer characteristics used by various communication protocols to achieve various levels of performance for network users.

Reed-Solomon code. An error correction code capable of correcting symbol errors. Since symbol errors are collections of bits, these codes provide good burst error correction capabilities.

Self-organizing time division multiple access (STDMA). A multiple access scheme based on time-shared use of a radio frequency (RF) channel employing: (1) discrete contiguous time slots as the fundamental shared resource; and (2) a set of operating protocols that allows users to mediate access to these time slots without reliance on a master control station.

Slot. One of a series of consecutive time intervals of equal duration. Each burst transmission starts at the beginning of a slot.

Subnetwork connection. A long-term association between an aircraft DTE and a ground DTE using successive virtual calls to maintain context across link handoff.

Subnetwork dependent convergence function (SNDCF). A function that matches the characteristics and services of a particular subnetwork to those characteristics and services required by the internetwork facility.

Subnetwork entity. In this document, the phrase "ground DCE" will be used for the subnetwork entity in a ground station communicating with an aircraft; the phrase "ground DTE" will be used for the subnetwork entity in a ground router communicating with an aircraft station; and, the phrase “aircraft DTE” will be used for the subnetwork entity in an aircraft communicating with the station. A subnetwork entity is a packet layer entity as defined in ISO 8208.

Subnetwork layer. The layer that establishes, manages and terminates connections across a subnetwork.

System. A VDL-capable entity. A system comprises one or more stations and the associated VDL management entity. A system may either be an aircraft system or a ground system.

Time division multiple access (TDMA). A multiple access scheme based on time-shared use of an RF channel employing: (1) discrete contiguous time slots as the fundamental shared resource; and (2) a set of operating protocols that allows users to interact with a master control station to mediate access to the channel.

User group. A group of ground and/or aircraft stations which share voice and/or data connectivity. For voice communications, all members of a user group can access all communications. For data, communications include point-to-point connectivity for air-to-ground messages, and point-to-point and broadcast connectivity for ground-to-air messages.

VDL management entity (VME). A VDL-specific entity that provides the quality of service requested by the ATN-defined SN_SME. A VME uses the LMEs (that it creates and destroys) to enquire the quality of service available from peer systems.

VDL Mode 4 burst. A VHF digital link (VDL) Mode 4 burst is composed of a sequence of source address, burst ID, information, slot reservation and frame check sequence (FCS) fields, bracketed by opening and closing flag sequences.

Note.— The start of a burst may occur only at quantized time intervals and this constraint allows the propagation delay between the transmission and reception to be derived.

VDL Mode 4 DLS system. A VDL system that implements the VDL Mode 4 DLS and subnetwork protocols to carry ATN packets or other packets.

VDL Mode 4 specific services (VSS) sublayer. The sublayer that resides above the MAC sublayer and provides VDL Mode 4 specific access protocols including reserved, random and fixed protocols.

VDL station. An aircraft-based or ground-based physical entity, capable of VDL Mode 2, 3 or 4.

Note.— In the context of this chapter, a VDL station is also referred to as a “station”.

Vocoder. A low bit rate voice encoder/decoder.

Voice unit. A device that provides a simplex audio and signalling interface between the user and VDL.

VSS user. A user of the VDL Mode 4 specific services. The VSS user could be higher layers in the VDL Mode 4 SARPs or an external application using VDL Mode 4.

6.1.2 Radio channels and functional channels

6.1.2.1 *Aircraft station radio frequency range.* An aircraft station shall be capable of tuning to any of the channels in the range specified in Section 6.1.4.1 within 100 milliseconds after the receipt of an autotune command. In addition, for VDL Mode 3, an aircraft station shall be able to tune to any channel in the range specified in Section 6.1.4.1 within 100 milliseconds after the receipt of any tuning command.

6.1.2.2 *Ground station radio frequency range.* A ground station shall be capable of operating on its assigned channel within the radio frequency range detailed in 6.1.4.1.

6.1.2.3 *Common signalling channel*. Frequency 136.975MHz shall be reserved as a worldwide common signalling channel (CSC) for VDL Mode 2.

6.1.3 System capabilities

6.1.3.1 *Data transparency*. The VDL system shall provide code-independent, byte-independent transfer of data.

6.1.3.2 *Broadcast*. The VDL system shall provide link layer data broadcast services (Mode 2) and/or voice and data broadcast services (Mode 3). For VDL Mode 3, the data broadcast service shall support network multicasting capability originating from the ground.

6.1.3.3 *Connection management*. The VDL system shall establish and maintain a reliable communications path between the aircraft and the ground system while allowing but not requiring manual intervention.

Note.— In this context "reliable" is defined by the BER requirement specified in 6.3.5.1.

6.1.3.4 *Ground network transition*. A VDL-equipped aircraft shall transition from one ground station to another when circumstances dictate.

6.1.3.5 *Voice capability*. The VDL Mode 3 system shall support a transparent, simplex voice operation based on a "Listen-Before-Push-To-Talk" channel access.

6.1.4 Air-ground VHF digital link communications system characteristics

6.1.4.1 The radio frequencies used shall be selected from the radio frequencies in the band 117.975–137 MHz. The lowest assignable frequency shall be 118.000 MHz, and the highest assignable frequency shall be 136.975 MHz. The separation between assignable frequencies (channel spacing) shall be 25 kHz.

Note.— Volume V specifies that the block of frequencies from 136.9 – 136.975 MHz inclusive is reserved for VHF air-ground digital communications.

6.1.4.2 The design polarization of emissions shall be vertical.

6.2 SYSTEM CHARACTERISTICS OF THE GROUND INSTALLATION

6.2.1 Ground station transmitting function

6.2.1.1 *Frequency stability*. The radio frequency of VDL ground station equipment operation shall not vary more than plus or minus 0.0002 per cent (2 parts per million) from the assigned frequency.

Note.— The frequency stability for VDL ground stations using DSB-AM modulation is specified in Part II, Chapter 2 for 25 kHz channel spacing.

6.2.2 Power

Recommendation.— *The effective radiated power should be such as to provide a field strength of at least 75 microvolts per metre (minus 109 dBW/m^2) within the defined operational coverage of the facility, on the basis of free-space propagation.*

6.2.3 Spurious emissions

6.2.3.1 Spurious emissions shall be kept at the lowest value which the state of the technique and the nature of the service permit.

Note.— Appendix S3 to the Radio Regulations specifies the levels of spurious emissions to which transmitters must conform.

6.2.4 Adjacent channel emissions

6.2.4.1 The amount of power from a VDL ground transmitter under all operating conditions when measured over the 25 kHz channel bandwidth of the first adjacent channel shall not exceed 0 dBm.

6.2.4.1.1 After 1 January 2002, the amount of power from all new installations of a VDL ground transmitter under all operating conditions when measured over the 25 kHz channel bandwidth of the first adjacent channel shall not exceed 2 dBm.

6.2.4.2 The amount of power from a VDL ground transmitter under all operating conditions when measured over the 25 kHz channel bandwidth of the second adjacent channel shall be less than minus 25 dBm and from thereon it shall monotonically decrease at the minimum rate of 5 dB per octave to a maximum value of minus 52 dBm.

6.2.4.2.1 After 1 January 2002, the amount of power from all new installations of a VDL ground transmitter under all operating conditions when measured over the 25 kHz channel bandwidth of the second adjacent channel shall be less than minus 28 dBm.

6.2.4.2.2 After 1 January 2002, the amount of power from all new installations of a VDL ground transmitter under all operating conditions when measured over the 25 kHz channel bandwidth of the fourth adjacent channel shall be less than minus 38 dBm, and from thereon it shall monotonically decrease at the minimum rate of 5 dB per octave to a maximum value of minus 53 dBm.

6.2.4.3 The amount of power from a VDL ground transmitter under all operating conditions when measured over a 16 kHz channel bandwidth centred on the first adjacent channel shall not exceed minus 20 dBm.

6.2.4.3.1 After 1 January 2002, the amount of power from all new installations of a VDL ground transmitter under all operating conditions when measured over a 16 kHz channel bandwidth centred on the first adjacent channel shall not exceed minus 18 dBm.

6.2.4.4 After 1 January 2005, all VDL ground transmitters shall meet the provisions of 6.2.4.1.1, 6.2.4.2.1, 6.2.4.2.2 and 6.2.4.3.1, subject to the conditions of 6.2.4.5.

6.2.4.5 Requirements of mandatory compliance of the provisions of 6.2.4.4 shall be made on the basis of regional air navigation agreements which specify the airspace of operation and the implementation timescales. The agreements shall provide at least two years' notice of mandatory compliance of ground systems.

6.3 SYSTEM CHARACTERISTICS OF THE AIRCRAFT INSTALLATION

6.3.1 *Frequency stability*. The radio frequency of VDL aircraft equipment shall not vary more than plus or minus 0.0005 per cent (5 parts per million) from the assigned frequency.

6.3.2 *Power*. The effective radiated power shall be such as to provide a field strength of at least 20 microvolts per metre (minus 120 dBW/m^2) on the basis of free-space propagation, at ranges and altitudes appropriate to the operational conditions pertaining to the areas over which the aircraft is operated.

6.3.3 Spurious emissions

6.3.3.1 Spurious emissions shall be kept at the lowest value which the state of the technique and the nature of the service permit.

Note.— Appendix S3 to the Radio Regulations specifies the levels of spurious emissions to which transmitters must conform.

6.3.4 Adjacent channel emissions

6.3.4.1 The amount of power from a VDL aircraft transmitter under all operating conditions when measured over the 25 kHz channel bandwidth of the first adjacent channel shall not exceed 0 dBm.

6.3.4.1.1 After 1 January 2002, the amount of power from all new installations of a VDL aircraft transmitter under all operating conditions when measured over the 25 kHz channel bandwidth of the first adjacent channel shall not exceed 2 dBm.

6.3.4.2 The amount of power from a VDL aircraft transmitter under all operating conditions when measured over the 25 kHz channel bandwidth of the second adjacent channel shall be less than minus 25 dBm and from thereon it shall monotonically decrease at the minimum rate of 5 dB per octave to a maximum value of minus 52 dBm.

6.3.4.2.1 After 1 January 2002, the amount of power from all new installations of a VDL aircraft transmitter under all operating conditions when measured over the 25 kHz channel bandwidth of the second adjacent channel shall be less than minus 28 dBm.

6.3.4.2.2 After 1 January 2002, the amount of power from all new installations of a VDL aircraft transmitter under all operating conditions when measured over the 25 kHz channel bandwidth of the fourth adjacent channel shall be less than minus 38 dBm, and from thereon it shall monotonically decrease at the minimum rate of 5 dB per octave to a maximum value of minus 53 dBm.

6.3.4.3 The amount of power from a VDL aircraft transmitter under all operating conditions when measured over a 16 kHz channel bandwidth centred on the first adjacent channel shall not exceed minus 20 dBm.

6.3.4.3.1 After 1 January 2002, the amount of power from all new installations of a VDL aircraft transmitter under all operating conditions when measured over a 16 kHz channel bandwidth centred on the first adjacent channel shall not exceed minus 18 dBm.

6.3.4.4 After 1 January 2005, all VDL aircraft transmitters shall meet the provisions of 6.3.4.1.1, 6.3.4.2.1, 6.3.4.2.2 and 6.3.4.3.1, subject to the conditions of 6.3.4.5.

6.3.4.5 Requirements of mandatory compliance of the provisions of 6.3.4.4 shall be made on the basis of regional air navigation agreements which specify the airspace of operation and the implementation timescales. The agreements shall provide at least two years' notice of mandatory compliance of aircraft systems.

6.3.5 Receiving function

6.3.5.1 *Specified error rate*. The specified error rate for Mode 2 operation shall be the maximum corrected Bit Error Rate (BER) of 1 in 10^4. The specified error rate for Mode 3 operation shall be the maximum uncorrected BER of 1 in 10^3. The specified error rate for Mode 4 operation shall be the maximum uncorrected BER of 1 in 10^4.

Note.— The above physical layer BER requirements are derived from the BER requirement imposed by ATN at the subnetwork interface.

6.3.5.2 *Sensitivity*. The receiving function shall satisfy the specified error rate with a desired signal strength of not more than 20 microvolts per metre (minus 120 dBW/m^2).

Note.— The required signal strength at the edge of the service volume takes into account the requirements of the system and signal losses within the system, and considers environmental noise sources.

6.3.5.3 *Out-of-band immunity performance*. The receiving function shall satisfy the specified error rate with a desired signal field strength of not more than 40 microvolts per metre (minus 114 dBW/m^2) and with an undesired DSB-AM D8PSK or GFSK signal on the adjacent or any other assignable channel being at least 40 dB higher than the desired signal.

6.3.5.3.1 After 1 January 2002, the receiving function of all new installations of VDL shall satisfy the specified error rate with a desired signal field strength of not more than 40 microvolts per metre (minus 114 dBW/m^2) and with an undesired VHF DSB-AM, D8PSK or GFSK signal at least 60 dB higher than the desired signal on any assignable channel 100 kHz or more away from the assigned channel of the desired signal.

Note.— This level of interference immunity performance provides a receiver performance consistent with the influence of the VDL RF spectrum mask as specified in 6.3.4 with an effective isolation transmitter/receiver isolation of 69 dB. Better transmitter and receiver performance could result in less isolation required. Guidance material on the measurement technique is included in Annex 10, Volume V, Attachment A, section 7.

6.3.5.3.2 After 1 January 2005, the receiving function of all installations of VDL shall meet the provisions of 6.3.5.3.1, subject to the conditions of 6.3.5.3.3.

6.3.5.3.3 Requirements of mandatory compliance of the provisions of 6.3.5.3.2 shall be made on the basis of regional air navigation agreements which specify the airspace of operation and the implementation timescales. The agreement shall provide for at least two years' notice of mandatory compliance of aircraft systems.

6.3.5.4 INTERFERENCE IMMUNITY PERFORMANCE

6.3.5.4.1 The receiving function shall satisfy the specified error rate with a desired field strength of not more than 40 microvolts per metre, and with one or more out-of-band signals, except for VHF FM broadcast signals, having a total level at the receiver input of minus 33 dBm.

Note.— In areas where adjacent higher band signal interference exceeds this specification, a higher immunity requirement will apply.

6.3.5.4.2 The receiving function shall satisfy the specified error rate with a desired field strength of not more than 40 microvolts per metre, and with one or more VHF FM broadcast signals having a total level at the receiver input of minus 5 dBm.

6.4 PHYSICAL LAYER PROTOCOLS AND SERVICES

The aircraft and ground stations shall access the physical medium operating in simplex mode.

6.4.1 Functions

6.4.1.1 The physical layer shall provide the following functions:

a) transmitter and receiver frequency control;

b) digital reception by the receiver;

c) digital transmission by the transmitter; and

d) notification services.

6.4.1.1.1 *Transmitter/receiver frequency control*. The VDL physical layer shall set the transmitter or receiver frequency as commanded by the link management entity (LME).

Note.— The LME is a link layer entity as contained in the Manuals on VDL Mode 2 and VDL Mode 3 Technical Specifications.

6.4.1.1.2 *Digital reception by the receiver*. The receiver shall decode input signals and forward them to the higher layers for processing.

6.4.1.1.3 *Digital transmission*. The VDL physical layer shall appropriately encode and transmit information received from higher layers over the RF channel.

6.4.2 Modes 2 and 3 common physical layer

6.4.2.1 *Modulation scheme.* Modes 2 and 3 shall use differentially encoded 8 phase shift keying (D8PSK), using a raised cosine filter with $\alpha = 0.6$ (nominal value). The information to be transmitted shall be differentially encoded with 3 bits per symbol (baud) transmitted as changes in phase rather than absolute phase. The data stream to be transmitted shall be divided into groups of 3 consecutive data bits, least significant bit first. Zeros shall be padded to the end of the transmissions if needed for the final channel symbol.

6.4.2.1.1 *Data encoding.* A binary data stream entering a differential data encoder shall be converted into three separate binary streams X, Y, and Z so that bits 3n form X, bits 3n + 1 form Y, and bits 3n + 2 form Z. The triplet at time k (X_k, Y_k, Z_k) shall be converted to a change in phase as shown in Table 6-1*, and the absolute phase ϕ_k is the accumulated series of $\Delta\phi_k$, that is:

$$\phi_k = \phi_{k-1} + \Delta\phi_k$$

6.4.2.1.2 *Transmitted signal form.* The phase-modulated baseband signal as defined in 6.4.2.1.1 shall excite the pulse shape filter.

$$s(t) = \sum_{k=-\infty}^{+\infty} h(\phi_k, t - kT_s)$$

where:

h is the complex impulse response of the pulse shape filter;
k is defined in 6.4.2.1.1;
ϕ is defined by the equation in 6.4.2.1.1;
t is time;
T_s is time duration of each symbol.

The output (function of time) of the pulse shape filter (s(t)) shall modulate the carrier frequency. The pulse shape filter shall have a nominal complex frequency response of a raised-cosine filter with α =0.6.

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* All tables are located at the end of this chapter.

6.4.2.2 *Modulation rate*. The symbol rate shall be 10 500 symbols/second, resulting in a nominal bit rate of 31 500 bits/s. The modulation stability requirements for Modes 2 and 3 are provided in Table 6-2.

6.4.3 Mode 2 specific physical layer

Note.— The Mode 2 specific physical layer specification includes a description of the Mode 2 training sequence, forward error correction (FEC), interleaving, bit scrambling, channel sensing, and physical layer system parameters.

6.4.3.1 To transmit a sequence of frames, a station shall insert the bit numbers and flags (per the data link service description for Mode 2 as contained in the Manual on VDL Mode 2 Technical Specifications), compute the FEC (per 6.4.3.1.2), interleave (per 6.4.3.1.3), prepend the training sequence (per 6.4.3.1.1), carry out bit scrambling (per 6.4.3.1.4) and finally encode and modulate the RF signal (per 6.4.2.1).

6.4.3.1.1 *Training sequence*. Data transmission shall begin with a demodulator training sequence consisting of five segments:

a) transmitter ramp-up and power stabilization;

b) synchronization and ambiguity resolution;

c) reserved symbol;

d) transmission length; and

e) header FEC.

Note.— Immediately after these segments follows an AVLC frame with the format as contained in the data link service description in the Manual on VDL Mode 2 Technical Specifications.

6.4.3.1.1.1 *Transmitter ramp-up and power stabilization*. The purpose of the first segment of the training sequence, called the ramp-up, is to provide for transmitter power stabilization and receiver AGC settling, and it shall immediately precede the first symbol of the unique word. The duration of the ramp-up shall be five symbol periods. The time reference point (t), for the following specification is the centre of the first unique word symbol, a point that occurs half a symbol period after the end of the ramp-up. Conversely stated, the beginning of the ramp-up starts at t = –5.5 symbol periods. The transmitted power shall be less than –40 dBc prior to time t = –5.5 symbol periods. The ramp-up shall provide that at time t = –3.0 symbol periods the transmitted power is 90 per cent of the manufacturer's stated output power or greater (see Figure 6-1*). Regardless of the method used to implement (or truncate) the raised cosine filter, the output of the transmitter between times t = –3.0 and t = –0.5 will appear as if '000' symbols were transmitted during the ramp-up period.

Note. 1.— For Mode 3, the timing reference point is the same as the "power reference point".

Note 2.— It is desirable to maximize the time allowed for the AGC settling time. Efforts should be made to have power above 90 per cent of nominal output power at t – 3.5 symbol periods.

6.4.3.1.1.2 *Synchronization and ambiguity resolution*. The second segment of the training sequence shall consist of the unique word:

000 010 011 110 000 001 101 110 001 100 011 111 101 111 100 010

and shall be transmitted from left to right.

* All figures are located at the end of this chapter.

6.4.3.1.1.3 *Reserved symbol*. The third segment of the training sequence shall consist of the single symbol representing 000.

Note.— This field is reserved for future definition.

6.4.3.1.1.4 *Transmission length*. To allow the receiver to determine the length of the final Reed-Solomon block, the transmitter shall send a 17-bit word, from least significant bit (lsb) to most significant bit (msb), indicating the total number of data bits that follow the header FEC.

Note.— The length does not include those bits transmitted for: the Reed Solomon FEC, extra bits padded to ensure that the interleaver generates an integral number of 8-bit words, or the extra bits padded to ensure that the data encoder generates an integral number of 3-bit symbols.

6.4.3.1.1.5 *Header FEC*. To correct bit errors in the header, a (25, 20) block code shall be computed over the reserved symbol and the transmission length segments. The block code shall be transmitted as the fifth segment. The encoder shall accept the header in the bit sequence that is being transmitted. The five parity bits to be transmitted shall be generated using the following equation:

$$[P_1 , \ldots , P_5] = [R_1 , \ldots , R_3 , TL_1 , \ldots , TL_{17}]\, H^T$$

where:

P is the parity symbol (P_1 shall be transmitted first);

R is the reserved symbol;

TL is the transmission Length symbol;

^{T} is the matrix transpose function; and

H is the parity matrix defined below:

$$H = \begin{bmatrix} 0&0&0&0&0&0&0&0&1&1&1&1&1&1&1&1&1&1&1&1 \\ 0&0&1&1&1&1&1&1&0&0&0&0&1&1&1&1&1&1&1&1 \\ 1&1&0&0&0&1&1&1&0&0&1&1&0&0&0&0&1&1&1&1 \\ 1&1&0&1&1&0&1&1&0&1&0&1&0&0&1&1&0&0&1&1 \\ 0&1&1&0&1&0&0&1&1&1&1&0&0&1&0&1&0&1&0&1 \end{bmatrix}$$

6.4.3.1.1.6 *Bit transmission order*. The five parity bits of the resultant vector product shall be transmitted from the left bit first.

6.4.3.1.2 *Forward error correction*. In order to improve the effective channel throughput by reducing the number of required retransmissions, FEC shall be applied after the training sequence, regardless of frame boundaries.

6.4.3.1.2.1 *FEC calculation*. The FEC coding shall be accomplished by means of a systematic fixed-length Reed-Solomon (RS)(255,249) 2^8-ary code.

Note 1.— This code is capable of correcting up to three octets for data blocks of 249 octets (1992 bits). Longer transmissions must be divided up into 1992 bit transmissions and shorter transmissions must be extended by virtual fill with trailing zeros. Six RS-check octets are appended for a total block of 255 octets.

The field defining the primitive polynomial of the code shall be as follows:

$$p(x) = (x^8 + x^7 + x^2 + x + 1)$$

The generator polynomial shall be as follows:

$$\prod_{i=120}^{125} (x - \alpha^i)$$

where:

α is a primitive element of GF(256);
GF(256) is a Galois field (GF) of size 256.

Note 2.— The Reed-Solomon codes are described in the Recommendation for Space Data System Standards Telemetry Channel Coding, by the Consultative Committee for Space Data Systems (see the Appendix to this chapter).

6.4.3.1.2.2 *Block lengths*. The six RS-check octets shall be calculated on blocks of 249 octets. Longer transmissions shall be split into blocks of 249 octets, per 6.4.3.1.3. Blocks of shorter length shall be extended to 249 octets by a virtual fill of trailing zeros. The virtual fill shall not be transmitted. Blocks shall be coded according to 6.4.3.1.2.3 through 6.4.3.1.2.3.3.

6.4.3.1.2.3 *No error correction*. For blocks with 2 or fewer non-fill octets, no error correction shall be used.

6.4.3.1.2.3.1 *Single-byte error correction*. For blocks with 3 to 30 non-fill octets, all six RS-check octets shall be generated, but only the first two shall be transmitted. The last four RS-check octets shall be treated as erasures at the decoder.

6.4.3.1.2.3.2 *Two-byte error correction*. For blocks with 31 to 67 non-fill octets, all six RS-check octets shall be generated, but only the first four shall be transmitted. The last two RS-check octets shall be treated as erasures at the decoder.

6.4.3.1.2.3.3 *Three-byte error correction*. For blocks with 68 or more non-fill octets, all six RS-check octets shall be generated and transmitted.

6.4.3.1.3 *Interleaving*. To improve the performance of the FEC, an octet-based table-driven interleaver shall be used. The interleaver shall create a table having 255 octets per row and c rows, where

$$c = \frac{\textit{transmission length (bits)}}{1992 \textit{ (bits)}}$$

where:

a) the transmission length is as defined in 6.4.3.1.1.5; and

b) c = the smallest integer greater than or equal to the value of the fraction.

After extending the data to an even multiple of 1992 bits, the interleaver shall write the transmission stream into the first 249 octets of each row by taking each consecutive group of eight bits and storing them from the first column to the 249th. The first bit in each group of eight bits shall be stored in the eighth bit position; the first group of 1992 bits shall be stored in the first row, the second group of 1992 bits in the second row, etc. After the FEC is computed on each row, the FEC data (or erasures) shall be stored in columns 250 through 255. The interleaver shall then pass the data to the scrambler by reading out column by column, skipping any octet which contains erasures or all fill bits. All of the bits in an octet shall be transmitted from bit 8 to bit 1.

On reception, the de-interleaver shall calculate the number of rows and size of the last (potentially partial) row from the length field in the header. It shall only pass valid data bytes to the higher layer.

6.4.3.1.4 *Bit scrambling*. To aid clock recovery and to stabilize the shape of the transmitted spectrum, bit scrambling shall be applied. The pseudo noise (PN) sequence shall be a 15-stage generator (see Figure 6-2) with the characteristic polynomial:

$$X^{15} + X + 1$$

The PN-sequence shall start after the frame synchronization pattern with the initial value 1101 0010 1011 001 with the left-most bit in the first stage of the register as per Figure 6-2. After processing each bit, the register shall be shifted one bit to the right. For possible encryption in the future this initial value shall be programmed. The sequence shall be added (modulo 2) to the data at the transmit side (scrambling) and to the scrambled data at the receive side (descrambling) per Table 6-3.

Note.— The concept of a PN scrambler is explained in ITU-R Recommendation S.446-4, Annex I, Section 4.3.1, Method 1 (see the Appendix to this chapter).

6.4.3.2 MODE 2 CHANNEL SENSING

6.4.3.2.1 *Channel busy to idle detection*. When a station receives on-channel power of at least –87 dBm for at least 5 milliseconds, then:

a) with a likelihood of 0.9, it shall continue to consider the channel occupied if the signal level is attenuated to below -92 dBm for less than 1 millisecond; and

b) with a likelihood of 0.9, it shall consider the channel unoccupied if the signal level is attenuated to below –92 dBm for at least 1.5 milliseconds.

Note.— The maximum link throughput available to all users is highly sensitive to the RF channel sense delay (from the time when the channel actually changes state until a station detects and acts on that change) and RF channel seizure delay (from the time when a station decides to transmit until the transmitter is sufficiently ramped up to lock out other stations). Accordingly, it is imperative that all efforts are made to reduce those times as the state-of-the-art advances.

6.4.3.2.2 *Channel idle to busy detection*. With a likelihood of at least 0.9, a station shall consider the channel occupied within 1 millisecond after on-channel power rises to at least –90 dBm.

6.4.3.2.3 **Recommendation.—** *The detection of an occupied channel should occur within 0.5 milliseconds*.

Note.— A higher probability of false alarm is acceptable on the idle to busy detection than the busy to idle detection because of the effects of the two different errors.

6.4.3.3 MODE 2 RECEIVER/TRANSMITTER INTERACTION

6.4.3.3.1 *Receiver to transmitter turnaround time*. A station shall transmit the training sequence such that the centre of the first symbol of the unique word will be transmitted within 1.25 milliseconds after the result of an access attempt is successful (see Figure 6-3). The total frequency change during the transmission of the unique word shall be less than 10 Hz. After transmission of the unique word, the phase acceleration shall be less than 500 Hz per second.

6.4.3.3.2 *Transmitter to receiver turnaround time*. The transmitter power shall be –20 dBc within 2.5 symbol periods of the middle of the final symbol of the burst. The transmitter power leakage when the transmitter is in the “off” state shall be less than –83 dBm. A station shall be capable of receiving and demodulating with nominal performance, an incoming signal within 1.5 milliseconds after transmission of the final information symbol.

Note.— Reference DO-160D section 21, category H for antenna radiated signals.

6.4.3.4 MODE 2 PHYSICAL LAYER SYSTEM PARAMETERS

6.4.3.4.1 The physical layer shall implement the system parameters as defined in Table 6-4.

6.4.3.4.1.1 *Parameter P1 (minimum transmission length)*. Parameter P1 defines the minimum transmission length that a receiver shall be capable of demodulating without degradation of BER.

6.4.4 Mode 3 specific physical layer

Note.— The Mode 3 specific physical layer specification includes a description of Mode 3 management (M) burst and handoff check message (H) burst uplink, M burst downlink, voice/data (V/D) burst, and bit scrambling.

6.4.4.1 *Management (M) burst and handoff check message (H) burst uplink*. The M uplink burst (as contained in the Manual on VDL Mode 3 Technical Specifications) shall consist of three segments, the training sequence followed by the system data and the transmitter ramp down. The H uplink burst (as contained in the Manual on VDL Mode 3 Technical Specifications) shall consist of three segments, the training sequence followed by the handoff check message and the transmitter ramp down.

6.4.4.1.1 *Training sequence*. Uplink M burst and H burst training sequences shall consist of two components as follows:

a) transmitter ramp up and power stabilization; and

b) synchronization and ambiguity resolution.

6.4.4.1.1.1 *Transmitter ramp-up and power stabilization*. This shall be as defined in Section 6.4.3.1.1.1.

6.4.4.1.1.2 *Synchronization and ambiguity resolution*. The second component of the training sequence shall consist of the synchronization sequence, known as S_2*, as follows:

000 001 101 100 110 010 111 100 010 011 101 000 111 000 011 001

and shall be transmitted from left to right.

Note.— The sequence S_2 is very closely related to the sequence S_2 (Section 6.4.4.3.1.2). The 15 phase changes between the 16 symbols of S_2* are each exactly 180^o out of phase from the 15 phase changes associated with S_2. This relationship can be used to simplify the process of simultaneously searching for both sequences.*

6.4.4.1.2 *System data and handoff check message*. The non-3T configuration (as contained in the Manual on VDL Mode 3 Technical Specifications) system data shall consist of 32 transmitted symbols. The 96 transmitted bits shall include 48 bits of information and 48 parity bits, generated as 4 Golay (24, 12) code words. The 3T configuration as contained in the Manual on VDL Mode 3 Technical Specifications shall consist of 128 transmitted symbols. The 384 transmitted bits shall include 192 bits of information and 192 parity bits, generated as 16 Golay (24, 12) code words. The 3T configuration handoff check message shall consist of 40 transmitted symbols. The 120 transmitted bits shall include 60 bits of information and 60 parity bits, generated as 5 Golay (24,12) code words.

The specific definition of the Golay encoder shall be as follows:

If the 12 bit input bit sequence is written as a row vector **x**, then the 24 bit output sequence can be written as the row vector **y**, where **y** = **x G**, and the matrix **G** shall be given by

$$\mathbf{G} = \begin{matrix}
1&1&0&1&0&1&1&1&0&0&0&1&1&0&0&0&0&0&0&0&0&0&0&0\\
0&1&1&1&1&1&0&0&1&0&0&1&0&1&0&0&0&0&0&0&0&0&0&0\\
1&1&1&0&1&0&0&1&0&1&0&1&0&0&1&0&0&0&0&0&0&0&0&0\\
0&1&1&0&0&0&1&1&1&0&1&1&0&0&0&1&0&0&0&0&0&0&0&0\\
1&1&1&0&0&1&1&0&1&1&0&0&0&0&0&0&1&0&0&0&0&0&0&0\\
1&0&1&1&0&0&1&1&0&1&1&0&0&0&0&0&0&1&0&0&0&0&0&0\\
1&0&0&1&1&0&0&1&1&0&1&1&0&0&0&0&0&0&1&0&0&0&0&0\\
0&1&0&1&1&0&1&1&1&1&0&0&0&0&0&0&0&0&0&1&0&0&0&0\\
0&0&1&0&1&1&0&1&1&1&1&0&0&0&0&0&0&0&0&0&1&0&0&0\\
0&0&0&1&0&1&1&0&1&1&1&1&0&0&0&0&0&0&0&0&0&1&0&0\\
1&1&0&1&1&1&0&0&0&1&1&0&0&0&0&0&0&0&0&0&0&0&1&0\\
1&0&1&0&1&1&1&0&0&0&1&1&0&0&0&0&0&0&0&0&0&0&0&1
\end{matrix}$$

Note.— The extended Golay code allows for the correction of any error pattern with 3 or fewer bit errors and the detection of any 4-bit error pattern.

6.4.4.1.3 *Transmitter ramp-down.* The transmitter power shall be –20 dBc within 2.5 symbol periods of the middle of the final symbol of the burst. The transmitter power leakage when the transmitter is in the "off" state shall be less than -83 dBm.

Note.— Reference RTCA/DO-160D section 21, category H for antenna radiated signals.

6.4.4.2 *Management (M) burst downlink*. The M downlink burst (as contained in the Manual on VDL Mode 3 Technical Specifications) shall consist of three segments, the training sequence followed by the system data and the transmitter ramp down.

6.4.4.2.1 *Training sequence*. The M downlink burst training sequence shall consist of two components as follows:

a) transmitter ramp up and power stabilization; and

b) synchronization and ambiguity resolution.

6.4.4.2.1.1 *Transmitter ramp-up and power stabilization***.** This shall be as defined in 6.4.4.1.1.1.

6.4.4.2.1.2 *Synchronization and ambiguity resolution*. Three separate synchronization sequences shall be used for this burst type. The standard sequence, known as S_1, shall be as follows:

000 111 001 001 010 110 000 011 100 110 011 111 010 101 100 101

and shall be transmitted from left to right. The special sequence used to identify poll responses shall be as defined in 6.4.4.1.1.2.

The special sequence used to identify net entry requests (S_1*) shall use the following sequence:

000 001 111 111 100 000 110 101 010 000 101 001 100 011 010 011

and shall be transmitted from left to right.

Note.— The sequence S_1 is very closely related to the sequence S_1. The 15 phase changes between the 16 symbols of S_1* are each exactly 180^o out of phase from the 15 phase changes associated with S_1. This relationship can be used to simplify the process of simultaneously searching for both sequences.*

6.4.4.2.2 *System data*. The system data segment shall consist of 16 transmitted symbols. The 48 transmitted bits shall be encoded as 24 bits of system data and 24 bits of parity bits generated as two consecutive (24, 12) Golay code words. The encoding of the (24, 12) Golay code words should be as defined in 6.4.4.1.2.

6.4.4.2.3 *Transmitter ramp-down*. This shall be as defined in 6.4.4.1.3.

6.4.4.3 *Voice or data (V/D) burst*. The V/D burst (as contained in the Manual on VDL Mode 3 Technical Specifications) shall consist of four segments: the training sequence followed by the header, the user information segment and the transmitter ramp down. The same V/D burst format shall be used for both uplink and downlink.

6.4.4.3.1 *Training sequence*. V/D burst training sequence shall consist of two components as follows:

a) transmitter ramp-up and power stabilization; and

b) synchronization and ambiguity resolution.

6.4.4.3.1.1 *Transmitter ramp-up and power stabilization*. This shall be as specified in 6.4.4.1.1.1.

6.4.4.3.1.2 *Synchronization and ambiguity resolution*. The second component of the training sequence shall consist of the synchronization sequence, known as S_2, as follows:

000 111 011 010 000 100 001 010 100 101 011 110 001 110 101 111

and shall be transmitted from left to right.

6.4.4.3.2 *Header*. The header segment shall consist of 8 transmitted symbols. The 24 transmitted bits shall be encoded as 12 bits of header information and 12 parity bits, generated as a single (24, 12) Golay code word. The encoding of the (24, 12) Golay code word shall be as defined in 6.4.4.1.2.

6.4.4.3.3 *User information*. The user information segment shall consist of 192 3-bit symbols. When transmitting voice, FEC shall be applied to the analysis output of the vocoder specified in 6.8. The vocoder shall provide satisfactory performance in a BER environment of 10^{-3} (with a design goal of 10^{-2}). The overall bit rate of the vocoder *including FEC* is 4 800 bits/s (except when in the truncated mode in which the bit rate is 4 000 bits/s).

6.4.4.3.3.1 When transmitting user data, the 576 bits shall be encoded as a single Reed-Solomon (72, 62) 2^8–ary code word. For user data input to the Reed-Solomon encoder of length less than 496 bits, input data shall be padded with zeroes at the end to a full length of 496 bits. The field defining the primitive polynomial of the code shall be as described in 6.4.3.1.2.1. The generator polynomial shall be as follows:

$$\prod_{i=120}^{129} (x - \alpha^i)$$

Note.— The Reed-Solomon (72, 62) code is capable of correcting up to five 2^8-ary (code word) symbol errors in the received word.

6.4.4.3.4 *Transmitter ramp-down*. This shall be as defined in 6.4.4.1.3.

6.4.4.4 *Interleaving*. There shall be no interleaving in Mode 3 operation.

6.4.4.5 *Bit scrambling.* Under Mode 3 operation, bit scrambling, as specified in 6.4.3.1.4 shall be performed on each burst, starting after the training sequence. The scrambling sequence shall be reinitialized on each burst effectively providing a constant overlay for each of the Mode 3 fixed length bursts.

6.4.4.6 *Receiver/transmitter interaction.* The switching times in this subsection will be defined as the time between the middle of the last information symbol of one burst and the middle of the first symbol of the synchronization sequence of the subsequent burst.

Note.— This nominal time will be shortened by considerations such as the finite width of each symbol due to Nyquist filtering and the ramp up and power stabilization sequence. Such alternative definitions could yield switching times up to 8 symbol periods shorter.

6.4.4.6.1 *Receiver to transmitter switching time.* An aircraft radio shall be capable of switching from reception to transmission within 17 symbol periods. This time can be relaxed to 33 symbol periods for aircraft radios which do not implement functions requiring discrete addressing.

Note 1.— The shortest R/T switching time for an aircraft radio occurs when the reception of an uplink M channel beacon is followed by a V/D transmission in the same slot. In certain instances where aircraft radios do not implement functions requiring discrete addressing, the R/T switching time can be increased since the last two Golay words of the uplink M channel beacon need not be read.

Note 2.— The minimum turnaround time assumes that in configurations 3V1D, 2V1D, and 3T (as contained in Section 5.5.2.4 of the Manual on VDL Mode 3 Technical Specifications), the aircraft radios will be provided with software that will prevent them from transmitting a downlink M channel message in a slot following the reception of a voice message from another aircraft with a long time delay.

6.4.4.6.2 *Transmitter to receiver switching time.* An aircraft radio shall be capable of switching from transmission to reception within 32 symbol periods.

Note.— The worst case T/R switching time for an aircraft radio occurs when it transmits a downlink M channel message and receives a V/D message in the same slot.

6.4.4.7 *Fringe coverage indication*

6.4.4.7.1 **Recommendation.—** *Indication of near edge-of-coverage should be provided to the VDL Mode 3 aircraft.*

6.5 LINK LAYER PROTOCOLS AND SERVICES

6.5.1 General information

6.5.1.1 *Functionality*. The VDL link layer shall provide the following sublayer functions:

a) media access control (MAC) sublayer, which requires the use of the carrier sense multiple access (CSMA) algorithm for Mode 2 or TDMA for Mode 3;

b) a data link service (DLS) sublayer:

   1) for Mode 2, the DLS sublayer provides connection-oriented point-to-point links using data link entities (DLE) and connectionless broadcast link over the MAC sublayer; and

   2) for Mode 3, the DLS sublayer provides acknowledged connectionless point-to-point and point-to-multipoint links over a MAC sublayer that guarantees sequencing; and

c) a VDL management entity (VME), which establishes and maintains DLEs between the aircraft and the ground-based systems using link management entities (LME).

6.5.1.2 SERVICE

6.5.1.2.1 *Connection-oriented*. The VDL Mode 2 link layer shall provide a reliable point-to-point service using a connection-oriented DLS sublayer.

6.5.1.2.2 *Connectionless*. The VDL Mode 2 and 3 link layers shall provide an unacknowledged broadcast service using a connectionless DLS sublayer.

6.5.1.2.3 *Acknowledged connectionless*. The VDL Mode 3 link layer shall provide an acknowledged point-to-point service using a connectionless DLS sublayer that relies upon the MAC sublayer to guarantee sequencing.

6.5.2 MAC sublayer

6.5.2.1 The MAC sublayer shall provide for the transparent acquisition of the shared communications path. It makes invisible to the DLS sublayer the way in which supporting communications resources are utilized to achieve this.

Note.— Specific MAC services and procedures for VDL Modes 2 and 3 are contained in the Manuals on VDL Mode 2 and VDL Mode 3 Technical Specifications.

6.5.3 Data link service sublayer

6.5.3.1 For Mode 2, the DLS shall support bit-oriented simplex air-ground communications using the aviation VHF link control (AVLC) protocol.

Note.— Specific data link services, parameters and protocol definitions for VDL Mode 2 are contained in the Manual on VDL Mode 2 Technical Specifications.

6.5.3.2 For Mode 3, the DLS shall support bit-oriented, priority based, simplex air-ground communications using the acknowledged connectionless data link (A-CLDL) protocol.

Note.— Specific data link services, parameters and protocol definitions for VDL Mode 3 are contained in the Manual on VDL Mode 3 Technical Specifications.

6.5.4 VDL management entity

6.5.4.1 *Services*. The VME shall provide link establishment, maintenance and disconnection services as well as support parameter modification. Specific VME services, parameter formats and procedures for Modes 2 and 3 are contained in the Manuals on VDL Mode 2 and Mode 3 Technical Specifications.

6.6 SUBNETWORK LAYER PROTOCOLS AND SERVICES

6.6.1 Architecture for Mode 2

6.6.1.1 The subnetwork layer protocol used across the VHF air-ground subnetwork for VDL Mode 2 is referred to formally as a subnetwork access protocol (SNAcP) and shall conform to ISO 8208, except as contained in the Manual on VDL Mode 2 Technical Specifications. The SNAcP is contained within the Manual on VDL Mode 2 Technical Specifications as the subnetwork protocol. If there are any differences between the Manual on VDL Mode 2 Technical

Specifications and the cited specifications, the Manual on VDL Mode 2 Technical Specifications shall have precedence. On the air-ground interface, the aircraft subnetwork entity shall act as a DTE and the ground subnetwork entity shall act as a DCE.

Note.— Specific subnetwork layer protocol access points, services, packet formats, parameters and procedures for VDL Mode 2 are contained in the Manual on VDL Mode 2 Technical Specifications.

6.6.2 Architecture for Mode 3

6.6.2.1 The subnetwork layer used across the VHF air-ground subnetwork for VDL Mode 3 provides the flexibility to simultaneously support multiple subnetwork protocols. The currently defined options are to support ISO 8473 connectionless network protocol and to support ISO 8208, both as contained in the Manual on VDL Mode 3 Technical Specifications. The Manual on VDL Mode 3 Technical Specifications shall have precedence with respect to any differences with the cited specifications. For the ISO 8208 interface, both the air and ground subnetwork entities shall act as DCEs.

Note.— Specific subnetwork layer protocol access points, services, packet formats, parameters and procedures for VDL Mode 3 are contained in the Manual on VDL Mode 3 Technical Specifications.

6.7 THE VDL MOBILE SUBNETWORK DEPENDENT CONVERGENCE FUNCTION (SNDCF)

6.7.1 VDL Mode 2 SNDCF

6.7.1.1 *Introduction*. The VDL Mode 2 mobile SNDCF shall be the standard mobile SNDCF.

6.7.1.2 *New function*. The VDL Mode 2 mobile SNDCF shall support maintaining context (e.g. compression tables) across subnetwork calls. The SNDCF shall use the same context (e.g. compression tables) across all SVCs negotiated to a DTE, when negotiated with the same parameters. The SNDCF shall support at least 2 SVCs sharing a context.

Note 1.— Because handoffs can be expected to reorder packets, certain compression algorithms do not lend themselves to use over VDL Mode 2. Further, implementors of dictionary-based compression algorithms must be sensitive to the problem of updates arriving on either the old or newly established call.

Note 2.— The encoding of the Call User Data field is described in Doc 9705 except with modifications as contained in the Manual on VDL Mode 2 Technical Specifications.

6.7.2 VDL Mode 3 SNDCF

6.7.2.1 The VDL Mode 3 shall support one or more of the defined SNDCFs. The first is the standard ISO 8208 SNDCF as defined in Doc 9705. This is a connection-oriented SNDCF. The second type of SNDCF supported by VDL Mode 3 is denoted frame-based SNDCF. The details of this connectionless oriented SNDCF are contained in the Manual on VDL Mode 3 Technical Specifications, including network layer interface, support for broadcast and unicast network packets, and ATN router support.

Note.— The framed-based SNDCF is termed such because it uses the VDL Mode 3 frames without the need for an additional protocol (viz. ISO 8208 SNDCF) to transfer network packets. The frame-based SNDCF achieves independence from the network protocol by identifying the payload of each frame. Upon receipt of a frame, the payload is examined and control is passed to the protocol identified.

6.8 VOICE UNIT FOR MODE 3

6.8.1 Services

6.8.1.1 The voice unit shall provide for a simplex, "push-to-talk" audio and signalling interface between the user and the VDL. Two separate mutually exclusive voice circuit types shall be supported:

a) Dedicated circuits: This shall provide service to a specific user group on an exclusive basis with no sharing of the circuit with other users outside the group. Access shall be based on a "listen-before-push-to-talk" discipline.

b) Demand assigned circuits: This shall provide voice circuit access which is arbitrated by the ground station in response to an access request received from the aircraft station. This type of operation shall allow dynamic sharing of the channel resource increasing trunking efficiency.

6.8.1.2 *Priority access*. The voice unit operation shall support a priority override access for authorized ground users.

6.8.1.3 *Message source identification*. The voice unit operation shall support notification to the user of the source of a received message (i.e. whether the message originated from an air or ground station).

6.8.1.4 *Coded squelch*. The voice unit shall support a coded squelch operation that offers some degree of rejection of undesired co-channel voice messages based on the burst time of arrival.

6.8.2 Speech encoding, parameters and procedures

6.8.2.1 The VDL Mode 3 shall use the advanced multiband excitation (AMBE) 4.8 kbits/s encoding/decoding algorithm, version number AMBE-ATC-10, developed by Digital Voice Systems, Incorporated (DVSI) for voice communications.

Note 1.— Information on technical characteristics of the 4.8 kbits/s AMBE algorithm is contained in AMBE-ATC-10 Low Level Description, obtainable from DVSI.

Note 2.— The 4.8 kbits/s AMBE encoding/decoding technology described in the document is subject to DVSI patent rights and copyrights. Manufacturers must enter into a license agreement with DVSI prior to obtaining a detailed description of the algorithm before incorporation in equipment operating in the VDL Mode 3 service. By letter to ICAO dated 29 October 1999, DVSI confirmed its commitment to license the technology for the manufacture and sale of aeronautical equipment under reasonable terms and conditions, negotiated on a non-discriminatory basis.

6.8.2.2 Speech encoding definition, voice unit parameters, and procedure descriptions for VDL Mode 3 Voice Unit operation are contained in the Manual on VDL Mode 3 Technical Specifications.

6.9 VDL MODE 4

6.9.1 A Mode 4 station shall conform to the requirements defined in 6.1.2.3, 6.1.4.2, 6.2.1.1, 6.2.3.1, 6.2.4, 6.3.1, 6.3.3.1, 6.3.4, 6.3.5.1, 6.3.5.2, 6.3.5.3, 6.3.5.4.1 and 6.9.

6.9.2 VDL Mode 4 radio channels

6.9.2.1 VDL MODE 4 STATION FREQUENCY RANGE

6.9.2.1.1 *Transmitter/receiver tuning range*. A VDL Mode 4 transmitter/receiver shall be capable of tuning to any of the 25 kHz channels from 117.975 MHz through 137 MHz. The transmitter shall have a means for the tuning range to be restricted to a narrower range.

Note.— Operational conditions or certain applications may require the equipment to be operated in a narrower frequency range.

6.9.2.1.2 **Recommendation.**— *A VDL Mode 4 transmitter/receiver should be capable of tuning to any of the 25 kHz channels from 108 to 117.975 MHz.*

Note.— The band 108–117.975 MHz may be utilized in accordance with the relevant provisions of the ITU Radio Regulations.

6.9.2.1.3 *Simultaneous reception.* A VDL Mode 4 station shall be capable of receiving two channels simultaneously.

6.9.2.1.4 **Recommendation.**— *A VDL Mode 4 station should be capable of receiving additional channels simultaneously as required by operational services.*

6.9.2.2 GLOBAL SIGNALLING CHANNELS

6.9.2.2.1 VDL Mode 4 stations shall use two assigned frequencies as global signalling channels (GSC), to support user communications and link management functions.

Note.— Additional channels may be defined in a local domain and notified to mobile users by broadcast from ground stations on the GSCs defined above.

6.9.3 System capabilities

6.9.3.1 *ATN compatibility*. The VDL Mode 4 system shall support ATN-compliant subnetwork services for surveillance applications.

6.9.3.2 *Data transparency*. The VDL Mode 4 system shall provide code-independent, byte-independent transfer of data.

6.9.3.3 *Broadcast.* The VDL Mode 4 system shall provide link layer broadcast services.

6.9.3.4 *Point-to-point*. The VDL Mode 4 system shall provide link layer point-to-point services.

6.9.3.5 *Air-air communications.* The VDL Mode 4 system shall provide air-air communications, without ground support, as well as air-ground communications.

6.9.3.6 *Connection management*. When supporting air-ground operations, the VDL Mode 4 system shall establish and maintain a reliable communications path between the aircraft and the ground system while allowing, but not requiring, manual intervention.

6.9.3.7 *Ground network transition.* A mobile VDL Mode 4 DLS station shall transition from one ground VDL Mode 4 DLS station to another as required.

6.9.3.8 *Derived time capability.* VDL Mode 4 shall provide the capability for deriving time from time-of-arrival measurements of received VDL Mode 4 transmissions whenever externally derived estimates of time are unavailable.

6.9.3.9 *Simplex operations.* Mobile and ground VDL Mode 4 stations shall access the physical medium operating in simplex mode.

6.9.4 Coordination of channel utilization

6.9.4.1 On a regional basis, transmissions shall be scheduled relative to UTC, to ensure efficient use of shared channels and to avoid unintentional slot re-use.

6.9.5 Physical layer protocols and services

Note.— Unless otherwise stated, the requirements defined in this section apply to both mobile and ground stations.

6.9.5.1 FUNCTIONS

6.9.5.1.1 *TRANSMITTED POWER*

6.9.5.1.1.1 *Airborne installation.* The effective radiated power shall be such as to provide a field strength of at least 35 microvolts per metre (minus 114.5 dBW/m^2) on the basis of free space propagation, at ranges and altitudes appropriate to the conditions pertaining to the areas over which the aircraft is operated.

6.9.5.1.1.2 *Ground installation.*

Recommendation.— *The effective radiated power should be such as to provide a field strength of at least 75 microvolts per metre (minus 109 dBW/m^2) within the defined operational coverage of the facility, on the basis of free-space propagation.*

6.9.5.1.2 *TRANSMITTER AND RECEIVER FREQUENCY CONTROL*

6.9.5.1.2.1 The VDL Mode 4 physical layer shall set the transmitter or receiver frequency as commanded by the link management entity (LME). Channel selection time shall be less than 13 ms after the receipt of a command from a VSS user.

6.9.5.1.3 *DATA RECEPTION BY RECEIVER*

6.9.5.1.3.1 The receiver shall decode input signals and forward them to the higher layers for processing.

6.9.5.1.4 *DATA TRANSMISSION BY TRANSMITTER*

6.9.5.1.4.1 *Data encoding and transmission.* The physical layer shall encode the data received from the data link layer and transmit it over the RF channel. RF transmission shall take place only when permitted by the MAC.

6.9.5.1.4.2 *Order of transmission.* The transmission shall consist of the following stages in the following order:

a) transmitter power stabilization;

b) bit synchronization;

c) ambiguity resolution and data transmission; and

d) transmitter decay.

Note.— The definitions of the stages are given in Sections 6.9.5.2.3.1 to 6.9.5.2.3.4.

6.9.5.1.4.3 *Automatic transmitter shutdown.* A VDL Mode 4 station shall automatically shut-down power to any final stage amplifier in the event that output power from that amplifier exceeds –30 dBm for more than 1 second. Reset to an operational mode for the affected amplifier shall require a manual operation.

Note.— This is intended to protect the shared channel resource against so-called "stuck transmitters".

6.9.5.1.5 NOTIFICATION SERVICES

6.9.5.1.5.1 *Signal quality*. The operational parameters of the equipment shall be monitored at the physical layer. Signal quality analysis shall be performed in the demodulator process and in the receive process.

Note.— Processes that may be evaluated in the demodulator include bit error rate (BER), signal to noise ratio (SNR), and timing jitter. Processes that may be evaluated in the receiver include received signal level and group delay.

6.9.5.1.5.2 *Arrival time*. The arrival time of each received transmission shall be measured with a two-sigma error of 5 microseconds.

6.9.5.1.5.3 **Recommendation.—** *The receiver should be capable of measuring the arrival time within a two-sigma error of 1 microsecond.*

6.9.5.2 PROTOCOL DEFINITION FOR GFSK

6.9.5.2.1 *Modulation scheme.* The modulation scheme shall be GFSK. The first bit transmitted (in the training sequence) shall be a high tone and the transmitted tone shall be toggled before transmitting a 0 (i.e. non-return to zero inverted encoding).

6.9.5.2.2 *Modulation rate.* Binary ones and binary zeros shall be generated with a modulation index of 0.25 ± 0.03 and a BT product of 0.28 ± 0.03, producing data transmission at a bit rate of 19 200 bits/s ± 50 ppm.

6.9.5.2.3 STAGES OF TRANSMISSION

6.9.5.2.3.1 *Transmitter power stabilization.* The first segment of the training sequence is the transmitter power stabilization, which shall have a duration of 16 symbol periods. The transmitter power level shall be no less than 90 per cent of the steady state power level at the end of the transmitter power stabilization segment.

6.9.5.2.3.2 *Bit synchronization*. The second segment of the training sequence shall be the 24-bit binary sequence 0101 0101 0101 0101 0101 0101, transmitted from left to right immediately before the start of the data segment.

6.9.5.2.3.3 *Ambiguity resolution and data transmission.* The transmission of the first bit of data shall start 40 bit intervals (approximately 2 083.3 microseconds) ± 1 microsecond after the nominal start of transmission.

Note 1.— This is referenced to emissions at the output of the antenna.

Note 2.— Ambiguity resolution is performed by the link layer.

6.9.5.2.3.4 *Transmitter decay.* The transmitted power level shall decay at least by 20 dB within 300 microseconds after completing a transmission. The transmitter power level shall be less than -90 dBm within 832 microseconds after completing a transmission.

6.9.5.3 CHANNEL SENSING

6.9.5.3.1 *Estimation of noise floor.* A VDL Mode 4 station shall estimate the noise floor based on power measurements of the channel whenever a valid training sequence has not been detected.

6.9.5.3.2 The algorithm used to estimate the noise floor shall be such that the estimated noise floor shall be lower than the maximum power value measured on the channel over the last minute when the channel is regarded as idle.

Note.— The VDL Mode 4 receiver uses an energy sensing algorithm as one of the means to determine the state of the channel (idle or busy). One algorithm that can be used to estimate the noise floor is described in the Manual on VDL Mode 4 Technical Specifications.

6.9.5.3.3 *Channel idle to busy detection.* A VDL Mode 4 station shall employ the following means to determine the channel idle to busy transition at the physical layer.

6.9.5.3.3.1 *Detection of a training sequence.* The channel shall be declared busy if a VDL Mode 4 station detects a valid training sequence followed by a frame flag.

6.9.5.3.3.2 *Measurement of channel power.* Regardless of the ability of the demodulator to detect a valid training sequence, a VDL Mode 4 station shall consider the channel busy with at least a 95 per cent probability within 1 ms after on-channel power rises to the equivalent of at least four times the estimated noise floor for at least 0.5 milliseconds.

6.9.5.3.4 *CHANNEL BUSY TO IDLE DETECTION*

6.9.5.3.4.1 A VDL Mode 4 station shall employ the following means to determine the channel busy to idle transition.

6.9.5.3.4.2 *Measurement of transmission length.* When the training sequence has been detected, the channel busy state shall be held for a period of time at least equal to 5 milliseconds, and subsequently allowed to transition to the idle state based on measurement of channel power.

6.9.5.3.4.3 *Measurement of channel power.* When not otherwise held in the channel busy state, a VDL Mode 4 station shall consider the channel idle with at least a 95 per cent probability if on-channel power falls below the equivalent of twice the estimated noise floor for at least 0.9 milliseconds.

6.9.5.4 RECEIVER/TRANSMITTER INTERACTION

6.9.5.4.1 *Receiver to transmitter turnaround time.* A VDL Mode 4 station shall be capable of beginning the transmission of the transmitter power stabilization sequence within 16 microseconds after terminating the receiver function.

6.9.5.4.2 *Frequency change during transmission.* The phase acceleration of the carrier from the start of the synchronization sequence to the data end flag shall be less than 300 Hz per second.

6.9.5.4.3 *Transmitter to receiver turnaround time.* A VDL Mode 4 station shall be capable of receiving and demodulating with nominal performance an incoming signal within 1 ms after completing a transmission.

Note.— Nominal performance is defined as a bit error rate (BER) of 10^{-4}.

6.9.5.5 PHYSICAL LAYER SYSTEM PARAMETERS

6.9.5.5.1 *PARAMETER P1 (MINIMUM TRANSMISSION LENGTH)*

6.9.5.5.1.1 A receiver shall be capable of demodulating a transmission of minimum length P1 without degradation of BER.

6.9.5.5.1.2 The value of P1 shall be 19 200 bits.

6.9.5.5.2 *PARAMETER P2 (NOMINAL CO-CHANNEL INTERFERENCE PERFORMANCE)*

6.9.5.5.2.1 The parameter P2 shall be the nominal co-channel interference at which a receiver shall be capable of demodulating without degradation in BER.

6.9.5.5.2.2 The value of P2 shall be 12 dB.

6.9.5.6 FM BROADCAST INTERFERENCE IMMUNITY PERFORMANCE FOR VDL MODE 4 RECEIVING SYSTEMS

6.9.5.6.1 A VDL Mode 4 station shall conform to the requirements defined in section 6.3.5.4 when operating in the band 117.975–137 MHz.

6.9.5.6.2 A VDL Mode 4 station shall conform to the requirements defined below when operating in the band 108-117.975 MHz.

6.9.5.6.2.1 The VDL Mode 4 receiving system shall meet the requirements specified in 6.3.5.1 in the presence of two-signal, third-order intermodulation products caused by VHF FM broadcast signals having levels in accordance with the following:

$$2N_1 + N_2 + 72 \le 0$$

for VHF FM sound broadcasting signals in the range 107.7–108.0 MHz

and

$$2N_1 + N_2 + 3\left\{24 - 20\log\frac{\Delta f}{0.4}\right\} \le 0$$

for VHF FM sound broadcasting signals below 107.7 MHz,

where the frequencies of the two VHF FM sound broadcasting signals produce, within the receiver, a two-signal, third-order intermodulation product on the desired VDL Mode 4 frequency.

N_1 and N_2 are the levels (dBm) of the two VHF FM sound broadcasting signals at the VDL Mode 4 receiver input. Neither level shall exceed the desensitization criteria set forth in 6.9.5.6.2.2.

$\Delta f = 108.1 - f_1$, where f_1 is the frequency of N_1, the VHF FM sound broadcasting signal closer to 108.1 MHz.

Note.— The FM intermodulation immunity requirements are not applied to a VDL Mode 4 channel operating below 108.1 MHz, and hence frequencies below 108.1 MHz are not intended for general assignments.

6.9.5.6.2.2 The VDL Mode 4 receiving system shall not be desensitized in the presence of VHF FM broadcast signals having levels in accordance with Tables 6-5 and 6-6.

6.9.6 Link layer

Note.— Details on link layer functions are contained in the Manual on VDL Mode 4 Technical Specifications.

6.9.7 Subnetwork layer and SNDCF

Note.— Details on subnetwork layer functions and SNDCF are contained in the Manual on VDL Mode 4 Technical Specifications.

6.9.8 ADS-B applications

Note.— Details on ADS-B application functions are contained in the Manual on VDL Mode 4 Technical Specifications.

TABLES FOR CHAPTER 6

Table 6-1. Modes 2 and 3 data encoding

X_k	Y_k	Z_k	$\Delta\phi_k$
0	0	0	$0 \pi / 4$
0	0	1	$1 \pi / 4$
0	1	1	$2 \pi / 4$
0	1	0	$3 \pi / 4$
1	1	0	$4 \pi / 4$
1	1	1	$5 \pi / 4$
1	0	1	$6 \pi / 4$
1	0	0	$7 \pi / 4$

Table 6-2. Modes 2 and 3 modulation stability

VDL Mode	Aircraft Modulation Stability	Ground Modulation Stability
Mode 2	± 0.0050 per cent	± 0.0050 per cent
Mode 3	± 0.0005 per cent	± 0.0002 per cent

Table 6-3. Scrambler functions

Function	Data in	Data out
scrambling	clean data	scrambled data
descrambling	scrambled data	clean data

Table 6-4. Physical services system parameters

Symbol	Parameter name	Mode 2 value
P1	Minimum transmission length	131071 bits

Table 6-5. VDL Mode 4 operating on frequencies between 108.0–111.975 MHz

Frequency (MHz)	Maximum level of unwanted signal at receiver input (dBm)
88–102	+15
104	+10
106	+5
107.9	–10

Table 6-6. VDL Mode 4 operating on frequencies between 112.0–117.975 MHz

Frequency (MHz)	Maximum level of unwanted signal at receiver input (dBm)
88–104	+15
106	+10
107	+5
107.9	0

Note.— The relationship is linear between adjacent points designated by the above frequencies.

FIGURES FOR CHAPTER 6

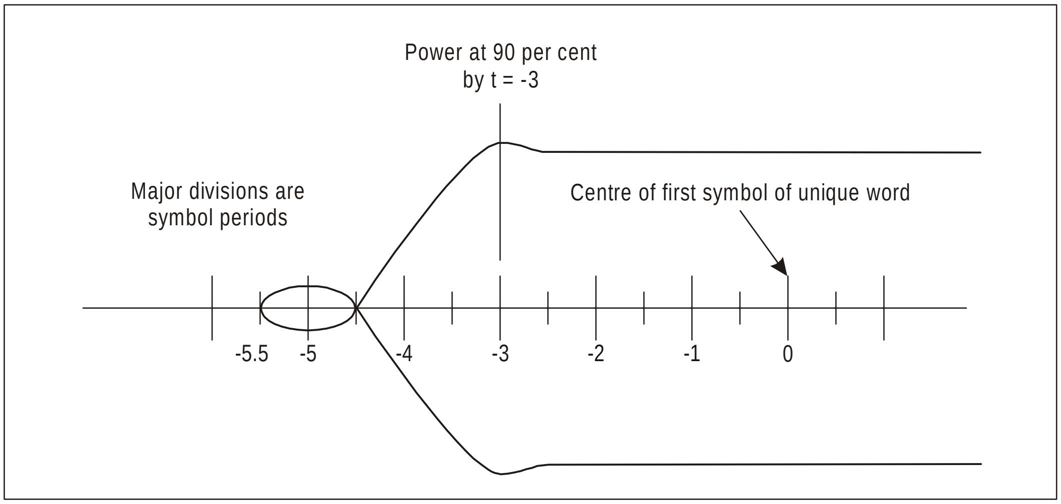


Figure 6-1. Transmitter power stabilization

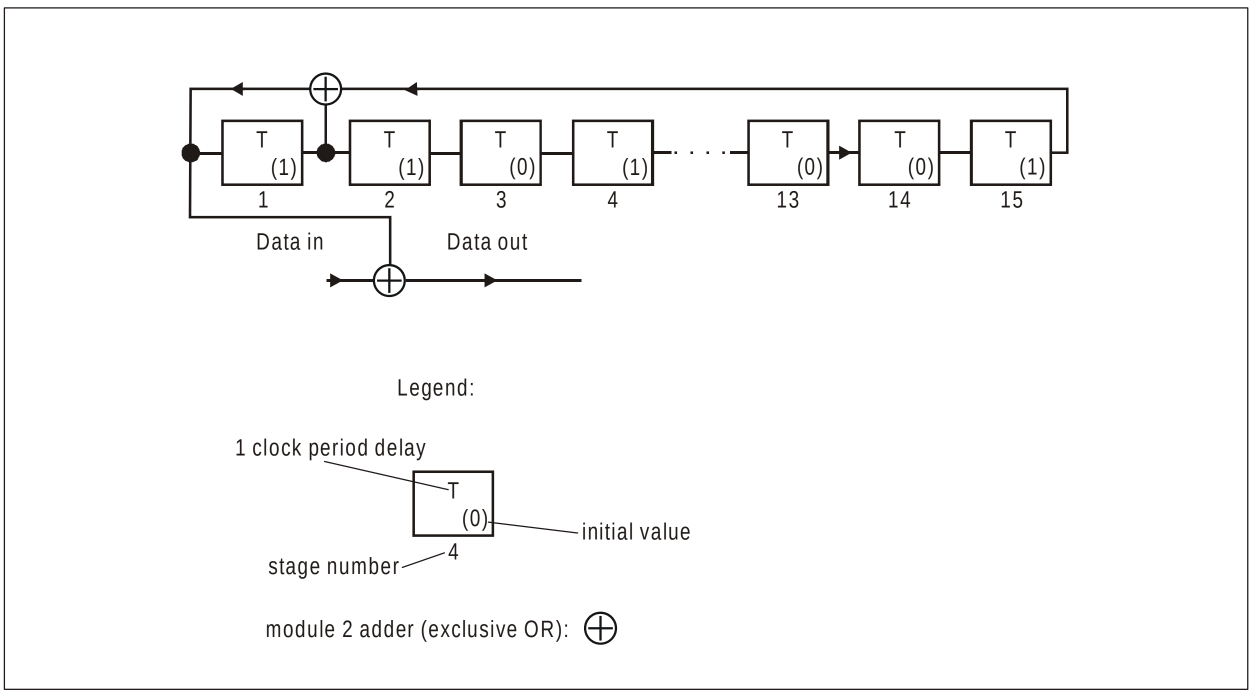


Figure 6-2. PN-generator for bit scrambling sequence

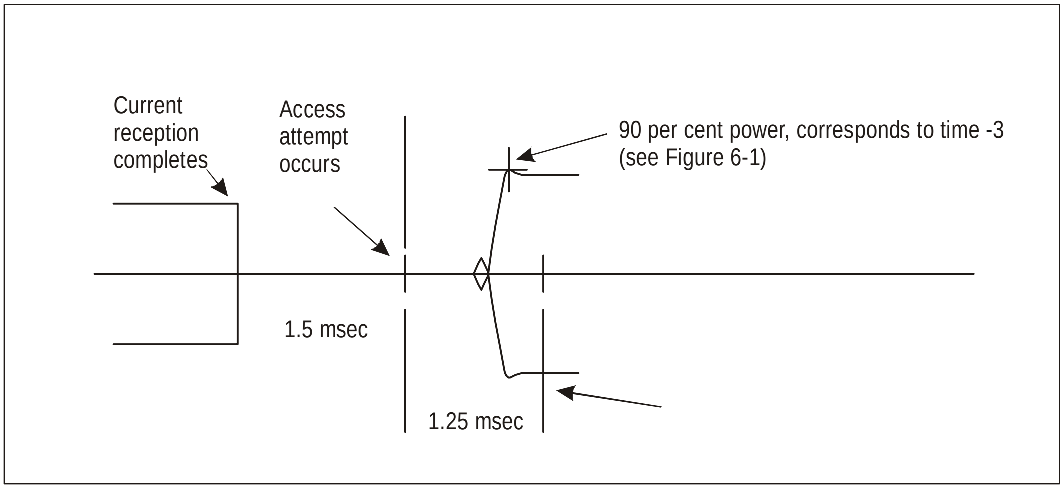


Figure 6-3. Receive to Transmit turnaround time

APPENDIX TO CHAPTER 6
REFERENCES

1. REFERENCES

References to Standards from the International Organization for Standardization (ISO) are as specified (including date published) below. These ISO Standards shall apply to the extent specified in the SARPs.

2. NORMATIVE REFERENCES

These SARPs reference the following ISO documents:

ISO	*Title*	*Date published*
646	*Information technology — ISO 7-bit coded character set for information interchange*	12/91
3309	*HDLC Procedures — Frame Structure, Version 3*	12/93
4335	*HDLC Elements of Procedures*, Version 3	12/93
7498	*OSI Basic Reference Model, Version 1*	11/94
7809	*HDLC Procedures — Consolidation of Classes of Procedures, Version 1*	12/93
8208	*Information Processing Systems — Data Communications — X.25 Packet Level Protocol for Data Terminal Equipment*	3/90 2nd ed.
8885	*HDLC Procedures — General Purpose XID Frame Information Field Content and Format*, Version [1]	12/93
8886.3	*OSI Data Link Service Definition*, Version 3	6/92
10039	*Local Area Networks — MAC Service Definition*, Version 1	6/91

3. BACKGROUND REFERENCES

The following documents are listed as reference material.

Originator	*Title*	*Date published*
ITU-R	Recommendation S.446.4, Annex I	
CCSDS	*Telemetry Channel Coding, Recommendation for Space Data System Standards*, Consultative Committee for Space Date Systems, CCSDS 101.0-B-3, Blue Book	5/92

CHAPTER 7. SUBNETWORK INTERCONNECTION

[to be developed]

CHAPTER 8. AFTN NETWORK

8.1 DEFINITIONS

Data signalling rate. Data signalling rate refers to the passage of information per unit of time, and is expressed in bits/second. Data signalling rate is given by the formula:

$$\sum_{i=1}^{i=m} \frac{1}{T_i} \log_2 n_i$$

where m is the number of parallel channels, T_i is the minimum interval for the ith channel expressed in seconds, n_i is the number of significant conditions of the modulation in the ith channel.

Note 1.—

a) *For a single channel (serial transmission) it reduces to* $(1/T)\log_2 n$; *with a two-condition modulation* (n = 2), *it is* 1/T.

b) *For a parallel transmission with equal minimum intervals and equal number of significant conditions on each channel, it is* $m(1/T)\log_2 n$ (m(1/T) *in case of a two-condition modulation).*

Note 2.— In the above definition, the term "parallel channels" is interpreted to mean: channels, each of which carries an integral part of an information unit, e.g. the parallel transmission of bits forming a character. In the case of a circuit comprising a number of channels, each of which carries information "independently", with the sole purpose of increasing the traffic handling capacity, these channels are not to be regarded as parallel channels in the context of this definition.

Degree of standardized test distortion. The degree of distortion of the restitution measured during a specific period of time when the modulation is perfect and corresponds to a specific text.

Effective margin. That margin of an individual apparatus which could be measured under actual operating conditions.

Low modulation rates. Modulation rates up to and including 300 bauds.

Margin. The maximum degree of distortion of the circuit at the end of which the apparatus is situated which is compatible with the correct translation of all the signals which it may possibly receive.

Medium modulation rates. Modulation rates above 300 and up to and including 3 000 bauds.

Modulation rate. The reciprocal of the unit interval measured in seconds. This rate is expressed in bauds.

Note.— Telegraph signals are characterized by intervals of time of duration equal to or longer than the shortest or unit interval. The modulation rate (formerly telegraph speed) is therefore expressed as the inverse of the value of this unit interval. If, for example, the unit interval is 20 milliseconds, the modulation rate is 50 bauds.

Synchronous operation. Operation in which the time interval between code units is a constant.

8.2 TECHNICAL PROVISIONS RELATING TO TELETYPEWRITER APPARATUS AND CIRCUITS USED IN THE AFTN

8.2.1 In international teletypewriter circuits of the AFTN, using a 5-unit code, the International Telegraph Alphabet No. 2 (see Table 8-1*) shall be used only to the extent prescribed in 4.1.2 of Volume II.

8.2.2 **Recommendation.—** *The modulation rate should be determined by bilateral or multilateral agreement between administrations concerned, taking into account primarily traffic volume.*

8.2.3 **Recommendation.—** *The nominal duration of the transmitting cycle should be at least 7.4 units (preferably 7.5), the stop element lasting for at least 1.4 units (preferably 1.5).*

8.2.3.1 **Recommendation.—** *The receiver should be able to translate correctly in service the signals coming from a transmitter with a nominal transmitting cycle of 7 units.*

8.2.4 **Recommendation.—** *Apparatus in service should be maintained and adjusted in such a manner that its net effective margin is never less than 35 per cent.*

8.2.5 **Recommendation.—** *The number of characters which the textual line of the page-printing apparatus may contain should be fixed at 69.*

8.2.6 **Recommendation.—** *In start-stop apparatus fitted with automatic time delay switches, the disconnection of the power supply to the motor should not take place before the lapse of at least 45 seconds after the reception of the last signal.*

8.2.7 **Recommendation.—** *Arrangements should be made to avoid the mutilation of signals transmitted at the head of a message and received on start-stop reperforating apparatus.*

8.2.7.1 **Recommendation.—** *If the reperforating apparatus is provided with local means for feeding the paper, not more than one mutilated signal should be tolerated.*

8.2.8 **Recommendation.—** *Complete circuits should be so engineered and maintained that their degree of standardized test distortion does not exceed 28 per cent on the standardized text:*

THE QUICK BROWN FOX JUMPS
OVER THE LAZY DOG

or

VOYEZ LE BRICK GEANT QUE
JEXAMINE PRES DU WHARF

8.2.9 **Recommendation.—** *The degree of isochronous distortion on the standardized text of each of the parts of a complete circuit should be as low as possible, and in any case should not exceed 10 per cent.*

8.2.10 **Recommendation.—** *The overall distortion in transmitting equipment used on teletypewriter channels should not exceed 5 per cent.*

8.2.11 **Recommendation.—** *AFTN circuits should be equipped with a system of continuous check of channel condition. Additionally, controlled circuit protocols should be applied.*

* All tables and figures are located at the end of this chapter.

8.3 TERMINAL EQUIPMENT ASSOCIATED WITH AERONAUTICAL RADIOTELETYPEWRITER CHANNELS OPERATING IN THE BAND 2.5 – 30 MHz

8.3.1 Selection of type of modulation and code

8.3.1.1 **Recommendation.—** *Frequency shift modulation (F1B) should be employed in radioteletypewriter systems used in the aeronautical fixed service (AFS), except where the characteristics of the independent sideband (ISB) method of operation are of advantage.*

Note.— F1B type of modulation is accomplished by shifting a radio frequency carrier between two frequencies representing "position A" (start signal polarity) and "position Z" (stop signal polarity) of the start-stop 5-unit telegraphic code.

8.3.2 System characteristics

8.3.2.1 **Recommendation.—** *The characteristics of signals from radioteletypewriter transmitters utilizing F1B modulation should be as follows:*

a) Frequency shift: *the lowest possible value.*

b) Frequency shift tolerance: *within plus or minus 3 per cent of the nominal value of the frequency shift.*

c) Polarity: single channel circuits: *the higher frequency corresponds to "position A" (start signal polarity).*

8.3.2.2 **Recommendation.—** *The variation of the mean between the radio frequencies representing respectively "position A" and "position Z" should not exceed 100 Hz during any two-hour period.*

8.3.2.3 **Recommendation.—** *The overall distortion of the teletypewriter signal, as monitored at the output of the radio transmitter or in its immediate vicinity, should not exceed 10 per cent.*

Note.— Such distortion means the displacement in time of the transitions between elements from their proper positions, expressed as a percentage of unit element time.

8.3.2.4 **Recommendation.—** *Radioteletypewriter receivers concerned with F1B modulation should be capable of operating satisfactorily on signals having the characteristics set out in 8.3.2.1 and 8.3.2.2.*

8.3.2.5 **Recommendation.—** *The characteristics of multichannel transmission of teletypewriter signals over a radio circuit should be established by agreement between the Administrations concerned.*

8.4 CHARACTERISTICS OF INTERREGIONAL AFS CIRCUITS

8.4.1 **Recommendation.—** *Interregional AFS circuits being implemented or upgraded should employ high quality telecommunications service. Modulation rate should take into account traffic volumes expected under both normal and alternate route conditions.*

8.5 TECHNICAL PROVISIONS RELATING TO ATS MESSAGE TRANSMISSION

8.5.1 *Interconnection by direct or omnibus channels — low modulation rates — 5-unit code.*

Note.— See 8.6 for medium modulation rates.

8.5.1.1 **Recommendation.—** *AFTN techniques (cf. 8.2) should be used.*

8.6 TECHNICAL PROVISIONS RELATING TO INTERNATIONAL GROUND-GROUND DATA INTERCHANGE AT MEDIUM AND HIGHER SIGNALLING RATES

Note.— Throughout this section in the context of coded character sets, the term "unit" means the unit of selective information and is essentially equivalent to the term "bit".

8.6.1 General

8.6.1.1 **Recommendation.—** *In international data interchange of characters, a 7-unit coded character set providing a repertoire of 128 characters and designated as International Alphabet No. 5 (IA-5) should be used. Compatibility with the 5-unit coded character set of International Telegraph Alphabet No. 2 (ITA-2) should be ensured where applicable.*

8.6.1.2 When the provisions of 8.6.1.1 are applied, International Alphabet No. 5 (IA-5) contained in Table 8-2 shall be used.

8.6.1.2.1 The serial transmission of units comprising an individual character of IA-5 shall be with the low order unit (b_1) transmitted first.

8.6.1.2.2 **Recommendation.—** *When IA-5 is used, each character should include an additional unit for parity in the eighth level position.*

8.6.1.2.3 When the provisions of 8.6.1.2.2 are applied, the sense of the character parity bit shall produce even parity in links which operate on the start-stop principle, and odd parity in links using end-to-end synchronous operations.

8.6.1.2.4 Character-for-character conversion shall be as listed in Tables 8-3 and 8-4 for all characters which are authorized in the AFTN format for transmission on the AFS in both IA-5 and ITA-2.

8.6.1.2.5 Characters which appear in only one code set, or which are not authorized for transmission on the AFS shall be as depicted in the code conversion tables.

8.6.2 Data transmission characteristics

8.6.2.1 **Recommendation.—** *The data signalling rate should be chosen from among the following:*

600 bits/s	*4 800 bits/s*
1 200 bits/s	*9 600 bits/s*
2 400 bits/s	

8.6.2.2 **Recommendation.—** *The type of transmission for each data signalling rate should be chosen as follows:*

Data signalling rate	Type of transmission
600 bits/s	*Synchronous or asynchronous serial transmission*
1 200 bits/s	*Synchronous or asynchronous serial transmission*
2 400 bits/s	*Synchronous serial transmission*
4 800 bits/s	*Synchronous serial transmission*
9 600 bits/s	*Synchronous serial transmission*

8.6.2.3 **Recommendation.—** *The type of modulation for each data signalling rate should be chosen as follows:*

Data signalling rate	Type of modulation
600 bits/s	*Frequency*
1 200 bits/s	*Frequency*
2 400 bits/s	*Phase*
4 800 bits/s	*Phase*
9 600 bits/s	*Phase-amplitude*

Note.— This recommendation does not necessarily apply to ground-ground extensions of air-ground links used exclusively for the transfer of air-ground data, inasmuch as such circuits may be considered as part of the air-ground link.

8.6.2.4 CHARACTER STRUCTURE ON DATA LINKS

8.6.2.4.1 Character parity shall not be used for error checking on CIDIN links. Parity appended to IA-5 coded characters per 8.6.1.2.2, prior to entry to the CIDIN shall be ignored. For messages exiting the CIDIN, parity shall be generated in accordance with 8.6.1.2.3.

8.6.2.4.2 Characters of less than eight bits in length shall be padded out to eight bits in length before transmission over any octet-based or bit-oriented communications network. The padding bits shall occupy the higher order end of the octet, i.e. bit 8, bit 7 as required, and shall have the binary values 0.

8.6.2.5 When exchanging data over CIDIN links using bit-oriented procedures, the entry centre address, exit centre addresses and destination addresses in the Transport and CIDIN Packet Headers shall be in the IA-5 character set contained in Table 8-2.

8.6.2.6 **Recommendation.—** *When transmitting messages in AFTN format over CIDIN links using bit-oriented procedures, the messages should be in the IA-5 character set contained in Table 8-2.*

8.6.3 Ground-ground character-oriented data link control procedures

Note.— The provisions of this section pertain to ground-ground data interchange applications using IA-5 prescribed by 8.6.1 and which employ the ten transmission control characters (SOH, STX, ETX, EOT, ENQ, ACK, DLE, NAK, SYN, and ETB) for data link control, over synchronous or asynchronous transmission facilities.

8.6.3.1 *Descriptions.* The following descriptions shall apply to data link applications contained in this section:

a) A master station is that station which has control of the data link at a given instant.

b) A slave station is one that has been selected to receive a transmission from the master station.

c) A control station is the single station on a multipoint link that is permitted to assume master status and deliver messages to one or more individually selected (non-control) tributary stations, or it is permitted to assign temporary master status to any of the other tributary stations.

8.6.3.2 MESSAGE COMPOSITION

a) A transmission shall consist of characters from IA-5 transmitted in accordance with 8.6.1.2.2 and shall be either an information message or a supervisory sequence.

b) An information message used for the exchange of data shall take one of the following forms:

```
1)  S                E  B
    T    ---TEXT---  T  C
    X                X  C

2)  S                E  B
    T    ---TEXT---  T  C
    X                B  C

3)  S                   S                E  B
    O  ---HEADING---    T    ---TEXT---  T  C
    H                   X                X  C

4)  S                   S                E  B
    O  ---HEADING---    T    ---TEXT---  T  C
    H                   X                B  C

5)  S                   E     B
    O  ---HEADING---    T     C
    H                   B     C
```

B
Note 1.— C is a block check character (BCC).
C

Note 2.— In formats 2), 4), and 5) above which end with ETB, some continuation is required.

c) A supervisory sequence shall be composed of either a single transmission control character (EOT, ENQ, ACK or NAK) or a single transmission control (ENQ) preceded by a prefix of up to 15 non-control characters, or the character DLE used in conjunction with other graphic and control characters to provide additional communication control functions.

8.6.3.3 Three system categories are specified in terms of their respective circuit characteristics, terminal configurations, and message transfer procedures as follows:

System category A: two-way alternate, multipoint allowing either centralized or non-centralized operation and single or multiple message-oriented information transfers without replies (but with delivery verification).

System category B: two-way simultaneous, point-to-point employing message associated blocking and modulo 8 numbering of blocks and acknowledgements.

System category C: two-way alternate, multipoint allowing only centralized (computer-to-terminal) operation, single or multiple message transfers with replies.

8.6.3.3.1 In addition to the characteristics prescribed in the paragraphs that follow for both system categories A and B, other parameters that shall be accounted for in order to ensure viable, operationally reliable communications include:

a) the number of SYN characters required to establish and maintain synchronization;

Note.— Normally the transmitting station sends three contiguous SYN characters and the receiving station detects at least two before any action is taken.

b) the values of system time-outs for such functions as “idle line” and “no response” as well as the number of automatic retries that are to be attempted before manual intervention is signalled;

c) the composition of prefixes within a 15 character maximum.

Note.— By agreement between the administrations concerned, it is permissible for supervisory signals to contain a station identification prefix using characters selected from columns 4 through 7 of IA-5.

8.6.3.3.2 **Recommendation.—** *For multipoint implementations designed to permit only centralized (computer-to-terminal) operations, the provisions of 8.6.3.7 should be employed.*

8.6.3.4 BLOCK CHECK CHARACTER

8.6.3.4.1 Both system category A and B shall utilize a block check character to determine the validity of a transmission.

8.6.3.4.2 The block check character shall be composed of 7 bits plus a parity bit.

8.6.3.4.3 Each of the first 7 bits of the block check character shall be the modulo 2 binary sum of every element in the same bit 1 to bit 7 column of the successive characters of the transmitted block.

8.6.3.4.4 The longitudinal parity of each column of the block, including the block check character, shall be even.

8.6.3.4.5 The sense of the parity bit of the block check character shall be the same as for the information characters (see 8.6.1.2.3).

8.6.3.4.6 *SUMMATION*

8.6.3.4.6.1 The summation to obtain the block check character shall be started by the first appearance of either SOH (start of heading) or STX (start of text).

8.6.3.4.6.2 The starting character shall not be included in the summation.

8.6.3.4.6.3 If an STX character appears after the summation has been started by SOH, then the STX character shall be included in the summation as if it were a text character.

8.6.3.4.6.4 With the exception of SYN (synchronous idle), all the characters which are transmitted after the start of the block check summation shall be included in the summation, including the ETB (end of transmission/block) or ETX (end of text) control character which signals that the following character is the block check character.

8.6.3.4.7 No character, SYN or otherwise, shall be inserted between the ETB or ETX character and the block check character.

8.6.3.5 DESCRIPTION OF SYSTEM CATEGORY A

System category A is one in which a number of stations are connected by a multipoint link and one station is permanently designated as the control station which monitors the link at all times to ensure orderly operation.

8.6.3.5.1 *LINK ESTABLISHMENT PROCEDURE*

8.6.3.5.1.1 To establish the link for transmission, the control station shall either:

a) poll one of the tributary stations to assign it master status; or

b) assume master status and select one or more tributary (slave) stations to receive a transmission.

8.6.3.5.1.2 Polling shall be accomplished by the control station sending a polling supervisory sequence consisting of a prefix identifying a single tributary station and ending in ENQ.

8.6.3.5.1.3 A tributary station detecting its assigned polling supervisory sequence shall assume master status and respond in one of two ways:

a) if the station has a message to send, it shall initiate a selection supervisory sequence as described in 8.6.3.5.1.5;

b) if the station has no message to send, it shall send EOT, and master status shall revert to the control station.

8.6.3.5.1.4 If the control station detects an invalid or no response resulting from a poll, it shall terminate by sending EOT prior to resuming polling or selection.

8.6.3.5.1.5 Selection shall be accomplished by the designated master station sending a selection supervisory sequence consisting of a prefix identifying a single station and ending in ENQ.

8.6.3.5.1.6 A station detecting its assigned selection supervisory sequence shall assume slave status and send one of two replies:

a) if the station is ready to receive, it shall send a prefix followed by ACK. Upon detecting this reply, the master station shall either select another station or proceed with message transfer;

b) if the station is not ready to receive, it shall send a prefix followed by NAK and thereby relinquish slave status. If the master station receives NAK, or no reply, it shall either select another or the same tributary station or terminate;

c) it shall be permissible for N retries ($N \geq 0$) to be made to select a station for which NAK, an invalid reply, or no response has been received.

8.6.3.5.1.7 If one or more stations have been selected and have properly responded with ACK, the master station shall proceed with message transfer.

8.6.3.5.2 *MESSAGE TRANSFER PROCEDURE*

8.6.3.5.2.1 The master station shall send a message or series of messages, with or without headings to the selected slave station(s).

8.6.3.5.2.2 The transmission of a message shall:

a) begin with:

— SOH if the message has a heading,
— STX if the message has no heading;

b) be continuous, ending with ETX, immediately followed by a block check character (BCC).

8.6.3.5.2.3 After transmitting one or more messages, the master station shall verify successful delivery at each selected slave station.

8.6.3.5.3 *DELIVERY VERIFICATION PROCEDURE*

8.6.3.5.3.1 The master station shall send a delivery verification supervisory sequence consisting of a prefix identifying a single slave station and ending in ENQ.

8.6.3.5.3.2 A slave station detecting its assigned delivery verification supervisory sequence shall send one of two replies:

a) if the slave station properly received all of the transmission, it shall send an optional prefix followed by ACK;

b) if the slave station did not receive all of the transmission properly, it shall send an optional prefix followed by NAK.

8.6.3.5.3.3 If the master station receives no reply or an invalid reply, it shall request a reply from the same or another slave station until all selected stations have been properly accounted for.

8.6.3.5.3.4 If the master station receives a negative reply (NAK) or, after $N \geq 0$ repeat attempts, no reply, it shall repeat that transmission to the appropriate slave stations at a later opportunity.

8.6.3.5.3.5 After all messages have been sent and delivery verified, the master station shall proceed with link termination.

8.6.3.5.4 *LINK TERMINATION PROCEDURE*

8.6.3.5.4.1 The terminate function, negating the master or slave status of all stations and returning master status to the control station, shall be accomplished by the master station transmitting EOT.

8.6.3.6 DESCRIPTION OF SYSTEM CATEGORY B

System category B is one in which two stations are on a point-to-point, full-duplex link and each station has the capability to maintain concurrent master and slave status, i.e. master status on its transmit side and slave status on its receive side and both stations can transmit simultaneously.

8.6.3.6.1 *LINK ESTABLISHMENT PROCEDURE*

8.6.3.6.1.1 To establish the link for message transfers (from the calling to the called station), the calling station shall request the identity of the called station by sending an identification supervisory sequence consisting of a DLE character followed by a colon character, an optional prefix, and ENQ.

8.6.3.6.1.2 The called station, upon detecting ENQ, shall send one of two replies:

a) if ready to receive, it shall send a sequence consisting of a DLE followed by a colon, a prefix which includes its identity and ended by ACK0 (see 8.6.3.6.2.5). This establishes the link for message transfers from the calling to the called station;

b) if not ready to receive, it shall send the above sequence with the ACK0 replaced by NAK.

8.6.3.6.1.3 Establishment of the link for message transfers in the opposite direction can be initiated at any time following circuit connection in a similar manner to that described above.

8.6.3.6.2 *MESSAGE TRANSFER PROCEDURE*

8.6.3.6.2.1 System category B message transfer provides for message associated blocking with longitudinal checking and modulo 8 numbered acknowledgements.

8.6.3.6.2.2 It is permissible for a transmission block to be a complete message or a portion of a message. The sending station shall initiate the transmission with SOTB N followed by:

a) SOH if it is the beginning of a message that contains a heading;

b) STX if it is the beginning of a message that has no heading;

c) SOH if it is an intermediate block that continues a heading;

d) STX if it is an intermediate block that continues a text.

Note.— SOTB N is the two-character transmission control sequence DLE = (characters 1/0, and 3/13) followed by the block number, N, where N is one of the IA-5 characters 0, 1 ... 7 (characters 3/0, 3/1 ... 3/7).

8.6.3.6.2.3 A block which ends at an intermediate point within a message shall be ended with ETB; a block which ends at the end of a message shall be ended with ETX.

8.6.3.6.2.4 It shall be permissible for each station to initiate and continue to send messages to the other concurrently according to the following sequence.

a) It shall be permissible for the sending station (master side) to send blocks, containing messages or parts of messages, continuously to the receiving station (slave side) without waiting for a reply.

b) It shall be permissible for replies, in the form of slave responses, to be transmitted by the receiving station while the sending station is sending subsequent blocks.

Note.— By use of modulo 8 numbering of blocks and replies, it shall be permissible for the sending station to send as many as seven blocks ahead of the received replies before being required to stop transmission until six or less blocks are outstanding.

c) If a negative reply is received, the sending station (master side) shall start retransmission with the block following the last block for which the proper affirmative acknowledgement was received.

8.6.3.6.2.5 Slave responses shall be according to one of the following:

a) if a transmission block is received without error and the station is ready to receive another block, it shall send DLE, a colon, an optional prefix, and the appropriate acknowledgement ACKN (referring to the received block beginning with SOTB N, e.g. ACK0, transmitted as DLE0 is used as the affirmative reply to the block numbered SOTB0, DLE1 for SOTB1, etc.);

b) if a transmission block is not acceptable, the receiving station shall send DLE, a colon, an optional prefix, and NAK.

8.6.3.6.2.6 **Recommendation.—** *Slave responses should be interleaved between message blocks and transmitted at the earliest possible time.*

8.6.3.6.3 *LINK TERMINATION PROCEDURE*

8.6.3.6.3.1 If the link has been established for message transfers in either or both directions, the sending of EOT by a station shall signal the end of message transfers in that direction. To resume message transfers after sending EOT, the link shall be re-established in that direction.

8.6.3.6.3.2 EOT shall only be transmitted by a station after all outstanding slave responses have been received or otherwise accounted for.

8.6.3.6.4 *CIRCUIT DISCONNECTION*

8.6.3.6.4.1 On switched connections, the data links in both directions shall be terminated before the connection is cleared. In addition, the station initiating clearing of the connection shall first announce its intention to do so by transmitting the two-character sequence DLE EOT, followed by any other signals required to clear the connection.

8.6.3.7 DESCRIPTION OF SYSTEM CATEGORY C (CENTRALIZED)

System category C (centralized) is one (like system category A) in which a number of stations are connected by a multipoint link and one station is designated as the control station but (unlike system category A) provides only for centralized (computer-to-terminal) operations where message interchange (with replies) shall be constrained to occur only between the control and a selected tributary station.

8.6.3.7.1 *LINK ESTABLISHMENT PROCEDURE*

8.6.3.7.1.1 To establish the link for transmission the control station shall either:

a) poll one of the tributary stations to assign it master status; or

b) assume master status and select a tributary station to assume slave status and receive a transmission according to either of two prescribed selection procedures:

 1) selection with response (see 8.6.3.7.1.5); or

 2) fast select (see 8.6.3.7.1.7).

8.6.3.7.1.2 Polling is accomplished by the control station sending a polling supervisory sequence consisting of a prefix identifying a single tributary station and ending in ENQ.

8.6.3.7.1.3 A tributary station detecting its assigned polling supervisory sequence shall assume master status and respond in one of two ways:

a) if the station has a message to send, it shall initiate message transfer. The control station assumes slave status;

b) if the station has no message to send, it shall send EOT and master status shall revert to the control station.

8.6.3.7.1.4 If the control station detects an invalid or no response resulting from a poll, it shall terminate by sending EOT prior to resuming polling or selection.

8.6.3.7.1.5 Selection with response is accomplished by the control station assuming master status and sending a selection supervisory sequence consisting of a prefix identifying a single tributary station and ending in ENQ.

8.6.3.7.1.6 A tributary station detecting its assigned selection supervisory sequence shall assume slave status and send one of two replies:

a) if the station is ready to receive, it shall send an optional prefix followed by ACK. Upon detecting this reply, the master station shall proceed with message transfer;

b) if the station is not ready to receive, it shall send an optional prefix followed by NAK. Upon detecting NAK, it shall be permissible for the master station to again attempt selecting the same tributary station or initiate termination by sending EOT.

Note.— If the control station receives an invalid or no reply, it is permitted to attempt again to select the same tributary or after N *retries (*$N \geq 0$*) either to exit to a recovery procedure or to initiate termination by sending EOT.*

8.6.3.7.1.7 Fast select is accomplished by the control station assuming master status and sending a selection supervisory sequence, and without ending this transmission with ENQ or waiting for the selected tributary to respond, proceeding directly to message transfer.

8.6.3.7.2 *MESSAGE TRANSFER PROCEDURE*

8.6.3.7.2.1 The station with master status shall send a single message to the station with slave status and wait for a reply.

8.6.3.7.2.2 The message transmission shall:

a) begin with:

— SOH if the message has a heading,
— STX if the message has no heading;

and

b) be continuous, ending with ETX, immediately followed by BCC.

8.6.3.7.2.3 The slave station, upon detecting ETX followed by BCC, shall send one of two replies:

a) if the messages were accepted and the slave station is ready to receive another message, it shall send an optional prefix followed by ACK. Upon detecting ACK, the master station shall be permitted either to transmit the next message or initiate termination;

b) if the message was not accepted and the slave station is ready to receive another message, it shall send an optional prefix followed by NAK. Upon detecting NAK, the master station may either transmit another message or initiate termination. Following the NAK reply, the next message transmitted need not be a retransmission of the message that was not accepted.

8.6.3.7.2.4 If the master station receives an invalid or no reply to a message, it shall be permitted to send a delivery verification supervisory sequence consisting of an optional prefix followed by ENQ. Upon receipt of a delivery verification supervisory sequence, the slave station repeats its last reply.

8.6.3.7.2.5 N retries ($N \geq 0$) may be made by the master station in order to get a valid slave reply. If a valid reply is not received after N retries, the master station exits to a recovery procedure.

8.6.3.7.3 *LINK TERMINATION PROCEDURE*

8.6.3.7.3.1 The station with master status shall transmit EOT to indicate that it has no more messages to transmit. EOT shall negate the master/slave status of both stations and return master status to the control station.

8.6.4 Ground-ground bit-oriented data link control procedures

Note.— The provisions of this section pertain to ground-ground data interchange applications using bit-oriented data link control procedures enabling transparent, synchronous transmission that is independent of any encoding; data link control functions are accomplished by interpreting designated bit positions in the transmission envelope of a frame.

8.6.4.1 The following descriptions shall apply to data link applications contained in this section:

a) Bit-oriented data link control procedures enable transparent transmission that is independent of any encoding.

b) A data link is the logical association of two interconnected stations, including the communication control capability of the interconnected stations.

c) A station is a configuration of logical elements, from or to which messages are transmitted on a data link, including those elements which control the message flow on the link via communication control procedures.

d) A combined station sends and receives both commands and responses and is responsible for control of the data link.

e) Data communication control procedures are the means used to control and protect the orderly interchange of information between stations on a data link.

f) A component is defined as a number of bits in a prescribed order within a sequence for the control and supervision of the data link.

g) An octet is a group of 8 consecutive bits.

h) A sequence is one or more components in prescribed order comprising an integral number of octets.

i) A field is a series of a specified number of bits or specified maximum number of bits which performs the functions of data link or communications control or constitutes data to be transferred.

j) A frame is a unit of data to be transferred over the data link, comprising one or more fields in a prescribed order.

k) A common ICAO data interchange network (CIDIN) switching centre is that part of an automatic AFTN switching centre which provides for the entry, relay, and exit centre functions using the bit-oriented link and CIDIN network procedures specified in this section and includes the appropriate interface(s) with other parts of the AFTN and with other networks.

8.6.4.2 BIT-ORIENTED DATA LINK CONTROL PROCEDURES FOR POINT-TO-POINT, GROUND-GROUND DATA INTERCHANGE APPLICATIONS EMPLOYING SYNCHRONOUS TRANSMISSION FACILITIES

Note.— The following link level procedures are the same as the LAPB link level procedures described in ITU CCITT Recommendation X.25, Section 2, Yellow Book (1981 version). Later versions of Recommendation X.25 will be reviewed as they are released to ascertain whether or not they should be adopted.

8.6.4.2.1 *Frame format.* Frames shall contain not less than 32 bits, excluding the opening and closing flags, and shall conform to the following format:

FLAG F	ADDRESS A	CONTROL C	INFORMATION I	FCS	FLAG F

8.6.4.2.1.1 A frame shall consist of an opening flag (F), an address field (A), a control field (C), an optional information field (I), a frame check sequence (FCS), and a closing flag sequence (F), and shall be transmitted in that order.

Note.— In relation to CIDIN, the opening flag, the fields A and C, the FCS and the closing flag form together the Data Link Control Field (DLCF). The field I is denoted as the Link Data Field (LDF).

8.6.4.2.1.1.1 The flag (F) shall be the 8-bit sequence 01111110 which delimits the beginning and ending of each frame. It shall be permissible for the closing flag of a frame to also serve as the opening flag of the next frame.

8.6.4.2.1.1.2 The address (A) field shall consist of one octet, excluding 0 bits added to achieve transparent transmission, which shall contain the link address of the combined station.

8.6.4.2.1.1.3 The control (C) field shall consist of one octet, excluding 0 bits added to achieve transparent transmission, and shall contain the commands, responses, and frame sequence number components for the control of the data link.

8.6.4.2.1.1.4 The information (I) field shall contain digital data which may be presented in any code or sequence but shall not exceed a maximum of 259 octets, excluding 0 bits added to achieve transparent transmission. The I field shall always be a multiple of 8 bits in length.

8.6.4.2.1.1.5 The frame check sequence (FCS) shall consist of two octets, excluding 0 bits added to achieve transparent transmission, and shall contain the error detecting bits.

8.6.4.2.2 A frame check sequence (FCS) shall be included in each frame for the purpose of error checking.

8.6.4.2.2.1 The error checking algorithm shall be a cyclic redundancy check (CRC).

8.6.4.2.2.2 The CRC polynomial ($P(x)$) shall be

$$x^{16} + x^{12} + x^5 + 1.$$

8.6.4.2.2.3 The FCS shall be a 16-bit sequence. This FCS shall be the ones' complement of the remainder, $R(x)$, obtained from the modulo 2 division of

$$x^{16}[G(x)] + x^K(x^{15} + x^{14} + x^{13} + ... + x^2 + x^1 + 1)$$

by the CRC polynomial, $P(x)$.

$G(x)$ shall be the contents of the frame existing between, but including neither, the final bit of the opening flag nor the first bit of the FCS, excluding bits inserted for transparent transmission.

K shall be the length of $G(x)$ (number of bits).

8.6.4.2.2.4 The generation and checking of the FCS accumulation shall be as follows:

a) the transmitting station shall initiate the FCS accumulation with the first (least significant) bit of the address (A) field and shall include all bits up to and including the last bit preceding the FCS sequence, but shall exclude all 0 bits (if any) inserted to achieve transparent transmission;

b) upon completion of the accumulation the FCS shall be transmitted, starting with bit b1 (highest order coefficient) and proceeding in sequence to bit b16 (lowest order coefficient) as shown below;

First bit transmitted ↓

b16	b15	b14	----------	b3	b2	b1
x^0	x^1	x^2		x^{13}	x^{14}	x^{15}

c) the receiving station shall carry out the cyclic redundancy check (CRC) on the content of the frame commencing with the first bit received following the opening flag, and shall include all bits up to and including the last bit preceding the closing flag, but shall exclude all 0 bits (if any) deleted according to the rules for achievement of transparency;

d) upon completion of the FCS accumulation, the receiving station shall examine the remainder. In the absence of transmission error, the remainder shall be 1111000010111000 (x^0 through x^{15}, respectively).

8.6.4.2.3 *Achievement of transparency.* The frame format contents (A, C, link data field, and FCS) shall be capable of containing any bit configuration.

8.6.4.2.3.1 The following rules shall apply to all frame contents, except flag sequences:

a) the transmitting station shall examine the frame contents before transmission, and shall insert a single 0 bit immediately following each sequence of 5 consecutive 1 bits;

b) the receiving station shall examine the received frame contents for patterns consisting of 5 consecutive 1 bits immediately followed by one (or more) 0 bit(s) and shall remove the 0 bit which directly follows 5 consecutive 1 bits.

8.6.4.2.4 *Special transmission sequences and related link states.* In addition to employing the prescribed repertoire of commands and responses to manage the interchange of data and control information, stations shall use the following conventions to signal the indicated conditions:

a) *Abort* is the procedure by which a station in the process of sending a frame ends the frame in an unusual manner such that the receiving station shall ignore the frame. The conventions for aborting a frame shall be:

1) transmitting at least seven, but less than fifteen, one bits (with no inserted zeros);

2) receiving seven one bits.

b) *Active link state.* A link is in an active state when a station is transmitting a frame, an abort sequence, or interframe time fill. When the link is in the active state, the right of the transmitting station to continue transmission shall be reserved.

c) *Interframe time fill.* Interframe time fill shall be accomplished by transmitting continuous flags between frames. There is no provision for time fill within a frame.

d) *Idle link state.* A link is in an idle state when a continuous one condition is detected that persists for 15 bit times, or longer. Idle link time fill shall be a continuous one condition on the link.

e) *Invalid frame.* An invalid frame is one that is not properly bounded by two flags or one which is shorter than 32 bits between flags.

8.6.4.2.5 *MODES*

8.6.4.2.5.1 *Operational mode.* The operational mode shall be the asynchronous balanced mode (ABM).

8.6.4.2.5.1.1 It shall be permissible for a combined station in ABM to transmit without invitation from the associated station.

8.6.4.2.5.1.2 A combined station in ABM shall be permitted to transmit any command or response type frame except DM.

8.6.4.2.5.2 *Non-operational mode.* The non-operational mode shall be the asynchronous disconnected mode (ADM) in which a combined station is logically disconnected from the data link.

8.6.4.2.5.2.1 It shall be permissible for a combined station in ADM to transmit without invitation from the associated station.

8.6.4.2.5.2.2 A combined station in ADM shall transmit only SABM, DISC, UA and DM frames. (See 8.6.4.2.7 for a description of the commands and responses to which these frame types refer.)

8.6.4.2.5.2.3 A combined station in ADM shall transmit a DM when a DISC is received, and shall discard all other received command frames except SABM. If a discarded command frame has the P bit set to “1”, the combined station shall transmit a DM with the F bit set to “1”.

8.6.4.2.6 *Control field functions and parameters.* Control fields contain a command or a response and sequence numbers where applicable. Three types of control fields shall be used to perform:

a) numbered information transfer (I-frames);

b) numbered supervisory functions (S-frames); and

c) unnumbered control functions (U-frames).

The control field formats shall be as shown in Table 8-5. The functional frame designation associated with each type control field as well as the control field parameters employed in performing these functions shall be described in the following paragraphs.

8.6.4.2.6.1 The I-frame type is used to perform information transfers. Except for some special cases it is the only format which shall be permitted to contain an information field.

8.6.4.2.6.2 The S-frame type is used for supervisory commands and responses that perform link supervisory control functions such as acknowledge information frames, request transmission or retransmission of information frames, and to request a temporary suspension of transmission of I-frames. No information field shall be contained in the S-frame.

8.6.4.2.6.3 The U-frame type is used for unnumbered commands and responses that provide additional link control functions. One of the U-frame responses, the frame reject (FRMR) response, shall contain an information field; all other frames of the U-frame type shall not contain an information field.

8.6.4.2.6.4 The station parameters associated with the three control field types shall be as follows:

a) *Modulus.* Each I-frame shall be sequentially numbered with a send sequence count, *N(S),* having value 0 through modulus minus one (where modulus is the modulus of the sequence numbers). The modulus shall be 8. The maximum number of sequentially numbered I-frames that a station shall have outstanding (i.e. unacknowledged) at any given time shall never exceed one less than the modulus of the sequence numbers. This restriction on the number of outstanding frames is to prevent any ambiguity in the association of transmission frames with sequence numbers during normal operation and/or error recovery.

b) The send state variable $V(S)$ shall denote the sequence number of the next in-sequence I-frame to be transmitted.

   1) The send state variable shall take on the value 0 through modulus minus one (modulus is the modulus of the sequence numbering and the numbers cycle through the entire range).

   2) The value of $V(S)$ shall be incremented by one with each successive in-sequence I-frame transmission, but shall not exceed the value of $N(R)$ contained in the last received frame by more than the maximum permissible number of outstanding I-frames (k). See i) below for the definition of k.

c) Prior to transmission of an in-sequence I-frame, the value of $N(S)$ shall be updated to equal the value of $V(S)$.

d) The receive state variable $V(R)$ shall denote the sequence number of the next in-sequence I-frame to be received.

   1) $V(R)$ shall take on the values 0 through modulus minus one.

   2) The value of $V(R)$ shall be incremented by one after the receipt of an error-free, in-sequence I-frame whose send sequence number $N(S)$, equals $V(R)$.

e) All I-frames and S-frames shall contain $N(R)$, the expected sequence number of the next received frame. Prior to transmission of either an I or an S type frame, the value of $N(R)$ shall be updated to equal the current value of the receive state variable. $N(R)$ indicates that the station transmitting the $N(R)$ has correctly received all I-frames numbered up to and including $N(R) – 1$.

f) Each station shall maintain an independent send state variable, $V(S)$, and receive state variable, $V(R)$, on the I-frames it sends and receives. That is, each combined station shall maintain a $V(S)$ count on the I-frames it transmits and a $V(R)$ count on the I-frames it has correctly received from the remote combined station.

g) The poll (P/F) bit shall be used by a combined station to solicit (poll) a response or sequence of responses from the remote combined station.

h) The final (P/F) bit shall be used by the remote combined station to indicate the response frame transmitted as the result of a soliciting (poll) command.

i) The maximum number (k) of sequentially numbered I-frames that a station may have outstanding (i.e. unacknowledged) at any given time is a station parameter which shall never exceed the modulus.

Note.— k is determined by station buffering limitations and should be the subject of bilateral agreement at the time of circuit establishment.

8.6.4.2.7 *Commands and responses.* It shall be permissible for a combined station to generate either commands or responses. A command shall contain the remote station address while a response shall contain the sending station address. The mnemonics associated with all of the commands and responses prescribed for each of the three frame types (I, S, and U) and the corresponding encoding of the control field are as shown in Table 8-6.

8.6.4.2.7.1 The I-frame command provides the means for transmitting sequentially numbered frames, each of which shall be permitted to contain an information field.

8.6.4.2.7.2 The S-frame commands and responses shall be used to perform numbered supervisory functions (such as acknowledgement, polling, temporary suspension of information transfer, or error recovery).

8.6.4.2.7.2.1 The receive ready command or response (RR) shall be used by a station to:

a) indicate that it is ready to receive an I-frame;

b) acknowledge previously received I-frames numbered up to and including $N(R) - 1$;

c) clear a busy condition that was initiated by the transmission of RNR.

Note.— It is permissible for a combined station to use the RR command to solicit a response from the remote combined station with the poll bit set to "1".

8.6.4.2.7.2.2 It shall be permissible to issue a reject command or response (REJ) to request retransmission of frames starting with the I-frame numbered $N(R)$ where:

a) I-frames numbered $N(R) - 1$ and below are acknowledged;

b) additional I-frames pending initial transmission are to be transmitted following the retransmitted I-frame(s);

c) only one REJ exception condition, from one given station to another station, shall be established at any given time: another REJ shall not be issued until the first REJ exception condition has been cleared;

d) the REJ exception condition is cleared (reset) upon the receipt of an I-frame with an $N(S)$ count equal to the $N(R)$ of the REJ command/response.

8.6.4.2.7.2.3 The receive not ready command or response (RNR) shall be used to indicate a busy condition, i.e. temporary inability to accept additional incoming I-frames, where:

a) frames numbered up to and including $N(R) - 1$ are acknowledged;

b) frame $N(R)$ and any subsequent I-frames received, if any, are not acknowledged (the acceptance status of these frames shall be indicated in subsequent exchanges);

c) the clearing of a busy condition shall be indicated by the transmission of an RR, REJ, SABM, or UA with or without the P/F bit set to "1".

8.6.4.2.7.2.3.1 **Recommendation.—**

a) A station receiving an RNR frame when in the process of transmitting should stop transmitting I-frames at the earliest possible time.

b) Any REJ command or response which was received prior to the RNR should be actioned before the termination of transmission.

c) It should be permissible for a combined station to use the RNR command with the poll bit set to "1" to obtain a supervisory frame with the final bit set to "1" from the remote combined station.

8.6.4.2.7.2.4 It shall be permissible for the selective reject command or response (SREJ) to be used to request retransmission of the single I-frame numbered $N(R)$ where:

a) frames numbered up to $N(R) - 1$ are acknowledged; frame $N(R)$ is not accepted; the only I-frames accepted are those received correctly and in sequence following the I-frame requested; the specific I-frame to be retransmitted is indicated by the $N(R)$ in the SREJ command/response;

b) the SREJ exception condition is cleared (reset) upon receipt of an I-frame with an $N(S)$ count equal to the $N(R)$ of the SREJ;

c) after a station transmits a SREJ it is not permitted to transmit SREJ or REJ for an additional sequence error until the first SREJ error condition has been cleared;

d) I-frames that have been permitted to be transmitted following the I-frame indicated by the SREJ are not retransmitted as the result of receiving a SREJ; and

e) it is permissible for additional I-frames pending initial transmission to be transmitted following the retransmission of the specific I-frame requested by the SREJ.

8.6.4.2.7.3 The U-frame commands and responses shall be used to extend the number of link control functions. Transmitted U-frames do not increment the sequence counts at either the transmitting or receiving station.

a) The U-frame mode-setting commands (SABM, and DISC) shall be used to place the addressed station in the appropriate response mode (ABM or ADM) where:

   1) upon acceptance of the command, the station send and receive state variables, $V(S)$ and $V(R)$, are set to zero;

   2) the addressed station confirms acceptance at the earliest possible time by transmission of a single unnumbered acknowledgement, UA;

   3) previously transmitted frames that are unacknowledged when the command is actioned remain unacknowledged;

   4) the DISC command is used to perform a logical disconnect, i.e. to inform the addressed combined station that the transmitting combined station is suspending operation. No information field shall be permitted with the DISC command.

b) The unnumbered acknowledge response (UA) shall be used by a combined station to acknowledge the receipt and acceptance of an unnumbered command. Received unnumbered commands are not actioned until the UA response is transmitted. No information field shall be permitted with the UA response.

c) The frame reject response (FRMR), employing the information field described below, shall be used by a combined station in the operational mode (ABM) to report that one of the following conditions resulted from the receipt of a frame without an FCS error:

   1) a command/response that is invalid or not implemented;

   2) a frame with an information field that exceeds the size of the buffer available;

3) a frame having an invalid *N*(*R*) count.

Note.— An invalid N(R) *is a count which points to an I-frame which has previously been transmitted and acknowledged or to an I-frame which has not been transmitted and is not the next sequential I-frame pending transmission.*

d) The disconnected mode response (DM) shall be used to report a non-operational status where the station is logically disconnected from the link. No information field shall be permitted with the DM response.

Note.— The DM response shall be sent to request the remote combined station to issue a mode-setting command or, if sent in response to the reception of a mode-setting command, to inform the remote combined station that the transmitting station is still in ADM and cannot action the mode-setting command.

8.6.4.3 EXCEPTION CONDITION REPORTING AND RECOVERY

This section specifies the procedures that shall be employed to effect recovery following the detection or occurrence of an exception condition at the link level. Exception conditions described are those situations that may occur as the result of transmission errors, station malfunction, or operational situations.

8.6.4.3.1 *Busy condition.* A busy condition occurs when a station temporarily cannot receive or continue to receive I-frames due to internal constraints, e.g. due to buffering limitations. The busy condition shall be reported to the remote combined station by the transmission of an RNR frame with the *N*(*R*) number of the next I-frame that is expected. It shall be permissible for traffic pending transmission at the busy station to be transmitted prior to or following the RNR.

Note.— The continued existence of a busy condition must be reported by retransmission of RNR at each P/F frame exchange.

8.6.4.3.1.1 Upon receipt of an RNR, a combined station in ABM shall cease transmitting I-frames at the earliest possible time by completing or aborting the frame in process. The combined station receiving an RNR shall perform a time-out operation before resuming asynchronous transmission of I-frames unless the busy condition is reported as cleared by the remote combined station. If the RNR was received as a command with the P bit set to "1", the receiving station shall respond with an S-frame with the F bit set to "1".

8.6.4.3.1.2 The busy condition shall be cleared at the station which transmitted the RNR when the internal constraint ceases. Clearance of the busy condition shall be reported to the remote station by transmission of an RR, REJ, SABM, or UA frame (with or without the P/F bit set to "1").

8.6.4.3.2 N(S) *sequence error*. An *N*(*S*) sequence exception shall be established in the receiving station when an I-frame that is received error free (no FCS error) contains an *N*(*S*) sequence number that is not equal to the receive variable *V*(*R*) at the receiving station. The receiving station shall not acknowledge (shall not increment its receive variable *V*(*R*)) the frame causing the sequence error, or any I-frames which may follow, until an I-frame with the correct *N*(*S*) number is received. A station that receives one or more I-frames having sequence errors, but which are otherwise error free, shall accept the control information contained in the *N*(*R*) field and the P/F bit to perform link control functions, e.g. to receive acknowledgement of previously transmitted I-frames (via the *N*(*R*)), to cause the station to respond (P bit set to "1").

8.6.4.3.2.1 The means specified in 8.6.4.3.2.1.1 and 8.6.4.3.2.1.2 shall be available for initiating the retransmission of lost or errored I-frames following the occurrence of a sequence error.

8.6.4.3.2.1.1 Where the REJ command/response is used to initiate an exception recovery following the detection of a sequence error, only one "sent REJ" exception condition, from one station to another station, shall be established at a time. A "sent REJ" exception shall be cleared when the requested I-frame is received. A station receiving REJ shall initiate sequential (re)transmission of I-frames starting with the I-frame indicated by the *N*(*R*) contained in the REJ frame.

FRMR INFORMATION FIELD BITS FOR BASIC (SABM) OPERATION

First bit transmitted

1 8	9	10 12	13	14 16	17	18	19	20	21 24
rejected basic control field	0	*V(S)*	*v*	*V(R)*	*w*	*x*	*y*	*z*	set to zero

where:

rejected basic control field is the control field of the received frame which caused the frame reject;

V(*S*) is the current value of the send state variable at the remote combined station reporting the error condition (bit 10 = low order bit);

V(*R*) is the current value of the receive state variable at the remote combined station reporting the error condition (bit 14 = low order bit);

v set to "1" indicates that the received frame which caused rejection was a response;

w set to "1" indicates that the control field received and returned in bits 1 through 8 are invalid or not implemented;

x set to "1" indicates that the control field received and returned in bits 1 through 8 was considered invalid because the frame contained an information field which is not permitted with this command. Bit *w* must be set to "1" in conjunction with this bit;

y set to "1" indicates that the information field received exceeded the maximum information field length which can be accommodated by the station reporting the error condition. This bit is mutually exclusive with bits *w* and *x* above;

z set to "1" indicates that the control field received and returned in bits 1 through 8 contained an invalid *N(R)* count. This bit is mutually exclusive with bit *w*.

8.6.4.3.2.1.2 In the event a receiving station, due to a transmission error, does not receive (or receives and discards) a single I-frame or the last I-frame(s) in a sequence of I-frames, it shall not detect an out-of-sequence exception and, therefore, shall not transmit REJ. The station which transmitted the unacknowledged I-frame(s) shall, following the completion of a system-specified time-out period, take appropriate recovery action to determine the sequence number at which retransmission must begin.

8.6.4.3.2.1.3 **Recommendation.—** *A combined station which has timed out waiting for a response should not retransmit all unacknowledged frames immediately. The station may enquire about status with a supervisory frame.*

Note 1.— If a station does retransmit all unacknowledged I-frames after a time-out, it must be prepared to receive a subsequent REJ frame with an N(R) *greater than its send variable* V(S)*.*

Note 2.— Since contention may occur in the case of two-way alternate communications in ABM or ADM, the time-out interval employed by one combined station must be greater than that employed by the other combined station so as to permit contention to be resolved.

8.6.4.3.3 *FCS error.* Any frame with an FCS error shall not be accepted by the receiving station and will be discarded. No action shall be taken by the receiving station as the result of that frame.

8.6.4.3.4 *Frame reject exception condition.* A frame reject exception condition shall be established upon the receipt of an error-free frame which contains an invalid or unimplemented control field, an invalid *N(R)*, or an information field which has exceeded the maximum established storage capability. If a frame reject exception condition occurs in a combined station, the station shall either:

a) take recovery action without reporting the condition to the remote combined station; or

b) report the condition to the remote combined station with a FRMR response. The remote station will then be expected to take recovery action; if, after waiting an appropriate time, no recovery action appears to have been taken, the combined station reporting the frame reject exception condition may take recovery action.

Recovery action for balanced operation includes the transmission of an implemented mode-setting command. Higher level functions may also be involved in the recovery.

8.6.4.3.5 *Mode-setting contention.* A mode-setting contention situation exists when a combined station issues a mode-setting command and, before receiving an appropriate response (UA or DM), receives a mode-setting command from the remote combined station. Contention situations shall be resolved in the following manner:

a) when the send and receive mode-setting commands are the same, each combined station shall send a UA response at the earliest respond opportunity. Each combined station shall either enter the indicated mode immediately or defer entering the indicated mode until receiving a UA response. In the latter case, if the UA response is not received:

   1) the mode may be entered when the response timer expires; or

   2) the mode-setting command may be reissued;

b) when the mode-setting commands are different, each combined station shall enter ADM and issue a DM response at the earliest respond opportunity. In the case of DISC contention with a different mode-setting command, no further action is required.

8.6.4.3.6 *Time-out functions.* Time-out functions shall be used to detect that a required or expected acknowledging action or response to a previously transmitted frame has not been received. Expiration of the time-out function shall initiate appropriate action, e.g. error recovery or reissuance of the P bit. The duration of the following time-out functions is system dependent and subject to bilateral agreement:

a) combined stations shall provide a time-out function to determine that a response frame with F bit set to “1” to a command frame with the P bit set to “1” has not been received. The time-out function shall automatically cease upon receipt of a valid frame with the F bit set to “1”;

b) a combined station which has no P bit outstanding, and which has transmitted one or more frames for which responses are anticipated shall start a time-out function to detect the no-response condition. The time-out function shall cease when an I- or S-frame is received with the $N(R)$ higher than the last received $N(R)$ (actually acknowledging one or more I-frames).

8.6.5 Common ICAO data interchange network (CIDIN)

8.6.5.1 INTRODUCTION

Note 1.— The common ICAO data interchange network (CIDIN) is an element of the aeronautical fixed service (AFS) which uses bit-oriented procedures, store and forward techniques and packet switching techniques based on CCITT Recommendation X.25 to carry messages of specific applications of the AFS such as AFTN and operational meteorological information (OPMET).

Note 2.— The CIDIN provides a reliable common network service for the conveyance of application messages in binary or text form to air traffic service providers and aircraft operating agencies.

8.6.5.1.1 CIDIN entry and exit centres or stations shall be used to connect application entities to the CIDIN.

Note.— The interfacing between CIDIN and application entities is a matter for local implementation.

8.6.5.1.2 CIDIN relay centres shall be used to forward packets between CIDIN entry and exit centres or stations which are not directly connected.

8.6.5.2 GENERAL

8.6.5.2.1 There shall be four protocol levels defined to control the transfer of messages between CIDIN switching centres:

— the data link protocol level

— the X.25 packet protocol level

— the CIDIN packet protocol level

— the CIDIN transport protocol level.

Note 1.— The relationship of the terms used is shown in Figures 8-1 and 8-2.

Note 2.— The details of CIDIN communication procedures and system specifications, as implemented in Europe, are shown in the EUR CIDIN Manual *(EUR Doc 005).*

8.6.5.2.2 *THE DATA LINK PROTOCOL LEVEL*

8.6.5.2.2.1 X.25 packets to be transferred between two CIDIN switching centres or a CIDIN switching centre and a packet switched data network, shall be formatted into data link frames.

8.6.5.2.2.2 Each data link frame shall consist of a data link control field (DLCF), possibly followed by a link data field, and shall be terminated by a frame check sequence and flag (being the second part of the DLCF). If a link data field is present, the frame shall be denoted as an information frame.

8.6.5.2.2.3 X.25 packets shall be transmitted within the link data field of information frames. Only one packet shall be contained in the link data field.

8.6.5.2.3 *THE X.25 PACKET PROTOCOL LEVEL*

8.6.5.2.3.1 Each CIDIN packet to be transferred on CIDIN circuits between CIDIN switching centres shall be formatted into one X.25 packet. When a packet switched data network is used, it shall be permissible to format the CIDIN packet into more than one X.25 packet.

8.6.5.2.3.2 The integrity of each CIDIN packet shall be preserved by the X.25 packet protocol by mapping each CIDIN packet onto one complete X.25 packet sequence, as defined in CCITT Recommendation X.25.

8.6.5.2.3.3 Each X.25 packet shall consist of an X.25 packet header, possibly followed by a user data field (UDF).

8.6.5.2.3.4 The X.25 packet protocol is based on the application of virtual circuit procedures. A virtual circuit shall be defined as a logical path between two CIDIN switching centres. If a packet switched data network is used to interconnect two CIDIN switching centres, the procedure shall provide full compatibility with the procedures to be followed for virtual circuits according to CCITT Recommendation X.25.

8.6.5.2.4 *THE CIDIN PACKET PROTOCOL LEVEL*

8.6.5.2.4.1 Each transport header and the associated segment shall be preceded by a CIDIN packet header. No further segmentation of the CIDIN message shall be used between transport protocol level and CIDIN packet protocol level. Both headers, therefore, shall be used in combination. Together they shall be referred to as the communications control field (CCF). Together with the message segment they form CIDIN packets that shall be transmitted from entry centre to exit centre(s), when necessary through one or more relay centres, as an entity.

8.6.5.2.4.2 CIDIN packets of one CIDIN message shall be relayed independently via predetermined routes through the network thus allowing alternative routing on a CIDIN packet basis as necessary.

8.6.5.2.4.3 The CIDIN packet header shall contain information to enable relay centres to handle CIDIN packets in the order of priority, to transmit the CIDIN packets on the proper outgoing circuit(s) and to duplicate or multiplicate CIDIN packets when required for multiple dissemination purposes. The information shall be sufficient to apply address stripping on the exit addresses as well as on the addressee indicators of messages in AFTN format.

8.6.5.2.5 *THE TRANSPORT PROTOCOL LEVEL*

8.6.5.2.5.1 Information exchanged over the CIDIN shall be transmitted as CIDIN messages.

8.6.5.2.5.2 The length of a CIDIN message shall be defined by the CIDIN packet sequence number (CPSN). The maximum permissible length is 2^{15} packets which in effect results in no practical limitation.

8.6.5.2.5.3 If the length of a CIDIN message and its transport and packet headers (as defined below) exceeds 256 octets, the message shall be divided into segments and placed in the CIDIN user data field of CIDIN packets. Each segment shall be preceded by a transport header containing information to enable the re-assembly of the CIDIN message at the exit centre(s) from individually received segments and to determine further handling of the received complete CIDIN message.

8.6.5.2.5.4 All segments of one CIDIN message shall be provided with the same message identification information in the transport header. Only the CPSN and final CIDIN packet (FCP) indicator shall be different.

8.6.5.2.5.5 Recovery of messages shall be performed at the transport level.

TABLES FOR CHAPTER 8

Table 8-1. International Telegraph Alphabets No. 2 and No. 3

Number of signal	*Letter case*	*Figure case*	*Impulses 5-unit code* Start	*12345*	*Stop*
				International Code No. 2	
1	A	—	A	ZZAAA	Z
2	B	?	A	ZAAZZ	Z
3	C	:	A	AZZZA	Z
4	D	Note 1	A	ZAAZA	Z
5	E	3	A	ZAAAA	Z
6	F		A	ZAZZA	Z
7	G		A	AZAZZ	Z
8	H		A	AAZAZ	Z
9	I	8	A	AZZAA	Z
10	J	Attention signal	A	ZZAZA	Z
11	K	(	A	ZZZZA	Z
12	L	)	A	AZAAZ	Z
13	M	.	A	AAZZZ	Z
14	N	,	A	AAZZA	Z
15	O	9	A	AAAZZ	Z
16	P	0	A	AZZAZ	Z
17	Q	1	A	ZZZAZ	Z
18	R	4	A	AZAZA	Z
19	S	’	A	ZAZAA	Z
20	T	5	A	AAAAZ	Z
21	U	7	A	ZZZAA	Z
22	V	=	A	AZZZZ	Z
23	W	2	A	ZZAAZ	Z
24	X	/	A	ZAZZZ	Z
25	Y	6	A	ZAZAZ	Z
26	Z	+	A	ZAAAZ	Z
27	carriage return		A	AAAZA	Z
28	line feed		A	AZAAA	Z
29	letters		A	ZZZZZ	Z
30	figures		A	ZZAZZ	Z
31	space		A	AAZAA	Z
32	unperforated tape		A	AAAAA	Z
33	signal repetition				
34	signal α				
35	signal ß				

Sign	*Closed circuit*	*Double current*
A	No current	Negative current
Z	Positive current	Positive current

Note 1.— Used for answer-back facility.

Table 8-2. International Alphabet No. 5 (IA-5)
(international reference version)

				b_7	0	0	0	0	1	1	1	1
				b_6	0	0	1	1	0	0	1	1
				b_5	0	1	0	1	0	1	0	1
b_4	b_3	b_2	b_1		0	1	2	3	4	5	6	7
0	0	0	0	0	NUL	TC_7 (DLE)	SP	0	@	P	`	p
0	0	0	1	1	TC_1 (SOH)	DC_1	!	1	A	Q	a	q
0	0	1	0	2	TC_2 (STX)	DC_2	" ④	2	B	R	b	r
0	0	1	1	3	TC_3 (ETX)	DC_3	#	3	C	S	c	s
0	1	0	0	4	TC_4 (EOT)	DC_4	¤ ②	4	D	T	d	t
0	1	0	1	5	TC_5 (ENQ)	TC_8 (NAK)	%	5	E	U	e	u
0	1	1	0	6	TC_6 (ACK)	TC_9 (SYN)	&	6	F	V	f	v
0	1	1	1	7	BEL	TC_{10} (ETB)	' ④	7	G	W	g	w
1	0	0	0	8	FE_0 (BS)	CAN	(	8	H	X	h	x
1	0	0	1	9	FE_1 (HT)	EM	)	9	I	Y	i	y
1	0	1	0	10	$FE_2$① (LF)	SUB	*	:	J	Z	j	z
1	0	1	1	11	FE_3 (VT)	ESC	+	;	K	[	k	{
1	1	0	0	12	FE_4 (FF)	IS_4 (FS)	④ ,	<	L	\	l	|
1	1	0	1	13	$FE_5$① (CR)	IS_3 (GS)	–	=	M	]	m	}
1	1	1	0	14	SO	IS_2 (RS)	.	>	N	^ ④	n	‾ ③
1	1	1	1	15	SI	IS_1 (US)	/	?	O	__	o	DEL

NOTES

Note 1.—The format effectors are intended for equipment in which horizontal and vertical movements are effected separately. If equipment requires the action of CARRIAGE RETURN to be combined with a vertical movement, the format effector for that vertical movement may be used to effect the combined movement. Use of FE 2 for a combined CR and LF operation is not allowed for international transmission on AFS networks.

Note 2.—The symbol ¤ does not designate the currency of a specific country.

Note 3.—Position 7/14 is used for graphic character ‾ (OVERLINE), the graphical representation of which may vary according to national use to represent (TILDE) or another diacritical sign provided that there is no risk of confusion with another graphic character included in the table.

Note 4.—The graphic characters in position 2/2, 2/7, 2/12 and 5/14 have respectively the significance of QUOTATION MARK, APOSTROPHE, COMMA and UPWARD ARROW HEAD; however, these characters take on the significance of the diacritical signs DIAERESIS, ACUTE ACCENT, CEDILLA and CIRCUMFLEX ACCENT when they are preceded or followed by the BACKSPACE character (0/8).

Note 5.—When graphical representation of the control characters of IA-5 is required, it is permissible to use the symbols specified in International Organization for Standardization (ISO) Standard 2047-1975.

CONTROL CHARACTERS

Abbreviation	*Meaning*	*Position in the code table*
ACK	Acknowledge	0/6
BEL	Bell	0/7
BS	Backspace	0/8
CAN	Cancel	1/8
CR	Carriage return*	0/13
DC	Device control	–
DEL	Delete	7/15
DLE	Data link escape	1/0
EM	End of medium	1/9
ENQ	Enquiry	0/5
EOT	End of transmission	0/4
ESC	Escape	1/11
ETB	End of transmission block	1/7
ETX	End of text	0/3
FE	Format effector	–
FF	Form feed	0/12
FS	File separator	1/12
GS	Group separator	1/13
HT	Horizontal tabulation	0/9
IS	Information separator	–
LF	Line feed*	0/10
NAK	Negative acknowledge	1/5
NUL	Null	0/0
RS	Record separator	1/14
SI	Shift-in	0/15
SO	Shift-out	0/14
SOH	Start of heading	0/1
SP	Space	2/0
STX	Start of text	0/2
SUB	Substitute character	1/10
SYN	Synchronous idle	1/6
TC	Transmission control	–
US	Unit separator	1/15
VT	Vertical tabulation	0/11

GRAPHIC CHARACTERS

Graphic	*Note*	*Name*	*Position in the code table*
(space)		Space (*see* 7.2)	2/0
!		Exclamation mark	2/1
"	4	Quotation mark, Diaeresis	2/2
#		Number sign	2/3
¤	2	Currency sign	2/4
%		Percent sign	2/5
&		Ampersand	2/6
'	4	Apostrophe, Acute accent	2/7
(		Left parenthesis	2/8
)		Right parenthesis	2/9
*		Asterisk	2/10
+		Plus sign	2/11
,	4	Comma, Cedilla	2/12
–		Hyphen, Minus sign	2/13
.		Full stop (period)	2/14
/		Solidus	2/15
:		Colon	3/10
;		Semi-colon	3/11
<		Less-than sign	3/12
=		Equal sign	3/13
>		Greater-than sign	3/14
?		Question mark	3/15
@		Commercial 'at'	4/0
[		Left square bracket	5/11
\		Reverse solidus	5/12
]		Right square bracket	5/13
^	4	Upward arrow head, Circumflex accent	5/14
_		Underline	5/15
`		Grave accent	6/0
{		Left curly bracket	7/11
|		Vertical line	7/12
}		Right curly bracket	7/13
‾	3	Overline, Tilde	7/14

* See Note 1.

DIACRITICAL SIGNS

In the character set, some printing symbols may be designed to permit their use for the composition of accented letters when necessary for general interchange of information. A sequence of three characters, comprising a letter, BACKSPACE and one of these symbols, is needed for this composition, and the symbol is then regarded as a diacritical sign. It should be noted that these symbols take on their diacritical significance only when they are preceded or followed by the BACKSPACE character: for example, the symbol corresponding to the code combination 2/7 (**'**) normally has the significance of APOSTROPHE, but becomes the diacritical sign ACUTE ACCENT when it precedes or follows the BACKSPACE character.

NAMES, MEANINGS AND FONTS OF GRAPHIC CHARACTERS

At least one name is assigned to denote each of the graphic characters. These names are intended to reflect their customary meanings and are not intended to define or restrict the meanings of graphic characters. No particular style or font design is specified for the graphic characters.

UNIQUENESS OF CHARACTER ALLOCATION

A character allocated to a position in the table may not be placed elsewhere in the table.

FUNCTIONAL CHARACTERISTICS RELATED TO CONTROL CHARACTERS

Some definitions given below are stated in general terms and more explicit definitions of use may be needed for specific implementation of the code table on recording media or on transmission channels. These more explicit definitions and the use of these characters are the subject of ISO publications.

General designations of control characters

The general designation of control characters involves a specific class name followed by a subscript number. They are defined as follows:

TC — *Transmission control characters* — Control characters intended to control or facilitate transmission of information over telecommunication networks.
The use of the TC characters on the general telecommunication networks is the subject of ISO publications.
The transmission control characters are:
ACK, DLE, ENQ, EOT, ETB, ETX, NAK, SOH, STX and SYN.

FE — *Format effectors* — Control characters mainly intended for the control of the layout and positioning of information on printing and/or display devices. In the definitions of specific format effectors, any reference to printing devices should be interpreted as including display devices. The definitions of format effectors use the following concept:

a) a page is composed of a number of lines of characters;

b) the characters forming a line occupy a number of positions called character positions;

c) the active position is that character position in which the character about to be processed would appear if it were to be printed. The active position normally advances one character position at a time.

The format effector characters are:
BS, CR, FF, HT, LF and VT.

DC — *Device control characters* — Control characters for the control of a local or remote ancillary device (or devices) connected to a data processing and/or telecommunication system. These control characters are not intended to control telecommunication systems; this should be achieved by the use of TCs.
Certain preferred uses of the individual DCs are given below under *Specific control characters*.

IS — *Information separators* — Control characters that are used to separate and qualify data logically. There are four such characters. They may be used either in hierarchical order or non-hierarchically; in the latter case their specific meanings depend on their applications.
When they are used hierarchically, the ascending order is:
US, RS, GS, FS.
In this case data normally delimited by a particular separator cannot be split by a higher order separator but will be considered as delimited by any higher order separator.

Specific control characters

Individual members of the classes of controls are sometimes referred to by their abbreviated class name and a subscript number (e.g. TC_5) and sometimes by a specific name indicative of their use (e.g. ENQ).

Different but related meanings may be associated with some of the control characters but in an interchange of data this normally requires agreement between the sender and the recipient.

ACK — *Acknowledge* — A transmission control character transmitted by a receiver as an affirmative response to the sender.

BEL — *Bell* — A control character that is used when there is a need to call for attention; it may control alarm or attention devices.

BS — *Backspace* — A format effector which moves the active position one character position backwards on the same line.

CAN — *Cancel* — A character, or the first character of a sequence, indicating that the data preceding it are in error. As a result these data are to be ignored. The specific meaning of this character must be defined for each application and/or between sender and recipient.

CR — *Carriage return* — A format effector which moves the active position to the first character position on the same line.

Device controls

DC_1 — A device control character which is primarily intended for turning on or starting an ancillary device. If it is not required for this purpose, it may be used to restore a device to the basic mode of operation (*see also* DC_2 and DC_3), or for any other device control function not provided by other DCs.

DC_2 — A device control character which is primarily intended for turning on or starting an ancillary device. If it is not required for this purpose, it may be used to set a device to a special mode of operation (in which case DC_1 is used to restore the device to the basic mode), or for any other device control function not provided by other DCs.

DC_3 — A device control character which is primarily intended for turning off or stopping an ancillary device. This function may be a secondary level stop, e.g. wait, pause, stand-by or halt (in which case DC_1 is used to restore normal operation). If it is not required for this purpose, it may be used for any other device control function not provided by other DCs.

DC_4 — A device control character which is primarily intended for turning off, stopping or interrupting an ancillary device. If it is not required for this purpose, it may be used for any other device control function not provided by other DCs.

Examples of use of the device controls

1) One switching

	on — DC_2	off — DC_4

2) Two independent switchings

First one	on — DC_2	off — DC_4
Second one	on — DC_1	off — DC_3

3) Two dependent switchings

General	on — DC_2	off — DC_4
Particular	on — DC_1	off — DC_3

4) Input and output switching

Output	on — DC_2	off — DC_4
Input	on — DC_1	off — DC_3

DEL — *Delete* — A character used primarily to erase or obliterate an erroneous or unwanted character in punched tape. DEL characters may also serve to accomplish media-fill or time-fill. They may be inserted into or removed from a stream of data without affecting the information content of that stream, but then the addition or removal of these characters may affect the information layout and/or the control of equipment.

DLE — *Data link escape* — A transmission control character which will change the meaning of a limited number of contiguously following characters. It is used exclusively to provide supplementary data transmission control functions. Only graphic characters and transmission control characters can be used in DLE sequences.

EM — *End of medium* — A control character that may be used to identify the physical end of a medium, or the end of the used portion of a medium, or the end of the wanted portion of data recorded on a medium. The position of this character does not necessarily correspond to the physical end of the medium.

ENQ — *Enquiry* — A transmission control character used as a request for a response from a remote station — the response may include station identification and/or station status. When a “Who are you?” function is required on the general switched transmission network, the first use of ENQ after the connection is established shall have the meaning “Who are you?” (station identification). Subsequent use of ENQ may, or may not, include the function “Who are you?”, as determined by agreement.

EOT — *End of transmission* — A transmission control character used to indicate the conclusion of the transmission of one or more texts.

ESC — *Escape* — A control character which is used to provide an additional control function. It alters the meaning of a limited number of contiguously following bit combinations which constitute the escape sequence.

Escape sequences are used to obtain additional control functions which may provide among other things graphic sets outside the standard set. Such control functions must not be used as additional transmission controls.

The use of the character ESC and of the escape sequences in conjunction with code extension techniques is the subject of an ISO Standard.

ETB — *End of transmission block* — A transmission control character used to indicate the end of a transmission block of data where data are divided into such blocks for transmission purposes.

ETX — *End of text* — A transmission control character which terminates a text.

FF — *Form feed* — A format effector which advances the active position to the same character position on a predetermined line of the next form or page.

HT — *Horizontal tabulation* — A format effector which advances the active position to the next predetermined character position on the same line.

Information separators

IS_1 (US) — A control character used to separate and qualify data logically; its specific meaning has to be defined for each application. If this character is used in hierarchical order as specified in the general definition of IS, it delimits a data item called a UNIT.

IS_2 (RS) — A control character used to separate and qualify data logically; its specific meaning has to be defined for each application. If this character is used in hierarchical order as specified in the general definition of IS, it delimits a data item called a RECORD.

IS_3 (GS) — A control character used to separate and qualify data logically; its specific meaning has to be defined for each application. If this character is used in hierarchical order as specified in the general definition of IS, it delimits a data item called a GROUP.

IS_4 (FS) — A control character used to separate and qualify data logically; its specific meaning has to be defined for each application. If this character is used in hierarchical order as specified in the general definition of IS, it delimits a data item called a FILE.

LF — *Line feed* — A format effector which advances the active position to the same character position of the next line.

NAK — *Negative acknowledge* — A transmission control character transmitted by a receiver as a negative response to the sender.

NUL — *Null* — A control character used to accomplish media-fill or time-fill. NUL characters may be inserted into or removed from a stream of data without affecting the information content of that stream, but then the addition or removal of these characters may affect the information layout and/or the control of equipment.

SI	—	*Shift-in* — A control character which is used in conjunction with SHIFT-OUT and ESCAPE to extend the graphic character set of the code. It may reinstate the standard meanings of the bit combinations which follow it. The effect of this character when using code extension techniques is described in an ISO Standard.
SO	—	*Shift-out* — A control character which is used in conjunction with SHIFT-IN and ESCAPE to extend the graphic character set of the code. It may alter the meaning of the bit combinations of columns 2 to 7 which follow it until a SHIFT-IN character is reached. However, the characters SPACE (2/0) and DELETE (7/15) are unaffected by SHIFT-OUT. The effect of this character when using code extension techniques is described in an ISO Standard.
SOH	—	*Start of heading* — A transmission control character used as the first character of a heading of an information message.
SP	—	*Space* — A character which advances the active position one character position on the same line. This character is also regarded as a non-printing graphic.
STX	—	*Start of text* — A transmission control character which precedes a text and which is used to terminate a heading.
SUB	—	*Substitute character* — A control character used in the place of a character that has been found to be invalid or in error. SUB is intended to be introduced by automatic means.
SYN	—	*Synchronous idle* — A transmission control character used by a synchronous transmission system in the absence of any other character (idle condition) to provide a signal from which synchronism may be achieved or retained between data terminal equipment.
VT	—	*Vertical tabulation* — A format effector which advances the active position to the same character position on the next predetermined line.

Table 8-3. Conversion from the International Telegraph Alphabet No. 2 (ITA-2) to the International Alphabet No. 5 (IA-5)

ITA-2 letter case of signal No.		*IA-5 column/row*		*ITA-2 figure case of signal No.*		*IA-5 column/row*	
1	A	4/1	A	1	–	2/13	–
2	B	4/2	B	2	?	3/15	?
3	C	4/3	C	3	:	3/10	:
4	D	4/4	D	4		3/15	?
5	E	4/5	E	5	3	3/3	3
6	F	4/6	F	6		3/15	?
7	G	4/7	G	7		3/15	?
8	H	4/8	H	8		3/15	?
9	I	4/9	I	9	8	3/8	8
10	J	4/10	J	10	Attention Signal *(Note 3)*	0/7	Bel
11	K	4/11	K	11	(	2/8	(
12	L	4/12	L	12	)	2/9	)
13	M	4/13	M	13	.	2/14	.
14	N	4/14	N	14	,	2/12	,
15	O	4/15	O	15	9	3/9	9
16	P	5/0	P	16	0	3/0	0
17	Q	5/1	Q	17	1	3/1	1
18	R	5/2	R	18	4	3/4	4
19	S	5/3	S	19	’	2/7	’
20	T	5/4	T	20	5	3/5	5
21	U	5/5	U	21	7	3/7	7
22	V	5/6	V	22	=	3/13	=
23	W	5/7	W	23	2	3/2	2
24	X	5/8	X	24	/	2/15	/
25	Y	5/9	Y	25	6	3/6	6
26	Z	5/10	Z	26	+	2/11	+
27	CR	0/13	CR	27	CR	0/13	CR
28	LF	0/10	LF	28	LF	0/10	LF
29	LTRS	*		29	LTRS	*	
30	FIGS	*		30	FIGS	*	
31	SP	2/0	SP	31	SP	2/0	SP
32		*		32		*	

** No conversion shall be made for these positions and the signal/character shall be removed from the data.*

Note 1.— The end-of-message signal NNNN (in letter and figure case) shall convert to ETX (0/3).

Note 2.— The start-of-message signal ZCZC (in letter and figure case) shall convert to SOH (0/1).

Note 3.— Figures case of Signal No. 10 shall only be converted upon detection of the AFTN priority alarm which shall convert to five occurrences of BEL (0/7).

Note 4.— When converting from ITA-2, a STX (0/2) character shall be inserted once at the beginning of the next line following detection of CR LF or LF CR at the end of the Origin Line.

Note 5.— The sequence of seven signal 28 (LF) shall convert to one VT (0/11) character.

Table 8-4. Conversion from the International Alphabet No. 5 (IA-5) to the International Telegraph Alphabet No. 2 (ITA-2)

Row \ Col.	0	1	2	3	4	5	6	7
0	*	*	31FL	16F	2F	16L	2F	16L
1	Note 5	*	2F	17F	1L	17L	1L	17L
2	*	*	2F	23F	2L	18L	2L	18L
3	Note 1	*	2F	5F	3L	19L	3L	19L
4	*	*	2F	18F	4L	20L	4L	20L
5	*	*	2F	20F	5L	21L	5L	21L
6	*	*	2F	25F	6L	22L	6L	22L
7	Note 2	*	19F	21F	7L	23L	7L	23L
8	*	*	11F	9F	8L	24L	8L	24L
9	*	*	12F	15F	9L	25L	9L	25L
10	28 FL	*	2F	3F	10L	26L	10L	26L
11	Note 3	*	26F	2F	11L	2F	11L	2F
12	*	*	14F	2F	12L	2F	12L	2F
13	27FL	*	1F	22F	13L	2F	13L	2F
14	*	*	13F	2F	14L	2F	14L	2F
15	*	*	24F	2F	15L	2F	15L	*

** No conversion shall be made for these positions and the signal/character shall be removed from the data.*

Example: *To find the ITA-2 signal to which the character 3/6 of IA-5 is to be converted, look at column 3, row 6. 25F means figure case of signal No. 25 (L = letter case, FL = either case designation).*

Note 1.— The character 0/3 (ETX) shall convert to the ITA-2 sequence signals 14L, 14L, 14L, 14L (NNNN).

Note 2. — The signal 0/7 (BEL) shall only be converted when a sequence of 5 occurrences is detected, which shall convert to the ITA-2 sequence signals 30, 10F, 10F, 10F, 10F, 10F, 29.

Note 3. — The character sequence CR CR LF VT (0/11) ETX (0/3) shall convert to the ITA-2 sequence signals 29, 27, 27, 28, 28, 28, 28, 28, 28, 28, 28, 14L, 14L, 14L, 14L.

Note 4. — To prevent redundant generation of figure and letter characters in ITA-2 when converting from IA-5, no case designation shall be assigned to ITA-2 non-printing functions (signals No. 27, 28, 29, 30, 31).

Note 5. — The character 0/1 (SOH) shall convert to the ITA-2 sequence signals 26L, 3L, 26L, 3L (ZCZC).

Table 8-5. Control field formats

Control field format for	Control field bits							
	1	2	3	4	5	6	7	8
Information transfer (I frame)	0		*N(S)*		*P*		*N(R)*	
Supervisory commands/responses (S frame)	1	0	*S*	*S*	*P/F*		*N(R)*	
Unnumbered commands/responses	1	1	*M*	*M*	*P/F*	*M*	*M*	*M*

where:

N(*S*) = send sequence count (bit 2 = low order bit)
N(*R*) = receive sequence count (bit 6 = low order bit)
S = supervisory function bits
M = modifier function bits
P = poll bit (in commands)
F = final bit (in responses)

Table 8-6. Commands and responses

Type	*Commands*		*Responses*		*C field encoding* 1	2	3	4	5	6	7	8
Information transfer	I	(information)			0		*N(S)*		*P*		*N(R)*	
Supervisory	RR	(receive ready)	RR	(receive ready)	1	0	0	0	*P/F*		*N(R)*	
	RNR	(receive not ready)	RNR	(receive not ready)	1	0	1	0	*P/F*		*N(R)*	
	REJ	(reject)	REJ	(reject)	1	0	0	1	*P/F*		*N(R)*	
Unnumbered			DM	(disconnected mode)	1	1	1	1	*P/F*	0	0	0
	SABM	(set asynchronous balanced mode)			1	1	1	1	*P*	1	0	0
	DISC	(disconnect)			1	1	0	0	*P*	0	1	0
			UA	(unnumbered acknowledgement)	1	1	0	0	*F*	1	1	0
			FRMR	(frame reject)	1	1	1	0	*F*	0	0	1

FIGURES FOR CHAPTER 8

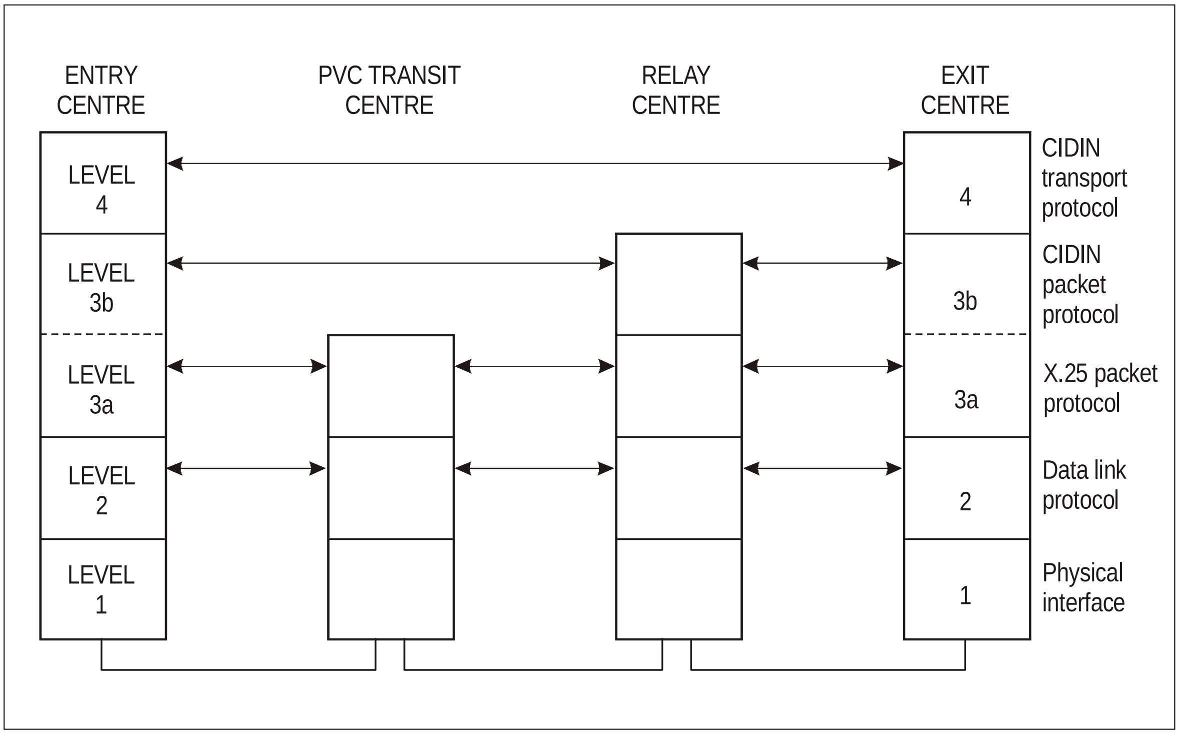


Figure 8-1. CIDIN protocol levels

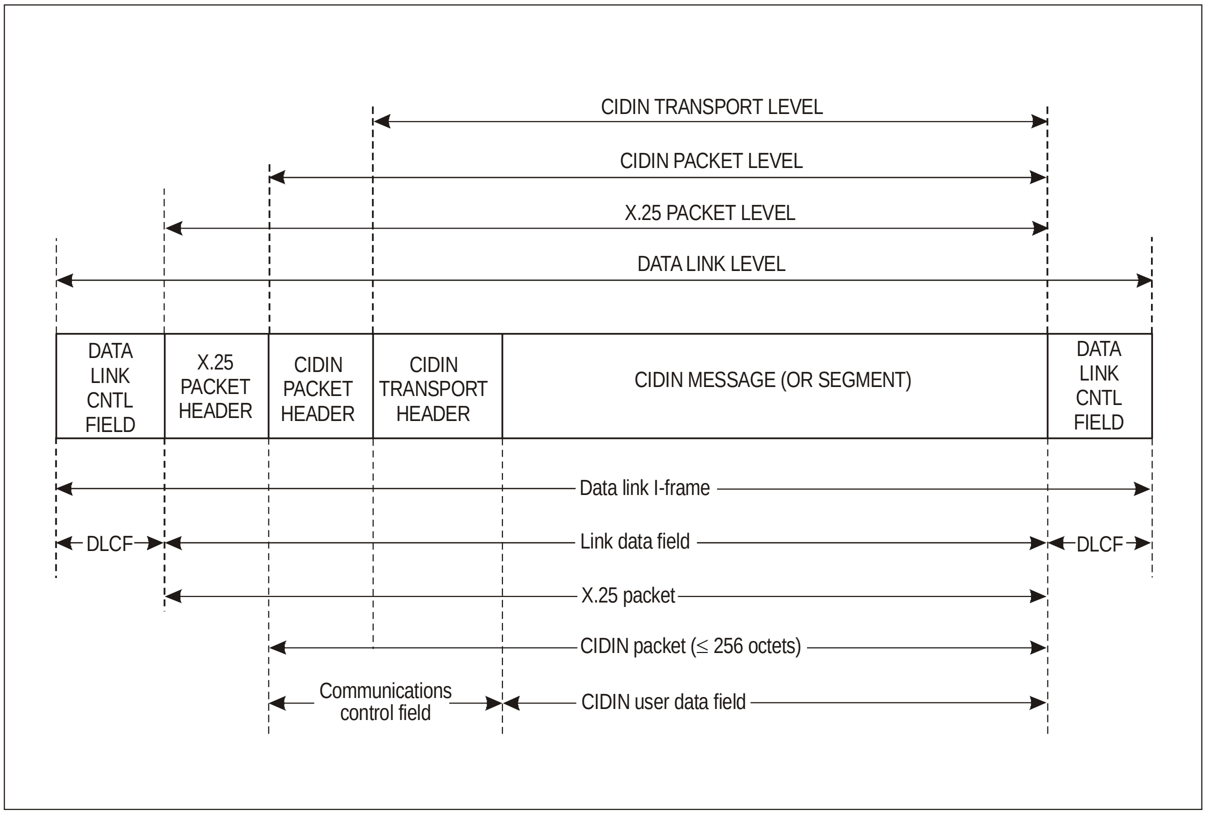


Figure 8-2. CIDIN terminology

CHAPTER 9. AIRCRAFT ADDRESSING SYSTEM

9.1 The aircraft address shall be one of 16 777 214 twenty-four-bit aircraft addresses allocated by ICAO to the State of Registry or common mark registering authority and assigned as prescribed in the Appendix to this chapter.

9.1.1 Non-aircraft transponders that are installed on aerodrome surface vehicles, obstacles or fixed Mode S target detection devices for surveillance and/or radar monitoring purposes shall be assigned 24-bit aircraft addresses.

Note.— Under such specific conditions, the term "aircraft" can be understood as "aircraft (or pseudo-aircraft) or vehicle (A/V)" where a limited set of data is generally sufficient for operational purposes.

9.1.1.1 **Recommendation.—** *Mode S transponders used under specific conditions stated in 9.1.1 should not have any negative impact on the performance of existing ATS surveillance systems and ACAS.*

APPENDIX TO CHAPTER 9. A WORLDWIDE SCHEME FOR THE ALLOCATION, ASSIGNMENT AND APPLICATION OF AIRCRAFT ADDRESSES

1. GENERAL

1.1 Global communications, navigation and surveillance systems shall use an individual aircraft address composed of 24 bits. At any one time, no address shall be assigned to more than one aircraft. The assignment of aircraft addresses requires a comprehensive scheme providing for a balanced and expandable distribution of aircraft addresses applicable worldwide.

2. DESCRIPTION OF THE SCHEME

2.1 Table 9-1 provides for blocks of consecutive addresses available to States for assignment to aircraft. Each block is defined by a fixed pattern of the first 4, 6, 9, 12 or 14 bits of the 24-bit address. Thus, blocks of different sizes (1 048 576, 262 144, 32 768, 4 096 and 1 024 consecutive addresses, respectively) are made available.

3. MANAGEMENT OF THE SCHEME

3.1 The International Civil Aviation Organization (ICAO) shall administer the scheme so that appropriate international distribution of aircraft addresses can be maintained.

4. ALLOCATION OF AIRCRAFT ADDRESSES

4.1 Blocks of aircraft addresses shall be allocated by ICAO to the State of Registry or common mark registering authority. Address allocations to States shall be as shown in Table 9-1.

4.2 A State of Registry or common mark registering authority shall notify ICAO when allocation to that State of an additional block of addresses is required for assignment to aircraft.

4.3 In the future management of the scheme, advantage shall be taken of the blocks of aircraft addresses not yet allocated. These spare blocks shall be distributed on the basis of the relevant ICAO region:

Addresses starting with bit combination 00100: AFI region

Addresses starting with bit combination 00101: SAM region

Addresses starting with bit combination 0101: EUR and NAT regions

Addresses starting with bit combination 01100: MID region

Addresses starting with bit combination 01101: ASIA region

Addresses starting with bit combination 1001: NAM and PAC regions

Addresses starting with bit combination 111011: CAR region

In addition, aircraft addresses starting with bit combinations 1011, 1101 and 1111 have been reserved for future use.

4.4 Any future requirement for additional aircraft addresses shall be accommodated through coordination between ICAO and the States of Registry or common mark registering authority concerned. A request for additional aircraft addresses shall only be made by a registering authority when at least 75 per cent of the number of addresses already allocated to that registering authority have been assigned to aircraft.

4.5 ICAO shall allocate blocks of aircraft addresses to non-Contracting States upon request.

5. ASSIGNMENT OF AIRCRAFT ADDRESSES

5.1 When required for use by suitably equipped aircraft entered on a national or international register, individual aircraft addresses within each block shall be assigned to aircraft by the State of Registry or common mark registering authority.

5.2 Aircraft addresses shall be assigned in accordance with the following principles:

a) at any one time, no address shall be assigned to more than one aircraft with the exception of aerodrome surface vehicles on surface movement areas. If such exceptions are applied by the State of Registry, the vehicles which have been allocated the same address shall not operate on aerodromes separated by less than 1 000 km;

b) only one address shall be assigned to an aircraft, irrespective of the composition of equipment on board. In the case when a removable transponder is shared by several light aviation aircraft such as balloons or gliders, it shall be possible to assign a unique address to the removable transponder. The registers 08_{16}, 20_{16}, 21_{16}, 22_{16} and 25_{16} of the removable transponder shall be correctly updated each time the removable transponder is installed in any aircraft;

c) the address shall not be changed except under exceptional circumstances and shall not be changed during flight;

d) when an aircraft changes its State of Registry, the previously assigned address shall be relinquished and a new address shall be assigned by the new registering authority;

e) the address shall serve only a technical role for addressing and identification of aircraft and shall not be used to convey any specific information; and

f) the addresses composed of 24 ZEROs or 24 ONEs shall not be assigned to aircraft.

6. APPLICATION OF AIRCRAFT ADDRESSES

6.1 The aircraft addresses shall be used in applications which require the routing of information to or from individual suitably equipped aircraft.

Note 1.— Examples of such applications are the aeronautical telecommunication network (ATN), SSR Mode S and airborne collision avoidance system (ACAS).

Note 2.— This Standard does not preclude assigning the aircraft addresses for special applications associated with the general applications defined therein. Examples of such special applications are the utilization of the 24-bit address in a pseudo-aeronautical earth station to monitor the aeronautical mobile-satellite service ground earth station and in the fixed Mode S transponders (reporting the on-the-ground status as specified in Annex 10, Volume IV, 3.1.2.6.10.1.2) to monitor the Mode S ground station operation. Address assignments for special applications are to be carried out in conformance with the procedure established by the State to manage the 24-bit address assignments to aircraft.

6.2 An address consisting of 24 ZEROs shall not be used for any application.

7. ADMINISTRATION OF THE TEMPORARY AIRCRAFT ADDRESS ASSIGNMENTS

7.1 Temporary addresses shall be assigned to aircraft in exceptional circumstances, such as when operators have been unable to obtain an address from their individual States of Registry or Common Mark Registering Authority in a timely manner. ICAO shall assign temporary addresses from the block ICAO[1] shown in Table 9-1.

7.2 When requesting a temporary address, the aircraft operator shall supply to ICAO: aircraft identification, type and make of aircraft, name and address of the operator, and an explanation of the reason for the request.

7.2.1 Upon issuance of the temporary address to the aircraft operators, ICAO shall inform the State of Registry of the issuance of the temporary address, reason and duration.

7.3 The aircraft operator shall:

a) inform the State of Registry of the temporary assignment and reiterate the request for a permanent address; and

b) inform the airframe manufacturer.

7.4 When the permanent aircraft address is obtained from the State of Registry, the operator shall:

a) inform ICAO without delay;

b) relinquish his/her temporary address; and

c) arrange for encoding of the valid unique address within 180 calendar days.

7.5 If a permanent address is not obtained within one year, the aircraft operator shall re-apply for a new temporary aircraft address. Under no circumstances shall a temporary aircraft address be used by the aircraft operator for over one year.

Table 9-1. Allocation of aircraft addresses to States

Note.— The left-hand column of the 24-bit address patterns represents the most significant bit (MSB) of the address.

State	*Number of addresses in block*					*Allocation of blocks of addresses (a dash represents a bit value equal to 0 or 1)*
	1 024	*4 096*	*32 768*	*262 144*	*1 048 576*	
Afghanistan		*				0 1 1 1 0 0 0 0 0 0 0 0 – – – – – – – – – – – –
Albania	*					0 1 0 1 0 0 0 0 0 0 0 1 0 0 – – – – – – – – – –
Algeria			*			0 0 0 0 1 0 1 0 0 – – – – – – – – – – – – – – –
Angola		*				0 0 0 0 1 0 0 1 0 0 0 0 – – – – – – – – – – – –
Antigua and Barbuda	*					0 0 0 0 1 1 0 0 1 0 1 0 0 0 – – – – – – – – – –
Argentina				*		1 1 1 0 0 0 – – – – – – – – – – – – – – – – – –
Armenia	*					0 1 1 0 0 0 0 0 0 0 0 0 0 0 – – – – – – – – – –
Australia				*		0 1 1 1 1 1 – – – – – – – – – – – – – – – – – –
Austria			*			0 1 0 0 0 1 0 0 0 – – – – – – – – – – – – – – –
Azerbaijan	*					0 1 1 0 0 0 0 0 0 0 0 0 1 0 – – – – – – – – – –
Bahamas		*				0 0 0 0 1 0 1 0 1 0 0 0 – – – – – – – – – – – –
Bahrain		*				1 0 0 0 1 0 0 1 0 1 0 0 – – – – – – – – – – – –
Bangladesh		*				0 1 1 1 0 0 0 0 0 0 1 0 – – – – – – – – – – – –
Barbados	*					0 0 0 0 1 0 1 0 1 0 1 0 0 0 – – – – – – – – – –
Belarus	*					0 1 0 1 0 0 0 1 0 0 0 0 0 0 – – – – – – – – – –
Belgium			*			0 1 0 0 0 1 0 0 1 – – – – – – – – – – – – – – –
Belize	*					0 0 0 0 1 0 1 0 1 0 1 1 0 0 – – – – – – – – – –
Benin	*					0 0 0 0 1 0 0 1 0 1 0 0 0 0 – – – – – – – – – –
Bhutan	*					0 1 1 0 1 0 0 0 0 0 0 0 0 0 – – – – – – – – – –
Bolivia		*				1 1 1 0 1 0 0 1 0 1 0 0 – – – – – – – – – – – –
Bosnia and Herzegovina	*					0 1 0 1 0 0 0 1 0 0 1 1 0 0 – – – – – – – – – –
Botswana	*					0 0 0 0 0 0 1 1 0 0 0 0 0 0 – – – – – – – – – –
Brazil				*		1 1 1 0 0 1 – – – – – – – – – – – – – – – – – –
Brunei Darussalam	*					1 0 0 0 1 0 0 1 0 1 0 1 0 0 – – – – – – – – – –
Bulgaria			*			0 1 0 0 0 1 0 1 0 – – – – – – – – – – – – – – –
Burkina Faso		*				0 0 0 0 1 0 0 1 1 1 0 0 – – – – – – – – – – – –
Burundi		*				0 0 0 0 0 0 1 1 0 0 1 0 – – – – – – – – – – – –
Cambodia		*				0 1 1 1 0 0 0 0 1 1 1 0 – – – – – – – – – – – –
Cameroon		*				0 0 0 0 0 0 1 1 0 1 0 0 – – – – – – – – – – – –
Canada				*		1 1 0 0 0 0 – – – – – – – – – – – – – – – – – –
Cape Verde	*					0 0 0 0 1 0 0 1 0 1 1 0 0 0 – – – – – – – – – –
Central African Republic		*				0 0 0 0 0 1 1 0 1 1 0 0 – – – – – – – – – – – –
Chad		*				0 0 0 0 1 0 0 0 0 1 0 0 – – – – – – – – – – – –
Chile		*				1 1 1 0 1 0 0 0 0 0 0 0 – – – – – – – – – – – –
China				*		0 1 1 1 1 0 – – – – – – – – – – – – – – – – – –
Colombia		*				0 0 0 0 1 0 1 0 1 1 0 0 – – – – – – – – – – – –
Comoros	*					0 0 0 0 0 0 1 1 0 1 0 1 0 0 – – – – – – – – – –
Congo		*				0 0 0 0 0 0 1 1 0 1 1 0 – – – – – – – – – – – –
Cook Islands	*					1 0 0 1 0 0 0 0 0 0 0 1 0 0 – – – – – – – – – –
Costa Rica		*				0 0 0 0 1 0 1 0 1 1 1 0 – – – – – – – – – – – –
Côte d'Ivoire		*				0 0 0 0 0 0 1 1 1 0 0 0 – – – – – – – – – – – –
Croatia	*					0 1 0 1 0 0 0 0 0 0 0 1 1 1 – – – – – – – – – –
Cuba		*				0 0 0 0 1 0 1 1 0 0 0 0 – – – – – – – – – – – –
Cyprus	*					0 1 0 0 1 1 0 0 1 0 0 0 0 0 – – – – – – – – – –
Czech Republic			*			0 1 0 0 1 0 0 1 1 – – – – – – – – – – – – – – –

State	*Number of addresses in block*					*Allocation of blocks of addresses (a dash represents a bit value equal to 0 or 1)*					
	1 024	*4 096*	*32 768*	*262 144*	*1 048 576*						
Democratic People's Republic of Korea			*			0 1 1 1	0 0	1 0 0	– – –	– –	– – – – – – – – – –
Democratic Republic of the Congo		*				0 0 0 0	1 0	0 0 1	1 0 0	– –	– – – – – – – – – –
Denmark			*			0 1 0 0	0 1	0 1 1	– – –	– –	– – – – – – – – – –
Djibouti	*					0 0 0 0	1 0	0 1 1	0 0 0	0 0	– – – – – – – – – –
Dominican Republic		*				0 0 0 0	1 1	0 0 0	1 0 0	– –	– – – – – – – – – –
Ecuador		*				1 1 1 0	1 0	0 0 0	1 0 0	– –	– – – – – – – – – –
Egypt			*			0 0 0 0	0 0	0 1 0	– – –	– –	– – – – – – – – – –
El Salvador		*				0 0 0 0	1 0	1 1 0	0 1 0	– –	– – – – – – – – – –
Equatorial Guinea		*				0 0 0 0	0 1	0 0 0	0 1 0	– –	– – – – – – – – – –
Eritrea	*					0 0 1 0	0 0	0 0 0	0 1 0	0 0	– – – – – – – – – –
Estonia	*					0 1 0 1	0 0	0 1 0	0 0 1	0 0	– – – – – – – – – –
Ethiopia		*				0 0 0 0	0 1	0 0 0	0 0 0	– –	– – – – – – – – – –
Fiji		*				1 1 0 0	1 0	0 0 1	0 0 0	– –	– – – – – – – – – –
Finland			*			0 1 0 0	0 1	1 0 0	– – –	– –	– – – – – – – – – –
France				*		0 0 1 1	1 0	– – –	– – –	– –	– – – – – – – – – –
Gabon		*				0 0 0 0	0 0	1 1 1	1 1 0	– –	– – – – – – – – – –
Gambia		*				0 0 0 0	1 0	0 1 1	0 1 0	– –	– – – – – – – – – –
Georgia	*					0 1 0 1	0 0	0 1 0	1 0 0	0 0	– – – – – – – – – –
Germany				*		0 0 1 1	1 1	– – –	– – –	– –	– – – – – – – – – –
Ghana		*				0 0 0 0	0 1	0 0 0	1 0 0	– –	– – – – – – – – – –
Greece			*			0 1 0 0	0 1	1 0 1	– – –	– –	– – – – – – – – – –
Grenada	*					0 0 0 0	1 1	0 0 1	1 0 0	0 0	– – – – – – – – – –
Guatemala		*				0 0 0 0	1 0	1 1 0	1 0 0	– –	– – – – – – – – – –
Guinea		*				0 0 0 0	0 1	0 0 0	1 1 0	– –	– – – – – – – – – –
Guinea-Bissau	*					0 0 0 0	0 1	0 0 1	0 0 0	0 0	– – – – – – – – – –
Guyana		*				0 0 0 0	1 0	1 1 0	1 1 0	– –	– – – – – – – – – –
Haiti		*				0 0 0 0	1 0	1 1 1	0 0 0	– –	– – – – – – – – – –
Honduras		*				0 0 0 0	1 0	1 1 1	0 1 0	– –	– – – – – – – – – –
Hungary			*			0 1 0 0	0 1	1 1 0	– – –	– –	– – – – – – – – – –
Iceland		*				0 1 0 0	1 1	0 0 1	1 0 0	– –	– – – – – – – – – –
India				*		1 0 0 0	0 0	– – –	– – –	– –	– – – – – – – – – –
Indonesia			*			1 0 0 0	1 0	1 0 0	– – –	– –	– – – – – – – – – –
Iran, Islamic Republic of			*			0 1 1 1	0 0	1 1 0	– – –	– –	– – – – – – – – – –
Iraq			*			0 1 1 1	0 0	1 0 1	– – –	– –	– – – – – – – – – –
Ireland		*				0 1 0 0	1 1	0 0 1	0 1 0	– –	– – – – – – – – – –
Israel			*			0 1 1 1	0 0	1 1 1	– – –	– –	– – – – – – – – – –
Italy				*		0 0 1 1	0 0	– – –	– – –	– –	– – – – – – – – – –
Jamaica		*				0 0 0 0	1 0	1 1 1	1 1 0	– –	– – – – – – – – – –
Japan				*		1 0 0 0	0 1	– – –	– – –	– –	– – – – – – – – – –
Jordan			*			0 1 1 1	0 1	0 0 0	– – –	– –	– – – – – – – – – –
Kazakhstan	*					0 1 1 0	1 0	0 0 0	0 1 1	0 0	– – – – – – – – – –
Kenya		*				0 0 0 0	0 1	0 0 1	1 0 0	– –	– – – – – – – – – –
Kiribati	*					1 1 0 0	1 0	0 0 1	1 1 0	0 0	– – – – – – – – – –
Kuwait		*				0 1 1 1	0 0	0 0 0	1 1 0	– –	– – – – – – – – – –
Kyrgyzstan	*					0 1 1 0	0 0	0 0 0	0 0 1	0 0	– – – – – – – – – –
Lao People's Democratic Republic		*				0 1 1 1	0 0	0 0 1	0 0 0	– –	– – – – – – – – – –
Latvia	*					0 1 0 1	0 0	0 0 0	0 1 0	1 1	– – – – – – – – – –

State	*Number of addresses in block* 1 024	4 096	32 768	262 144	1 048 576	*Allocation of blocks of addresses (a dash represents a bit value equal to 0 or 1)*					
Lebanon			*			0 1 1 1	0 1	0 0 1	– – –	– –	– – – – – – – – – –
Lesotho	*					0 0 0 0	0 1	0 0 1	0 1 0	0 0	– – – – – – – – – –
Liberia		*				0 0 0 0	0 1	0 1 0	0 0 0	– –	– – – – – – – – – –
Libyan Arab Jamahiriya			*			0 0 0 0	0 0	0 1 1	– – –	– –	– – – – – – – – – –
Lithuania	*					0 1 0 1	0 0	0 0 0	0 1 1	1 1	– – – – – – – – – –
Luxembourg	*					0 1 0 0	1 1	0 1 0	0 0 0	0 0	– – – – – – – – – –
Madagascar		*				0 0 0 0	0 1	0 1 0	1 0 0	– –	– – – – – – – – – –
Malawi		*				0 0 0 0	0 1	0 1 1	0 0 0	– –	– – – – – – – – – –
Malaysia			*			0 1 1 1	0 1	0 1 0	– – –	– –	– – – – – – – – – –
Maldives	*					0 0 0 0	0 1	0 1 1	0 1 0	0 0	– – – – – – – – – –
Mali		*				0 0 0 0	0 1	0 1 1	1 0 0	– –	– – – – – – – – – –
Malta	*					0 1 0 0	1 1	0 1 0	0 1 0	0 0	– – – – – – – – – –
Marshall Islands	*					1 0 0 1	0 0	0 0 0	0 0 0	0 0	– – – – – – – – – –
Mauritania	*					0 0 0 0	0 1	0 1 1	1 1 0	0 0	– – – – – – – – – –
Mauritius	*					0 0 0 0	0 1	1 0 0	0 0 0	0 0	– – – – – – – – – –
Mexico			*			0 0 0 0	1 1	0 1 0	– – –	– –	– – – – – – – – – –
Micronesia, Federated States of	*					0 1 1 0	1 0	0 0 0	0 0 1	0 0	– – – – – – – – – –
Monaco	*					0 1 0 0	1 1	0 1 0	1 0 0	0 0	– – – – – – – – – –
Mongolia	*					0 1 1 0	1 0	0 0 0	0 1 0	0 0	– – – – – – – – – –
Morocco			*			0 0 0 0	0 0	1 0 0	– – –	– –	– – – – – – – – – –
Mozambique		*				0 0 0 0	0 0	0 0 0	1 1 0	– –	– – – – – – – – – –
Myanmar		*				0 1 1 1	0 0	0 0 0	1 0 0	– –	– – – – – – – – – –
Namibia	*					0 0 1 0	0 0	0 0 0	0 0 1	0 0	– – – – – – – – – –
Nauru	*					1 1 0 0	1 0	0 0 1	0 1 0	0 0	– – – – – – – – – –
Nepal		*				0 1 1 1	0 0	0 0 1	0 1 0	– –	– – – – – – – – – –
Netherlands, Kingdom of the			*			0 1 0 0	1 0	0 0 0	– – –	– –	– – – – – – – – – –
New Zealand			*			1 1 0 0	1 0	0 0 0	– – –	– –	– – – – – – – – – –
Nicaragua		*				0 0 0 0	1 1	0 0 0	0 0 0	– –	– – – – – – – – – –
Niger		*				0 0 0 0	0 1	1 0 0	0 1 0	– –	– – – – – – – – – –
Nigeria		*				0 0 0 0	0 1	1 0 0	1 0 0	– –	– – – – – – – – – –
Norway			*			0 1 0 0	0 1	1 1 1	– – –	– –	– – – – – – – – – –
Oman	*					0 1 1 1	0 0	0 0 1	1 0 0	0 0	– – – – – – – – – –
Pakistan			*			0 1 1 1	0 1	1 0 0	– – –	– –	– – – – – – – – – –
Palau	*					0 1 1 0	1 0	0 0 0	1 0 0	0 0	– – – – – – – – – –
Panama		*				0 0 0 0	1 1	0 0 0	0 1 0	– –	– – – – – – – – – –
Papua New Guinea		*				1 0 0 0	1 0	0 1 1	0 0 0	– –	– – – – – – – – – –
Paraguay		*				1 1 1 0	1 0	0 0 1	0 0 0	– –	– – – – – – – – – –
Peru		*				1 1 1 0	1 0	0 0 1	1 0 0	– –	– – – – – – – – – –
Philippines			*			0 1 1 1	0 1	0 1 1	– – –	– –	– – – – – – – – – –
Poland			*			0 1 0 0	1 0	0 0 1	– – –	– –	– – – – – – – – – –
Portugal			*			0 1 0 0	1 0	0 1 0	– – –	– –	– – – – – – – – – –
Qatar	*					0 0 0 0	0 1	1 0 1	0 1 0	0 0	– – – – – – – – – –
Republic of Korea			*			0 1 1 1	0 0	0 1 1	– – –	– –	– – – – – – – – – –
Republic of Moldova	*					0 1 0 1	0 0	0 0 0	1 0 0	1 1	– – – – – – – – – –
Romania			*			0 1 0 0	1 0	1 0 0	– – –	– –	– – – – – – – – – –
Russian Federation					*	0 0 0 1	– –	– – –	– – –	– –	– – – – – – – – – –
Rwanda		*				0 0 0 0	0 1	1 0 1	1 1 0	– –	– – – – – – – – – –
Saint Lucia	*					1 1 0 0	1 0	0 0 1	1 0 0	0 0	– – – – – – – – – –

State	*Number of addresses in block* 1 024	4 096	32 768	262 144	1 048 576	*Allocation of blocks of addresses (a dash represents a bit value equal to 0 or 1)*
Saint Vincent and the Grenadines	*					0000 10 111 100 00 ––––––––––
Samoa	*					1001 00 000 010 00 ––––––––––
San Marino	*					0101 00 000 000 00 ––––––––––
Sao Tome and Principe	*					0000 10 011 110 00 ––––––––––
Saudi Arabia			*			0111 00 010 ––– –– ––––––––––
Senegal		*				0000 01 110 000 –– ––––––––––
Seychelles	*					0000 01 110 100 00 ––––––––––
Sierra Leone	*					0000 01 110 110 00 ––––––––––
Singapore			*			0111 01 101 ––– –– ––––––––––
Slovakia	*					0101 00 000 101 11 ––––––––––
Slovenia	*					0101 00 000 110 11 ––––––––––
Solomon Islands	*					1000 10 010 111 00 ––––––––––
Somalia		*				0000 01 111 000 –– ––––––––––
South Africa			*			0000 00 001 ––– –– ––––––––––
Spain				*		0011 01 ––– ––– –– ––––––––––
Sri Lanka			*			0111 01 110 ––– –– ––––––––––
Sudan		*				0000 01 111 100 –– ––––––––––
Suriname		*				0000 11 001 000 –– ––––––––––
Swaziland	*					0000 01 111 010 00 ––––––––––
Sweden			*			0100 10 101 ––– –– ––––––––––
Switzerland			*			0100 10 110 ––– –– ––––––––––
Syrian Arab Republic			*			0111 01 111 ––– –– ––––––––––
Tajikistan	*					0101 00 010 101 00 ––––––––––
Thailand			*			1000 10 000 ––– –– ––––––––––
The former Yugoslav Republic of Macedonia	*					0101 00 010 010 00 ––––––––––
Togo		*				0000 10 001 000 –– ––––––––––
Tonga	*					1100 10 001 101 00 ––––––––––
Trinidad and Tobago		*				0000 11 000 110 –– ––––––––––
Tunisia			*			0000 00 101 ––– –– ––––––––––
Turkey			*			0100 10 111 ––– –– ––––––––––
Turkmenistan	*					0110 00 000 001 10 ––––––––––
Uganda		*				0000 01 101 000 –– ––––––––––
Ukraine			*			0101 00 001 ––– –– ––––––––––
United Arab Emirates		*				1000 10 010 110 –– ––––––––––
United Kingdom				*		0100 00 ––– ––– –– ––––––––––
United Republic of Tanzania		*				0000 10 000 000 –– ––––––––––
United States					*	1010 –– ––– ––– –– ––––––––––
Uruguay		*				1110 10 010 000 –– ––––––––––
Uzbekistan	*					0101 00 000 111 11 ––––––––––
Vanuatu	*					1100 10 010 000 00 ––––––––––
Venezuela			*			0000 11 011 ––– –– ––––––––––
Viet Nam			*			1000 10 001 ––– –– ––––––––––
Yemen		*				1000 10 010 000 –– ––––––––––
Yugoslavia			*			0100 11 000 ––– –– ––––––––––
Zambia		*				0000 10 001 010 –– ––––––––––
Zimbabwe	*					0000 00 000 100 00 ––––––––––

State	*Number of addresses in block* 1 024	4 096	32 768	262 144	1 048 576	*Allocation of blocks of addresses (a dash represents a bit value equal to 0 or 1)*
Other allocations						
ICAO[1]			*			1 1 1 1 0 0 0 0 0 – – – – – – – – – – – – – – –
ICAO[2]	*					1 0 0 0 1 0 0 1 1 0 0 1 0 0 – – – – – – – – – –
ICAO[2]	*					1 1 1 1 0 0 0 0 1 0 0 1 0 0 – – – – – – – – – –

1. ICAO administers this block for assigning temporary aircraft addresses as described in section 7.

2. Block allocated for special use in the interest of flight safety.

CHAPTER 10. POINT-TO-MULTIPOINT COMMUNICATIONS

10.1 SERVICE VIA SATELLITE FOR THE DISSEMINATION OF AERONAUTICAL INFORMATION

10.1.1 Point-to-multipoint telecommunication service via satellite to support the dissemination of aeronautical information shall be based on full-time, non pre-emptible, protected services as defined in the relevant CCITT Recommendations.

10.2 SERVICE VIA SATELLITE FOR THE DISSEMINATION OF WAFS PRODUCTS

10.2.1 **Recommendation.—** *System characteristics should include the following:*

a) frequency — C-band, earth-to-satellite, 6 GHz band, satellite-to-earth, 4 GHz band;

b) capacity with effective signalling rate of not less than 9 600 bits/s;

c) bit error rates — better than 1 in 10^7*;*

d) forward error correction; and

e) availability 99.95 per cent.

CHAPTER 11. HF DATA LINK

11.1 DEFINITIONS AND SYSTEM CAPABILITIES

Note.— The following Standards and Recommended Practices are specific to the high frequency data link (HFDL) and are in addition to the requirements specified in the ITU Radio Regulations (Appendix 27). The HFDL is a constituent mobile subnetwork of the aeronautical telecommunication network (ATN), operating in the aeronautical mobile (R) high frequency bands. In addition, the HFDL may provide non-ATN functions, such as direct link service (DLS). The HFDL system must enable aircraft to exchange data with ground-based users.

11.1.1 Definitions

Coded chip. A “1” or “0” output of the rate ½ or ¼ convolutional code encoder.

Designated operational coverage (DOC) area. The area in which a particular service is provided and in which the service is afforded frequency protection.

Note.— This area may, after proper coordination to ensure frequency protection, extend to areas outside the allotment areas contained in Appendix S27 to the Radio Regulations.

Direct link service (DLS). A data communications service which makes no attempt to automatically correct errors, detected or undetected, at the link layer of the air-ground communications path. (Error control may be effected by end-user systems.)

High frequency network protocol data unit (HFNPDU). User data packet.

Link protocol data unit (LPDU). Data unit which encapsulates a segment of an HFNPDU.

M-ary phase shift keying (M-PSK) modulation. A digital phase modulation that causes the phase of the carrier waveform to take on one of a set of M values.

Media access protocol data unit (MPDU). Data unit which encapsulates one or more LPDUs.

M-PSK symbol. One of the M possible phase shifts of the M-PSK modulated carrier representing a group of $\log_2$ M coded chips.

Peak envelope power (PEP). The peak power of the modulated signal supplied by the transmitter to the antenna transmission line.

Physical layer protocol data unit (PPDU). Data unit passed to the physical layer for transmission, or decoded by the physical layer after reception.

Quality of service (QOS). The information relating to data transfer characteristics used by various communications protocols to achieve various levels of performance for network users.

Reliable link service (RLS). A data communications service provided by the subnetwork which automatically provides for error control over its link through error detection and requested retransmission of signal units found to be in error.

Squitter protocol data unit (SPDU). Data packet which is broadcast every 32 seconds by an HFDL ground station on each of its operating frequencies, and which contains link management information.

11.2 HF DATA LINK SYSTEM

11.2.1 System architecture

The HFDL system shall consist of one or more ground and aircraft station subsystems, which implement the HFDL protocol (see 11.3). The HFDL system shall also include a ground management subsystem (see 11.4).

11.2.1.1 AIRCRAFT AND GROUND STATION SUBSYSTEMS

The HFDL aircraft station subsystem and the HFDL ground station subsystem shall include the following functions:

a) HF transmission and reception;

b) data modulation and demodulation; and

c) HFDL protocol implementation and frequency selection.

11.2.2 Operational coverage

Frequency assignments for HFDL shall be protected throughout their designated operational coverage (DOC) area.

Note 1.— DOC areas may be different from current MWARAs or RDARAs as defined in Appendix 27 to the ITU Radio Regulations.

Note 2.— Additional coordination with ITU is required in cases where DOC areas are not in conformity with the allotment areas specified in the ITU Radio Regulations.

11.2.3 Requirements for carriage of HFDL equipment

Requirements for mandatory carriage of HFDL equipment shall be made on the basis of regional air navigation agreements that specify the airspace of operation and the implementation timescale.

11.2.3.1 NOTICE

The agreement above shall provide advance notice of at least two years for the mandatory carriage of airborne systems.

11.2.4 Ground station networking

11.2.4.1 **Recommendation.—** *HFDL ground station subsystems should interconnect through a common ground management subsystem.*

Note.— This provides a distributed subnetwork, with a subnetwork point of attachment (SNPA), depending on the method of implementation, which allows for the maintenance of virtual circuit connections as aircraft stations transition between designated operational coverage areas. The distribution may be multi-regional or worldwide.

11.2.5 Ground station synchronization

Synchronization of HFDL ground station subsystems shall be to within ±25 ms of UTC. For any station not operating within ±25 ms of UTC, appropriate notification shall be made to all aircraft and ground station subsystems to allow for continued system operation.

11.2.6 Quality of service

11.2.6.1 RESIDUAL PACKET ERROR RATE

The undetected error rate for a network user packet which contains between 1 and 128 octets of user data shall be equal to or less than 1 in 10^6.

11.2.6.2 SPEED OF SERVICE

Transit and transfer delays for network user packets (128 octets) with priorities defined in Part I, Chapter 4, Table 4-26 for message priorities 7 through 14, shall not exceed the values of Table 11-1*.

11.3 HF DATA LINK PROTOCOL

The HFDL protocol shall consist of a physical layer, a link layer, and a subnetwork layer, as specified below.

Note.— The HFDL protocol is a layered protocol and is compatible with the open systems interconnection (OSI) reference model. It permits the HFDL to function as an aeronautical telecommunication network (ATN)-compatible subnetwork. The details of the protocol are described in the Manual on HF Data Link *(Doc 9741).*

11.3.1 Physical layer RF characteristics

The aircraft and ground stations shall access the physical medium operating in simplex mode.

11.3.1.1 FREQUENCY BANDS

HFDL installations shall be capable of operating at any single sideband (SSB) carrier (reference) frequency available to the aeronautical mobile (R) service in the band 2.8 to 22 MHz, and in compliance with the relevant provisions of the Radio Regulations.

* All tables and figures are located at the end of this chapter.

11.3.1.2 CHANNELS

Channel utilization shall be in conformity with the table of carrier (reference) frequencies of Appendix 27 to the ITU Radio Regulations.

11.3.1.3 TUNING

The equipment shall be capable of operating on integral multiples of 1 kHz.

11.3.1.4 SIDEBAND

The sideband used for transmission shall be on the higher side of its carrier (reference) frequency.

11.3.1.5 MODULATION

HFDL shall employ M-ary phase shift keying (M-PSK) to modulate the radio frequency carrier at the assigned frequency. The symbol rate shall be 1 800 symbols per second ±10 parts per million (i.e. 0.018 symbols per second). The value of M and the information data rate shall be as specified in Table 11-2.

11.3.1.5.1 *M-PSK CARRIER*

The M-PSK carrier expressed mathematically shall be defined as:

$s(t) = A\Sigma(p(t-kT)\cos[2\pi f_0 t + \varphi(k)])$, $k = 0, 1 \ldots, N-1$

where:

N	=	number of M-PSK symbols in transmitted physical layer protocol data unit (PPDU)
s(t)	=	analog waveform or signal at time t
A	=	peak amplitude
f_0	=	SSB carrier (reference) + 1 440 Hz
T	=	M-PSK symbol period (1/1 800 s)
φ (k)	=	phase of kth M-PSK symbol
p(t-kT)	=	pulse shape of kth M-PSK symbol at time t.

Note.— The number of M-PSK symbols sent, N, defines the length (duration = NT seconds) of the PPDU. These parameters are defined in the Manual on HF Data Link *(Doc 9741).*

11.3.1.5.2 *PULSE SHAPE*

The pulse shape, p(t), shall determine the spectral distribution of the transmitted signal. The Fourier transform of the pulse shape, P(f), shall be defined by:

$P(f) = 1$,	if $0 < \|f\| < (1 - b)/2T$
$P(f) = \cos\{\pi(2\|f\|T - 1 + b)/4b\}$,	if $(1 - b)/2T < \|f\| < (1 + b)/2T$
$P(f) = 0$,	if $\|f\| > (1 + b)/2T$

where the spectral roll-off parameter, b = 0.31, has been chosen so that the –20 dB points of the signal are at SSB carrier (reference) + 290 Hz and SSB carrier (reference) + 2 590 Hz and the peak-to-average power ratio of the waveform is less than 5 dB.

11.3.1.6 TRANSMITTER STABILITY

The basic frequency stability of the transmitting function shall be better than:

a) ±20 Hz for HFDL aircraft station subsystems; and

b) ±10 Hz for HFDL ground station subsystems.

11.3.1.7 RECEIVER STABILITY

The basic frequency stability of the receiving function shall be such that, with the transmitting function stability specified in 11.3.1.6, the overall frequency difference between ground and airborne functions achieved in service does not exceed 70 Hz.

11.3.1.8 PROTECTION

A 15 dB desired to undesired (D/U) signal ratio shall apply for the protection of co-channel assignments for HFDL as follows:

a) data versus data;

b) data versus voice; and

c) voice versus data.

11.3.1.9 CLASS OF EMISSION

The class of emission shall be 2K80J2DEN.

11.3.1.10 ASSIGNED FREQUENCY

The HFDL assigned frequency shall be 1 400 Hz higher than the SSB carrier (reference) frequency.

Note.— By convention, the HFDL assigned frequency is offset from the SSB carrier (reference) frequency by 1 400 Hz. The HFDL M-PSK carrier of the digital modulation is offset from the SSB carrier (reference) frequency by 1 440 Hz. The digital modulation is fully contained within the same overall channel bandwidth as the voice signal and complies with the provisions of Appendix 27 to the ITU Radio Regulations.

11.3.1.11 EMISSION LIMITS

For HFDL aircraft and ground station transmitters, the peak envelope power (P_p) of any emission on any discrete frequency shall be less than the peak envelope power (P_p) of the transmitter in accordance with the following (see Figure 11-1):

a) on any frequency between 1.5 kHz and 4.5 kHz lower than the HFDL assigned frequency, and on any frequency between 1.5 kHz and 4.5 kHz higher than the HFDL assigned frequency: at least 30 dB;

b) on any frequency between 4.5 kHz and 7.5 kHz lower than the HFDL assigned frequency, and on any frequency between 4.5 kHz and 7.5 kHz higher than the HFDL assigned frequency: at least 38 dB; and

c) on any frequency lower than 7.5 kHz below the HFDL assigned frequency and on any frequency higher than 7.5 kHz above the HFDL assigned frequency:

1) HFDL aircraft station transmitters: 43 dB;

2) HFDL ground station transmitters up to and including 50 W:

$[43 + 10 \log_{10} P_p(W)]$ dB; and

3) HFDL ground station transmitters more than 50 W: 60 dB.

11.3.1.12 POWER

11.3.1.12.1 *Ground station installations*. The peak envelope power (P_p) supplied to the antenna transmission line shall not exceed a maximum value of 6 kW as provided for in Appendix 27 of the Radio Regulations.

11.3.1.12.2 *Aircraft station installations*. The peak envelope power supplied to the antenna transmission line shall not exceed 400 W, except as provided for in Appendix 27/62 of the Radio Regulations.

11.3.1.13 UNDESIRED SIGNAL REJECTION

For HFDL aircraft and ground station receivers, undesired input signals shall be attenuated in accordance with the following:

a) on any frequency between f_c and (f_c – 300 Hz), or between (f_c + 2 900 Hz) and (f_c + 3 300 Hz): at least 35 dB below the peak of the desired signal level; and

b) on any frequency below (f_c – 300 Hz), or above (f_c + 3 300 Hz): at least 60 dB below the peak of the desired signal level,

where f_c is the carrier (reference) frequency.

11.3.1.14 RECEIVER RESPONSE TO TRANSIENTS

Recommendation.— *The receiving function should recover from an instantaneous increase in RF power at the antenna terminal of 60 dB within 10 milliseconds. The receiving function should recover from an instantaneous decrease in RF power at the antenna terminal of 60 dB within 25 milliseconds.*

11.3.2 Physical layer functions

11.3.2.1 FUNCTIONS

The functions provided by the physical layer shall include the following:

a) transmitter and receiver control;

b) transmission of data; and

c) reception of data.

11.3.2.2 Transmitter and receiver control

The HFDL physical layer shall implement the transmitter/receiver switching and frequency tuning as commanded by the link layer. The physical layer shall perform transmitter keying on demand from the link layer to transmit a packet.

11.3.2.2.1 *Transmitter to receiver turnaround time*

The transmitted power level shall decay at least by 10 dB within 100 milliseconds after completing a transmission. An HFDL station subsystem shall be capable of receiving and demodulating, with nominal performance, an incoming signal within 200 milliseconds of the start of the subsequent receive slot.

11.3.2.2.2 *Receiver to transmitter turnaround time*

An HFDL station subsystem shall provide nominal output power within plus or minus 1 dB to the antenna transmission line within 200 milliseconds of the start of the transmit slot.

11.3.2.3 Transmission of data

Transmission of data shall be accomplished using a time division multiple access (TDMA) technique. The HFDL data link ground station subsystems shall maintain TDMA frame and slot synchronization for the HFDL system. To ensure that slot synchronization is maintained, each HF data link modulator shall begin outputting a pre-key segment at the beginning of a time slot plus or minus 10 milliseconds.

11.3.2.3.1 *TDMA structure*

Each TDMA frame shall be 32 seconds. Each TDMA frame shall be divided into thirteen equal duration slots as follows:

a) the first slot of each TDMA frame shall be reserved for use by the HFDL ground station subsystem to broadcast link management data in SPDU packets; and

b) the remaining slots shall be designated either as uplink slots, downlink slots reserved for specific HFDL aircraft station subsystems, or as downlink random access slots for use by all HFDL aircraft station subsystems on a contention basis. These TDMA slots shall be assigned on a dynamic basis using a combination of reservation, polling and random access assignments.

11.3.2.3.2 *Broadcast*

The HFDL ground station subsystem shall broadcast a squitter protocol data unit (SPDU) every 32 seconds on each of its operating frequencies.

Note.— Details on the TDMA frame and slot structures, pre-key segment, data structures, including the SPDU, are contained in the Manual on HF Data Link *(Doc 9741).*

11.3.2.4 Reception of data

11.3.2.4.1 *Frequency search*

Each HFDL aircraft station shall automatically search the assigned frequencies until it detects an operating frequency.

11.3.2.4.2 *RECEPTION OF PPDUS*

The HF data link receiver shall provide the means to detect, synchronize, demodulate and decode PPDUs modulated according to the waveform defined in 11.3.1.5, subject to the following distortion:

a) the 1 440 Hz audio carrier offset by plus or minus 70 Hz;

b) discrete and/or diffuse multipath distortion with up to 5 ms multipath spread;

c) multipath amplitude fading with up to 2 Hz two-sided RMS Doppler spread and Rayleigh statistics; and

d) additive Gaussian and broadband impulsive noise with varying amplitude and random arrival times.

Note.— Reference CCIR Report 549-2.

11.3.2.4.3 *DECODING OF PPDUS*

Upon receipt of the preamble segment the receiver shall:

a) detect the beginning of a burst of data;

b) measure and correct the frequency offset between the transmitter and receiver due to Doppler shift and transmitter/receiver frequency offsets;

c) determine the data rate and interleaver settings to use during data demodulation;

d) achieve M-PSK symbol synchronization; and

e) train the equalizer.

11.3.2.4.4 *SYNCHRONIZATION*

Each HFDL aircraft station subsystem shall synchronize its slot timing to that of its corresponding ground station with respect to the reception time of the last received SPDU.

11.3.2.4.5 *SPECIFIED PACKET ERROR RATE PERFORMANCE*

11.3.2.4.5.1 The number of HFDL media access protocol data units (MPDUs) received with one or more bit errors shall not exceed 5 per cent of the total number of MPDUs received, when using a 1.8 second interleaver and under the signal-in-space conditions shown in Table 11-3.

11.3.2.4.5.2 **Recommendation.—** *The number of HFDL MPDUs received with one or more bit errors should not exceed 5 per cent of the total number of MPDUs received, when using a 1.8 second interleaver under the conditions shown in Table 11-3a.*

11.3.3 Link layer

Note.— Details on link layer functions are contained in the Manual on HF Data Link *(Doc 9741).*

The link layer shall provide control functions for the physical layer, link management and data service protocols.

11.3.3.1 CONTROL FUNCTIONS

The link layer shall pass commands for frequency tuning, transmitter keying and transmitter/receiver switching to the physical layer.

11.3.3.2 LINK MANAGEMENT

The link layer shall manage TDMA slot assignments, log-on and log-off procedures, ground station and aircraft station TDMA synchronization, and other functions necessary, taking into account message priority, for the establishment and maintenance of communications.

11.3.3.3 DATA SERVICE PROTOCOLS

The link layer shall support a reliable link service (RLS) protocol and a direct link service (DLS) protocol.

11.3.3.3.1 *RLS*

The RLS protocol shall be used to exchange acknowledged user data packets between aircraft and ground peer link layers.

11.3.3.3.2 *DLS*

The DLS protocol shall be used to broadcast unsegmented uplink high frequency network protocol data units (HFNPDUs) and other HFNPDUs not requiring automatic retransmission by the link layer.

11.3.4 Subnetwork layer

Note.— Details on subnetwork layer protocols and services are contained in the Manual on HF Data Link *(Doc 9741).*

11.3.4.1 PACKET DATA

The HFDL subnetwork layer in the HFDL aircraft station subsystem and HFDL ground station subsystem shall provide connection-oriented packet data service by establishing subnetwork connections between subnetwork service users.

11.3.4.2 CONNECTIVITY NOTIFICATION SERVICE

The HFDL subnetwork layer in the HFDL aircraft station subsystem shall provide the additional connectivity notification service by sending connectivity notification event messages to the attached ATN router.

11.3.4.2.1 *CONNECTIVITY NOTIFICATION EVENT MESSAGES*

The connectivity notification service shall send connectivity notification event messages to the attached ATN router through the subnetwork access function.

11.3.4.3 HFDL SUBNETWORK LAYER FUNCTIONS

The HFDL subnetwork layer in both the HFDL aircraft station subsystem and HFDL ground station subsystem shall include the following three functions:

a) HFDL subnetwork dependent (HFSND) function;

b) subnetwork access function; and

c) interworking function.

11.3.4.3.1 *HFSND FUNCTION*

The HFSND function shall perform the HFSND protocol between each pair of HFDL aircraft station subsystems and HFDL ground station subsystems by exchanging HFNPDUs. It shall perform the HFSND protocol aircraft function in the HFDL aircraft station subsystem and the HFSND protocol ground function in the HFDL ground station subsystem.

11.3.4.3.2 *SUBNETWORK ACCESS FUNCTION*

The subnetwork access function shall perform the ISO 8208 protocol between the HFDL aircraft station subsystem or HFDL ground station subsystem and the attached routers by exchanging ISO 8208 packets. It shall perform the ISO 8208 DCE function in the HFDL aircraft station subsystem and the HFDL ground station subsystem.

11.3.4.3.3 *INTERWORKING FUNCTION*

The interworking function shall provide the necessary harmonization functions between the HFSND, the subnetwork access and the connectivity notification functions.

11.4 GROUND MANAGEMENT SUBSYSTEM

Note.— Details on the ground management subsystem functions and interfaces are contained in the Manual on HF Data Link *(Doc 9741).*

11.4.1 Management functions

The ground management subsystem shall perform the functions necessary to establish and maintain communications channels between the HFDL ground and aircraft station subsystems.

11.4.2 Management/control information exchange

The ground management subsystem shall interface with the ground station subsystem in order to exchange control information required for frequency management, system table management, log status management, channel management, and quality of service (QOS) data collection.

TABLES FOR CHAPTER 11

Table 11-1. Transfer delays

	Direction	*Priority*	*Delay*
Transit delay	To-aircraft	7 through 14	45 s
	From-aircraft	7 through 14	60 s
Transfer delay (95 percentile)	To-aircraft	11 through 14 7 through 10	90 s 120 s
	From-aircraft	11 through 14 7 through 10	150 s 250 s

Table 11-2. Value of M and information data rate

M	*Information data rate (bits per second)*
2	300 or 600
4	1 200
8	1 800

Note.— When M equals the value 2, the data rate may be 300 or 600 bits per second as determined by the channel coding rate. The value of M may change from one data transmission to another depending on the data rate selected. The channel coding rate is described in the Manual on HF Data Link *(Doc 9741).*

Table 11-3. HF signal-in-space conditions

Data rate (bits per second)	*Number of channel paths*	*Multipath spread (milliseconds)*	*Fading bandwidth (Hz) per CCIR Report 5492*	*Frequency offset (Hz)*	*Signal to noise ratio (dB) in a 3 kHz bandwidth*	*MPDU size (octets)*
1 200	1 fixed	–	–	40	4	256
1 800	2 fading	2	1	40	16	400
1 200	2 fading	2	1	40	11.5	256
600	2 fading	2	1	40	8	128
300	2 fading	2	1	40	5	64

Table 11-3a. HF signal-in-space conditions

Data rate (bits per second)	*Number of channel paths*	*Multipath spread (milliseconds)*	*Fading bandwidth (Hz) per CCIR Report 5492*	*Frequency offset (Hz)*	*Signal to noise ratio (dB) in a 3 kHz bandwidth*	*MPDU size (octets)*
1 200	2 fading	4	1	40	13	256
1 200	2 fading	2	2	40	11.5	256

FIGURE FOR CHAPTER 11

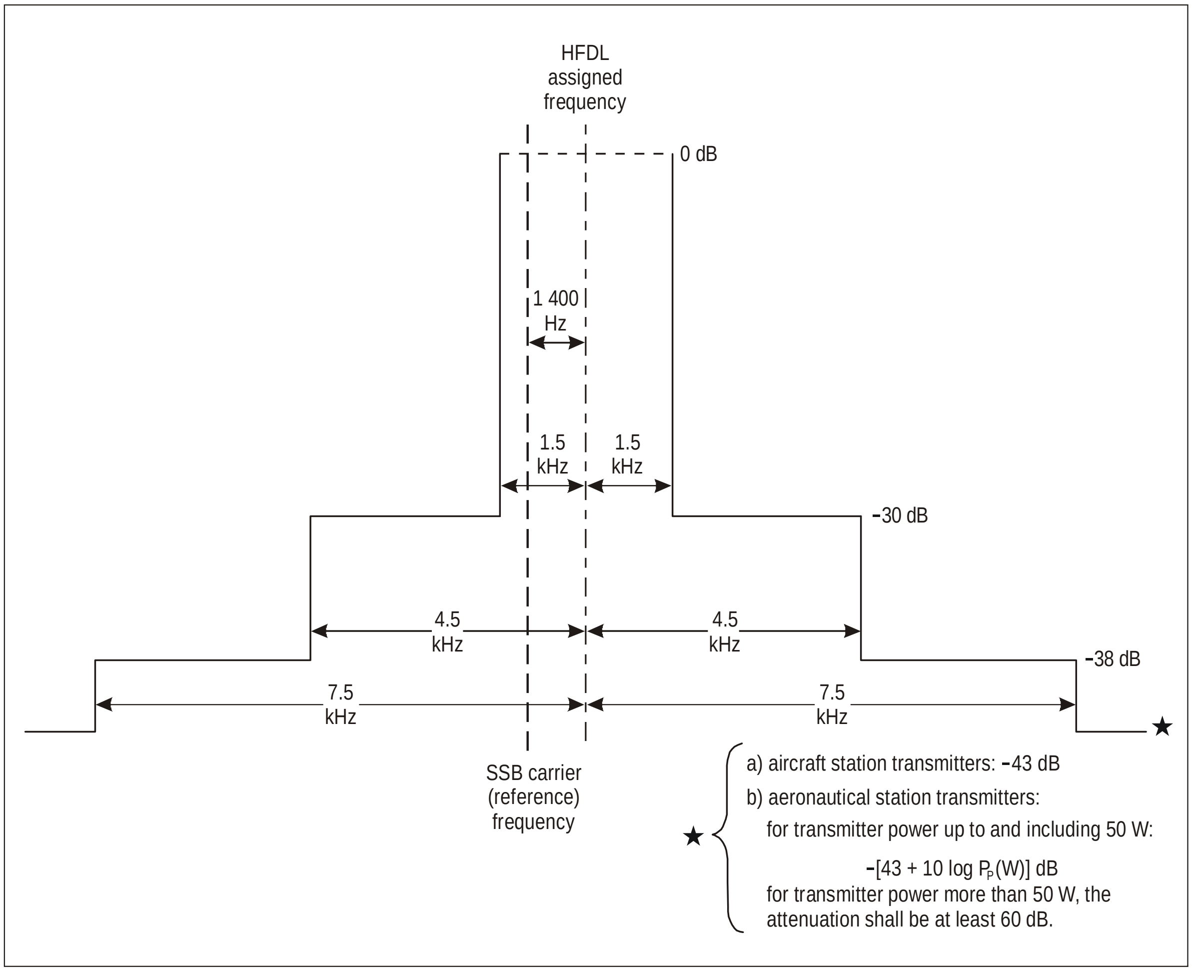


Figure 11-1. Required spectrum limits (in terms of peak power) for HFDL aircraft and ground station transmitters

CHAPTER 12. UNIVERSAL ACCESS TRANSCEIVER (UAT)

12.1 DEFINITIONS AND OVERALL SYSTEM CHARACTERISTICS

12.1.1 Definitions

High performance receiver. A UAT receiver with enhanced selectivity to further improve the rejection of adjacent frequency DME interference (see 12.3.2.2 for further details).

Optimum sampling point. The optimum sampling point of a received UAT bit stream is at the nominal centre of each bit period, when the frequency offset is either plus or minus 312.5 kHz.

Power measurement point (PMP). A cable connects the antenna to the UAT equipment. The PMP is the end of that cable that attaches to the antenna. All power measurements are considered as being made at the PMP unless otherwise specified. The cable connecting the UAT equipment to the antenna is assumed to have 3 dB of loss.

Pseudorandom message data block. Several UAT requirements state that performance will be tested using pseudorandom message data blocks. Pseudorandom message data blocks should have statistical properties that are nearly indistinguishable from those of a true random selection of bits. For instance, each bit should have (nearly) equal probability of being a ONE or a ZERO, independent of its neighbouring bits. There should be a large number of such pseudorandom message data blocks for each message type (Basic ADS-B, Long ADS-B or Ground Uplink) to provide sufficient independent data for statistical performance measurements. See Section 2.3 of Part I of the *Manual on the Universal Access Transceiver (UAT)* (Doc 9861) for an example of how to provide suitable pseudorandom message data blocks.

Service volume. A part of the facility coverage where the facility provides a particular service in accordance with relevant SARPs and within which the facility is afforded frequency protection.

Standard UAT receiver. A general purpose UAT receiver satisfying the minimum rejection requirements of interference from adjacent frequency distance measuring equipment (DME) (see 12.3.2.2 for further details).

Successful message reception (SMR). The function within the UAT receiver for declaring a received message as valid for passing to an application that uses received UAT messages. See Section 4 of Part I of the *Manual on the Universal Access Transceiver (UAT)* (Doc 9861) for a detailed description of the procedure to be used by the UAT receiver for declaring successful message reception.

UAT ADS-B message. A message broadcasted once per second by each aircraft to convey state vector and other information. UAT ADS-B messages can be in one of two forms depending on the amount of information to be transmitted in a given second: the *Basic UAT ADS-B Message* or the *Long UAT ADS-B Message* (see 12.4.4.1 for definition of each). UAT ground stations can support traffic information service-broadcast (TIS-B) through transmission of individual ADS-B messages in the ADS-B segment of the UAT frame.

UAT ground uplink message. A message broadcasted by ground stations, within the ground segment of the UAT frame, to convey flight information such as text and graphical weather data, advisories, and other aeronautical information, to aircraft that are in the service volume of the ground station (see 12.4.4.2 for further details).

Universal access transceiver (UAT). A broadcast data link operating on 978 MHz, with a modulation rate of 1.041667 Mbps.

12.1.2 UAT overall system characteristics of aircraft and ground stations

Note.— Details on technical requirements related to the implementation of UAT SARPs are contained in Part I of the Manual on the Universal Access Transceiver (UAT) *(Doc 9861). Part II of the* Manual on the Universal Access Transceiver (UAT*) (Doc 9861) (in preparation) will provide additional guidance material.*

12.1.2.1 TRANSMISSION FREQUENCY

The transmission frequency shall be 978 MHz.

12.1.2.2 FREQUENCY STABILITY

The radio frequency of the UAT equipment shall not vary more than ±0.002 per cent (20 ppm) from the assigned frequency.

12.1.2.3 TRANSMIT POWER

12.1.2.3.1 *TRANSMIT POWER LEVELS*

UAT equipment shall operate at one of the power levels shown in Table 12-1*.

12.1.2.3.2 *MAXIMUM POWER*

The maximum equivalent isotropically radiated power (EIRP) for a UAT aircraft or ground station shall not exceed +58 dBm.

Note.— For example, the maximum EIRP listed above could result from the maximum allowable aircraft transmitter power shown in Table 12-1 with a maximum antenna gain of 4 dBi.

12.1.2.3.3 *TRANSMIT MASK*

The spectrum of a UAT ADS-B message transmission modulated with pseudorandom message data blocks (MDB) shall fall within the limits specified in Table 12-2 when measured in a 100 kHz bandwidth.

Note.— Figure 12-1 is a graphical representation of Table 12-2.*

12.1.2.4 SPURIOUS EMISSIONS

Spurious emissions shall be kept at the lowest value which the state of the technique and the nature of the service permit.

Note.— Appendix 3 of the ITU Radio Regulations requires that transmitting stations shall conform to the maximum permitted power levels for spurious emissions or for unwanted emissions in the spurious domain.

* All tables and figures are located at the end of the chapter.

12.1.2.5 POLARIZATION

The design polarization of emissions shall be vertical.

12.1.2.6 TIME/AMPLITUDE PROFILE OF UAT MESSAGE TRANSMISSION

The time/amplitude profile of a UAT message transmission shall meet the following requirements, in which the *reference time* is defined as the beginning of the first bit of the synchronization sequence (see 12.4.4.1.1, 12.4.4.2.1) appearing at the output port of the equipment.

Notes.—

1. All power requirements for subparagraphs "a" through "f" below apply to the PMP. For installations that support transmitter diversity, the RF power output on the non-selected antenna port should be at least 20 dB below the level on the selected port.

2. All power requirements for subparagraphs "a" and "f" assume a 300 kHz measurement bandwidth. All power requirements for subparagraphs "b", "c", "d" and "e" assume a 2 MHz measurement bandwidth.

3. The beginning of a bit is 1/2 bit period prior to the optimum sample point.

4. These requirements are depicted graphically in Figure 12-2.

a) Prior to 8 bit periods before the reference time, the RF output power at the PMP shall not exceed –80 dBm.

Note.— This unwanted radiated power restriction is necessary to ensure that the UAT transmitting subsystem does not prevent closely located UAT receiving equipment on the same aircraft from meeting its requirements. It assumes that the isolation between transmitter and receiver equipment at the PMP exceeds 20 dB.

b) Between 8 and 6 bit periods prior to the reference time, the RF output power at the PMP shall remain at least 20 dB below the minimum power requirement for the UAT equipment class.

Note.— Guidance on definition of UAT equipment classes will be provided in Part II of the Manual on the Universal Access Transceiver (UAT) *(Doc 9861) (in preparation).*

c) During the Active state, defined as beginning at the reference time and continuing for the duration of the message, the RF output power at the PMP shall be greater than or equal to the minimum power requirement for the UAT equipment class.

d) The RF output power at the PMP shall not exceed the maximum power for the UAT equipment class at any time during the Active state.

e) Within 6 bit periods after the end of the Active state, the RF output power at the PMP shall be at a level at least 20 dB below the minimum power requirement for the UAT equipment class.

f) Within 8 bit periods after the end of the Active state, the RF output power at the PMP shall fall to a level not to exceed –80 dBm.

Note.— This unwanted radiated power restriction is necessary to ensure that the transmitting subsystem does not prevent closely located UAT receiving equipment on the same aircraft from meeting its requirements. It assumes that the isolation between transmitter and receiver equipment at the PMP exceeds 20 dB.

12.1.3 Mandatory carriage requirements

Requirements for mandatory carriage of UAT equipment shall be made on the basis of regional air navigation agreements which specify the airspace of operation and the implementation timescales for the carriage of equipment, including the appropriate lead time.

Note.— No changes will be required to aircraft systems or ground systems operating solely in regions not using UAT.

12.2 SYSTEM CHARACTERISTICS OF THE GROUND INSTALLATION

12.2.1 Ground station transmitting function

12.2.1.1 GROUND STATION TRANSMITTER POWER

12.2.1.1.1 **Recommendation.—** *The effective radiated power should be such as to provide a field strength of at least 280 microvolts per metre (minus 97 dBW/m²) within the service volume of the facility on the basis of free-space propagation.*

Note.— This is determined on the basis of delivering a –91 dBm (corresponds to 200 microvolts per metre) signal level at the PMP (assuming an omnidirectional antenna). The 280 µV/m recommendation corresponds to the delivery of a -88 dBm signal level at the PMP of the receiving equipment. The 3 dB difference between –88 dBm and –91 dBm provides margin for excess path loss over free-space propagation.

12.2.2 Ground station receiving function

Note.— An example ground station receiver is discussed in Section 2.5 of Part II of the Manual on the Universal Access Transceiver (UAT) *(Doc 9861), with UAT air-to-ground performance estimates consistent with use of that receiver provided in Appendix B of that manual.*

12.3 SYSTEM CHARACTERISTICS OF THE AIRCRAFT INSTALLATION

12.3.1 Aircraft transmitting function

12.3.1.1 AIRCRAFT TRANSMITTER POWER

The effective radiated power shall be such as to provide a field strength of at least 225 microvolts per metre (minus 99 dBW/m²) on the basis of free-space propagation, at ranges and altitudes appropriate to the operational conditions pertaining to the areas over which the aircraft is operated. Transmitter power shall not exceed 54 dBm at the PMP.

Note 1.— The above field strength is determined on the basis of delivering a –93 dBm (corresponds to 160 microvolts per metre) signal level at the PMP (assuming an omnidirectional antenna). The 3 dB difference between 225 µV/m and 160 µV/m provides margin for excess path loss over free-space propagation when receiving a long UAT ADS-B message. A 4 dB margin is provided when receiving a basic UAT ADS-B message.

Note 2.—Various aircraft operations may have different air-air range requirements depending on the intended ADS-B function of the UAT equipment. Therefore different installations may operate at different power levels (see 12.1.2.3.1).

12.3.2 Receiving function

12.3.2.1 RECEIVER SENSITIVITY

12.3.2.1.1 *LONG UAT ADS-B MESSAGE AS DESIRED SIGNAL*

A desired signal level of –93 dBm applied at the PMP shall produce a rate of successful message reception (SMR) of 90 per cent or better under the following conditions:

a) When the desired signal is of nominal modulation (i.e. FM deviation is 625 kHz) and at the maximum signal frequency offsets, and subject to relative Doppler shift at ±1 200 knots;

b) When the desired signal is of maximum modulation distortion allowed in 12.4.3, at the nominal transmission frequency ±1 parts per million (ppm), and subject to relative Doppler shift at ±1 200 knots.

Note. — The receiver criteria for successful message reception of UAT ADS-B messages are provided in Section 4 of Part I of the Manual on the Universal Access Transceiver (UAT) *(Doc 9861).*

12.3.2.1.2 *BASIC UAT ADS-B MESSAGE AS DESIRED SIGNAL*

A desired signal level of –94 dBm applied at the PMP shall produce a rate of SMR of 90 per cent or better under the following conditions:

a) When the desired signal is of nominal modulation (i.e. FM deviation is 625 kHz) and at the maximum signal frequency offsets, and subject to relative Doppler shift at ±1 200 knots;

b) When the desired signal is of maximum modulation distortion allowed in 12.4.3, at the nominal transmission frequency ±1 ppm, and subject to relative Doppler shift at ±1 200 knots.

Note.— The receiver criteria for successful message reception of UAT ADS-B messages are provided in Section 4 of Part I of the Manual on the Universal Access Transceiver (UAT) *(Doc 9861).*

12.3.2.1.3 *UAT GROUND UPLINK MESSAGE AS DESIRED SIGNAL*

A desired signal level of –91 dBm applied at the PMP shall produce a rate of an SMR of 90 per cent or better under the following conditions:

a) When the desired signal is of nominal modulation (i.e. FM deviation is 625 kHz) and at the maximum signal frequency offsets, and subject to relative Doppler shift at ±850 knots;

b) When the desired signal is of maximum modulation distortion allowed in 12.4.3, at the nominal transmission frequency ±1 ppm, and subject to relative Doppler shift at ±850 knots.

Notes.—

1. *The receiver criteria for successful message reception of UAT ground uplink messages are provided in Section 4 of Part I of the* Manual on the Universal Access Transceiver (UAT) *(Doc 9861) (in preparation).*

2. *This requirement ensures the bit rate accuracy supporting demodulation in the UAT equipment is adequate to properly receive the longer UAT ground uplink message.*

12.3.2.2 RECEIVER SELECTIVITY

Notes.—

1. *The undesired signal used is an unmodulated carrier applied at the frequency offset.*

2. *This requirement establishes the receiver's rejection of the off-channel energy.*

3. *It is assumed that ratios in between the specified offsets will fall near the interpolated value.*

4. *The desired signal used is a UAT ADS-B long message at -90 dBm at the PMP, to be received with a 90 per cent successful message reception rate.*

5. *The tolerable co-channel continuous wave interference power level for aircraft UAT receivers is assumed to be -101 dBm or less at the PMP.*

6. *See Section 2.4.2 of Part II of the* Manual on the Universal Access Transceiver (UAT) *(Doc 9861) for a discussion of when a high-performance receiver is desirable.*

a) Standard UAT receivers shall meet the selectivity characteristics given in Table 12-3.

b) High-performance receivers shall meet the more stringent selectivity characteristics given in Table 12-4.

Note.— See Section 2.4.2 of Part II of the Manual on the Universal Access Transceiver (UAT) *(Doc 9861) for guidance material on the implementation of high-performance receivers.*

12.3.2.3 RECEIVER DESIRED SIGNAL DYNAMIC RANGE

The receiver shall achieve a successful message reception rate for long ADS-B messages of 99 per cent or better when the desired signal level is between –90 dBm and –10 dBm at the PMP in the absence of any interfering signals.

Note.— The value of –10 dBm represents 120-foot separation from an aircraft transmitter transmitting at maximum allowed power.

12.3.2.4 RECEIVER TOLERANCE TO PULSED INTERFERENCE

Note.— All power level requirements in this section are referenced to the PMP.

a) For Standard and High-Performance receivers the following requirements shall apply:

   1) The receiver shall be capable of achieving 99 per cent SMR of long UAT ADS-B messages when the desired signal level is between –90 dBm and –10 dBm when subjected to DME interference under the following conditions: DME pulse pairs at a nominal rate of 3 600 pulse pairs per second at either 12 or 30 microseconds pulse spacing at a level of –36 dBm for any 1 MHz DME channel frequency between 980 MHz and 1 213 MHz inclusive.

2) Following a 21 microsecond pulse at a level of ZERO (0) dBm and at a frequency of 1 090 MHz, the receiver shall return to within 3 dB of the specified sensitivity level (see 12.3.2.1) within 12 microseconds.

b) For the standard UAT receiver the following additional requirements shall apply:

1) The receiver shall be capable of achieving 90 per cent SMR of long UAT ADS-B messages when the desired signal level is between –87 dBm and –10 dBm when subjected to DME interference under the following conditions: DME pulse pairs at a nominal rate of 3 600 pulse pairs per second at a 12 microseconds pulse spacing at a level of –56 dBm and a frequency of 979 MHz.

2) The receiver shall be capable of achieving 90 per cent SMR of long UAT ADS-B messages when the desired signal level is between –87 dBm and –10 dBm when subjected to DME interference under the following conditions: DME pulse pairs at a nominal rate of 3 600 pulse pairs per second at a 12 microseconds pulse spacing at a level of –70 dBm and a frequency of 978 MHz.

c) For the high-performance receiver the following additional requirements shall apply:

1) The receiver shall be capable of achieving 90 per cent SMR of long UAT ADS-B messages when the desired signal level is between –87 dBm and –10 dBm when subjected to DME interference under the following conditions: DME pulse pairs at a nominal rate of 3 600 pulse pairs per second at a 12 microseconds pulse spacing at a level of –43 dBm and a frequency of 979 MHz.

2) The receiver shall be capable of achieving 90 per cent SMR of long UAT ADS-B messages when the desired signal level is between –87 dBm and –10 dBm when subjected to DME interference under the following conditions: DME pulse pairs at a nominal rate of 3 600 pulse pairs per second at a 12 microseconds pulse spacing at a level of –79 dBm and a frequency of 978 MHz.

12.4 PHYSICAL LAYER CHARACTERISTICS

12.4.1 Modulation rate

The modulation rate shall be 1.041 667 Mbps with a tolerance for aircraft transmitters of ±20 ppm and a tolerance for ground transmitters of ±2 ppm.

Note.— The tolerance on the modulation rate is consistent with the requirement on modulation distortion (see 12.4.3).

12.4.2 Modulation type

a) Data shall be modulated onto the carrier using binary continuous phase frequency shift keying. The modulation index, *h*, shall be no less than 0.6;

b) A binary ONE (1) shall be indicated by a shift up in frequency from the nominal carrier frequency and a binary ZERO (0) by a shift down from the nominal carrier frequency.

Notes.—

1. Filtering of the transmitted signal (at base band and/or after frequency modulation) will be required to meet the spectral containment requirement of 12.1.2.3.3. This filtering may cause the deviation to exceed these values at points other than the optimum sampling points.

2. *Because of the filtering of the transmitted signal, the received frequency offset varies continuously between the nominal values of ±312.5 kHz (and beyond), and the optimal sampling point may not be easily identified. This point can be defined in terms of the so-called "eye diagram" of the received signal. The ideal eye diagram is a superposition of samples of the (undistorted) post detection waveform shifted by multiples of the bit period (0.96 microseconds). The optimum sampling point is the point during the bit period at which the opening of the eye diagram (i.e. the minimum separation between positive and negative frequency offsets at very high signal-to-noise ratios) is maximized. An example "eye diagram" can be seen in Figure 12-3. The timing of the points where the lines converge defines the "optimum sampling point". Figure 12-4 shows an eye pattern that has been partially closed by modulation distortion.*

12.4.3 Modulation distortion

a) For aircraft transmitters, the minimum vertical opening of the eye diagram of the transmitted signal (measured at the optimum sampling points) shall be no less than 560 kHz when measured over an entire long UAT ADS-B message containing pseudorandom message data blocks.

b) For ground transmitters, the minimum vertical opening of the eye diagram of the transmitted signal (measured at the optimum sampling points) shall be no less than 560 kHz when measured over an entire UAT ground uplink message containing pseudorandom message data blocks.

c) For aircraft transmitters, the minimum horizontal opening of the eye diagram of the transmitted signal (measured at 978 MHz) shall be no less than 0.624 microseconds (0.65 symbol periods) when measured over an entire long UAT ADS-B message containing pseudorandom message data blocks.

d) For ground transmitters, the minimum horizontal opening of the eye diagram of the transmitted signal (measured at 978 MHz) shall be no less than 0.624 microseconds (0.65 symbol periods) when measured over an entire UAT ground uplink message containing pseudorandom message data blocks.

Notes.—

1. *Section 12.4.4 defines the UAT ADS-B message types.*

2. *The ideal eye diagram is a superposition of samples of the (undistorted) post detection waveform shifted by multiples of the bit period (0.96 microseconds).*

12.4.4 Broadcast message characteristics

The UAT system shall support two different message types: the UAT ADS-B message and the UAT ground uplink message.

12.4.4.1 UAT ADS-B MESSAGE

The Active portion (see 12.1.2.6) of a UAT ADS-B message shall contain the following elements, in the following order:

— Bit synchronization
— Message data block
— FEC parity.

12.4.4.1.1 *BIT SYNCHRONIZATION*

The first element of the Active portion of the UAT ADS-B message shall be a 36-bit synchronization sequence. For the UAT ADS-B messages the sequence shall be:

111010101100110111011010010011100010

with the left-most bit transmitted first.

12.4.4.1.2 *THE MESSAGE DATA BLOCK*

The second element of the Active portion of the UAT ADS-B message shall be the message data block. There shall be two lengths of UAT ADS-B message data blocks supported. The basic UAT ADS-B message shall have a 144-bit message data block and the long UAT ADS-B message shall have a 272-bit message data block.

Note.— The format, encoding and transmission order of the message data block element is provided in Section 2.1 of Part I of the Manual on the Universal Access Transceiver (UAT) *(Doc 9861).*

12.4.4.1.3 *FEC PARITY*

The third and final element of the Active portion of the UAT ADS-B message shall be the FEC parity.

12.4.4.1.3.1 *Code type*

The FEC parity generation shall be based on a systematic Reed-Solomon (RS) 256-ary code with 8-bit code word symbols. FEC parity generation shall be per the following code:

a) **Basic UAT ADS-B message**: Parity shall be a RS (30, 18) code.

Note.— This results in 12 bytes (code symbols) of parity capable of correcting up to 6 symbol errors per block.

b) **Long UAT ADS-B message**: Parity shall be a RS (48, 34) code.

Note.— This results in 14 bytes (code symbols) of parity capable of correcting up to 7 symbol errors per block.

For either message length the primitive polynomial of the code shall be as follows:

$$p(x) = x^8 + x^7 + x^2 + x + 1$$

The generator polynomial shall be as follows:

$$\prod_{i=120}^{P} (x - \alpha^i)$$

where:

P = 131 for RS (30, 18) code,

P = 133 for RS (48, 34) code, and

α is a primitive element of a Galois field of size 256 (i.e. GF(256)).

12.4.4.1.3.2 *Transmission order of FEC parity*

FEC parity bytes shall be ordered most significant to least significant in terms of the polynomial coefficients they represent. The ordering of bits within each byte shall be most significant to least significant. FEC parity bytes shall follow the message data block.

12.4.4.2 UAT GROUND UPLINK MESSAGE

The Active portion of a UAT ground uplink message shall contain the following elements, in the following order:

— Bit synchronization
— Interleaved message data block and FEC parity.

12.4.4.2.1 *BIT SYNCHRONIZATION*

The first element of the Active portion of the UAT ground uplink message shall be a 36-bit synchronization sequence. For the UAT ground uplink message the sequence shall be:

000101010011001000100101101100011101

with the left-most bit transmitted first.

12.4.4.2.2 *INTERLEAVED MESSAGE DATA BLOCK AND FEC PARITY*

12.4.4.2.2.1 *Message data block (before interleaving and after de-interleaving)*

The UAT ground uplink message shall have 3 456 bits of message data block. These bits are divided into 6 groups of 576 bits. FEC is applied to each group as described in 12.4.4.2.2.2.

Note.— Further details on the format, encoding and transmission order of the UAT ground uplink message data block are provided in Section 2.2 of Part I of the Manual on the Universal Access Transceiver (UAT) *(Doc 9861).*

12.4.4.2.2.2 *FEC parity (before interleaving and after de-interleaving)*

12.4.4.2.2.2.1 *Code type*

The FEC parity generation shall be based on a systematic RS 256-ary code with 8-bit code word symbols. FEC parity generation for each of the six blocks shall be a RS (92,72) code.

Notes.—

1. *Section 12.4.4.2.2.3 provides details on the interleaving procedure.*

2. *This results in 20 bytes (symbols) of parity capable of correcting up to 10 symbol errors per block. The additional use of interleaving for the UAT ground uplink message allows additional robustness against burst errors.*

The primitive polynomial of the code is as follows:

$$p(x) = x^8 + x^7 + x^2 + x + 1$$

The generator polynomial is as follows:

$$\prod_{i=120}^{P}(x-\alpha^{i})$$

where:

P = 139, and

α is a primitive element of a Galois field of size 256 (i.e. GF(256)).

12.4.4.2.2.2.2 *Transmission order of FEC parity*

FEC parity bytes are ordered most significant to least significant in terms of the polynomial coefficients they represent. The ordering of bits within each byte shall be most significant to least significant. FEC parity bytes shall follow the message data block.

12.4.4.2.2.3 *Interleaving procedure*

UAT ground uplink messages shall be interleaved and transmitted by the ground station, as listed below:

a) **Interleaving procedure**: The interleaved message data block and FEC parity consists of 6 interleaved Reed-Solomon blocks. The interleaver is represented by a 6×92 matrix, where each entry is a RS 8-bit symbol. Each row comprises a single RS (92,72) block as shown in Table 12-5. In this table, block numbers prior to interleaving are represented as "A" through "F". The information is ordered for transmission column by column, starting at the upper left corner of the matrix.

b) **Transmission order**: The bytes are then transmitted in the following order:

1,73,145,217,289,361,2,74,146,218,290,362,3,. . .,C/20,D/20,E/20,F/20.

Note.— On reception these bytes need to be de-interleaved so that the RS blocks can be reassembled prior to error correction decoding.

12.5 GUIDANCE MATERIAL

Notes.—

1. *The* Manual on the Universal Access Transceiver (UAT) *(Doc 9861), Part I, provides detailed technical specifications on UAT, including ADS-B message data blocks and formats, procedures for operation of UAT transmitting subsystems, and avionics interface requirements with other aircraft systems.*

2. *The* Manual on the Universal Access Transceiver (UAT) *(Doc 9861), Part II, provides information on UAT system operation, description of a range of example avionics equipment classes and their applications, guidance on UAT aircraft and ground station installation aspects, and detailed information on UAT system performance simulation.*

TABLES FOR CHAPTER 12

Table 12-1. Transmitter power levels

Transmitter type	*Minimum power at PMP*	*Maximum power at PMP*	*Intended minimum air-to-air ranges*
Aircraft (Low)	7 watts (+38.5 dBm)	18 watts (+42.5 dBm)	20 NM
Aircraft (Medium)	16 watts (+42 dBm)	40 watts (+46 dBm)	40 NM
Aircraft (High)	100 watts (+50 dBm)	250 watts (+54 dBm)	120 NM
Ground Station	Specified by the service provider to meet local requirements within the constraint of 12.1.2.3.2.		

Notes.—

1. *The three levels listed for the avionics are available to support applications with varying range requirements. See the discussion of UAT aircraft Equipage Classes in Section 2.4.2 of Part II of the* Manual on the Universal Access Transceiver (UAT) *(Doc 9861) (in preparation).*

2. *The intended minimum air-to-air ranges are for high-density air traffic environments. Larger air-to-air ranges will be achieved in low-density air traffic environments.*

Table 12-2. UAT transmit spectrum

Frequency offset from centre	*Required attenuation from maximum power level (dB as measured at the PMP)*
All frequencies in the range 0 – 0.5 MHz	0
All frequencies in the range 0.5 – 1.0 MHz	Based on linear* interpolation between these points
1.0 MHz	18
All frequencies in the range 1.0 – 2.25 MHz	Based on linear* interpolation between these points
2.25 MHz	50
All frequencies in the range 2.25 – 3.25 MHz	Based on linear* interpolation between these points
3.25 MHz	60

** based on attenuation in dB and a linear frequency scale*

Table 12-3. Standard UAT receiver rejection ratios

Frequency offset from centre	*Minimum rejection ratio (Undesired/desired level in dB)*
–1.0 MHz	10
+1.0 MHz	15
(±) 2.0 MHz	50
(±) 10.0 MHz	60

Note.— It is assumed that ratios in between the specified offsets will fall near the interpolated value.

Table 12-4. High-performance receiver rejection ratios

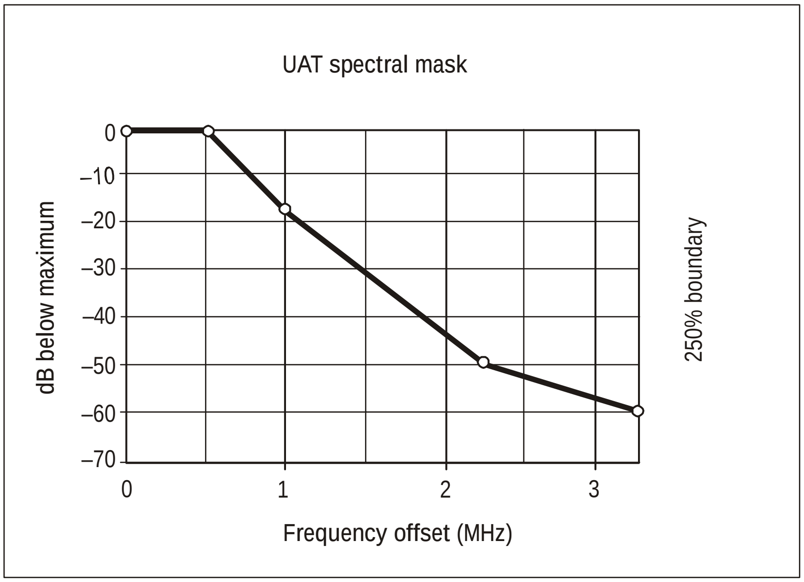
Frequency offset from centre	*Minimum rejection ratio (Undesired/desired level in dB)*
–1.0 MHz	30
+1.0 MHz	40
(±) 2.0 MHz	50
(±) 10.0 MHz	60

Table 12-5. Ground uplink interleaver matrix

RS Block	*MDB Byte #*						*FEC Parity (Block/Byte #)*			
A	1	2	3	…	71	72	A/1	…	A/19	A/20
B	73	74	75	…	143	144	B/1	…	B/19	B/20
C	145	146	147	…	215	216	C/1	…	C/19	C/20
D	217	218	219	…	287	288	D/1	…	D/19	D/20
E	289	290	291	…	359	360	E/1	…	E/19	E/20
F	361	362	363	…	431	432	F/1	…	F/19	F/20

Note.— In Table 12-5, message data block Byte #1 through #72 are the 72 bytes (8 bits each) of message data block information carried in the first RS (92,72) block. FEC parity A/1 through A/20 are the 20 bytes of FEC parity associated with that block (A).

FIGURES FOR CHAPTER 12



Notes.—

1. *99 per cent of the power of the UAT spectrum is contained in 1.3 MHz (±0.65 MHz). This is roughly equivalent to the 20 dB bandwidth.*

2. *Spurious emissions requirements begin at ±250 per cent of the 1.3 MHz value, therefore the transmit mask requirement extends to ±3.25 MHz.*

Figure 12-1. UAT transmit spectrum

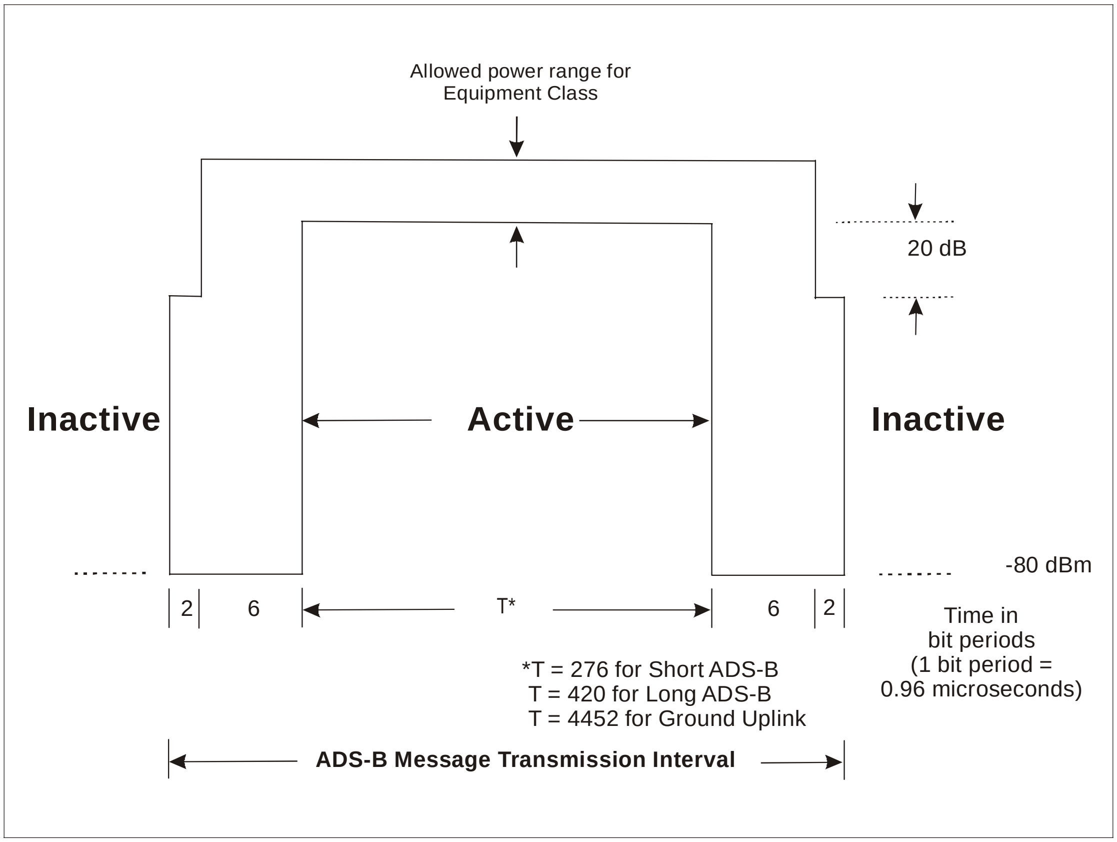


Figure 12-2. Time/amplitude profile of UAT message transmission

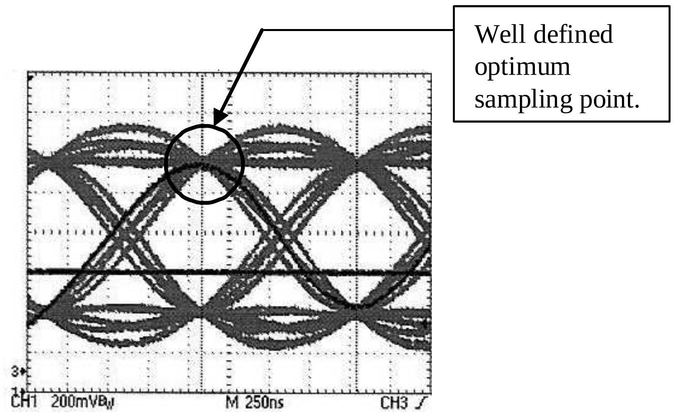


Figure 12-3. Ideal eye diagram

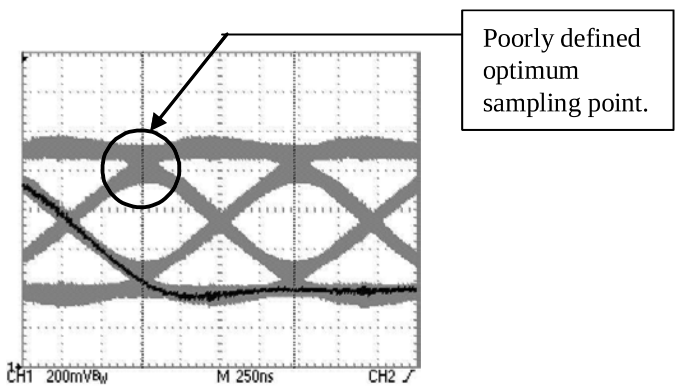


Figure 12-4. Distorted eye diagram

INTERNATIONAL STANDARDS AND RECOMMENDED PRACTICES

PART II — VOICE COMMUNICATION SYSTEMS

CHAPTER 1. DEFINITIONS

Note.— Material on secondary power supply and guidance material concerning reliability and availability for communication systems is contained in Annex 10, Volume I, 2.9 and Volume I, Attachment F, respectively.

CHAPTER 2. AERONAUTICAL MOBILE SERVICE

2.1 AIR-GROUND VHF COMMUNICATION SYSTEM CHARACTERISTICS

Note.— In the following text the channel spacing for 8.33 kHz channel assignments is defined as 25 kHz divided by 3 which is 8.3333 ... kHz.

2.1.1 The characteristics of the air-ground VHF communication system used in the International Aeronautical Mobile Service shall be in conformity with the following specifications:

2.1.1.1 Radiotelephone emissions shall be double sideband (DSB) amplitude modulated (AM) carriers. The designation of emission is A3E, as specified in the ITU Radio Regulations.

2.1.1.2 Spurious emissions shall be kept at the lowest value which the state of technique and the nature of the service permit.

Note.— Appendix S3 to the ITU Radio Regulations specifies the levels of spurious emissions to which transmitters must conform.

2.1.1.3 The radio frequencies used shall be selected from the radio frequencies in the band 117.975 – 137 MHz. The separation between assignable frequencies (channel spacing) and frequency tolerances applicable to elements of the system shall be as specified in Volume V.

Note.— The band 117.975 – 132 MHz was allocated to the Aeronautical Mobile (R) Service in the ITU Radio Regulations (1947). By subsequent revisions at ITU World Administrative Radio Conferences the bands 132 – 136 MHz and 136 – 137 MHz were added under conditions which differ for ITU Regions, or for specified countries or combinations of countries (see RRs S5.203, S5.203A and S5.203B for additional allocations in the band 136 – 137 MHz, and S5.201 for the band 132 – 136 MHz).

2.1.1.4 The design polarization of emissions shall be vertical.

2.2 SYSTEM CHARACTERISTICS OF THE GROUND INSTALLATION

2.2.1 Transmitting function

2.2.1.1 *Frequency stability.* The radio frequency of operation shall not vary more than plus or minus 0.005 per cent from the assigned frequency. Where 25 kHz channel spacing is introduced in accordance with Volume V, the radio frequency of operation shall not vary more than plus or minus 0.002 per cent from the assigned frequency. Where 8.33 kHz channel spacing is introduced in accordance with Volume V, the radio frequency of operation shall not vary more than plus or minus 0.0001 per cent from the assigned frequency.

Note.— The above tolerances will not be suitable for offset carrier systems.

2.2.1.1.1 Offset carrier systems in 25 kHz, 50 kHz and 100 kHz channel spaced environments. The stability of individual carriers of an offset carrier system shall be such as to prevent first-order heterodyne frequencies of less than 4 kHz and, additionally, the maximum frequency excursion of the outer carrier frequencies from the assigned carrier frequency shall not exceed 8 kHz. Offset carrier systems shall not be used on 8.33 kHz spaced channels.

Note.— Examples of the required stability of the individual carriers of offset carrier systems may be found at the Attachment to Part II.

2.2.1.2 POWER

Recommendation.— *On a high percentage of occasions, the effective radiated power should be such as to provide a field strength of a least 75 microvolts per metre (minus 109 dBW/m²) within the defined operational coverage of the facility, on the basis of free-space propagation.*

2.2.1.3 *Modulation.* A peak modulation factor of at least 0.85 shall be achievable.

2.2.1.4 **Recommendation.—** *Means should be provided to maintain the average modulation factor at the highest practicable value without overmodulation.*

2.2.2 Receiving function

2.2.2.1 *Frequency stability*. Where 8.33 kHz channel spacing is introduced in accordance with Volume V, the radio frequency of operation shall not vary more than plus or minus 0.0001 per cent from the assigned frequency.

2.2.2.2 *Sensitivity*. After due allowance has been made for feeder loss and antenna polar diagram variation, the sensitivity of the receiving function shall be such as to provide on a high percentage of occasions an audio output signal with a wanted/unwanted ratio of 15 dB, with a 50 per cent amplitude modulated (A3E) radio signal having a field strength of 20 microvolts per metre (minus 120 dBW/m^2) or more.

2.2.2.3 *Effective acceptance bandwidth*. When tuned to a channel having a width of 25 kHz, 50 kHz or 100 kHz, the receiving system shall provide an adequate and intelligible audio output when the signal specified at 2.2.2.2 has a carrier frequency within plus or minus 0.005 per cent of the assigned frequency. When tuned to a channel having a width of 8.33 kHz, the receiving system shall provide an adequate and intelligible audio output when the signal specified at 2.2.2.2 has a carrier frequency within plus or minus 0.0005 per cent of the assigned frequency. Further information on the effective acceptance bandwidth is contained in the Attachment to Part II.

Note.— The effective acceptance bandwidth includes Doppler shift.

2.2.2.4 *Adjacent channel rejection.* The receiving system shall ensure an effective rejection of 60 dB or more at the next assignable channel.

Note.— The next assignable frequency will normally be plus or minus 50 kHz. Where this channel spacing will not suffice, the next assignable frequency will be plus or minus 25 kHz, or plus or minus 8.33 kHz, implemented in accordance with the provisions of Volume V. It is recognized that in certain areas of the world receivers designed for 25 kHz, 50 kHz or 100 kHz channel spacing may continue to be used.

2.3 SYSTEM CHARACTERISTICS OF THE AIRBORNE INSTALLATION

2.3.1 Transmitting function

2.3.1.1 *Frequency stability.* The radio frequency of operation shall not vary more than plus or minus 0.005 per cent from the assigned frequency. Where 25 kHz channel spacing is introduced, the radio frequency of operation shall not vary more than plus or minus 0.003 per cent from the assigned frequency. Where 8.33 kHz channel spacing is introduced, the radio frequency of operation shall not vary more than plus or minus 0.0005 per cent from the assigned frequency.

2.3.1.2 *Power*. On a high percentage of occasions, the effective radiated power shall be such as to provide a field strength of at least 20 microvolts per metre (minus 120 dBW/m^2) on the basis of free space propagation, at ranges and altitudes appropriate to the operational conditions pertaining to the areas over which the aircraft is operated.

2.3.1.3 *Adjacent channel power*. The amount of power from a 8.33 kHz airborne transmitter under all operating conditions when measured over a 7 kHz channel bandwidth centred on the first 8.33 kHz adjacent channel shall not exceed -45 dB below the transmitter carrier power. The above adjacent channel power shall take into account the typical voice spectrum.

Note.— The voice spectrum is assumed to be a constant level between 300 and 800 Hz and attenuated by 10 dB per octave above 800 Hz.

2.3.1.4 *Modulation.* A peak modulation factor of at least 0.85 shall be achievable.

2.3.1.5 **Recommendation.—** *Means should be provided to maintain the average modulation factor at the highest practicable value without overmodulation.*

2.3.2 Receiving function

2.3.2.1 *Frequency stability*. Where 8.33 kHz channel spacing is introduced in accordance with Volume V, the radio frequency of operation shall not vary more than plus or minus 0.0005 per cent from the assigned frequency.

2.3.2.2 SENSITIVITY

2.3.2.2.1 **Recommendation.—** *After due allowance has been made for aircraft feeder mismatch, attenuation loss and antenna polar diagram variation, the sensitivity of the receiving function should be such as to provide on a high percentage of occasions an audio output signal with a wanted/unwanted ratio of 15 dB, with a 50 per cent amplitude modulated (A3E) radio signal having a field strength of 75 microvolts per metre (minus 109 dBW/m^2).*

Note.— For planning extended range VHF facilities, an airborne receiving function sensitivity of 30 microvolts per metre may be assumed.

2.3.2.3 *Effective acceptance bandwidth for 100 kHz, 50 kHz and 25 kHz channel spacing receiving installations.* When tuned to a channel designated in Volume V as having a width of 25 kHz, 50 kHz or 100 kHz, the receiving function shall ensure an effective acceptance bandwidth as follows:

a) in areas where offset carrier systems are employed, the receiving function shall provide an adequate audio output when the signal specified at 2.3.2.2 has a carrier frequency within 8 kHz of the assigned frequency;

b) in areas where offset carrier systems are not employed, the receiving function shall provide an adequate audio output when the signal specified at 2.3.2.2 has a carrier frequency of plus or minus 0.005 per cent of the assigned frequency.

2.3.2.4 *Effective acceptance bandwidth for 8.33 kHz channel spacing receiving installations*. When tuned to a channel designated in Volume V, as having a width of 8.33 kHz, the receiving function shall provide an adequate audio output when the signal specified at 2.3.2.2 has a carrier frequency within plus or minus 0.0005 per cent of the assigned frequency. Further information on the effective acceptance bandwidth is contained in the Attachment to Part II.

Note.— The effective acceptance bandwidth includes Doppler shift.

2.3.2.5 *Adjacent channel rejection.* The receiving function shall ensure an effective adjacent channel rejection as follows:

a) *8.33 kHz channels:* 60 dB or more at plus or minus 8.33 kHz with respect to the assigned frequency, and 40 dB or more at plus or minus 6.5 kHz;

Note.— The receiver local oscillator phase noise should be sufficiently low to avoid any degradation of the receiver capability to reject off carrier signals. A phase noise level better than minus 99 dBc/Hz 8.33 kHz away from the carrier is necessary to comply with 45 dB adjacent channel rejection under all operating conditions.

b) *25 kHz channel spacing environment:* 50 dB or more at plus or minus 25 kHz with respect to the assigned frequency and 40 dB or more at plus or minus 17 kHz;

c) *50 kHz channel spacing environment:* 50 dB or more at plus or minus 50 kHz with respect to the assigned frequency and 40 dB or more at plus or minus 35 kHz;

d) *100 kHz channel spacing environment:* 50 dB or more at plus or minus 100 kHz with respect to the assigned frequency.

2.3.2.6 **Recommendation.—** *Whenever practicable, the receiving system should ensure an effective adjacent channel rejection characteristic of 60 dB or more at plus or minus 25 kHz, 50 kHz and 100 kHz from the assigned frequency for receiving systems intended to operate in channel spacing environments of 25 kHz, 50 kHz and 100 kHz, respectively.*

Note.— Frequency planning is normally based on an assumption of 60 dB effective adjacent channel rejection at plus or minus 25 kHz, 50 kHz or 100 kHz from the assigned frequency as appropriate to the channel spacing environment.

2.3.2.7 **Recommendation.—** *In the case of receivers complying with 2.3.2.3 used in areas where offset carrier systems are in force, the characteristics of the receiver should be such that:*

a) the audio frequency response precludes harmful levels of audio heterodynes resulting from the reception of two or more offset carrier frequencies;

b) the receiver muting circuits, if provided, operate satisfactorily in the presence of audio heterodynes resulting from the reception of two or more offset carrier frequencies.

2.3.2.8 *VDL — Interference immunity performance*

2.3.2.8.1 For equipment intended to be used in independent operations of services applying DSB-AM and VDL technology on board the same aircraft, the receiving function shall provide an adequate and intelligible audio output with a desired signal field strength of not more than 150 microvolts per metre (minus 102 dBW/m^2) and with an undesired VDL signal field strength of at least 50 dB above the desired field strength on any assignable channel 100 kHz or more away from the assigned channel of the desired signal.

Note.— This level of VDL interference immunity performance provides a receiver performance consistent with the influence of the VDL RF spectrum mask as specified in Volume III, Part I, 6.3.4 with an effective transmitter/receiver isolation of 68 dB. Better transmitter and receiver performance could result in less isolation required.

2.3.2.8.2 After 1 January 2002, the receiving function of all new installations intended to be used in independent operations of services applying DSB-AM and VDL technology on board the same aircraft shall meet the provisions of 2.3.2.8.1.

2.3.2.8.3 After 1 January 2005, the receiving function of all installations intended to be used in independent operations of services applying DSB-AM and VDL technology on board the same aircraft shall meet the provisions of 2.3.2.8.1, subject to the conditions of 2.3.2.8.4.

2.3.2.8.4 Requirements for mandatory compliance of the provisions of 2.3.2.8.3 shall be made on the basis of regional air navigation agreements which specify the airspace of operation and the implementation timescales.

2.3.2.8.4.1 The agreement indicated in 2.3.2.8.4 shall provide at least two years' notice of mandatory compliance of airborne systems.

2.3.3 Interference immunity performance

2.3.3.1 After 1 January 1998, the VHF communications receiving system shall provide satisfactory performance in the presence of two signal, third-order intermodulation products caused by VHF FM broadcast signals having levels at the receiver input of minus 5 dBm.

2.3.3.2 After 1 January 1998, the VHF communications receiving system shall not be desensitized in the presence of VHF FM broadcast signals having levels at the receiver input of minus 5 dBm.

Note.— Guidance material on immunity criteria to be used for the performance quoted in 2.3.3.1 and 2.3.3.2 is contained in the Attachment to Part II, 1.3.

2.3.3.3 After 1 January 1995, all new installations of airborne VHF communications receiving systems shall meet the provisions of 2.3.3.1 and 2.3.3.2.

2.3.3.4 **Recommendation.—** *Airborne VHF communications receiving systems meeting the immunity performance Standards of 2.3.3.1 and 2.3.3.2 should be placed into operation at the earliest possible date.*

2.4 SINGLE SIDEBAND (SSB) HF COMMUNICATION SYSTEM CHARACTERISTICS FOR USE IN THE AERONAUTICAL MOBILE SERVICE

2.4.1 The characteristics of the air-ground HF SSB system, where used in the Aeronautical Mobile Service, shall be in conformity with the following specifications.

2.4.1.1 FREQUENCY RANGE

2.4.1.1.1 HF SSB installations shall be capable of operation at any SSB carrier (reference) frequency available to the Aeronautical Mobile (R) Service in the band 2.8 MHz to 22 MHz and necessary to meet the approved assignment plan for the region(s) in which the system is intended to operate, and in compliance with the relevant provisions of the Radio Regulations.

Note 1.— See Introduction to Volume V, Chapter 3, and Figures 2-1 and 2-2[*].

Note 2.— The ITU World Administrative Radio Conference, Aeronautical Mobile (R) Service, Geneva, 1978, established a new Allotment Plan (Appendix 27, Aer to the Radio Regulations) based on single sideband replacing the earlier double sideband Allotment Plan. The World Radiocommunication Conference 1995 redesignated it as Appendix S.27. Minor editorial changes were made at the World Radiocommunication Conference 1997.

2.4.1.1.2 The equipment shall be capable of operating on integral multiples of 1 kHz.

2.4.1.2 SIDEBAND SELECTION

2.4.1.2.1 The sideband transmitted shall be that on the higher frequency side of its carrier (reference) frequency.

2.4.1.3 CARRIER (REFERENCE) FREQUENCY

2.4.1.3.1 Channel utilization shall be in conformity with the table of carrier (reference) frequencies at 27/16 and the Allotment Plan at 27/186 to 27/207 inclusive (or frequencies established on the basis of 27/21, as may be appropriate) of Appendix S27.

Note.— It is intended that only the carrier (reference) frequency be promulgated in Regional Plans and Aeronautical Publications.

2.4.1.4 CLASSES OF EMISSION AND CARRIER SUPPRESSION

2.4.1.4.1 The system shall utilize the suppressed carrier class of emission J3E (also J7B and J9B as applicable). When SELCAL is employed as specified in Chapter 3 of Part II, the installation shall utilize class H2B emission.

2.4.1.4.2 By 1 February 1982 aeronautical stations and aircraft stations shall have introduced the appropriate class(es) of emission prescribed in 2.4.1.4.1. Effective this date the use of class A3E emission shall be discontinued except as provided in 2.4.1.4.4.

2.4.1.4.3 Until 1 February 1982 aeronautical stations and aircraft stations equipped for single sideband operations shall also be equipped to transmit class H3E emission where required to be compatible with reception by double sideband equipment. Effective this date the use of class H3E emission shall be discontinued except as provided in 2.4.1.4.4.

2.4.1.4.4 **Recommendation.—** *For stations directly involved in coordinated search and rescue operations using the frequencies 3 023 kHz and 5 680 kHz, the class of emission J3E should be used; however, since maritime mobile and land mobile services may be involved, A3E and H3E classes of emission may be used.*

2.4.1.4.5 After 1 April 1981 no new DSB equipment shall be installed.

2.4.1.4.6 Aircraft station transmitters shall be capable of at least 26 dB carrier suppression with respect to peak envelope power (P_p) for classes of emission J3E, J7B or J9B.

2.4.1.4.7 Aeronautical station transmitters shall be capable of 40 dB carrier suppression with respect to peak envelope power (P_p) for classes of emission J3E, J7B or J9B.

[*] All figures are located at the end of this chapter.

2.4.1.5 AUDIO FREQUENCY BANDWIDTH

2.4.1.5.1 For radiotelephone emissions the audio frequencies shall be limited to between 300 and 2 700 Hz and the occupied bandwidth of other authorized emissions shall not exceed the upper limit of J3E emissions. In specifying these limits, however, no restriction in their extension shall be implied in so far as emissions other than J3E are concerned, provided that the limits of unwanted emissions are met (see 2.4.1.7).

Note.— For aircraft and aeronautical station transmitter types first installed before 1 February 1983 the audio frequencies will be limited to 3 000 Hz.

2.4.1.5.2 For other authorized classes of emission the modulation frequencies shall be such that the required spectrum limits of 2.4.1.7 will be met.

2.4.1.6 FREQUENCY TOLERANCE

2.4.1.6.1 The basic frequency stability of the transmitting function for classes of emission J3E, J7B or J9B shall be such that the difference between the actual carrier of the transmission and the carrier (reference) frequency shall not exceed:

— 20 Hz for airborne installations;

— 10 Hz for ground installations.

2.4.1.6.2 The basic frequency stability of the receiving function shall be such that, with the transmitting function stabilities specified in 2.4.1.6.1, the overall frequency difference between ground and airborne functions achieved in service and including Doppler shift, does not exceed 45 Hz. However, a greater frequency difference shall be permitted in the case of supersonic aircraft.

2.4.1.7 SPECTRUM LIMITS

2.4.1.7.1 For aircraft station transmitter types and for aeronautical station transmitters first installed before 1 February 1983 and using single sideband classes of emission H2B, H3E, J3E, J7B or J9B the mean power of any emission on any discrete frequency shall be less than the mean power (P_m) of the transmitter in accordance with the following:

— on any frequency removed by 2 kHz or more up to 6 kHz from the assigned frequency: at least 25 dB;

— on any frequency removed by 6 kHz or more up to 10 kHz from the assigned frequency: at least 35 dB;

— on any frequency removed from the assigned frequency by 10 kHz or more:

a) aircraft station transmitters: 40 dB;

b) aeronautical station transmitters:

$$[43 + 10 \log_{10} P_m\ (W)]\ dB$$

2.4.1.7.2 For aircraft station transmitters first installed after 1 February 1983 and for aeronautical station transmitters in use as of 1 February 1983 and using single sideband classes of emission H2B, H3E, J3E, J7B or J9B, the peak envelope power (P_p) of any emission on any discrete frequency shall be less than the peak envelope power (P_p) of the transmitter in accordance with the following:

— on any frequency removed by 1.5 kHz or more up to 4.5 kHz from the assigned frequency: at least 30 dB;

— on any frequency removed by 4.5 kHz or more up to 7.5 kHz from the assigned frequency: at least 38 dB;

— on any frequency removed from the assigned frequency by 7.5 kHz or more:

a) aircraft station transmitters: 43 dB;

b) aeronautical station transmitters: for transmitter power up to and including 50 W:

$$[43 + 10 \log_{10} P_p\ (W)]\ dB$$

For transmitter power more than 50 W: 60 dB.

Note.— See Figures 2-1 and 2-2.

2.4.1.8 POWER

2.4.1.8.1 *Aeronautical station installations.* Except as permitted by the relevant provisions of Appendix S27 to the ITU Radio Regulations, the peak envelope power (P_p) supplied to the antenna transmission line for H2B, H3E, J3E, J7B or J9B classes of emissions shall not exceed a maximum value of 6 kW.

2.4.1.8.2 *Aircraft station installations.* The peak envelope power supplied to the antenna transmission line for H2B, H3E, J3E, J7B or J9B classes of emission shall not exceed 400 W except as provided for in Appendix S27 of the ITU Radio Regulations as follows:

S27/68 It is recognized that the power employed by aircraft transmitters may, in practice, exceed the limits specified in No. 27/60. However, the use of such increased power (which normally should not exceed 600 $W\ P_p$) shall not cause harmful interference to stations using frequencies in accordance with the technical principles on which the Allotment Plan is based.

S27/60 Unless otherwise specified in Part II of this Appendix, the peak envelope powers supplied to the antenna transmission line shall not exceed the maximum values indicated in the table below; the corresponding peak effective radiated powers being assumed to be equal to two-thirds of these values:

Class of emission	*Stations*	*Max. peak envelope power (P_p)*
H2B, J3E, J7B, J9B, A3E*, H3E* (100% modulation)	Aeronautical stations Aircraft stations	6 kW 400 W
Other emission such as A1A, F1B	Aeronautical stations Aircraft stations	1.5 kW 100 W

* A3E and H3E to be used only on 3 023 kHz and 5 680 kHz.

2.4.1.9 *Method of operation.* Single channel simplex shall be employed.

FIGURES FOR CHAPTER 2

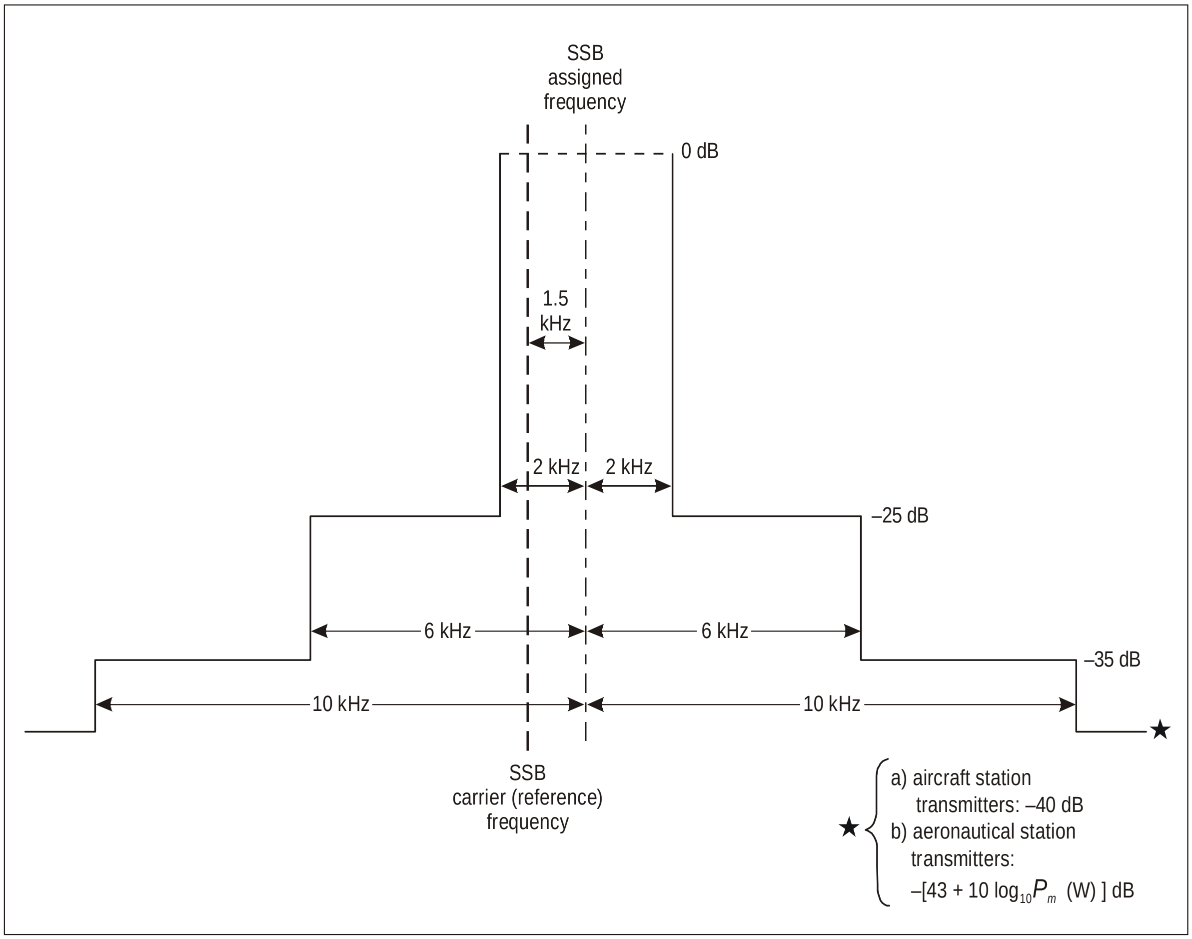


Figure 2-1. Required spectrum limits (in terms of mean power) for aircraft station transmitter types and for aeronautical station transmitters first installed before 1 February 1983

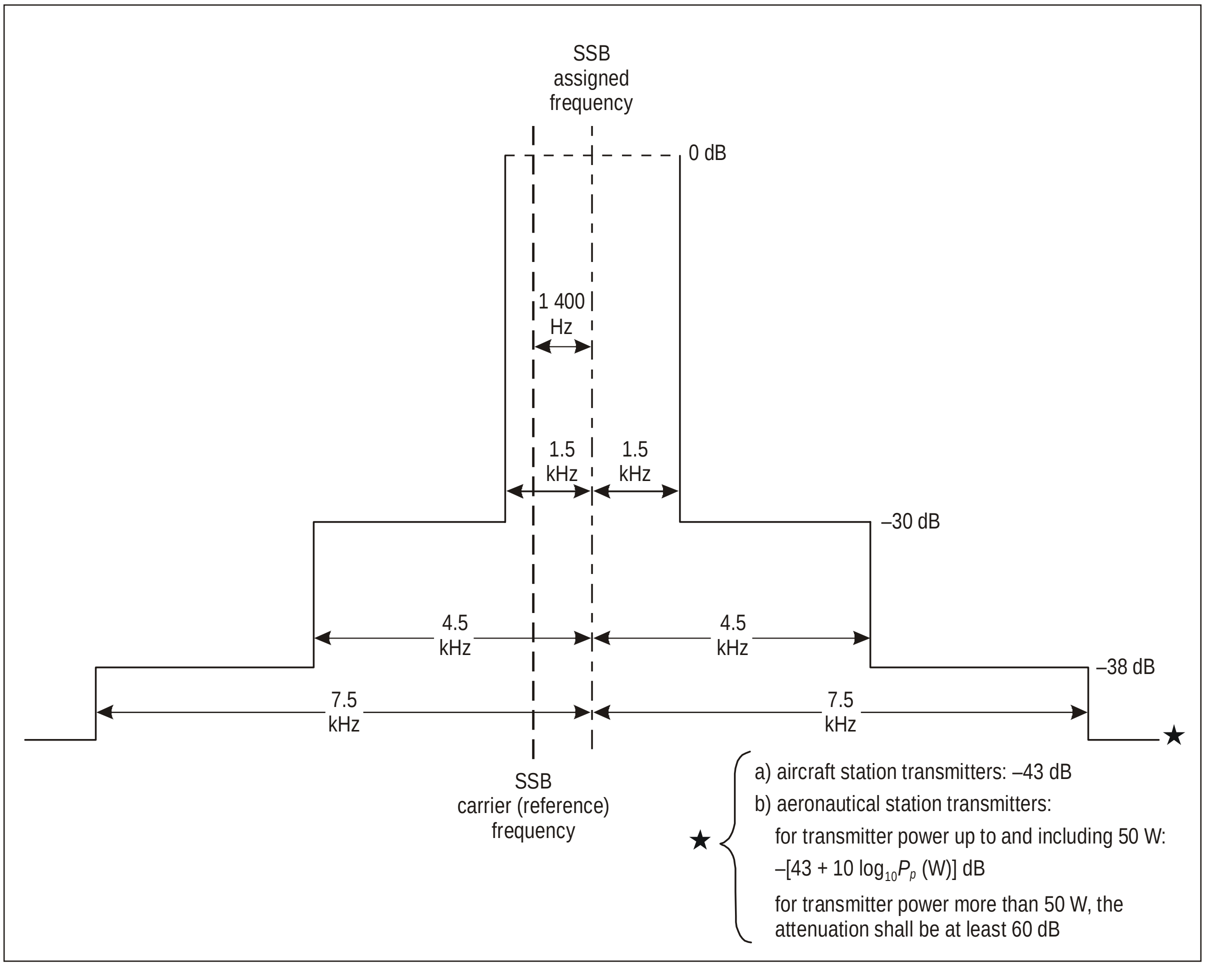


Figure 2-2. Required spectrum limits (in terms of peak power) for aircraft station transmitters first installed after 1 February 1983 and aeronautical station transmitters in use after 1 February 1983

CHAPTER 3. SELCAL SYSTEM

3.1 **Recommendation.—** *Where a SELCAL system is installed, the following system characteristics should be applied:*

a) Transmitted code. *Each transmitted code should be made up of two consecutive tone pulses, with each pulse containing two simultaneously transmitted tones. The pulses should be of 1.0 plus or minus 0.25 seconds duration, separated by an interval of 0.2 plus or minus 0.1 second.*

b) Stability. *The frequency of transmitted tones should be held to plus or minus 0.15 per cent tolerance to ensure proper operation of the airborne decoder.*

c) Distortion. *The overall audio distortion present on the transmitted RF signal should not exceed 15 per cent.*

d) Per cent modulation. *The RF signal transmitted by the ground radio station should contain, within 3 dB, equal amounts of the two modulating tones. The combination of tones should result in a modulation envelope having a nominal modulation percentage as high as possible and in no case less than 60 per cent.*

e) Transmitted tones. *Tone codes should be made up of various combinations of the tones listed in the following table and designated by colour and letter as indicated:*

Designation	*Frequency (Hz)*
Red A	*312.6*
Red B	*346.7*
Red C	*384.6*
Red D	*426.6*
Red E	*473.2*
Red F	*524.8*
Red G	*582.1*
Red H	*645.7*
Red J	*716.1*
Red K	*794.3*
Red L	*881.0*
Red M	*977.2*
Red P	*1 083.9*
Red Q	*1 202.3*
Red R	*1 333.5*
Red S	*1 479.1*

Note 1.— It should be noted that the tones are spaced by Log^{-1} 0.045 to avoid the possibility of harmonic combinations.

Note 2.— In accordance with the application principles developed by the Sixth Session of the Communications Division, the only codes at present used internationally are selected from the red group.

Note 3.— Guidance material on the use of SELCAL systems is contained in the Attachment to Part II.

Note 4.— The tones Red P, Red Q, Red R, and Red S are applicable after 1 September 1985, in accordance with 3.2.

3.2 As from 1 September 1985, aeronautical stations which are required to communicate with SELCAL-equipped aircraft shall have SELCAL encoders in accordance with the red group in the table of tone frequencies of 3.1. After 1 September 1985, SELCAL codes using the tones Red P, Red Q, Red R, and Red S may be assigned.

CHAPTER 4. AERONAUTICAL SPEECH CIRCUITS

4.1 TECHNICAL PROVISIONS RELATING TO INTERNATIONAL AERONAUTICAL SPEECH CIRCUIT SWITCHING AND SIGNALLING FOR GROUND-GROUND APPLICATIONS

Note.— Guidance material on the implementation of aeronautical speech circuit switching and signalling for ground-ground applications is contained in the Manual on Air Traffic Services (ATS) Ground-Ground Voice Switching and Signalling *(Doc 9804). The material includes explanation of terms, performance parameters, guidance on basic call types and additional functions, references to appropriate ISO/IEC international standards and ITU-T recommendations, guidance on the use of signalling systems, details of the recommended numbering scheme and guidance on migration to future schemes.*

4.1.1 The use of circuit switching and signalling to provide speech circuits to interconnect ATS units not interconnected by dedicated circuits shall be by agreement between the Administrations concerned.

4.1.2 The application of aeronautical speech circuit switching and signalling shall be made on the basis of regional air navigation agreements.

4.1.3 **Recommendation.—** *The ATC communication requirements defined in Annex 11, Section 6.2 should be met by implementation of one or more of the following basic three call types:*

a) instantaneous access;

b) direct access; and

c) indirect access.

4.1.4 **Recommendation.—** *In addition to the ability to make basic telephone calls, the following functions should be provided in order to meet the requirements set out in Annex 11:*

a) means of indicating the calling/called party identity;

b) means of initiating urgent/priority calls; and

c) conference capabilities.

4.1.5 **Recommendation.—** *The characteristics of the circuits used in aeronautical speech circuit switching and signalling should conform to appropriate ISO/IEC international standards and ITU-T recommendations.*

4.1.6 **Recommendation.—** *Digital signalling systems should be used wherever their use can be justified in terms of any of the following:*

a) improved quality of service;

b) improved user facilities; or

c) reduced costs where quality of service is maintained.

4.1.7 **Recommendation.—** *The characteristics of supervisory tones to be used (such as ringing, busy, number unobtainable) should conform to appropriate ITU-T recommendations.*

4.1.8 **Recommendation.—** *To take advantage of the benefits of interconnecting regional and national aeronautical speech networks, the international aeronautical telephone network numbering scheme should be used.*

CHAPTER 5. EMERGENCY LOCATOR TRANSMITTER (ELT) FOR SEARCH AND RESCUE

5.1 GENERAL

5.1.1 Until 1 January 2005, emergency locator transmitters shall operate either on both 406 MHz and 121.5 MHz or on 121.5 MHz.

Note.— From 1 January 2000, ELTs operating on 121.5 MHz will be required to meet the improved technical characteristics contained in 5.2.1.8.

5.1.2 All installations of emergency locator transmitters operating on 406 MHz shall meet the provisions of 5.3.

5.1.3 All installations of emergency locator transmitters operating on 121.5 MHz shall meet the provisions of 5.2.

5.1.4 From 1 January 2005, emergency locator transmitters shall operate on 406 MHz and 121.5 MHz simultaneously.

5.1.5 All emergency locator transmitters installed on or after 1 January 2002 shall operate simultaneously on 406 MHz and 121.5 MHz.

5.1.6 The technical characteristics for the 406 MHz component of an integrated ELT shall be in accordance with 5.3.

5.1.7 The technical characteristics for the 121.5 MHz component of an integrated ELT shall be in accordance with 5.2.

5.1.8 States shall make arrangements for a 406 MHz ELT register. Register information regarding the ELT shall be immediately available to search and rescue authorities. States shall ensure that the register is updated whenever necessary.

5.1.9 ELT register information shall include the following:

a) transmitter identification (expressed in the form of an alphanumerical code of 15 hexadecimal characters);

b) transmitter manufacturer, model and, when available, manufacturer's serial number;

c) COSPAS-SARSAT* type approval number;

d) name, address (postal and e-mail) and emergency telephone number of the owner and operator;

e) name, address (postal and e-mail) and telephone number of other emergency contacts (two, if possible) to whom the owner or the operator is known;

f) aircraft manufacturer and type; and

g) colour of the aircraft.

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* COSPAS = Space system for search of vessels in distress;
SARSAT = Search and rescue satellite-aided tracking.

Note 1.— Various coding protocols are available to States. Depending on the protocol adopted, States may, at their discretion, include one of the following as supplementary identification information to be registered:

a) aircraft operating agency designator and operator's serial number; or

b) 24-bit aircraft address; or

c) aircraft nationality and registration marks.

The aircraft operating agency designator is allocated to the operator by ICAO through the State administration, and the operator's serial number is allocated by the operator from the block 0001 to 4096.

Note 2.— At their discretion, depending on arrangements in place, States may include other relevant information to be registered such as the last date of register, battery expiry date and place of ELT in the aircraft (e.g. "primary ELT" or "life-raft No. 1").

5.2 SPECIFICATION FOR THE 121.5 MHz COMPONENT OF EMERGENCY LOCATOR TRANSMITTER (ELT) FOR SEARCH AND RESCUE

Note 1.— Information on technical characteristics and operational performance of 121.5 MHz ELTs is contained in RTCA Document DO-183 and European Organization for Civil Aviation Equipment (EUROCAE) Document ED.62.

Note 2.— Technical characteristics of emergency locator transmitters operating on 121.5 MHz are contained in ITU-R Recommendation M.690-1. The ITU designation for an ELT is Emergency Position — Indicating Radio Beacon (EPIRB).

5.2.1 Technical characteristics

5.2.1.1 Emergency locator transmitters (ELT) shall operate on 121.5 MHz. The frequency tolerance shall not exceed plus or minus 0.005 per cent.

5.2.1.2 The emission from an ELT under normal conditions and attitudes of the antenna shall be vertically polarized and essentially omnidirectional in the horizontal plane.

5.2.1.3 Over a period of 48 hours of continuous operation, at an operating temperature of minus 20°C, the peak effective radiated power (PERP) shall at no time be less than 50 mW.

5.2.1.4 The type of emission shall be A3X. Any other type of modulation that meets the requirements of 5.2.1.5, 5.2.1.6 and 5.2.1.7 may be used provided that it will not prejudice precise location of the beacon by homing equipment.

Note.— Some ELTs are equipped with an optional voice capability (A3E) in addition to the A3X emission.

5.2.1.5 The carrier shall be amplitude modulated at a modulation factor of at least 0.85.

5.2.1.6 The modulation applied to the carrier shall have a minimum duty cycle of 33 per cent.

5.2.1.7 The emission shall have a distinctive audio characteristic achieved by amplitude modulating the carrier with an audio frequency sweeping downward over a range of not less than 700 Hz within the range 1 600 Hz to 300 Hz and with a sweep repetition rate of between 2 Hz and 4 Hz.

5.2.1.8 After 1 January 2000, the emission shall include a clearly defined carrier frequency distinct from the modulation sideband components; in particular, at least 30 per cent of the power shall be contained at all times within plus or minus 30 Hz of the carrier frequency on 121.5 MHz.

5.3 SPECIFICATION FOR THE 406 MHz COMPONENT OF EMERGENCY LOCATOR TRANSMITTER (ELT) FOR SEARCH AND RESCUE

5.3.1 Technical characteristics

Note 1.— Transmission characteristics for 406 MHz emergency locator transmitters are contained in ITU-R M.633.

Note 2.— Information on technical characteristics and operational performance of 406 MHz ELTs is contained in RTCA Document DO-204 and European Organization for Civil Aviation Equipment (EUROCAE) Document ED-62.

5.3.1.1 Emergency locator transmitters shall operate on one of the frequency channels assigned for use in the frequency band 406.0 to 406.1 MHz.

Note.— The COSPAS-SARSAT 406 MHz channel assignment plan is contained in COSPAS-SARSAT Document C/S T.012.

5.3.1.2 The period between transmissions shall be 50 seconds plus or minus 5 per cent.

5.3.1.3 Over a period of 24 hours of continuous operation at an operating temperature of –20°C, the transmitter power output shall be within the limits of 5 W plus or minus 2 dB.

5.3.1.4 The 406 MHz ELT shall be capable of transmitting a digital message.

5.3.2 Transmitter identification coding

5.3.2.1 Emergency locator transmitters operating on 406 MHz shall be assigned a unique coding for identification of the transmitter or aircraft on which it is carried.

5.3.2.2 The emergency locator transmitter shall be coded in accordance with either the aviation user protocol or one of the serialized user protocols described in the Appendix to this chapter, and shall be registered with the appropriate authority.

APPENDIX TO CHAPTER 5. EMERGENCY LOCATOR TRANSMITTER CODING

(see Chapter 5, 5.3.2)

Note.— A detailed description of beacon coding is contained in Specification for COSPAS-SARSAT 406 MHz Distress Beacons (C/S T.001). The following technical specifications are specific to emergency locator transmitters used in aviation.

1. GENERAL

1.1 The emergency locator transmitter (ELT) operating on 406 MHz shall have the capacity to transmit a programmed digital message which contains information related to the ELT and/or the aircraft on which it is carried.

1.2 The ELT shall be uniquely coded in accordance with 1.3 and be registered with the appropriate authority.

1.3 The ELT digital message shall contain either the transmitter serial number or one of the following information elements:

a) aircraft operating agency designator and a serial number;

b) 24-bit aircraft address;

c) aircraft nationality and registration marks.

1.4 All ELTs shall be designed for operation with the COSPAS-SARSAT* system and be type approved.

Note.— Transmission characteristics of the ELT signal can be confirmed by making use of the COSPAS-SARSAT Type Approval Standard (C/S T.007).

2. ELT CODING

2.1 The ELT digital message shall contain information relating to the message format, coding protocol, country code, identification data and location data, as appropriate.

2.2 For ELTs with no navigation data provided, the short message format C/S T.001 shall be used, making use of bits 1 through 112. For ELTs with navigation data, if provided, the long message format shall be used, making use of bits 1 through 144.

2.3 Protected data field

2.3.1 The protected data field consisting of bits 25 through 85 shall be protected by an error correcting code and shall be the portion of the message which shall be unique in every distress ELT.

2.3.2 A message format flag indicated by bit 25 shall be set to “0” to indicate the short message format or set to “1” to indicate the long format for ELTs capable of providing location data.

* COSPAS = Space system for search of vessels in distress;
SARSAT = Search and rescue satellite-aided tracking.

2.3.3 A protocol flag shall be indicated by bit 26 and shall be set to “1” for user and user location protocols, and “0” for location protocols.

2.3.4 A country code, which indicates the State where additional data are available on the aircraft on which the ELT is carried, shall be contained in bits 27 through 36 which designate a three-digit decimal country code number expressed in binary notation.

Note.— Country codes are based on the International Telecommunication Union (ITU) country codes shown in Table 4 of Part I, Volume I of the ITU List of Call Signs and Numerical Identities*.*

2.3.5 Bits 37 through 39 (user and user location protocols) or bits 37 through 40 (location protocols) shall designate one of the protocols where values “001” and “011” or “0011”, “0100”, “0101”, and “1000” are used for aviation as shown in the examples contained in this appendix.

2.3.6 The ELT digital message shall contain either the transmitter serial number or an identification of the aircraft or operator as shown below.

2.3.7 In the serial user and serial user location protocol (designated by bit 26=1 and bits 37 through 39 being “011”), the serial identification data shall be encoded in binary notation with the least significant bit on the right. Bits 40 through 42 shall indicate type of ELT serial identification data encoded where:

— “000” indicates ELT serial number (binary notation) is encoded in bits 44 through 63;

— “001” indicates aircraft operator (3 letter encoded using modified Baudot code shown in Table 5-1) and a serial number (binary notation) are encoded in bits 44 through 61 and 62 through 73, respectively;

— “011” indicates the 24-bit aircraft address is encoded in bits 44 through 67 and each additional ELT number (binary notation) on the same aircraft is encoded in bits 68 through 73.

Note.— States will ensure that each beacon, coded with the country code of the State, is uniquely coded and registered in a database. Unique coding of serialized coded beacons can be facilitated by including the COSPAS-SARSAT Type Approval Certificate Number which is a unique number assigned by COSPAS-SARSAT for each approved ELT model, as part of the ELT message.

2.3.8 In the aviation user or user location protocol (designated by bit 26=1 and bits 37 through 39 being “001”), the aircraft nationality and registration marking shall be encoded in bits 40 through 81, using the modified Baudot code shown in Table 5-1 to encode seven alphanumeric characters. This data shall be right justified with the modified Baudot “space” (“100100”) being used where no character exists.

2.3.9 Bits 84 and 85 (user or user location protocol) or bit 112 (location protocols) shall indicate any homing transmitter that may be integrated in the ELT.

2.3.10 In standard and national location protocols, all identification and location data shall be encoded in binary notation with the least significant bit right justified. The aircraft operator designator (3 letter code) shall be encoded in 15 bits using a modified Baudot code (Table 5-1) using only the 5 right most bits per letter and dropping the left most bit which has a value of 1 for letters.

Table 5-1. Modified Baudot code

Letter	*Code* *MSB LSB*	*Figure*	*Code* *MSB LSB*
A	111000	(-)*	011000
B	110011		
C	101110		
D	110010		
E	110000	3	010000
F	110110		
G	101011		
H	100101		
I	101100		
J	111010	8	001100
K	111110		
L	101001		
M	100111		
N	100110		
O	100011	9	000011
P	101101	0	001101
Q	111101	1	011101
R	101010	4	001010
S	110100		
T	100001	5	000001
U	111100	7	011100
V	101111		
W	111001	2	011001
X	110111	/	010111
Y	110101	6	010101
Z	110001		
( )**	100100		

MSB = most significant bit
LSB = least significant bit
* = hyphen
** = space

EXAMPLES OF CODING

ELT serial number

25		27 36	37			40				44 63	64 73	74 83		85
F	1	COUNTRY	0	1	1	T	T	T	C	SERIAL NUMBER DATA (20 BITS)	SEE NOTE 1	SEE NOTE 2	A	A

Aircraft address

25		27 36	37			40				44 67	68 73	74 83		85
F	1	COUNTRY	0	1	1	T	T	T	C	AIRCRAFT ADDRESS (24 BITS)	SEE NOTE 3	SEE NOTE 2	A	A

Aircraft operator designator and serial number

25		27 36	37			40				44 61	62 73	74 83		85
F	1	COUNTRY	0	1	1	T	T	T	C	OPERATOR 3-LETTER DESIGNATOR	SERIAL NUMBER 1-4096	SEE NOTE 2	A	A

Aircraft registration marking

25		27 36	37			40 81		83		85
F	1	COUNTRY	0	0	1	AIRCRAFT REGISTRATION MARKING (UP TO 7 ALPHANUMERIC CHARACTERS) (42 BITS)	0	0	A	A

T = Beacon type TTT: = 000 indicates ELT serial number is encoded;
= 001 indicates operating agency and serial number are encoded;
= 011 indicates 24-bit aircraft address is encoded.

C = Certificate flag bit: 1 = to indicate that COSPAS-SARSAT Type Approval Certificate number is encoded in bits 74 through 83 and
0 = otherwise

F = Format flag: 0 = Short Message
1 = Long Message

A = Auxiliary radio-locating device: 00 = no auxiliary radio-locating device
01 = 121.5 MHz
11 = other auxiliary radio-locating device

Note 1.— 10 bits, all 0s or National use.

Note 2.— COSPAS-SARSAT Type Approval Certificate number in binary notation with the least significant bit on the right, or National use.

Note 3.— Serial number, in binary notation with the least significant bit on the right, of additional ELTs carried in the same aircraft or default to 0s when only one ELT is carried.

EXAMPLE OF CODING (USER LOCATION PROTOCOL)

25	26	←27 36→	←37 39→	←40 83→	85→	←86 106→	←107	112→	←113				132→	←133 144→
1	1	10	3	44	2	21	1	12			13			12
1	1	CC	T	IDENTIFICATION DATA (AS IN ANY OF USER PROTOCOLS ABOVE)	A	21-BIT BCH ERROR CORRECTING CODE	E	LATITUDE			LONGITUDE			12-BIT BCH ERROR CORRECTING CODE
								1	7	4	1	8	4	
								N / S	DEG 0–90 (1 d)	MIN 0–56 (4m)	E / W	DEG 0–180 (1 d)	MIN 0–56 (4m)	

CC = Country Code;
E = Encoded position data source: 1 = Internal navigation device, 0 = External navigation device

EXAMPLE OF CODING (STANDARD LOCATION PROTOCOL)

25	26	←27 36→	←37 40→	|←41					85→	←86 106→	107 112	←113					132→	←133 144→
61 BITS											26 BITS							
1	1	10	4	45						21	6	20						12
1	0	CC	PC	IDENTIFICATION DATA		LATITUDE		LONGITUDE		21-BIT BCH CODE	SD	Δ LATITUDE			Δ LONGITUDE			12-BIT BCH CODE
				24		1	9	1	10			1	5	4	1	5	4	
			0011	AIRCRAFT 24 BIT ADDRESS		N = 0 S = 1	LAT DEG 0–90 (1/4 d)	E = 0 W = 1	LON DEG 0–180 (1/4 d)			= 0 + = 1	MINUTES 0–30 (1 m)	SECONDS 0–56 (4 s)	= 0 + = 1	MINUTES 0–30 (1 m)	SECONDS 0–56 (4 s)	
			0101	15 AIRCRAFT OPER. DESIGNATOR	9 SERIAL No 1–511													
			0100	10 C/STA No 1–1023	14 SERIAL No 1–16383													

CC = Country Code;
PC = Protocol Code 0011 indicates 24-bit aircraft address is encoded;
0101 indicates operating agency and serial number are encoded;
0100 indicates ELT serial number is encoded.
SD = Supplementary Data bits 107 – 110 = 1101;
bit 111 = Encoded Position Data Source (1 = internal; 0 = external)
bit 112: 1 = 121.5 MHz auxiliary radio locating device;
0 = other or no auxiliary radio locating device.

Note 1.— Further details on protocol coding can be found in Specification for COSPAS-SARSAT 406 MHz Distress Beacon (C/S T.001).

Note 2. — All identification and location data are to be encoded in binary notation with the least significant bit on the right except for the aircraft operator designator (3 letter code).

Note 3. — For details on BCH error correcting code see Specification for COSPAS-SARSAT 406 MHz Distress Beacon (C/S T.001).

EXAMPLE OF CODING (NATIONAL LOCATION PROTOCOL)

<table>
<tr><td>25</td><td>26</td><td>←27
36→</td><td colspan="8">←37
40→|←41 85→</td><td>←86
106→</td><td>107
112</td><td colspan="7">←113
132→</td><td>←133
144→</td></tr>
<tr><td colspan="11">61 BITS
PDF-1</td><td>BCH-1</td><td colspan="8">26 BITS
PDF-2</td><td>BCH-2</td></tr>
<tr><td>1</td><td>1</td><td>10</td><td>4</td><td colspan="7">45</td><td>21</td><td>6</td><td colspan="3">7</td><td colspan="3">7</td><td>6</td><td>12</td></tr>
<tr><td rowspan="3">1</td><td rowspan="3">0</td><td rowspan="3">CC</td><td rowspan="3">1000</td><td>18 bits
ID</td><td colspan="6">27 bits
LATITUDE LONGITUDE</td><td rowspan="3">21-BIT
BCH
CODE</td><td rowspan="3">SD</td><td colspan="3">Δ LATITUDE</td><td colspan="3">Δ LONGITUDE</td><td rowspan="3">NU</td><td rowspan="3">12-BIT
BCH
CODE</td></tr>
<tr><td>18</td><td>1</td><td>7</td><td>5</td><td>1</td><td>8</td><td>5</td><td>1</td><td>2</td><td>4</td><td>1</td><td>2</td><td>4</td></tr>
<tr><td>NATIONAL
ID
NUMBER</td><td>N = 0
S = 1</td><td>DEGREES
0–90
(1 d)</td><td>MINUTES
0–58
(2 m)</td><td>E = 0
W = 1</td><td>DEGREES
0–180
(1 d)</td><td>MINUTES
0–58
(2 m)</td><td>– = 0
+ = 1</td><td>MINUTES
0–3
(1 m)</td><td>SECONDS
0–56
(4 s)</td><td>– = 0
+ = 1</td><td>MINUTES
0–3
(1 m)</td><td>SECONDS
0–56
(4 s)</td></tr>
</table>

CC = Country Code;
ID = Identification Data = 8-bit identification data consisting of a serial number assigned by the appropriate national authority
SD = Supplementary Data = bits 107 – 109 = 110;
bit 110 = Additional Data Flag describing the use of bits 113 to 132:
1 = Delta position; 0 = National assignment;
bit 111 = Encoded Position Data Source: 1 = internal, 0 = external;
bit 112: 1 = 121.5 MHz auxiliary radio locating device;
0 = other or no device
NU = National use = 6 bits reserved for national use (additional beacon type identification or other uses).

Note 1.— Further details on protocol coding can be found in Specification for COSPAS-SARSAT 406 MHz Distress Beacon (C/S T.001).

Note 2.— All identification and location data are to be encoded in binary notation with the least significant bit on the right.

Note 3.— For details on BCH error correcting code see Specification for COSPAS-SARSAT 406 MHZ Distress Beacon (C/S T.001).

ATTACHMENT TO PART I. GUIDANCE MATERIAL FOR THE VHF DIGITAL LINK (VDL)

1. GUIDANCE MATERIAL FOR THE VHF DIGITAL LINK (VDL)

Note.— The Standards and Recommended Practices (SARPs) referred to are contained in Annex 10, Volume III, Part 1, Chapter 6.

2. SYSTEM DESCRIPTION

2.1 The VDL system provides an air-ground data communications link within the aeronautical telecommunications network (ATN). The VDL will operate in parallel with the other ATN air-ground subnetworks.

2.2 VDL ground stations consist of a VHF radio and a computer capable of handling the VDL protocol throughout the coverage area. The VDL stations offer connectivity via a ground-based telecommunications network (e.g. X.25 based) to ATN intermediate systems which will provide access to ground-based ATN end systems.

2.3 In order to communicate with the VDL ground stations, aircraft are required to be equipped with VDL avionics which will include a VHF radio and a computer capable of handling the VDL protocol. The air-ground communication will utilize 25 kHz channels in the VHF aeronautical mobile (route) service band.

3. VDL PRINCIPLES

3.1 Communications transfer principles

3.1.1 Connectivity between applications running in ATN end systems (ES) using the ATN and its subnetworks, including the VDL, for air-ground communication is provided by the transport layer entities in these end systems. Transport connections between airborne and ground end systems shall be maintained through controlled changes of the precise ATN intermediate systems (IS) and VDL network elements that provide this connectivity.

3.1.2 Transport connections between ATN ES are not linked to a particular subnetwork and ISO 8473 network protocol data units transmitted by an ES can pass via any air-ground ATN compatible subnetwork (such as aeronautical mobile-satellite service (AMSS) data link, SSR Mode S data link or VDL) that meets the quality of service (QOS) requirements. A transport connection between an aircraft ES and a ground ES shall be maintained as long as there is at least one air-ground subnetwork connection between the aircraft IS and a ground IS which has connectivity to the ground ES. In order to maximize subnetwork connectivity, aircraft are expected to maintain air-ground subnetwork connections via any subnetwork (AMSS, Mode S or VDL) with which link layer connectivity can be established.

3.1.3 The VDL subnetwork provides connectivity in the form of switched virtual circuits between ISO 8208 data terminal equipment (DTE) entities of aircraft and ground-based ATN intermediate systems. Due to the fact that VHF signals have only line-of-sight propagation, it is necessary for aircraft in flight to regularly establish link connections with new VDL ground stations in order to maintain VHF coverage. An established VDL virtual circuit between an aircraft DTE and a ground DTE is maintained through a controlled change to a ground station through which the ground DTE can be accessed.

3.1.4 VDL virtual circuits may be cleared when the aircraft or ground IS identifies a policy situation where the virtual circuit to the ground DTE is no longer necessary but this shall only happen if another VDL virtual circuit remains established. A policy situation is a situation where considerations other than coverage influence the decision to establish a connection. This could be, for example, a situation where an aircraft is within the designated operational coverage area of ground stations operated by different operators and a decision must be made with which operator to establish a connection. The case where an aircraft crosses a border between two States needs special attention. An aircraft has to establish a virtual circuit to the DTE in the IS of the State entered before clearing the virtual circuit with the DTE in the IS of the State left.

3.1.5 The scenarios for subnetwork connection maintenance are shown in Figure ATT I-1*. If the ground stations on each side of a State border do not offer ISO 8208 connectivity to the DTEs of the IS in both States, aircraft crossing the border will have to set up a link connection to a ground station in the State entered before being able to establish a virtual circuit to the IS of that State. Only after establishment of the new link connection and virtual circuit, the aircraft will clear the virtual circuit with the DTE of the IS of the country left over the link which gave access to that IS. If the VDL aeronautical stations on both sides of the State border offer connectivity to the IS in both States, the changeover of the virtual circuits has to take place over the same link connection.

3.2 VDL quality of service for ATN routing

3.2.1 The use of the VDL system for air-ground communications will depend on the routing decisions of aircraft and ground-based ATN IS. These ISs will decide on the path to be used for air-ground communications based on quality of service values requested by transmitting ESs.

3.2.2 The IS at each end of the air-ground connections must interpret the requested QOS value and decide which of the available connections can best be met. It is important that the level of QOS which a VDL connection is perceived as providing is set at a level which corresponds to its true performance.

3.2.3 In cases where the VDL is the only data link with which an aircraft has been equipped, all communications must be routed via a VDL connection and the value set for QOS to be provided by the connection must not block the communication.

3.2.4 In other cases where aircraft are equipped with other air-ground data links (such as AMSS and SSR Mode S) there may be simultaneous parallel connections over multiple subnetworks. In these cases, the values for QOS provided by each subnetwork must be set so as to ensure that the VDL connection will be used where appropriate.

3.2.5 It is necessary that coordination take place between aircraft operators, ground station operators and ground system operators to ensure that the right balance is achieved between different subnetworks.

4. VDL GROUND STATION NETWORK CONCEPT

4.1 Access

4.1.1 A VDL ground station will provide access for aircraft to the ground ATN IS using the VDL protocol over a VHF channel.

* The figure is located at the end of this attachment.

4.2 Institutional issues concerning VDL ground station network operators

4.2.1 An ATS provider wishing to use VDL for air traffic service (ATS) communications needs to ensure that the VDL service is available. The ATS provider can either operate the VDL ground station network itself or arrange for the operation of the VDL stations (or VDL network) by a telecommunications service provider. It seems likely that individual States will make different arrangements for the provision of VDL service to aircraft. Operation and implementation of VDL need to be coordinated at a regional level in order to ensure acceptable service on international routes.

4.2.2 The use of a VDL ground station network by entities external to the ATS provider will be subject to service agreements between the ATS provider and the telecommunications service provider. These agreements set out the obligations of the two parties and need, in particular, to be specific on the quality of service provided as well as the characteristics of the user interface.

4.2.3 It seems likely that some VDL ground station network operators will levy user charges. These are expected to be levied either on the aircraft operators and/or on the ATS providers. It is necessary to ensure that the use of VDL is feasible for those aircraft operators intended to use VDL for ATS/AOC communications.

4.3 VDL ground station equipment

4.3.1 A VDL ground station will consist of a VHF radio and a computer which may be separate or integrated with the radio. The VDL functionality of the VHF radio equipment will be similar to that installed in aircraft.

4.3.2 The provision of network status monitoring is an important element in the maintenance of the highest availability possible.

4.4 Ground station siting

4.4.1 The line of sight limitations of VHF propagation is an important factor in the siting of ground stations. It is necessary to ensure that the ground stations are installed in a manner which provides coverage throughout the designated operational coverage area (DOC).

4.4.2 The coverage requirements for VDL depend on the applications that are intended to operate over the VDL. These applications may function, for example, when an aircraft is at en-route altitude, in a terminal area or on the ground at an airport.

4.4.3 En-route coverage can be provided using a small number of ground stations with a large DOC (for example, the range of a VHF signal from a station at sea level and an aircraft at 37 000 ft is approximately 200 NM). Hence, it is in fact desirable that the smallest number of ground stations possible be used to provide en-route coverage in order to minimize the possibility of simultaneous uplink transmissions from ground stations which may cause message collisions on the VHF channel. The factors limiting en-route coverage will be availability of landmass and the availability of a communications link from a ground station to other ground systems.

4.4.4 Terminal area coverage requires, in general, the installation of ground stations at all airports where VDL operation is required in order to ensure coverage throughout the terminal area.

4.4.5 Aerodrome surface communication coverage must be provided by a ground station at the airport but, due to the physical structure of the airport, it may not be possible to guarantee coverage in all areas with a single station.

4.5 Ground station frequency engineering

4.5.1 The choice of the VHF channel on which a ground station will operate depends on the coverage that the ground station will be required to provide. Coverage on a particular channel is provided by a collection of ground stations operating on that channel and the communications on that channel will occupy the channel for all the ground stations in a coverage area.

4.5.2 As with VHF voice communications, VDL communications cannot be limited to propagating only within States, and frequency coordination between States will be required in the allocation of VDL frequencies. The nature of the protocol does, however, allow for frequency re-use by several ground stations within the same coverage area and hence the rules for the assignment of frequencies are not the same as for voice communications.

4.5.3 The carrier sense multiple access (CSMA) media access control protocol (MAC) layer used in VDL cannot exclude message collisions if some stations using a frequency channel cannot receive the transmissions of other stations, a situation known as a hidden transmitter situation. Hidden transmitters lead to simultaneous transmissions which can cause the intended receiver of one or both transmissions to be unable to decode the received signal.

4.5.4 A frequency will be assigned to providing en-route coverage and all the en-route stations will be set to operate on this frequency. In order to minimize the probability of simultaneous transmissions on the channel by hidden transmitters in a CSMA environment, this channel may not be used for terminal area or aerodrome surface communications except in areas of very low channel loading.

4.5.5 The VDL SARPs call for the provision of a common signalling channel (CSC) on which access to VDL service will be guaranteed in all areas where VDL Mode 2 service is available. This is especially important at airports and on the edge of VDL en-route coverage zones where aircraft are likely to establish initial VDL connectivity. Since the characteristics of Mode 1 and Mode 2 radio frequency transmissions are not compatible, the CSC cannot be used for Mode 1 communications. There is no requirement for a CSC for VDL Mode 1.

4.6 Ground station connection to intermediate systems

4.6.1 In order to provide access to the ground systems which are connected to the aeronautical telecommunications network, a VDL ground station needs to be connected to one or more ATN IS. The purpose of a VDL ground station is to interconnect aircraft with the ground-based ATN via which communications with terrestrial ATN ES can take place.

4.6.2 The ground-based ATN IS can be co-hosted in the VDL ground station computer in which case the VDL subnetwork virtual circuit will end in that computer. This architecture will have an impact on the exchanges required when an aircraft establishes a VDL link with a new ground station. The exact exchange will depend on whether the ground stations contain separate IS or elements of the same distributed intermediate system.

4.6.3 If the IS is not contained in the VDL ground station, it will be connected to the ground station by one of the following means:

a) wide area network (WAN);

b) local area network (LAN); and

c) dedicated communications line.

4.6.4 In all cases, in order to be in accordance with the *Manual of the Aeronautical Telecommunication Network (ATN)* (Doc 9578) for providing an open systems interconnection (OSI) compatible connection-oriented subnetwork service between the aircraft IS and the ground-based IS, the VDL ground station computer will be required to extend the VDL virtual circuit across the terrestrial network or link.

4.6.5 In order to provide simultaneous virtual circuits to several terrestrial ISs, the VDL ground station computer needs to contain a VDL subnetwork entity capable of converting addresses in VDL subnetwork call requests into addresses in the ground-based network.

5. VDL AIRBORNE OPERATING CONCEPT

5.1 Avionics

5.1.1 *VDL avionics*. In order to operate in a VDL network, aircraft need to be equipped with an avionics system providing the VDL subnetwork user (ISO 8208 DTE) function. The system providing this function will also provide the subnetwork user functions for the other air-ground ATN-compatible subnetworks and the aircraft ATN intermediate system function and, hence, its development is necessary in order to provide ATN communications to multiple end-systems or over multiple air-ground subnetworks.

5.2 VDL avionics certification

5.2.1 The VHF digital radio may also provide for double-side band amplitude modulation (DSB-AM) voice capability for emergency back-up to VHF radios used for voice communications. It would be necessary in this case to demonstrate that the VDL functionality of the VDR does not interfere with the DSB-AM voice functionality.

5.2.2 The VDL function in the VHF digital radio provides an air-ground data link service to the VDL subnetwork user entity of the aircraft ATN intermediate system. If the provision of a VHF subnetwork service to an ATN intermediate system were considered an essential service for a particular installation, the VDL functionality of the VDR would need to be certified as an essential function. The use of VDL for ATS communications is not, however, intended to require two aircraft radios to operate simultaneously in VDL mode.

5.3 Registration of aircraft with VDL network operators

5.3.1 For normal communications service, it is to be expected that aircraft operators will be required to register their aircraft with the network operators. In emergency or back-up situations, it must be possible for any VDL-equipped aircraft to establish connectivity over any VDL ground station network.

5.3.2 Registration of aircraft VDL stations with VDL network operators is desirable for network management since, for example, a network operator may identify a temporary fault in the VDL communications from an aircraft and would wish to contact the operator of the aircraft in order to have the fault resolved. Registration of aircraft is also useful in planning the required ground station network capacity. Registration with a VDL ground station network operator does not necessarily imply that the aircraft operator will be charged for use of the VDL ground station network.

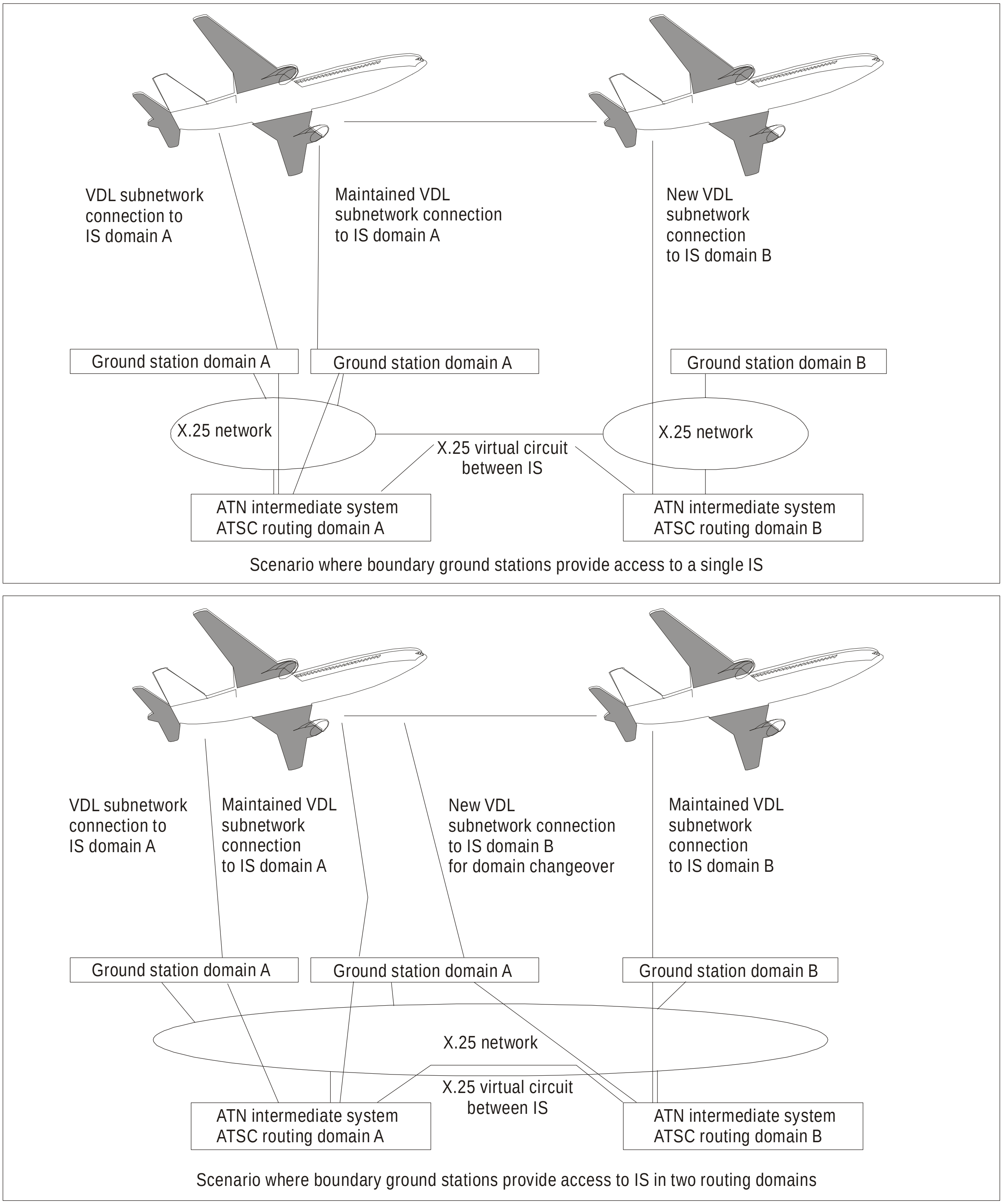

Figure ATT I-1.

ATTACHMENT TO PART II. GUIDANCE MATERIAL FOR COMMUNICATION SYSTEMS

1. VHF COMMUNICATIONS

1.1 Audio characteristics of VHF communication equipment

1.1.1 The aeronautical radiotelephony services represent a special case of the application of radiotelephony, in that the requirement is for the transmission of messages in such a way that fidelity of wave form is of secondary importance, emphasis being upon fidelity of basic intelligence. This means that it is not necessary to transmit those parts of the wave form which are solely concerned with individuality, accent and emphasis.

1.1.2 The effective acceptance bandwidth for 8.33 kHz equipment is required to be at least plus and minus 3 462 Hz. This value considers the general case, i.e. air-to-ground transmissions and consists of 2 500 Hz audio bandwidth, 685 Hz for an aircraft transmitter instability of 5 ppm, 137 Hz for a ground receiver instability of 1 ppm and 140 Hz due to Doppler shift (2.2.2.4 and 2.3.2.6 of Part II refer).

1.2 Off-set carrier system

The following are examples of offset carrier systems which meet the requirements of Part II, 2.2.1.1.1.

a) *2-carrier system.* Carriers should be spaced at plus and minus 5 kHz. This requires a frequency stability of plus or minus 2 kHz (15.3 parts per million at 130 MHz).

b) *3-carrier system.* Carriers should be spaced at zero and plus and minus 7.3 kHz. This requires a frequency stability of plus or minus 0.65 kHz (5 parts per million at 130 MHz).

The following are examples or 4- and 5-carrier systems which meet the requirements of Part II, 2.2.1.1.1.

c) *4-carrier system.* Carriers should be spaced at plus and minus 2.5 kHz and plus and minus 7.5 kHz. This requires a frequency stability of plus or minus 0.5 kHz (3.8 parts per million at 130 MHz).

d) *5-carrier system.* Carriers should be spaced at zero, plus and minus 4 kHz and plus and minus 8 kHz. A frequency stability in the order of plus or minus 40 Hz (0.3 parts per million at 130 MHz) is an achievable and practicable interpretation of the requirement in this case.

Note 1.— The carrier frequency spacings referred to above are with respect to the assigned channel frequency.

Note 2.— In aircraft receivers which employ a measurement of the received carrier-to-noise ratio to operate the mute, the audio heterodynes caused by the reception of two or more off-set carriers can be interpreted as noise and cause the audio output to be muted even when an adequate wanted signal is present. In order that the airborne receiving system can conform with the sensitivity recommendations contained in Part II, 2.3.2.2, the design of the receivers may need to ensure that their sensitivity is maintained at a high level when receiving off-set carrier transmissions. The use of a carrier level override is an unsatisfactory solution to this requirement, but where it is employed, setting the override level as low as possible can ameliorate the problem.

1.3 Immunity performance of COM receiving systems in the presence of VHF FM broadcast interference

1.3.1 With reference to the Note of 2.3.3.2 of Part II, the immunity performance defined there must be measured against an agreed measure of derogation of the receiving system's normal performance, and in the presence of, and under standard conditions for the input wanted signal. This is necessary to ensure that the checking of receiving station equipment on bench test can be performed to a repeatable set of conditions, and results, and to facilitate their subsequent approval. An adequate measure of immunity performance may be obtained by the use of wanted signal of minus 87 dBm into the receiving equipment and the signal modulated with a 1 kHz tone at 30 per cent modulation depth. The signal-to-noise ratio should not fall below 6 dB when the interfering signals specified at Part II, 2.3.3.1 and 2.3.3.2 are applied. The broadcast signals should be selected from frequencies in the range between 87.5 and 107.9 MHz and should be modulated with a representative broadcast type signal.

Note 1.— The signal level of minus 87 dBm assumes a combined antenna and feeder gain of 0 dB.

Note 2.— The reduction in the signal-to-noise ratio quoted above is for the purpose of standardization when checking that receiving station equipment on bench measurements meet the required immunity. In the planning of frequencies and in the assessment of protection from FM broadcast interference, a value not less than this, and in many cases higher, depending on the operational circumstances in individual cases, should be chosen as the basis of the interference assessment.

2. SELCAL SYSTEM

2.1 This material is intended to provide information and guidance relating to the operation of the SELCAL system. It is associated with the Recommended Practices contained in Part II, Chapter 3.

a) *Function.* The purpose of the SELCAL system is to permit the selective calling of individual aircraft over radiotelephone channels linking the ground station with the aircraft, and is intended to operate on en-route frequencies with existing HF and VHF ground-to-air communications transmitters and receivers with a minimum of electrical and mechanical modification. The normal functioning of the ground-to-air communications link should be unaffected, except at such time as the selective calling function is being formed.

b) *Principles of operation.* Selective calling is accomplished by the coder of the ground transmitter sending a single group of coded tone pulses to the aircraft receiver and decoder. The airborne receiver and decoder equipment is capable of receiving and interpreting, by means of an indicator, the correct code and rejecting all other codes in the presence of random noise and interference. The ground portion of the coding device (ground selective calling unit) supplies coded information to the ground-to-air transmitter. The airborne selective calling unit is the special airborne equipment which operates with existing communications receivers on the aircraft to permit decoding of the ground-to-air signals for display on the signal indicator. The type of signal indicator can be chosen to suit operational requirements of the user and may consist of a lamp, a bell, a chime or any combination of such indicating devices.

— END —

ICAO TECHNICAL PUBLICATIONS

The following summary gives the status, and also describes in general terms the contents of the various series of technical publications issued by the International Civil Aviation Organization. It does not include specialized publications that do not fall specifically within one of the series, such as the Aeronautical Chart Catalogue *or the* Meteorological Tables for International Air Navigation.

International Standards and Recommended Practices are adopted by the Council in accordance with Articles 54, 37 and 90 of the Convention on International Civil Aviation and are designated, for convenience, as Annexes to the Convention. The uniform application by Contracting States of the specifications contained in the International Standards is recognized as necessary for the safety or regularity of international air navigation while the uniform application of the specifications in the Recommended Practices is regarded as desirable in the interest of safety, regularity or efficiency of international air navigation. Knowledge of any differences between the national regulations or practices of a State and those established by an International Standard is essential to the safety or regularity of international air navigation. In the event of non-compliance with an International Standard, a State has, in fact, an obligation, under Article 38 of the Convention, to notify the Council of any differences. Knowledge of differences from Recommended Practices may also be important for the safety of air navigation and, although the Convention does not impose any obligation with regard thereto, the Council has invited Contracting States to notify such differences in addition to those relating to International Standards.

Procedures for Air Navigation Services (PANS) are approved by the Council for worldwide application. They contain, for the most part, operating procedures regarded as not yet having attained a sufficient degree of maturity for adoption as International Standards and Recommended Practices, as well as material of a more permanent character which is considered too detailed for incorporation in an Annex, or is susceptible to frequent amendment, for which the processes of the Convention would be too cumbersome.

Regional Supplementary Procedures (SUPPS) have a status similar to that of PANS in that they are approved by the Council, but only for application in the respective regions. They are prepared in consolidated form, since certain of the procedures apply to overlapping regions or are common to two or more regions.

The following publications are prepared by authority of the Secretary General in accordance with the principles and policies approved by the Council.

Technical Manuals provide guidance and information in amplification of the International Standards, Recommended Practices and PANS, the implementation of which they are designed to facilitate.

Air Navigation Plans detail requirements for facilities and services for international air navigation in the respective ICAO Air Navigation Regions. They are prepared on the authority of the Secretary General on the basis of recommendations of regional air navigation meetings and of the Council action thereon. The plans are amended periodically to reflect changes in requirements and in the status of implementation of the recommended facilities and services.

ICAO Circulars make available specialized information of interest to Contracting States. This includes studies on technical subjects.

International Standards
and Recommended Practices

Annex 10
to the Convention on
International Civil Aviation

Aeronautical Telecommunications

Volume IV
Surveillance and Collision Avoidance Systems

This edition incorporates all amendments adopted by the Council prior to 27 February 2007 and supersedes, on 22 November 2007, all previous editions of Annex 10, Volume IV.

For information regarding the applicability of the Standards and Recommended Practices, *see* Foreword.

Fourth Edition
July 2007

International Civil Aviation Organization

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TRANSMITTAL NOTE

NEW EDITIONS OF ANNEXES TO THE CONVENTION ON INTERNATIONAL CIVIL AVIATION

It has come to our attention that when a new edition of an Annex is published, users have been discarding, along with the previous edition of the Annex, the **Supplement** to the previous edition. Please note that the Supplement to the previous edition should be retained until a new Supplement is issued.

**International Standards
and Recommended Practices**

Annex 10
**to the Convention on
International Civil Aviation**

Aeronautical Telecommunications

Volume IV
Surveillance and Collision Avoidance Systems

This edition incorporates all amendments adopted by the Council prior to 27 February 2007 and supersedes, on 28 November 2007, all previous editions of Annex 10, Volume IV.

For information regarding the applicability of the Standards and Recommended Practices, *see* Foreword.

**Fourth Edition
July 2007**

International Civil Aviation Organization

AMENDMENTS

The issue of amendments is announced regularly in the *ICAO Journal* and in the monthly *Supplement to the Catalogue of ICAO Publications and Audio-visual Training Aids*, which holders of this publication should consult. The space below is provided to keep a record of such amendments.

RECORD OF AMENDMENTS AND CORRIGENDA

AMENDMENTS			
No.	Date applicable	Date entered	Entered by
70-82	Incorporated in this edition		

CORRIGENDA			
No.	Date of issue	Date entered	Entered by

TABLE OF CONTENTS

FOREWORD

Historical background

Standards and Recommended Practices for Aeronautical Telecommunications were first adopted by the Council on 30 May 1949 pursuant to the provisions of Article 37 of the Convention on International Civil Aviation (Chicago 1944) and designated as Annex 10 to the Convention. They became effective on 1 March 1950. The Standards and Recommended Practices were based on recommendations of the Communications Division at its Third Session in January 1949.

Up to and including the Seventh Edition, Annex 10 was published in one volume containing four Parts together with associated attachments: Part I — Equipment and Systems, Part II — Radio Frequencies, Part III — Procedures, and Part IV — Codes and Abbreviations.

By Amendment 42, Part IV was deleted from the Annex; the codes and abbreviations contained in that Part were transferred to a new document, Doc 8400.

As a result of the adoption of Amendment 44 on 31 May 1965, the Seventh Edition of Annex 10 was replaced by two volumes: Volume I (First Edition) containing Part I — Equipment and Systems, and Part II — Radio Frequencies, and Volume II (First Edition) containing Communication Procedures.

As a result of the adoption of Amendment 70 on 20 March 1995, Annex 10 was restructured to include five volumes: Volume I — Radio Navigation Aids; Volume II — Communication Procedures; Volume III — Communication Systems; Volume IV — Surveillance Radar and Collision Avoidance Systems; and Volume V — Aeronautical Radio Frequency Spectrum Utilization. By Amendment 70, Volumes III and IV were published in 1995 and Volume V was planned for publication with Amendment 71.

Table A shows the origin of amendments to Annex 10, Volume IV subsequent to Amendment 70, together with a summary of the principal subjects involved and the dates on which the Annex and the amendments were adopted by Council, when they became effective and when they became applicable.

Action by Contracting States

Notification of differences. The attention of Contracting States is drawn to the obligation imposed by Article 38 of the Convention by which Contracting States are required to notify the Organization of any differences between their national regulations and practices and the International Standards contained in this Annex and any amendments thereto. Contracting States are invited to extend such notification to any differences from the Recommended Practices contained in this Annex and any amendments thereto, when the notification of such differences is important for the safety of air navigation. Further, Contracting States are invited to keep the Organization currently informed of any differences which may subsequently occur, or of the withdrawal of any differences previously notified. A specific request for notification of differences will be sent to Contracting States immediately after the adoption of each amendment to this Annex.

The attention of States is also drawn to the provisions of Annex 15 related to the publication of differences between their national regulations and practices and the related ICAO Standards and Recommended Practices through the Aeronautical Information Service, in addition to the obligation of States under Article 38 of the Convention.

Promulgation of information. The establishment and withdrawal of and changes to facilities, services and procedures affecting aircraft operations provided in accordance with the Standards, Recommended Practices and Procedures specified in Annex 10 should be notified and take effect in accordance with the provisions of Annex 15.

Use of the text of the Annex in national regulations. The Council, on 13 April 1948, adopted a resolution inviting the attention of Contracting States to the desirability of using in their own national regulations, as far as practicable, the precise language of those ICAO Standards that are of a regulatory character and also of indicating departures from the Standards, including any additional national regulations that were important for the safety or regularity of air navigation. Wherever possible, the provisions of this Annex have been deliberately written in such a way as would facilitate incorporation, without major textual changes, into national legislation.

Status of Annex components

An Annex is made up of the following component parts, not all of which, however, are necessarily found in every Annex; they have the status indicated:

1.— *Material comprising the Annex proper*:

a) *Standards* and *Recommended Practices* adopted by the Council under the provisions of the Convention. They are defined as follows:

   Standard: Any specification for physical characteristics, configuration, matériel, performance, personnel or procedure, the uniform application of which is recognized as necessary for the safety or regularity of international air navigation and to which Contracting States will conform in accordance with the Convention; in the event of impossibility of compliance, notification to the Council is compulsory under Article 38.

   Recommended Practice: Any specification for physical characteristics, configuration, matériel, performance, personnel or procedure, the uniform application of which is recognized as desirable in the interest of safety, regularity or efficiency of international air navigation, and to which Contracting States will endeavour to conform in accordance with the Convention.

b) *Appendices* comprising material grouped separately for convenience but forming part of the Standards and Recommended Practices adopted by the Council.

c) *Definitions* of terms used in the Standards and Recommended Practices which are not self-explanatory in that they do not have accepted dictionary meanings. A definition does not have independent status but is an essential part of each Standard and Recommended Practice in which the term is used, since a change in the meaning of the term would affect the specification.

d) *Tables* and *Figures* which add to or illustrate a Standard or Recommended Practice and which are referred to therein, form part of the associated Standard or Recommended Practice and have the same status.

2.— *Material approved by the Council for publication in association with the Standards and Recommended Practices*:

a) *Forewords* comprising historical and explanatory material based on the action of the Council and including an explanation of the obligations of States with regard to the application of the Standards and Recommended Practices ensuing from the Convention and the Resolution of Adoption;

b) *Introductions* comprising explanatory material introduced at the beginning of parts, chapters or sections of the Annex to assist in the understanding of the application of the text;

c) *Notes* included in the text, where appropriate, to give factual information or references bearing on the Standards or Recommended Practices in question, but not constituting part of the Standards or Recommended Practices;

d) *Attachments* comprising material supplementary to the Standards and Recommended Practices, or included as a guide to their application.

Disclaimer regarding patents

Attention is drawn to the possibility that certain elements of Standards and Recommended Practices in this Annex may be the subject of patents or other intellectual property rights. ICAO shall not be responsible or liable for not identifying any or all such rights. ICAO takes no position regarding the existence, validity, scope or applicability of any claimed patents or other intellectual property rights, and accepts no responsibility or liability therefore or relating thereto.

Selection of language

This Annex has been adopted in four languages — English, French, Russian and Spanish. Each Contracting State is requested to select one of those texts for the purpose of national implementation and for other effects provided for in the Convention, either through direct use or through translation into its own national language, and to notify the Organization accordingly.

Editorial practices

The following practice has been adhered to in order to indicate at a glance the status of each statement: *Standards* have been printed in light face roman; *Recommended Practices* have been printed in light face italics, the status being indicated by the prefix **Recommendation**; *Notes* have been printed in light face italics, the status being indicated by the prefix *Note*.

The following editorial practice has been followed in the writing of specifications: for Standards the operative verb "shall" is used, and for Recommended Practices the operative verb "should" is used.

The units of measurement used in this document are in accordance with the International System of Units (SI) as specified in Annex 5 to the Convention on International Civil Aviation. Where Annex 5 permits the use of non-SI alternative units these are shown in parentheses following the basic units. Where two sets of units are quoted it must not be assumed that the pairs of values are equal and interchangeable. It may, however, be inferred that an equivalent level of safety is achieved when either set of units is used exclusively.

Any reference to a portion of this document, which is identified by a number and/or title, includes all subdivisions of that portion.

Table A. Amendments to Annex 10, Volume IV

Amendment	*Source(s)*	*Subject(s)*	*Adopted/approved* *Effective* *Applicable*
70	Air Navigation Commission; Fifth meeting of the Secondary Surveillance Radar Improvements and Collision Avoidance Systems Panel	Creation of Volume IV and introduction of Standards and Recommended Practices and related guidance material for the airborne collision avoidance system (ACAS).	20 March 1995 24 July 1995 9 November 1995
71	Air Navigation Commission; Fourth and fifth meetings of the Secondary Surveillance Radar Improvements and Collision Avoidance Systems Panel (SICASP)	Changes to material related to SSR Mode S air-ground data link system and the carriage of SSR transponders.	12 March 1996 15 July 1996 7 November 1996
72	—	No change.	—
73 (2nd edition)	Air Navigation Commission; Sixth meeting of the Secondary Surveillance Radar Improvements and Collision Avoidance Systems Panel (SICASP)	Addition of specifications for the SSR Mode S system; introduction of material related to the performance of the collision avoidance logic; changes to guidance material related to the airborne collision avoidance system; introduction of Human Factors related material.	19 March 1998 20 July 1998 5 November 1998
74	Air Navigation Commission	Note related to the waiving of patent rights on Mode S extended squitter technique.	18 March 1999 18 March 1999 —
75	—	No change.	—
76	Seventh meeting of the Aeronautical Mobile Communications Panel (AMCP)	Note related to update of references to the ITU Radio Regulations.	12 March 2001 12 March 2001 —
77 (3rd edition)	Seventh meeting of the Secondary Surveillance Radar Improvements and Collision Avoidance Systems Panel (SICASP)	SSR Mode S (Chapters 2 and 3); and ACAS (Chapters 1 and 4).	27 February 2002 15 July 2002 28 November 2002
78	—	No change.	—
79	—	No change.	—
80	—	No change.	—
81	—	No change.	—
82	Surveillance and Conflict Resolution Systems Panel (SCRSP)	Updates to SARPs on ADS-B	26 February 2007 16 July 2007 22 November 2007

INTERNATIONAL STANDARDS AND RECOMMENDED PRACTICES

CHAPTER 1. DEFINITIONS

Note 1.— All references to "Radio Regulations" are to the Radio Regulations published by the International Telecommunication Union (ITU). Radio Regulations are amended from time to time by the decisions embodied in the Final Acts of World Radiocommunication Conferences held normally every two to three years. Further information on the ITU processes as they relate to aeronautical radio system frequency use is contained in the Handbook on Radio Frequency Spectrum Requirements for Civil Aviation including statement of approved ICAO policies *(Doc 9718).*

Note 2.— The Mode S extended squitter system is subject to patent rights from the Massachusetts Institute of Technology (MIT) Lincoln Laboratory. On 22 August 1996, MIT Lincoln Laboratory issued a notice in the Commerce Business Daily (CBD), a United States Government publication, of its intent not to assert its rights as patent owner against any and all persons in the commercial or non-commercial practice of the patent, in order to promote the widest possible use of the Mode S extended squitter technology. Further, by letter to ICAO dated 27 August 1998, MIT Lincoln Laboratory confirmed that the CBD notice has been provided to satisfy ICAO requirements for a statement of patent rights for techniques that are included in SARPs, and that the patent holders offer this technique free of charge for any use.

Airborne collision avoidance system (ACAS). An aircraft system based on secondary surveillance radar (SSR) transponder signals which operates independently of ground-based equipment to provide advice to the pilot on potential conflicting aircraft that are equipped with SSR transponders.

Note.— SSR transponders referred to above are those operating in Mode C or Mode S.

Aircraft address. A unique combination of twenty-four bits available for assignment to an aircraft for the purpose of air-ground communications, navigation and surveillance.

Note.— SSR Mode S transponders transmit extended squitters to support the broadcast of aircraft-derived position for surveillance purposes. The broadcast of this type of information is a form of automatic dependent surveillance (ADS) known as ADS-broadcast (ADS-B).

Automatic dependent surveillance-broadcast (ADS-B) OUT. A function on an aircraft or vehicle that periodically broadcasts its state vector (position and velocity) and other information derived from on-board systems in a format suitable for ADS-B IN capable receivers.

Automatic dependent surveillance-broadcast (ADS-B) IN. A function that receives surveillance data from ADS-B OUT data sources.

Collision avoidance logic. The sub-system or part of ACAS that analyses data relating to an intruder and own aircraft, decides whether or not advisories are appropriate and, if so, generates the advisories. It includes the following functions: range and altitude tracking, threat detection and RA generation. It excludes surveillance.

Human Factors principles. Principles which apply to design, certification, training, operations and maintenance and which seek safe interface between the human and other system components by proper consideration to human performance.

Secondary surveillance radar (SSR). A surveillance radar system which uses transmitters/receivers (interrogators) and transponders.

Note.— The requirements for interrogators and transponders are specified in Chapter 3.

Surveillance radar. Radar equipment used to determine the position of an aircraft in range and azimuth.

Traffic information service – broadcast (TIS-B) IN. A surveillance function that receives and processes surveillance data from TIS-B OUT data sources.

Traffic information service – broadcast (TIS-B) OUT. A function on the ground that periodically broadcasts the surveillance information made available by ground sensors in a format suitable for TIS-B IN capable receivers.

Note.— This technique can be achieved through different data links. The requirements for Mode S extended squitters are specified in Annex 10, Volume IV, Chapter 5. The requirements for VHF digital link (VDL) Mode 4 and universal access transceiver (UAT) are specified in Annex 10, Volume III, Part I.

CHAPTER 2. GENERAL

2.1 SECONDARY SURVEILLANCE RADAR (SSR)

2.1.1 When SSR is installed and maintained in operation as an aid to air traffic services, it shall conform with the provisions of 3.1 unless otherwise specified in this 2.1.

Note.— As referred to in this Annex, Mode A/C transponders are those which conform to the characteristics prescribed in 3.1.1. Mode S transponders are those which conform to the characteristics prescribed in 3.1.2. The functional capabilities of Mode A/C transponders are an integral part of those of Mode S transponders.

2.1.2 Interrogation modes (ground-to-air)

2.1.2.1 Interrogation for air traffic services shall be performed on the modes described in 3.1.1.4.3 or 3.1.2. The uses of each mode shall be as follows:

1) *Mode A* — to elicit transponder replies for identity and surveillance.

2) *Mode C* — to elicit transponder replies for automatic pressure-altitude transmission and surveillance.

3) *Intermode* —

   a) *Mode A/C/S all-call:* to elicit replies for surveillance of Mode A/C transponders and for the acquisition of Mode S transponders.

   b) *Mode A/C-only all-call:* to elicit replies for surveillance of Mode A/C transponders. Mode S transponders do not reply.

4) Mode S —

   a) *Mode S-only all-call:* to elicit replies for acquisition of Mode S transponders.

   b) *Broadcast:* to transmit information to all Mode S transponders. No replies are elicited.

   c) *Selective:* for surveillance of, and communication with, individual Mode S transponders. For each interrogation, a reply is elicited only from the transponder uniquely addressed by the interrogation.

Note 1.— Mode A/C transponders are suppressed by Mode S interrogations and do not reply.

Note 2.— There are 25 possible interrogation (uplink) formats and 25 possible Mode S reply (downlink) formats. For format assignment see 3.1.2.3.2, Figures 3-7 and 3-8.

2.1.2.1.1 **Recommendation.—** *Administrations should coordinate with appropriate national and international authorities those implementation aspects of the SSR system which will permit its optimum use.*

Note.— In order to permit the efficient operation of ground equipment designed to eliminate interference from unwanted aircraft transponder replies to adjacent interrogators (defruiting equipment), States may need to develop coordinated plans for the assignment of pulse recurrence frequencies (PRF) to SSR interrogators.

2.1.2.1.2 The assignment of interrogator identifier (II) codes, where necessary in areas of overlapping coverage, across international boundaries of flight information regions, shall be the subject of regional air navigation agreements.

2.1.2.1.3 The assignment of surveillance identifier (SI) codes, where necessary in areas of overlapping coverage, shall be the subject of regional air navigation agreements.

Note.— The SI lockout facility cannot be used unless all Mode S transponders within coverage range are equipped for this purpose.

2.1.2.2 Mode A and Mode C interrogations shall be provided.

Note.— This requirement may be satisfied by intermode interrogations which elicit Mode A and Mode C replies from Mode A/C transponders.

2.1.2.3 **Recommendation.—** *In areas where improved aircraft identification is necessary to enhance the effectiveness of the ATC system, SSR ground facilities having Mode S features should include aircraft identification capability.*

Note.— Aircraft identification reporting through the Mode S data link provides unambiguous identification of aircraft suitably equipped.

2.1.2.4 SIDE-LOBE SUPPRESSION CONTROL INTERROGATION

2.1.2.4.1 Side-lobe suppression shall be provided in accordance with the provisions of 3.1.1.4 and 3.1.1.5 on all Mode A, Mode C and intermode interrogations.

2.1.2.4.2 Side-lobe suppression shall be provided in accordance with the provisions of 3.1.2.1.5.2.1 on all Mode S-only all-call interrogations.

2.1.3 Transponder reply modes (air-to-ground)

2.1.3.1 Transponders shall respond to Mode A interrogations in accordance with the provisions of 3.1.1.7.12.1 and to Mode C interrogations in accordance with the provisions of 3.1.1.7.12.2.

Note.— If pressure-altitude information is not available, transponders reply to Mode C interrogations with framing pulses only.

2.1.3.1.1 The pressure-altitude reports contained in Mode S replies shall be derived as specified in 3.1.1.7.12.2.

Note.— 3.1.1.7.12.2 is intended to relate to Mode C replies and specifies, inter alia, *that Mode C pressure-altitude reports be referenced to a standard pressure setting of 1 013.25 hectopascals. The intention of 2.1.3.1.1 is to ensure that all transponders, not just Mode C transponders, report uncorrected pressure-altitude.*

2.1.3.2 Where the need for Mode C automatic pressure-altitude transmission capability within a specified airspace has been determined, transponders, when used within the airspace concerned, shall respond to Mode C interrogations with pressure-altitude encoding in the information pulses.

2.1.3.2.1 From 1 January 1999, all transponders, regardless of the airspace in which they will be used, shall respond to Mode C interrogations with pressure-altitude information.

Note.— Operation of the airborne collision avoidance system (ACAS) depends upon intruder aircraft reporting pressure-altitude in Mode C replies.

2.1.3.2.2 For aircraft equipped with 7.62 m (25 ft) or better pressure-altitude sources, the pressure-altitude information provided by Mode S transponders in response to selective interrogations (i.e. in the AC field, 3.1.2.6.5.4) shall be reported in 7.62 m (25 ft) increments.

Note.— Performance of the ACAS is significantly enhanced when an intruder aircraft is reporting pressure-altitude in 7.62 m (25 ft) increments.

2.1.3.2.3 All Mode A/C transponders shall report pressure-altitude encoded in the information pulses in Mode C replies.

2.1.3.2.4 All Mode S transponders shall report pressure-altitude encoded in the information pulses in Mode C replies and in the AC field of Mode S replies.

2.1.3.2.5 When a Mode S transponder is not receiving more pressure-altitude information from a source with a quantization of 7.62 m (25 ft) or better increments, the reported value of the altitude shall be the value obtained by expressing the measured value of the uncorrected pressure-altitude of the aircraft in 30.48 m (100 ft) increments and the Q bit (see 3.1.2.6.5.4 b)) shall be set to 0.

Note.— This requirement relates to the installation and use of the Mode S transponder. The purpose is to ensure that altitude data obtained from a 30.48 m (100 ft) increment source are not reported using the formats intended for 7.62 m (25 ft) data.

2.1.3.3 Transponders used within airspace where the need for Mode S airborne capability has been determined shall also respond to intermode and Mode S interrogations in accordance with the applicable provisions of 3.1.2.

2.1.3.3.1 Requirements for mandatory carriage of SSR Mode S transponders shall be on the basis of regional air navigation agreements which shall specify the airspace and the airborne implementation timescales.

2.1.3.3.2 **Recommendation.—** *The agreements indicated in 2.1.3.3.1 should provide at least five years' notice.*

2.1.4 Mode A reply codes (information pulses)

2.1.4.1 All transponders shall be capable of generating 4 096 reply codes conforming to the characteristics given in 3.1.1.6.2.

2.1.4.1.1 **Recommendation.—** *ATS authorities should establish the procedures for the allotment of SSR codes in conformity with Regional Air Navigation agreements, taking into account other users of the system.*

Note.— Principles for the allocation of SSR codes are given in Doc 4444, Chapter 8.

2.1.4.2 The following Mode A codes shall be reserved for special purposes:

2.1.4.2.1 Code 7700 to provide recognition of an aircraft in an emergency.

2.1.4.2.2 Code 7600 to provide recognition of an aircraft with radiocommunication failure.

2.1.4.2.3 Code 7500 to provide recognition of an aircraft which is being subjected to unlawful interference.

2.1.4.3 Appropriate provisions shall be made in ground decoding equipment to ensure immediate recognition of Mode A codes 7500, 7600 and 7700.

2.1.4.4 **Recommendation.—** *Mode A code 0000 should be reserved for allocation subject to regional agreement, as a general purpose code.*

2.1.4.5 Mode A code 2000 shall be reserved to provide recognition of an aircraft which has not received any instructions from air traffic control units to operate the transponder.

2.1.5 Mode S airborne equipment capability

2.1.5.1 All Mode S transponders shall conform to one of the following five levels:

2.1.5.1.1 Level 1 — Level 1 transponders shall have the capabilities prescribed for:

a) Mode A identity and Mode C pressure-altitude reporting (3.1.1);

b) intermode and Mode S all-call transactions (3.1.2.5);

c) addressed surveillance altitude and identity transaction (3.1.2.6.1, 3.1.2.6.3, 3.1.2.6.5 and 3.1.2.6.7);

d) lockout protocols (3.1.2.6.9);

e) basic data protocols except data link capability reporting (3.1.2.6.10); and

f) air-air service and squitter transactions (3.1.2.8).

Note.— Level 1 permits SSR surveillance based on pressure-altitude reporting and the Mode A identity code. In an SSR Mode S environment, technical performance relative to a Mode A/C transponder is improved due to Mode S selective aircraft interrogation.

2.1.5.1.2 Level 2 — Level 2 transponders shall have the capabilities of 2.1.5.1.1 and also those prescribed for:

a) standard length communications (Comm-A and Comm-B) (3.1.2.6.2, 3.1.2.6.4, 3.1.2.6.6, 3.1.2.6.8 and 3.1.2.6.11);

b) data link capability reporting (3.1.2.6.10.2.2); and

c) aircraft identification reporting (3.1.2.9).

Note.— Level 2 permits aircraft identification reporting and other standard length data link communications from ground to air and air to ground. The aircraft identification reporting capability requires an interface and appropriate input device.

2.1.5.1.3 Level 3 — Level 3 transponders shall have the capabilities of 2.1.5.1.2 and also those prescribed for ground-to-air extended length message (ELM) communications (3.1.2.7.1 to 3.1.2.7.5).

Note.— Level 3 permits extended length data link communications from ground to air and thus may provide retrieval from ground-based data banks and receipt of other air traffic services which are not available with Level 2 transponders.

2.1.5.1.4 Level 4 — Level 4 transponders shall have the capabilities of 2.1.5.1.3 and also those prescribed for air-to-ground extended length message (ELM) communications (3.1.2.7.7 and 3.1.2.7.8).

Note.— Level 4 permits extended length data link communications from air to ground and thus may provide access from the ground to airborne data sources and the transmission of other data required by air traffic services which are not available with Level 2 transponders.

2.1.5.1.5 Level 5 — Level 5 transponders shall have the capabilities of 2.1.5.1.4 and also those prescribed for enhanced Comm-B and extended length message (ELM) communications (3.1.2.6.11.3.4, 3.1.2.7.6 and 3.1.2.7.9).

Note.— Level 5 permits Comm-B and extended length data link communications with multiple interrogators without requiring the use of multisite reservations. This level of transponder has a higher minimum data link capacity than the other transponder levels.

2.1.5.1.6 *Extended squitter* — Extended squitter transponders shall have the capabilities of 2.1.5.1.2, 2.1.5.1.3, 2.1.5.1.4 or 2.1.5.1.5, the capabilities prescribed for extended squitter operation (3.1.2.8.6) and the capabilities prescribed for ACAS cross-link operation (3.1.2.8.3 and 3.1.2.8.4). Transponders with these capabilities shall be designated with a suffix "e".

Note.— For example, a level 4 transponder with extended squitter capability would be designated "level 4e".

2.1.5.1.7 *SI capability* — Transponders with the ability to process SI codes shall have the capabilities of 2.1.5.1.2, 2.1.5.1.3, 2.1.5.1.4 or 2.1.5.1.5 and also those prescribed for SI code operation (3.1.2.3.2.1.4, 3.1.2.5.2.1, 3.1.2.6.1.3, 3.1.2.6.1.4.1. 3.1.2.6.9.1.1 and 3.1.2.6.9.2). Transponders with this capability shall be designated with a suffix "s".

Note.— For example, a level 4 transponder with extended squitter capability and SI capability would be designated "level 4es".

2.1.5.1.7.1 SI code capability shall be provided in accordance with the provisions of 2.1.5.1.7 for all Mode S transponders installed on or after 1 January 2003 and by all Mode S transponders by 1 January 2005.

Note.— Mandates from certain States may require applicability in advance of these dates.

2.1.5.1.8 *Extended squitter non-transponder devices.* Devices that are capable of broadcasting extended squitters that are not part of a Mode S transponder shall conform to all of the 1 090 MHz RF signals in space requirements specified for a Mode S transponder, except for transmit power levels for the identified equipment class as specified in 5.1.1.

2.1.5.2 All Mode S transponders used by international civil air traffic shall conform, at least, to the requirements of Level 2 prescribed in 2.1.5.1.2.

Note 1.— Level 1 may be admitted for use within an individual State or within the terms of a regional air navigation agreement. The Mode S Level 1 transponder comprises the minimum set of features for compatible operation of Mode S transponders with SSR Mode S interrogators. It is defined to prevent a proliferation of transponder types below Level 2 which would be incompatible with SSR Mode S interrogators.

Note 2.— The intent of the requirement for a Level 2 capability is to ensure the widespread use of an ICAO standard transponder capability to allow worldwide planning of Mode S ground facilities and services. The requirement also discourages an initial installation with Level 1 transponders that would be rendered obsolete by later requirements in certain airspace for mandatory carriage of transponders having Level 2 capabilities.

2.1.5.3 Mode S transponders installed on aircraft with gross mass in excess of 5 700 kg or a maximum cruising true airspeed capability in excess of 463 km/h (250 kt) shall operate with antenna diversity as prescribed in 3.1.2.10.4 if:

a) the aircraft individual certificate of airworthiness is first issued on or after 1 January 1990; or

b) Mode S transponder carriage is required on the basis of regional air navigation agreement in accordance with 2.1.3.3.1 and 2.1.3.3.2.

Note.— Aircraft with maximum cruising true airspeed exceeding 324 km/h (175 kt) are required to operate with a peak power of not less than 21.0 dBW as specified in 3.1.2.10.2 c).

2.1.5.4 CAPABILITY REPORTING IN MODE S SQUITTERS

2.1.5.4.1 Capability reporting in Mode S acquisition squitters (unsolicited downlink transmissions) shall be provided in accordance with the provisions of 3.1.2.8.5.1 for all Mode S transponders installed on or after 1 January 1995.

2.1.5.4.2 **Recommendation.—** *Transponders equipped for extended squitter operation should have a means to disable acquisition squitters when extended squitters are being emitted.*

Note.— This will facilitate the suppression of acquisition squitters if all ACAS units have been converted to receive the extended squitter.

2.1.5.5 EXTENDED LENGTH MESSAGE (ELM) TRANSMIT POWER

In order to facilitate the conversion of existing Mode S transponders to include full Mode S capability, transponders originally manufactured before 1 January 1999 shall be permitted to transmit a burst of 16 ELM segments at a minimum power level of 20 dBW.

Note.— This represents a 1 dB relaxation from the power requirement specified in 3.1.2.10.2.

2.1.6 SSR Mode S address (aircraft address)

The SSR Mode S address shall be one of 16 777 214 twenty-four-bit aircraft addresses allocated by ICAO to the State of Registry or common mark registering authority and assigned as prescribed in 3.1.2.4.1.2.3.1.1 and the Appendix to Chapter 9, Part I, Volume III, Annex 10.

2.2 HUMAN FACTORS CONSIDERATIONS

Recommendation.— *Human Factors principles should be observed in the design and certification of surveillance radar and collision avoidance systems.*

Note.— Guidance material on Human Factors principles can be found in Doc 9683, Human Factors Training Manual *and Circular 249* (Human Factors Digest No. 11 — Human Factors in CNS/ATM Systems).

CHAPTER 3. SURVEILLANCE SYSTEMS

3.1 SECONDARY SURVEILLANCE RADAR (SSR) SYSTEM CHARACTERISTICS

Note 1.— Section 3.1.1 prescribes the technical characteristics of SSR systems having only Mode A and Mode C capabilities. Section 3.1.2 prescribes the characteristics of systems with Mode S capabilities. Chapter 5 prescribes additional requirements on Mode S extended squitters.

Note 2.— Systems using Mode S capabilities are generally used for air traffic control surveillance systems. In addition, certain ATC applications may use Mode S emitters, e.g. for vehicle surface surveillance or for fixed target detection on surveillance systems. Under such specific conditions, the term "aircraft" can be understood as "aircraft or vehicle (A/V)". While those applications may use a limited set of data, any deviation from standard physical characteristics must be considered very carefully by the appropriate authorities. They must take into account not only their own surveillance (SSR) environment but also possible effects on other systems like ACAS.

Note 3.— Non-Standard-International alternative units are used as permitted by Annex 5, Chapter 3, 3.2.2.

3.1.1 Systems having only Mode A and Mode C capabilities

Note 1.— In this section, SSR modes are designated by letters A and C. Suffixed letters, e.g. A_2, C_4, *are used to designate the individual pulses used in the air-to-ground pulse trains. This common use of letters is not to be construed as implying any particular association of modes and codes.*

Note 2.— Provisions for the recording and retention of radar data are contained in Annex 11, Chapter 6.

3.1.1.1 INTERROGATION AND CONTROL (INTERROGATION SIDE-LOBE SUPPRESSION) RADIO FREQUENCIES (GROUND-TO-AIR)

3.1.1.1.1 The carrier frequency of the interrogation and control transmissions shall be 1 030 MHz.

3.1.1.1.2 The frequency tolerance shall be plus or minus 0.2 MHz.

3.1.1.1.3 The carrier frequencies of the control transmission and of each of the interrogation pulse transmissions shall not differ from each other by more than 0.2 MHz.

3.1.1.2 REPLY CARRIER FREQUENCY (AIR-TO-GROUND)

3.1.1.2.1 The carrier frequency of the reply transmission shall be 1 090 MHz.

3.1.1.2.2 The frequency tolerance shall be plus or minus 3 MHz.

3.1.1.3 POLARIZATION

Polarization of the interrogation, control and reply transmissions shall be predominantly vertical.

3.1.1.4 INTERROGATION MODES (SIGNALS-IN-SPACE)

3.1.1.4.1 The interrogation shall consist of two transmitted pulses designated P_1 and P_3. A control pulse P_2 shall be transmitted following the first interrogation pulse P_1.

3.1.1.4.2 Interrogation Modes A and C shall be as defined in 3.1.1.4.3.

3.1.1.4.3 The interval between P_1 and P_3 shall determine the mode of interrogation and shall be as follows:

Mode A 8 ±0.2 microseconds
Mode C 21 ±0.2 microseconds

3.1.1.4.4 The interval between P_1 and P_2 shall be 2.0 plus or minus 0.15 microseconds.

3.1.1.4.5 The duration of pulses P_1, P_2 and P_3 shall be 0.8 plus or minus 0.1 microsecond.

3.1.1.4.6 The rise time of pulses P_1, P_2 and P_3 shall be between 0.05 and 0.1 microsecond.

Note 1.— The definitions are contained in Figure 3-1 “Definitions of secondary surveillance radar waveform shapes, intervals and the reference point for sensitivity and power”.

Note 2.— The intent of the lower limit of rise time (0.05 microsecond) is to reduce sideband radiation. Equipment will meet this requirement if the sideband radiation is no greater than that which, theoretically, would be produced by a trapezoidal wave having the stated rise time.

3.1.1.4.7 The decay time of pulses P_1, P_2 and P_3 shall be between 0.05 and 0.2 microsecond.

Note.— The intent of the lower limit of decay time (0.05 microsecond) is to reduce sideband radiation. Equipment will meet this requirement if the sideband radiation is no greater than that which, theoretically, would be produced by a trapezoidal wave having the stated decay time.

3.1.1.5 INTERROGATOR AND CONTROL TRANSMISSION CHARACTERISTICS (INTERROGATION SIDE-LOBE SUPPRESSION — SIGNALS-IN-SPACE)

3.1.1.5.1 The radiated amplitude of P_2 at the antenna of the transponder shall be:

a) equal to or greater than the radiated amplitude of P_1 from the side-lobe transmissions of the antenna radiating P_1; and

b) at a level lower than 9 dB below the radiated amplitude of P_1, within the desired arc of interrogation.

3.1.1.5.2 Within the desired beam width of the directional interrogation (main lobe), the radiated amplitude of P_3 shall be within 1 dB of the radiated amplitude of P_1.

3.1.1.6 REPLY TRANSMISSION CHARACTERISTICS (SIGNALS-IN-SPACE)

3.1.1.6.1 Framing pulses. The reply function shall employ a signal comprising two framing pulses spaced 20.3 microseconds as the most elementary code.

3.1.1.6.2 Information pulses. Information pulses shall be spaced in increments of 1.45 microseconds from the first framing pulse. The designation and position of these information pulses shall be as follows:

Pulses	*Position (microseconds)*
C_1	1.45
A_1	2.90
C_2	4.35
A_2	5.80
C_4	7.25
A_4	8.70
X	10.15
B_1	11.60
D_1	13.05
B_2	14.50
D_2	15.95
B_4	17.40
D_4	18.85

Note.— The Standard relating to the use of these pulses is given in 2.1.4.1. However, the position of the "X" pulse is specified only as a technical standard to safeguard possible future use.

3.1.1.6.3 *Special position identification pulse (SPI).* In addition to the information pulses provided, a special position identification pulse shall be transmitted but only as a result of manual (pilot) selection. When transmitted, it shall be spaced at an interval of 4.35 microseconds following the last framing pulse of Mode A replies only.

3.1.1.6.4 *Reply pulse shape.* All reply pulses shall have a pulse duration of 0.45 plus or minus 0.1 microsecond, a pulse rise time between 0.05 and 0.1 microsecond and a pulse decay time between 0.05 and 0.2 microsecond. The pulse amplitude variation of one pulse with respect to any other pulse in a reply train shall not exceed 1 dB.

Note.— The intent of the lower limit of rise and decay times (0.05 microsecond) is to reduce sideband radiation. Equipment will meet this requirement if the sideband radiation is not greater than that which, theoretically, would be produced by a trapezoidal wave having the stated rise and decay times.

3.1.1.6.5 *Reply pulse position tolerances.* The pulse spacing tolerance for each pulse (including the last framing pulse) with respect to the first framing pulse of the reply group shall be plus or minus 0.10 microsecond. The pulse interval tolerance of the special position identification pulse with respect to the last framing pulse of the reply group shall be plus or minus 0.10 microsecond. The pulse spacing tolerance of any pulse in the reply group with respect to any other pulse (except the first framing pulse) shall not exceed plus or minus 0.15 microsecond.

3.1.1.6.6 *Code nomenclature.* The code designation shall consist of digits between 0 and 7 inclusive, and shall consist of the sum of the subscripts of the pulse numbers given in 3.1.1.6.2 above, employed as follows:

Digit	*Pulse Group*
First (most significant)	A
Second	B
Third	C
Fourth	D

3.1.1.7 TECHNICAL CHARACTERISTICS OF TRANSPONDERS WITH MODE A AND MODE C CAPABILITIES ONLY

3.1.1.7.1 *Reply.* The transponder shall reply (not less than 90 per cent triggering) when all of the following conditions have been met:

a) the received amplitude of P_3 is in excess of a level 1 dB below the received amplitude of P_1 but no greater than 3 dB above the received amplitude of P_1;

b) either no pulse is received in the interval 1.3 microseconds to 2.7 microseconds after P_1, or P_1 exceeds by more than 9 dB any pulse received in this interval;

c) the received amplitude of a proper interrogation is more than 10 dB above the received amplitude of random pulses where the latter are not recognized by the transponder as P_1, P_2 or P_3.

3.1.1.7.2 The transponder shall not reply under the following conditions:

a) to interrogations when the interval between pulses P_1 and P_3 differs from those specified in 3.1.1.4.3 by more than plus or minus 1.0 microsecond;

b) upon receipt of any single pulse which has no amplitude variations approximating a normal interrogation condition.

3.1.1.7.3 *Dead time.* After recognition of a proper interrogation, the transponder shall not reply to any other interrogation, at least for the duration of the reply pulse train. This dead time shall end no later than 125 microseconds after the transmission of the last reply pulse of the group.

3.1.1.7.4 *SUPPRESSION*

Note.— This characteristic is used to prevent replies to interrogations received via the side lobes of the interrogator antenna, and to prevent Mode A/C transponders from replying to Mode S interrogations.

3.1.1.7.4.1 The transponder shall be suppressed when the received amplitude of P_2 is equal to, or in excess of, the received amplitude of P_1 and spaced 2.0 plus or minus 0.15 microseconds. The detection of P_3 is not required as a prerequisite for initiation of suppression action.

3.1.1.7.4.2 The transponder suppression shall be for a period of 35 plus or minus 10 microseconds.

3.1.1.7.4.2.1 The suppression shall be capable of being reinitiated for the full duration within 2 microseconds after the end of any suppression period.

3.1.1.7.5 *RECEIVER SENSITIVITY AND DYNAMIC RANGE*

3.1.1.7.5.1 The minimum triggering level of the transponder shall be such that replies are generated to at least 90 per cent of the interrogation signals when:

a) the two pulses P_1 and P_3 constituting an interrogation are of equal amplitude and P_2 is not detected; and

b) the amplitude of these signals is nominally 71 dB below 1 mW, with limits between 69 dB and 77 dB below 1 mW.

3.1.1.7.5.2 The reply and suppression characteristics shall apply over a received amplitude of P_1 between minimum triggering level and 50 dB above that level.

3.1.1.7.5.3 The variation of the minimum triggering level between modes shall not exceed 1 dB for nominal pulse spacings and pulse widths.

3.1.1.7.6 *Pulse duration discrimination.* Signals of received amplitude between minimum triggering level and 6 dB above this level, and of a duration less than 0.3 microsecond, shall not cause the transponder to initiate reply or suppression action. With the exception of single pulses with amplitude variations approximating an interrogation, any single pulse of a duration more than 1.5 microseconds shall not cause the transponder to initiate reply or suppression action over the signal amplitude range of minimum triggering level (MTL) to 50 dB above that level.

3.1.1.7.7 *Echo suppression and recovery.* The transponder shall contain an echo suppression facility designed to permit normal operation in the presence of echoes of signals-in-space. The provision of this facility shall be compatible with the requirements for suppression of side lobes given in 3.1.1.7.4.1.

3.1.1.7.7.1 *Desensitization.* Upon receipt of any pulse more than 0.7 microsecond in duration, the receiver shall be desensitized by an amount that is within at least 9 dB of the amplitude of the desensitizing pulse but shall at no time exceed the amplitude of the desensitizing pulse, with the exception of possible overshoot during the first microsecond following the desensitizing pulse.

Note.— Single pulses of duration less than 0.7 microsecond are not required to cause the specified desensitization nor to cause desensitization of duration greater than permitted by 3.1.1.7.7.1 and 3.1.1.7.7.2.

3.1.1.7.7.2 *Recovery.* Following desensitization, the receiver shall recover sensitivity (within 3 dB of minimum triggering level) within 15 microseconds after reception of a desensitizing pulse having a signal strength up to 50 dB above minimum triggering level. Recovery shall be at an average rate not exceeding 4.0 dB per microsecond.

3.1.1.7.8 *Random triggering rate.* In the absence of valid interrogation signals, Mode A/C transponders shall not generate more than 30 unwanted Mode A or Mode C replies per second as integrated over an interval equivalent to at least 300 random triggers, or 30 seconds, whichever is less. This random triggering rate shall not be exceeded when all possible interfering equipments installed in the same aircraft are operating at maximum interference levels.

3.1.1.7.8.1 *Random triggering rate in the presence of low-level in-band continuous wave (CW) interference.* The total random trigger rate on all Mode A and/or Mode C replies shall not be greater than 10 reply pulse groups or suppressions per second, averaged over a period of 30 seconds, when operated in the presence of non-coherent CW interference at a frequency of 1 030 ±0.2 MHz and a signal level of –60 dBm or less.

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3.1.1.7.9 *REPLY RATE*

3.1.1.7.9.1 The transponder shall be capable of at least 1 200 replies per second for a 15-pulse coded reply, except that, for transponder installations used solely below 4 500 m (15 000 ft), or below a lesser altitude established by the appropriate authority or by regional air navigation agreement, transponders capable of at least 1 000 replies per second for a 15-pulse coded reply shall be permitted.

3.1.1.7.9.2 *Reply rate limit control.* To protect the system from the effects of transponder over-interrogation by preventing response to weaker signals when a predetermined reply rate has been reached, a sensitivity reduction type reply limit control shall be incorporated in the equipment. The range of this control shall permit adjustment, as a minimum, to any value between 500 and 2 000 replies per second, or to the maximum reply rate capability if less than 2 000 replies per second, without regard to the number of pulses in each reply. Sensitivity reduction in excess of 3 dB shall not take effect until 90 per cent of the selected value is exceeded. Sensitivity reduction shall be at least 30 dB for rates in excess of 150 per cent of the selected value.

3.1.1.7.9.3 **Recommendation.—** *The reply rate limit should be set at 1 200 replies per second, or the maximum value below 1 200 replies per second of which the transponder is capable.*

3.1.1.7.10 *Reply delay and jitter.* The time delay between the arrival, at the transponder receiver, of the leading edge of P_3 and the transmission of the leading edge of the first pulse of the reply shall be 3 plus or minus 0.5 microseconds. The total jitter of the reply pulse code group, with respect to P_3, shall not exceed 0.1 microsecond for receiver input levels between 3 dB and 50 dB above minimum triggering level. Delay variations between modes on which the transponder is capable of replying shall not exceed 0.2 microsecond.

3.1.1.7.11 *TRANSPONDER POWER OUTPUT AND DUTY CYCLE*

3.1.1.7.11.1 The peak pulse power available at the antenna end of the transmission line of the transponder shall be at least 21 dB and not more than 27 dB above 1 W, except that for transponder installations used solely below 4 500 m (15 000 ft), or below a lesser altitude established by the appropriate authority or by regional air navigation agreement, a peak pulse power available at the antenna end of the transmission line of the transponder of at least 18.5 dB and not more than 27 dB above 1 W shall be permitted.

Note.— An extended squitter non-transponder device on an aerodrome surface vehicle may operate with a lower minimum power output as specified in 5.1.1.2.

3.1.1.7.11.2 **Recommendation.—** *The peak pulse power specified in 3.1.1.7.11.1 should be maintained over a range of replies from code 0000 at a rate of 400 replies per second to a maximum pulse content at a rate of 1 200 replies per second or a maximum value below 1 200 replies per second of which the transponder is capable.*

3.1.1.7.12 *REPLY CODES*

3.1.1.7.12.1 *Identification.* The reply to a Mode A interrogation shall consist of the two framing pulses specified in 3.1.1.6.1 together with the information pulses (Mode A code) specified in 3.1.1.6.2.

Note.— The Mode A code designation is a sequence of four digits in accordance with 3.1.1.6.6.

3.1.1.7.12.1.1 The Mode A code shall be manually selected from the 4 096 codes available.

3.1.1.7.12.2 *Pressure-altitude transmission.* The reply to Mode C interrogation shall consist of the two framing pulses specified in 3.1.1.6.1 above. When digitized pressure-altitude information is available, the information pulses specified in 3.1.1.6.2 shall also be transmitted.

3.1.1.7.12.2.1 Transponders shall be provided with means to remove the information pulses but to retain the framing pulses when the provision of 3.1.1.7.12.2.4 below is not complied with in reply to Mode C interrogation.

3.1.1.7.12.2.2 The information pulses shall be automatically selected by an analog-to-digital converter connected to a pressure-altitude data source in the aircraft referenced to the standard pressure setting of 1 013.25 hectopascals.

Note.— The pressure setting of 1 013.25 hectopascals is equal to 29.92 inches of mercury.

3.1.1.7.12.2.3 Pressure-altitude shall be reported in 100-ft increments by selection of pulses as shown in the Appendix to this chapter.

3.1.1.7.12.2.4 The digitizer code selected shall correspond to within plus or minus 38.1 m (125 ft), on a 95 per cent probability basis, with the pressure-altitude information (referenced to the standard pressure setting of 1 013.25 hectopascals), used on board the aircraft to adhere to the assigned flight profile.

3.1.1.7.13 *Transmission of the special position identification (SPI) pulse.* When required, this pulse shall be transmitted with Mode A replies, as specified in 3.1.1.6.3, for a period of between 15 and 30 seconds.

3.1.1.7.14 *ANTENNA*

3.1.1.7.14.1 The transponder antenna system, when installed on an aircraft, shall have a radiation pattern which is essentially omnidirectional in the horizontal plane.

3.1.1.7.14.2 **Recommendation.—** *The vertical radiation pattern should be nominally equivalent to that of a quarter-wave monopole on a ground plane.*

3.1.1.8 TECHNICAL CHARACTERISTICS OF GROUND INTERROGATORS WITH MODE A AND MODE C CAPABILITIES ONLY

3.1.1.8.1 *Interrogation repetition frequency.* The maximum interrogation repetition frequency shall be 450 interrogations per second.

3.1.1.8.1.1 **Recommendation.—** *To minimize unnecessary transponder triggering and the resulting high density of mutual interference, all interrogators should use the lowest practicable interrogator repetition frequency that is consistent with the display characteristics, interrogator antenna beam width and antenna rotation speed employed.*

3.1.1.8.2 *RADIATED POWER*

Recommendation.— *In order to minimize system interference the effective radiated power of interrogators should be reduced to the lowest value consistent with the operationally required range of each individual interrogator site.*

3.1.1.8.3 **Recommendation.—** *When Mode C information is to be used from aircraft flying below transition levels, the altimeter pressure reference datum should be taken into account.*

Note.— Use of Mode C below transition levels is in accordance with the philosophy that Mode C can usefully be employed in all environments.

3.1.1.9 INTERROGATOR RADIATED FIELD PATTERN

Recommendation.— *The beam width of the directional interrogator antenna radiating* P_3 *should not be wider than is operationally required. The side- and back-lobe radiation of the directional antenna should be at least 24 dB below the peak of the main-lobe radiation.*

3.1.1.10 INTERROGATOR MONITOR

3.1.1.10.1 The range and azimuth accuracy of the ground interrogator shall be monitored at sufficiently frequent intervals to ensure system integrity.

Note.— Interrogators that are associated with and operated in conjunction with primary radar may use the primary radar as the monitoring device; alternatively, an electronic range and azimuth accuracy monitor would be required.

3.1.1.10.2 **Recommendation.—** *In addition to range and azimuth monitoring, provision should be made to monitor continuously the other critical parameters of the ground interrogator for any degradation of performance exceeding the allowable system tolerances and to provide an indication of any such occurrence.*

3.1.1.11 SPURIOUS EMISSIONS AND SPURIOUS RESPONSES

3.1.1.11.1 *SPURIOUS RADIATION*

Recommendation.— *CW radiation should not exceed 76 dB below 1 W for the interrogator and 70 dB below 1 W for the transponder.*

3.1.1.11.2 *SPURIOUS RESPONSES*

Recommendation.— *The response of both airborne and ground equipment to signals not within the receiver pass band should be at least 60 dB below normal sensitivity.*

3.1.2 Systems having Mode S capabilities

3.1.2.1 *Interrogation signals-in-space characteristics.* The paragraphs herein describe the signals-in-space as they can be expected to appear at the antenna of the transponder.

Note.— Because signals can be corrupted in propagation, certain interrogation pulse duration, pulse spacing and pulse amplitude tolerances are more stringent for interrogators as described in 3.1.2.11.4.

3.1.2.1.1 *Interrogation carrier frequency.* The carrier frequency of all interrogations (uplink transmissions) from ground facilities with Mode S capabilities shall be 1 030 plus or minus 0.01 MHz.

3.1.2.1.2 *Interrogation spectrum.* The spectrum of a Mode S interrogation about the carrier frequency shall not exceed the limits specified in Figure 3-2.

Note.— The Mode S interrogation spectrum is data dependent. The broadest spectrum is generated by an interrogation that contains all binary ONEs.

3.1.2.1.3 *Polarization.* Polarization of the interrogation and control transmissions shall be nominally vertical.

3.1.2.1.4 *Modulation.* For Mode S interrogations, the carrier frequency shall be pulse modulated. In addition, the data pulse, P_6, shall have internal phase modulation.

3.1.2.1.4.1 *Pulse modulation.* Intermode and Mode S interrogations shall consist of a sequence of pulses as specified in 3.1.2.1.5 and Tables 3-1, 3-2, 3-3, and 3-4.

Note.— The 0.8 microsecond pulses used in intermode and Mode S interrogations are identical in shape to those used in Modes A and C as defined in 3.1.1.4.

3.1.2.1.4.2 *Phase modulation.* The short (16.25-microsecond) and long (30.25-microsecond) P_6 pulses of 3.1.2.1.4.1 shall have internal binary differential phase modulation consisting of 180-degree phase reversals of the carrier at a 4 megabit per second rate.

3.1.2.1.4.2.1 *Phase reversal duration.* The duration of the phase reversal shall be less than 0.08 microsecond and the phase shall advance (or retard) monotonically throughout the transition region. There shall be no amplitude modulation applied during the phase transition.

Note.— The minimum duration of the phase reversal is not specified. Nonetheless, the spectrum requirements of 3.1.2.1.2 must be met.

3.1.2.1.4.2.2 *Phase relationship.* The tolerance on the 0 and 180-degree phase relationship between successive chips and on the sync phase reversal (3.1.2.1.5.2.2) within the P_6 pulse shall be plus or minus 5 degrees.

Note.— In Mode S a "chip" is the 0.25 microsecond carrier interval between possible data phase reversals.

3.1.2.1.5 *Pulse and phase reversal sequences.* Specific sequences of the pulses or phase reversals described in 3.1.2.1.4 shall constitute interrogations.

3.1.2.1.5.1 *Intermode interrogation*

3.1.2.1.5.1.1 *Mode A/C/S all-call interrogation.* This interrogation shall consist of three pulses: P_1, P_3, and the long P_4 as shown in Figure 3-3. One or two control pulses (P_2 alone, or P_1 and P_2) shall be transmitted using a separate antenna pattern to suppress responses from aircraft in the side lobes of the interrogator antenna.

Note.— The Mode A/C/S all-call interrogation elicits a Mode A or Mode C reply (depending on the P_1-P_3 *pulse spacing) from a Mode A/C transponder because it does not recognize the* P_4 *pulse. A Mode S transponder recognizes the long* P_4 *pulse and responds with a Mode S reply. This interrogation was originally planned for use by isolated or clustered interrogators. Lockout for this interrogation was based on the use of II equals 0. The development of the Mode S subnetwork now dictates the use of a non-zero II code for communication purposes. For this reason, II equals 0 has been reserved for use in support of a form of Mode S acquisition that uses stochastic/lockout override (3.1.2.5.2.1.4 and 3.1.2.5.2.1.5). The Mode A/C/S all-call cannot be used with full Mode S operation since II equals 0 can only be locked out for short time periods (3.1.2.5.2.1.5.2.1). This interrogation cannot be used with stochastic/lockout override, since probability of reply cannot be specified.*

3.1.2.1.5.1.2 *Mode A/C-only all-call interrogation.* This interrogation shall be identical to that of the Mode A/C/S all-call interrogation except that the short P_4 pulse shall be used.

Note.— The Mode A/C-only all-call interrogation elicits a Mode A or Mode C reply from a Mode A/C transponder. A Mode S transponder recognizes the short P_4 *pulse and does not reply to this interrogation.*

3.1.2.1.5.1.3 *Pulse intervals.* The pulse intervals between P_1, P_2 and P_3 shall be as defined in 3.1.1.4.3 and 3.1.1.4.4. The pulse interval between P_3 and P_4 shall be 2 plus or minus 0.05 microsecond.

3.1.2.1.5.1.4 *Pulse amplitudes.* Relative amplitudes between pulses P_1, P_2 and P_3 shall be in accordance with 3.1.1.5. The amplitude of P_4 shall be within 1 dB of the amplitude of P_3.

3.1.2.1.5.2 *Mode S interrogation.* The Mode S interrogation shall consist of three pulses: P_1, P_2 and P_6 as shown in Figure 3-4.

Note.— P_6 is preceded by a $P_1 – P_2$ pair which suppresses replies from Mode A/C transponders to avoid synchronous garble due to random triggering by the Mode S interrogation. The sync phase reversal within P_6 is the timing mark for demodulation of a series of time intervals (chips) of 0.25 microsecond duration. This series of chips starts 0.5 microsecond after the sync phase reversal and ends 0.5 microsecond before the trailing edge of P_6. A phase reversal may or may not precede each chip to encode its binary information value.

3.1.2.1.5.2.1 *Mode S side-lobe suppression.* The P_5 pulse shall be used with the Mode S-only all-call interrogation (UF = 11, see 3.1.2.5.2) to prevent replies from aircraft in the side and back lobes of the antenna (3.1.2.1.5.2.5). When used, P_5 shall be transmitted using a separate antenna pattern.

Note 1.— The action of P_5 is automatic. Its presence, if of sufficient amplitude at the receiving location, masks the sync phase reversal of P_6.

Note 2.— The P_5 pulse may be used with other Mode S interrogations.

3.1.2.1.5.2.2 *Sync phase reversal.* The first phase reversal in the P_6 pulse shall be the sync phase reversal. It shall be the timing reference for subsequent transponder operations related to the interrogation.

3.1.2.1.5.2.3 *Data phase reversals.* Each data phase reversal shall occur only at a time interval (N times 0.25) plus or minus 0.02 microsecond (N equal to, or greater than 2) after the sync phase reversal. The 16.25-microsecond P_6 pulse shall contain at most 56 data phase reversals. The 30.25-microsecond P_6 pulse shall contain at most 112 data phase reversals. The last chip, that is the 0.25-microsecond time interval following the last data phase reversal position, shall be followed by a 0.5-microsecond guard interval.

Note.— The 0.5-microsecond guard interval following the last chip prevents the trailing edge of P_6 from interfering with the demodulation process.

3.1.2.1.5.2.4 *Intervals.* The pulse interval between P_1 and P_2 shall be 2 plus or minus 0.05 microsecond. The interval between the leading edge of P_2 and the sync phase reversal of P_6 shall be 2.75 plus or minus 0.05 microsecond. The leading edge of P_6 shall occur 1.25 plus or minus 0.05 microsecond before the sync phase reversal. P_5, if transmitted, shall be centred over the sync phase reversal; the leading edge of P_5 shall occur 0.4 plus or minus 0.05 microsecond before the sync phase reversal.

3.1.2.1.5.2.5 *Pulse amplitudes*. The amplitude of P_2 and the amplitude of the first microsecond of P_6 shall be greater than the amplitude of P_1 minus 0.25 dB. Exclusive of the amplitude transients associated with phase reversals, the amplitude variation of P_6 shall be less than 1 dB and the amplitude variation between successive chips in P_6 shall be less than 0.25 dB. The radiated amplitude of P_5 at the antenna of the transponder shall be:

a) equal to or greater than the radiated amplitude of P_6 from the side-lobe transmissions of the antenna radiating P_6; and

b) at a level lower than 9 dB below the radiated amplitude of P_6 within the desired arc of interrogation.

3.1.2.2 REPLY SIGNALS-IN-SPACE CHARACTERISTICS

3.1.2.2.1 *Reply carrier frequency.* The carrier frequency of all replies (downlink transmissions) from transponders with Mode S capabilities shall be 1 090 plus or minus 1 MHz.

3.1.2.2.2 *Reply spectrum.* The spectrum of a Mode S reply about the carrier frequency shall not exceed the limits specified in Figure 3-5.

3.1.2.2.3 *Polarization.* Polarization of the reply transmissions shall be nominally vertical.

3.1.2.2.4 *Modulation.* The Mode S reply shall consist of a preamble and a data block. The preamble shall be a 4-pulse sequence and the data block shall be binary pulse-position modulated at a 1 megabit per second data rate.

3.1.2.2.4.1 *Pulse shapes.* Pulse shapes shall be as defined in Table 3-2. All values are in microseconds.

3.1.2.2.5 *Mode S reply.* The Mode S reply shall be as shown in Figure 3-6. The data block in Mode S replies shall consist of either 56 or 112 information bits.

3.1.2.2.5.1 *Pulse intervals.* All reply pulses shall start at a defined multiple of 0.5 microsecond from the first transmitted pulse. The tolerance in all cases shall be plus or minus 0.05 microsecond.

3.1.2.2.5.1.1 *Reply preamble.* The preamble shall consist of four pulses, each with a duration of 0.5 microsecond. The pulse intervals from the first transmitted pulse to the second, third and fourth transmitted pulses shall be 1, 3.5 and 4.5 microseconds, respectively.

3.1.2.2.5.1.2 *Reply data pulses.* The reply data block shall begin 8 microseconds after the leading edge of the first transmitted pulse. Either 56 or 112 one-microsecond bit intervals shall be assigned to each transmission. A 0.5-microsecond pulse shall be transmitted either in the first or in the second half of each interval. When a pulse transmitted in the second half of one interval is followed by another pulse transmitted in the first half of the next interval, the two pulses merge and a one-microsecond pulse shall be transmitted.

3.1.2.2.5.2 *Pulse amplitudes.* The pulse amplitude variation between one pulse and any other pulse in a Mode S reply shall not exceed 2 dB.

3.1.2.3 MODE S DATA STRUCTURE

3.1.2.3.1 *DATA ENCODING*

3.1.2.3.1.1 *Interrogation data.* The interrogation data block shall consist of the sequence of 56 or 112 data chips positioned after the data phase reversals within P_6 (3.1.2.1.5.2.3). A 180-degree carrier phase reversal preceding a chip shall characterize that chip as a binary ONE. The absence of a preceding phase reversal shall denote a binary ZERO.

3.1.2.3.1.2 *Reply data.* The reply data block shall consist of 56 or 112 data bits formed by binary pulse position modulation encoding of the reply data as described in 3.1.2.2.5.1.2. A pulse transmitted in the first half of the interval shall represent a binary ONE whereas a pulse transmitted in the second half shall represent a binary ZERO.

3.1.2.3.1.3 *Bit numbering.* The bits shall be numbered in the order of their transmission, beginning with bit 1. Unless otherwise stated, numerical values encoded by groups (fields) of bits shall be encoded using positive binary notation and the first bit transmitted shall be the most significant bit (MSB). Information shall be coded in fields which consist of at least one bit.

Note.— In the description of Mode S formats the decimal equivalent of the binary code formed by the bit sequence within a field is used as the designator of the field function or command.

3.1.2.3.2 *FORMATS OF MODE S INTERROGATIONS AND REPLIES*

Note.— A summary of all Mode S interrogation and reply formats is presented in Figures 3-7 and 3-8. A summary of all fields appearing in uplink and downlink formats is given in Table 3-3 and a summary of all subfields is given in Table 3-4.

3.1.2.3.2.1 *Essential fields.* Every Mode S transmission shall contain two essential fields. One is a descriptor which shall uniquely define the format of the transmission. This shall appear at the beginning of the transmission for all formats.

The descriptors are designated by the UF (uplink format) or DF (downlink format) fields. The second essential field shall be a 24-bit field appearing at the end of each transmission and shall contain parity information. In all uplink and in currently defined downlink formats parity information shall be overlaid either on the aircraft address (3.1.2.4.1.2.3.1) or on the interrogator identifier according to 3.1.2.3.3.2. The designators are AP (address/parity) or PI (parity/interrogator identifier).

Note.— The remaining coding space is used to transmit the mission fields. For specific functions, a specific set of mission fields is prescribed. Mode S mission fields have two-letter designators. Subfields may appear within mission fields. Mode S subfields are labelled with three-letter designators.

3.1.2.3.2.1.1 *UF: Uplink format.* This uplink format field (5 bits long except in format 24 where it is 2 bits long) shall serve as the uplink format descriptor in all Mode S interrogations and shall be coded according to Figure 3-7.

3.1.2.3.2.1.2 *DF: Downlink format.* This downlink format field (5 bits long except in format 24 where it is 2 bits long) shall serve as the downlink format descriptor in all Mode S replies and shall be coded according to Figure 3-8.

3.1.2.3.2.1.3 *AP: Address/parity.* This 24-bit (33-56 or 89-112) field shall appear in all uplink and currently defined downlink formats except the Mode S-only all-call reply, DF = 11. The field shall contain parity overlaid on the aircraft address according to 3.1.2.3.3.2.

3.1.2.3.2.1.4 *PI: Parity/interrogator identifier.* This 24-bit (33-56) or (89-112) downlink field shall have parity overlaid on the interrogator's identity code according to 3.1.2.3.3.2 and shall appear in the Mode S all-call reply, DF = 11 and in the extended squitter, DF = 17 or DF = 18. If the reply is made in response to a Mode A/C/S all-call, a Mode S-only all-call with CL field (3.1.2.5.2.1.3) and IC field (3.1.2.5.2.1.2) equal to 0, or is an acquisition or an extended squitter (3.1.2.8.5, 3.1.2.8.6 or 3.1.2.8.7), the II and the SI codes shall be 0.

3.1.2.3.2.2 *Unassigned coding space.* Unassigned coding space shall contain all ZEROs as transmitted by interrogators and transponders.

Note.— Certain coding space indicated as unassigned in this section is reserved for other applications such as ACAS, data link, etc.

3.1.2.3.2.3 *Zero and unassigned codes.* A zero code assignment in all defined fields shall indicate that no action is required by the field. In addition, codes not assigned within the fields shall indicate that no action is required.

Note.— The provisions of 3.1.2.3.2.2 and 3.1.2.3.2.3 ensure that future assignments of previously unassigned coding space will not result in ambiguity. That is, Mode S equipment in which the new coding has not been implemented will clearly indicate that no information is being transmitted in newly assigned coding space.

3.1.2.3.2.4 *Formats reserved for military use.* States shall ensure that uplink formats are only used for selectively addressed interrogations and that transmissions of uplink or downlink formats do not exceed the RF power, interrogation rate, reply rate and squitter rate requirements of Annex 10.

3.1.2.3.2.4.1 **Recommendation.—** *Through investigation and validation, States should ensure that military applications do not unduly affect the existing 1 030/1 090 MHz civil aviation operations environment.*

3.1.2.3.3 *ERROR PROTECTION*

3.1.2.3.3.1 *Technique.* Parity check coding shall be used within Mode S interrogations and replies to provide protection against the occurrence of errors.

3.1.2.3.3.1.1 *Parity check sequence.* A sequence of 24 parity check bits shall be generated by the rule described in 3.1.2.3.3.1.2 and shall be incorporated into the field formed by the last 24 bits of all Mode S transmissions. The 24 parity check bits shall be combined with either the address coding or the interrogator identifier coding as described in 3.1.2.3.3.2. The resulting combination then forms either the AP (address/parity, 3.1.2.3.2.1.3) field or the PI (parity/interrogator identifier, 3.1.2.3.2.1.4) field.

3.1.2.3.3.1.2 *Parity check sequence generation.* The sequence of 24 parity bits ($p_1, p_2, \ldots, p_{24}$) shall be generated from the sequence of information bits ($m_1, m_2, \ldots, m_k$) where k is 32 or 88 for short or long transmissions respectively. This shall be done by means of a code generated by the polynomial:

$$G(x) = 1 + x^3 + x^{10} + x^{12} + x^{13} + x^{14} + x^{15} + x^{16}$$

$$+ x^{17} + x^{18} + x^{19} + x^{20} + x^{21} + x^{22} + x^{23} + x^{24}$$

When by the application of binary polynomial algebra, x^{24} [$M(x)$] is divided by $G(x)$ where the information sequence $M(x)$ is:

$$m_k + m_{k-1}x + m_{k-2}x^2 + \ldots + m_1x^{k-1}$$

the result is a quotient and a remainder $R(x)$ of degree less than 24. The bit sequence formed by this remainder represents the parity check sequence. Parity bit p_i, for any i from 1 to 24, is the coefficient of x^{24-i} in $R(x)$.

Note.— The effect of multiplying M(x) by x^{24} is to append 24 ZERO bits to the end of the sequence.

3.1.2.3.3.2 *AP and PI field generation.* Different address parity sequences shall be used for the uplink and downlink.

Note.— The uplink sequence is appropriate for a transponder decoder implementation. The downlink sequence facilitates the use of error correction in downlink decoding.

The code used in uplink AP field generation shall be formed as specified below from either the aircraft address (3.1.2.4.1.2.3.1.1), the all-call address (3.1.2.4.1.2.3.1.2) or the broadcast address (3.1.2.4.1.2.3.1.3).

The code used in downlink AP field generation shall be formed directly from the sequence of 24 Mode S address bits ($a_1, a_2, \ldots, a_{24}$), where a_i is the i-th bit transmitted in the aircraft address (AA) field of an all-call reply (3.1.2.5.2.2.2).

The code used in downlink PI field generation shall be formed by a sequence of 24 bits ($a_1, a_2, \ldots, a_{24}$), where the first 17 bits are ZEROs, the next three bits are a replica of the code label (CL) field (3.1.2.5.2.1.3) and the last four bits are a replica of the interrogator code (IC) field (3.1.2.5.2.1.2).

Note.— The PI code is not used in uplink transmissions.

A modified sequence ($b_1, b_2, \ldots, b_{24}$) shall be used for uplink AP field generation. Bit b_i is the coefficient of x^{48-i} in the polynomial $G(x)A(x)$, where:

$$A(x) = a_1x^{23} + a_2x^{22} + \ldots + a_{24}$$

and

$G(x)$ is as defined in 3.1.2.3.3.1.2.

In the aircraft address a_i shall be the i-th bit transmitted in the AA field of an all-call reply. In the all-call and broadcast addresses a_i shall equal 1 for all values of i.

3.1.2.3.3.2.1 *Uplink transmission order.* The sequence of bits transmitted in the uplink AP field is:

$$t_{k+1}, t_{k+2} \ldots t_{k+24}$$

where the bits are numbered in order of transmission, starting with $k + 1$.

In uplink transmissions:

$$t_{k+i} = b_i \oplus p_i$$

where "⊕" prescribes modulo-2 addition: i equals 1 is the first bit transmitted in the AP field.

3.1.2.3.3.2.2 *Downlink transmission order.* The sequence of bits transmitted in the downlink AP and PI field is:

$$t_{k+1}, t_{k+2} \ldots t_{k+24}$$

where the bits are numbered in order of transmission, starting with $k + 1$. In downlink transmissions:

$$t_{k+i} = a_i \oplus p_i$$

where "⊕" prescribes modulo-2 addition: i equals 1 is the first bit transmitted in the AP or PI field.

3.1.2.4 GENERAL INTERROGATION-REPLY PROTOCOL

3.1.2.4.1 *Transponder transaction cycle.* A transponder transaction cycle shall begin when the SSR Mode S transponder has recognized an interrogation. The transponder shall then evaluate the interrogation and determine whether it shall be accepted. If accepted, it shall then process the received interrogation and generate a reply, if appropriate. The transaction cycle shall end when:

a) any one of the necessary conditions for acceptance has not been met, or

b) an interrogation has been accepted and the transponder has either:

   1) completed the processing of the accepted interrogation if no reply is required, or

   2) completed the transmission of a reply.

A new transponder transaction cycle shall not begin until the previous cycle has ended.

3.1.2.4.1.1 *Interrogation recognition.* SSR Mode S transponders shall be capable of recognizing the following distinct types of interrogations:

a) Modes A and C;

b) intermode; and

c) Mode S.

Note.— The recognition process is dependent upon the signal input level and the specified dynamic range (3.1.2.10.1).

3.1.2.4.1.1.1 *Mode A and Mode C interrogation recognition.* A Mode A or Mode C interrogation shall be recognized when a $P_1 – P_3$ pulse pair meeting the requirements of 3.1.1.4 has been received, and the leading edge of a P_4 pulse with an amplitude that is greater than a level 6 dB below the amplitude of P_3 is not received within the interval from 1.7 to 2.3 microseconds following the leading edge of P_3.

If a $P_1 - P_2$ suppression pair and a Mode A or Mode C interrogation are recognized simultaneously, the transponder shall be suppressed. An interrogation shall not be recognized as Mode A or Mode C if the transponder is in suppression (3.1.2.4.2). If a Mode A and a Mode C interrogation are recognized simultaneously the transponder shall complete the transaction cycle as if only a Mode C interrogation had been recognized.

3.1.2.4.1.1.2 *Intermode interrogation recognition.* An intermode interrogation shall be recognized when a $P_1 - P_3 - P_4$ pulse triplet meeting the requirements of 3.1.2.1.5.1 is received. An interrogation shall not be recognized as an intermode interrogation if:

a) the received amplitude of the pulse in the P_4 position is smaller than 6 dB below the amplitude of P_3; or

b) the pulse interval between P_3 and P_4 is larger than 2.3 microseconds or shorter than 1.7 microseconds; or

c) the received amplitude of P_1 and P_3 is between MTL and –45 dBm and the pulse duration of P_1 or P_3 is less than 0.3 microsecond; or

d) the transponder is in suppression (3.1.2.4.2).

If a $P_1 - P_2$ suppression pair and a Mode A or Mode C intermode interrogation are recognized simultaneously the transponder shall be suppressed.

3.1.2.4.1.1.3 *Mode S interrogation recognition.* A Mode S interrogation shall be recognized when a P_6 pulse is received with a sync phase reversal within the interval from 1.20 to 1.30 microseconds following the leading edge of P_6. A Mode S interrogation shall not be recognized if a sync phase reversal is not received within the interval from 1.05 to 1.45 microseconds following the leading edge of P_6.

3.1.2.4.1.2 *Interrogation acceptance.* Recognition according to 3.1.2.4.1 shall be a prerequisite for acceptance of any interrogation.

3.1.2.4.1.2.1 *Mode A and Mode C interrogation acceptance.* Mode A and Mode C interrogations shall be accepted when recognized (3.1.2.4.1.1.1).

3.1.2.4.1.2.2 *Intermode interrogation acceptance*

3.1.2.4.1.2.2.1 *Mode A/C/S all-call interrogation acceptance.* A Mode A/C/S all-call interrogation shall be accepted if the trailing edge of P_4 is received within 3.45 to 3.75 microseconds following the leading edge of P_3 and no lockout condition (3.1.2.6.9) prevents acceptance. A Mode A/C/S all-call shall not be accepted if the trailing edge of P_4 is received earlier than 3.3 or later than 4.2 microseconds following the leading edge of P_3, or if a lockout condition (3.1.2.6.9) prevents acceptance.

3.1.2.4.1.2.2.2 *Mode A/C-only all-call interrogation acceptance.* A Mode A/C-only all-call interrogation shall not be accepted by a Mode S transponder.

Note.— The technical condition for non-acceptance of a Mode A/C-only all-call is given in the preceding paragraph by the requirement for rejecting an intermode interrogation with a P_4 pulse having a trailing edge following the leading edge of P_3 by less than 3.3 microseconds.

3.1.2.4.1.2.3 *Mode S interrogation acceptance.* A Mode S interrogation shall only be accepted if:

a) the transponder is capable of processing the uplink format (UF) of the interrogation (3.1.2.3.2.1.1);

b) the address of the interrogation matches one of the addresses as defined in 3.1.2.4.1.2.3.1 implying that parity is established, as defined in 3.1.2.3.3;

c) in the case of an all-call interrogation, no all-call lockout condition applies, as defined in 3.1.2.6.9; and

d) the transponder is capable of processing the uplinked data of a long air-air surveillance (ACAS) interrogation (UF-16) and presenting it at an output interface as prescribed in 3.1.2.10.5.2.2.1.

Note.— A Mode S interrogation may be accepted if the conditions specified in 3.1.2.4.1.2.3 a) and b) are met and the transponder is not capable of both processing the uplinked data of a Comm-A interrogation (UF=20 and 21) and presenting it at an output interface as prescribed in 3.1.2.10.5.2.2.1.

3.1.2.4.1.2.3.1 *Addresses.* Mode S interrogations shall contain either:

a) aircraft address; or

b) the all-call address; or

c) the broadcast address.

3.1.2.4.1.2.3.1.1 *Aircraft address.* If the aircraft's address is identical to the address extracted from a received interrogation according to the procedure of 3.1.2.3.3.2 and 3.1.2.3.3.2.1, the extracted address shall be considered correct for purposes of Mode S interrogation acceptance.

3.1.2.4.1.2.3.1.2 *All-call address.* A Mode S-only all-call interrogation (uplink format UF = 11) shall contain an address, designated the all-call address, consisting of twenty-four consecutive ONEs. If the all-call address is extracted from a received interrogation with format UF = 11 according to the procedure of 3.1.2.3.3.2 and 3.1.2.3.3.2.1, the address shall be considered correct for Mode S-only all-call interrogation acceptance.

3.1.2.4.1.2.3.1.3 *Broadcast address.* To broadcast a message to all Mode S transponders within the interrogator beam, a Mode S interrogation uplink format 20 or 21 shall be used and an address of twenty-four consecutive ONEs shall be substituted for the aircraft address. If the UF code is 20 or 21 and this broadcast address is extracted from a received interrogation according to the procedure of 3.1.2.3.3.2 and 3.1.2.3.3.2.1, the address shall be considered correct for Mode S broadcast interrogation acceptance.

Note.— Transponders associated with airborne collision avoidance systems also accept a broadcast with UF = 16.

3.1.2.4.1.3 *Transponder replies.* Mode S transponders shall transmit the following reply types:

a) Mode A and Mode C replies; and

b) Mode S replies.

3.1.2.4.1.3.1 *Mode A and Mode C replies.* A Mode A (Mode C) reply shall be transmitted as specified in 3.1.1.6 when a Mode A (Mode C) interrogation has been accepted.

3.1.2.4.1.3.2 *Mode S replies.* Replies to other than Mode A and Mode C interrogations shall be Mode S replies.

3.1.2.4.1.3.2.1 *Replies to intermode interrogations.* A Mode S reply with downlink format 11 shall be transmitted in accordance with the provisions of 3.1.2.5.2.2 when a Mode A/C/S all-call interrogation has been accepted.

Note.— Since Mode S transponders do not accept Mode A/C-only all-call interrogations, no reply is generated.

3.1.2.4.1.3.2.2 *Replies to Mode S interrogations.* The information content of a Mode S reply shall reflect the conditions existing in the transponder after completion of all processing of the interrogation eliciting that reply. The correspondence between uplink and downlink formats shall be as summarized in Table 3-5.

Note.— Four categories of Mode S replies may be transmitted in response to Mode S interrogations:

a) Mode S all-call replies (DF = 11);

b) surveillance and standard-length communications replies (DF = 4, 5, 20 and 21);

c) extended length communications replies (DF = 24); and

d) air-air surveillance replies (DF = 0 and 16).

3.1.2.4.1.3.2.2.1 *Replies to SSR Mode S-only all-call interrogations.* The downlink format of the reply to a Mode S-only all-call interrogation (if required) shall be DF = 11. The reply content and rules for determining the requirement to reply shall be as defined in 3.1.2.5.

Note.— A Mode S reply may or may not be transmitted when a Mode S interrogation with UF = 11 has been accepted.

3.1.2.4.1.3.2.2.2 *Replies to surveillance and standard length communications interrogations.* A Mode S reply shall be transmitted when a Mode S interrogation with UF = 4, 5, 20 or 21 and an aircraft address has been accepted. The contents of these interrogations and replies shall be as defined in 3.1.2.6.

Note.— If a Mode S interrogation with UF = 20 or 21 and a broadcast address is accepted, no reply is transmitted (3.1.2.4.1.2.3.1.3).

3.1.2.4.1.3.2.2.3 *Replies to extended length communications interrogations.* A series of Mode S replies ranging in number from 0 to 16 shall be transmitted when a Mode S interrogation with UF = 24 has been accepted. The downlink format of the reply (if any) shall be DF = 24. Protocols defining the number and content of the replies shall be as defined in 3.1.2.7.

3.1.2.4.1.3.2.2.4 *Replies to air-air surveillance interrogations.* A Mode S reply shall be transmitted when a Mode S interrogation with UF = 0 and an aircraft address has been accepted. The contents of these interrogations and replies shall be as defined in 3.1.2.8.

3.1.2.4.2 *SUPPRESSION*

3.1.2.4.2.1 *Effects of suppression.* A transponder in suppression (3.1.1.7.4) shall not recognize Mode A, Mode C or intermode interrogations if either the P_1 pulse alone or both the P_1 and P_3 pulses of the interrogation are received during the suppression interval. Suppression shall not affect the recognition of, acceptance of, or replies to Mode S interrogations.

3.1.2.4.2.2 *Suppression pairs.* The two-pulse Mode A/C suppression pair defined in 3.1.1.7.4.1 shall initiate suppression in a Mode S transponder regardless of the position of the pulse pair in a group of pulses, provided the transponder is not already suppressed or in a transaction cycle.

Note.— The $P_3 – P_4$ pair of the Mode A/C-only all-call interrogation both prevents a reply and initiates suppression. Likewise, the $P_1 – P_2$ preamble of a Mode S interrogation initiates suppression independently of the waveform that follows it.

3.1.2.5 INTERMODE AND MODE S ALL-CALL TRANSACTIONS

3.1.2.5.1 *INTERMODE TRANSACTIONS*

Note.— Intermode transactions permit the surveillance of Mode A/C-only aircraft and the acquisition of Mode S aircraft. The Mode A/C/S all-call interrogation allows Mode A/C-only and Mode S transponders to be interrogated by the same *transmissions. The Mode A/C-only all-call interrogation makes it possible to elicit replies only from Mode A/C transponders. In multisite scenarios, the interrogator must transmit its identifier code in the Mode S only all-call interrogation. Thus, a pair of Mode S-only and Mode A/C-only all-call interrogations are used. The intermode interrogations are defined in 3.1.2.1.5.1 and the corresponding interrogation-reply protocols are defined in 3.1.2.4.*

3.1.2.5.2 MODE S-ONLY ALL-CALL TRANSACTIONS

Note.— These transactions allow the ground to acquire Mode S aircraft by use of an interrogation addressed to all Mode S-equipped aircraft. The reply is via downlink format 11 which returns the aircraft address. The interrogation-reply protocols are defined in 3.1.2.4.

3.1.2.5.2.1 *Mode S-only all-call interrogation, uplink format 11*

1	6	10	14	17	33
UF	PR	IC	CL		AP
5	9	13	16	32	56

The format of this interrogation shall consist of these fields:

Field	*Reference*
UF uplink format	3.1.2.3.2.1.1
PR probability of reply	3.1.2.5.2.1.1
IC interrogator code	3.1.2.5.2.1.2
CL code label	3.1.2.5.2.1.3
spare — 16 bits	
AP address/parity	3.1.2.3.2.1.3

3.1.2.5.2.1.1 *PR: Probability of reply.* This 4-bit (6-9) uplink field shall contain commands to the transponder specifying the probability of reply to that interrogation (3.1.2.5.4). Codes are as follows:

0	signifies reply with probability of 1
1	signifies reply with probability of 1/2
2	signifies reply with probability of 1/4
3	signifies reply with probability of 1/8
4	signifies reply with probability of 1/16
5, 6, 7	not assigned
8	signifies disregard lockout, reply with probability of 1
9	signifies disregard lockout, reply with probability of 1/2
10	signifies disregard lockout, reply with probability of 1/4
11	signifies disregard lockout, reply with probability of 1/8
12	signifies disregard lockout, reply with probability of 1/16
13, 14, 15	not assigned.

3.1.2.5.2.1.2 *IC: Interrogator code.* This 4-bit (10-13) uplink field shall contain either the 4-bit interrogator identifier code (3.1.2.5.2.1.2.3) or the lower 4 bits of the 6-bit surveillance identifier code (3.1.2.5.2.1.2.4) depending on the value of the CL field (3.1.2.5.2.1.3).

3.1.2.5.2.1.2.1 **Recommendation.—** *It is recommended that whenever possible an interrogator should operate using a single interrogator code.*

3.1.2.5.2.1.2.2 *The use of multiple interrogator codes by one interrogator.* An interrogator shall not interleave Mode S-only all-call interrogations using different interrogator codes.

Note.— An explanation of RF interference issues, sector size and impact on data link transactions is presented in the Manual of the Secondary Surveillance Radar (SSR) Systems *(Doc 9684).*

3.1.2.5.2.1.2.3 *II: Interrogator identifier*. This 4-bit value shall define an interrogator identifier (II) code. These II codes shall be assigned to interrogators in the range from 0 to 15. The II code value of 0 shall only be used for supplementary acquisition in conjunction with acquisition based on lockout override (3.1.2.5.2.1.4 and 3.1.2.5.2.1.5). When two II codes are assigned to one interrogator only, one II code shall be used for full data link purposes.

Note.— Limited data link activity including single segment Comm-A, uplink and downlink broadcast protocols and GICB extraction may be performed by both II codes.

3.1.2.5.2.1.2.4 *SI: Surveillance identifier*. This 6-bit value shall define a surveillance identifier (SI) code. These SI codes shall be assigned to interrogators in the range from 1 to 63. The SI code value of 0 shall not be used. The SI codes shall be used with the multisite lockout protocols (3.1.2.6.9.1). The SI codes shall not be used with the multisite communications protocols (3.1.2.6.11.3.2, 3.1.2.7.4 or 3.1.2.7.7).

3.1.2.5.2.1.3 *CL: Code label.* This 3-bit (14-16) uplink field shall define the contents of the IC field.

Coding (in binary)

000 signifies that the IC field contains the II code
001 signifies that the IC field contains SI codes 1 to 15
010 signifies that the IC field contains SI codes 16 to 31
011 signifies that the IC field contains SI codes 32 to 47
100 signifies that the IC field contains SI codes 48 to 63

The other values of the CL field shall not be used.

3.1.2.5.2.1.3.1 *Surveillance identifier (SI) code capability report.* Transponders which process the SI codes (3.1.2.5.2.1.2.4) shall report this capability by setting bit 35 to 1 in the surveillance identifier capability (SIC) subfield of the MB field of the data link capability report (3.1.2.6.10.2.2).

3.1.2.5.2.1.4 *Operation based on lockout override*

Note 1.— The Mode S-only all-call lockout override provides the basis for acquisition of Mode S aircraft for interrogators that have not been assigned a unique IC (II or SI code) for full Mode S operation (protected acquisition by ensuring that no other interrogator on the same IC can lock out the target in the same coverage area).

Note 2.— Lockout override is possible using any interrogator code.

3.1.2.5.2.1.4.1 *Maximum Mode S-only all-call interrogation rate.* The maximum rate of Mode S-only all-call interrogations made by an interrogator using acquisition based on lockout override shall depend on the reply probability as follows:

a) for a reply probability equal to 1.0:

the smaller of 3 interrogations per 3 dB beam dwell or 30 interrogations per second;

b) for a reply probability equal to 0.5:

the smaller of 5 interrogations per 3 dB beam dwell or 60 interrogations per second; and

c) for a reply probability equal to 0.25 or less:

the smaller of 10 interrogations per 3 dB beam dwell or 125 interrogations per second.

Note.— These limits have been defined in order to minimize the RF pollution generated by such a method while keeping a minimum of replies to allow acquisition of aircraft within a beam dwell.

3.1.2.5.2.1.4.2 *Field content for a selectively addressed interrogation used by an interrogator without an assigned interrogator code.* An interrogator that has not been assigned with a unique discrete interrogator code and is authorized to transmit shall use the II code 0 to perform the selective interrogations. In this case, selectively addressed interrogations used in connection with acquisition using lockout override shall have interrogation field contents restricted as follows:

UF = 4, 5, 20 or 21
PC = 0
RR ≠ 16 if RRS = 0
DI = 7
IIS = 0
LOS = 0 except as specified in 3.1.2.5.2.1.5
TMS = 0

Note.— These restrictions permit surveillance and GICB transactions, but prevent the interrogation from making any changes to transponder multisite lockout or communications protocol states.

3.1.2.5.2.1.5 *Supplementary acquisition using II equals 0*

Note 1.— The acquisition technique defined in 3.1.2.5.2.1.4 provides rapid acquisition for most aircraft. Due to the probabilistic nature of the process, it may take many interrogations to acquire the last aircraft of a large set of aircraft in the same beam dwell and near the same range (termed a local garble zone). Acquisition performance is greatly improved for the acquisition of these aircraft through the use of limited selective lockout using II equals 0.

Note 2.— Supplementary acquisition consists of locking out acquired aircraft to II=0 followed by acquisition by means of the Mode S-only all-call interrogation with II=0. Only the aircraft not yet acquired and not yet locked-out will reply resulting in an easier acquisition.

3.1.2.5.2.1.5.1 *Lockout within a beam dwell*

3.1.2.5.2.1.5.1.1 **Recommendation.—** *When II equals 0 lockout is used to supplement acquisition, all aircraft within the beam dwell of the aircraft being acquired should be commanded to lock out to II equals 0, not just those in the garble zone.*

Note.— Lockout of all aircraft in the beam dwell will reduce the amount of all-call fruit replies generated to the II equals 0 all-call interrogations.

3.1.2.5.2.1.5.2 *Duration of lockout*

3.1.2.5.2.1.5.2.1 Interrogators performing supplementary acquisition using II equals 0 shall perform acquisition by transmitting a lockout command for no more than two consecutive scans to each of the aircraft already acquired in the beam dwell containing the garble zone and shall not repeat it before 48 seconds have elapsed.

Note.— Minimizing the lockout time reduces the probability of conflict with the acquisition activities of a neighbouring interrogator that is also using II equals 0 for supplementary acquisition.

3.1.2.5.2.1.5.2.2 **Recommendation**.— *Mode S only all-call interrogations with II=0 for the purpose of supplementary acquisition should take place within a garble zone over no more than two consecutive scans or a maximum of 18 seconds.*

3.1.2.5.2.2 *All-call reply, downlink format 11*

1	6	9	33
DF	CA	AA	PI
5	8	32	56

The reply to the Mode S-only all-call or the Mode A/C/S all-call interrogation shall be the Mode S all-call reply, downlink format 11. The format of this reply shall consist of these fields:

Field	*Reference*
DF downlink format	3.1.2.3.2.1.2
CA capability	3.1.2.5.2.2.1
AA address announced	3.1.2.5.2.2.2
PI parity/interrogator identifier	3.1.2.3.2.1.4

3.1.2.5.2.2.1 *CA: Capability.* This 3-bit (6-8) downlink field shall convey information on the transponder level, the additional information below, and shall be used in formats DF = 11 and DF = 17.

Coding	
0	signifies Level 1 transponder (surveillance only), and no ability to set CA code 7 and either airborne or on the ground
1	reserved
2	reserved
3	reserved
4	signifies Level 2 or above transponder and ability to set CA code 7 and on the ground
5	signifies Level 2 or above transponder and ability to set CA code 7 and airborne
6	signifies Level 2 or above transponder and ability to set CA code 7 and either airborne or on the ground
7	signifies the DR field is not equal to 0 or the FS field equals 2, 3, 4 or 5, and either airborne or on the ground

When the conditions for CA code 7 are not satisfied, Level 2 or above transponders in installations that do not have automatic means to set the on-the-ground condition shall use CA code 6. Aircraft with automatic on-the-ground determination shall use CA code 4 when on the ground and 5 when airborne. Data link capability reports (3.1.2.6.10.2.2) shall be available from aircraft installations that set CA code 4, 5, 6 or 7.

Note.— CA codes 1 to 3 are reserved to maintain backward compatibility.

3.1.2.5.2.2.2 *AA: Address announced.* This 24-bit (9-32) downlink field shall contain the aircraft address which provides unambiguous identification of the aircraft.

3.1.2.5.3 *Lockout protocol.* The all-call lockout protocol defined in 3.1.2.6.9 shall be used by the interrogator with respect to an aircraft once the address of that specific aircraft has been acquired by an interrogator provided that:

— the interrogator is using an IC code different from zero; and

— the aircraft is located in an area where the interrogator is authorized to use lockout.

Note 1.— Following acquisition, a transponder is interrogated by discretely addressed interrogations as prescribed in 3.1.2.6, 3.1.2.7 and 3.1.2.8 and the all-call lockout protocol is used to inhibit replies to further all-call interrogations.

Note 2.— Regional IC allocation bodies may define rules limiting the use of selective interrogation and lockout protocol (e.g. no lockout in defined limited area, use of intermittent lockout in defined areas, and no lockout of aircraft not yet equipped with SI code capability).

3.1.2.5.4 *Stochastic all-call protocol.* The transponder shall execute a random process upon acceptance of a Mode S-only all-call with a PR code equal to 1 to 4 or 9 to 12. A decision to reply shall be made in accordance with the probability specified in the interrogation. A transponder shall not reply if a PR code equal to 5, 6, 7, 13, 14 or 15 is received (3.1.2.5.2.1.1).

Note.— The random occurrence of replies makes it possible for the interrogator to acquire closely spaced aircraft, replies from which would otherwise synchronously garble each other.

3.1.2.6 ADDRESSED SURVEILLANCE AND STANDARD LENGTH COMMUNICATION TRANSACTIONS

Note 1.— The interrogations described in this section are addressed to specific aircraft. There are two basic interrogation and reply types, short and long. The short interrogations and replies are UF 4 and 5 and DF 4 and 5, while the long interrogations and replies are UF 20 and 21 and DF 20 and 21.

Note 2.— The communications protocols are given in 3.1.2.6.11. These protocols describe the control of the data exchange.

3.1.2.6.1 *SURVEILLANCE, ALTITUDE REQUEST, UPLINK FORMAT 4*

1	6	9	14	17	33
UF	PC	RR	DI	SD	AP
5	8	13	16	32	56

The format of this interrogation shall consist of these fields:

Field	*Reference*
UF uplink format	3.1.2.3.2.1.1
PC protocol	3.1.2.6.1.1
RR reply request	3.1.2.6.1.2
DI designator identification	3.1.2.6.1.3
SD special designator	3.1.2.6.1.4
AP address/parity	3.1.2.3.2.1.3

3.1.2.6.1.1 *PC: Protocol.* This 3-bit, (6-8) uplink field shall contain operating commands to the transponder. The PC field shall be ignored for the processing of surveillance or Comm-A interrogations containing DI = 3 (3.1.2.6.1.4.1).

Coding

0 signifies no action
1 signifies non-selective all-call lockout (3.1.2.6.9.2)
2 not assigned
3 not assigned
4 signifies close out Comm-B (3.1.2.6.11.3.2.3)
5 signifies close out uplink ELM (3.1.2.7.4.2.8)
6 signifies close out downlink ELM (3.1.2.7.7.3)
7 not assigned.

3.1.2.6.1.2 *RR: Reply request.* This 5-bit, (9-13) uplink field shall command the length and content of a requested reply.

The last four bits of the 5-bit RR code, transformed into their decimal equivalent, shall designate the BDS1 code (3.1.2.6.11.2 or 3.1.2.6.11.3) of the requested Comm-B message if the most significant bit (MSB) of the RR code is 1 (RR is equal to or greater than 16).

Coding

RR = 0-15 shall be used to request a reply with surveillance format (DF = 4 or 5);
RR = 16-31 shall be used to request a reply with Comm-B format (DF = 20 or 21);
RR = 16 shall be used to request transmission of an air-initiated Comm-B according to 3.1.2.6.11.3;
RR = 17 shall be used to request a data link capability report according to 3.1.2.6.10.2.2;
RR = 18 shall be used to request aircraft identification according to 3.1.2.9;
19-31 are not assigned in section 3.1.

Note.— Codes 19-31 are reserved for applications such as data link communications, airborne collision avoidance systems (ACAS), etc.

3.1.2.6.1.3 *DI: Designator identification.* This 3-bit (14-16) uplink field shall identify the structure of the SD field (3.1.2.6.1.4).

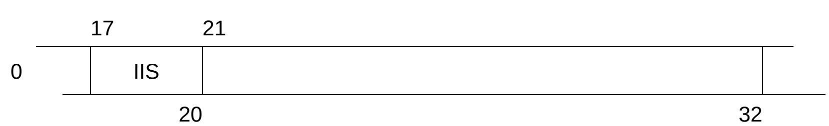
Coding

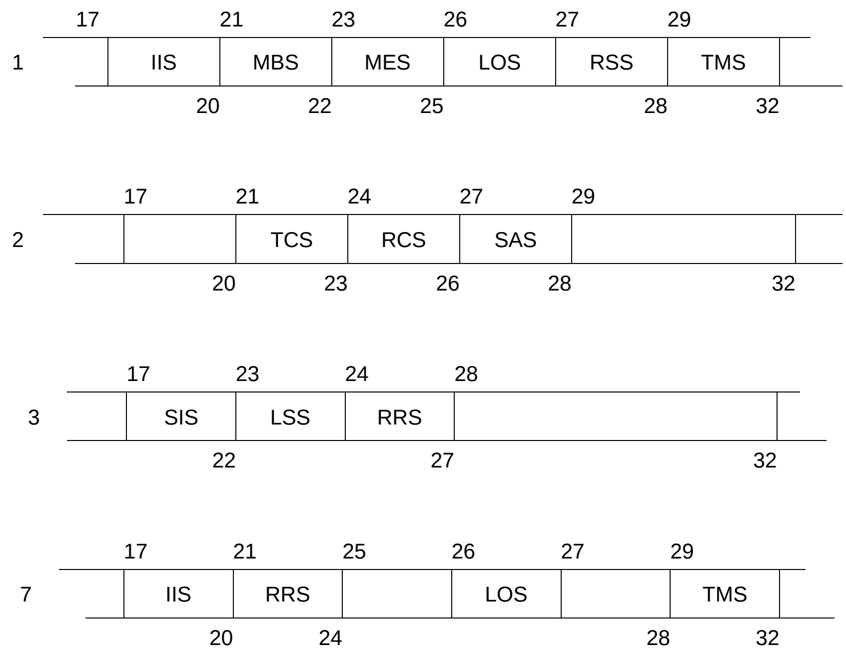
0 signifies SD not assigned except for IIS
1 signifies SD contains multisite and communications control information
2 signifies SD contains control data for extended squitter
3 signifies SD contains SI multisite lockout, broadcast and GICB control information
4-6 signifies SD not assigned
7 signifies SD contains extended data readout request, multisite and communications control information.

3.1.2.6.1.4 *SD: Special designator.* This 16-bit (17-32) uplink field shall contain control codes which depend on the coding in the DI field.

Note.— The special designator (SD) field is provided to accomplish the transfer of multisite, lockout and communications control information from the ground station to the transponder.

DI CODE *SD FIELD STRUCTURE*





3.1.2.6.1.4.1 *Subfields in SD.* The SD field shall contain information as follows:

a) If DI = 0, 1 or 7:

IIS, the 4-bit (17-20) interrogator identifier subfield shall contain an assigned identifier code of the interrogator (3.1.2.5.2.1.2.3).

b) If DI = 0:

bits 21-32 are not assigned.

c) If DI = 1:

MBS, the 2-bit (21, 22) multisite Comm-B subfield shall have the following codes:

0 signifies no Comm-B action
1 signifies air-initiated Comm-B reservation request (3.1.2.6.11.3.1)
2 signifies Comm-B closeout (3.1.2.6.11.3.2.3)
3 not assigned.

MES, the 3-bit (23-25) multisite ELM subfield shall contain reservation and closeout commands for ELM as follows:

0 signifies no ELM action
1 signifies uplink ELM reservation request (3.1.2.7.4.1)
2 signifies uplink ELM closeout (3.1.2.7.4.2.8)
3 signifies downlink ELM reservation request (3.1.2.7.7.1.1)
4 signifies downlink ELM closeout (3.1.2.7.7.3)
5 signifies uplink ELM reservation request and downlink ELM closeout
6 signifies uplink ELM closeout and downlink ELM reservation request
7 signifies uplink ELM and downlink ELM closeouts.

RSS, the 2-bit (27, 28) reservation status subfield shall request the transponder to report its reservation status in the UM field. The following codes have been assigned:

0 signifies no request
1 signifies report Comm-B reservation status in UM
2 signifies report uplink ELM reservation status in UM
3 signifies report downlink ELM reservation status in UM.

d) If DI = 1 or 7:

LOS, the 1-bit (26) lockout subfield, if set to 1, shall signify a multisite lockout command from the interrogator indicated in IIS. LOS set to 0, shall be used to signify that no change in lockout state is commanded.

TMS, the 4-bit (29-32) tactical message subfield shall contain communications control information used by the data link avionics.

e) If DI = 7:

RRS, the 4-bit (21-24) reply request subfield in SD shall give the BDS2 code of a requested Comm-B reply.

Bits 25, 27 and 28 are not assigned.

f) If DI = 2:

TCS, the 3-bit (21-23) type control subfield in SD shall control the position type used by the transponder. The following codes have been assigned:

0 signifies no position type command
1 signifies use surface position type for the next 15 seconds
2 signifies use surface position type for the next 60 seconds
3 signifies cancel surface type command
4-7 not assigned.

RCS, the 3-bit (24-26) rate control subfield in SD shall control the squitter rate of the transponder when it is reporting the surface format. This subfield shall have no effect on the transponder squitter rate when it is reporting the airborne position type. The following codes have been assigned:

0 signifies no surface position extended squitter rate command
1 signifies report high surface position extended squitter rate for 60 seconds
2 signifies report low surface position extended squitter rate for 60 seconds
3 signifies suppress all surface position extended squitters for 60 seconds
4 signifies suppress all surface position extended squitters for 120 seconds
5-7 not assigned.

Note 1.— The definition of high and low squitter rates is given in 3.1.2.8.6.4.3.

Note 2.— As stated in 3.1.2.8.5.2 d), acquisition squitters are transmitted when surface position extended squitters are suppressed by using RCS=3 or 4.

SAS, the 2-bit (27-28) surface antenna subfield in SD shall control the selection of the transponder diversity antenna that is used for (1) the extended squitter when the transponder is reporting the surface format, and (2) the acquisition squitter when the transponder is reporting the on-the-ground status. This subfield shall have no effect on the transponder diversity antenna selection when it is reporting the airborne status. The following codes have been assigned:

0 signifies no antenna command
1 signifies alternate top and bottom antennas for 120 seconds
2 signifies use bottom antenna for 120 seconds
3 signifies return to the default.

Note.— The top antenna is the default condition (3.1.2.8.6.5).

g) If DI = 3:

SIS, the 6-bit (17-22) surveillance identifier subfield in SD shall contain an assigned surveillance identifier code of the interrogator (3.1.2.5.2.1.2.4).

LSS, the 1-bit (23) lockout surveillance subfield, if set to 1, shall signify a multisite lockout command from the interrogator indicated in SIS. If set to 0, LSS shall signify that no change in lockout state is commanded.

RRS, the 4-bit (24-27) reply request subfield in SD shall contain the BDS2 code of a requested GICB register.

Bits 28 to 32 are not assigned.

3.1.2.6.1.5 *PC and SD field processing.* When DI = 1, PC field processing shall be completed before processing the SD field.

3.1.2.6.2 *COMM-A ALTITUDE REQUEST, UPLINK FORMAT 20*

1	6	9	14	17	33	89
UF	PC	RR	DI	SD	MA	AP
5	8	13	16	32	88	112

The format of this interrogation shall consist of these fields:

Field	*Reference*
UF uplink format	3.1.2.3.2.1.1
PC protocol	3.1.2.6.1.1
RR reply request	3.1.2.6.1.2
DI designator identification	3.1.2.6.1.3
SD special designator	3.1.2.6.1.4
MA message, Comm-A	3.1.2.6.2.1
AP address/parity	3.1.2.3.2.1.3

3.1.2.6.2.1 *MA: Message, Comm-A.* This 56-bit (33-88) field shall contain a data link message to the aircraft.

3.1.2.6.3 *SURVEILLANCE IDENTITY REQUEST, UPLINK FORMAT 5*

1	6	9	14	17	33
UF	PC	RR	DI	SD	AP
5	8	13	16	32	56

The format of this interrogation shall consist of these fields:

Field	*Reference*
UF uplink format	3.1.2.3.2.1.1
PC protocol	3.1.2.6.1.1
RR reply request	3.1.2.6.1.2
DI designator identification	3.1.2.6.1.3
SD special designator	3.1.2.6.1.4
AP address/parity	3.1.2.3.2.1.3

3.1.2.6.4 *COMM-A IDENTITY REQUEST, UPLINK FORMAT 21*

1	6	9	14	17	33	89
UF	PC	RR	DI	SD	MA	AP
5	8	13	16	32	88	112

The format of this interrogation shall consist of these fields:

Field	*Reference*
UF uplink format	3.1.2.3.2.1.1
PC protocol	3.1.2.6.1.1
RR reply request	3.1.2.6.1.2
DI designator identification	3.1.2.6.1.3
SD special designator	3.1.2.6.1.4
MA message, Comm-A	3.1.2.6.2.1
AP address/parity	3.1.2.3.2.1.3

3.1.2.6.5 *SURVEILLANCE ALTITUDE REPLY, DOWNLINK FORMAT 4*

1	6	9	14	20	33
DF	FS	DR	UM	AC	AP
5	8	13	19	32	56

This reply shall be generated in response to an interrogation UF 4 or 20 with an RR field value less than 16. The format of this reply shall consist of these fields:

Field	*Reference*
DF downlink format	3.1.2.3.2.1.2
FS flight status	3.1.2.6.5.1
DR downlink request	3.1.2.6.5.2
UM utility message	3.1.2.6.5.3
AC altitude code	3.1.2.6.5.4
AP address/parity	3.1.2.3.2.1.3

3.1.2.6.5.1 *FS: Flight status.* This 3-bit (6-8) downlink field shall contain the following information:

Coding

0	signifies no alert and no SPI, aircraft is airborne
1	signifies no alert and no SPI, aircraft is on the ground
2	signifies alert, no SPI, aircraft is airborne
3	signifies alert, no SPI, aircraft is on the ground
4	signifies alert and SPI, aircraft is airborne or on the ground
5	signifies no alert and SPI, aircraft is airborne or on the ground
6	reserved
7	not assigned

Note.— The conditions which cause an alert are given in 3.1.2.6.10.1.1.

3.1.2.6.5.2 *DR: Downlink request.* This 5-bit (9-13) downlink field shall contain requests to downlink information.

Coding

0	signifies no downlink request
1	signifies request to send Comm-B message
2	reserved for ACAS
3	reserved for ACAS
4	signifies Comm-B broadcast message 1 available
5	signifies Comm-B broadcast message 2 available
6	reserved for ACAS
7	reserved for ACAS
8-15	not assigned
16-31	see downlink ELM protocol (3.1.2.7.7.1)

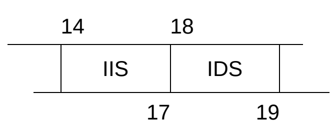
Codes 1-15 shall take precedence over codes 16-31.

Note.— Giving precedence to codes 1-15 permits the announcement of a Comm-B message to interrupt the announcement of a downlink ELM. This gives priority to the announcement of the shorter message.

3.1.2.6.5.3 *UM: Utility message.* This 6-bit (14-19) downlink field shall contain transponder communications status information as specified in 3.1.2.6.1.4.1 and 3.1.2.6.5.3.1.

3.1.2.6.5.3.1 Subfields in UM for multisite protocols

UM FIELD STRUCTURE



The following subfields shall be inserted by the transponder into the UM field of the reply if a surveillance or Comm-A interrogation (UF equals 4, 5, 20, 21) contains DI = 1 and RSS other than 0:

IIS: The 4-bit (14-17) interrogator identifier subfield reports the identifier of the interrogator that is reserved for multisite communications.

IDS: The 2-bit (18, 19) identifier designator subfield reports the type of reservation made by the interrogator identified in IIS.

Assigned coding is:

0 signifies no information
1 signifies IIS contains Comm-B II code
2 signifies IIS contains Comm-C II code
3 signifies IIS contains Comm-D II code.

3.1.2.6.5.3.2 *Multisite reservation status.* The interrogator identifier of the ground station currently reserved for multisite Comm-B delivery (3.1.2.6.11.3.1) shall be transmitted in the IIS subfield together with code 1 in the IDS subfield if the UM content is not specified by the interrogation (when DI = 0 or 7, or when DI = 1 and RSS = 0).

The interrogator identifier of the ground station currently reserved for downlink ELM delivery (3.1.2.7.6.1), if any, shall be transmitted in the IIS subfield together with code 3 in the IDS subfield if the UM content is not specified by the interrogation and there is no current Comm-B reservation.

3.1.2.6.5.4 *AC: Altitude code.* This 13-bit (20-32) field shall contain altitude coded as follows:

a) Bit 26 is designated as the M bit, and shall be 0 if the altitude is reported in feet. M equals 1 shall be reserved to indicate that the altitude reporting is in metric units.

b) If M equals 0, then bit 28 is designated as the Q bit. Q equals 0 shall be used to indicate that the altitude is reported in 100-foot increments. Q equals 1 shall be used to indicate that the altitude is reported in 25-foot increments.

c) If the M bit (bit 26) and the Q bit (bit 28) equal 0, the altitude shall be coded according to the pattern for Mode C replies of 3.1.1.7.12.2.3. Starting with bit 20 the sequence shall be C1, A1, C2, A2, C4, A4, ZERO, B1, ZERO, B2, D2, B4, D4.

d) If the M bit equals 0 and the Q bit equals 1, the 11-bit field represented by bits 20 to 25, 27 and 29 to 32 shall represent a binary coded field with a least significant bit (LSB) of 25 ft. The binary value of the positive decimal integer “N” shall be encoded to report pressure-altitude in the range [(25 N – 1 000) plus or minus 12.5 ft]. The coding of 3.1.2.6.5.4 c) shall be used to report pressure-altitude above 50 187.5 ft.

Note 1.— This coding method is only able to provide values between minus 1 000 ft and plus 50 175 ft.

Note 2.— The most significant bit (MSB) of this field is bit 20 as required by 3.1.2.3.1.3.

e) If the M bit equals 1, the 12-bit field represented by bits 20 to 25 and 27 to 31 shall be reserved for encoding altitude in metric units.

f) 0 shall be transmitted in each of the 13 bits of the AC field if altitude information is not available or if the altitude has been determined invalid.

3.1.2.6.6 *COMM-B ALTITUDE REPLY, DOWNLINK FORMAT 20*

1	6	9	14	20	33	89
DF	FS	DR	UM	AC	MB	AP
5	8	13	19	32	88	112

This reply shall be generated in response to an interrogation UF 4 or 20 with an RR field value greater than 15. The format of this reply shall consist of these fields:

Field	*Reference*
DF downlink format	3.1.2.3.2.1.2
FS flight status	3.1.2.6.5.1
DR downlink request	3.1.2.6.5.2
UM utility message	3.1.2.6.5.3
AC altitude code	3.1.2.6.5.4
MB message, Comm-B	3.1.2.6.6.1
AP address/parity	3.1.2.3.2.1.3

3.1.2.6.6.1 *MB: Message, Comm-B.* This 56-bit (33-88) downlink field shall be used to transmit data link messages to the ground.

3.1.2.6.7 *SURVEILLANCE IDENTITY REPLY, DOWNLINK FORMAT 5*

1	6	9	14	20	33
DF	FS	DR	UM	ID	AP
5	8	13	19	32	56

This reply shall be generated in response to an interrogation UF 5 or 21 with an RR field value less than 16. The format of this reply shall consist of these fields:

Field	*Reference*
DF downlink format	3.1.2.3.2.1.2
FS flight status	3.1.2.6.5.1
DR downlink request	3.1.2.6.5.2
UM utility message	3.1.2.6.5.3
ID identity	3.1.2.6.7.1
AP address/parity	3.1.2.3.2.1.3

3.1.2.6.7.1 *ID: Identity (Mode A code).* This 13-bit (20-32) field shall contain aircraft identity code, in accordance with the pattern for Mode A replies in 3.1.1.6. Starting with bit 20, the sequence shall be C1, A1, C2, A2, C4, A4, ZERO, B1, D1, B2, D2, B4, D4.

3.1.2.6.8 *COMM-B IDENTITY REPLY, DOWNLINK FORMAT 21*

1	6	9	14	20	33	89
DF	FS	DR	UM	ID	MB	AP
5	8	13	19	32	88	112

This reply shall be generated in response to an interrogation UF 5 or 21 with an RR field value greater than 15. The format of this reply shall consist of these fields:

Field	*Reference*
DF downlink format	3.1.2.3.2.1.2
FS flight status	3.1.2.6.5.1
DR downlink request	3.1.2.6.5.2
UM utility message	3.1.2.6.5.3
ID identity	3.1.2.6.7.1
MB message, Comm-B	3.1.2.6.6.1
AP address/parity	3.1.2.3.2.1.3

3.1.2.6.9 *LOCKOUT PROTOCOLS*

3.1.2.6.9.1 *Multisite all-call lockout*

Note.— The multisite lockout protocol prevents transponder acquisition from being denied one ground station by lockout commands from an adjacent ground station that has overlapping coverage.

3.1.2.6.9.1.1 The multisite lockout command shall be transmitted in the SD field (3.1.2.6.1.4.1). A lockout command for an II code shall be transmitted in an SD with DI = 1 or DI = 7. An II lockout command shall be indicated by LOS code equals 1 and the presence of a non-zero interrogator identifier in the IIS subfield of SD. A lockout command for an SI code shall be transmitted in an SD with DI = 3. SI lockout shall be indicated by LSS equals 1 and the presence of a non-zero interrogator identifier in the SIS subfield of SD. After a transponder has accepted an interrogation containing a multisite lockout command, that transponder shall commence to lock out (i.e. not accept) any Mode S-only all-call interrogation which includes the identifier of the interrogator that commanded the lockout. The lockout shall persist for an interval T_L (3.1.2.10.3.9) after the last acceptance of an interrogation containing the multisite lockout command. Multisite lockout shall not prevent acceptance of a Mode S-only all-call interrogation containing PR codes 8 to 12. If a lockout command (LOS = 1) is received together with IIS = 0, it shall be interpreted as a non-selective all-call lockout (3.1.2.6.9.2).

Note 1.— Fifteen interrogators can send independent multisite II lockout commands. In addition, 63 interrogators can send independent SI lockout commands. Each of these lockout commands must be timed separately.

Note 2.— Multisite lockout (which only uses non-zero II codes) does not affect the response of the transponder to Mode S-only all-call interrogations containing II equals 0 or to Mode A/C/S all-call interrogations.

3.1.2.6.9.2 *Non-selective all-call lockout*

Note 1.— In cases where the multisite lockout protocol for II codes is not required (e.g. there is no overlapping coverage or there is ground station coordination via ground-to-ground communications) the non-selective lockout protocol may be used.

On acceptance of an interrogation containing code 1 in the PC field, a transponder shall commence to lock out (i.e. not accept) two types of all-call interrogations:

a) the Mode S-only all-call (UF = 11), with II equals 0; and

b) the Mode A/C/S all-call of 3.1.2.1.5.1.1.

This lockout condition shall persist for an interval T_D (3.1.2.10.3.9) after the last receipt of the command. Non-selective lockout shall not prevent acceptance of a Mode S-only all-call interrogation containing PR codes 8 to 12.

Note 2.— Non-selective lockout does not affect the response of the transponder to Mode S-only all-call interrogations containing II not equal to 0.

3.1.2.6.10 BASIC DATA PROTOCOLS

3.1.2.6.10.1 *Flight status protocol.* Flight status shall be reported in the FS field (3.1.2.6.5.1).

3.1.2.6.10.1.1 *Alert.* An alert condition shall be reported in the FS field if the Mode A identity code transmitted in Mode A replies and in downlink formats DF equals 5 and DF equals 21 are changed by the pilot.

3.1.2.6.10.1.1.1 *Permanent alert condition.* The alert condition shall be maintained if the Mode A identity code is changed to 7500, 7600 or 7700.

3.1.2.6.10.1.1.2 *Temporary alert condition.* The alert condition shall be temporary and shall cancel itself after T_C seconds if the Mode A identity code is changed to a value other than those listed in 3.1.2.6.10.1.1.1.

Note.— The value of T_C *is given in 3.1.2.10.3.9.*

3.1.2.6.10.1.1.3 *Termination of the permanent alert condition.* The permanent alert condition shall be terminated and replaced by a temporary alert condition when the Mode A identity code is set to a value other than 7500, 7600 or 7700.

3.1.2.6.10.1.2 *Ground report.* The on-the-ground status of the aircraft shall be reported in the CA field (3.1.2.5.2.2.1), the FS field (3.1.2.6.5.1), and the VS field (3.1.2.8.2.1). If an automatic indication of the on-the-ground condition (e.g. from a weight on wheels or strut switch) is available at the transponder data interface, it shall be used as the basis for the reporting of on-the-ground status except as specified in 3.1.2.6.10.3.1. If such indication is not available at the transponder data interface (3.1.2.10.5.1.3), the FS and VS codes shall indicate that the aircraft is airborne and the CA field shall indicate that the aircraft is either airborne or on the ground (CA=6).

3.1.2.6.10.1.3 *Special position identification (SPI).* An equivalent of the SPI pulse shall be transmitted by Mode S transponders in the FS field and the surveillance status subfield (SSS) when manually activated. This pulse shall be transmitted for T_I seconds after initiation (3.1.1.6.3, 3.1.1.7.13 and 3.1.2.8.6.3.1.1).

Note.— The value of T_I *is given in 3.1.2.10.3.9.*

3.1.2.6.10.2 *Capability reporting protocol.* The data structure and content of the data link capability report registers shall be implemented in such a way that interoperability is ensured.

Note 1.— Aircraft capability is reported in special fields as defined in the following paragraphs.

Note 2.— The data format of the registers for reporting capability is specified in the Technical Provisions for Mode S Services and Extended Squitter *(Doc 9871).*

3.1.2.6.10.2.1 *Capability report.* The 3-bit CA field, contained in the all-call reply, DF equals 11, shall report the basic capability of the Mode S transponder as described in 3.1.2.5.2.2.1.

3.1.2.6.10.2.2 *Data link capability report.* The data link capability report shall provide the interrogator with a description of the data link capability of the Mode S installation.

Note.— The data link capability report is contained in register 10_{16} with a possible extension in registers 11_{16} to 16_{16} when any continuation will be required.

3.1.2.6.10.2.2.1 *Extraction and subfields in MB for data link capability report.*

3.1.2.6.10.2.2.1.1 *Extraction of the data link capability report contained in register 10_{16}* .The report shall be obtained by a ground-initiated Comm-B reply in response to an interrogation containing RR equals 17 and DI is not equal to 7 or DI equals 7 and RRS equals 0 (3.1.2.6.11.2).

3.1.2.6.10.2.2.1.2 *Sources of data link capability*. Data link capability reports shall contain the capabilities provided by the transponder, the ADLP and the ACAS unit. If external inputs are lost, the transponder shall zero the corresponding bits in the data link report.

3.1.2.6.10.2.2.1.3 The data link capability report shall contain information on the following capabilities as specified in Table 3-٦.

3.1.2.6.10.2.2.1.4 The Mode S subnetwork version number shall contain information to ensure interoperability with older airborne equipment.

3.1.2.6.10.2.2.1.4.1 The Mode S subnetwork version number shall indicate that all implemented subnetwork functions are in compliance with the requirements of the indicated version number. The Mode S subnetwork version number shall be set to a non-zero value if at least one DTE or Mode S specific service is installed.

Note.— The version number does not indicate that all possible functions of that version are implemented.

3.1.2.6.10.2.2.2 *Updating of the data link capability report.* The transponder shall, at intervals not exceeding four seconds, compare the current data link capability status (bits 41-88 in the data link capability report) with that last reported and shall, if a difference is noted, initiate a revised data link capability report by Comm-B broadcast (3.1.2.6.11.4) for BDS1 = 1 (33-36) and BDS2 = 0 (37-40). The transponder shall initiate, generate and transmit the revised capability report even if the aircraft data link capability is degraded or lost. The transponder shall set the BDS code for the data link capability report.

Note.— The setting of the BDS code by the transponder ensures that a broadcast change of capability report will contain the BDS code for all cases of data link failure (e.g. the loss of the transponder data link interface).

3.1.2.6.10.2.2.3 *Zeroing of bits in the data link capability report*

If capability information to the transponder fails to provide an update at a rate of at least once every 4 seconds, the transponder shall insert ZERO in bits 41 to 56 of the data link capability report (transponder register 10_{16}).

Note.— Bits 1 to 8 contain the BDS1 and BDS2 codes. Bits 16 and 37 to 40 contain ACAS capability information. Bit 33 indicates the availability of aircraft identification data and is set by the transponder when the data comes from a separate interface and not from the ADLP. Bit 35 is the SI code indication. All of these bits are inserted by the transponder.

3.1.2.6.10.2.3 *Common usage GICB capability report.* Common usage GICB services which are being actively updated shall be indicated in transponder register 17_{16}.

3.1.2.6.10.2.4 *Mode S specific services GICB capability reports.* GICB services that are installed shall be reported in registers 18_{16} to $1C_{16.}$

3.1.2.6.10.2.5 *Mode S specific services MSP capability reports.* MSP services that are installed shall be reported in registers $1D_{16}$ to $1F_{16}$.

3.1.2.6.10.3 *Validation of on-the-ground status declared by an automatic means*

Note.— For aircraft with an automatic means of determining vertical status, the CA field reports whether the aircraft is airborne or on the ground. ACAS II acquires aircraft using the short or extended squitter, both of which contain the CA field. If an aircraft reports on-the-ground status, that aircraft will not be interrogated by ACAS II in order to reduce unnecessary interrogation activity. If the aircraft is equipped to report extended squitter messages, the function that formats these messages may have information available to validate that an aircraft reporting "on-the-ground" is actually airborne.

3.1.2.6.10.3.1 Aircraft with an automatic means for determining the on-the-ground condition that are equipped to format extended squitter messages shall perform the following validation check:

If the automatically determined air/ground status is not available or is "airborne", no validation shall be performed. If the automatically determined air/ground status is available and "on-the-ground" condition is being reported, the air/ground status shall be overridden and changed to "airborne" if the conditions given for the vehicle category in Table 3-٧ are satisfied.

Note.— While this test is only required for aircraft that are equipped to format extended squitter messages, this feature is desirable for all aircraft.

3.1.2.6.11 *STANDARD LENGTH COMMUNICATIONS PROTOCOLS*

Note 1.— The two types of standard length communications protocols are Comm-A and Comm-B; messages using these protocols are transferred under the control of the interrogator. Comm-A messages are sent directly to the transponder and are completed within one transaction. A Comm-B message is used to transfer information from air to ground and can be initiated either by the interrogator or the transponder. In the case of ground-initiated Comm-B transfers, the interrogator requests data to be read out from the transponder, which delivers the message in the same transaction. In the case of air-initiated Comm-B transfers, the transponder announces the intention to transmit a message; in a subsequent transaction an interrogator will extract the message.

Note 2.— In a non-selective air-initiated Comm-B protocol all transactions necessary can be controlled by any interrogator.

Note 3.— In some areas of overlapping interrogator coverage there may be no means for coordinating interrogator activities via ground communications. Air-initiated Comm-B communications protocols require more than one transaction for completion. Provision is made to ensure that a Comm-B message is closed out only by the interrogator that actually transferred the message. This can be accomplished through the use of the multisite Comm-B communications protocols or through the use of the enhanced Comm-B communications protocols.

Note 4.— The multisite and the non-selective communications protocols cannot be used simultaneously in a region of overlapping interrogator coverage unless the interrogators coordinate their communications activities via ground communications.

Note 5.— The multisite communications protocol is independent of the multisite lockout protocol. That is, the multisite communications protocol may be used with the non-selective lockout protocol and vice versa. The choice of lockout and communications protocols to be used depends upon the network management technique being used.

Note 6.— The broadcast Comm-B protocol can be used to make a message available to all active interrogators.

3.1.2.6.11.1 *Comm-A.* The interrogator shall deliver a Comm-A message in the MA field of an interrogation UF = 20 or 21.

3.1.2.6.11.1.1 *Comm-A technical acknowledgement.* Acceptance of a Comm-A interrogation shall be automatically technically acknowledged by the transponder, by the transmission of the requested reply (3.1.2.10.5.2.2.1).

Note.— The receipt of a reply from the transponder according to the rules of 3.1.2.4.1.2.3 d) and 3.1.2.4.1.3.2.2.2 is the acknowledgement to the interrogator that the interrogation has been accepted by the transponder. If either uplink or downlink fail, this reply will be missing and the interrogator will normally send the message again. In the case of downlink failure, the transponder may receive the message more than once.

3.1.2.6.11.1.2 *Comm-A broadcast.* If a Comm-A broadcast interrogation is accepted (3.1.2.4.1.2.3.1.3) information transfer shall be handled according to 3.1.2.10.5.2.1.1 but other transponder functions shall not be affected and a reply shall not be transmitted.

Note 1.— There is no technical acknowledgement to a Comm-A broadcast message.

Note 2.— Since the transponder does not process the control fields of a Comm-A broadcast interrogation, the 27 bits following the UF field are also available for user data.

3.1.2.6.11.2 *Ground-initiated Comm-B*

3.1.2.6.11.2.1 *Comm-B data selector, BDS.* The 8-bit BDS code shall determine the register whose contents shall be transferred in the MB field of the Comm-B reply. It shall be expressed in two groups of 4 bits each, BDS1 (most significant 4 bits) and BDS2 (least significant 4 bits).

Note.— The transponder register allocation is specified in Annex 10, Volume III, Part I, Chapter 5, Table 5-24.

3.1.2.6.11.2.2 *BDS1 code.* The BDS1 code shall be as defined in the RR field of a surveillance or Comm-A interrogation.

3.1.2.6.11.2.3 *BDS2 code.* The BDS2 code shall be as defined in the RRS subfield of the SD field (3.1.2.6.1.4.1) when DI = 7. If no BDS2 code is specified (i.e. DI is not equal to 7) it shall signify that BDS2 = 0.

3.1.2.6.11.2.4 *Protocol.* On receipt of such a request, the MB field of the reply shall contain the contents of the requested ground-initiated Comm-B register.

3.1.2.6.11.3 *Air-initiated Comm-B*

3.1.2.6.11.3.1 *General protocol.* The transponder shall announce the presence of an air-initiated Comm-B message with the insertion of code 1 in the DR field. To extract an air-initiated Comm-B message, the interrogator shall transmit a request for a Comm-B message reply in a subsequent interrogation with RR equal to 16 and, if DI equals 7, RRS must be equal to 0 (3.1.2.6.11.3.2.1 and 3.1.2.6.11.3.3.1). Receipt of this request code shall cause the transponder to transmit the air-initiated Comm-B message. If a command to transmit an air-initiated Comm-B message is received while no message is waiting to be transmitted, the reply shall contain all ZEROs in the MB field.

The reply that delivers the message shall continue to contain code 1 in the DR field. After a Comm-B closeout has been accomplished, the message shall be cancelled and the DR code belonging to this message immediately removed. If another air-initiated Comm-B message is waiting to be transmitted, the transponder shall set the DR code to 1, so that the reply contains the announcement of this next message.

Note.— The announcement and cancellation protocol ensures that an air-initiated message will not be lost due to uplink or downlink failures that occur during the delivery process.

3.1.2.6.11.3.2 *Additional protocol for multisite air-initiated Comm-B*

Note.— The announcement of an air-initiated Comm-B message waiting to be delivered may be accompanied by a multisite reservation status report in the UM field (3.1.2.6.5.3.2).

Recommendation.— *An interrogator should not attempt to extract a message if it has determined that it is not the reserved site.*

3.1.2.6.11.3.2.1 *Message transfer.* An interrogator shall request a Comm-B reservation and extract an air-initiated Comm-B message by transmitting a surveillance or Comm-A interrogation UF equals 4, 5, 20 or 21 containing:

RR = 16
DI = 1
IIS = assigned interrogator identifier
MBS = 1 (Comm-B reservation request)

Note.— A Comm-B multisite reservation request is normally accompanied by a Comm-B reservation status request (RSS = 1). This causes the interrogator identifier of the reserved site to be inserted in the UM field of the reply.

3.1.2.6.11.3.2.1.1 Protocol procedure in response to this interrogation shall depend upon the state of the B-timer which indicates if a Comm-B reservation is active. This timer shall run for T_R seconds.

Note 1.— The value of T_R *is given in 3.1.2.10.3.9.*

a) If the B-timer is not running, the transponder shall grant a reservation to the requesting interrogator by:

   1) storing the IIS of the interrogation as the Comm-B II; and

   2) starting the B-timer.

   A multisite Comm-B reservation shall not be granted by the transponder unless an air-initiated Comm-B message is waiting to be transmitted and the requesting interrogation contains RR equals 16, DI equals 1, MBS equals 1 and IIS is not 0.

b) If the B-timer is running and the IIS of the interrogation equals the Comm-B II, the transponder shall restart the B-timer.

c) If the B-timer is running and the IIS of the interrogation does not equal the Comm-B II, then there shall be no change to the Comm-B II or the B-timer.

Note 2.— In case c) the reservation request has been denied.

3.1.2.6.11.3.2.1.2 In each case the transponder shall reply with the Comm-B message in the MB field.

3.1.2.6.11.3.2.1.3 An interrogator shall determine if it is the reserved site for this message through coding in the UM field. If it is the reserved site it shall attempt to close out the message in a subsequent interrogation. If it is not the reserved site it shall not attempt to close out the message.

3.1.2.6.11.3.2.2 *Multisite-directed Comm-B transmissions.* To direct an air-initiated Comm-B message to a specific interrogator, the multisite Comm-B protocol shall be used. When the B-timer is not running, the interrogator identifier of the desired destination shall be stored as the Comm-B II. Simultaneously the B-timer shall be started and the DR code shall be set to 1. For a multisite-directed Comm-B message, the B-timer shall not automatically time out but shall continue to run until:

a) the message is read and closed out by the reserved site; or

b) the message is cancelled (3.1.2.10.5.4) by the data link avionics.

Note.— The protocols of 3.1.2.6.5.3 and 3.1.2.6.11.3.2.1 will then result in delivery of the message to the reserved site. The data link avionics may cancel the message if delivery to the reserved site cannot be accomplished.

3.1.2.6.11.3.2.3 *Multisite Comm-B closeout.* The interrogator shall close out a multisite air-initiated Comm-B by transmitting either a surveillance or a Comm-A interrogation containing:

either DI = 1
IIS = assigned interrogator identifier
MBS = 2 (Comm-B closeout)

or DI = 0, 1 or 7
IIS = assigned interrogator identifier
PC = 4 (Comm-B closeout)

The transponder shall compare the IIS of the interrogation to the Comm-B II and if the interrogator identifiers do not match, the message shall not be cleared and the status of the Comm-B II, B-timer, and DR code shall not be changed. If the interrogator identifiers match, the transponder shall set the Comm-B II to 0, reset the B-timer, clear the DR code for this message and clear the message itself. The transponder shall not close out a multisite air-initiated Comm-B message unless it has been read out at least once by the reserved site.

3.1.2.6.11.3.2.4 *Automatic expiration of Comm-B reservation.* If the B-timer period expires before a multisite closeout has been accomplished, the Comm-B II shall be set to 0 and the B-timer reset. The Comm-B message and the DR field shall not be cleared by the transponder.

Note.— This makes it possible for another site to read and clear this message.

3.1.2.6.11.3.3 *Additional protocol for non-selective air-initiated Comm-B*

Note.— In cases where the multisite protocols are not required (i.e. no overlapping coverage or sensor coordination via ground-to-ground communication), the non-selective air-initiated Comm-B protocol may be used.

3.1.2.6.11.3.3.1 *Message transfer.* The interrogator shall extract the message by transmitting either RR equals 16 and DI is not equal to 7, or RR equals 16, DI equals 7 and RRS equals 0 in a surveillance or Comm-A interrogation.

3.1.2.6.11.3.3.2 *Comm-B closeout.* The interrogator shall close out a non-selective air-initiated Comm-B message by transmitting PC equals 4 (Comm-B closeout). On receipt of this command, the transponder shall perform closeout, unless the B-timer is running. If the B-timer is running, indicating that a multisite reservation is in effect, closeout shall be accomplished as per 3.1.2.6.11.3.2.3. The transponder shall not close out a non-selective air-initiated Comm-B message unless it has been read out at least once by an interrogation using non-selective protocols.

3.1.2.6.11.3.4 *Enhanced air-initiated Comm-B protocol*

Note.— The enhanced air-initiated Comm-B protocol provides a higher data link capacity by permitting parallel delivery of air-initiated Comm-B messages by up to sixteen interrogators, one for each II code. Operation without the need for multisite Comm-B reservations is possible in regions of overlapping coverage for interrogators equipped for the enhanced air-initiated Comm-B protocol. The protocol is fully conformant to the standard multisite protocol and thus is compatible with interrogators that are not equipped for the enhanced protocol.

3.1.2.6.11.3.4.1 The transponder shall be capable of storing each of the sixteen II codes: (1) an air-initiated or multisite-directed Comm-B message and (2) the contents of GICB registers 2 through 4.

Note.— GICB registers 2 through 4 are used for the Comm-B linking protocol defined in the Mode S subnetwork SARPs (Annex 10, Volume III, Part I, Chapter 5).

3.1.2.6.11.3.4.2 *Enhanced multisite air-initiated Comm-B protocol*

3.1.2.6.11.3.4.2.1 *Initiation.* An air-initiated Comm-B message input into the transponder shall be stored in the registers assigned to II = 0.

3.1.2.6.11.3.4.2.2 *Announcement and extraction.* A waiting air-initiated Comm-B message shall be announced in the DR field of the replies to all interrogators for which a multisite directed Comm-B message is not waiting. The UM field of the announcement reply shall indicate that the message is not reserved for any II code, i.e. the IIS subfield shall be set to 0. When a command to read this message is received from a given interrogator, the reply containing the message shall contain an IIS subfield content indicating that the message is reserved for the II code contained in the interrogation from that interrogator. After readout and until closeout, the message shall continue to be assigned to that II code. Once a message is assigned to a specific II code, announcement of this message shall be no longer made in the replies to interrogators with other II codes. If the message is not closed out by the assigned interrogator for the period of the B-timer, the message shall revert back to multisite air-initiated status and the process shall repeat. Only one multisite air-initiated Comm-B message shall be in process at a time.

3.1.2.6.11.3.4.2.3 *Closeout.* A closeout for a multisite air-initiated message shall only be accepted from the interrogator that is currently assigned to transfer the message.

3.1.2.6.11.3.4.2.4 *Announcement of the next message waiting.* The DR field shall indicate a message waiting in the reply to an interrogation containing a Comm-B closeout if an unassigned air-initiated message is waiting and has not been assigned to a II code, or if a multisite-directed message is waiting for that II code (3.1.2.6.11.3.4.3).

3.1.2.6.11.3.4.3 *Enhanced multisite directed Comm-B protocol*

3.1.2.6.11.3.4.3.1 *Initiation.* When a multisite directed message is input into the transponder, it shall be placed in the Comm-B registers assigned to the II code specified for the message. If the registers for this II code are already occupied, (i.e. a multisite directed message is already in process to this II code) the new message shall be queued until the current transaction with that II code is closed out.

3.1.2.6.11.3.4.3.2 *Announcement.* Announcement of a Comm-B message waiting transfer shall be made using the DR field as specified in 3.1.2.6.5.2 with the destination interrogator II code contained in the IIS subfield as specified in 3.1.2.6.5.3.2. The DR field and IIS subfield contents shall be set specifically for the interrogator that is to receive the reply. A waiting multisite directed message shall only be announced in the replies to the intended interrogator. It shall not be announced in the replies to other interrogators.

Note 1.— If a multisite-directed message is waiting for II = 2, the surveillance replies to that interrogator will contain DR = 1 and IIS = 2. If this is the only message in process, replies to all other interrogators will indicate that no message is waiting.

Note 2.— In addition to permitting parallel operation, this form of announcement enables a greater degree of announcement of downlink ELMs. The announcements for the downlink ELM and the Comm-B share the DR field. Only one announcement can take place at a time due to coding limitations. In case both a Comm-B and a downlink ELM are waiting, announcement preference is given to the Comm-B. In the example above, if an air-directed Comm-B was waiting for II = 2 and a multisite-directed downlink ELM was waiting for II = 6, both interrogators would see their respective announcements on the first scan since there would be no Comm-B announcement to II = 6 to block the announcement of the waiting downlink ELM.

3.1.2.6.11.3.4.3.3 *Closeout.* Closeout shall be accomplished as specified in 3.1.2.6.11.3.2.3.

3.1.2.6.11.3.4.3.4 *Announcement of the next message waiting.* The DR field shall indicate a message waiting in the reply to an interrogation containing a Comm-B closeout if another multisite directed message is waiting for that II code, or if an air-initiated message is waiting and has not been assigned to a II code. (See 3.1.2.6.11.3.4.2.4.)

3.1.2.6.11.3.4.4 *Enhanced non-selective Comm-B protocol.* The availability of a non-selective Comm-B message shall be announced to all interrogators. Otherwise, the protocol shall be as specified in 3.1.2.6.11.3.3.

3.1.2.6.11.4 *Comm-B broadcast*

Note 1.— A Comm-B message may be broadcast to all active interrogators within range. Messages are alternately numbered 1 and 2 and are self-cancelling after 18 seconds. Interrogators have no means to cancel Comm-B broadcast messages.

Note 2.— Use of the Comm-B broadcast is restricted to transmission of information which does not require a subsequent ground-initiated uplink response.

Note 3.— The timer used for the Comm-B broadcast cycle is the same as that used for the Comm-B multisite protocol.

Note 4.— Data formats for Comm-B broadcast are specified in the Technical Provisions for Mode S Services and Extended Squitter *(Doc 9871).*

3.1.2.6.11.4.1 *Initiation.* A Comm-B broadcast cycle shall not be initiated when an air-initiated Comm-B is waiting to be transmitted. A Comm-B broadcast cycle shall begin with:

a) the insertion of DR code 4 or 5, (3.1.2.6.5.2) into replies with DF 4, 5, 20 or 21; and

b) the starting of the B-timer.

3.1.2.6.11.4.2 *Extraction.* To extract the broadcast message, an interrogator shall transmit RR equals 16 and DI not equal to 7 or RR equals 16 and DI equals 7 with RRS equals 0 in a subsequent interrogation.

3.1.2.6.11.4.3 *Expiration.* When the B-timer period expires, the transponder shall clear the DR code for this message, discard the present broadcast message and change the broadcast message number (from 1 to 2 or 2 to 1) in preparation for a subsequent Comm-B broadcast.

3.1.2.6.11.4.4 *Interruption.* In order to prevent a Comm-B broadcast cycle from delaying the delivery of an air-initiated Comm-B message, provision shall be made for an air-initiated Comm-B to interrupt a Comm-B broadcast cycle. If a broadcast cycle is interrupted, the B-timer shall be reset, the interrupted broadcast message shall be retained and the message number shall not be changed. Delivery of the interrupted broadcast message shall recommence when no air-initiated Comm-B transaction is in effect. The message shall then be broadcast for the full duration of the B-timer.

3.1.2.6.11.4.5 *Enhanced broadcast Comm-B protocol.* A broadcast Comm-B message shall be announced to all interrogators using II codes. The message shall remain active for the period of the B-timer for each II code. The provision for interruption of a broadcast by non-broadcast Comm-B as specified in 3.1.2.6.11.4.4 shall apply separately to each II code. When the B-timer period has been achieved for all II codes, the broadcast message shall be automatically cleared as specified in 3.1.2.6.11.4.3. A new broadcast message shall not be initiated until the current broadcast has been cleared.

Note.— Due to the fact that broadcast message interruption occurs independently for each II code, it is possible that the broadcast message timeout will occur at different times for different II codes.

3.1.2.7 EXTENDED LENGTH COMMUNICATION TRANSACTIONS

Note 1.— Long messages, either on the uplink or the downlink, can be transferred by the extended length message (ELM) protocols through the use of Comm-C (UF = 24) and Comm-D (DF = 24) formats respectively. The ELM uplink protocol provides for the transmission on the uplink of up to sixteen 80-bit message segments before requiring a reply from the transponder. They also allow a corresponding procedure on the downlink.

Note 2.— In some areas of overlapping interrogator coverage there may be no means for coordinating interrogator activities via ground communications. However, the ELM communication protocols require more than one transaction for completion; coordination is thus necessary to ensure that segments from different messages are not interleaved and that transactions are not inadvertently closed out by the wrong interrogator. This can be accomplished through the use of the multisite communications protocols or through the use of the enhanced ELM protocols.

Note 3.— Downlink extended length messages are transmitted only after authorization by the interrogator. The segments to be transmitted are contained in Comm-D replies. As with air-initiated Comm-B messages, downlink ELMs are either announced to all interrogators or directed to a specific interrogator. In the former case an individual interrogator can use the multisite protocol to reserve for itself the ability to close out the downlink ELM transaction. A transponder can be instructed to identify the interrogator that has reserved the transponder for an ELM transaction. Only that interrogator can close out the ELM transaction and reservation.

Note 4.— The multisite protocol and the non-selective protocol cannot be used simultaneously in a region of overlapping interrogator coverage unless the interrogators coordinate their communications activities via ground communications.

3.1.2.7.1 *COMM-C, UPLINK FORMAT 24*

1	3	5	9	89
UF	RC	NC	MC	AP
2	4	8	88	112

The format of this interrogation shall consist of these fields:

Field	*Reference*
UF uplink format	3.1.2.3.2.1.1
RC reply control	3.1.2.7.1.1
NC number of C-segment	3.1.2.7.1.2
MC message, Comm-C	3.1.2.7.1.3
AP address/parity	3.1.2.3.2.1.3

3.1.2.7.1.1 *RC: Reply control.* This 2-bit (3-4) uplink field shall designate segment significance and reply decision.

Coding

RC = 0 signifies uplink ELM initial segment in MC
= 1 signifies uplink ELM intermediate segment in MC
= 2 signifies uplink ELM final segment in MC
= 3 signifies a request for downlink ELM delivery (3.1.2.7.7.2)

3.1.2.7.1.2 *NC: Number of C-segment.* This 4-bit (5-8) uplink field shall designate the number of the message segment contained in MC (3.1.2.7.4.2.1). NC shall be coded as a binary number.

3.1.2.7.1.3 *MC: Message, Comm-C.* This 80-bit (9-88) uplink field shall contain:

a) one of the segments of a sequence used to transmit an uplink ELM to the transponder containing the 4-bit (9-12) IIS subfield; or

b) control codes for a downlink ELM, the 16-bit (9-24) SRS subfield (3.1.2.7.7.2.1) and the 4-bit (25-28) IIS subfield.

Note.— Message content and codes are not included in this chapter except for 3.1.2.7.7.2.1.

3.1.2.7.2 *INTERROGATION-REPLY PROTOCOL FOR UF24*

Note.— Interrogation-reply coordination for the above format follows the protocol outlined in Table 3-5 (3.1.2.4.1.3.2.2).

3.1.2.7.3 *COMM-D, DOWNLINK FORMAT 24*

1		4	5	9	89
DF		KE	ND	MD	AP
	2		8	88	112

The format of this reply shall consist of these fields:

Field	*Reference*
DF downlink format	3.1.2.3.2.1.2
spare — 1 bit	
KE control, ELM	3.1.2.7.3.1
ND number of D-segment	3.1.2.7.3.2
MD message, Comm-D	3.1.2.7.3.3
AP address/parity	3.1.2.3.2.1.3

3.1.2.7.3.1 *KE: Control, ELM.* This 1-bit (4) downlink field shall define the content of the ND and MD fields.

Coding
KE = 0 signifies downlink ELM transmission
1 signifies uplink ELM acknowledgement

3.1.2.7.3.2 *ND: Number of D-segment.* This 4-bit (5-8) downlink field shall designate the number of the message segment contained in MD (3.1.2.7.7.2). ND shall be coded as a binary number.

3.1.2.7.3.3 *MD: Message, Comm-D.* This 80-bit (9-88) downlink field shall contain:

a) one of the segments of a sequence used to transmit a downlink ELM to the interrogator; or

b) control codes for an uplink ELM.

3.1.2.7.4 *MULTISITE UPLINK ELM PROTOCOL*

3.1.2.7.4.1 *Multisite uplink ELM reservation.* An interrogator shall request a reservation for an uplink ELM by transmitting a surveillance or Comm-A interrogation containing:

DI = 1
IIS = assigned interrogator identifier
MES = 1 or 5 (uplink ELM reservation request)

Note.— A multisite uplink ELM reservation request is normally accompanied by an uplink ELM reservation status request (RSS = 2). This causes the interrogator identifier of the reserved site to be inserted in the UM field of the reply.

3.1.2.7.4.1.1 Protocol procedure in response to this interrogation shall depend upon the state of the C-timer which indicates if an uplink ELM reservation is active. This timer shall run for T_R seconds.

Note 1.— The value of T_R *is given in 3.1.2.10.3.9.*

a) If the C-timer is not running, the transponder shall grant a reservation to the requesting interrogator by:

   1) storing the IIS of the interrogation as the Comm-C II and,

   2) starting the C-timer.

b) If the C-timer is running and the IIS of the interrogation equals the Comm-C II, the transponder shall restart the C-timer.

c) If the C-timer is running and the IIS of the interrogation does not equal the Comm-C II, there shall be no change to the Comm-C II or the C-timer.

Note 2.— In case c) the reservation request has been denied.

3.1.2.7.4.1.2 An interrogator shall not start ELM activity unless, during the same scan, having requested an uplink ELM status report, it has received its own interrogator identifier as the reserved interrogator for uplink ELM in the UM field.

Note.— If ELM activity is not started during the same scan as the reservation, a new reservation request may be made during the next scan.

3.1.2.7.4.1.3 If uplink ELM delivery is not completed on the current scan, the interrogator shall ensure that it still has a reservation before delivering additional segments on a subsequent scan.

3.1.2.7.4.2 *Multisite uplink ELM delivery.* The minimum length of an uplink ELM shall be 2 segments, the maximum length shall be 16 segments.

3.1.2.7.4.2.1 *Initial segment transfer.* The interrogator shall begin the ELM uplink delivery for an n-segment message (NC values from 0 to n-1) by a Comm-C transmission containing RC equals 0. The message segment transmitted in the MC field shall be the last segment of the message and shall carry NC equals *n*-1.

On receipt of an initializing segment (RC = 0) the transponder shall establish a “setup” defined as:

a) clearing the number and content of previous segment storage registers and the associated TAS field;

b) assigning storage space for the number of segments announced in NC of this interrogation; and

c) storing the MC field of the segment received.

The transponder shall not reply to this interrogation.

Receipt of another initializing segment shall result in a new setup within the transponder.

3.1.2.7.4.2.2 *Transmission acknowledgement.* The transponder shall use the TAS subfield to report the segments received so far in an uplink ELM sequence. The information contained in the TAS subfield shall be continually updated by the transponder as segments are received.

Note.— Segments lost in uplink transmission are noted by their absence in the TAS report and are retransmitted by the interrogator which will then send further final segments to assess the extent of message completion.

3.1.2.7.4.2.2.1 *TAS, transmission acknowledgement subfield in MD.* This 16-bit (17-32) downlink subfield in MD reports the segment numbers received so far in an uplink ELM sequence. Starting with bit 17, which denotes segment number 0, each of the following bits shall be set to ONE if the corresponding segment of the sequence has been received. TAS shall appear in MD if KE equals 1 in the same reply.

3.1.2.7.4.2.3 *Intermediate segment transfer.* The interrogator shall transfer intermediate segments by transmitting Comm-C interrogations with RC equals 1. The transponder shall store the segments and update TAS only if the setup of 3.1.2.7.4.2.1 is in effect and if the received NC is smaller than the value stored at receipt of the initial segment. No reply shall be generated on receipt of an intermediate segment.

Note.— Intermediate segments may be transmitted in any order.

3.1.2.7.4.2.4 *Final segment transfer.* The interrogator shall transfer a final segment by transmitting a Comm-C interrogation with RC equals 2. The transponder shall store the content of the MC field and update TAS if the setup of 3.1.2.7.4.2.1 is in effect and if the received NC is smaller than the value of the initial segment NC. The transponder shall reply under all circumstances as per 3.1.2.7.4.2.5.

Note 1.— This final segment transfer interrogation can contain any message segment.

Note 2.— RC equals 2 is transmitted any time that the interrogator wants to receive the TAS subfield in the reply. Therefore, more than one "final" segment may be transferred during the delivery of an uplink ELM.

3.1.2.7.4.2.5 *Acknowledgement reply.* On receipt of a final segment, the transponder shall transmit a Comm-D reply (DF = 24), with KE equals 1 and with the TAS subfield in the MD field. This reply shall be transmitted at 128 microseconds plus or minus 0.25 microsecond following the sync phase reversal of the interrogation delivering the final segment.

3.1.2.7.4.2.6 *Completed message.* The transponder shall deem the message complete if all segments announced by NC in the initializing segment have been received. If the message is complete, the message content shall be delivered to the outside via the ELM interface of 3.1.2.10.5.2.1.3 and cleared. No later-arriving segments shall be stored. The TAS content shall remain unchanged until either a new setup is called for (3.1.2.7.4.2.1) or until closeout (3.1.2.7.4.2.8).

3.1.2.7.4.2.7 *C-timer restart.* The C-timer shall be restarted each time that a received segment is stored and the Comm-C II is not 0.

Note.— The requirement for the Comm-C II to be non-zero prevents the C-timer from being restarted during a non-selective uplink ELM transaction.

3.1.2.7.4.2.8 *Multisite uplink ELM closeout.* The interrogator shall close out a multisite uplink ELM by transmitting either a surveillance or a Comm-A interrogation containing:

either DI = 1
IIS = assigned interrogator identifier
MES = 2, 6 or 7 (uplink ELM closeout)

or DI = 0, 1 or 7
IIS = assigned interrogator identifier
PC = 5 (uplink ELM closeout)

The transponder shall compare the IIS of the interrogation to the Comm-C II and if the interrogator identifiers do not match, the state of the ELM uplink process shall not be changed.

If the interrogator identifiers match, the transponder shall set the Comm-C II to 0, reset the C-timer, clear the stored TAS and discard any stored segments of an incomplete message.

3.1.2.7.4.2.9 *Automatic multisite uplink ELM closeout.* If the C-timer period expires before a multisite closeout has been accomplished the closeout actions described in 3.1.2.7.4.2.8 shall be initiated automatically by the transponder.

3.1.2.7.5 *NON-SELECTIVE UPLINK ELM*

Note.— In cases where the multisite protocols are not required (for example, no overlapping coverage or sensor coordination via ground-to-ground communication), the non-selective uplink ELM protocol may be used.

Non-selective uplink ELM delivery shall take place as for multisite uplink ELMs described in 3.1.2.7.4.2. The interrogator shall close out an uplink ELM by transmitting PC equals 5 (uplink ELM closeout) in a surveillance or Comm-A interrogation. On receipt of this command, the transponder shall perform closeout, unless the C-timer is running. If the C-timer is running, indicating that a multisite reservation is in effect, the closeout shall be accomplished as per 3.1.2.7.4.2.8. An uncompleted message, present when the closeout is accepted, shall be cancelled.

3.1.2.7.6 *ENHANCED UPLINK ELM PROTOCOL*

Note.— The enhanced uplink ELM protocol provides a higher data link capacity by permitting parallel delivery of uplink ELM messages by up to sixteen interrogators, one for each II code. Operation without the need for multisite uplink ELM reservations is possible in regions of overlapping coverage for interrogators equipped for the enhanced uplink ELM protocol. The protocol is fully conformant to the standard multisite protocol and thus is compatible with interrogators that are not equipped for the enhanced protocol.

3.1.2.7.6.1 *General*

3.1.2.7.6.1.1 The interrogator shall determine from the data link capability report whether the transponder supports the enhanced protocols. If the enhanced protocols are not supported by both the interrogator and the transponder, the multisite reservation protocols specified in 3.1.2.7.4.1 shall be used.

Note.— If the enhanced protocols are supported, uplink ELMs delivered using the multisite protocol may be delivered without a prior reservation.

3.1.2.7.6.1.2 **Recommendation.—** *If the transponder and the interrogator are equipped for the enhanced protocol, the interrogator should use the enhanced uplink protocol.*

3.1.2.7.6.1.3 The transponder shall be capable of storing a sixteen segment message for each of the sixteen II codes.

3.1.2.7.6.2 *Reservation processing.* The transponder shall support reservation processing for each II code as specified in 3.1.2.7.4.1

Note 1.— Reservation processing is required for interrogators that do not support the enhanced protocol.

Note 2.— Since the transponder can process simultaneous uplink ELMs for all sixteen II codes, a reservation will always be granted.

3.1.2.7.6.3 *Enhanced uplink ELM delivery and closeout.* The transponder shall process received segments separately by II code. For each value of II code, uplink ELM delivery and closeout shall be performed as specified in 3.1.2.7.4.2 except that the MD field used to transmit the technical acknowledgment shall also contain the 4-bit (33-36) IIS subfield.

Note.— The interrogator may use the II code contained in the technical acknowledgement in order to verify that it has received the correct technical acknowledgement.

3.1.2.7.7 *MULTISITE DOWNLINK ELM PROTOCOL*

3.1.2.7.7.1 *Initialization.* The transponder shall announce the presence of a downlink ELM of *n* segments by making the binary code corresponding to the decimal value 15 + *n* available for insertion in the DR field of a surveillance or Comm-B reply, DF equals 4, 5, 20, 21. This announcement shall remain active until the ELM is closed out (3.1.2.7.7.3, 3.1.2.7.8.1).

3.1.2.7.7.1.1 *Multisite downlink ELM reservation.* An interrogator shall request a reservation for extraction of a downlink ELM by transmitting a surveillance or Comm-A interrogation containing:

DI = 1
IIS = assigned interrogator identifier
MES = 3 or 6 (downlink ELM reservation request)

Note.— A multisite downlink ELM reservation request is normally accompanied by a downlink ELM reservation status request (RSS = 3). This causes the interrogator identifier of the reserved interrogator to be inserted in the UM field of the reply.

3.1.2.7.7.1.1.1 Protocol procedure in response to this interrogation shall depend upon the state of the D-timer which indicates if a downlink ELM reservation is active. This timer shall run for T_R seconds.

Note 1.— The value of $\mathrm{T_R}$ *is given in 3.1.2.10.3.9.*

a) if the D-timer is not running, the transponder shall grant a reservation to the requesting interrogator by:

 1) storing the IIS of the interrogation as the Comm-D II; and

 2) starting the D-timer.

 A multisite downlink ELM reservation shall not be granted by the transponder unless a downlink ELM is waiting to be transmitted.

b) if the D-timer is running and the IIS of the interrogation equals the Comm-D II, the transponder shall restart the D-timer; and

c) if the D-timer is running and the IIS of the interrogation does not equal the Comm-D II, there shall be no change to the Comm-D II or D-timer.

Note 2.— In case c) the reservation request has been denied.

3.1.2.7.7.1.1.2 An interrogator shall determine if it is the reserved site through coding in the UM field and, if so, it is authorized to request delivery of the downlink ELM. Otherwise, ELM activity shall not be started during this scan.

Note.— If the interrogator is not the reserved site, a new reservation request may be made during the next scan.

3.1.2.7.7.1.1.3 If downlink ELM activity is not completed on the current scan, the interrogator shall ensure that it still has a reservation before requesting additional segments on a subsequent scan.

3.1.2.7.7.1.2 *Multisite-directed downlink ELM transmissions.* To direct a downlink ELM message to a specific interrogator, the multisite downlink ELM protocol shall be used. When the D-timer is not running, the interrogator identifier of the desired destination shall be stored as the Comm-D II. Simultaneously, the D-timer shall be started and the DR code (3.1.2.7.7.1) shall be set. For a multisite-directed downlink ELM, the D-timer shall not automatically time out but shall continue to run until:

a) the message is read and closed out by the reserved site; or

b) the message is cancelled (3.1.2.10.5.4) by the data link avionics.

Note.— The protocols of 3.1.2.7.7.1 will then result in the delivery of the message to the reserved site. The data link avionics may cancel the message if delivery to the reserved site cannot be accomplished.

3.1.2.7.7.2 *Delivery of downlink ELMs.* The interrogator shall extract a downlink ELM by transmitting a Comm-C interrogation with RC equals 3. This interrogation shall carry the SRS subfield which specifies the segments to be transmitted. On receipt of this request, the transponder shall transfer the requested segments by means of Comm-D replies with KE equals 0 and ND corresponding to the number of the segment in MD. The first segment shall be transmitted 128 microseconds plus or minus 0.25 microsecond following the sync phase reversal of the interrogation requesting delivery and subsequent segments shall be transmitted at a rate of one every 136 microseconds plus or minus 1 microsecond. If a request is received to transmit downlink ELM segments and no message is waiting, each reply segment shall contain all ZEROs in the MD field.

Note 1.— The requested segments may be transmitted in any order.

Note 2.— Segments lost in downlink transmissions will be requested again by the interrogator on a subsequent interrogation carrying the SRS subfield. This process is repeated until all segments have been transferred.

3.1.2.7.7.2.1 *SRS, segment request subfield in MC.* This 16-bit (9-24) uplink subfield in MC shall request the transponder to transfer downlink ELM segments. Starting with bit 9, which denotes segment number 0, each of the following bits shall be set to ONE if the transmission of the corresponding segment is requested. SRS shall appear in MC if RC equals 3 in the same interrogation.

3.1.2.7.7.2.2 *D-timer restart.* The D-timer shall be restarted each time that a request for Comm-D segments is received if the Comm-D II is non-zero.

Note.— The requirement for the Comm-D II to be non-zero prevents the D-timer from being restarted during a non-selective downlink ELM transaction.

3.1.2.7.7.3 *Multisite downlink ELM closeout.* The interrogator shall close out a multisite downlink ELM by transmitting either a surveillance or a Comm-A interrogation containing:

either DI = 1
IIS = assigned interrogator identifier
MES = 4, 5 or 7 (downlink ELM closeout)

or DI = 0, 1 or 7
IIS = assigned interrogator identifier
PC = 6 (downlink ELM closeout).

The transponder shall compare the IIS of the interrogation to the Comm-D II and if the interrogator identifiers do not match, the state of the downlink process shall not be changed.

If the interrogator identifiers match, and if a request for transmission has been complied with at least once, the transponder shall set the Comm-D II to 0, reset the D-timer, clear the DR code for this message and clear the message itself.

If another downlink ELM is waiting to be transmitted, the transponder shall set the DR code (if no Comm-B message is waiting to be delivered) so that the reply contains the announcement of the next message.

3.1.2.7.7.4 *Automatic expiration of downlink ELM reservation.* If the D-timer period expires before a multisite closeout has been accomplished, the Comm-D II shall be set to 0, and the D-timer reset. The message and DR code shall not be cleared.

Note.— This makes it possible for another site to read and clear this message.

3.1.2.7.8 *NON-SELECTIVE DOWNLINK ELM*

Note.— In cases where the multisite protocols are not required (i.e. no overlapping coverage or sensor coordination via ground-to-ground communication), the non-selective downlink ELM protocol may be used.

Non-selective downlink ELM delivery shall take place as described in 3.1.2.7.7.2.

3.1.2.7.8.1 *Non-selective downlink ELM closeout.* The interrogator shall close out a non-selective downlink ELM by transmitting PC equals 6 (downlink ELM closeout) in a surveillance or Comm-A interrogation. On receipt of this command, and if a request for transmission has been complied with at least once, the transponder shall perform closeout unless the D-timer is running. If the D-timer is running, indicating that a multisite reservation is in effect, the closeout shall be accomplished as per 3.1.2.7.7.3.

3.1.2.7.9 *ENHANCED DOWNLINK ELM PROTOCOL*

Note.— The enhanced downlink ELM protocol provides a higher data link capacity by permitting parallel delivery of downlink ELM messages by up to sixteen interrogators, one for each II code. Operation without the need for multisite downlink ELM reservations is possible in regions of overlapping coverage for interrogators equipped for the enhanced downlink ELM protocol. The protocol is fully conformant to the standard multisite protocol and thus is compatible with interrogators that are not equipped for the enhanced protocol.

3.1.2.7.9.1 *General*

3.1.2.7.9.1.1 The interrogator shall determine from the data link capability report whether the transponder supports the enhanced protocols. If the enhanced protocols are not supported by both the interrogator and the transponder, the multisite reservation protocols specified in 3.1.2.6.11 shall be used for multisite and multisite-directed downlink ELMs.

Note.— If the enhanced protocols are supported, downlink ELMs delivered using the multisite-directed protocol can be delivered without a prior reservation.

3.1.2.7.9.1.2 **Recommendation.—** *If the transponder and the interrogator are equipped for the enhanced protocol, the interrogator should use the enhanced downlink protocol.*

3.1.2.7.9.2 *Enhanced multisite downlink ELM protocol*

3.1.2.7.9.2.1 The transponder shall be capable of storing a sixteen segment message for each of the sixteen II codes.

3.1.2.7.9.2.2 *Initialization.* A multisite message input into the transponder shall be stored in the registers assigned to II = 0.

3.1.2.7.9.2.3 *Announcement and extraction.* A waiting multisite downlink ELM message shall be announced in the DR field of the replies to all interrogators for which a multisite directed downlink ELM message is not waiting. The UM field of the announcement reply shall indicate that the message is not reserved for any II code, i.e. the IIS subfield shall be set to 0. When a command to reserve this message is received from a given interrogator, the message shall be reserved for the II code contained in the interrogation from that interrogator. After readout and until closeout, the message shall continue to be assigned to that II code. Once a message is assigned to a specific II code, announcement of this message shall no longer be made in the replies to interrogators with other II codes. If the message is not closed out by the associated interrogator for the period of the D-timer, the message shall revert back to multisite status and the process shall repeat. Only one multisite downlink ELM message shall be in process at a time.

3.1.2.7.9.2.4 *Closeout.* A closeout for a multisite message shall only be accepted from the interrogator that was assigned most recently to transfer the message.

3.1.2.7.9.2.5 *Announcement of the next message waiting.* The DR field shall indicate a message waiting in the reply to an interrogation containing a downlink ELM closeout if an unassigned multisite downlink ELM is waiting, or if a multisite directed message is waiting for that II code (3.1.2.7.9.2).

3.1.2.7.9.3 *Enhanced multisite directed downlink ELM protocol*

3.1.2.7.9.3.1 *Initialization.* When a multisite directed message is input into the transponder, it shall be placed in the downlink ELM registers assigned to the II code specified for the message. If the registers for this II code are already in use (i.e. a multisite directed downlink ELM message is already in process for this II code), the new message shall be queued until the current transaction with that II code is closed out.

3.1.2.7.9.3.2 *Announcement.* Announcement of a downlink ELM message waiting transfer shall be made using the DR field as specified in 3.1.2.7.7.1 with the destination interrogator II code contained in the IIS subfield as specified in 3.1.2.6.5.3.2. The DR field and IIS subfield contents shall be set specifically for the interrogator that is to receive the reply. A waiting multisite directed message shall only be announced in the replies to the intended interrogator. It shall not be announced in replies to other interrogators.

3.1.2.7.9.3.3 *Delivery.* An interrogator shall determine if it is the reserved site through coding in the UM field. The delivery shall only be requested if it is the reserved site and shall be as specified in 3.1.2.7.7.2. The transponder shall transmit the message contained in the buffer associated with the II code specified in the IIS subfield of the segment request interrogation.

3.1.2.7.9.3.4 *Closeout.* Closeout shall be accomplished as specified in 3.1.2.7.7.3 except that a message closeout shall only be accepted from the interrogator with a II code equal to the one that transferred the message.

3.1.2.7.9.3.5 *Announcement of the next message waiting.* The DR field shall indicate a message waiting in the reply to an interrogation containing a downlink ELM closeout if another multisite directed message is waiting for that II code, or if a downlink message is waiting that has not been assigned a II code (3.1.2.7.9.2).

3.1.2.7.9.4 *Enhanced non-selective downlink ELM protocol.* The availability of a non-selective downlink ELM message shall be announced to all interrogators. Otherwise, the protocol shall be as specified in 3.1.2.7.7.

3.1.2.8 AIR-AIR SERVICE AND SQUITTER TRANSACTIONS

Note.— Airborne collision avoidance system (ACAS) equipment uses the formats UF or DF equals 0 or 16 for air-air surveillance.

3.1.2.8.1 *SHORT AIR-AIR SURVEILLANCE, UPLINK FORMAT 0*

1		9		14	15		33
UF		RL		AQ	DS		AP
5					22		56

The format of this interrogation shall consist of these fields:

Field	*Reference*
UF uplink format	3.1.2.3.2.1.1
spare — 3 bits	
RL reply length	3.1.2.8.1.2
spare — 4 bits	
AQ acquisition	3.1.2.8.1.1
DS data selector	3.1.2.8.1.3
spare — 10 bits	
AP address/parity	3.1.2.3.2.1.3

3.1.2.8.1.1 *AQ: Acquisition.* This 1-bit (14) uplink field shall contain a code which controls the content of the RI field.

3.1.2.8.1.2 *RL: Reply length.* This 1-bit (9) uplink field shall command the format to be used for the reply.

Coding

0 signifies a reply with DF = 0

1 signifies a reply with DF = 16

Note.— A transponder that does not support DF = 16 (i.e. transponder which does not support the ACAS cross-link capability and is not associated with airborne collision avoidance equipment) would not reply to a UF=0 interrogation with RL=1

3.1.2.8.1.3 *DS: Data selector.* This 8-bit (15-22) uplink field shall contain the BDS code (3.1.2.6.11.2.1) of the GICB register whose contents shall be returned to the corresponding reply with DF = 16.

3.1.2.8.2 *SHORT AIR-AIR SURVEILLANCE, DOWNLINK FORMAT 0*

1	6	7		14		20	33
DF	VS	CC		RI		AC	AP
5				17		32	56

This reply shall be sent in response to an interrogation with UF equals 0 and RL equals 0. The format of this reply shall consist of these fields:

Field	*Reference*
DF downlink format	3.1.2.3.2.1.2
VS vertical status	3.1.2.8.2.1
CC cross-link capability	3.1.2.8.2.3
spare — 6 bits	
RI reply information	3.1.2.8.2.2

spare — 2 bits	
AC altitude code	3.1.2.6.5.4
AP address/parity	3.1.2.3.2.1.3

3.1.2.8.2.1 *VS: Vertical status:* This 1-bit (6) downlink field shall indicate the status of the aircraft (3.1.2.6.10.1.2).

Coding

0	signifies that the aircraft is airborne
1	signifies that the aircraft is on the ground

3.1.2.8.2.2 *RI: Reply information, air-air.* This 4-bit (14-17) downlink field shall report the aircraft's maximum cruising true airspeed capability and type of reply to interrogating aircraft. The coding shall be as follows:

0	signifies a reply to an air-air interrogation UF = 0 with AQ = 0, no operating ACAS
1-7	reserved for ACAS
8-15	signifies a reply to an air-air interrogation UF = 0 with AQ = 1 and that the maximum airspeed is as follows:
8	no maximum airspeed data available
9	maximum airspeed is .LE. 140 km/h (75 kt)
10	maximum airspeed is .GT. 140 and .LE. 280 km/h (75 and 150 kt)
11	maximum airspeed is .GT. 280 and .LE. 560 km/h (150 and 300 kt)
12	maximum airspeed is .GT. 560 and .LE. 1 110 km/h (300 and 600 kt)
13	maximum airspeed is .GT. 1 110 and .LE. 2 220 km/h (600 and 1 200 kt)
14	maximum airspeed is more than 2 220 km/h (1 200 kt)
15	not assigned.

Note.— ".LE." means "less than or equal to" and ".GT." means "greater than".

3.1.2.8.2.3 *CC: Cross-link capability.* This 1-bit (7) downlink field shall indicate the ability of the transponder to support the cross-link capability, i.e. decode the contents of the DS field in an interrogation with UF equals 0 and respond with the contents of the specified GICB register in the corresponding reply with DF equals 16.

Coding

0	signifies that the transponder cannot support the cross-link capability
1	signifies that the transponder supports the cross-link capability.

3.1.2.8.3 LONG AIR-AIR SURVEILLANCE, DOWNLINK FORMAT 16

1	6		14		20	33	89
DF	VS		RI		AC	MV	AP
5			17		32	88	112

This reply shall be sent in response to an interrogation with UF equals 0 and RL equals 1. The format of this reply shall consist of these fields:

Field	*Reference*
DF downlink format	3.1.2.3.2.1.2
VS vertical status	3.1.2.8.2.1
spare — 7 bits	
RI reply information	3.1.2.8.2.2

spare — 2 bits	
AC altitude code	3.1.2.6.5.4
MV message, ACAS	3.1.2.8.3.1
AP address/parity	3.1.2.3.2.1.3

3.1.2.8.3.1 *MV: Message, ACAS*. This 56-bit (33-88) downlink field shall contain GICB information as requested in the DS field of the UF 0 interrogation that elicited the reply.

Note.— The MV field is also used by ACAS for air-air coordination (4.3.8.4.2.4).

3.1.2.8.4 *AIR-AIR TRANSACTION PROTOCOL*

Note.— Interrogation-reply coordination for the air-air formats follows the protocol outlined in Table 3-5 (3.1.2.4.1.3.2.2).

The most significant bit (bit 14) of the RI field of an air-air reply shall replicate the value of the AQ field (bit 14) received in an interrogation with UF equals 0.

If AQ equals 0 in the interrogation, the RI field of the reply shall contain the value 0.

If AQ equals 1 in the interrogation, the RI field of the reply shall contain the maximum cruising true airspeed capability of the aircraft as defined in 3.1.2.8.2.2.

In response to a UF = 0 with RL = 1 and DS ≠ 0, the transponder shall reply with a DF = 16 reply in which the MV field shall contain the contents of the GICB register designated by the DS value. In response to a UF = 0 with RL = 1 and DS = 0, the transponder shall reply with a DF = 16 with an MV field of all zeros. Receipt of a UF = 0 with DS ≠ 0 but RL = 0 shall have no associated ACAS cross-link action, and the transponder shall reply as specified in 3.1.2.8.2.2.

3.1.2.8.5 *ACQUISITION SQUITTER*

Note.— SSR Mode S transponders transmit acquisition squitters (unsolicited downlink transmissions) to permit passive acquisition by interrogators with broad antenna beams, where active acquisition may be hindered by all-call synchronous garble. Examples of such interrogators are an airborne collision avoidance system and an airport surface surveillance system.

3.1.2.8.5.1 *Acquisition squitter format.* The format used for acquisition squitter transmissions shall be the all-call reply, (DF = 11) with II = 0.

3.1.2.8.5.2 *Acquisition squitter rate.* Acquisition squitter transmissions shall be emitted at random intervals that are uniformly distributed over the range from 0.8 to 1.2 seconds using a time quantization of no greater than 15 milliseconds relative to the previous acquisition squitter, with the following exceptions:

a) the scheduled acquisition squitter shall be delayed if the transponder is in a transaction cycle (3.1.2.4.1);

b) the acquisition squitter shall be delayed if an extended squitter is in process;

c) the scheduled acquisition squitter shall be delayed if a mutual suppression interface is active (see Note 1 below); or

d) acquisition squitters shall only be transmitted on the surface if the transponder is not reporting the surface position type of Mode S extended squitter.

An acquisition squitter shall not be interrupted by link transactions or mutual suppression activity after the squitter transmission has begun.

Note 1.— A mutual suppression system may be used to connect onboard equipment operating in the same frequency band in order to prevent mutual interference. Acquisition squitter action resumes as soon as practical after a mutual suppression interval.

Note 2.— The surface report type may be selected automatically by the aircraft or by commands from a squitter ground station (3.1.2.8.6.7).

3.1.2.8.5.3 *Acquisition squitter antenna selection.* Transponders operating with antenna diversity (3.1.2.10.4) shall transmit acquisition squitters as follows:

a) when airborne (3.1.2.8.6.7), the transponder shall transmit acquisition squitters alternately from the two antennas; and

b) when on the surface (3.1.2.8.6.7), the transponder shall transmit acquisition squitters under control of SAS (3.1.2.6.1.4.1 f)). In the absence of any SAS commands, use of the top antenna only shall be the default.

Note.— Acquisition squitters are not emitted on the surface if the transponder is reporting the surface type of extended squitter (3.1.2.8.6.4.3).

3.1.2.8.6 *EXTENDED SQUITTER, DOWNLINK FORMAT 17*

1	6	9	33	89
DF	CA	AA	ME	PI
5	8	32	88	112

Note.— SSR Mode S transponders transmit extended squitters to support the broadcast of aircraft-derived position for surveillance purposes. The broadcast of this type of information is a form of automatic dependent surveillance (ADS) known as ADS-broadcast (ADS-B).

3.1.2.8.6.1 *Extended squitter format.* The format used for the extended squitter shall be a 112-bit downlink format (DF = 17) containing the following fields:

Field	*Reference*
DF downlink format	3.1.2.3.2.1.2
CA capability	3.1.2.5.2.2.1
AA address, announced	3.1.2.5.2.2.2
ME message, extended squitter	3.1.2.8.6.2
PI parity/interrogator identifier	3.1.2.3.2.1.4

The PI field shall be encoded with II equal to 0.

3.1.2.8.6.2 *ME: Message, extended squitter.* This 56-bit (33-88) downlink field in DF = 17 shall be used to transmit broadcast messages. Extended squitter shall be supported by registers 05, 06, 07, 08, 09, 0A {HEX} and 61-6F {HEX} and shall conform to either version 0 or version 1 message formats as described below:

a) Version 0 ES message formats and related requirements are suitable for early implementation of extended squitter applications. Surveillance quality is reported by navigation uncertainty category (NUC), which can be an indication of either the accuracy or integrity of the navigation data used by ADS-B. However, there is no indication as to which of these, integrity or accuracy, the NUC value is providing an indication of.

b) Version 1 ES message formats and related requirements apply to more advanced ADS-B applications. Surveillance accuracy and integrity are reported separately as navigation accuracy category (NAC), navigation integrity category (NIC) and surveillance integrity level (SIL). Version 1 ES formats also include provisions for enhanced reporting of status information.

Note 1.— The formats and update rates of each register are specified in the Technical Provisions for Mode S Services and Extended Squitter *(Doc 9871).*

Note 2.— The formats for the two versions are interoperable. An extended squitter receiver can recognize and decode both version 0 and version 1 message formats.

Note 3.— Guidance material on transponder register formats and data sources is included in the Manual on Mode S Specific Services *(Doc 9688).*

3.1.2.8.6.3 *Extended squitter types*

3.1.2.8.6.3.1 *Airborne position squitter.* The airborne position extended squitter type shall use format DF = 17 with the contents of GICB register 05 {HEX} inserted in the ME field.

Note.— A GICB request (3.1.2.6.11.2) containing RR equals 16 and DI equals 7 and RRS equals 5 will cause the resulting reply to contain the airborne position report in its MB field.

3.1.2.8.6.3.1.1 *SSS, surveillance status subfield in ME.* The transponder shall report the surveillance status of the transponder in this 2-bit (38, 39) subfield of ME when ME contains an airborne position squitter report.

Coding

0	signifies no status information
1	signifies transponder reporting permanent alert condition (3.1.2.6.10.1.1.1)
2	signifies transponder reporting a temporary alert condition (3.1.2.6.10.1.1.2)
3	signifies transponder reporting SPI condition (3.1.2.6.10.1.3)

Codes 1 and 2 shall take precedence over code 3.

3.1.2.8.6.3.1.2 *ACS, altitude code subfield in ME.* Under control of ATS (3.1.2.8.6.3.1.3), the transponder shall report either navigation-derived altitude, or the barometric altitude code in this 12-bit (41-52) subfield of ME when ME contains an airborne position report. When barometric altitude is reported, the contents of the ACS shall be as specified for the 13-bit AC field (3.1.2.6.5.4) except that the M-bit (bit 26) shall be omitted.

3.1.2.8.6.3.1.3 *Control of ACS reporting.* Transponder reporting of altitude data in ACS shall depend on the altitude type subfield (ATS) as specified in 3.1.2.8.6.8.2. Transponder insertion of barometric altitude data in the ACS subfield shall take place when the ATS subfield has the value of ZERO. Transponder insertion of barometric altitude data in ACS shall be inhibited when ATS has the value 1.

3.1.2.8.6.3.2 *Surface position squitter.* The surface position extended squitter type shall use format DF = 17 with the contents of GICB register 06 {HEX} inserted in the ME field.

Note.— A GICB request (3.1.2.6.11.2) containing RR equals 16 and DI equals 7 and RRS equals 6 will cause the resulting reply to contain the surface position report in its MB field.

3.1.2.8.6.3.3 *Aircraft identification squitter.* The aircraft identification extended squitter type shall use format DF = 17 with the contents of GICB register 08 {HEX} inserted in the ME field.

Note.— A GICB request (3.1.2.6.11.2) containing RR equals 16 and DI equals 7 and RRS equals 8 will cause the resulting reply to contain the aircraft identification report in its MB field.

3.1.2.8.6.3.4 *Airborne velocity squitter.* The airborne velocity extended squitter type shall use format DF = 17 with the contents of GICB register 09 {HEX} inserted in the ME field.

Note.— A GICB request (3.1.2.6.11.2) containing RR equals 16 and DI equals 7 and RRS equals 9 will cause the resulting reply to contain the airborne velocity report in its MB field.

3.1.2.8.6.3.5 *Event-driven squitter.* The event-driven extended squitter type shall use format DF = 17 with the contents of GICB register 0A {HEX} inserted in the ME field.

Note.— A GICB request (3.1.2.6.11.2) containing RR equals 16 and DI equals 7 and RRS equals 10 will cause the resulting reply to contain the event-driven report in its MB field.

3.1.2.8.6.4 *Extended squitter rate*

3.1.2.8.6.4.1 *Initialization.* At power up initialization, the transponder shall commence operation in a mode in which it broadcasts only acquisition squitters (3.1.2.8.5). The transponder shall initiate the broadcast of extended squitters for airborne position, surface position, airborne velocity and aircraft identification when data are inserted into transponder registers 05, 06, 09 and 08 {HEX}, respectively. This determination shall be made individually for each squitter type. When extended squitters are broadcast, transmission rates shall be as indicated in the following paragraphs. Acquisition squitters shall be reported in addition to extended squitters unless the acquisition squitter is inhibited (2.1.5.4). Acquisition squitters shall always be reported if position or velocity extended squitters are not reported.

Note 1.— This suppresses the transmission of extended squitters from aircraft that are unable to report position, velocity or identity. If input to the register for a squitter type stops for 60 seconds, broadcast of that extended squitter type will be discontinued until data insertion is resumed.

Note 2.— After timeout (3.1.2.8.6.6), this squitter type may contain an ME field of all zeroes.

3.1.2.8.6.4.2 *Airborne position squitter rate.* Airborne position squitter transmissions shall be emitted when the aircraft is airborne (3.1.2.8.6.7) at random intervals that are uniformly distributed over the range from 0.4 to 0.6 seconds using a time quantization of no greater than 15 milliseconds relative to the previous airborne position squitter, with the exceptions as specified in 3.1.2.8.6.4.7.

3.1.2.8.6.4.3 *Surface position squitter rate.* Surface position squitter transmissions shall be emitted when the aircraft is on the surface (3.1.2.8.6.7) using one of two rates depending upon whether the high or low squitter rate has been selected (3.1.2.8.6.9). When the high squitter rate has been selected, surface position squitters shall be emitted at random intervals that are uniformly distributed over the range from 0.4 to 0.6 seconds using a time quantization of no greater than 15 milliseconds relative to the previous surface position squitter (termed the high rate). When the low squitter rate has been selected, surface position squitters shall be emitted at random intervals that are uniformly distributed over the range of 4.8 to 5.2 seconds using a time quantization of no greater than 15 milliseconds relative to the previous surface position squitter (termed the low rate). Exceptions to these transmission rates are specified in 3.1.2.8.6.4.7.

3.1.2.8.6.4.4 *Aircraft identification squitter rate.* Aircraft identification squitter transmissions shall be emitted at random intervals that are uniformly distributed over the range of 4.8 to 5.2 seconds using a time quantization of no greater than 15 milliseconds relative to the previous identification squitter when the aircraft is reporting the airborne position squitter type, or when the aircraft is reporting the surface position squitter type and the high surface squitter rate has been selected. When the surface position squitter type is being reported at the low surface rate, the aircraft identification squitter shall be emitted at random intervals that are uniformly distributed over the range of 9.8 to 10.2 seconds using a time quantization of no greater than 15 milliseconds relative to the previous identification squitter. Exceptions to these transmission rates are specified in 3.1.2.8.6.4.7.

3.1.2.8.6.4.5 *Airborne velocity squitter rate.* Airborne velocity squitter transmissions shall be emitted when the aircraft is airborne (3.1.2.8.6.7) at random intervals that are uniformly distributed over the range from 0.4 to 0.6 seconds using a time quantization of no greater than 15 milliseconds relative to the previous airborne velocity squitter, with the exceptions as specified in 3.1.2.8.6.4.7.

3.1.2.8.6.4.6 *Event-driven squitter rate.* The event-driven squitter shall be transmitted once, each time that GICB register 0A {HEX} is loaded, while observing the delay conditions specified in 3.1.2.8.6.4.7. The maximum transmission rate for the event-driven squitter shall be limited by the transponder to twice per second. If a message is inserted in the event-driven register and cannot be transmitted due to rate limiting, it shall be held and transmitted when the rate limiting condition has cleared. If a new message is received before transmission is permitted, it shall overwrite the earlier message.

Note.— The squitter transmission rate and the duration of squitter transmissions is application-dependent. Choices made for each application must take into account interference considerations (Manual of the Secondary Surveillance Radar (SSR) Systems *(Doc 9684), Chapter 8 refers).*

3.1.2.8.6.4.7 *Delayed transmission.* Extended squitter transmission shall be delayed in the following circumstances:

a) if the transponder is in a transaction cycle (3.1.2.4.1);

b) if an acquisition or another type of extended squitter is in process; or

c) if a mutual suppression interface is active.

The delayed squitter shall be transmitted as soon as the transponder becomes available.

3.1.2.8.6.5 *Extended squitter antenna selection.* Transponders operating with antenna diversity (3.1.2.10.4) shall transmit extended squitters as follows:

a) when airborne (3.1.2.8.6.7), the transponder shall transmit each type of extended squitter alternately from the two antennas; and

b) when on the surface (3.1.2.8.6.7), the transponder shall transmit extended squitters under control of SAS (3.1.2.6.1.4.1 f)).

In the absence of any SAS commands, use of the top antenna only shall be the default condition.

3.1.2.8.6.6 *Register time-out*. The transponder shall clear all 56-bits of the airborne position, surface position, squitter status and airborne velocity information transponder registers 05, 06, 07 and 09 {HEX} if these registers are not updated within two seconds of the previous update. This time-out shall be determined separately for each of these registers.

Note 1.— Termination of extended squitter broadcast is specified in the Technical Provisions for Mode S Services and Extended Squitter (Doc 9871).

Note 2.— These registers are cleared to prevent the reporting of outdated position, velocity and squitter rate information.

3.1.2.8.6.7 *Airborne/surface state determination.* Aircraft with an automatic means of determining on-the-ground conditions shall use this input to select whether to report the airborne or surface message types. Aircraft without such means shall report the airborne type messages, except as specified in Table 3-^. Use of this table shall only be applicable to aircraft that are equipped to provide data for radio altitude AND, as a minimum, airspeed OR ground speed. Otherwise, aircraft in the specified categories that are only equipped to provide data for airspeed and ground speed shall broadcast the surface format if:

airspeed <50 knots AND ground speed <50 knots.

Aircraft with or without such automatic on-the-ground determination shall use position message types as commanded by control codes in TCS (3.1.2.6.1.4.1 f)). After time-out of the TCS commands, control of airborne/surface determination shall revert to the means described above.

Note ١.— Use of this technique may result in the surface position format being transmitted when the air-ground status in the CA fields indicates "airborne or on the ground".

Note ٢.— Extended squitter ground stations determine aircraft airborne or surface status by monitoring aircraft position, altitude and ground speed. Aircraft determined to be on the ground that are not reporting the surface position message type will be commanded to report the surface format via TCS (3.1.2.6.1.4.1 f)). The normal return to the airborne position message type is via a ground command to report the airborne message type. To guard against loss of communications after take-off, commands to report the surface position message type automatically time-out.

3.1.2.8.6.8 *Squitter status reporting.* A GICB request (3.1.2.6.11.2) containing RR equals 16 and DI equals 7 and RRS equals 7 shall cause the resulting reply to contain the squitter status report in its MB field.

3.1.2.8.6.8.1 *TRS, transmission rate subfield in MB.* The transponder shall report the capability of the aircraft to automatically determine its surface squitter rate and its current squitter rate in this 2-bit (33, 34) subfield of MB.

Coding

0	signifies no capability to automatically determine surface squitter rate
1	signifies that the high surface squitter rate has been selected
2	signifies that the low surface squitter rate has been selected
3	unassigned

Note 1.— High and low squitter rate is determined on board the aircraft.

Note 2.— The low rate is used when the aircraft is stationary and the high rate is used when the aircraft is moving. For details of how "moving" is determined, see the data format of register 07_{16} in the Technical Provisions for Mode S Services and Extended Squitter *(Doc 9871).*

3.1.2.8.6.8.2 *ATS, altitude type subfield in MB.* The transponder shall report the type of altitude being provided in the airborne position extended squitter in this 1-bit (35) subfield of MB when the reply contains the contents of transponder register 07 {HEX}.

Coding

0	signifies that barometric altitude shall be reported in the ACS (3.1.2.8.6.3.1.2) of transponder register 05 {HEX}.
1	signifies that navigation-derived altitude shall be reported in the ACS (3.1.2.8.6.3.1.2) of transponder register 05 {HEX}.

Note.— Details of the contents of transponder registers 05 {HEX} and 07 {HEX} are shown in the Technical Provisions for Mode S Services and Extended Squitter *(Doc 9871).*

3.1.2.8.6.9 *Surface squitter rate control.* Surface squitter rate shall be determined as follows:

a) once per second the contents of the TRS shall be read. If the value of TRS is 0 or 1, the transponder shall transmit surface squitters at the high rate. If the value of TRS is 2, the transponder shall transmit surface squitters at the low rate;

b) the squitter rate determined via TRS shall be subject to being overridden by commands received via RCS (3.1.2.6.1.4.1 f)). RCS code 1 shall cause the transponder to squitter at the high rate for 60 seconds. RCS code 2 shall cause the transponder to squitter at the low rate for 60 seconds. These commands shall be able to be refreshed for a new 60 second period before time-out of the prior period; and

c) after time-out and in the absence of RCS codes 1 and 2, control shall return to TRS.

3.1.2.8.6.10 *Latitude/longitude coding using compact position reporting (CPR).* Mode S extended squitter shall use compact position reporting (CPR) to encode latitude and longitude efficiently into messages.

Note.— The method used to encode/decode CPR is specified in the Technical Provisions for Mode S Services and Extended Squitter *(Doc 9871).*

3.1.2.8.6.11 *Data insertion.* When the transponder determines that it is time to emit an airborne position squitter, it shall insert the current value of the barometric altitude (unless inhibited by the ATS subfield, 3.1.2.8.6.8.2) and surveillance status into the appropriate fields of register 05 {HEX}. The contents of this register shall then be inserted into the ME field of DF = 17 and transmitted.

Note.— Insertion in this manner ensures that (1) the squitter contains the latest altitude and surveillance status, and (2) ground read-out of register 05 {HEX} will yield exactly the same information as the AC field of a Mode S surveillance reply.

3.1.2.8.7 EXTENDED SQUITTER/SUPPLEMENTARY, DOWNLINK FORMAT *18*

10010	CF:3			PI:24

Note 1.— This format supports the broadcast of extended squitter ADS-B messages by non-transponder devices, i.e. they are not incorporated into a Mode S transponder. A separate format is used to clearly identify this non-transponder case to prevent ACAS II or extended squitter ground stations from attempting to interrogate these devices.

Note 2.— This format is also used for ground broadcast of ADS-B related services such as traffic information broadcast (TIS-B).

Note 3.— The format of the DF = 18 transmission is defined by the value of the CF field.

3.1.2.8.7.1 *ES supplementary format.* The format used for ES supplementary shall be a 112-bit downlink format (DF = 18) containing the following fields:

Field	*Reference*
DF downlink format	3.1.2.3.2.1.2
CF control field	3.1.2.8.7.2
PI parity/interrogator identifier	3.1.2.3.2.1.4

The PI field shall be encoded with II equal to zero.

3.1.2.8.7.2 *Control field*. This 3-bit (6-8) downlink field in DF = 18 shall be used to define the format of the 112-bit transmission as follows.

Code 0 = ADS-B ES/NT devices that report the ICAO 24-bit address in the AA field (3.1.2.8.7)

Code 1 = Reserved for ADS-B for ES/NT devices that use other addressing techniques in the AA field (3.1.2.8.7.3)

Code 2 = Fine format TIS-B message

Code 3 = Coarse format TIS-B message

Code 4 = Reserved for TIS-B management messages

Code 5 = TIS-B messages that relay ADS-B messages that use other addressing techniques in the AA field

Code 6 = ADS-B rebroadcast using the same type codes and message formats as defined for DF = 17 ADS-B messages

Code 7 = Reserved

Note 1.— Administrations may wish to make address assignments for ES/NT devices in addition to the 24-bit addresses allocated by ICAO (Annex 10, Volume III, Part I, Chapter 9) in order to increase the available number of 24-bit addresses.

Note 2.— These non-ICAO 24-bit addresses are not intended for international use.

3.1.2.8.7.3 *ADS-B for extended squitter/non-transponder (ES/NT) devices*

10010	CF=0	AA:24	ME:56	PI:24

3.1.2.8.7.3.1 *ES/NT format.* The format used for ES/NT shall be a 112-bit downlink format (DF = 18) containing the following fields:

Field	*Reference*
DF downlink format	3.1.2.3.2.1.2
CF control field = 0	3.1.2.8.7.2
AA address, announced	3.1.2.5.2.2.2
ME message, extended squitter	3.1.2.8.6.2
PI parity/interrogator identifier	3.1.2.3.2.1.4

The PI field shall be encoded with II equal to zero.

3.1.2.8.7.3.2 *ES/NT squitter types*

3.1.2.8.7.3.2.1 *Airborne position squitter.* The airborne position type ES/NT shall use format DF = 18 with the format for register 05 {HEX} as defined in 3.1.2.8.6.2 inserted in the ME field.

3.1.2.8.7.3.2.2 *Surface position squitter.* The surface position type ES/NT shall use format DF = 18 with the format for register 06 {HEX} as defined in 3.1.2.8.6.2 inserted in the ME field.

3.1.2.8.7.3.2.3 *Aircraft identification squitter*. The aircraft identification type ES/NT shall use format DF = 18 with the format for register 08 {HEX} as defined in 3.1.2.8.6.2 inserted in the ME field.

3.1.2.8.7.3.2.4 *Airborne velocity squitter*. The airborne velocity type ES/NT shall use format DF = 18 with the format for register 09 {HEX} as defined in 3.1.2.8.6.2 inserted in the ME field.

3.1.2.8.7.3.2.5 *Event-driven squitter.* The event-driven type ES/NT shall use format DF = 18 with the format for register 0A {HEX} as defined in 3.1.2.8.6.2 inserted in the ME field.

3.1.2.8.7.3.3 *ES/NT squitter rate*

3.1.2.8.7.3.3.1 *Initialization.* At power up initialization, the non-transponder device shall commence operation in a mode in which it does not broadcast any squitters. The non-transponder device shall initiate the broadcast of ES/NT squitters for airborne position, surface position, airborne velocity and aircraft identification when data are available for inclusion in the ME field of these squitter types. This determination shall be made individually for each squitter type. When ES/NT squitters are broadcast, transmission rates shall be as indicated in 3.1.2.8.6.4.2 to 3.1.2.8.6.4.6.

Note 1.— This suppresses the transmission of extended squitters from aircraft that are unable to report position, velocity or identity. If input to the register for squitter types stops for 60 seconds, broadcast for this extended squitter type will cease until data insertion resumes, except for an ES/NT device operating on the surface (as specified for extended squitter Version 1 formats in the Technical Provisions for Mode S Services and Extended Squitter *(Doc 9871).*

Note 2.— After timeout (3.1.2.8.7.6) this squitter type may contain an ME field of all zeros.

3.1.2.8.7.3.3.2 *Delayed transmission.* ES/NT squitter transmission shall be delayed if the non-transponder device is busy broadcasting one of the other squitter types.

3.1.2.8.7.3.3.2.1 The delayed squitter shall be transmitted as soon as the non-transponder device becomes available.

3.1.2.8.7.3.3.3 *ES/NT antenna selection.* Non-transponder devices operating with antenna diversity (3.1.2.10.4) shall transmit ES/NT squitters as follows:

a) when airborne (3.1.2.8.6.7), the non-transponder device shall transmit each type of ES/NT squitter alternately from the two antennas; and

b) when on the surface (3.1.2.8.6.7), the non-transponder device shall transmit ES/NT squitters using the top antenna.

3.1.2.8.7.3.3.4 *Register timeout.* The non-transponder device shall clear all 56-bits of the airborne position, surface position and velocity registers used for these messages if these registers are not updated within two seconds of the previous update. This timeout shall be determined separately for each of these registers.

Note 1.— The termination of an extended squitter broadcast is specified in the Technical Provisions for Mode S Services and Extended Squitter *(Doc 9871).*

Note 2.— These registers are cleared to prevent the reporting of outdated position and velocity information.

3.1.2.8.7.3.3.5 *Airborne/surface state determination.* Aircraft with an automatic means of determining on-the-ground condition shall use this input to select whether to report the airborne or surface message types except as specified in 3.1.2.6.10.3.1. Aircraft without such means shall report the airborne type message, except as specified in 3.1.2.8.6.7.

3.1.2.8.7.3.3.6 *Surface squitter rate control.* Aircraft motion shall be determined once per second. The surface squitter rate shall be set according to the results of this determination.

Note.— The algorithm to determine aircraft motion is specified in the definition of register 07_{16} *in the* Technical Provisions for Mode S Services and Extended Squitter *(Doc 9871).*

3.1.2.8.8 *EXTENDED SQUITTER MILITARY APPLICATION, DOWNLINK FORMAT 19*

10011	AF:3	

Note.— This format supports the broadcast of extended squitter ADS-B messages in support of military applications. A separate format is used to distinguish these extended squitters from the standard ADS-B message set broadcast using DF = 17 or 18.

3.1.2.8.8.1 *Military format.* The format used for DF = 19 shall be a 112-bit downlink format containing the following fields:

Field	*Reference*
DF downlink format	3.1.2.3.2.1.2
AF control field	3.1.2.8.8.2

3.1.2.8.8.2 *Application field.* This 3-bit (6-8) downlink field in DF = 19 shall be used to define the format of the 112-bit transmission.

Code 0 to 7 = Reserved

3.1.2.8.9 EXTENDED SQUITTER MAXIMUM TRANSMISSION RATE

3.1.2.8.9.1 The maximum total number of extended squitters (DF = 17, 18 or 19) emitted by any extended squitter installation shall not exceed 6.2 per second.

3.1.2.9 AIRCRAFT IDENTIFICATION PROTOCOL

3.1.2.9.1 *Aircraft identification reporting.* A ground-initiated Comm-B request (3.1.2.6.11.2) containing RR equals 18 and either DI does not equal 7 or DI equals 7 and RRS equals 0 shall cause the resulting reply to contain the aircraft identification in its MB field.

3.1.2.9.1.1 *AIS, aircraft identification subfield in MB.* The transponder shall report the aircraft identification in the 48-bit (41-88) AIS subfield of MB. The aircraft identification transmitted shall be that employed in the flight plan. When no flight plan is available, the registration marking of the aircraft shall be inserted in this subfield.

Note.— When the registration marking of the aircraft is used, it is classified as "fixed direct data" (3.1.2.10.5.1.1). When another type of aircraft identification is used, it is classified as "variable direct data" (3.1.2.10.5.1.3).

3.1.2.9.1.2 *Coding of the AIS subfield.* The AIS subfield shall be coded as follows:

33	41	47	53	59	65	71	77	83
BDS	Char. 1	Char. 2	Char. 3	Char. 4	Char. 5	Char. 6	Char. 7	Char. 8
40	46	52	58	64	70	76	82	88

Note.— Aircraft identification coding provides up to eight characters.

The BDS code for the aircraft identification message shall be BDS1 equals 2 (33-36) and BDS2 equals 0 (37-40).

Each character shall be coded as a 6-bit subset of the International Alphabet Number 5 (IA-5) as illustrated in Table 3-9. The character code shall be transmitted with the high order unit (b_6) first and the reported aircraft identification shall be transmitted with its left-most character first. Characters shall be coded consecutively without intervening SPACE code. Any unused character spaces at the end of the subfield shall contain a SPACE character code.

3.1.2.9.1.3 *Aircraft identification capability report.* Transponders which respond to a ground-initiated request for aircraft identification shall report this capability in the data link capability report (3.1.2.6.10.2.2.2) by setting bit 33 of the MB subfield to 1.

3.1.2.9.1.4 *Change of aircraft identification.* If the aircraft identification reported in the AIS subfield is changed in flight, the transponder shall report the new identification to the ground by use of the Comm-B broadcast message protocol of 3.1.2.6.11.4.

3.1.2.10 ESSENTIAL SYSTEM CHARACTERISTICS OF THE SSR MODE S TRANSPONDER

3.1.2.10.1 *Transponder sensitivity and dynamic range.* Transponder sensitivity shall be defined in terms of a given interrogation signal input level and a given percentage of corresponding replies. Only correct replies containing the required bit pattern for the interrogation received shall be counted. Given an interrogation that requires a reply according to 3.1.2.4, the minimum triggering level, MTL, shall be defined as the minimum input power level for 90 per cent reply-to-interrogation ratio. The MTL shall be –74 dBm ±3 dB. The reply-to-interrogation ratio of a Mode S transponder shall be:

a) at least 99 per cent for signal input levels between 3 dB above MTL and –21 dBm; and

b) no more than 10 per cent at signal input levels below –81 dBm.

Note.— Transponder sensitivity and output power are described in this section in terms of signal level at the terminals of the antenna. This gives the designer freedom to arrange the installation, optimizing cable length and receiver-transmitter design, and does not exclude receiver and/or transmitter components from becoming an integral part of the antenna subassembly.

3.1.2.10.1.1 *Reply ratio in the presence of interference*

Note.— The following paragraphs present measures of the performance of the Mode S transponder in the presence of interfering Mode A/C interrogation pulses and low-level in-band CW interference.

3.1.2.10.1.1.1 *Reply ratio in the presence of an interfering pulse.* Given a Mode S interrogation which requires a reply (3.1.2.4), the reply ratio of a transponder shall be at least 95 per cent in the presence of an interfering Mode A/C interrogation pulse if the level of the interfering pulse is 6 dB or more below the signal level for Mode S input signal levels between –68 dBm and –21 dBm and the interfering pulse overlaps the P_6 pulse of the Mode S interrogation anywhere after the sync phase reversal.

Under the same conditions, the reply ratio shall be at least 50 per cent if the interference pulse level is 3 dB or more below the signal level.

3.1.2.10.1.1.2 *Reply ratio in the presence of pulse pair interference.* Given an interrogation which requires a reply (3.1.2.4), the reply ratio of a transponder shall be at least 90 per cent in the presence of an interfering $P_1 – P_2$ pulse pair if the level of the interfering pulse pair is 9 dB or more below signal level for input signal levels between –68 dBm and –21 dBm and the P_1 pulse of the interfering pair occurs no earlier than the P_1 pulse of the Mode S signal.

3.1.2.10.1.1.3 *Reply ratio in the presence of low level asynchronous interference.* For all received signals between –65 dBm and –21 dBm and given a Mode S interrogation that requires a reply according to 3.1.2.4 and if no lockout condition is in effect, the transponder shall reply correctly with at least 95 per cent reply ratio in the presence of asynchronous interference. Asynchronous interference shall be taken to be a single Mode A/C interrogation pulse occurring at all repetition rates up to 10 000 Hz at a level 12 dB or more below the level of the Mode S signal.

Note.— Such pulses may combine with the P_1 *and* P_2 *pulses of the Mode S interrogation to form a valid Mode A/C-only all-call interrogation. The Mode S transponder does not respond to Mode A/C-only all-call interrogations. A preceding pulse* *may also combine with the* P_2 *of the Mode S interrogation to form a valid Mode A or Mode C interrogation. However, the* P_1 *–* P_2 *pair of the Mode S preamble takes precedence (3.1.2.4.1.1.1). The Mode S decoding process is independent of the Mode A/Mode C decoding process and the Mode S interrogation is accepted.*

3.1.2.10.1.1.4 *Reply ratio in the presence of low-level in-band CW interference.* In the presence of non-coherent CW interference at a frequency of 1 030 ±0.2 MHz at signal levels of 20 dB or more below the desired Mode A/C or Mode S interrogation signal level, the transponder shall reply correctly to at least 90 per cent of the interrogations.

3.1.2.10.1.1.5 *Spurious response*

Recommendation.— *The response to signals not within the receiver pass band should be at least 60 dB below normal sensitivity.*

3.1.2.10.2 *Transponder peak pulse power.* The peak power of each pulse of a reply shall:

a) not be less than 18.5 dBW for aircraft not capable of operating at altitudes exceeding 4 570 m (15 000 ft);

b) not be less than 21.0 dBW for aircraft capable of operating above 4 570 m (15 000 ft);

c) not be less than 21.0 dBW for aircraft with maximum cruising speed exceeding 324 km/h (175 kt); and

d) not exceed 27.0 dBW.

3.1.2.10.2.1 *Inactive state transponder output power.* When the transponder is in the inactive state the peak pulse power at 1 090 MHz plus or minus 3 MHz shall not exceed –50 dBm. The inactive state is defined to include the entire period between transmissions less 10-microsecond transition periods preceding the first pulse and following the last pulse of the transmission.

Note.— Inactive state transponder power is constrained in this way to ensure that an aircraft, when located as near as 185 m (0.1 NM) to a Mode A/C or Mode S interrogator, does not cause interference to that installation. In certain applications of Mode S, airborne collision avoidance for example, where a 1 090 MHz transmitter and receiver are in the same aircraft, it may be necessary to further constrain the inactive state transponder power.

3.1.2.10.2.2 *Spurious emission radiation*

Recommendation.— *CW radiation should not exceed 70 dB below 1 watt.*

3.1.2.10.3 *SPECIAL CHARACTERISTICS*

3.1.2.10.3.1 *Mode S side-lobe suppression*

Note.— Side-lobe suppression for Mode S formats occurs when a P_5 *pulse overlays the location of the sync phase reversal of* P_6*, causing the transponder to fail to recognize the interrogation (3.1.2.4.1.1.3).*

Given a Mode S interrogation that requires a reply, the transponder shall:

a) at all signal levels between MTL +3 dB and –21 dBm, have a reply ratio of less than 10 per cent if the received amplitude of P_5 exceeds the received amplitude of P_6 by 3 dB or more;

b) at all signal levels between MTL +3 dB and –21 dBm, have a reply ratio of at least 99 per cent if the received amplitude of P_6 exceeds the received amplitude of P_5 by 12 dB or more.

3.1.2.10.3.2 *Mode S dead time.* Dead time shall be defined as the time interval beginning at the end of a reply transmission and ending when the transponder has regained sensitivity to within 3 dB of MTL. Mode S transponders shall not have more than 125 microseconds' dead time.

3.1.2.10.3.3 *Mode S receiver desensitization.* The transponder's receiver shall be desensitized according to 3.1.1.7.7.1 on receipt of any pulse of more than 0.7 microseconds duration.

3.1.2.10.3.3.1 *Recovery from desensitization.* Recovery from desensitization shall begin at the trailing edge of each pulse of a received signal and shall occur at the rate prescribed in 3.1.1.7.7.2, provided that no reply or data transfer is made in response to the received signal.

3.1.2.10.3.4 *Recovery after Mode S interrogations that do not elicit replies*

3.1.2.10.3.4.1 *Recovery after a single Mode S interrogation*

3.1.2.10.3.4.1.1 The transponder shall recover sensitivity to within 3 dB of MTL no later than 128 microseconds after receipt of the sync phase reversal following a Mode S interrogation that is not accepted (3.1.2.4.1.2) or that is accepted but requires no reply.

3.1.2.10.3.4.1.2 **Recommendation.—** *The transponder should recover sensitivity to within 3 dB of MTL no later than 45 microseconds after receipt of the sync phase reversal following a Mode S interrogation that is not accepted (3.1.2.4.1.2) or that is accepted but requires no reply.*

3.1.2.10.3.4.1.3 All Mode S transponders installed on or after 1 January 1999 shall recover sensitivity to within 3 dB of MTL no later than 45 microseconds after receipt of the sync phase reversal following a Mode S interrogation that is not accepted (3.1.2.4.1.2) or that is accepted but requires no reply.

3.1.2.10.3.4.2 *Recovery after a Mode S Comm-C interrogation.* A Mode S transponder with Comm-C capability shall recover sensitivity to within 3 dB of MTL no later than 45 microseconds after receipt of the sync phase reversal following acceptance of a Comm-C interrogation for which no reply is required.

3.1.2.10.3.5 *Unwanted Mode S replies.* Mode S transponders shall not generate unwanted Mode S replies more often than once in 10 seconds. Installation in the aircraft shall be made in such a manner that this standard shall be achieved when all possible interfering equipments installed in the same aircraft are operating at maximum interference levels.

3.1.2.10.3.5.1 *Unwanted Mode S replies in the presence of low-level in-band CW interference.* In the presence of non-coherent CW interference at a frequency of 1 030 ±0.2 MHz and at signal levels of -60 dBm or less, and in the absence of valid interrogation signals, Mode S transponders shall not generate unwanted Mode S replies more often than once per 10 seconds.

3.1.2.10.3.6 *Reply rate limiting*

Note.— Reply rate limiting is prescribed separately for Modes A and C and for Mode S.

3.1.2.10.3.6.1 *Mode S reply rate limiting.* Reply rate limiting is not required for the Mode S formats of a transponder. If such limiting is incorporated for circuit protection, it shall permit the minimum reply rates required in 3.1.2.10.3.7.2 and 3.1.2.10.3.7.3.

3.1.2.10.3.6.2 *Modes A and C reply rate limiting.* Reply rate limiting for Modes A and C shall be effected according to 3.1.1.7.9.1. The prescribed sensitivity reduction (3.1.1.7.9.2) shall not affect the Mode S performance of the transponder.

3.1.2.10.3.7 *Minimum reply rate capability, Modes A, C and S*

3.1.2.10.3.7.1 All reply rates specified in 3.1.2.10.3.7 shall be in addition to any squitter transmissions that the transponder is required to make.

3.1.2.10.3.7.2 *Minimum reply rate capability, Modes A and C.* The minimum reply rate capability for Modes A and C shall be in accordance with 3.1.1.7.9.

3.1.2.10.3.7.3 *Minimum reply rate capability, Mode S.* A transponder capable of transmitting only short Mode S replies shall be able to generate replies at the following rates:

50 Mode S replies in any 1-second interval
18 Mode S replies in a 100-millisecond interval
8 Mode S replies in a 25-millisecond interval
4 Mode S replies in a 1.6-millisecond interval

In addition to any downlink ELM transmissions, a level 2, 3 or 4 transponder shall be able to generate as long replies at least:

16 of 50 Mode S replies in any 1-second interval
6 of 18 Mode S replies in a 100-millisecond interval
4 of 8 Mode S replies in a 25-millisecond interval
2 of 4 Mode S replies in a 1.6-millisecond interval

In addition to downlink ELM transmissions, a level 5 transponder shall be able to generate as long replies at least:

24 of 50 Mode S replies in any 1-second interval
9 of 18 Mode S replies in a 100-millisecond interval
6 of 8 Mode S replies in a 25-millisecond interval
2 of 4 Mode S replies in a 1.6-millisecond interval

In addition, a transponder within an ACAS installation shall be able to generate as ACAS coordination replies at least 3 of 50 Mode S replies in any 1-second interval.

3.1.2.10.3.7.4 *Minimum Mode S ELM peak reply rate*

Note 1.— When a downlink ELM is initialized (3.1.2.7.7.1), the Mode S transponder announces the length (in segments) of the waiting message. The transponder must be able to transmit this number of segments, plus an additional margin to make up for missed replies, during the beam dwell of the ground interrogator.

At least once every second a Mode S transponder equipped for ELM downlink operation shall be capable of transmitting in a 25-millisecond interval, at least 25 per cent more segments than have been announced in the initialization (3.1.2.7.7.1). The minimum length downlink ELM capability for level 4 and 5 transponders shall be as specified in 3.1.2.10.5.2.2.2.

Note 2.— A transponder capable of processing the maximum length downlink ELM (16 segments) is therefore required to be able to transmit 20 long replies under the above conditions. Level 4 transponders may be built which process less than the maximum message length. These transponders cannot initialize a message length that exceeds their transmitter capability. For example, a transponder that can transmit at most 10 long replies under the above conditions can never announce a message of more than 8 segments.

3.1.2.10.3.8 *Reply delay and jitter*

Note.— After an interrogation has been accepted and if a reply is required, this reply transmission begins after a fixed delay needed to carry out the protocols. Different values for this delay are assigned for Modes A and C, for Mode S and for Modes A/C/S all-call replies.

3.1.2.10.3.8.1 *Reply delay and jitter for Modes A and C.* The reply delay and jitter for Modes A and C transactions shall be as prescribed in 3.1.1.7.10.

3.1.2.10.3.8.2 *Reply delay and jitter for Mode S.* For all input signal levels between MTL and –21 dBm, the leading edge of the first preamble pulse of the reply (3.1.2.2.5.1.1) shall occur 128 plus or minus 0.25 microsecond after the sync phase reversal (3.1.2.1.5.2.2) of the received P_6. The jitter of the reply delay shall not exceed 0.08 microsecond, peak (99.9 percentile).

3.1.2.10.3.8.3 *Reply delay and jitter for Modes A/C/S all call.* For all input signal levels between MTL +3 dB and –21 dBm the leading edge of the first preamble pulse of the reply (3.1.2.2.5.1.1) shall occur 128 plus or minus 0.5 microseconds after the leading edge of the P_4 pulse of the interrogation (3.1.2.1.5.1.1). Jitter shall not exceed 0.1 microsecond, peak (99.9 percentile).

Note.— A peak jitter of 0.1 microsecond is consistent with the jitter prescribed in 3.1.1.7.10.

3.1.2.10.3.9 *Timers.* Duration and features of timers shall be as shown in Table 3-10.

All timers shall be capable of being restarted. On receipt of any start command, they shall run for their specified times. This shall occur regardless of whether they are in the running or the non-running state at the time that the start command is received. A command to reset a timer shall cause the timer to stop running and to return to its initial state in preparation for a subsequent start command.

3.1.2.10.3.10 *Inhibition of replies.* Replies to Mode A/C/S all-call and Mode S-only all-call interrogations shall always be inhibited when the aircraft declares the on-the-ground state. It shall not be possible to inhibit replies to discretely addressed Mode S interrogations regardless of whether the aircraft is airborne or on the ground.

3.1.2.10.3.10.1 **Recommendation.—** *Aircraft should provide means to determine the on-the-ground state automatically and provide that information to the transponder.*

3.1.2.10.3.10.2 **Recommendation.—** *Mode A/C replies should be inhibited when the aircraft is on the ground to prevent interference when in close proximity to an interrogator or other aircraft.*

Note.— Mode S discretely addressed interrogations do not give rise to such interference and may be required for data link communications with aircraft on the airport surface. Acquisition squitter transmissions may be used for passive surveillance of aircraft on the airport surface.

3.1.2.10.3.10.3 *Inhibition of squitter transmissions.* It shall not be possible to inhibit extended squitter transmissions except as specified in 3.1.2.8.6 or acquisition squitter transmissions except as specified in 3.1.2.8.5 regardless of whether the aircraft is airborne or on the ground.

Note.— For additional information on squitter inhibition see the Manual of the Secondary Surveillance Radar (SSR) Systems *(Doc 9684).*

3.1.2.10.4 *Transponder antenna system and diversity operation.* Mode S transponders equipped for diversity operation shall have two RF ports for operation with two antennas, one antenna on the top and the other on the bottom of the aircraft's fuselage. The received signal from one of the antennas shall be selected for acceptance and the reply shall be transmitted from the selected antenna only.

3.1.2.10.4.1 *Radiation pattern.* The radiation pattern of Mode S antennas when installed on an aircraft shall be nominally equivalent to that of a quarter-wave monopole on a ground plane.

Note.— Transponder antennas designed to increase gain at the expense of vertical beamwidth are undesirable because of their poor performance during turns.

3.1.2.10.4.2 *Antenna location.* The top and bottom antennas shall be mounted as near as possible to the centre line of the fuselage. Antennas shall be located so as to minimize obstruction to their fields in the horizontal plane.

3.1.2.10.4.2.1 **Recommendation.—** *The horizontal distance between the top and bottom antennas should not be greater than 7.6 m (25 ft).*

Note.— This recommendation is intended to support the operation of any diversity transponder (including cables) with any diversity antenna installation and still satisfy the requirement of 3.1.2.10.4.5.

3.1.2.10.4.3 *Antenna selection.* Mode S transponders equipped for diversity operation shall have the capability to evaluate a pulse sequence simultaneously received on both antenna channels to determine individually for each channel if the P_1 pulse and the P_2 pulse of a Mode S interrogation preamble meet the requirements for a Mode S interrogation as defined in 3.1.2.1 and if the P_1 pulse and the P_3 pulse of a Mode A, Mode C or intermode interrogation meet the requirements for Mode A and Mode C interrogations as defined in 3.1.1.

Note.— Transponders equipped for diversity operation may optionally have the capability to evaluate additional characteristics of the received pulses of the interrogations in making a diversity channel selection. The transponder may as an option evaluate a complete Mode S interrogation simultaneously received on both channels to determine individually for each channel if the interrogation meets the requirements for Mode S interrogation acceptance as defined in 3.1.2.4.1.2.3.

3.1.2.10.4.3.1 If the two channels simultaneously receive at least a $P_1 – P_2$ pulse pair that meets the requirements for a Mode S interrogation, or a $P_1 – P_3$ pulse pair that meets the requirements for a Mode A or Mode C interrogation, or if the two channels simultaneously accept a complete interrogation, the antenna at which the signal strength is greater shall be selected for the reception of the remainder (if any) of the interrogation and for the transmission of the reply.

3.1.2.10.4.3.2 If only one channel receives a pulse pair that meets the requirements for an interrogation, or if only one channel accepts an interrogation, the antenna associated with that channel shall be selected regardless of received signal strength.

3.1.2.10.4.3.3 *Selection threshold.* If antenna selection is based on signal level, it shall be carried out at all signal levels between MTL and –21 dBm.

Note.— Either antenna may be selected if the difference in signal level is less than 3 dB.

3.1.2.10.4.3.4 *Received signal delay tolerance.* If an interrogation is received at one antenna 0.125 microsecond or less in advance of reception at the other antenna, the interrogations shall be considered to be simultaneous interrogations, and the above antenna selection criteria applied. If an accepted interrogation is received at either antenna 0.375 microsecond or more in advance of reception at the other antenna, the antenna selected for the reply shall be that which received the earlier interrogation. If the relative time of receipt is between 0.125 and 0.375 microsecond, the transponder shall select the antenna for reply either on the basis of the simultaneous interrogation criteria or on the basis of the earlier time of arrival.

3.1.2.10.4.4 *Diversity transmission channel isolation.* The peak RF power transmitted from the selected antenna shall exceed the power transmitted from the non-selected antenna by at least 20 dB.

3.1.2.10.4.5 *Reply delay of diversity transponders.* The total two-way transmission difference in mean reply delay between the two antenna channels (including the differential delay caused by transponder-to-antenna cables and the horizontal distance along the aircraft centre line between the two antennas) shall not exceed 0.13 microsecond for interrogations of equal amplitude. This requirement shall hold for interrogation signal strengths between MTL +3 dB and –21 dBm. The jitter requirements on each individual channel shall remain as specified for non-diversity transponders.

Note.— This requirement limits apparent jitter caused by antenna switching and by cable delay differences.

3.1.2.10.5 DATA PROCESSING AND INTERFACES

3.1.2.10.5.1 *Direct data.* Direct data shall be those which are required for the surveillance protocol of the Mode S system.

3.1.2.10.5.1.1 *Fixed direct data.* Fixed direct data are data from the aircraft which do not change in flight and shall be:

a) the aircraft address (3.1.2.4.1.2.3.1.1 and 3.1.2.5.2.2.2);

b) the maximum airspeed (3.1.2.8.2.2); and

c) the registration marking if used for flight identification (3.1.2.9.1.1).

3.1.2.10.5.1.2 *Interfaces for fixed direct data*

Recommendation.— *Interfaces from the transponder to the aircraft should be designed such that the values of the fixed direct data become a function of the aircraft installation rather than of the transponder configuration.*

Note.— The intent of this recommendation is to encourage an interface technique which permits transponder exchange without manipulation of the transponder itself for setting the fixed direct data.

3.1.2.10.5.1.3 *Variable direct data.* Variable direct data are data from the aircraft which can change in flight and shall be:

a) the Mode C altitude code (3.1.2.6.5.4);

b) the Mode A identity code (3.1.2.6.7.1);

c) the on-the-ground condition (3.1.2.5.2.2.1, 3.1.2.6.5.1 and 3.1.2.8.2.1);

d) the aircraft identification if different from the registration marking (3.1.2.9.1.1); and

e) the SPI condition (3.1.2.6.10.1.3).

3.1.2.10.5.1.4 *Interfaces for variable direct data.* A means shall be provided for the Mode A identity code, the SPI condition and, for transponders of Level 2 and above, the aircraft identification to be inserted by the pilot via a variable data interface.

Interfaces shall be included to accept the pressure-altitude and on-the-ground coding.

Note.— A specific interface design for the variable direct data is not prescribed.

3.1.2.10.5.2 *Indirect data*

Note.— Indirect data are those which pass through the transponder in either direction but which do not affect the surveillance function.

If origins and/or destinations of indirect data are not within the transponder's enclosure, interfaces shall be used for the necessary connections.

3.1.2.10.5.2.1 *The function of interfaces*

Note.— Indirect data interfaces for standard transactions serve interrogations which require a reply and the broadcast function. Indirect data interfaces for ELM serve that system and require buffering and protocol circuitry within the transponder. Interface ports can be separate for each direction and for each service or can be combined in any manner.

3.1.2.10.5.2.1.1 *Uplink standard length transaction interface.* The uplink standard length transaction interface shall transfer all bits of accepted interrogations, (with the possible exception of the AP field), except for UF = 0, 11 or 16.

Note.— AP can also be transferred to aid in integrity implementation.

3.1.2.10.5.2.1.2 *Downlink standard length transaction interface.* A transponder which transmits information originating in a peripheral device shall be able to receive bits or bit patterns for insertion at appropriate locations within the transmission. These locations shall not include those into which bit patterns generated internally by the transponder are inserted, nor the AP field of the reply.

A transponder which transmits information using the Comm-B format shall have immediate access to requested data in the sense that the transponder shall respond to an interrogation with data requested by that interrogation.

Note.— This requirement may be met in two ways:

a) the transponder may have provisions for internal data and protocol buffering;

b) the transponder may employ a "real time" interface which operates such that uplink data leave the transponder before the corresponding reply is generated and downlink data enter the transponder in time to be incorporated in the reply.

3.1.2.10.5.2.1.3 *Extended length message interface*

Note.— The ELM interface extracts from, and enters into, the transponder the data exchanged between air and ground by means of the ELM protocol (3.1.2.7).

3.1.2.10.5.2.2 *Indirect data transaction rates*

3.1.2.10.5.2.2.1 *Standard length transactions.* A transponder equipped for information transfer to and from external devices shall be capable of processing the data of at least as many replies as prescribed for minimum reply rates in 3.1.2.10.3.7.2 and uplink data from interrogations being delivered at a rate of at least:

50 long interrogations in any 1-second interval
18 long interrogations in a 100-millisecond interval
8 long interrogations in a 25-millisecond interval
4 long interrogations in a 1.6-millisecond interval.

Note 1.— A transponder capable of reply rates higher than the minimum of 3.1.2.10.3.7.2 need not accept long interrogations after reaching the uplink data processing limits above.

Note 2.— The Mode S reply is the sole means of acknowledging receipt of the data content of a Mode S interrogation. Thus, if the transponder is capable of replying to an interrogation, the Mode S installation must be capable of accepting the data contained in that interrogation regardless of the timing between it and other accepted interrogations. Overlapping Mode S beams from several interrogators could lead to the requirement for considerable data processing and buffering. The minimum described here reduces data processing to a realistic level and the non-acceptance provision provides for notification to the interrogator that data will temporarily not be accepted.

3.1.2.10.5.2.2.2 *Extended length transactions.* Level 3 (2.1.5.1.3) and level 4 (2.1.5.1.4) transponders shall be able to transfer data from at least four complete sixteen segment uplink ELMs (3.1.2.7.4) in any four second interval. A level 5 transponder (2.1.5.1.5) shall be able to transfer the data from at least four complete sixteen segment uplink ELMs in any one second interval and shall be capable of accepting at least two complete sixteen segment uplink ELMs with the same II code in a 250 millisecond interval. A level 4 transponder shall be able to transmit at least one four-segment downlink ELM (3.1.2.7.7 and 3.1.2.10.3.7.3) in any one second interval. A level 5 transponder shall be able to transmit at least one sixteen segment downlink ELM in any one second interval.

3.1.2.10.5.2.2.2.1 **Recommendation.—** *Level 3 and level 4 transponders should be able to accept at least two complete sixteen segment uplink ELMs in a 250 millisecond interval.*

3.1.2.10.5.2.3 *Data formats for standard length transactions and required downlink aircraft parameters (DAPs)*

3.1.2.10.5.2.3.1 All level 2 and above transponders shall support the following registers:

— the capability reports (3.1.2.6.10.2);

— the aircraft identification protocol register 20 {HEX} (3.1.2.9); and

— for ACAS-equipped aircraft, the active resolution advisory register 30 {HEX} (4.3.8.4.2.2).

3.1.2.10.5.2.3.2 Where required, DAPs shall be supported by the registers listed in Table 3-11. The formats and minimum update rates of transponder registers shall be implemented consistently to ensure interoperability.

3.1.2.10.5.2.3.3 The downlink standard length transaction interface shall deliver downlink aircraft parameters (DAPs) to the transponder which makes them available to the ground. Each DAP shall be packed into the Comm-B format ('MB' field) and can be extracted using either the ground-initiated Comm-B (GICB) protocol, or using MSP downlink channel 3 via the dataflash application.

Note.— The formats and update rates of each register and the dataflash application are specified in the Technical Provisions for Mode S Services and Extended Squitter *(Doc 9871).*

3.1.2.10.5.3 *Integrity of data content transfer.* A transponder which employs data interfaces shall include sufficient protection to ensure error rates of less than one error in 10^3 messages and less than one undetected error in 10^7 112-bit transmissions in both directions between the antenna and each interface port.

3.1.2.10.5.4 *Message cancellation.* The downlink standard length transaction interface and the extended length message interface shall include the capability to cancel a message sent to the transponder for delivery to the ground, but whose delivery cycle has not been completed (i.e. a closeout has not been accomplished by a ground interrogator).

Note.— One example of the need for this capability is to cancel a message if delivery is attempted when the aircraft is not within coverage of a Mode S ground station. The message must then be cancelled to prevent it from being read and interpreted as a current message when the aircraft re-enters Mode S airspace.

3.1.2.10.5.5 *Air-directed messages.* The transfer of this type of message requires all of the actions indicated in 3.1.2.10.5.4 plus the transfer to the transponder of the interrogator identifier of the site that is to receive the message.

3.1.2.11 ESSENTIAL SYSTEM CHARACTERISTICS OF THE GROUND INTERROGATOR

Note.— To ensure that Mode S interrogator action is not detrimental to Mode A/C interrogators, performance limits exist for Mode S interrogators.

3.1.2.11.1 *Interrogation repetition rates.* Mode S interrogators shall use the lowest practicable interrogation repetition rates for all interrogation modes.

Note.— Accurate azimuth data at low interrogation rates can be obtained with monopulse techniques.

3.1.2.11.1.1 *All-call interrogation repetition rate.* The interrogation repetition rate for the Mode A/C/S all-call, used for acquisition, shall be less than 250 per second. This rate shall also apply to the paired Mode S-only and Mode A/C-only all-call interrogations used for acquisition in the multisite mode.

3.1.2.11.1.2 *Interrogation repetition rate to a single aircraft*

3.1.2.11.1.2.1 *Interrogations requiring a reply*. Mode S interrogations requiring a reply shall not be transmitted to a single aircraft at intervals shorter than 400 microseconds.

3.1.2.11.1.2.2 *Uplink ELM interrogations.* The minimum time between the beginning of successive Comm-C interrogations shall be 50 microseconds.

3.1.2.11.1.3 *Transmission rate for selective interrogations*

3.1.2.11.1.3.1 For all Mode S interrogators, the transmission rate for selective interrogations shall be:

a) less than 2 400 per second averaged over a 40-millisecond interval; and

b) less than 480 into any 3-degree sector averaged over a 1-second interval.

3.1.2.11.1.3.2 Additionally, for a Mode S interrogator that has overlapping coverage with the sidelobes of any other Mode S interrogator, the transmission rate for selective interrogations shall be:

a) less than 1 200 per second averaged over a 4-second interval; and

b) less than 1 800 per second averaged over a 1-second interval.

Note.— Typical minimum distance to ensure sidelobe separation between interrogators is 35 km.

3.1.2.11.2 *INTERROGATOR-EFFECTIVE RADIATED POWER*

Recommendation.— *The effective radiated power of all interrogation pulses should be minimized as described in 3.1.1.8.2.*

3.1.2.11.3 *Inactive-state interrogator output power.* When the interrogator transmitter is not transmitting an interrogation, its output shall not exceed –5 dBm effective radiated power at any frequency between 960 MHz and 1 215 MHz.

Note.— This constraint ensures that aircraft flying near the interrogator (as close as 1.85 km (1 NM)) will not receive interference that would prevent them from being tracked by another interrogator. In certain instances even smaller interrogator-to-aircraft distances are of significance, for example if Mode S surveillance on the airport surface is used. In such cases a further restraint on inactive state interrogator output power may be necessary.

3.1.2.11.3.1 *Spurious emission radiation*

Recommendation.— *CW radiation should not exceed 76 dB below 1 watt.*

3.1.2.11.4 *Tolerances on transmitted signals.* In order that the signal-in-space be received by the transponder as described in 3.1.2.1, the tolerances on the transmitted signal shall be as summarized in Table 3-12.

3.1.2.11.5 *SPURIOUS RESPONSE*

Recommendation.— *The response to signals not within the passband should be at least 60 dB below normal sensitivity.*

3.1.2.11.6 *Lockout coordination.* A Mode S interrogator shall not be operated using all-call lockout until coordination has been achieved with all other operating Mode S interrogators having any overlapping coverage volume in order to ensure that no interrogator can be denied the acquisition of Mode S-equipped aircraft.

Note.— This coordination may be via ground network or by the allocation of interrogator identifier (II) codes and will involve regional agreements where coverage overlaps international boundaries.

3.1.2.11.7 *MOBILE INTERROGATORS*

Recommendation.— *Mobile interrogators should acquire, whenever possible, Mode S aircraft through the reception of squitters.*

Note.— Passive squitter acquisition reduces channel loading and can be accomplished without the need for coordination.

TABLES FOR CHAPTER 3

Table 3-1. Pulse shapes — Mode S and intermode interrogations

Pulse	*Duration*	*Duration tolerance*	*(Rise time) Min.*	*(Rise time) Max.*	*(Decay time) Min.*	*(Decay time) Max.*
P_1, P_2, P_3, P_5	0.8	±0.1	0.05	0.1	0.05	0.2
P_4 (short)	0.8	±0.1	0.05	0.1	0.05	0.2
P_4 (long)	1.6	±0.1	0.05	0.1	0.05	0.2
P_6 (short)	16.25	±0.25	0.05	0.1	0.05	0.2
P_6 (long)	30.25	±0.25	0.05	0.1	0.05	0.2

Table 3-2. Pulse shapes — Mode S replies

Pulse duration	*Duration tolerance*	*(Rise time) Min.*	*(Rise time) Max.*	*(Decay time) Min.*	*(Decay time) Max.*
0.5	±0.05	0.05	0.1	0.05	0.2
1.0	±0.05	0.05	0.1	0.05	0.2

Table 3-3. Field definitions

Field		*Format*		*Reference*
Designator	*Function*	*UF*	*DF*	
AA	Address announced		11, 17, 18	3.1.2.5.2.2.2
AC	Altitude code		4, 20	3.1.2.6.5.4
AF	Application field		19	3.1.2.8.8.2
AP	Address/parity	All	0, 4, 5, 16, 20, 21, 24	3.1.2.3.2.1.3
AQ	Acquisition	0		3.1.2.8.1.1
CA	Capability		11, 17	3.1.2.5.2.2.1
CC	Cross-link capability		0	3.1.2.8.2.3
CF	Control field		18	3.1.2.8.7.2
CL	Code label	11		3.1.2.5.2.1.3
DF	Downlink format		All	3.1.2.3.2.1.2
DI	Designator identification	4, 5, 20, 21		3.1.2.6.1.3
DR	Downlink request		4, 5, 20, 21	3.1.2.6.5.2
DS	Data selector	0		3.1.2.8.1.3
FS	Flight status		4, 5, 20, 21	3.1.2.6.5.1
IC	Interrogator code	11		3.1.2.5.2.1.2
ID	Identity		5, 21	3.1.2.6.7.1

Field		*Format*		*Reference*
Designator	*Function*	*UF*	*DF*	
KE	Control, ELM		24	3.1.2.7.3.1
MA	Message, Comm-A	20, 21		3.1.2.6.2.1
MB	Message, Comm-B		20, 21	3.1.2.6.6.1
MC	Message, Comm-C	24		3.1.2.7.1.3
MD	Message, Comm-D		24	3.1.2.7.3.3
ME	Message, extended squitter		17, 18	3.1.2.8.6.2
MU	Message, ACAS	16		4.3.8.4.2.3
MV	Message, ACAS		16	3.1.2.8.3.1, 4.3.8.4.2.4
NC	Number of C-segment	24		3.1.2.7.1.2
ND	Number of D-segment		24	3.1.2.7.3.2
PC	Protocol	4, 5, 20, 21		3.1.2.6.1.1
PI	Parity/interrogator identifier		11, 17, 18	3.1.2.3.2.1.4
PR	Probability of reply	11		3.1.2.5.2.1.1
RC	Reply control	24		3.1.2.7.1.1
RI	Reply information		0	3.1.2.8.2.2
RL	Reply length	0		3.1.2.8.1.2
RR	Reply request	4, 5, 20, 21		3.1.2.6.1.2
SD	Special designator	4, 5, 20, 21		3.1.2.6.1.4
UF	Uplink format	All		3.1.2.3.2.1.1
UM	Utility message		4, 5, 20, 21	3.1.2.6.5.3
VS	Vertical status		0	3.1.2.8.2.1

Table 3-4. Subfield definitions

Subfield			
Designator	*Function*	*Field*	*Reference*
ACS	Altitude code subfield	ME	3.1.2.8.6.3.1.2
AIS	Aircraft identification subfield	MB	3.1.2.9.1.1
ATS	Altitude type subfield	MB	3.1.2.8.6.8.2
BDS 1	Comm-B data selector subfield 1	MB	3.1.2.6.11.2.1
BDS 2	Comm-B data selector subfield 2	MB	3.1.2.6.11.2.1
IDS	Identifier designator subfield	UM	3.1.2.6.5.3.1
IIS	Interrogator identifier subfield	SD UM	3.1.2.6.1.4.1 a) 3.1.2.6.5.3.1
LOS	Lockout subfield	SD	3.1.2.6.1.4.1 d)
LSS	Lockout surveillance subfield	SD	3.1.2.6.1.4.1 g)
MBS	Multisite Comm-B subfield	SD	3.1.2.6.1.4.1 c)
MES	Multisite ELM subfield	SD	3.1.2.6.1.4.1 c)

Subfield			
Designator	*Function*	*Field*	*Reference*
RCS	Rate control subfield	SD	3.1.2.6.1.4.1 f)
RRS	Reply request subfield	SD	3.1.2.6.1.4.1 e) and g)
RSS	Reservation status subfield	SD	3.1.2.6.1.4.1 c)
SAS	Surface antenna subfield	SD	3.1.2.6.1.4.1 f)
SCS	Squitter capability subfield	MB	3.1.2.6.10.2.2.1
SIC	Surveillance identifier capability	MB	3.1.2.6.10.2.2.1
SIS	Surveillance identifier subfield	SD	3.1.2.6.1.4.1 g)
SRS	Segment request subfield	MC	3.1.2.7.7.2.1
SSS	Surveillance status subfield	ME	3.1.2.8.6.3.1.1
TAS	Transmission acknowledgement subfield	MD	3.1.2.7.4.2.6
TCS	Type control subfield	SD	3.1.2.6.1.4.1 f)
TMS	Tactical message subfield	SD	3.1.2.6.1.4.1 d)
TRS	Transmission rate subfield	MB	3.1.2.8.6.8.1

Table 3-5. Interrogation — reply protocol summary

Interrogation UF	*Special conditions*	*Reply DF*
0	RL (3.1.2.8.1.2) equals 0	0
	RL (3.1.2.8.1.2) equals 1	16
4	RR (3.1.2.6.1.2) less than 16	4
	RR (3.1.2.6.1.2) equal to or greater than 16	20
5	RR (3.1.2.6.1.2) less than 16	5
	RR (3.1.2.6.1.2) equal to or greater than 16	21
11	Transponder locked out to interrogator code, IC (3.1.2.5.2.1.2)	No reply
	Stochastic reply test fails (3.1.2.5.4)	No reply
	Otherwise	11
20	RR (3.1.2.6.1.2) less than 16	4
	RR (3.1.2.6.1.2) equal to or greater than 16	20
	AP contains broadcast address (3.1.2.4.1.2.3.1.3)	No reply
21	RR (3.1.2.6.1.2) less than 16	5
	RR (3.1.2.6.1.2) equal to or greater than 16	21
	AP contains broadcast address (3.1.2.4.1.2.3.1.3)	No reply
24	RC (3.1.2.7.1.1) equals 0 or 1	No reply
	RC (3.1.2.7.1.1) equals 2 or 3	24

Table 3-٦. Table for register 10_{16}

Subfields of register 10_{16}	*MB bits*	*Comm-B bits*
Continuation flag	9	41
ACAS capability	16 and 37-40	48 and 69-72
Mode S subnetwork version number	17-23	49-55
Transponder enhanced protocol indicator	24	56
Specific services capability	25	57
Uplink ELM capability	26-28	58-60
Downlink ELM capability	29-32	61-64
Aircraft identification capability	33	65
Squitter capability subfield (SCS)	34	66
Surveillance identifier code capability (SIC)	35	67
Common usage GICB capability report	36	68
Status of DTE sub-addresses 0 to 15	41-56	73-88

Table 3-7. Validation of on-the-ground status

Determination of airborne status					
A/V category	*Ground speed*		*Airspeed*		*Radio altitude*
No information	No change to on-the-ground status				
Weight < 15 500 lbs (7 031 kg)	No change to on-the-ground status				
Weight ≥15 500 lbs (7 031 kg)	>100 knots	or	>100 knots	or	>50 feet
High performance (>5 g acceleration and >400 knots)	>100 knots	or	>100 knots	or	>50 feet
Rotorcraft	No change to on-the-ground status				

Table 3-٨. Surface format broadcast without an automatic means of on-the-ground determination

ADS-B Emitter Category set "A"						
Coding	*Meaning*	*Ground Speed*		*Airspeed*		*Radio Altitude*
0	No ADS-B emitter category information	Always report airborne position message (3.1.2.8.6.3.1)				
1	Light (<15 500 lbs or 7 031 kg)	Always report airborne position message (3.1.2.8.6.3.1)				
2	Small (15 500 to 75 000 lbs or 7 031 to 34 019 kg)	< 100 knots	and	<100 knots	and	<50 feet
3	Large (75 000 lbs to 300 000 lbs or 34 019 to 136 078 kg)	<100 knots	and	<100 knots	and	<50 feet

4	High-vortex aircraft	<100 knots	and	<100 knots	and	<50 feet
5	Heavy (> 300 000 lbs or 136 078 kg)	<100 knots	and	<100 knots	and	<50 feet
6	High performance (>5g acceleration and >400 knots)	<100 knots	and	<100 knots	and	<50 feet
7	Rotorcraft	Always report airborne position message (3.1.2.8.6.3.1)				
ADS-B Emitter Category Set “B”						
Coding	*Meaning*	*Ground Speed*		*Airspeed*		*Radio Altitude*
0	No ADS-B emitter category information	Always report airborne position message (3.1.2.8.6.3.1)				
1	Glider/sailplane	Always report airborne position message (3.1.2.8.6.3.1)				
2	Lighter-than-air	Always report airborne position message (3.1.2.8.6.3.1)				
3	Parachutist/skydiver	Always report airborne position message (3.1.2.8.6.3.1)				
4	Ultra-light/hang-glider/paraglider	Always report airborne position message (3.1.2.8.6.3.1)				
5	Reserved	Reserved				
6	Unmanned aerial vehicle	Always report airborne position message (3.1.2.8.6.3.1)				
7	Space/trans-atmospheric vehicle	<100 knots	and	<100 knots	and	<50 feet
ADS-B Emitter Category Set “C”						
Coding	*Meaning*					
0	No ADS-B emitter category information	Always report airborne position message (3.1.2.8.6.3.1)				
1	Surface vehicle – emergency vehicle	Always report surface position message (3.1.2.8.6.3.2)				
2	Surface vehicle - service vehicle	Always report surface position message (3.1.2.8.6.3.2)				
3	Fixed ground or tethered obstruction	Always report airborne position message (3.1.2.8.6.3.1)				
4 – 7	Reserved	Reserved				
ADS-B Emitter Category Set “D”						
Coding	*Meaning*					
0	No ADS-B emitter category information	Always report airborne position message (3.1.2.8.6.3.1)				
1 – 7	Reserved	Reserved				

Table 3-9. Character coding for transmission of aircraft identification by data link
(subset of IA-5 — see 3.1.2.9.1.2)

				b_6	0	0	1	1
				b_5	0	1	0	1
b_4	b_3	b_2	b_1					
0	0	0	0			P	SP	0
0	0	0	1		A	Q		1
0	0	1	0		B	R		2
0	0	1	1		C	S		3
0	1	0	0		D	T		4
0	1	0	1		E	U		5
0	1	1	0		F	V		6
0	1	1	1		G	W		7
1	0	0	0		H	X		8
1	0	0	1		I	Y		9
1	0	1	0		J	Z		
1	0	1	1		K			
1	1	0	0		L			
1	1	0	1		M			
1	1	1	0		N			
1	1	1	1		O			

Table 3-10. Timer characteristics

Timer Name	*Number*	*Reference*	*Symbol*	*Duration s*	*Tolerance s*	*Resettable*
Non-selective lock-out	1	3.1.2.6.9.2	T_D	18	±1	no
Temporary alert	1	3.1.2.6.10.1.1.2	T_C	18	±1	no
SPI	1	3.1.2.6.10.1.3	T_I	18	±1	no
Reservations B, C, D	3*	3.1.2.6.11.3.1	T_R	18	±1	yes
Multisite lockout	78	3.1.2.6.9.1	T_L	18	±1	no

* As required

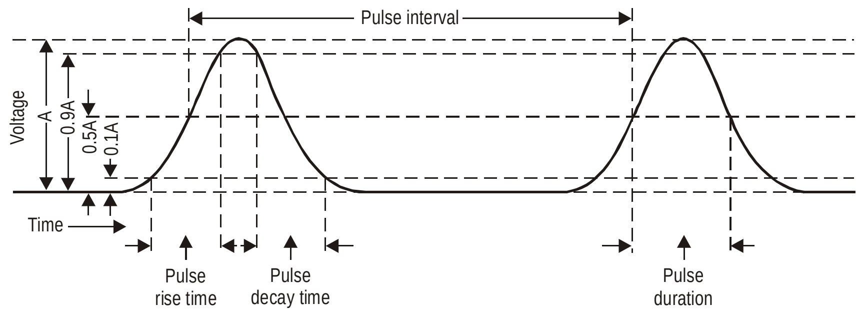
Table 3-11. DAPs registers

Register	*Name*	*Data content*	*Bits*
40 {HEX}	Selected vertical intention	MCP/FCU selected altitude	1-13
		FMS selected altitude	14-26
		Barometric pressure setting minus 800 mb	27-39
		MCP/FCU mode bits	48-51
		Target altitude source bits	54-56
50 {HEX}	Track and turn report	Roll angle	1-11
		True track angle	12-23
		Ground speed	24-34
		Track angle rate	35-45
		True airspeed	46-56
60 {HEX}	Heading and speed report	Magnetic heading	1-12
		Indicated airspeed	13-23
		Mach	24-34
		Barometric altitude rate	35-45
		Inertial vertical velocity	46-56

Table 3-12. Transmitted signal tolerances

Reference	*Function*	*Tolerance*
3.1.2.1.4.1	Pulse duration P_1, P_2, P_3, P_4, P_5 Pulse duration P_6	±0.09 microsecond ±0.20 microsecond
3.1.1.4	Pulse duration $P_1 – P_3$ Pulse duration $P_1 – P_2$	±0.18 microsecond ±0.10 microsecond
3.1.2.1.5.1.3	Pulse duration $P_3 – P_4$	±0.04 microsecond
3.1.2.1.5.2.4	Pulse duration $P_1 – P_2$ Pulse duration P_2 — sync phase reversal Pulse duration P_6 — sync phase reversal Pulse duration P_5 — sync phase reversal	±0.04 microsecond ±0.04 microsecond ±0.04 microsecond ±0.05 microsecond
3.1.1.5	Pulse amplitude P_3	P_1 ±0.5 dB
3.1.2.1.5.1.4	Pulse amplitude P_4	P_3 ±0.5 dB
3.1.2.1.5.2.5	Pulse amplitude P_6	Equal to or greater than P_2 – 0.25 dB
3.1.2.1.4.1	Pulse rise times	0.05 microsecond minimum, 0.1 microsecond maximum
3.1.2.1.4.1	Pulse decay times	0.05 microsecond minimum, 0.2 microsecond maximum

FIGURES FOR CHAPTER 3



Definitions

Phase reversal. A 180-degree change in the phase of the radio frequency carrier.

Phase reversal duration. The time between the 10-degree and 170-degree points of a phase reversal.

Pulse amplitude A. The peak voltage amplitude of the pulse envelope.

Pulse decay time. The time between 0.9A and 0.1A on the trailing edge of the pulse envelope.

Pulse duration. The time interval between 0.5A points on leading and trailing edges of the pulse envelope.

Pulse interval. The time interval between the 0.5A point on the leading edge of the first pulse and the 0.5A point on the leading edge of the second pulse.

Pulse rise time. The time between 0.1A and 0.9A on the leading edge of the pulse envelope.

Time intervals. The intervals are referenced to:

a) the 0.5A point on the leading edge of a pulse;

b) the 0.5A point on the trailing edge of a pulse; or

c) the 90-degree point of a phase reversal.

Transponder sensitivity and power reference point. The antenna end of the transmission line of the transponder.

Note.— The 90-degree point of a phase reversal can be approximated by the minimum amplitude point on the envelope amplitude transient associated with the phase reversal and the phase reversal duration can be approximated by the time between the 0.8A points of the envelope amplitude transient.

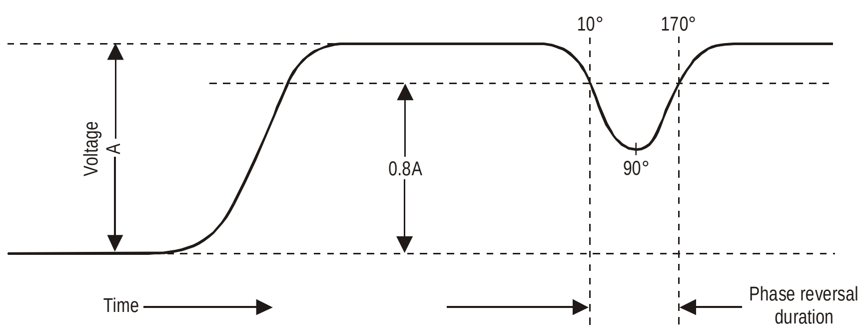


Figure 3-1. Definitions of secondary surveillance radar waveform shapes, intervals and the reference point for sensitivity and power

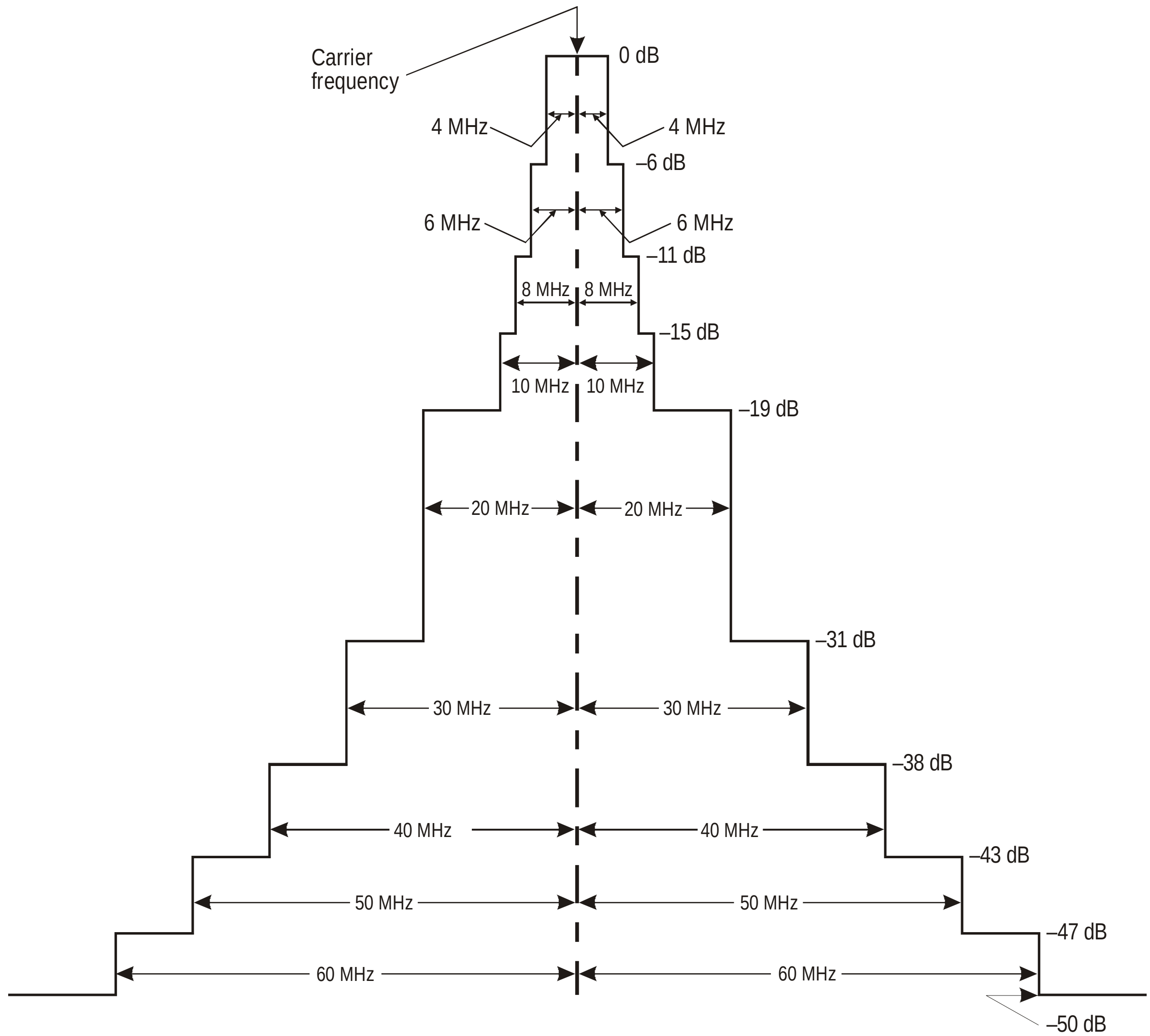


Figure 3-2. Required spectrum limits for interrogator transmitter

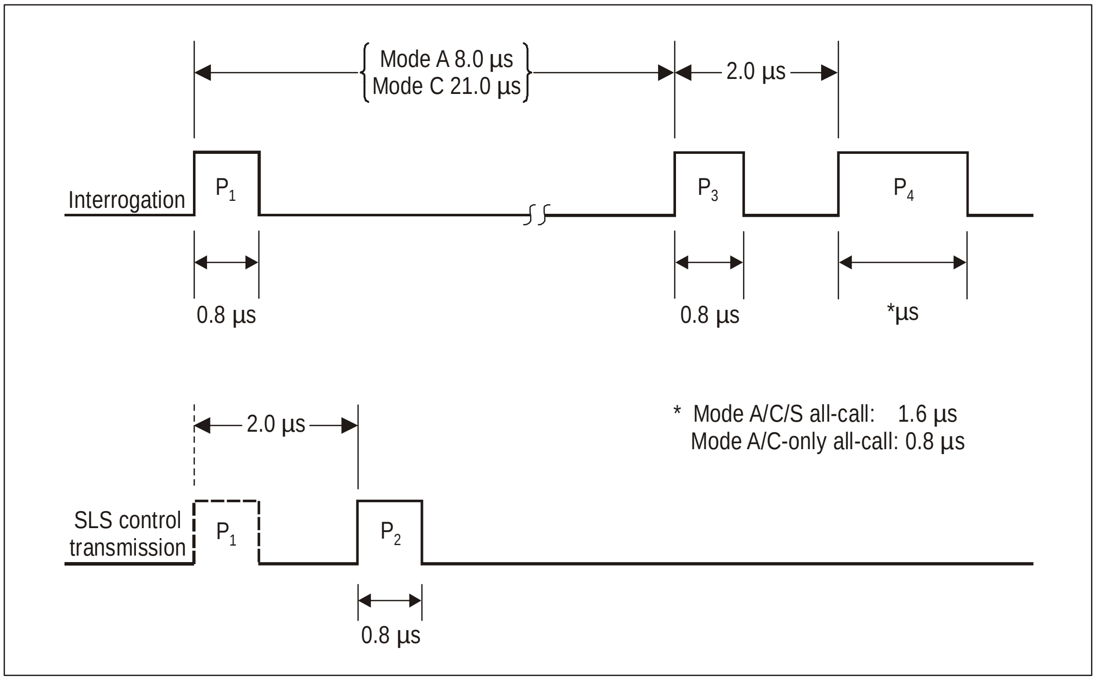


Figure 3-3. Intermode interrogation pulse sequence

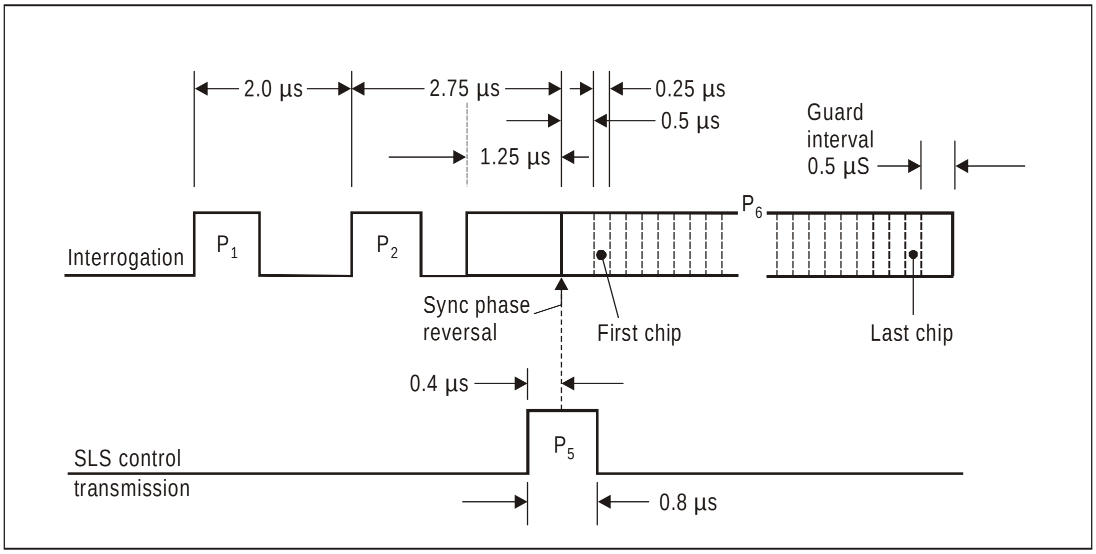


Figure 3-4. Mode S interrogation pulse sequence

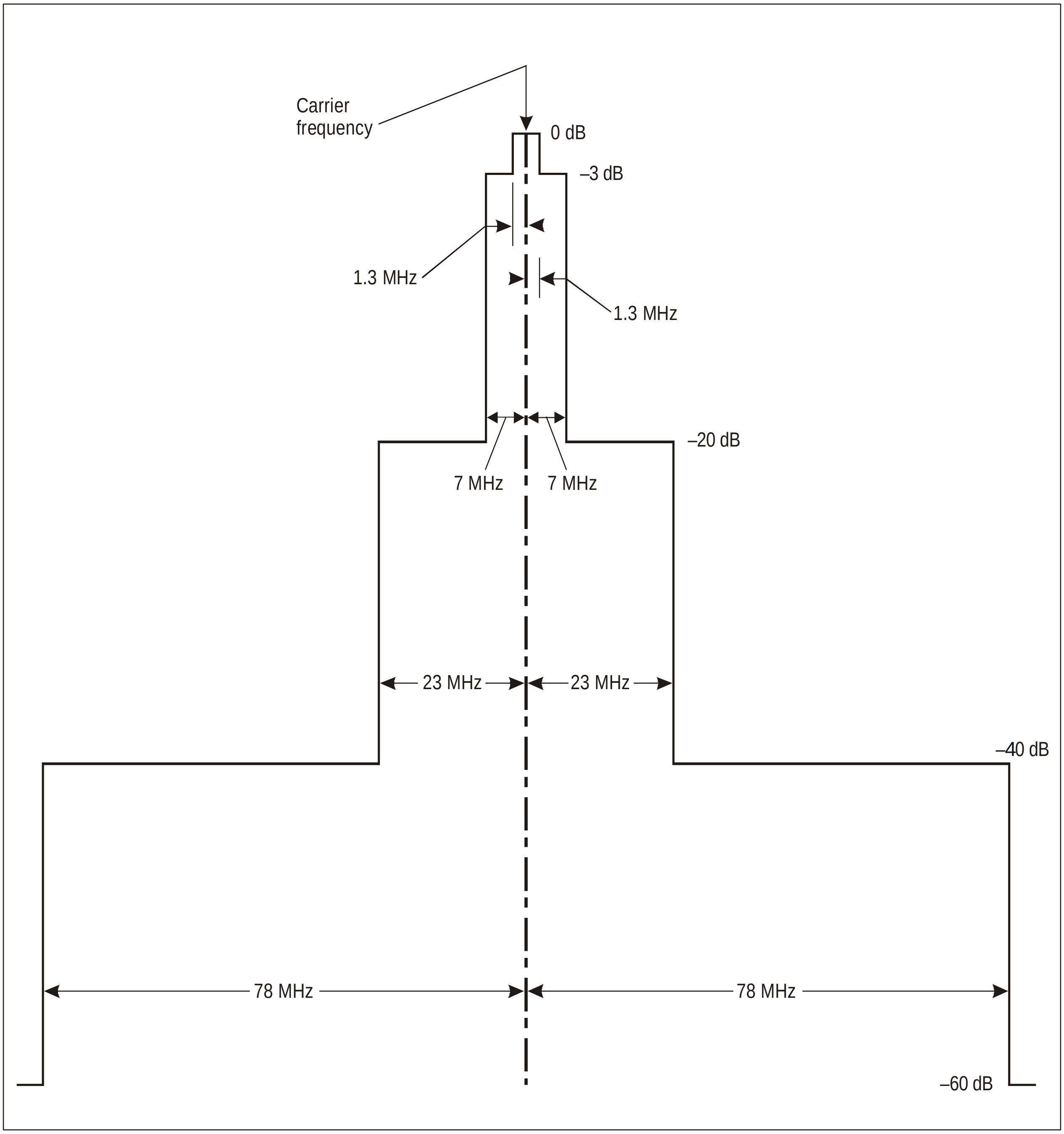


Figure 3-5. Required spectrum limits for transponder transmitter

Note.— This figure shows the spectrum centred on the carrier frequency and will therefore shift in its entirety plus or minus 1 MHz along with the carrier frequency.

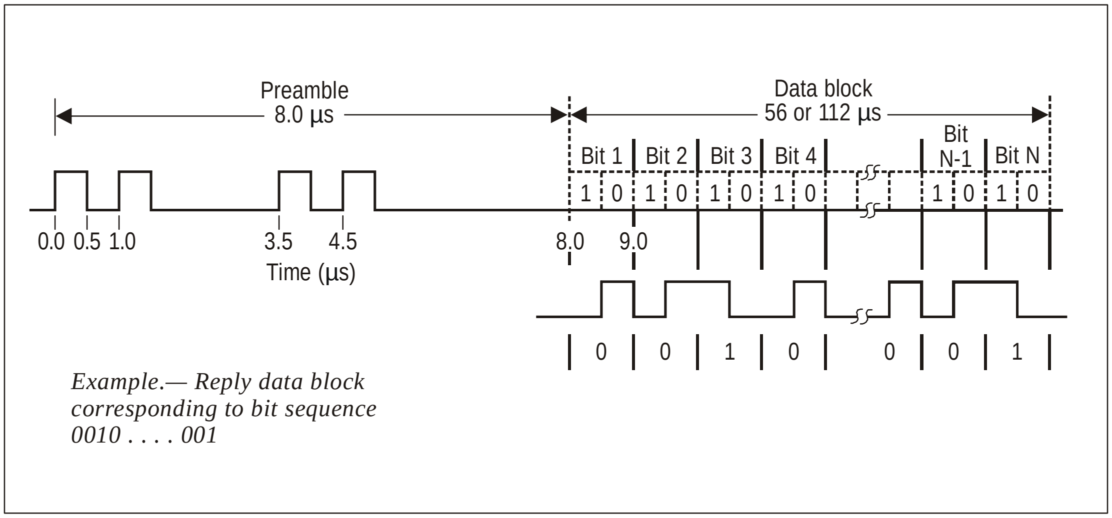


Figure 3-6. Mode S reply

Format No.	UF								
0	00000	3	RL:1	4	AQ:1	18		AP:24	.... Short air-air surveillance (ACAS)
1	00001	27 or 83						AP:24	... Reserved
2	00010	27 or 83						AP:24	... Reserved
3	00011	27 or 83						AP:24	... Reserved
4	00100	PC:3	RR:5	DI:3	SD:16			AP:24	.... Surveillance, altitude request
5	00101	PC:3	RR:5	DI:3	SD:16			AP:24	.... Surveillance, identify request
6	00110	27 or 83						AP:24	... Reserved
7	00111	27 or 83						AP:24	... Reserved
8	01000	27 or 83						AP:24	... Reserved
9	01001	27 or 83						AP:24	... Reserved
10	01010	27 or 83						AP:24	... Reserved
11	01011	PR:4	IC:4	CL:3	16			AP:24	.... Mode S only all-call
12	01100	27 or 83						AP:24	... Reserved
13	01101	27 or 83						AP:24	... Reserved
14	01110	27 or 83						AP:24	... Reserved
15	01111	27 or 83						AP:24	... Reserved
16	10000	3	RL:1	4	AQ:1	18	MU:56	AP:24	.... Long air-air surveillance (ACAS)
17	10001	27 or 83						AP:24	... Reserved
18	10010	27 or 83						AP:24	... Reserved
19	10011	27 or 83						AP:24	... Reserved for military use
20	10100	PC:3	RR:5	DI:3	SD:16	MA:56		AP:24	.... Comm-A, altitude request
21	10101	PC:3	RR:5	DI:3	SD:16	MA:56		AP:24	.... Comm-A, identify request
22	10110	27 or 83						AP:24	... Reserved for military use
23	10111	27 or 83						AP:24	... Reserved
24	11	RC:2	NC:4	MC:80				AP:24	.... Comm-C (ELM)

NOTES:

1. XX:M denotes a field designated "XX" which is assigned M bits.
2. N denotes unassigned coding space with N available bits. These shall be coded as ZEROs for transmission.
3. For uplink formats (UF) 0 to 23 the format number corresponds to the binary code in the first five bits of the interrogation. Format number 24 is defined as the format beginning with "11" in the first two bit positions while the following three bits vary with the interrogation content.
4. All formats are shown for completeness, although a number of them are unused. Those formats for which no application is presently defined remain undefined in length. Depending on future assignment they may be short (56 bits) or long (112 bits) formats. Specific formats associated with Mode S capability levels are described in later paragraphs.
5. The PC, RR, DI and SD fields do not apply to a Comm-A broadcast interrogation.

Figure 3-7. Summary of Mode S interrogation or uplink formats

Format No.	DF	Fields						
0	00000	VS:1	7	RI:4	2	AC:13	AP:24	.... Short air-air surveillance (ACAS)
1	00001	27 or 83					P:24	... Reserved
2	00010	27 or 83					P:24	... Reserved
3	00011	27 or 83					P:24	... Reserved
4	00100	FS:3	DR:5	UM:6	AC:13		AP:24	.... Surveillance, altitude reply
5	00101	FS:3	DR:5	UM:6	ID:13		AP:24	.... Surveillance, identify reply
6	00110	27 or 83					P:24	... Reserved
7	00111	27 or 83					P:24	... Reserved
8	01000	27 or 83					P:24	... Reserved
9	01001	27 or 83					P:24	... Reserved
10	01010	27 or 83					P:24	... Reserved
11	01011	CA:3	AA:24				PI:24	.... All-call reply
12	01100	27 or 83					P:24	... Reserved
13	01101	27 or 83					P:24	... Reserved
14	01110	27 or 83					P:24	... Reserved
15	01111	27 or 83					P:24	... Reserved
16	10000	VS:1	7	RI:4	2	AC:13 MV:56	AP:24	.... Long air-air surveillance (ACAS)
17	10001	CA:3	AA:24	ME:56			PI:24	... Extended squitter
18	10010	CF:3	AA:24	ME:56			PI:24	... Extended squitter/non transponder
19	10011	AF:3	104					... Military extended squitter
20	10100	FS:3	DR:5	UM:6	AC:13	MB:56	AP:24	.... Comm-B, altitude reply
21	10101	FS:3	DR:5	UM:6	ID:13	MB:56	AP:24	.... Comm-B, identify reply
22	10110	27 or 83					P:24	... Reserved for military use
23	10111	27 or 83					P:24	... Reserved
24	11	1	KE:1	ND:4	MD:80		AP:24	.... Comm-D (ELM)

NOTES:

1. XX:M denotes a field designated "XX" which is assigned M bits.

   P:24 denotes a 24-bit field reserved for parity information.

2. N denotes unassigned coding space with N available bits. These shall be coded as ZEROs for transmission.

3. For downlink formats (DF) 0 to 23 the format number corresponds to the binary code in the first five bits of the reply. Format number 24 is defined as the format beginning with "11" in the first two bit positions while the following three bits may vary with the reply content.

4. All formats are shown for completeness, although a number of them are unused. Those formats for which no application is presently defined remain undefined in length. Depending on future assignment they may be short (56 bits) or long (112 bits) formats. Specific formats associated with Mode S capability levels are described in later paragraphs.

Figure 3-8. Summary of Mode S reply or downlink formats

APPENDIX TO CHAPTER 3

SSR automatic pressure-altitude transmission code (pulse position assignment)

RANGE	PULSE POSITIONS *(0 or 1 in a pulse position denotes absence or presence of a pulse, respectively)*										
Increments *(Feet)*	D_2	D_4	A_1	A_2	A_4	B_1	B_2	B_4	C_1	C_2	C_4
−1 000 to −950	0	0	0	0	0	0	0	0	0	1	0
−950 to −850	0	0	0	0	0	0	0	0	1	1	0
−850 to −750	0	0	0	0	0	0	0	0	1	0	0
−750 to −650	0	0	0	0	0	0	0	1	1	0	0
−650 to −550	0	0	0	0	0	0	0	1	1	1	0
−550 to −450	0	0	0	0	0	0	0	1	0	1	0
−450 to −350	0	0	0	0	0	0	0	1	0	1	1
−350 to −250	0	0	0	0	0	0	0	1	0	0	1
−250 to −150	0	0	0	0	0	0	1	1	0	0	1
−150 to −50	0	0	0	0	0	0	1	1	0	1	1
−50 to 50	0	0	0	0	0	0	1	1	0	1	0
50 to 150	0	0	0	0	0	0	1	1	1	1	0
150 to 250	0	0	0	0	0	0	1	1	1	0	0
250 to 350	0	0	0	0	0	0	1	0	1	0	0
350 to 450	0	0	0	0	0	0	1	0	1	1	0
450 to 550	0	0	0	0	0	0	1	0	0	1	0
550 to 650	0	0	0	0	0	0	1	0	0	1	1
650 to 750	0	0	0	0	0	0	1	0	0	0	1
750 to 850	0	0	0	0	0	1	1	0	0	0	1
850 to 950	0	0	0	0	0	1	1	0	0	1	1
950 to 1 050	0	0	0	0	0	1	1	0	0	1	0
1 050 to 1 150	0	0	0	0	0	1	1	0	1	1	0
1 150 to 1 250	0	0	0	0	0	1	1	0	1	0	0
1 250 to 1 350	0	0	0	0	0	1	1	1	1	0	0
1 350 to 1 450	0	0	0	0	0	1	1	1	1	1	0
1 450 to 1 550	0	0	0	0	0	1	1	1	0	1	0
1 550 to 1 650	0	0	0	0	0	1	1	1	0	1	1
1 650 to 1 750	0	0	0	0	0	1	1	1	0	0	1
1 750 to 1 850	0	0	0	0	0	1	0	1	0	0	1
1 850 to 1 950	0	0	0	0	0	1	0	1	0	1	1
1 950 to 2 050	0	0	0	0	0	1	0	1	0	1	0
2 050 to 2 150	0	0	0	0	0	1	0	1	1	1	0
2 150 to 2 250	0	0	0	0	0	1	0	1	1	0	0
2 250 to 2 350	0	0	0	0	0	1	0	0	1	0	0
2 350 to 2 450	0	0	0	0	0	1	0	0	1	1	0
2 450 to 2 550	0	0	0	0	0	1	0	0	0	1	0
2 550 to 2 650	0	0	0	0	0	1	0	0	0	1	1
2 650 to 2 750	0	0	0	0	0	1	0	0	0	0	1

RANGE			PULSE POSITIONS *(0 or 1 in a pulse position denotes absence or presence of a pulse, respectively)*										
Increments *(Feet)*			D_2	D_4	A_1	A_2	A_4	B_1	B_2	B_4	C_1	C_2	C_4
2 750	to	2 850	0	0	0	0	1	1	0	0	0	0	1
2 850	to	2 950	0	0	0	0	1	1	0	0	0	1	1
2 950	to	3 050	0	0	0	0	1	1	0	0	0	1	0
3 050	to	3 150	0	0	0	0	1	1	0	0	1	1	0
3 150	to	3 250	0	0	0	0	1	1	0	0	1	0	0
3 250	to	3 350	0	0	0	0	1	1	0	1	1	0	0
3 350	to	3 450	0	0	0	0	1	1	0	1	1	1	0
3 450	to	3 550	0	0	0	0	1	1	0	1	0	1	0
3 550	to	3 650	0	0	0	0	1	1	0	1	0	1	1
3 650	to	3 750	0	0	0	0	1	1	0	1	0	0	1
3 750	to	3 850	0	0	0	0	1	1	1	1	0	0	1
3 850	to	3 950	0	0	0	0	1	1	1	1	0	1	1
3 950	to	4 050	0	0	0	0	1	1	1	1	0	1	0
4 050	to	4 150	0	0	0	0	1	1	1	1	1	1	0
4 150	to	4 250	0	0	0	0	1	1	1	1	1	0	0
4 250	to	4 350	0	0	0	0	1	1	1	0	1	0	0
4 350	to	4 450	0	0	0	0	1	1	1	0	1	1	0
4 450	to	4 550	0	0	0	0	1	1	1	0	0	1	0
4 550	to	4 650	0	0	0	0	1	1	1	0	0	1	1
4 650	to	4 750	0	0	0	0	1	1	1	0	0	0	1
4 750	to	4 850	0	0	0	0	1	0	1	0	0	0	1
4 850	to	4 950	0	0	0	0	1	0	1	0	0	1	1
4 950	to	5 050	0	0	0	0	1	0	1	0	0	1	0
5 050	to	5 150	0	0	0	0	1	0	1	0	1	1	0
5 150	to	5 250	0	0	0	0	1	0	1	0	1	0	0
5 250	to	5 350	0	0	0	0	1	0	1	1	1	0	0
5 350	to	5 450	0	0	0	0	1	0	1	1	1	1	0
5 450	to	5 550	0	0	0	0	1	0	1	1	0	1	0
5 550	to	5 650	0	0	0	0	1	0	1	1	0	1	1
5 650	to	5 750	0	0	0	0	1	0	1	1	0	0	1
5 750	to	5 850	0	0	0	0	1	0	0	1	0	0	1
5 850	to	5 950	0	0	0	0	1	0	0	1	0	1	1
5 950	to	6 050	0	0	0	0	1	0	0	1	0	1	0
6 050	to	6 150	0	0	0	0	1	0	0	1	1	1	0
6 150	to	6 250	0	0	0	0	1	0	0	1	1	0	0
6 250	to	6 350	0	0	0	0	1	0	0	0	1	0	0
6 350	to	6 450	0	0	0	0	1	0	0	0	1	1	0
6 450	to	6 550	0	0	0	0	1	0	0	0	0	1	0
6 550	to	6 650	0	0	0	0	1	0	0	0	0	1	1
6 650	to	6 750	0	0	0	0	1	0	0	0	0	0	1
6 750	to	6 850	0	0	0	1	1	0	0	0	0	0	1
6 850	to	6 950	0	0	0	1	1	0	0	0	0	1	1
6 950	to	7 050	0	0	0	1	1	0	0	0	0	1	0
7 050	to	7 150	0	0	0	1	1	0	0	0	1	1	0
7 150	to	7 250	0	0	0	1	1	0	0	0	1	0	0

RANGE	PULSE POSITIONS *(0 or 1 in a pulse position denotes absence or presence of a pulse, respectively)*										
Increments *(Feet)*	D_2	D_4	A_1	A_2	A_4	B_1	B_2	B_4	C_1	C_2	C_4
7 250 to 7 350	0	0	0	1	1	0	0	1	1	0	0
7 350 to 7 450	0	0	0	1	1	0	0	1	1	1	0
7 450 to 7 550	0	0	0	1	1	0	0	1	0	1	0
7 550 to 7 650	0	0	0	1	1	0	0	1	0	1	1
7 650 to 7 750	0	0	0	1	1	0	0	1	0	0	1
7 750 to 7 850	0	0	0	1	1	0	1	1	0	0	1
7 850 to 7 950	0	0	0	1	1	0	1	1	0	1	1
7 950 to 8 050	0	0	0	1	1	0	1	1	0	1	0
8 050 to 8 150	0	0	0	1	1	0	1	1	1	1	0
8 150 to 8 250	0	0	0	1	1	0	1	1	1	0	0
8 250 to 8 350	0	0	0	1	1	0	1	0	1	0	0
8 350 to 8 450	0	0	0	1	1	0	1	0	1	1	0
8 450 to 8 550	0	0	0	1	1	0	1	0	0	1	0
8 550 to 8 650	0	0	0	1	1	0	1	0	0	1	1
8 650 to 8 750	0	0	0	1	1	0	1	0	0	0	1
8 750 to 8 850	0	0	0	1	1	1	1	0	0	0	1
8 850 to 8 950	0	0	0	1	1	1	1	0	0	1	1
8 950 to 9 050	0	0	0	1	1	1	1	0	0	1	0
9 050 to 9 150	0	0	0	1	1	1	1	0	1	1	0
9 150 to 9 250	0	0	0	1	1	1	1	0	1	0	0
9 250 to 9 350	0	0	0	1	1	1	1	1	1	0	0
9 350 to 9 450	0	0	0	1	1	1	1	1	1	1	0
9 450 to 9 550	0	0	0	1	1	1	1	1	0	1	0
9 550 to 9 650	0	0	0	1	1	1	1	1	0	1	1
9 650 to 9 750	0	0	0	1	1	1	1	1	0	0	1
9 750 to 9 850	0	0	0	1	1	1	0	1	0	0	1
9 850 to 9 950	0	0	0	1	1	1	0	1	0	1	1
9 950 to 10 050	0	0	0	1	1	1	0	1	0	1	0
10 050 to 10 150	0	0	0	1	1	1	0	1	1	1	0
10 150 to 10 250	0	0	0	1	1	1	0	1	1	0	0
10 250 to 10 350	0	0	0	1	1	1	0	0	1	0	0
10 350 to 10 450	0	0	0	1	1	1	0	0	1	1	0
10 450 to 10 550	0	0	0	1	1	1	0	0	0	1	0
10 550 to 10 650	0	0	0	1	1	1	0	0	0	1	1
10 650 to 10 750	0	0	0	1	1	1	0	0	0	0	1
10 750 to 10 850	0	0	0	1	0	1	0	0	0	0	1
10 850 to 10 950	0	0	0	1	0	1	0	0	0	1	1
10 950 to 11 050	0	0	0	1	0	1	0	0	0	1	0
11 050 to 11 150	0	0	0	1	0	1	0	0	1	1	0
11 150 to 11 250	0	0	0	1	0	1	0	0	1	0	0
11 250 to 11 350	0	0	0	1	0	1	0	1	1	0	0
11 350 to 11 450	0	0	0	1	0	1	0	1	1	1	0
11 450 to 11 550	0	0	0	1	0	1	0	1	0	1	0
11 550 to 11 650	0	0	0	1	0	1	0	1	0	1	1
11 650 to 11 750	0	0	0	1	0	1	0	1	0	0	1

RANGE			PULSE POSITIONS *(0 or 1 in a pulse position denotes absence or presence of a pulse, respectively)*										
Increments *(Feet)*			D_2	D_4	A_1	A_2	A_4	B_1	B_2	B_4	C_1	C_2	C_4
11 750	to	11 850	0	0	0	1	0	1	1	1	0	0	1
11 850	to	11 950	0	0	0	1	0	1	1	1	0	1	1
11 950	to	12 050	0	0	0	1	0	1	1	1	0	1	0
12 050	to	12 150	0	0	0	1	0	1	1	1	1	1	0
12 150	to	12 250	0	0	0	1	0	1	1	1	1	0	0
12 250	to	12 350	0	0	0	1	0	1	1	0	1	0	0
12 350	to	12 450	0	0	0	1	0	1	1	0	1	1	0
12 450	to	12 550	0	0	0	1	0	1	1	0	0	1	0
12 550	to	12 650	0	0	0	1	0	1	1	0	0	1	1
12 650	to	12 750	0	0	0	1	0	1	1	0	0	0	1
12 750	to	12 850	0	0	0	1	0	0	1	0	0	0	1
12 850	to	12 950	0	0	0	1	0	0	1	0	0	1	1
12 950	to	13 050	0	0	0	1	0	0	1	0	0	1	0
13 050	to	13 150	0	0	0	1	0	0	1	0	1	1	0
13 150	to	13 250	0	0	0	1	0	0	1	0	1	0	0
13 250	to	13 350	0	0	0	1	0	0	1	1	1	0	0
13 350	to	13 450	0	0	0	1	0	0	1	1	1	1	0
13 450	to	13 550	0	0	0	1	0	0	1	1	0	1	0
13 550	to	13 650	0	0	0	1	0	0	1	1	0	1	1
13 650	to	13 750	0	0	0	1	0	0	1	1	0	0	1
13 750	to	13 850	0	0	0	1	0	0	0	1	0	0	1
13 850	to	13 950	0	0	0	1	0	0	0	1	0	1	1
13 950	to	14 050	0	0	0	1	0	0	0	1	0	1	0
14 050	to	14 150	0	0	0	1	0	0	0	1	1	1	0
14 150	to	14 250	0	0	0	1	0	0	0	1	1	0	0
14 250	to	14 350	0	0	0	1	0	0	0	0	1	0	0
14 350	to	14 450	0	0	0	1	0	0	0	0	1	1	0
14 450	to	14 550	0	0	0	1	0	0	0	0	0	1	0
14 550	to	14 650	0	0	0	1	0	0	0	0	0	1	1
14 650	to	14 750	0	0	0	1	0	0	0	0	0	0	1
14 750	to	14 850	0	0	1	1	0	0	0	0	0	0	1
14 850	to	14 950	0	0	1	1	0	0	0	0	0	1	1
14 950	to	15 050	0	0	1	1	0	0	0	0	0	1	0
15 050	to	15 150	0	0	1	1	0	0	0	0	1	1	0
15 150	to	15 250	0	0	1	1	0	0	0	0	1	0	0
15 250	to	15 350	0	0	1	1	0	0	0	1	1	0	0
15 350	to	15 450	0	0	1	1	0	0	0	1	1	1	0
15 450	to	15 550	0	0	1	1	0	0	0	1	0	1	0
15 550	to	15 650	0	0	1	1	0	0	0	1	0	1	1
15 650	to	15 750	0	0	1	1	0	0	0	1	0	0	1
15 750	to	15 850	0	0	1	1	0	0	1	1	0	0	1
15 850	to	15 950	0	0	1	1	0	0	1	1	0	1	1
15 950	to	16 050	0	0	1	1	0	0	1	1	0	1	0
16 050	to	16 150	0	0	1	1	0	0	1	1	1	1	0
16 150	to	16 250	0	0	1	1	0	0	1	1	1	0	0

RANGE			PULSE POSITIONS *(0 or 1 in a pulse position denotes absence or presence of a pulse, respectively)*										
Increments *(Feet)*			D_2	D_4	A_1	A_2	A_4	B_1	B_2	B_4	C_1	C_2	C_4
16 250	to	16 350	0	0	1	1	0	0	1	0	1	0	0
16 350	to	16 450	0	0	1	1	0	0	1	0	1	1	0
16 450	to	16 550	0	0	1	1	0	0	1	0	0	1	0
16 550	to	16 650	0	0	1	1	0	0	1	0	0	1	1
16 650	to	16 750	0	0	1	1	0	0	1	0	0	0	1
16 750	to	16 850	0	0	1	1	0	1	1	0	0	0	1
16 850	to	16 950	0	0	1	1	0	1	1	0	0	1	1
16 950	to	17 050	0	0	1	1	0	1	1	0	0	1	0
17 050	to	17 150	0	0	1	1	0	1	1	0	1	1	0
17 150	to	17 250	0	0	1	1	0	1	1	0	1	0	0
17 250	to	17 350	0	0	1	1	0	1	1	1	1	0	0
17 350	to	17 450	0	0	1	1	0	1	1	1	1	1	0
17 450	to	17 550	0	0	1	1	0	1	1	1	0	1	0
17 550	to	17 650	0	0	1	1	0	1	1	1	0	1	1
17 650	to	17 750	0	0	1	1	0	1	1	1	0	0	1
17 750	to	17 850	0	0	1	1	0	1	0	1	0	0	1
17 850	to	17 950	0	0	1	1	0	1	0	1	0	1	1
17 950	to	18 050	0	0	1	1	0	1	0	1	0	1	0
18 050	to	18 150	0	0	1	1	0	1	0	1	1	1	0
18 150	to	18 250	0	0	1	1	0	1	0	1	1	0	0
18 250	to	18 350	0	0	1	1	0	1	0	0	1	0	0
18 350	to	18 450	0	0	1	1	0	1	0	0	1	1	0
18 450	to	18 550	0	0	1	1	0	1	0	0	0	1	0
18 550	to	18 650	0	0	1	1	0	1	0	0	0	1	1
18 650	to	18 750	0	0	1	1	0	1	0	0	0	0	1
18 750	to	18 850	0	0	1	1	1	1	0	0	0	0	1
18 850	to	18 950	0	0	1	1	1	1	0	0	0	1	1
18 950	to	19 050	0	0	1	1	1	1	0	0	0	1	0
19 050	to	19 150	0	0	1	1	1	1	0	0	1	1	0
19 150	to	19 250	0	0	1	1	1	1	0	0	1	0	0
19 250	to	19 350	0	0	1	1	1	1	0	1	1	0	0
19 350	to	19 450	0	0	1	1	1	1	0	1	1	1	0
19 450	to	19 550	0	0	1	1	1	1	0	1	0	1	0
19 550	to	19 650	0	0	1	1	1	1	0	1	0	1	1
19 650	to	19 750	0	0	1	1	1	1	0	1	0	0	1
19 750	to	19 850	0	0	1	1	1	1	1	1	0	0	1
19 850	to	19 950	0	0	1	1	1	1	1	1	0	1	1
19 950	to	20 050	0	0	1	1	1	1	1	1	0	1	0
20 050	to	20 150	0	0	1	1	1	1	1	1	1	1	0
20 150	to	20 250	0	0	1	1	1	1	1	1	1	0	0
20 250	to	20 350	0	0	1	1	1	1	1	0	1	0	0
20 350	to	20 450	0	0	1	1	1	1	1	0	1	1	0
20 450	to	20 550	0	0	1	1	1	1	1	0	0	1	0
20 550	to	20 650	0	0	1	1	1	1	1	0	0	1	1
20 650	to	20 750	0	0	1	1	1	1	1	0	0	0	1

RANGE			PULSE POSITIONS *(0 or 1 in a pulse position denotes absence or presence of a pulse, respectively)*										
Increments *(Feet)*			D_2	D_4	A_1	A_2	A_4	B_1	B_2	B_4	C_1	C_2	C_4
20 750	to	20 850	0	0	1	1	1	0	1	0	0	0	1
20 850	to	20 950	0	0	1	1	1	0	1	0	0	1	1
20 950	to	21 050	0	0	1	1	1	0	1	0	0	1	0
21 050	to	21 150	0	0	1	1	1	0	1	0	1	1	0
21 150	to	21 250	0	0	1	1	1	0	1	0	1	0	0
21 250	to	21 350	0	0	1	1	1	0	1	1	1	0	0
21 350	to	21 450	0	0	1	1	1	0	1	1	1	1	0
21 450	to	21 550	0	0	1	1	1	0	1	1	0	1	0
21 550	to	21 650	0	0	1	1	1	0	1	1	0	1	1
21 650	to	21 750	0	0	1	1	1	0	1	1	0	0	1
21 750	to	21 850	0	0	1	1	1	0	0	1	0	0	1
21 850	to	21 950	0	0	1	1	1	0	0	1	0	1	1
21 950	to	22 050	0	0	1	1	1	0	0	1	0	1	0
22 050	to	22 150	0	0	1	1	1	0	0	1	1	1	0
22 150	to	22 250	0	0	1	1	1	0	0	1	1	0	0
22 250	to	22 350	0	0	1	1	1	0	0	0	1	0	0
22 350	to	22 450	0	0	1	1	1	0	0	0	1	1	0
22 450	to	22 550	0	0	1	1	1	0	0	0	0	1	0
22 550	to	22 650	0	0	1	1	1	0	0	0	0	1	1
22 650	to	22 750	0	0	1	1	1	0	0	0	0	0	1
22 750	to	22 850	0	0	1	0	1	0	0	0	0	0	1
22 850	to	22 950	0	0	1	0	1	0	0	0	0	1	1
22 950	to	23 050	0	0	1	0	1	0	0	0	0	1	0
23 050	to	23 150	0	0	1	0	1	0	0	0	1	1	0
23 150	to	23 250	0	0	1	0	1	0	0	0	1	0	0
23 250	to	23 350	0	0	1	0	1	0	0	1	1	0	0
23 350	to	23 450	0	0	1	0	1	0	0	1	1	1	0
23 450	to	23 550	0	0	1	0	1	0	0	1	0	1	0
23 550	to	23 650	0	0	1	0	1	0	0	1	0	1	1
23 650	to	23 750	0	0	1	0	1	0	0	1	0	0	1
23 750	to	23 850	0	0	1	0	1	0	1	1	0	0	1
23 850	to	23 950	0	0	1	0	1	0	1	1	0	1	1
23 950	to	24 050	0	0	1	0	1	0	1	1	0	1	0
24 050	to	24 150	0	0	1	0	1	0	1	1	1	1	0
24 150	to	24 250	0	0	1	0	1	0	1	1	1	0	0
24 250	to	24 350	0	0	1	0	1	0	1	0	1	0	0
24 350	to	24 450	0	0	1	0	1	0	1	0	1	1	0
24 450	to	24 550	0	0	1	0	1	0	1	0	0	1	0
24 550	to	24 650	0	0	1	0	1	0	1	0	0	1	1
24 650	to	24 750	0	0	1	0	1	0	1	0	0	0	1
24 750	to	24 850	0	0	1	0	1	1	1	0	0	0	1
24 850	to	24 950	0	0	1	0	1	1	1	0	0	1	1
24 950	to	25 050	0	0	1	0	1	1	1	0	0	1	0
25 050	to	25 150	0	0	1	0	1	1	1	0	1	1	0
25 150	to	25 250	0	0	1	0	1	1	1	0	1	0	0

RANGE			PULSE POSITIONS (0 or 1 in a pulse position denotes absence or presence of a pulse, respectively)										
Increments (Feet)			D_2	D_4	A_1	A_2	A_4	B_1	B_2	B_4	C_1	C_2	C_4
25 250	to	25 350	0	0	1	0	1	1	1	1	1	0	0
25 350	to	25 450	0	0	1	0	1	1	1	1	1	1	0
25 450	to	25 550	0	0	1	0	1	1	1	1	0	1	0
25 550	to	25 650	0	0	1	0	1	1	1	1	0	1	1
25 650	to	25 750	0	0	1	0	1	1	1	1	0	0	1
25 750	to	25 850	0	0	1	0	1	1	0	1	0	0	1
25 850	to	25 950	0	0	1	0	1	1	0	1	0	1	1
25 950	to	26 050	0	0	1	0	1	1	0	1	0	1	0
26 050	to	26 150	0	0	1	0	1	1	0	1	1	1	0
26 150	to	26 250	0	0	1	0	1	1	0	1	1	0	0
26 250	to	26 350	0	0	1	0	1	1	0	0	1	0	0
26 350	to	26 450	0	0	1	0	1	1	0	0	1	1	0
26 450	to	26 550	0	0	1	0	1	1	0	0	0	1	0
26 550	to	26 650	0	0	1	0	1	1	0	0	0	1	1
26 650	to	26 750	0	0	1	0	1	1	0	0	0	0	1
26 750	to	26 850	0	0	1	0	0	1	0	0	0	0	1
26 850	to	26 950	0	0	1	0	0	1	0	0	0	1	1
26 950	to	27 050	0	0	1	0	0	1	0	0	0	1	0
27 050	to	27 150	0	0	1	0	0	1	0	0	1	1	0
27 150	to	27 250	0	0	1	0	0	1	0	0	1	0	0
27 250	to	27 350	0	0	1	0	0	1	0	1	1	0	0
27 350	to	27 450	0	0	1	0	0	1	0	1	1	1	0
27 450	to	27 550	0	0	1	0	0	1	0	1	0	1	0
27 550	to	27 650	0	0	1	0	0	1	0	1	0	1	1
27 650	to	27 750	0	0	1	0	0	1	0	1	0	0	1
27 750	to	27 850	0	0	1	0	0	1	1	1	0	0	1
27 850	to	27 950	0	0	1	0	0	1	1	1	0	1	1
27 950	to	28 050	0	0	1	0	0	1	1	1	0	1	0
28 050	to	28 150	0	0	1	0	0	1	1	1	1	1	0
28 150	to	28 250	0	0	1	0	0	1	1	1	1	0	0
28 250	to	28 350	0	0	1	0	0	1	1	0	1	0	0
28 350	to	28 450	0	0	1	0	0	1	1	0	1	1	0
28 450	to	28 550	0	0	1	0	0	1	1	0	0	1	0
28 550	to	28 650	0	0	1	0	0	1	1	0	0	1	1
28 650	to	28 750	0	0	1	0	0	1	1	0	0	0	1
28 750	to	28 850	0	0	1	0	0	0	1	0	0	0	1
28 850	to	28 950	0	0	1	0	0	0	1	0	0	1	1
28 950	to	29 050	0	0	1	0	0	0	1	0	0	1	0
29 050	to	29 150	0	0	1	0	0	0	1	0	1	1	0
29 150	to	29 250	0	0	1	0	0	0	1	0	1	0	0
29 250	to	29 350	0	0	1	0	0	0	1	1	1	0	0
29 350	to	29 450	0	0	1	0	0	0	1	1	1	1	0
29 450	to	29 550	0	0	1	0	0	0	1	1	0	1	0
29 550	to	29 650	0	0	1	0	0	0	1	1	0	1	1
29 650	to	29 750	0	0	1	0	0	0	1	1	0	0	1

RANGE			PULSE POSITIONS *(0 or 1 in a pulse position denotes absence or presence of a pulse, respectively)*										
Increments *(Feet)*			D_2	D_4	A_1	A_2	A_4	B_1	B_2	B_4	C_1	C_2	C_4
29 750	to	29 850	0	0	1	0	0	0	0	1	0	0	1
29 850	to	29 950	0	0	1	0	0	0	0	1	0	1	1
29 950	to	30 050	0	0	1	0	0	0	0	1	0	1	0
30 050	to	30 150	0	0	1	0	0	0	0	1	1	1	0
30 150	to	30 250	0	0	1	0	0	0	0	1	1	0	0
30 250	to	30 350	0	0	1	0	0	0	0	0	1	0	0
30 350	to	30 450	0	0	1	0	0	0	0	0	1	1	0
30 450	to	30 550	0	0	1	0	0	0	0	0	0	1	0
30 550	to	30 650	0	0	1	0	0	0	0	0	0	1	1
30 650	to	30 750	0	0	1	0	0	0	0	0	0	0	1
30 750	to	30 850	0	1	1	0	0	0	0	0	0	0	1
30 850	to	30 950	0	1	1	0	0	0	0	0	0	1	1
30 950	to	31 050	0	1	1	0	0	0	0	0	0	1	0
31 050	to	31 150	0	1	1	0	0	0	0	0	1	1	0
31 150	to	31 250	0	1	1	0	0	0	0	0	1	0	0
31 250	to	31 350	0	1	1	0	0	0	0	1	1	0	0
31 350	to	31 450	0	1	1	0	0	0	0	1	1	1	0
31 450	to	31 550	0	1	1	0	0	0	0	1	0	1	0
31 550	to	31 650	0	1	1	0	0	0	0	1	0	1	1
31 650	to	31 750	0	1	1	0	0	0	0	1	0	0	1
31 750	to	31 850	0	1	1	0	0	0	1	1	0	0	1
31 850	to	31 950	0	1	1	0	0	0	1	1	0	1	1
31 950	to	32 050	0	1	1	0	0	0	1	1	0	1	0
32 050	to	32 150	0	1	1	0	0	0	1	1	1	1	0
32 150	to	32 250	0	1	1	0	0	0	1	1	1	0	0
32 250	to	32 350	0	1	1	0	0	0	1	0	1	0	0
32 350	to	32 450	0	1	1	0	0	0	1	0	1	1	0
32 450	to	32 550	0	1	1	0	0	0	1	0	0	1	0
32 550	to	32 650	0	1	1	0	0	0	1	0	0	1	1
32 650	to	32 750	0	1	1	0	0	0	1	0	0	0	1
32 750	to	32 850	0	1	1	0	0	1	1	0	0	0	1
32 850	to	32 950	0	1	1	0	0	1	1	0	0	1	1
32 950	to	33 050	0	1	1	0	0	1	1	0	0	1	0
33 050	to	33 150	0	1	1	0	0	1	1	0	1	1	0
33 150	to	33 250	0	1	1	0	0	1	1	0	1	0	0
33 250	to	33 350	0	1	1	0	0	1	1	1	1	0	0
33 350	to	33 450	0	1	1	0	0	1	1	1	1	1	0
33 450	to	33 550	0	1	1	0	0	1	1	1	0	1	0
33 550	to	33 650	0	1	1	0	0	1	1	1	0	1	1
33 650	to	33 750	0	1	1	0	0	1	1	1	0	0	1
33 750	to	33 850	0	1	1	0	0	1	0	1	0	0	1
33 850	to	33 950	0	1	1	0	0	1	0	1	0	1	1
33 950	to	34 050	0	1	1	0	0	1	0	1	0	1	0
34 050	to	34 150	0	1	1	0	0	1	0	1	1	1	0
34 150	to	34 250	0	1	1	0	0	1	0	1	1	0	0

RANGE			PULSE POSITIONS *(0 or 1 in a pulse position denotes absence or presence of a pulse, respectively)*										
Increments *(Feet)*			D_2	D_4	A_1	A_2	A_4	B_1	B_2	B_4	C_1	C_2	C_4
34 250	to	34 350	0	1	1	0	0	1	0	0	1	0	0
34 350	to	34 450	0	1	1	0	0	1	0	0	1	1	0
34 450	to	34 550	0	1	1	0	0	1	0	0	0	1	0
34 550	to	34 650	0	1	1	0	0	1	0	0	0	1	1
34 650	to	34 750	0	1	1	0	0	1	0	0	0	0	1
34 750	to	34 850	0	1	1	0	1	1	0	0	0	0	1
34 850	to	34 950	0	1	1	0	1	1	0	0	0	1	1
34 950	to	35 050	0	1	1	0	1	1	0	0	0	1	0
35 050	to	35 150	0	1	1	0	1	1	0	0	1	1	0
35 150	to	35 250	0	1	1	0	1	1	0	0	1	0	0
35 250	to	35 350	0	1	1	0	1	1	0	1	1	0	0
35 350	to	35 450	0	1	1	0	1	1	0	1	1	1	0
35 450	to	35 550	0	1	1	0	1	1	0	1	0	1	0
35 550	to	35 650	0	1	1	0	1	1	0	1	0	1	1
35 650	to	35 750	0	1	1	0	1	1	0	1	0	0	1
35 750	to	35 850	0	1	1	0	1	1	1	1	0	0	1
35 850	to	35 950	0	1	1	0	1	1	1	1	0	1	1
35 950	to	36 050	0	1	1	0	1	1	1	1	0	1	0
36 050	to	36 150	0	1	1	0	1	1	1	1	1	1	0
36 150	to	36 250	0	1	1	0	1	1	1	1	1	0	0
36 250	to	36 350	0	1	1	0	1	1	1	0	1	0	0
36 350	to	36 450	0	1	1	0	1	1	1	0	1	1	0
36 450	to	36 550	0	1	1	0	1	1	1	0	0	1	0
36 550	to	36 650	0	1	1	0	1	1	1	0	0	1	1
36 650	to	36 750	0	1	1	0	1	1	1	0	0	0	1
36 750	to	36 850	0	1	1	0	1	0	1	0	0	0	1
36 850	to	36 950	0	1	1	0	1	0	1	0	0	1	1
36 950	to	37 050	0	1	1	0	1	0	1	0	0	1	0
37 050	to	37 150	0	1	1	0	1	0	1	0	1	1	0
37 150	to	37 250	0	1	1	0	1	0	1	0	1	0	0
37 250	to	37 350	0	1	1	0	1	0	1	1	1	0	0
37 350	to	37 450	0	1	1	0	1	0	1	1	1	1	0
37 450	to	37 550	0	1	1	0	1	0	1	1	0	1	0
37 550	to	37 650	0	1	1	0	1	0	1	1	0	1	1
37 650	to	37 750	0	1	1	0	1	0	1	1	0	0	1
37 750	to	37 850	0	1	1	0	1	0	0	1	0	0	1
37 850	to	37 950	0	1	1	0	1	0	0	1	0	1	1
37 950	to	38 050	0	1	1	0	1	0	0	1	0	1	0
38 050	to	38 150	0	1	1	0	1	0	0	1	1	1	0
38 150	to	38 250	0	1	1	0	1	0	0	1	1	0	0
38 250	to	38 350	0	1	1	0	1	0	0	0	1	0	0
38 350	to	38 450	0	1	1	0	1	0	0	0	1	1	0
38 450	to	38 550	0	1	1	0	1	0	0	0	0	1	0
38 550	to	38 650	0	1	1	0	1	0	0	0	0	1	1
38 650	to	38 750	0	1	1	0	1	0	0	0	0	0	1

RANGE			PULSE POSITIONS *(0 or 1 in a pulse position denotes absence or presence of a pulse, respectively)*										
Increments *(Feet)*			D_2	D_4	A_1	A_2	A_4	B_1	B_2	B_4	C_1	C_2	C_4
38 750	to	38 850	0	1	1	1	1	0	0	0	0	0	1
38 850	to	38 950	0	1	1	1	1	0	0	0	0	1	1
38 950	to	39 050	0	1	1	1	1	0	0	0	0	1	0
39 050	to	39 150	0	1	1	1	1	0	0	0	1	1	0
39 150	to	39 250	0	1	1	1	1	0	0	0	1	0	0
39 250	to	39 350	0	1	1	1	1	0	0	1	1	0	0
39 350	to	39 450	0	1	1	1	1	0	0	1	1	1	0
39 450	to	39 550	0	1	1	1	1	0	0	1	0	1	0
39 550	to	39 650	0	1	1	1	1	0	0	1	0	1	1
39 650	to	39 750	0	1	1	1	1	0	0	1	0	0	1
39 750	to	39 850	0	1	1	1	1	0	1	1	0	0	1
39 850	to	39 950	0	1	1	1	1	0	1	1	0	1	1
39 950	to	40 050	0	1	1	1	1	0	1	1	0	1	0
40 050	to	40 150	0	1	1	1	1	0	1	1	1	1	0
40 150	to	40 250	0	1	1	1	1	0	1	1	1	0	0
40 250	to	40 350	0	1	1	1	1	0	1	0	1	0	0
40 350	to	40 450	0	1	1	1	1	0	1	0	1	1	0
40 450	to	40 550	0	1	1	1	1	0	1	0	0	1	0
40 550	to	40 650	0	1	1	1	1	0	1	0	0	1	1
40 650	to	40 750	0	1	1	1	1	0	1	0	0	0	1
40 750	to	40 850	0	1	1	1	1	1	1	0	0	0	1
40 850	to	40 950	0	1	1	1	1	1	1	0	0	1	1
40 950	to	41 050	0	1	1	1	1	1	1	0	0	1	0
41 050	to	41 150	0	1	1	1	1	1	1	0	1	1	0
41 150	to	41 250	0	1	1	1	1	1	1	0	1	0	0
41 250	to	41 350	0	1	1	1	1	1	1	1	1	0	0
41 350	to	41 450	0	1	1	1	1	1	1	1	1	1	0
41 450	to	41 550	0	1	1	1	1	1	1	1	0	1	0
41 550	to	41 650	0	1	1	1	1	1	1	1	0	1	1
41 650	to	41 750	0	1	1	1	1	1	1	1	0	0	1
41 750	to	41 850	0	1	1	1	1	1	0	1	0	0	1
41 850	to	41 950	0	1	1	1	1	1	0	1	0	1	1
41 950	to	42 050	0	1	1	1	1	1	0	1	0	1	0
42 050	to	42 150	0	1	1	1	1	1	0	1	1	1	0
42 150	to	42 250	0	1	1	1	1	1	0	1	1	0	0
42 250	to	42 350	0	1	1	1	1	1	0	0	1	0	0
42 350	to	42 450	0	1	1	1	1	1	0	0	1	1	0
42 450	to	42 550	0	1	1	1	1	1	0	0	0	1	0
42 550	to	42 650	0	1	1	1	1	1	0	0	0	1	1
42 650	to	42 750	0	1	1	1	1	1	0	0	0	0	1
42 750	to	42 850	0	1	1	1	0	1	0	0	0	0	1
42 850	to	42 950	0	1	1	1	0	1	0	0	0	1	1
42 950	to	43 050	0	1	1	1	0	1	0	0	0	1	0
43 050	to	43 150	0	1	1	1	0	1	0	0	1	1	0
43 150	to	43 250	0	1	1	1	0	1	0	0	1	0	0

RANGE	PULSE POSITIONS *(0 or 1 in a pulse position denotes absence or presence of a pulse, respectively)*										
Increments *(Feet)*	D_2	D_4	A_1	A_2	A_4	B_1	B_2	B_4	C_1	C_2	C_4
43 250 to 43 350	0	1	1	1	0	1	0	1	1	0	0
43 350 to 43 450	0	1	1	1	0	1	0	1	1	1	0
43 450 to 43 550	0	1	1	1	0	1	0	1	0	1	0
43 550 to 43 650	0	1	1	1	0	1	0	1	0	1	1
43 650 to 43 750	0	1	1	1	0	1	0	1	0	0	1
43 750 to 43 850	0	1	1	1	0	1	1	1	0	0	1
43 850 to 43 950	0	1	1	1	0	1	1	1	0	1	1
43 950 to 44 050	0	1	1	1	0	1	1	1	0	1	0
44 050 to 44 150	0	1	1	1	0	1	1	1	1	1	0
44 150 to 44 250	0	1	1	1	0	1	1	1	1	0	0
44 250 to 44 350	0	1	1	1	0	1	1	0	1	0	0
44 350 to 44 450	0	1	1	1	0	1	1	0	1	1	0
44 450 to 44 550	0	1	1	1	0	1	1	0	0	1	0
44 550 to 44 650	0	1	1	1	0	1	1	0	0	1	1
44 650 to 44 750	0	1	1	1	0	1	1	0	0	0	1
44 750 to 44 850	0	1	1	1	0	0	1	0	0	0	1
44 850 to 44 950	0	1	1	1	0	0	1	0	0	1	1
44 950 to 45 050	0	1	1	1	0	0	1	0	0	1	0
45 050 to 45 150	0	1	1	1	0	0	1	0	1	1	0
45 150 to 45 250	0	1	1	1	0	0	1	0	1	0	0
45 250 to 45 350	0	1	1	1	0	0	1	1	1	0	0
45 350 to 45 450	0	1	1	1	0	0	1	1	1	1	0
45 450 to 45 550	0	1	1	1	0	0	1	1	0	1	0
45 550 to 45 650	0	1	1	1	0	0	1	1	0	1	1
45 650 to 45 750	0	1	1	1	0	0	1	1	0	0	1
45 750 to 45 850	0	1	1	1	0	0	0	1	0	0	1
45 850 to 45 950	0	1	1	1	0	0	0	1	0	1	1
45 950 to 46 050	0	1	1	1	0	0	0	1	0	1	0
46 050 to 46 150	0	1	1	1	0	0	0	1	1	1	0
46 150 to 46 250	0	1	1	1	0	0	0	1	1	0	0
46 250 to 46 350	0	1	1	1	0	0	0	0	1	0	0
46 350 to 46 450	0	1	1	1	0	0	0	0	1	1	0
46 450 to 46 550	0	1	1	1	0	0	0	0	0	1	0
46 550 to 46 650	0	1	1	1	0	0	0	0	0	1	1
46 650 to 46 750	0	1	1	1	0	0	0	0	0	0	1
46 750 to 46 850	0	1	0	1	0	0	0	0	0	0	1
46 850 to 46 950	0	1	0	1	0	0	0	0	0	1	1
46 950 to 47 050	0	1	0	1	0	0	0	0	0	1	0
47 050 to 47 150	0	1	0	1	0	0	0	0	1	1	0
47 150 to 47 250	0	1	0	1	0	0	0	0	1	0	0
47 250 to 47 350	0	1	0	1	0	0	0	1	1	0	0
47 350 to 47 450	0	1	0	1	0	0	0	1	1	1	0
47 450 to 47 550	0	1	0	1	0	0	0	1	0	1	0
47 550 to 47 650	0	1	0	1	0	0	0	1	0	1	1
47 650 to 47 750	0	1	0	1	0	0	0	1	0	0	1

RANGE			PULSE POSITIONS *(0 or 1 in a pulse position denotes absence or presence of a pulse, respectively)*										
Increments *(Feet)*			D_2	D_4	A_1	A_2	A_4	B_1	B_2	B_4	C_1	C_2	C_4
47 750	to	47 850	0	1	0	1	0	0	1	1	0	0	1
47 850	to	47 950	0	1	0	1	0	0	1	1	0	1	1
47 950	to	48 050	0	1	0	1	0	0	1	1	0	1	0
48 050	to	48 150	0	1	0	1	0	0	1	1	1	1	0
48 150	to	48 250	0	1	0	1	0	0	1	1	1	0	0
48 250	to	48 350	0	1	0	1	0	0	1	0	1	0	0
48 350	to	48 450	0	1	0	1	0	0	1	0	1	1	0
48 450	to	48 550	0	1	0	1	0	0	1	0	0	1	0
48 550	to	48 650	0	1	0	1	0	0	1	0	0	1	1
48 650	to	48 750	0	1	0	1	0	0	1	0	0	0	1
48 750	to	48 850	0	1	0	1	0	1	1	0	0	0	1
48 850	to	48 950	0	1	0	1	0	1	1	0	0	1	1
48 950	to	49 050	0	1	0	1	0	1	1	0	0	1	0
49 050	to	49 150	0	1	0	1	0	1	1	0	1	1	0
49 150	to	49 250	0	1	0	1	0	1	1	0	1	0	0
49 250	to	49 350	0	1	0	1	0	1	1	1	1	0	0
49 350	to	49 450	0	1	0	1	0	1	1	1	1	1	0
49 450	to	49 550	0	1	0	1	0	1	1	1	0	1	0
49 550	to	49 650	0	1	0	1	0	1	1	1	0	1	1
49 650	to	49 750	0	1	0	1	0	1	1	1	0	0	1
49 750	to	49 850	0	1	0	1	0	1	0	1	0	0	1
49 850	to	49 950	0	1	0	1	0	1	0	1	0	1	1
49 950	to	50 050	0	1	0	1	0	1	0	1	0	1	0
50 050	to	50 150	0	1	0	1	0	1	0	1	1	1	0
50 150	to	50 250	0	1	0	1	0	1	0	1	1	0	0
50 250	to	50 350	0	1	0	1	0	1	0	0	1	0	0
50 350	to	50 450	0	1	0	1	0	1	0	0	1	1	0
50 450	to	50 550	0	1	0	1	0	1	0	0	0	1	0
50 550	to	50 650	0	1	0	1	0	1	0	0	0	1	1
50 650	to	50 750	0	1	0	1	0	1	0	0	0	0	1
50 750	to	50 850	0	1	0	1	1	1	0	0	0	0	1
50 850	to	50 950	0	1	0	1	1	1	0	0	0	1	1
50 950	to	51 050	0	1	0	1	1	1	0	0	0	1	0
51 050	to	51 150	0	1	0	1	1	1	0	0	1	1	0
51 150	to	51 250	0	1	0	1	1	1	0	0	1	0	0
51 250	to	51 350	0	1	0	1	1	1	0	1	1	0	0
51 350	to	51 450	0	1	0	1	1	1	0	1	1	1	0
51 450	to	51 550	0	1	0	1	1	1	0	1	0	1	0
51 550	to	51 650	0	1	0	1	1	1	0	1	0	1	1
51 650	to	51 750	0	1	0	1	1	1	0	1	0	0	1
51 750	to	51 850	0	1	0	1	1	1	1	1	0	0	1
51 850	to	51 950	0	1	0	1	1	1	1	1	0	1	1
51 950	to	52 050	0	1	0	1	1	1	1	1	0	1	0
52 050	to	52 150	0	1	0	1	1	1	1	1	1	1	0
52 150	to	52 250	0	1	0	1	1	1	1	1	1	0	0

RANGE			PULSE POSITIONS *(0 or 1 in a pulse position denotes absence or presence of a pulse, respectively)*										
Increments *(Feet)*			D_2	D_4	A_1	A_2	A_4	B_1	B_2	B_4	C_1	C_2	C_4
52 250	to	52 350	0	1	0	1	1	1	1	0	1	0	0
52 350	to	52 450	0	1	0	1	1	1	1	0	1	1	0
52 450	to	52 550	0	1	0	1	1	1	1	0	0	1	0
52 550	to	52 650	0	1	0	1	1	1	1	0	0	1	1
52 650	to	52 750	0	1	0	1	1	1	1	0	0	0	1
52 750	to	52 850	0	1	0	1	1	0	1	0	0	0	1
52 850	to	52 950	0	1	0	1	1	0	1	0	0	1	1
52 950	to	53 050	0	1	0	1	1	0	1	0	0	1	0
53 050	to	53 150	0	1	0	1	1	0	1	0	1	1	0
53 150	to	53 250	0	1	0	1	1	0	1	0	1	0	0
53 250	to	53 350	0	1	0	1	1	0	1	1	1	0	0
53 350	to	53 450	0	1	0	1	1	0	1	1	1	1	0
53 450	to	53 550	0	1	0	1	1	0	1	1	0	1	0
53 550	to	53 650	0	1	0	1	1	0	1	1	0	1	1
53 650	to	53 750	0	1	0	1	1	0	1	1	0	0	1
53 750	to	53 850	0	1	0	1	1	0	0	1	0	0	1
53 850	to	53 950	0	1	0	1	1	0	0	1	0	1	1
53 950	to	54 050	0	1	0	1	1	0	0	1	0	1	0
54 050	to	54 150	0	1	0	1	1	0	0	1	1	1	0
54 150	to	54 250	0	1	0	1	1	0	0	1	1	0	0
54 250	to	54 350	0	1	0	1	1	0	0	0	1	0	0
54 350	to	54 450	0	1	0	1	1	0	0	0	1	1	0
54 450	to	54 550	0	1	0	1	1	0	0	0	0	1	0
54 550	to	54 650	0	1	0	1	1	0	0	0	0	1	1
54 650	to	54 750	0	1	0	1	1	0	0	0	0	0	1
54 750	to	54 850	0	1	0	0	1	0	0	0	0	0	1
54 850	to	54 950	0	1	0	0	1	0	0	0	0	1	1
54 950	to	55 050	0	1	0	0	1	0	0	0	0	1	0
55 050	to	55 150	0	1	0	0	1	0	0	0	1	1	0
55 150	to	55 250	0	1	0	0	1	0	0	0	1	0	0
55 250	to	55 350	0	1	0	0	1	0	0	1	1	0	0
55 350	to	55 450	0	1	0	0	1	0	0	1	1	1	0
55 450	to	55 550	0	1	0	0	1	0	0	1	0	1	0
55 550	to	55 650	0	1	0	0	1	0	0	1	0	1	1
55 650	to	55 750	0	1	0	0	1	0	0	1	0	0	1
55 750	to	55 850	0	1	0	0	1	0	1	1	0	0	1
55 850	to	55 950	0	1	0	0	1	0	1	1	0	1	1
55 950	to	56 050	0	1	0	0	1	0	1	1	0	1	0
56 050	to	56 150	0	1	0	0	1	0	1	1	1	1	0
56 150	to	56 250	0	1	0	0	1	0	1	1	1	0	0
56 250	to	56 350	0	1	0	0	1	0	1	0	1	0	0
56 350	to	56 450	0	1	0	0	1	0	1	0	1	1	0
56 450	to	56 550	0	1	0	0	1	0	1	0	0	1	0
56 550	to	56 650	0	1	0	0	1	0	1	0	0	1	1
56 650	to	56 750	0	1	0	0	1	0	1	0	0	0	1

RANGE			PULSE POSITIONS (*0 or 1 in a pulse position denotes absence or presence of a pulse, respectively)*										
Increments (*Feet*)			D_2	D_4	A_1	A_2	A_4	B_1	B_2	B_4	C_1	C_2	C_4
56 750	to	56 850	0	1	0	0	1	1	1	0	0	0	1
56 850	to	56 950	0	1	0	0	1	1	1	0	0	1	1
56 950	to	57 050	0	1	0	0	1	1	1	0	0	1	0
57 050	to	57 150	0	1	0	0	1	1	1	0	1	1	0
57 150	to	57 250	0	1	0	0	1	1	1	0	1	0	0
57 250	to	57 350	0	1	0	0	1	1	1	1	1	0	0
57 350	to	57 450	0	1	0	0	1	1	1	1	1	1	0
57 450	to	57 550	0	1	0	0	1	1	1	1	0	1	0
57 550	to	57 650	0	1	0	0	1	1	1	1	0	1	1
57 650	to	57 750	0	1	0	0	1	1	1	1	0	0	1
57 750	to	57 850	0	1	0	0	1	1	0	1	0	0	1
57 850	to	57 950	0	1	0	0	1	1	0	1	0	1	1
57 950	to	58 050	0	1	0	0	1	1	0	1	0	1	0
58 050	to	58 150	0	1	0	0	1	1	0	1	1	1	0
58 150	to	58 250	0	1	0	0	1	1	0	1	1	0	0
58 250	to	58 350	0	1	0	0	1	1	0	0	1	0	0
58 350	to	58 450	0	1	0	0	1	1	0	0	1	1	0
58 450	to	58 550	0	1	0	0	1	1	0	0	0	1	0
58 550	to	58 650	0	1	0	0	1	1	0	0	0	1	1
58 650	to	58 750	0	1	0	0	1	1	0	0	0	0	1
58 750	to	58 850	0	1	0	0	0	1	0	0	0	0	1
58 850	to	58 950	0	1	0	0	0	1	0	0	0	1	1
58 950	to	59 050	0	1	0	0	0	1	0	0	0	1	0
59 050	to	59 150	0	1	0	0	0	1	0	0	1	1	0
59 150	to	59 250	0	1	0	0	0	1	0	0	1	0	0
59 250	to	59 350	0	1	0	0	0	1	0	1	1	0	0
59 350	to	59 450	0	1	0	0	0	1	0	1	1	1	0
59 450	to	59 550	0	1	0	0	0	1	0	1	0	1	0
59 550	to	59 650	0	1	0	0	0	1	0	1	0	1	1
59 650	to	59 750	0	1	0	0	0	1	0	1	0	0	1
59 750	to	59 850	0	1	0	0	0	1	1	1	0	0	1
59 850	to	59 950	0	1	0	0	0	1	1	1	0	1	1
59 950	to	60 050	0	1	0	0	0	1	1	1	0	1	0
60 050	to	60 150	0	1	0	0	0	1	1	1	1	1	0
60 150	to	60 250	0	1	0	0	0	1	1	1	1	0	0
60 250	to	60 350	0	1	0	0	0	1	1	0	1	0	0
60 350	to	60 450	0	1	0	0	0	1	1	0	1	1	0
60 450	to	60 550	0	1	0	0	0	1	1	0	0	1	0
60 550	to	60 650	0	1	0	0	0	1	1	0	0	1	1
60 650	to	60 750	0	1	0	0	0	1	1	0	0	0	1
60 750	to	60 850	0	1	0	0	0	0	1	0	0	0	1
60 850	to	60 950	0	1	0	0	0	0	1	0	0	1	1
60 950	to	61 050	0	1	0	0	0	0	1	0	0	1	0
61 050	to	61 150	0	1	0	0	0	0	1	0	1	1	0
61 150	to	61 250	0	1	0	0	0	0	1	0	1	0	0

RANGE			PULSE POSITIONS *(0 or 1 in a pulse position denotes absence or presence of a pulse, respectively)*										
Increments *(Feet)*			D_2	D_4	A_1	A_2	A_4	B_1	B_2	B_4	C_1	C_2	C_4
61 250	to	61 350	0	1	0	0	0	0	1	1	1	0	0
61 350	to	61 450	0	1	0	0	0	0	1	1	1	1	0
61 450	to	61 550	0	1	0	0	0	0	1	1	0	1	0
61 550	to	61 650	0	1	0	0	0	0	1	1	0	1	1
61 650	to	61 750	0	1	0	0	0	0	1	1	0	0	1
61 750	to	61 850	0	1	0	0	0	0	0	1	0	0	1
61 850	to	61 950	0	1	0	0	0	0	0	1	0	1	1
61 950	to	62 050	0	1	0	0	0	0	0	1	0	1	0
62 050	to	62 150	0	1	0	0	0	0	0	1	1	1	0
62 150	to	62 250	0	1	0	0	0	0	0	1	1	0	0
62 250	to	62 350	0	1	0	0	0	0	0	0	1	0	0
62 350	to	62 450	0	1	0	0	0	0	0	0	1	1	0
62 450	to	62 550	0	1	0	0	0	0	0	0	0	1	0
62 550	to	62 650	0	1	0	0	0	0	0	0	0	1	1
62 650	to	62 750	0	1	0	0	0	0	0	0	0	0	1
62 750	to	62 850	1	1	0	0	0	0	0	0	0	0	1
62 850	to	62 950	1	1	0	0	0	0	0	0	0	1	1
62 950	to	63 050	1	1	0	0	0	0	0	0	0	1	0
63 050	to	63 150	1	1	0	0	0	0	0	0	1	1	0
63 150	to	63 250	1	1	0	0	0	0	0	0	1	0	0
63 250	to	63 350	1	1	0	0	0	0	0	1	1	0	0
63 350	to	63 450	1	1	0	0	0	0	0	1	1	1	0
63 450	to	63 550	1	1	0	0	0	0	0	1	0	1	0
63 550	to	63 650	1	1	0	0	0	0	0	1	0	1	1
63 650	to	63 750	1	1	0	0	0	0	0	1	0	0	1
63 750	to	63 850	1	1	0	0	0	0	1	1	0	0	1
63 850	to	63 950	1	1	0	0	0	0	1	1	0	1	1
63 950	to	64 050	1	1	0	0	0	0	1	1	0	1	0
64 050	to	64 150	1	1	0	0	0	0	1	1	1	1	0
64 150	to	64 250	1	1	0	0	0	0	1	1	1	0	0
64 250	to	64 350	1	1	0	0	0	0	1	0	1	0	0
64 350	to	64 450	1	1	0	0	0	0	1	0	1	1	0
64 450	to	64 550	1	1	0	0	0	0	1	0	0	1	0
64 550	to	64 650	1	1	0	0	0	0	1	0	0	1	1
64 650	to	64 750	1	1	0	0	0	0	1	0	0	0	1
64 750	to	64 850	1	1	0	0	0	1	1	0	0	0	1
64 850	to	64 950	1	1	0	0	0	1	1	0	0	1	1
64 950	to	65 050	1	1	0	0	0	1	1	0	0	1	0
65 050	to	65 150	1	1	0	0	0	1	1	0	1	1	0
65 150	to	65 250	1	1	0	0	0	1	1	0	1	0	0
65 250	to	65 350	1	1	0	0	0	1	1	1	1	0	0
65 350	to	65 450	1	1	0	0	0	1	1	1	1	1	0
65 450	to	65 550	1	1	0	0	0	1	1	1	0	1	0
65 550	to	65 650	1	1	0	0	0	1	1	1	0	1	1
65 650	to	65 750	1	1	0	0	0	1	1	1	0	0	1

RANGE			PULSE POSITIONS *(0 or 1 in a pulse position denotes absence or presence of a pulse, respectively)*										
Increments *(Feet)*			D_2	D_4	A_1	A_2	A_4	B_1	B_2	B_4	C_1	C_2	C_4
65 750	to	65 850	1	1	0	0	0	1	0	1	0	0	1
65 850	to	65 950	1	1	0	0	0	1	0	1	0	1	1
65 950	to	66 050	1	1	0	0	0	1	0	1	0	1	0
66 050	to	66 150	1	1	0	0	0	1	0	1	1	1	0
66 150	to	66 250	1	1	0	0	0	1	0	1	1	0	0
66 250	to	66 350	1	1	0	0	0	1	0	0	1	0	0
66 350	to	66 450	1	1	0	0	0	1	0	0	1	1	0
66 450	to	66 550	1	1	0	0	0	1	0	0	0	1	0
66 550	to	66 650	1	1	0	0	0	1	0	0	0	1	1
66 650	to	66 750	1	1	0	0	0	1	0	0	0	0	1
66 750	to	66 850	1	1	0	0	1	1	0	0	0	0	1
66 850	to	66 950	1	1	0	0	1	1	0	0	0	1	1
66 950	to	67 050	1	1	0	0	1	1	0	0	0	1	0
67 050	to	67 150	1	1	0	0	1	1	0	0	1	1	0
67 150	to	67 250	1	1	0	0	1	1	0	0	1	0	0
67 250	to	67 350	1	1	0	0	1	1	0	1	1	0	0
67 350	to	67 450	1	1	0	0	1	1	0	1	1	1	0
67 450	to	67 550	1	1	0	0	1	1	0	1	0	1	0
67 550	to	67 650	1	1	0	0	1	1	0	1	0	1	1
67 650	to	67 750	1	1	0	0	1	1	0	1	0	0	1
67 750	to	67 850	1	1	0	0	1	1	1	1	0	0	1
67 850	to	67 950	1	1	0	0	1	1	1	1	0	1	1
67 950	to	68 050	1	1	0	0	1	1	1	1	0	1	0
68 050	to	68 150	1	1	0	0	1	1	1	1	1	1	0
68 150	to	68 250	1	1	0	0	1	1	1	1	1	0	0
68 250	to	68 350	1	1	0	0	1	1	1	0	1	0	0
68 350	to	68 450	1	1	0	0	1	1	1	0	1	1	0
68 450	to	68 550	1	1	0	0	1	1	1	0	0	1	0
68 550	to	68 650	1	1	0	0	1	1	1	0	0	1	1
68 650	to	68 750	1	1	0	0	1	1	1	0	0	0	1
68 750	to	68 850	1	1	0	0	1	0	1	0	0	0	1
68 850	to	68 950	1	1	0	0	1	0	1	0	0	1	1
68 950	to	69 050	1	1	0	0	1	0	1	0	0	1	0
69 050	to	69 150	1	1	0	0	1	0	1	0	1	1	0
69 150	to	69 250	1	1	0	0	1	0	1	0	1	0	0
69 250	to	69 350	1	1	0	0	1	0	1	1	1	0	0
69 350	to	69 450	1	1	0	0	1	0	1	1	1	1	0
69 450	to	69 550	1	1	0	0	1	0	1	1	0	1	0
69 550	to	69 650	1	1	0	0	1	0	1	1	0	1	1
69 650	to	69 750	1	1	0	0	1	0	1	1	0	0	1
69 750	to	69 850	1	1	0	0	1	0	0	1	0	0	1
69 850	to	69 950	1	1	0	0	1	0	0	1	0	1	1
69 950	to	70 050	1	1	0	0	1	0	0	1	0	1	0
70 050	to	70 150	1	1	0	0	1	0	0	1	1	1	0
70 150	to	70 250	1	1	0	0	1	0	0	1	1	0	0

RANGE	PULSE POSITIONS *(0 or 1 in a pulse position denotes absence or presence of a pulse, respectively)*										
Increments *(Feet)*	D_2	D_4	A_1	A_2	A_4	B_1	B_2	B_4	C_1	C_2	C_4
70 250 to 70 350	1	1	0	0	1	0	0	0	1	0	0
70 350 to 70 450	1	1	0	0	1	0	0	0	1	1	0
70 450 to 70 550	1	1	0	0	1	0	0	0	0	1	0
70 550 to 70 650	1	1	0	0	1	0	0	0	0	1	1
70 650 to 70 750	1	1	0	0	1	0	0	0	0	0	1
70 750 to 70 850	1	1	0	1	1	0	0	0	0	0	1
70 850 to 70 950	1	1	0	1	1	0	0	0	0	1	1
70 950 to 71 050	1	1	0	1	1	0	0	0	0	1	0
71 050 to 71 150	1	1	0	1	1	0	0	0	1	1	0
71 150 to 71 250	1	1	0	1	1	0	0	0	1	0	0
71 250 to 71 350	1	1	0	1	1	0	0	1	1	0	0
71 350 to 71 450	1	1	0	1	1	0	0	1	1	1	0
71 450 to 71 550	1	1	0	1	1	0	0	1	0	1	0
71 550 to 71 650	1	1	0	1	1	0	0	1	0	1	1
71 650 to 71 750	1	1	0	1	1	0	0	1	0	0	1
71 750 to 71 850	1	1	0	1	1	0	1	1	0	0	1
71 850 to 71 950	1	1	0	1	1	0	1	1	0	1	1
71 950 to 72 050	1	1	0	1	1	0	1	1	0	1	0
72 050 to 72 150	1	1	0	1	1	0	1	1	1	1	0
72 150 to 72 250	1	1	0	1	1	0	1	1	1	0	0
72 250 to 72 350	1	1	0	1	1	0	1	0	1	0	0
72 350 to 72 450	1	1	0	1	1	0	1	0	1	1	0
72 450 to 72 550	1	1	0	1	1	0	1	0	0	1	0
72 550 to 72 650	1	1	0	1	1	0	1	0	0	1	1
72 650 to 72 750	1	1	0	1	1	0	1	0	0	0	1
72 750 to 72 850	1	1	0	1	1	1	1	0	0	0	1
72 850 to 72 950	1	1	0	1	1	1	1	0	0	1	1
72 950 to 73 050	1	1	0	1	1	1	1	0	0	1	0
73 050 to 73 150	1	1	0	1	1	1	1	0	1	1	0
73 150 to 73 250	1	1	0	1	1	1	1	0	1	0	0
73 250 to 73 350	1	1	0	1	1	1	1	1	1	0	0
73 350 to 73 450	1	1	0	1	1	1	1	1	1	1	0
73 450 to 73 550	1	1	0	1	1	1	1	1	0	1	0
73 550 to 73 650	1	1	0	1	1	1	1	1	0	1	1
73 650 to 73 750	1	1	0	1	1	1	1	1	0	0	1
73 750 to 73 850	1	1	0	1	1	1	0	1	0	0	1
73 850 to 73 950	1	1	0	1	1	1	0	1	0	1	1
73 950 to 74 050	1	1	0	1	1	1	0	1	0	1	0
74 050 to 74 150	1	1	0	1	1	1	0	1	1	1	0
74 150 to 74 250	1	1	0	1	1	1	0	1	1	0	0
74 250 to 74 350	1	1	0	1	1	1	0	0	1	0	0
74 350 to 74 450	1	1	0	1	1	1	0	0	1	1	0
74 450 to 74 550	1	1	0	1	1	1	0	0	0	1	0
74 550 to 74 650	1	1	0	1	1	1	0	0	0	1	1
74 650 to 74 750	1	1	0	1	1	1	0	0	0	0	1

RANGE			PULSE POSITIONS *(0 or 1 in a pulse position denotes absence or presence of a pulse, respectively)*										
Increments *(Feet)*			D_2	D_4	A_1	A_2	A_4	B_1	B_2	B_4	C_1	C_2	C_4
74 750	to	74 850	1	1	0	1	0	1	0	0	0	0	1
74 850	to	74 950	1	1	0	1	0	1	0	0	0	1	1
74 950	to	75 050	1	1	0	1	0	1	0	0	0	1	0
75 050	to	75 150	1	1	0	1	0	1	0	0	1	1	0
75 150	to	75 250	1	1	0	1	0	1	0	0	1	0	0
75 250	to	75 350	1	1	0	1	0	1	0	1	1	0	0
75 350	to	75 450	1	1	0	1	0	1	0	1	1	1	0
75 450	to	75 550	1	1	0	1	0	1	0	1	0	1	0
75 550	to	75 650	1	1	0	1	0	1	0	1	0	1	1
75 650	to	75 750	1	1	0	1	0	1	0	1	0	0	1
75 750	to	75 850	1	1	0	1	0	1	1	1	0	0	1
75 850	to	75 950	1	1	0	1	0	1	1	1	0	1	1
75 950	to	76 050	1	1	0	1	0	1	1	1	0	1	0
76 050	to	76 150	1	1	0	1	0	1	1	1	1	1	0
76 150	to	76 250	1	1	0	1	0	1	1	1	1	0	0
76 250	to	76 350	1	1	0	1	0	1	1	0	1	0	0
76 350	to	76 450	1	1	0	1	0	1	1	0	1	1	0
76 450	to	76 550	1	1	0	1	0	1	1	0	0	1	0
76 550	to	76 650	1	1	0	1	0	1	1	0	0	1	1
76 650	to	76 750	1	1	0	1	0	1	1	0	0	0	1
76 750	to	76 850	1	1	0	1	0	0	1	0	0	0	1
76 850	to	76 950	1	1	0	1	0	0	1	0	0	1	1
76 950	to	77 050	1	1	0	1	0	0	1	0	0	1	0
77 050	to	77 150	1	1	0	1	0	0	1	0	1	1	0
77 150	to	77 250	1	1	0	1	0	0	1	0	1	0	0
77 250	to	77 350	1	1	0	1	0	0	1	1	1	0	0
77 350	to	77 450	1	1	0	1	0	0	1	1	1	1	0
77 450	to	77 550	1	1	0	1	0	0	1	1	0	1	0
77 550	to	77 650	1	1	0	1	0	0	1	1	0	1	1
77 650	to	77 750	1	1	0	1	0	0	1	1	0	0	1
77 750	to	77 850	1	1	0	1	0	0	0	1	0	0	1
77 850	to	77 950	1	1	0	1	0	0	0	1	0	1	1
77 950	to	78 050	1	1	0	1	0	0	0	1	0	1	0
78 050	to	78 150	1	1	0	1	0	0	0	1	1	1	0
78 150	to	78 250	1	1	0	1	0	0	0	1	1	0	0
78 250	to	78 350	1	1	0	1	0	0	0	0	1	0	0
78 350	to	78 450	1	1	0	1	0	0	0	0	1	1	0
78 450	to	78 550	1	1	0	1	0	0	0	0	0	1	0
78 550	to	78 650	1	1	0	1	0	0	0	0	0	1	1
78 650	to	78 750	1	1	0	1	0	0	0	0	0	0	1
78 750	to	78 850	1	1	1	1	0	0	0	0	0	0	1
78 850	to	78 950	1	1	1	1	0	0	0	0	0	1	1
78 950	to	79 050	1	1	1	1	0	0	0	0	0	1	0
79 050	to	79 150	1	1	1	1	0	0	0	0	1	1	0
79 150	to	79 250	1	1	1	1	0	0	0	0	1	0	0

RANGE			PULSE POSITIONS *(0 or 1 in a pulse position denotes absence or presence of a pulse, respectively)*										
Increments *(Feet)*			D_2	D_4	A_1	A_2	A_4	B_1	B_2	B_4	C_1	C_2	C_4
79 250	to	79 350	1	1	1	1	0	0	0	1	1	0	0
79 350	to	79 450	1	1	1	1	0	0	0	1	1	1	0
79 450	to	79 550	1	1	1	1	0	0	0	1	0	1	0
79 550	to	79 650	1	1	1	1	0	0	0	1	0	1	1
79 650	to	79 750	1	1	1	1	0	0	0	1	0	0	1
79 750	to	79 850	1	1	1	1	0	0	1	1	0	0	1
79 850	to	79 950	1	1	1	1	0	0	1	1	0	1	1
79 950	to	80 050	1	1	1	1	0	0	1	1	0	1	0
80 050	to	80 150	1	1	1	1	0	0	1	1	1	1	0
80 150	to	80 250	1	1	1	1	0	0	1	1	1	0	0
80 250	to	80 350	1	1	1	1	0	0	1	0	1	0	0
80 350	to	80 450	1	1	1	1	0	0	1	0	1	1	0
80 450	to	80 550	1	1	1	1	0	0	1	0	0	1	0
80 550	to	80 650	1	1	1	1	0	0	1	0	0	1	1
80 650	to	80 750	1	1	1	1	0	0	1	0	0	0	1
80 750	to	80 850	1	1	1	1	0	1	1	0	0	0	1
80 850	to	80 950	1	1	1	1	0	1	1	0	0	1	1
80 950	to	81 050	1	1	1	1	0	1	1	0	0	1	0
81 050	to	81 150	1	1	1	1	0	1	1	0	1	1	0
81 150	to	81 250	1	1	1	1	0	1	1	0	1	0	0
81 250	to	81 350	1	1	1	1	0	1	1	1	1	0	0
81 350	to	81 450	1	1	1	1	0	1	1	1	1	1	0
81 450	to	81 550	1	1	1	1	0	1	1	1	0	1	0
81 550	to	81 650	1	1	1	1	0	1	1	1	0	1	1
81 650	to	81 750	1	1	1	1	0	1	1	1	0	0	1
81 750	to	81 850	1	1	1	1	0	1	0	1	0	0	1
81 850	to	81 950	1	1	1	1	0	1	0	1	0	1	1
81 950	to	82 050	1	1	1	1	0	1	0	1	0	1	0
82 050	to	82 150	1	1	1	1	0	1	0	1	1	1	0
82 150	to	82 250	1	1	1	1	0	1	0	1	1	0	0
82 250	to	82 350	1	1	1	1	0	1	0	0	1	0	0
82 350	to	82 450	1	1	1	1	0	1	0	0	1	1	0
82 450	to	82 550	1	1	1	1	0	1	0	0	0	1	0
82 550	to	82 650	1	1	1	1	0	1	0	0	0	1	1
82 650	to	82 750	1	1	1	1	0	1	0	0	0	0	1
82 750	to	82 850	1	1	1	1	1	1	0	0	0	0	1
82 850	to	82 950	1	1	1	1	1	1	0	0	0	1	1
82 950	to	83 050	1	1	1	1	1	1	0	0	0	1	0
83 050	to	83 150	1	1	1	1	1	1	0	0	1	1	0
83 150	to	83 250	1	1	1	1	1	1	0	0	1	0	0
83 250	to	83 350	1	1	1	1	1	1	0	1	1	0	0
83 350	to	83 450	1	1	1	1	1	1	0	1	1	1	0
83 450	to	83 550	1	1	1	1	1	1	0	1	0	1	0
83 550	to	83 650	1	1	1	1	1	1	0	1	0	1	1
83 650	to	83 750	1	1	1	1	1	1	0	1	0	0	1

RANGE			PULSE POSITIONS (0 or 1 in a pulse position denotes absence or presence of a pulse, respectively)										
Increments (Feet)			D_2	D_4	A_1	A_2	A_4	B_1	B_2	B_4	C_1	C_2	C_4
83 750	to	83 850	1	1	1	1	1	1	1	1	0	0	1
83 850	to	83 950	1	1	1	1	1	1	1	1	0	1	1
83 950	to	84 050	1	1	1	1	1	1	1	1	0	1	0
84 050	to	84 150	1	1	1	1	1	1	1	1	1	1	0
84 150	to	84 250	1	1	1	1	1	1	1	1	1	0	0
84 250	to	84 350	1	1	1	1	1	1	1	0	1	0	0
84 350	to	84 450	1	1	1	1	1	1	1	0	1	1	0
84 450	to	84 550	1	1	1	1	1	1	1	0	0	1	0
84 550	to	84 650	1	1	1	1	1	1	1	0	0	1	1
84 650	to	84 750	1	1	1	1	1	1	1	0	0	0	1
84 750	to	84 850	1	1	1	1	1	0	1	0	0	0	1
84 850	to	84 950	1	1	1	1	1	0	1	0	0	1	1
84 950	to	85 050	1	1	1	1	1	0	1	0	0	1	0
85 050	to	85 150	1	1	1	1	1	0	1	0	1	1	0
85 150	to	85 250	1	1	1	1	1	0	1	0	1	0	0
85 250	to	85 350	1	1	1	1	1	0	1	1	1	0	0
85 350	to	85 450	1	1	1	1	1	0	1	1	1	1	0
85 450	to	85 550	1	1	1	1	1	0	1	1	0	1	0
85 550	to	85 650	1	1	1	1	1	0	1	1	0	1	1
85 650	to	85 750	1	1	1	1	1	0	1	1	0	0	1
85 750	to	85 850	1	1	1	1	1	0	0	1	0	0	1
85 850	to	85 950	1	1	1	1	1	0	0	1	0	1	1
85 950	to	86 050	1	1	1	1	1	0	0	1	0	1	0
86 050	to	86 150	1	1	1	1	1	0	0	1	1	1	0
86 150	to	86 250	1	1	1	1	1	0	0	1	1	0	0
86 250	to	86 350	1	1	1	1	1	0	0	0	1	0	0
86 350	to	86 450	1	1	1	1	1	0	0	0	1	1	0
86 450	to	86 550	1	1	1	1	1	0	0	0	0	1	0
86 550	to	86 650	1	1	1	1	1	0	0	0	0	1	1
86 650	to	86 750	1	1	1	1	1	0	0	0	0	0	1
86 750	to	86 850	1	1	1	0	1	0	0	0	0	0	1
86 850	to	86 950	1	1	1	0	1	0	0	0	0	1	1
86 950	to	87 050	1	1	1	0	1	0	0	0	0	1	0
87 050	to	87 150	1	1	1	0	1	0	0	0	1	1	0
87 150	to	87 250	1	1	1	0	1	0	0	0	1	0	0
87 250	to	87 350	1	1	1	0	1	0	0	1	1	0	0
87 350	to	87 450	1	1	1	0	1	0	0	1	1	1	0
87 450	to	87 550	1	1	1	0	1	0	0	1	0	1	0
87 550	to	87 650	1	1	1	0	1	0	0	1	0	1	1
87 650	to	87 750	1	1	1	0	1	0	0	1	0	0	1
87 750	to	87 850	1	1	1	0	1	0	1	1	0	0	1
87 850	to	87 950	1	1	1	0	1	0	1	1	0	1	1
87 950	to	88 050	1	1	1	0	1	0	1	1	0	1	0
88 050	to	88 150	1	1	1	0	1	0	1	1	1	1	0
88 150	to	88 250	1	1	1	0	1	0	1	1	1	0	0

RANGE			PULSE POSITIONS (*0 or 1 in a pulse position denotes absence or presence of a pulse, respectively)*										
Increments (*Feet)*			D_2	D_4	A_1	A_2	A_4	B_1	B_2	B_4	C_1	C_2	C_4
88 250	to	88 350	1	1	1	0	1	0	1	0	1	0	0
88 350	to	88 450	1	1	1	0	1	0	1	0	1	1	0
88 450	to	88 550	1	1	1	0	1	0	1	0	0	1	0
88 550	to	88 650	1	1	1	0	1	0	1	0	0	1	1
88 650	to	88 750	1	1	1	0	1	0	1	0	0	0	1
88 750	to	88 850	1	1	1	0	1	1	1	0	0	0	1
88 850	to	88 950	1	1	1	0	1	1	1	0	0	1	1
88 950	to	89 050	1	1	1	0	1	1	1	0	0	1	0
89 050	to	89 150	1	1	1	0	1	1	1	0	1	1	0
89 150	to	89 250	1	1	1	0	1	1	1	0	1	0	0
89 250	to	89 350	1	1	1	0	1	1	1	1	1	0	0
89 350	to	89 450	1	1	1	0	1	1	1	1	1	1	0
89 450	to	89 550	1	1	1	0	1	1	1	1	0	1	0
89 550	to	89 650	1	1	1	0	1	1	1	1	0	1	1
89 650	to	89 750	1	1	1	0	1	1	1	1	0	0	1
89 750	to	89 850	1	1	1	0	1	1	0	1	0	0	1
89 850	to	89 950	1	1	1	0	1	1	0	1	0	1	1
89 950	to	90 050	1	1	1	0	1	1	0	1	0	1	0
90 050	to	90 150	1	1	1	0	1	1	0	1	1	1	0
90 150	to	90 250	1	1	1	0	1	1	0	1	1	0	0
90 250	to	90 350	1	1	1	0	1	1	0	0	1	0	0
90 350	to	90 450	1	1	1	0	1	1	0	0	1	1	0
90 450	to	90 550	1	1	1	0	1	1	0	0	0	1	0
90 550	to	90 650	1	1	1	0	1	1	0	0	0	1	1
90 650	to	90 750	1	1	1	0	1	1	0	0	0	0	1
90 750	to	90 850	1	1	1	0	0	1	0	0	0	0	1
90 850	to	90 950	1	1	1	0	0	1	0	0	0	1	1
90 950	to	91 050	1	1	1	0	0	1	0	0	0	1	0
91 050	to	91 150	1	1	1	0	0	1	0	0	1	1	0
91 150	to	91 250	1	1	1	0	0	1	0	0	1	0	0
91 250	to	91 350	1	1	1	0	0	1	0	1	1	0	0
91 350	to	91 450	1	1	1	0	0	1	0	1	1	1	0
91 450	to	91 550	1	1	1	0	0	1	0	1	0	1	0
91 550	to	91 650	1	1	1	0	0	1	0	1	0	1	1
91 650	to	91 750	1	1	1	0	0	1	0	1	0	0	1
91 750	to	91 850	1	1	1	0	0	1	1	1	0	0	1
91 850	to	91 950	1	1	1	0	0	1	1	1	0	1	1
91 950	to	92 050	1	1	1	0	0	1	1	1	0	1	0
92 050	to	92 150	1	1	1	0	0	1	1	1	1	1	0
92 150	to	92 250	1	1	1	0	0	1	1	1	1	0	0
92 250	to	92 350	1	1	1	0	0	1	1	0	1	0	0
92 350	to	92 450	1	1	1	0	0	1	1	0	1	1	0
92 450	to	92 550	1	1	1	0	0	1	1	0	0	1	0
92 550	to	92 650	1	1	1	0	0	1	1	0	0	1	1
92 650	to	92 750	1	1	1	0	0	1	1	0	0	0	1

RANGE			PULSE POSITIONS *(0 or 1 in a pulse position denotes absence or presence of a pulse, respectively)*										
Increments *(Feet)*			D_2	D_4	A_1	A_2	A_4	B_1	B_2	B_4	C_1	C_2	C_4
92 750	to	92 850	1	1	1	0	0	0	1	0	0	0	1
92 850	to	92 950	1	1	1	0	0	0	1	0	0	1	1
92 950	to	93 050	1	1	1	0	0	0	1	0	0	1	0
93 050	to	93 150	1	1	1	0	0	0	1	0	1	1	0
93 150	to	93 250	1	1	1	0	0	0	1	0	1	0	0
93 250	to	93 350	1	1	1	0	0	0	1	1	1	0	0
93 350	to	93 450	1	1	1	0	0	0	1	1	1	1	0
93 450	to	93 550	1	1	1	0	0	0	1	1	0	1	0
93 550	to	93 650	1	1	1	0	0	0	1	1	0	1	1
93 650	to	93 750	1	1	1	0	0	0	1	1	0	0	1
93 750	to	93 850	1	1	1	0	0	0	0	1	0	0	1
93 850	to	93 950	1	1	1	0	0	0	0	1	0	1	1
93 950	to	94 050	1	1	1	0	0	0	0	1	0	1	0
94 050	to	94 150	1	1	1	0	0	0	0	1	1	1	0
94 150	to	94 250	1	1	1	0	0	0	0	1	1	0	0
94 250	to	94 350	1	1	1	0	0	0	0	0	1	0	0
94 350	to	94 450	1	1	1	0	0	0	0	0	1	1	0
94 450	to	94 550	1	1	1	0	0	0	0	0	0	1	0
94 550	to	94 650	1	1	1	0	0	0	0	0	0	1	1
94 650	to	94 750	1	1	1	0	0	0	0	0	0	0	1
94 750	to	94 850	1	0	1	0	0	0	0	0	0	0	1
94 850	to	94 950	1	0	1	0	0	0	0	0	0	1	1
94 950	to	95 050	1	0	1	0	0	0	0	0	0	1	0
95 050	to	95 150	1	0	1	0	0	0	0	0	1	1	0
95 150	to	95 250	1	0	1	0	0	0	0	0	1	0	0
95 250	to	95 350	1	0	1	0	0	0	0	1	1	0	0
95 350	to	95 450	1	0	1	0	0	0	0	1	1	1	0
95 450	to	95 550	1	0	1	0	0	0	0	1	0	1	0
95 550	to	95 650	1	0	1	0	0	0	0	1	0	1	1
95 650	to	95 750	1	0	1	0	0	0	0	1	0	0	1
95 750	to	95 850	1	0	1	0	0	0	1	1	0	0	1
95 850	to	95 950	1	0	1	0	0	0	1	1	0	1	1
95 950	to	96 050	1	0	1	0	0	0	1	1	0	1	0
96 050	to	96 150	1	0	1	0	0	0	1	1	1	1	0
96 150	to	96 250	1	0	1	0	0	0	1	1	1	0	0
96 250	to	96 350	1	0	1	0	0	0	1	0	1	0	0
96 350	to	96 450	1	0	1	0	0	0	1	0	1	1	0
96 450	to	96 550	1	0	1	0	0	0	1	0	0	1	0
96 550	to	96 650	1	0	1	0	0	0	1	0	0	1	1
96 650	to	96 750	1	0	1	0	0	0	1	0	0	0	1
96 750	to	96 850	1	0	1	0	0	1	1	0	0	0	1
96 850	to	96 950	1	0	1	0	0	1	1	0	0	1	1
96 950	to	97 050	1	0	1	0	0	1	1	0	0	1	0
97 050	to	97 150	1	0	1	0	0	1	1	0	1	1	0
97 150	to	97 250	1	0	1	0	0	1	1	0	1	0	0

RANGE			PULSE POSITIONS *(0 or 1 in a pulse position denotes absence or presence of a pulse, respectively)*										
Increments *(Feet)*			D_2	D_4	A_1	A_2	A_4	B_1	B_2	B_4	C_1	C_2	C_4
97 250	to	97 350	1	0	1	0	0	1	1	1	1	0	0
97 350	to	97 450	1	0	1	0	0	1	1	1	1	1	0
97 450	to	97 550	1	0	1	0	0	1	1	1	0	1	0
97 550	to	97 650	1	0	1	0	0	1	1	1	0	1	1
97 650	to	97 750	1	0	1	0	0	1	1	1	0	0	1
97 750	to	97 850	1	0	1	0	0	1	0	1	0	0	1
97 850	to	97 950	1	0	1	0	0	1	0	1	0	1	1
97 950	to	98 050	1	0	1	0	0	1	0	1	0	1	0
98 050	to	98 150	1	0	1	0	0	1	0	1	1	1	0
98 150	to	98 250	1	0	1	0	0	1	0	1	1	0	0
98 250	to	98 350	1	0	1	0	0	1	0	0	1	0	0
98 350	to	98 450	1	0	1	0	0	1	0	0	1	1	0
98 450	to	98 550	1	0	1	0	0	1	0	0	0	1	0
98 550	to	98 650	1	0	1	0	0	1	0	0	0	1	1
98 650	to	98 750	1	0	1	0	0	1	0	0	0	0	1
98 750	to	98 850	1	0	1	0	1	1	0	0	0	0	1
98 850	to	98 950	1	0	1	0	1	1	0	0	0	1	1
98 950	to	99 050	1	0	1	0	1	1	0	0	0	1	0
99 050	to	99 150	1	0	1	0	1	1	0	0	1	1	0
99 150	to	99 250	1	0	1	0	1	1	0	0	1	0	0
99 250	to	99 350	1	0	1	0	1	1	0	1	1	0	0
99 350	to	99 450	1	0	1	0	1	1	0	1	1	1	0
99 450	to	99 550	1	0	1	0	1	1	0	1	0	1	0
99 550	to	99 650	1	0	1	0	1	1	0	1	0	1	1
99 650	to	99 750	1	0	1	0	1	1	0	1	0	0	1
99 750	to	99 850	1	0	1	0	1	1	1	1	0	0	1
99 850	to	99 950	1	0	1	0	1	1	1	1	0	1	1
99 950	to	100 050	1	0	1	0	1	1	1	1	0	1	0
100 050	to	100 150	1	0	1	0	1	1	1	1	1	1	0
100 150	to	100 250	1	0	1	0	1	1	1	1	1	0	0
100 250	to	100 350	1	0	1	0	1	1	1	0	1	0	0
100 350	to	100 450	1	0	1	0	1	1	1	0	1	1	0
100 450	to	100 550	1	0	1	0	1	1	1	0	0	1	0
100 550	to	100 650	1	0	1	0	1	1	1	0	0	1	1
100 650	to	100 750	1	0	1	0	1	1	1	0	0	0	1
100 750	to	100 850	1	0	1	0	1	0	1	0	0	0	1
100 850	to	100 950	1	0	1	0	1	0	1	0	0	1	1
100 950	to	101 050	1	0	1	0	1	0	1	0	0	1	0
101 050	to	101 150	1	0	1	0	1	0	1	0	1	1	0
101 150	to	101 250	1	0	1	0	1	0	1	0	1	0	0
101 250	to	101 350	1	0	1	0	1	0	1	1	1	0	0
101 350	to	101 450	1	0	1	0	1	0	1	1	1	1	0
101 450	to	101 550	1	0	1	0	1	0	1	1	0	1	0
101 550	to	101 650	1	0	1	0	1	0	1	1	0	1	1
101 650	to	101 750	1	0	1	0	1	0	1	1	0	0	1

RANGE	PULSE POSITIONS *(0 or 1 in a pulse position denotes absence or presence of a pulse, respectively)*										
Increments *(Feet)*	D_2	D_4	A_1	A_2	A_4	B_1	B_2	B_4	C_1	C_2	C_4
101 750 to 101 850	1	0	1	0	1	0	0	1	0	0	1
101 850 to 101 950	1	0	1	0	1	0	0	1	0	1	1
101 950 to 102 050	1	0	1	0	1	0	0	1	0	1	0
102 050 to 102 150	1	0	1	0	1	0	0	1	1	1	0
102 150 to 102 250	1	0	1	0	1	0	0	1	1	0	0
102 250 to 102 350	1	0	1	0	1	0	0	0	1	0	0
102 350 to 102 450	1	0	1	0	1	0	0	0	1	1	0
102 450 to 102 550	1	0	1	0	1	0	0	0	0	1	0
102 550 to 102 650	1	0	1	0	1	0	0	0	0	1	1
102 650 to 102 750	1	0	1	0	1	0	0	0	0	0	1
102 750 to 102 850	1	0	1	1	1	0	0	0	0	0	1
102 850 to 102 950	1	0	1	1	1	0	0	0	0	1	1
102 950 to 103 050	1	0	1	1	1	0	0	0	0	1	0
103 050 to 103 150	1	0	1	1	1	0	0	0	1	1	0
103 150 to 103 250	1	0	1	1	1	0	0	0	1	0	0
103 250 to 103 350	1	0	1	1	1	0	0	1	1	0	0
103 350 to 103 450	1	0	1	1	1	0	0	1	1	1	0
103 450 to 103 550	1	0	1	1	1	0	0	1	0	1	0
103 550 to 103 650	1	0	1	1	1	0	0	1	0	1	1
103 650 to 103 750	1	0	1	1	1	0	0	1	0	0	1
103 750 to 103 850	1	0	1	1	1	0	1	1	0	0	1
103 850 to 103 950	1	0	1	1	1	0	1	1	0	1	1
103 950 to 104 050	1	0	1	1	1	0	1	1	0	1	0
104 050 to 104 150	1	0	1	1	1	0	1	1	1	1	0
104 150 to 104 250	1	0	1	1	1	0	1	1	1	0	0
104 250 to 104 350	1	0	1	1	1	0	1	0	1	0	0
104 350 to 104 450	1	0	1	1	1	0	1	0	1	1	0
104 450 to 104 550	1	0	1	1	1	0	1	0	0	1	0
104 550 to 104 650	1	0	1	1	1	0	1	0	0	1	1
104 650 to 104 750	1	0	1	1	1	0	1	0	0	0	1
104 750 to 104 850	1	0	1	1	1	1	1	0	0	0	1
104 850 to 104 950	1	0	1	1	1	1	1	0	0	1	1
104 950 to 105 050	1	0	1	1	1	1	1	0	0	1	0
105 050 to 105 150	1	0	1	1	1	1	1	0	1	1	0
105 150 to 105 250	1	0	1	1	1	1	1	0	1	0	0
105 250 to 105 350	1	0	1	1	1	1	1	1	1	0	0
105 350 to 105 450	1	0	1	1	1	1	1	1	1	1	0
105 450 to 105 550	1	0	1	1	1	1	1	1	0	1	0
105 550 to 105 650	1	0	1	1	1	1	1	1	0	1	1
105 650 to 105 750	1	0	1	1	1	1	1	1	0	0	1
105 750 to 105 850	1	0	1	1	1	1	0	1	0	0	1
105 850 to 105 950	1	0	1	1	1	1	0	1	0	1	1
105 950 to 106 050	1	0	1	1	1	1	0	1	0	1	0
106 050 to 106 150	1	0	1	1	1	1	0	1	1	1	0
106 150 to 106 250	1	0	1	1	1	1	0	1	1	0	0

RANGE			PULSE POSITIONS *(0 or 1 in a pulse position denotes absence or presence of a pulse, respectively)*										
Increments *(Feet)*			D_2	D_4	A_1	A_2	A_4	B_1	B_2	B_4	C_1	C_2	C_4
106 250	to	106 350	1	0	1	1	1	1	0	0	1	0	0
106 350	to	106 450	1	0	1	1	1	1	0	0	1	1	0
106 450	to	106 550	1	0	1	1	1	1	0	0	0	1	0
106 550	to	106 650	1	0	1	1	1	1	0	0	0	1	1
106 650	to	106 750	1	0	1	1	1	1	0	0	0	0	1
106 750	to	106 850	1	0	1	1	0	1	0	0	0	0	1
106 850	to	106 950	1	0	1	1	0	1	0	0	0	1	1
106 950	to	107 050	1	0	1	1	0	1	0	0	0	1	0
107 050	to	107 150	1	0	1	1	0	1	0	0	1	1	0
107 150	to	107 250	1	0	1	1	0	1	0	0	1	0	0
107 250	to	107 350	1	0	1	1	0	1	0	1	1	0	0
107 350	to	107 450	1	0	1	1	0	1	0	1	1	1	0
107 450	to	107 550	1	0	1	1	0	1	0	1	0	1	0
107 550	to	107 650	1	0	1	1	0	1	0	1	0	1	1
107 650	to	107 750	1	0	1	1	0	1	0	1	0	0	1
107 750	to	107 850	1	0	1	1	0	1	1	1	0	0	1
107 850	to	107 950	1	0	1	1	0	1	1	1	0	1	1
107 950	to	108 050	1	0	1	1	0	1	1	1	0	1	0
108 050	to	108 150	1	0	1	1	0	1	1	1	1	1	0
108 150	to	108 250	1	0	1	1	0	1	1	1	1	0	0
108 250	to	108 350	1	0	1	1	0	1	1	0	1	0	0
108 350	to	108 450	1	0	1	1	0	1	1	0	1	1	0
108 450	to	108 550	1	0	1	1	0	1	1	0	0	1	0
108 550	to	108 650	1	0	1	1	0	1	1	0	0	1	1
108 650	to	108 750	1	0	1	1	0	1	1	0	0	0	1
108 750	to	108 850	1	0	1	1	0	0	1	0	0	0	1
108 850	to	108 950	1	0	1	1	0	0	1	0	0	1	1
108 950	to	109 050	1	0	1	1	0	0	1	0	0	1	0
109 050	to	109 150	1	0	1	1	0	0	1	0	1	1	0
109 150	to	109 250	1	0	1	1	0	0	1	0	1	0	0
109 250	to	109 350	1	0	1	1	0	0	1	1	1	0	0
109 350	to	109 450	1	0	1	1	0	0	1	1	1	1	0
109 450	to	109 550	1	0	1	1	0	0	1	1	0	1	0
109 550	to	109 650	1	0	1	1	0	0	1	1	0	1	1
109 650	to	109 750	1	0	1	1	0	0	1	1	0	0	1
109 750	to	109 850	1	0	1	1	0	0	0	1	0	0	1
109 850	to	109 950	1	0	1	1	0	0	0	1	0	1	1
109 950	to	110 050	1	0	1	1	0	0	0	1	0	1	0
110 050	to	110 150	1	0	1	1	0	0	0	1	1	1	0
110 150	to	110 250	1	0	1	1	0	0	0	1	1	0	0
110 250	to	110 350	1	0	1	1	0	0	0	0	1	0	0
110 350	to	110 450	1	0	1	1	0	0	0	0	1	1	0
110 450	to	110 550	1	0	1	1	0	0	0	0	0	1	0
110 550	to	110 650	1	0	1	1	0	0	0	0	0	1	1
110 650	to	110 750	1	0	1	1	0	0	0	0	0	0	1

RANGE	PULSE POSITIONS *(0 or 1 in a pulse position denotes absence or presence of a pulse, respectively)*										
Increments *(Feet)*	D_2	D_4	A_1	A_2	A_4	B_1	B_2	B_4	C_1	C_2	C_4
110 750 to 110 850	1	0	0	1	0	0	0	0	0	0	1
110 850 to 110 950	1	0	0	1	0	0	0	0	0	1	1
110 950 to 111 050	1	0	0	1	0	0	0	0	0	1	0
111 050 to 111 150	1	0	0	1	0	0	0	0	1	1	0
111 150 to 111 250	1	0	0	1	0	0	0	0	1	0	0
111 250 to 111 350	1	0	0	1	0	0	0	1	1	0	0
111 350 to 111 450	1	0	0	1	0	0	0	1	1	1	0
111 450 to 111 550	1	0	0	1	0	0	0	1	0	1	0
111 550 to 111 650	1	0	0	1	0	0	0	1	0	1	1
111 650 to 111 750	1	0	0	1	0	0	0	1	0	0	1
111 750 to 111 850	1	0	0	1	0	0	1	1	0	0	1
111 850 to 111 950	1	0	0	1	0	0	1	1	0	1	1
111 950 to 112 050	1	0	0	1	0	0	1	1	0	1	0
112 050 to 112 150	1	0	0	1	0	0	1	1	1	1	0
112 150 to 112 250	1	0	0	1	0	0	1	1	1	0	0
112 250 to 112 350	1	0	0	1	0	0	1	0	1	0	0
112 350 to 112 450	1	0	0	1	0	0	1	0	1	1	0
112 450 to 112 550	1	0	0	1	0	0	1	0	0	1	0
112 550 to 112 650	1	0	0	1	0	0	1	0	0	1	1
112 650 to 112 750	1	0	0	1	0	0	1	0	0	0	1
112 750 to 112 850	1	0	0	1	0	1	1	0	0	0	1
112 850 to 112 950	1	0	0	1	0	1	1	0	0	1	1
112 950 to 113 050	1	0	0	1	0	1	1	0	0	1	0
113 050 to 113 150	1	0	0	1	0	1	1	0	1	1	0
113 150 to 113 250	1	0	0	1	0	1	1	0	1	0	0
113 250 to 113 350	1	0	0	1	0	1	1	1	1	0	0
113 350 to 113 450	1	0	0	1	0	1	1	1	1	1	0
113 450 to 113 550	1	0	0	1	0	1	1	1	0	1	0
113 550 to 113 650	1	0	0	1	0	1	1	1	0	1	1
113 650 to 113 750	1	0	0	1	0	1	1	1	0	0	1
113 750 to 113 850	1	0	0	1	0	1	0	1	0	0	1
113 850 to 113 950	1	0	0	1	0	1	0	1	0	1	1
113 950 to 114 050	1	0	0	1	0	1	0	1	0	1	0
114 050 to 114 150	1	0	0	1	0	1	0	1	1	1	0
114 150 to 114 250	1	0	0	1	0	1	0	1	1	0	0
114 250 to 114 350	1	0	0	1	0	1	0	0	1	0	0
114 350 to 114 450	1	0	0	1	0	1	0	0	1	1	0
114 450 to 114 550	1	0	0	1	0	1	0	0	0	1	0
114 550 to 114 650	1	0	0	1	0	1	0	0	0	1	1
114 650 to 114 750	1	0	0	1	0	1	0	0	0	0	1
114 750 to 114 850	1	0	0	1	1	1	0	0	0	0	1
114 850 to 114 950	1	0	0	1	1	1	0	0	0	1	1
114 950 to 115 050	1	0	0	1	1	1	0	0	0	1	0
115 050 to 115 150	1	0	0	1	1	1	0	0	1	1	0
115 150 to 115 250	1	0	0	1	1	1	0	0	1	0	0

RANGE			PULSE POSITIONS *(0 or 1 in a pulse position denotes absence or presence of a pulse, respectively)*										
Increments *(Feet)*			D_2	D_4	A_1	A_2	A_4	B_1	B_2	B_4	C_1	C_2	C_4
115 250	to	115 350	1	0	0	1	1	1	0	1	1	0	0
115 350	to	115 450	1	0	0	1	1	1	0	1	1	1	0
115 450	to	115 550	1	0	0	1	1	1	0	1	0	1	0
115 550	to	115 650	1	0	0	1	1	1	0	1	0	1	1
115 650	to	115 750	1	0	0	1	1	1	0	1	0	0	1
115 750	to	115 850	1	0	0	1	1	1	1	1	0	0	1
115 850	to	115 950	1	0	0	1	1	1	1	1	0	1	1
115 950	to	116 050	1	0	0	1	1	1	1	1	0	1	0
116 050	to	116 150	1	0	0	1	1	1	1	1	1	1	0
116 150	to	116 250	1	0	0	1	1	1	1	1	1	0	0
116 250	to	116 350	1	0	0	1	1	1	1	0	1	0	0
116 350	to	116 450	1	0	0	1	1	1	1	0	1	1	0
116 450	to	116 550	1	0	0	1	1	1	1	0	0	1	0
116 550	to	116 650	1	0	0	1	1	1	1	0	0	1	1
116 650	to	116 750	1	0	0	1	1	1	1	0	0	0	1
116 750	to	116 850	1	0	0	1	1	0	1	0	0	0	1
116 850	to	116 950	1	0	0	1	1	0	1	0	0	1	1
116 950	to	117 050	1	0	0	1	1	0	1	0	0	1	0
117 050	to	117 150	1	0	0	1	1	0	1	0	1	1	0
117 150	to	117 250	1	0	0	1	1	0	1	0	1	0	0
117 250	to	117 350	1	0	0	1	1	0	1	1	1	0	0
117 350	to	117 450	1	0	0	1	1	0	1	1	1	1	0
117 450	to	117 550	1	0	0	1	1	0	1	1	0	1	0
117 550	to	117 650	1	0	0	1	1	0	1	1	0	1	1
117 650	to	117 750	1	0	0	1	1	0	1	1	0	0	1
117 750	to	117 850	1	0	0	1	1	0	0	1	0	0	1
117 850	to	117 950	1	0	0	1	1	0	0	1	0	1	1
117 950	to	118 050	1	0	0	1	1	0	0	1	0	1	0
118 050	to	118 150	1	0	0	1	1	0	0	1	1	1	0
118 150	to	118 250	1	0	0	1	1	0	0	1	1	0	0
118 250	to	118 350	1	0	0	1	1	0	0	0	1	0	0
118 350	to	118 450	1	0	0	1	1	0	0	0	1	1	0
118 450	to	118 550	1	0	0	1	1	0	0	0	0	1	0
118 550	to	118 650	1	0	0	1	1	0	0	0	0	1	1
118 650	to	118 750	1	0	0	1	1	0	0	0	0	0	1
118 750	to	118 850	1	0	0	0	1	0	0	0	0	0	1
118 850	to	118 950	1	0	0	0	1	0	0	0	0	1	1
118 950	to	119 050	1	0	0	0	1	0	0	0	0	1	0
119 050	to	119 150	1	0	0	0	1	0	0	0	1	1	0
119 150	to	119 250	1	0	0	0	1	0	0	0	1	0	0
119 250	to	119 350	1	0	0	0	1	0	0	1	1	0	0
119 350	to	119 450	1	0	0	0	1	0	0	1	1	1	0
119 450	to	119 550	1	0	0	0	1	0	0	1	0	1	0
119 550	to	119 650	1	0	0	0	1	0	0	1	0	1	1
119 650	to	119 750	1	0	0	0	1	0	0	1	0	0	1

RANGE			PULSE POSITIONS *(0 or 1 in a pulse position denotes absence or presence of a pulse, respectively)*										
Increments *(Feet)*			D_2	D_4	A_1	A_2	A_4	B_1	B_2	B_4	C_1	C_2	C_4
119 750	to	119 850	1	0	0	0	1	0	1	1	0	0	1
119 850	to	119 950	1	0	0	0	1	0	1	1	0	1	1
119 950	to	120 050	1	0	0	0	1	0	1	1	0	1	0
120 050	to	120 150	1	0	0	0	1	0	1	1	1	1	0
120 150	to	120 250	1	0	0	0	1	0	1	1	1	0	0
120 250	to	120 350	1	0	0	0	1	0	1	0	1	0	0
120 350	to	120 450	1	0	0	0	1	0	1	0	1	1	0
120 450	to	120 550	1	0	0	0	1	0	1	0	0	1	0
120 550	to	120 650	1	0	0	0	1	0	1	0	0	1	1
120 650	to	120 750	1	0	0	0	1	0	1	0	0	0	1
120 750	to	120 850	1	0	0	0	1	1	1	0	0	0	1
120 850	to	120 950	1	0	0	0	1	1	1	0	0	1	1
120 950	to	121 050	1	0	0	0	1	1	1	0	0	1	0
121 050	to	121 150	1	0	0	0	1	1	1	0	1	1	0
121 150	to	121 250	1	0	0	0	1	1	1	0	1	0	0
121 250	to	121 350	1	0	0	0	1	1	1	1	1	0	0
121 350	to	121 450	1	0	0	0	1	1	1	1	1	1	0
121 450	to	121 550	1	0	0	0	1	1	1	1	0	1	0
121 550	to	121 650	1	0	0	0	1	1	1	1	0	1	1
121 650	to	121 750	1	0	0	0	1	1	1	1	0	0	1
121 750	to	121 850	1	0	0	0	1	1	0	1	0	0	1
121 850	to	121 950	1	0	0	0	1	1	0	1	0	1	1
121 950	to	122 050	1	0	0	0	1	1	0	1	0	1	0
122 050	to	122 150	1	0	0	0	1	1	0	1	1	1	0
122 150	to	122 250	1	0	0	0	1	1	0	1	1	0	0
122 250	to	122 350	1	0	0	0	1	1	0	0	1	0	0
122 350	to	122 450	1	0	0	0	1	1	0	0	1	1	0
122 450	to	122 550	1	0	0	0	1	1	0	0	0	1	0
122 550	to	122 650	1	0	0	0	1	1	0	0	0	1	1
122 650	to	122 750	1	0	0	0	1	1	0	0	0	0	1
122 750	to	122 850	1	0	0	0	0	1	0	0	0	0	1
122 850	to	122 950	1	0	0	0	0	1	0	0	0	1	1
122 950	to	123 050	1	0	0	0	0	1	0	0	0	1	0
123 050	to	123 150	1	0	0	0	0	1	0	0	1	1	0
123 150	to	123 250	1	0	0	0	0	1	0	0	1	0	0
123 250	to	123 350	1	0	0	0	0	1	0	1	1	0	0
123 350	to	123 450	1	0	0	0	0	1	0	1	1	1	0
123 450	to	123 550	1	0	0	0	0	1	0	1	0	1	0
123 550	to	123 650	1	0	0	0	0	1	0	1	0	1	1
123 650	to	123 750	1	0	0	0	0	1	0	1	0	0	1
123 750	to	123 850	1	0	0	0	0	1	1	1	0	0	1
123 850	to	123 950	1	0	0	0	0	1	1	1	0	1	1
123 950	to	124 050	1	0	0	0	0	1	1	1	0	1	0
124 050	to	124 150	1	0	0	0	0	1	1	1	1	1	0
124 150	to	124 250	1	0	0	0	0	1	1	1	1	0	0

RANGE			PULSE POSITIONS *(0 or 1 in a pulse position denotes absence or presence of a pulse, respectively)*										
Increments *(Feet)*			D_2	D_4	A_1	A_2	A_4	B_1	B_2	B_4	C_1	C_2	C_4
124 250	to	124 350	1	0	0	0	0	1	1	0	1	0	0
124 350	to	124 450	1	0	0	0	0	1	1	0	1	1	0
124 450	to	124 550	1	0	0	0	0	1	1	0	0	1	0
124 550	to	124 650	1	0	0	0	0	1	1	0	0	1	1
124 650	to	124 750	1	0	0	0	0	1	1	0	0	0	1
124 750	to	124 850	1	0	0	0	0	0	1	0	0	0	1
124 850	to	124 950	1	0	0	0	0	0	1	0	0	1	1
124 950	to	125 050	1	0	0	0	0	0	1	0	0	1	0
125 050	to	125 150	1	0	0	0	0	0	1	0	1	1	0
125 150	to	125 250	1	0	0	0	0	0	1	0	1	0	0
125 250	to	125 350	1	0	0	0	0	0	1	1	1	0	0
125 350	to	125 450	1	0	0	0	0	0	1	1	1	1	0
125 450	to	125 550	1	0	0	0	0	0	1	1	0	1	0
125 550	to	125 650	1	0	0	0	0	0	1	1	0	1	1
125 650	to	125 750	1	0	0	0	0	0	1	1	0	0	1
125 750	to	125 850	1	0	0	0	0	0	0	1	0	0	1
125 850	to	125 950	1	0	0	0	0	0	0	1	0	1	1
125 950	to	126 050	1	0	0	0	0	0	0	1	0	1	0
126 050	to	126 150	1	0	0	0	0	0	0	1	1	1	0
126 150	to	126 250	1	0	0	0	0	0	0	1	1	0	0
126 250	to	126 350	1	0	0	0	0	0	0	0	1	0	0
126 350	to	126 450	1	0	0	0	0	0	0	0	1	1	0
126 450	to	126 550	1	0	0	0	0	0	0	0	0	1	0
126 550	to	126 650	1	0	0	0	0	0	0	0	0	1	1
126 650	to	126 750	1	0	0	0	0	0	0	0	0	0	1

CHAPTER 4. AIRBORNE COLLISION AVOIDANCE SYSTEM

Note 1.— Guidance material relating to the airborne collision avoidance system is contained in the Attachment.

Note 2.— Non-SI alternative units are used as permitted by Annex 5, Chapter 3, 3.2.2. In limited cases, to ensure consistency at the level of the logic calculations, units such as ft/s, NM/s and kt/s are used.

4.1 DEFINITIONS RELATING TO AIRBORNE COLLISION AVOIDANCE SYSTEM

ACAS I. An ACAS which provides information as an aid to "see and avoid" action but does not include the capability for generating resolution advisories (RAs).

Note.— ACAS I is not intended for international implementation and standardization by ICAO. Therefore, only ACAS I characteristics required to ensure compatible operation with other ACAS configurations and interference limiting are defined in 4.2.

ACAS II. An ACAS which provides vertical resolution advisories (RAs) in addition to traffic advisories (TAs).

ACAS III. An ACAS which provides vertical and horizontal resolution advisories (RAs) in addition to traffic advisories (TAs).

ACAS broadcast. A long Mode S air-air surveillance interrogation (UF = 16) with the broadcast address.

Active RAC. An RAC is active if it currently constrains the selection of the RA. RACs that have been received within the last six seconds and have not been explicitly cancelled are active.

Altitude crossing RA. A resolution advisory is altitude crossing if own ACAS aircraft is currently at least 30 m (100 ft) below or above the threat aircraft for upward or downward sense advisories, respectively.

Climb RA. A positive RA recommending a climb but not an increased climb.

Closest approach. The occurrence of minimum range between own ACAS aircraft and the intruder. Thus range at closest approach is the smallest range between the two aircraft and time of closest approach is the time at which this occurs.

Coordination. The process by which two ACAS-equipped aircraft select compatible resolution advisories (RAs) by the exchange of resolution advisory complements (RACs).

Coordination interrogation. A Mode S interrogation (uplink transmission) radiated by ACAS II or III and containing a resolution message.

Coordination reply. A Mode S reply (downlink transmission) acknowledging the receipt of a coordination interrogation by the Mode S transponder that is part of an ACAS II or III installation.

Corrective RA. A resolution advisory that advises the pilot to deviate from the current flight path.

Cycle. The term "cycle" used in this chapter refers to one complete pass through the sequence of functions executed by ACAS II or ACAS III, nominally once a second.

Descend RA. A positive RA recommending a descent but not an increased descent.

Established track. A track generated by ACAS air-air surveillance that is treated as the track of an actual aircraft.

Increased rate RA. A resolution advisory with a strength that recommends increasing the altitude rate to a value exceeding that recommended by a previous climb or descend RA.

Intruder. An SSR transponder-equipped aircraft within the surveillance range of ACAS for which ACAS has an established track.

Own aircraft. The aircraft fitted with the ACAS that is the subject of the discourse, which ACAS is to protect against possible collisions, and which may enter a manoeuvre in response to an ACAS indication.

Positive RA. A resolution advisory that advises the pilot either to climb or to descend (applies to ACAS II).

Potential threat. An intruder deserving special attention either because of its close proximity to own aircraft or because successive range and altitude measurements indicate that it could be on a collision or near-collision course with own aircraft. The warning time provided against a potential threat is sufficiently small that a traffic advisory (TA) is justified but not so small that a resolution advisory (RA) would be justified.

Preventive RA. A resolution advisory that advises the pilot to avoid certain deviations from the current flight path but does not require any change in the current flight path.

RA sense. The sense of an ACAS II RA is "upward" if it requires climb or limitation of descent rate and "downward" if it requires descent or limitation of climb rate. It can be both upward and downward simultaneously if it requires limitation of the vertical rate to a specified range.

Note.— The RA sense may be both upward and downward when, having several simultaneous threats, ACAS generates an RA aimed at ensuring adequate separation below some threat(s) and above some other threat(s).

Resolution advisory (RA). An indication given to the flight crew recommending:

a) a manoeuvre intended to provide separation from all threats; or

b) a manoeuvre restriction intended to maintain existing separation.

Resolution advisory complement (RAC). Information provided by one ACAS to another via a Mode S interrogation in order to ensure complementary manoeuvres by restricting the choice of manoeuvres available to the ACAS receiving the RAC.

Resolution advisory complements record (RAC record). A composite of all currently active vertical RACs (VRCs) and horizontal RACs (HRCs) that have been received by ACAS. This information is provided by one ACAS to another ACAS or to a Mode S ground station via a Mode S reply.

Resolution advisory strength. The magnitude of the manoeuvre indicated by the RA. An RA may take on several successive strengths before being cancelled. Once a new RA strength is issued, the previous one automatically becomes void.

Resolution message. The message containing the resolution advisory complement (RAC).

Reversed sense RA. A resolution advisory that has had its sense reversed.

Sensitivity level (S). An integer defining a set of parameters used by the traffic advisory (TA) and collision avoidance algorithms to control the warning time provided by the potential threat and threat detection logic, as well as the values of parameters relevant to the RA selection logic.

Threat. An intruder deserving special attention either because of its close proximity to own aircraft or because successive range and altitude measurements indicate that it could be on a collision or near-collision course with own aircraft. The warning time provided against a threat is sufficiently small that an RA is justified.

Track. A sequence of at least three measurements representing positions that could reasonably have been occupied by an aircraft.

Traffic advisory (TA). An indication given to the flight crew that a certain intruder is a potential threat.

Vertical speed limit (VSL) RA. A resolution advisory advising the pilot to avoid a given range of altitude rates. A VSL RA can be either corrective or preventive.

Warning time. The time interval between potential threat or threat detection and closest approach when neither aircraft accelerates.

4.2 ACAS I GENERAL PROVISIONS AND CHARACTERISTICS

4.2.1 *Functional requirements.* ACAS I shall perform the following functions:

a) surveillance of nearby SSR transponder-equipped aircraft; and

b) provide indications to the flight crew identifying the approximate position of nearby aircraft as an aid to visual acquisition.

Note.— ACAS I is intended to operate using Mode A/C interrogations only. Furthermore, it does not coordinate with other ACAS. Therefore, a Mode S transponder is not required as a part of an ACAS I installation.

4.2.2 *Signal format.* The RF characteristics of all ACAS I signals shall conform to the provisions of Chapter 3, 3.1.1.1 through 3.1.1.6 and 3.1.2.1 through 3.1.2.4.

4.2.3 Interference control

4.2.3.1 *Maximum radiated RF power.* The effective radiated power of an ACAS I transmission at 0 degree elevation relative to the longitudinal axis of the aircraft shall not exceed 24 dBW.

4.2.3.2 *Unwanted radiated power.* When ACAS I is not transmitting an interrogation, the effective radiated power in any direction shall not exceed –70 dBm.

Note.— This requirement is to ensure that, when not transmitting an interrogation, ACAS I does not radiate RF energy that could interfere with, or reduce the sensitivity of, the SSR transponder or radio equipment in other nearby aircraft or ground facilities.

4.2.3.3 *Interference limiting.* Each ACAS I interrogator shall control its interrogation rate or power or both in all SSR modes to minimize interference effects (4.2.3.3.3 and 4.2.3.3.4).

Note.— These limits are a means of ensuring that all interference effects resulting from these interrogations, together with the interrogations from all other ACAS I, ACAS II and ACAS III interrogators in the vicinity are kept to a low level.

4.2.3.3.1 *Determination of own transponder reply rate.* ACAS I shall monitor the rate that own transponder replies to interrogations to ensure that the provisions in 4.2.3.3.3 are met.

4.2.3.3.2 *Determination of the number of ACAS II and ACAS III interrogators.* ACAS I shall count the number of ACAS II and ACAS III interrogators in the vicinity to ensure that the provisions in 4.2.3.3.3 or 4.2.3.3.4 are met. This count shall be obtained by monitoring ACAS broadcasts (UF = 16), (4.3.7.1.2.4) and shall be updated as the number of distinct ACAS aircraft addresses received within the previous 20-s period at a nominal frequency of at least 1 Hz.

4.2.3.3.3 *Mode A/C ACAS I interference limits.* The interrogator power shall not exceed the following limits:

n_a	*Upper limit for* $\{\sum_{k=1}^{k_1} P_a(\mathrm{k})\}$	
	If $f_r \leq 240$	*If* $f_r > 240$
0	250	118
1	250	113
2	250	108
3	250	103
4	250	98
5	250	94
6	250	89
7	250	84
8	250	79
9	250	74
10	245	70
11	228	65
12	210	60
13	193	55
14	175	50
15	158	45
16	144	41
17	126	36
18	109	31
19	91	26
20	74	21
21	60	17
≥22	42	12

where:

n_a = number of operating ACAS II and ACAS III equipped aircraft near own (based on ACAS broadcasts received with a transponder receiver threshold of –74 dBm);

{ } = average value of the expression within the brackets over last 8 interrogation cycles;

P_a(k) = peak power radiated from the antenna in all directions of the pulse having the largest amplitude in the group of pulses comprising a single interrogation during the *k*th Mode A/C interrogation in a 1 s interrogation cycle, W;

k = index number for Mode A/C interrogations, $k = 1, 2,..., k_t$;

k_t = number of Mode A/C interrogations transmitted in a 1 s interrogation cycle;

f_r = Mode A/C reply rate of own transponder.

4.2.3.3.4 *Mode S ACAS I interference limits.* An ACAS I that uses Mode S interrogations shall not cause greater interference effects than an ACAS I using Mode A/C interrogations only.

4.3 GENERAL PROVISIONS RELATING TO ACAS II AND ACAS III

Note 1.— The acronym ACAS is used in this section to indicate either ACAS II or ACAS III.

Note 2.— Carriage requirements for ACAS equipment are addressed in Annex 6, Part I, Chapter 6.

Note 3.— The term "equipped threat" is used in this section to indicate a threat fitted with ACAS II or ACAS III.

4.3.1 Functional requirements

4.3.1.1 *ACAS functions.* ACAS shall perform the following functions:

a) surveillance;

b) generation of TAs;

c) threat detection;

d) generation of RAs;

e) coordination; and

f) communication with ground stations.

The equipment shall execute functions b) through e) on each cycle of operation.

Note.— Certain features of these functions must be standardized to ensure that ACAS units cooperate satisfactorily with other ACAS units, with Mode S ground stations and with the ATC system. Each of the features that are standardized is discussed below. Certain other features are given herein as recommendations.

4.3.1.1.1 The duration of a cycle shall not exceed 1.2 s.

4.3.2 Surveillance performance requirements

4.3.2.1 *General surveillance requirements.* ACAS shall interrogate SSR Mode A/C and Mode S transponders in other aircraft and detect the transponder replies. ACAS shall measure the range and relative bearing of responding aircraft. Using these measurements and information conveyed by transponder replies, ACAS shall estimate the relative positions of each responding aircraft. ACAS shall include provisions for achieving such position determination in the presence of ground reflections, interference and variations in signal strength.

4.3.2.1.1 *Track establishment probability.* ACAS shall generate an established track, with at least a 0.90 probability that the track is established 30 s before closest approach, on aircraft equipped with transponders when all of the following conditions are satisfied:

a) the elevation angles of these aircraft are within ±10 degrees relative to the ACAS aircraft pitch plane;

b) the magnitudes of these aircraft's rates of change of altitude are less than or equal to 51 m/s (10 000 ft/min);

c) the transponders and antennas of these aircraft meet the Standards of Chapter 3, 3.1.1 and 3.1.2;

d) the closing speeds and directions of these aircraft, the local density of SSR transponder-equipped aircraft and the number of other ACAS interrogators in the vicinity (as determined by monitoring ACAS broadcasts, 4.3.7.1.2.4) satisfy the conditions specified in Table 4-1; and

e) the minimum slant range is equal to or greater than 300 m (1 000 ft).

Table 4-1. ACAS design assumptions

Conditions									*Performance*
Quadrant						*Maximum traffic density*		*Maximum number of other ACAS within 56 km (30 NM)*	*Probability of success*
Forward		*Side*		*Back*					
Maximum closing speed									
m/s	*kt*	*m/s*	*kt*	*m/s*	*kt*	*aircraft/km^2*	*aircraft/NM^2*		
260	500	150	300	93	180	0.087	0.30	30	0.9
620	1 200	390	750	220	430	0.017	0.06	30	0.9

Note.— Table 4-1 shows the design assumption upon which the development of ACAS was based. Operational experience and simulation show that ACAS provides adequate surveillance for collision avoidance even when the maximum number of other ACAS within 56 km (30 NM) is somewhat higher than that shown in Table 4-1. Future ACAS designs will take account of current and expected ACAS densities.

4.3.2.1.1.1 ACAS shall continue to provide surveillance with no abrupt degradation in track establishment probability as any one of the condition bounds defined in 4.3.2.1.1 is exceeded.

4.3.2.1.1.2 ACAS shall not track Mode S aircraft that report that they are on the ground.

Note.— A Mode S aircraft may report that it is on the ground by coding in the capability (CA) field in a DF = 11 or DF = 17 transmission (Chapter 3, 3.1.2.5.2.2.1) or by coding in the vertical status (VS) field in a DF = 0 transmission (Chapte 3, 3.1.2.8.2.1). Alternatively, if the aircraft is under Mode S ground surveillance, ground status may be determined by monitoring the flight status (FS) field in downlink formats DF = 4, 5, 20 or 21 (Chapter 3, 3.1.2.6.5.1).

4.3.2.1.1.3 **Recommendation.—** *ACAS should achieve the required tracking performance when the average SSR Mode A/C asynchronous reply rate from transponders in the vicinity of the ACAS aircraft is 240 replies per second and when the peak interrogation rate received by the individual transponders under surveillance is 500 per second.*

Note.— The peak interrogation rate mentioned above includes interrogations from all sources.

4.3.2.1.2 *False track probability.* The probability that an established Mode A/C track does not correspond in range and altitude, if reported, to an actual aircraft shall be less than 10^{-2}. For an established Mode S track this probability shall be less than 10^{-6}. These limits shall not be exceeded in any traffic environment.

4.3.2.1.3 *RANGE AND BEARING ACCURACY*

4.3.2.1.3.1 Range shall be measured with a resolution of 14.5 m (1/128 NM) or better.

4.3.2.1.3.2 **Recommendation.—** *The errors in the relative bearings of the estimated positions of intruders should not exceed 10 degrees rms.*

Note.— This accuracy in the relative bearing of intruders is practicable and sufficient as an aid to the visual acquisition of potential threats. In addition, such relative bearing information has been found useful in threat detection, where it can indicate that an intruder is a threat. However, this accuracy is not sufficient as a basis for horizontal RAs, nor is it sufficient for reliable predictions of horizontal miss distance.

4.3.2.2 INTERFERENCE CONTROL

4.3.2.2.1 *Maximum radiated RF power.* The effective radiated power of an ACAS transmission at 0 degree elevation relative to the longitudinal axis of the aircraft shall not exceed 27 dBW.

4.3.2.2.1.1 *Unwanted radiated power.* When ACAS is not transmitting an interrogation, the effective radiated power in any direction shall not exceed –70 dBm.

4.3.2.2.2 *Interference limiting.* Each ACAS interrogator operating below a pressure-altitude of 5 490 m (18 000 ft) shall control its interrogation rate or power or both so as to conform with specific inequalities (4.3.2.2.2.2).

4.3.2.2.2.1 *Determination of the number of other ACAS.* ACAS shall count the number of other ACAS II and III interrogators in the vicinity to ensure that the interference limits are met. This count shall be obtained by monitoring ACAS broadcasts (UF = 16), (4.3.7.1.2.4). Each ACAS shall monitor such broadcast interrogations to determine the number of other ACAS within detection range.

4.3.2.2.2.2 *ACAS interference limiting inequalities.* ACAS shall adjust its interrogation rate and interrogation power such that the following three inequalities remain true, except as provided in 4.3.2.2.2.2.1.

$$\{\sum_{i=1}^{i_1}\left[\frac{p(i)}{250}\right]^{\alpha}\} < minimum\left[\frac{280}{1+n_a},\frac{11}{\alpha^2}\right] \qquad (1)$$

$$\{\sum_{i=1}^{i_1} m(i)\} < 0.01 \qquad (2)$$

$$\{\frac{1}{B}\sum_{k=1}^{k_1}\frac{P_a(k)}{250}\} < minimum\left[\frac{80}{1+n_a},3\right] \qquad (3)$$

The variables in these inequalities shall be defined as follows:

i_t = number of interrogations (Mode A/C and Mode S) transmitted in a 1 s interrogation cycle;

i = index number for Mode A/C and Mode S interrogations, $i = 1, 2,..., i_t$;

α = the minimum of α_1 calculated as 1/4 $[n_b/n_c]$ subject to the special conditions given below and α_2 calculated as Log_{10} $[n_a/n_b]$ / Log_{10} 25, where n_b and n_c are defined as the number of operating ACAS II and ACAS III equipped aircraft (airborne or on the ground) within 11.2 km (6 NM) and 5.6 km (3 NM) respectively, of own ACAS (based on ACAS surveillance). ACAS aircraft operating at or below a radio altitude of 610 m (2 000 ft) AGL shall include both airborne and on-ground ACAS II and ACAS III aircraft in the value for n_b and n_c. Otherwise, ACAS shall include only airborne ACAS II and ACAS III aircraft in the value for n_b and n_c. The value of a is further constrained to a minimum of 0.5 and a maximum of 1.0.

In addition;

IF $[(n_b \leq 1)$ OR $(n_b > 4n_c)$ OR $(n_b \leq 4$ AND $n_c \leq 2$ AND $n_a > 25)]$ THEN $\alpha_1 = 1.0$,

IF $[(n_c > 2)$ AND $(n_b > 2\ n_c)$ AND $(n_a < 40)]$ THEN $\alpha_1 = 0.5$;

$p(i)$ = peak power radiated from the antenna in all directions of the pulse having the largest amplitude in the group of pulses comprising a single interrogation during the *i*th interrogation in a 1 s interrogation cycle, W;

$m(i)$ = duration of the mutual suppression interval for own transponder associated with the *i*th interrogation in a 1 s interrogation cycle, s;

B = beam sharpening factor (ratio of 3 dB beam width to beamwidth resulting from interrogation side-lobe suppression). For ACAS interrogators that employ transmitter side-lobe suppression (SLS), the appropriate beamwidth shall be the extent in azimuth angle of the Mode A/C replies from one transponder as limited by SLS, averaged over the transponder population;

{ } see 4.2.3.3.3

$P_a(k)$ "
k "
k_t "
n_a "

Note.— RA and ACAS broadcasts (4.3.6.2.1 and 4.3.7.1.2.4) are interrogations.

4.3.2.2.2.2.1 *Transmissions during RAs.* All air-to-air coordination interrogations and RA and ACAS broadcasts shall be transmitted at full power and these interrogations shall be excluded from the summations of Mode S interrogations in the left-hand terms of inequalities (1) and (2) in 4.3.2.2.2.2 for the duration of the RA.

4.3.2.2.2.2.2 *Transmissions from ACAS units on the ground.* Whenever the ACAS aircraft indicates that it is on the ground, ACAS interrogations shall be limited by setting the number of other ACAS II and III aircraft (n_a) count in the interference limiting inequalities to a value that is three times the value obtained based on ACAS broadcasts received with a transponder receiver threshold of –74 dBm. Whenever Mode A/C interrogation power is reduced because of interference limiting, the Mode A/C interrogation power in the forward beam shall be reduced first until the forward sequence matches the right and left sequences. The forward, right and left interrogation powers shall then sequentially be reduced until they match the rear interrogation power. Further reduction of Mode A/C power shall be accomplished by sequentially reducing the forward, side and rear interrogation powers.

4.3.2.2.2.2.3 *Transmissions from ACAS units above 5 490 m (18 000 ft) altitude.* Each ACAS interrogator operating above a pressure-altitude of 5 490 m (18 000 ft) shall control its interrogation rate or power or both such that inequalities (1) and (3) in 4.3.2.2.2.2 remain true when n_a and a are equal to 1, except as provided in 4.3.2.2.2.2.1.

4.3.3 Traffic advisories (TAs)

4.3.3.1 *TA function.* ACAS shall provide TAs to alert the flight crew to potential threats. Such TAs shall be accompanied by an indication of the approximate relative position of potential threats.

4.3.3.2 PROXIMATE TRAFFIC DISPLAY

Recommendation.— *While any RA and/or TA are displayed, proximate traffic within 11 km (6 NM) range and, if altitude reporting, ±370 m (1 200 ft) altitude should be displayed. This proximate traffic should be distinguished (e.g. by colour or symbol type) from threats and potential threats, which should be more prominently displayed.*

4.3.3.3 *TAs as RA precursors.* The criteria for TAs shall be such that they are satisfied before those for an RA.

4.3.3.3.1 *TA warning time.* For intruders reporting altitude, the nominal TA warning time shall not be greater than (T+20 s) where T is the nominal warning time for the generation of the resolution advisory.

Note.— Ideally, RAs would always be preceded by a TA but this is not always possible, e.g. the RA criteria might be already satisfied when a track is first established, or a sudden and sharp manoeuvre by the intruder could cause the TA lead time to be less than a cycle.

4.3.4 Threat detection

4.3.4.1 *Declaration of threat.* ACAS shall evaluate appropriate characteristics of each intruder to determine whether or not it is a threat.

4.3.4.1.1 *Intruder characteristics.* As a minimum, the characteristics of an intruder that are used to identify a threat shall include:

a) tracked altitude;

b) tracked rate of change of altitude;

c) tracked slant range;

d) tracked rate of change of slant range; and

e) sensitivity level of intruder's ACAS, S_i.

For an intruder not equipped with ACAS II or ACAS III, S_i shall be set to 1.

4.3.4.1.2 *Own aircraft characteristics.* As a minimum, the characteristics of own aircraft that are used to identify a threat shall include:

a) altitude;

b) rate of change of altitude; and

c) sensitivity level of own ACAS (4.3.4.3).

4.3.4.2 *Sensitivity levels.* ACAS shall be capable of operating at any of a number of sensitivity levels. These shall include:

a) *S* = 1, a "standby" mode in which the interrogation of other aircraft and all advisories are inhibited;

b) *S* = 2, a "TA only" mode in which RAs are inhibited; and

c) *S* = 3-7, further levels that enable the issue of RAs that provide the warning times indicated in Table 4-2 as well as TAs.

4.3.4.3 *Selection of own sensitivity level (S_o).* The selection of own ACAS sensitivity level shall be determined by sensitivity level control (SLC) commands which shall be accepted from a number of sources as follows:

a) SLC command generated automatically by ACAS based on altitude band or other external factors;

b) SLC command from pilot input; and

c) SLC command from Mode S ground stations.

4.3.4.3.1 *Permitted SLC command codes.* As a minimum, the acceptable SLC command codes shall include:

	Coding
for SLC based on altitude band	2-7
for SLC from pilot input	0,1,2
for SLC from Mode S ground stations	0,2-6

4.3.4.3.2 *Altitude-band SLC command.* Where ACAS selects an SLC command based on altitude, hysteresis shall be applied to the nominal altitude thresholds at which SLC command value changes are required as follows: for a climbing ACAS aircraft the SLC command shall be increased at the appropriate altitude threshold plus the hysteresis value; for a descending ACAS aircraft the SLC command shall be decreased at the appropriate altitude threshold minus the hysteresis value.

4.3.4.3.3 *Pilot SLC command.* For the SLC command set by the pilot the value 0 shall indicate the selection of the "automatic" mode for which the sensitivity level selection shall be based on the other commands.

Table 4-2

Sensitivity level	*2*	*3*	*4*	*5*	*6*	*7*
Nominal warning time	no RAs	15s	20s	25s	30s	35s

4.3.4.3.4 *Mode S ground station SLC command.* For SLC commands transmitted via Mode S ground stations (4.3.8.4.2.1.1), the value 0 shall indicate that the station concerned is not issuing an SLC command and that sensitivity level selection shall be based on the other commands, including non-0 commands from other Mode S ground stations. ACAS shall not process an uplinked SLC value of 1.

4.3.4.3.4.1 *ATS selection of SLC command code.* ATS authorities shall ensure that procedures are in place to inform pilots of any ATS selected SLC command code other than 0 (4.3.4.3.1).

4.3.4.3.5 *Selection rule.* Own ACAS sensitivity level shall be set to the smallest non-0 SLC command received from any of the sources listed in 4.3.4.3.

4.3.4.4 *Selection of parameter values for RA generation.* When the sensitivity level of own ACAS is 3 or greater, the parameter values used for RA generation that depend on sensitivity level shall be based on the greater of the sensitivity level of own ACAS, S_o, and the sensitivity level of the intruder's ACAS, S_i.

4.3.4.5 *Selection of parameter values for TA generation.* The parameter values used for TA generation that depend on sensitivity level shall be selected on the same basis as those for RAs (4.3.4.4) except when an SLC command with a value of 2 ("TA only" mode) has been received from either the pilot or a Mode S ground station. In this case, the parameter values for TA generation shall retain the values they would have had in the absence of the SLC command from the pilot or Mode S ground station.

4.3.5 Resolution advisories (RAs)

4.3.5.1 *RA generation.* For all threats, ACAS shall generate an RA except where it is not possible to select an RA that can be predicted to provide adequate separation either because of uncertainty in the diagnosis of the intruder's flight path or because there is a high risk that a manoeuvre by the threat will negate the RA.

4.3.5.1.1 *RA cancellation.* Once an RA has been generated against a threat or threats it shall be maintained or modified until tests that are less stringent than those for threat detection indicate on two consecutive cycles that the RA may be cancelled, at which time it shall be cancelled.

4.3.5.2 *RA selection.* ACAS shall generate the RA that is predicted to provide adequate separation from all threats and that has the least effect on the current flight path of the ACAS aircraft consistent with the other provisions in this chapter.

4.3.5.3 *RA effectiveness.* The RA shall not recommend or continue to recommend a manoeuvre or manoeuvre restriction that, considering the range of probable threat trajectories, is more likely to reduce separation than increase it, subject to the provisions in 4.3.5.5.1.1 and 4.3.5.6.

Note.— See also 4.3.5.8.

4.3.5.4 *Aircraft capability.* The RA generated by ACAS shall be consistent with the performance capability of the aircraft.

4.3.5.4.1 *Proximity to the ground.* Descend RAs shall not be generated or maintained when own aircraft is below 300 m (1 000 ft) AGL.

4.3.5.4.2 ACAS shall not operate in sensitivity levels 3-7 when own aircraft is below 300 m (1 000 ft) AGL.

4.3.5.5 *Reversals of sense.* ACAS shall not reverse the sense of an RA from one cycle to the next, except as permitted in 4.3.5.5.1 to ensure coordination or when the predicted separation at closest approach for the existing sense is inadequate.

4.3.5.5.1 *Sense reversals against equipped threats.* If an RAC received from an equipped threat is incompatible with the current RA sense, ACAS shall modify the RA sense to conform with the received RAC if own aircraft address is higher in value than that of the threat.

Note.— 4.3.6.1.3 requires that the own ACAS RAC for the threat is also reversed.

4.3.5.5.1.1 ACAS shall not modify an RA sense in a way that makes it incompatible with an RAC received from an equipped threat if own aircraft address is higher in value than that of the threat.

4.3.5.6 *RA strength retention.* Subject to the requirement that a descend RA is not generated at low altitude (4.3.5.4.1), an RA shall not be modified if the time to closest approach is too short to achieve a significant response or if the threat is diverging in range.

4.3.5.7 *Weakening an RA.* An RA shall not be weakened if it is likely that it would subsequently need to be strengthened.

4.3.5.8 *ACAS-equipped threats.* The RA shall be compatible with all the RACs transmitted to threats (4.3.6.1.3). If an RAC is received from a threat before own ACAS generates an RAC for that threat, the RA generated shall be compatible with the RAC received unless such an RA is more likely to reduce separation than increase it and own aircraft address is lower in value than that of the threat.

Note.— In encounters with more than one threat where it is necessary to pass above some threats and below other threats, this standard can be interpreted as referring to the whole duration of the RA. Specifically, it is permissible to retain an RA to climb (descend) towards a threat that is above (below) own aircraft provided there is a calculated intention to provide adequate separation from all threats by subsequently levelling-off.

4.3.5.9 *Encoding of ARA subfield.* On each cycle of an RA, the RA sense, strength and attributes shall be encoded in the active RA (ARA) subfield (4.3.8.4.2.2.1.1). If the ARA subfield has not been refreshed for an interval of 6 s, it shall be set to 0, along with the MTE subfield in the same message (4.3.8.4.2.2.1.3).

4.3.5.10 *System response time.* The system delay from receipt of the relevant SSR reply to presentation of an RA sense and strength to the pilot shall be as short as possible and shall not exceed 1.5 s.

4.3.6 Coordination and communication

4.3.6.1 PROVISIONS FOR COORDINATION WITH ACAS-EQUIPPED THREATS

4.3.6.1.1 *Multi-aircraft coordination.* In a multi-aircraft situation, ACAS shall coordinate with each equipped threat individually.

4.3.6.1.2 *Data protection during coordination.* ACAS shall prevent simultaneous access to stored data by concurrent processes, in particular, during resolution message processing.

4.3.6.1.3 *Coordination interrogation.* Each cycle ACAS shall transmit a coordination interrogation to each equipped threat, unless generation of an RA is delayed because it is not possible to select an RA that can be predicted to provide adequate separation (4.3.5.1). The resolution message transmitted to a threat shall include an RAC selected for that threat. If an RAC has been received from the threat before ACAS selects an RAC for that threat, the selected RAC shall be compatible with the received RAC unless no more than three cycles have elapsed since the RAC was received, the RAC is altitude-crossing, and own aircraft address is lower in value than that of the threat in which case ACAS shall select its RA independently. If an RAC received from an equipped threat is incompatible with the RAC own ACAS has selected for that threat, ACAS shall modify the selected RAC to be compatible with the received RAC if own aircraft address is higher in value than that of the threat.

Note.— The RAC included in the resolution message is in the form of a vertical RAC (VRC) for ACAS II (4.3.8.4.2.3.2.2) and a vertical RAC (VRC) and/or horizontal RAC (HRC) for ACAS III.

4.3.6.1.3.1 *Coordination termination*. Within the cycle during which an intruder ceases to be a reason for maintaining the RA, ACAS shall send a resolution message to that intruder by means of a coordination interrogation. The resolution message shall include the cancellation code for the last RAC sent to that intruder while it was a reason for maintaining the RA.

Note.— During an encounter with a single threat, the threat ceases to be a reason for the RA when the conditions for cancelling the RA are met. During an encounter with multiple threats, a threat ceases to be a reason for the RA when the conditions for cancelling the RA are met in respect of that threat, even though the RA may have to be maintained because of other threats.

4.3.6.1.3.2 ACAS coordination interrogations shall be transmitted until a coordination reply is received from the threat, up to a maximum of not less than six and not more than twelve attempts. The successive interrogations shall be nominally equally spaced over a period of 100 ±5 ms. If the maximum number of attempts is made and no reply is received, ACAS shall continue its regular processing sequence.

4.3.6.1.3.3 ACAS shall provide parity protection (4.3.8.4.2.3.2.6 and 4.3.8.4.2.3.2.7) for all fields in the coordination interrogation that convey RAC information.

Note.— This includes the vertical RAC (VRC), the cancel vertical RAC (CVC), the horizontal RAC (HRC) and the cancel horizontal RAC (CHC).

4.3.6.1.3.4 Whenever own ACAS reverses its sense against an equipped threat, the resolution message that is sent on the current and subsequent cycles to that threat shall contain both the newly selected RAC and the cancellation code for the RAC sent before the reversal.

4.3.6.1.3.5 When a vertical RA is selected, the vertical RAC (VRC) (4.3.8.4.2.3.2.2) that own ACAS includes in a resolution message to the threat shall be as follows:

a) "do not pass above" when the RA is intended to provide separation above the threat;

b) "do not pass below" when the RA is intended to provide separation below the threat.

4.3.6.1.4 *Resolution message processing.* Resolution messages shall be processed in the order in which they are received and with delay limited to that required to prevent possible concurrent access to stored data and delays due to the processing of previously received resolution messages. Resolution messages that are being delayed shall be temporarily queued to prevent possible loss of messages. Processing a resolution message shall include decoding the message and updating the appropriate data structures with the information extracted from the message.

Note.— According to 4.3.6.1.2, resolution message processing must not access any data whose usage is not protected by the coordination lock state.

4.3.6.1.4.1 An RAC or an RAC cancellation received from another ACAS shall be rejected if the encoded sense bits indicate the existence of a parity error or if undefined value(s) are detected in the resolution message. An RAC or an RAC cancellation received without parity errors and without undefined resolution message values shall be considered valid.

4.3.6.1.4.2 *RAC storage.* A valid RAC received from another ACAS shall be stored or shall be used to update the previously stored RAC corresponding to that ACAS. A valid RAC cancellation shall cause the previously stored RAC to be deleted. A stored RAC that has not been updated for an interval of 6 s shall be deleted.

4.3.6.1.4.3 *RAC record update.* A valid RAC or RAC cancellation received from another ACAS shall be used to update the RAC record. If a bit in the RAC record has not been refreshed for an interval of 6 s by any threat, that bit shall be set to 0.

4.3.6.2 PROVISIONS FOR ACAS COMMUNICATION WITH GROUND STATIONS

4.3.6.2.1 *Air-initiated downlink of ACAS RAs.* When an ACAS RA exists, ACAS shall:

a) transfer to its Mode S transponder an RA report for transmission to the ground in a Comm-B reply (4.3.11.4.1); and

b) transmit periodic RA broadcasts (4.3.7.3.2).

4.3.6.2.2 *Sensitivity level control (SLC) command.* ACAS shall store SLC commands from Mode S ground stations. An SLC command received from a Mode S ground station shall remain effective until replaced by an SLC command from the same ground station as indicated by the site number contained in the IIS subfield of the interrogation. If an existing stored command from a Mode S ground station is not refreshed within 4 minutes, or if the SLC command received has the value 15 (4.3.8.4.2.1.1), the stored SLC command for that Mode S ground station shall be set to 0.

4.3.6.3 PROVISIONS FOR DATA TRANSFER BETWEEN ACAS AND ITS MODE S TRANSPONDER

4.3.6.3.1 *Data transfer from ACAS to its Mode S transponder:*

a) ACAS shall transfer RA information to its Mode S transponder for transmission in an RA report (4.3.8.4.2.2.1) and in a coordination reply (4.3.8.4.2.4.2);

b) ACAS shall transfer current sensitivity level to its Mode S transponder for transmission in a sensitivity level report (4.3.8.4.2.5); and

c) ACAS shall transfer capability information to its Mode S transponder for transmission in a data link capability report (4.3.8.4.2.2.2).

4.3.6.3.2 *Data transfer from Mode S transponder to its ACAS:*

a) ACAS shall receive from its Mode S transponder sensitivity level control commands (4.3.8.4.2.1.1) transmitted by Mode S ground stations;

b) ACAS shall receive from its Mode S transponder ACAS broadcast messages (4.3.8.4.2.3.3) transmitted by other ACAS; and

c) ACAS shall receive from its Mode S transponder resolution messages (4.3.8.4.2.3.2) transmitted by other ACAS for air-air coordination purposes.

4.3.7 ACAS protocols

4.3.7.1 SURVEILLANCE PROTOCOLS

4.3.7.1.1 *Surveillance of Mode A/C transponders.* ACAS shall use the Mode C-only all-call interrogation (Chapter 3, 3.1.2.1.5.1.2) for surveillance of aircraft equipped with Mode A/C transponders.

4.3.7.1.2 *SURVEILLANCE OF MODE S TRANSPONDERS*

4.3.7.1.2.1 *Detection.* ACAS shall monitor 1 090 MHz for Mode S acquisition squitters (DF = 11). ACAS shall detect the presence and determine the address of Mode S-equipped aircraft using their Mode S acquisition squitters (DF = 11) or extended squitters (DF = 17).

Note 1.— It is acceptable to acquire individual aircraft using either acquisition or extended squitters (DF = 11 or DF = 17), and to monitor for both squitters. However, ACAS must monitor for acquisition squitters because, at any time, not all aircraft will transmit the extended squitter.

Note 2.— If, in the future, it becomes permitted for aircraft not to transmit the acquisition squitter, relying instead on continual transmission of the extended squitter, it would become essential for all ACAS units to monitor for both the acquisition and the extended squitters.

4.3.7.1.2.2 *Surveillance interrogations.* On first receipt of a 24-bit aircraft address from an aircraft that is determined to be within the reliable surveillance range of ACAS based on reception reliability and that is within an altitude band 3 050 m (10 000 ft) above and below own aircraft, ACAS shall transmit a short air-air interrogation (UF = 0) for range acquisition. Surveillance interrogations shall be transmitted at least once every five cycles when this altitude condition is satisfied. Surveillance interrogations shall be transmitted each cycle if the range of the detected aircraft is less than 5.6 km (3 NM) or the calculated time to closest approach is less than 60 s, assuming that both the detected and own aircraft proceed from their current positions with unaccelerated motion and that the range at closest approach equals 5.6 km (3 NM). Surveillance interrogations shall be suspended for a period of five cycles if:

a) a reply was successfully received; and

b) own aircraft and intruder aircraft are operating below a pressure-altitude of 5 490 m (18 000 ft); and

c) the range of the detected aircraft is greater than 5.6 km (3 NM) and the calculated time to closest approach exceeds 60 seconds, assuming that both the detected and own aircraft proceed from their current positions with unaccelerated motion and that the range at closest approach equals 5.6 km (3 NM).

4.3.7.1.2.2.1 *Range acquisition interrogations.* ACAS shall use the short air-air surveillance format (UF = 0) for range acquisition. ACAS shall set AQ = 1 (Chapter 3, 3.1.2.8.1.1) and RL = 0 (Chapter 3, 3.1.2.8.1.2) in an acquisition interrogation.

Note 1.— Setting AQ = 1 results in a reply with bit 14 of the RI field equal to 1 and serves as an aid in distinguishing the reply to own interrogation from replies elicited from other ACAS units (4.3.7.1.2.2.2).

Note 2.— In the acquisition interrogation RL is set to 0 to command a short acquisition reply (DF = 0).

4.3.7.1.2.2.2 *Tracking interrogations.* ACAS shall use the short air-air surveillance format (UF = 0) with RL = 0 and AQ = 0 for tracking interrogations.

4.3.7.1.2.3 *Surveillance replies.* These protocols are described in 4.3.11.3.1.

4.3.7.1.2.4 *ACAS broadcast.* An ACAS broadcast shall be made nominally every 8 to 10 s at full power from the top antenna. Installations using directional antennas shall operate such that complete circular coverage is provided nominally every 8 to 10 s.

Note.— A broadcast causes other Mode S transponders to accept the interrogation without replying and to present the interrogation content containing the MU field at the transponder output data interface. The UDS1 = 3, UDS2 = 2 combination identifies the data as an ACAS broadcast containing the 24-bit address of the interrogating ACAS aircraft. This provides each ACAS with a means of determining the number of other ACAS within its detection range for limiting interference. The format of the MU field is described in 4.3.8.4.2.3.

4.3.7.2 AIR-AIR COORDINATION PROTOCOLS

4.3.7.2.1 *Coordination interrogations.* ACAS shall transmit UF = 16 interrogations (Chapter 3, 3.1.2.3.2, Figure 3-7) with AQ = 0 and RL = 1 when another aircraft reporting RI = 3 or 4 is declared a threat (4.3.4). The MU field shall contain the resolution message in the subfields specified in 4.3.8.4.2.3.2.

Note 1.— A UF = 16 interrogation with AQ = 0 and RL = 1 is intended to cause a DF = 16 reply from the other aircraft.

Note 2.— An aircraft reporting RI = 3 or RI = 4 is an aircraft equipped with an operating ACAS which has vertical only or vertical and horizontal resolution capability, respectively.

4.3.7.2.2 *Coordination reply.* These protocols are described in 4.3.11.3.2.

4.3.7.3 PROTOCOLS FOR ACAS COMMUNICATION WITH GROUND STATIONS

4.3.7.3.1 *RA reports to Mode S ground stations.* These protocols are described in 4.3.11.4.1.

4.3.7.3.2 *RA broadcasts.* RA broadcasts shall be transmitted at full power from the bottom antenna at jittered, nominally 8 s intervals for the period that the RA is indicated. The RA broadcast shall include the MU field as specified in 4.3.8.4.2.3.4. The RA broadcast shall describe the most recent RA that existed during the preceding 8 s period. Installations using directional antennas shall operate such that complete circular coverage is provided nominally every 8 s and the same RA sense and strength is broadcast in each direction.

4.3.7.3.3 *Data link capability report.* These protocols are described in 4.3.11.4.2.

4.3.7.3.4 *ACAS sensitivity level control.* ACAS shall act upon an SLC command if and only if TMS (Chapter 3, 3.1.2.6.1.4.1) has the value 0 and DI is either 1 or 7 in the same interrogation.

4.3.8 Signal formats

4.3.8.1 The RF characteristics of all ACAS signals shall conform to the Standards of Chapter 3, 3.1.1.1 through 3.1.1.6, 3.1.2.1 through 3.1.2.3, 3.1.2.5 and 3.1.2.8.

4.3.8.2 RELATIONSHIP BETWEEN ACAS AND MODE S SIGNAL FORMATS

Note.— ACAS uses Mode S transmissions for surveillance and communications. ACAS air-air communication functions permit RA decisions to be coordinated with ACAS-equipped threats. ACAS air-ground communication functions permit the reporting of RAs to ground stations and the uplinking of commands to ACAS-equipped aircraft to control parameters of the collision avoidance algorithms.

4.3.8.3 *Signal format conventions.* The data encoding of all ACAS signals shall conform to the Standards of Chapter 3, 3.1.2.3.

Note.— In air-air transmissions used by ACAS, interrogations transmitted at 1 030 MHz are designated as uplink transmissions and contain uplink format (UF) codes. Replies received at 1 090 MHz are designated as downlink transmissions and contain downlink format (DF) codes.

4.3.8.4 FIELD DESCRIPTION

Note 1.— The air-air surveillance and communication formats which are used by ACAS but not fully described in Chapter 3, 3.1.2 are given in Figure 4-1.

Uplink:										
UF = 0	00000	3	RL:1	4	AQ:1	18	AP:24			
UF = 16	10000	3	RL:1	4	AQ:1	18	MU:56	AP:24		
Downlink:										
DF = 0	00000	VS:1	2	SL:3	2	RI:4	2	AC:13	AP:24	
DF = 16	10000	VS:1	2	SL:3	2	RI:4	2	AC:13	MV:56	AP:24

Figure 4-1. Surveillance and communication formats used by ACAS

Note 2.— This section defines the Mode S fields (and their subfields) that are processed by ACAS to accomplish ACAS functions. Some of the ACAS fields (those also used for other SSR Mode S functions) are described with unassigned ACAS codes in Chapter 3, 3.1.2.6. Such codes are assigned in 4.3.8.4.1. Fields and subfields used only by ACAS equipment are assigned in 4.3.8.4.2.

Note 3.— The bit numbering convention used in 4.3.8.4 reflects the bit numbering within the entire uplink or downlink format rather than the bits within individual fields or subfields.

4.3.8.4.1 *FIELDS AND SUBFIELDS INTRODUCED IN CHAPTER 3, 3.1.2*

Note.— Codes for mission fields and subfields that are designated "reserved for ACAS" in Chapter 3, 3.1.2, are specified in this section.

4.3.8.4.1.1 *DR (downlink request).* The significance of the coding of the downlink request field shall be as follows:

Coding	
0-1	See Chapter 3, 3.1.2.6.5.2
2	ACAS message available
3	Comm-B message available and ACAS message available
4-5	See Chapter 3, 3.1.2.6.5.2
6	Comm-B broadcast message 1 available and ACAS message available
7	Comm-B broadcast message 2 available and ACAS message available
8-31	See Chapter 3, 3.1.2.6.5.2

4.3.8.4.1.2 *RI (air-air reply information).* The significance of the coding in the RI field shall be as follows:

Coding	
0	No operating ACAS
1	Not assigned
2	ACAS with resolution capability inhibited
3	ACAS with vertical-only resolution capability
4	ACAS with vertical and horizontal resolution capability
5-7	Not assigned
8-15	See Chapter 3, 3.1.2.8.2.2

Bit 14 of the reply format containing this field shall replicate the AQ bit of the interrogation. The RI field shall report "no operating ACAS" (RI = 0) if the ACAS unit has failed or is in standby. The RI field shall report "ACAS with resolution capability inhibited" (RI = 2) if sensitivity level is 2 or TA only mode has been selected.

Note.— Codes 0-7 in the RI field indicate that the reply is a tracking reply and also give the ACAS capability of the interrogated aircraft. Codes 8-15 indicate that the reply is an acquisition reply and also give the maximum true airspeed capability of the interrogated aircraft.

4.3.8.4.1.3 *RR (reply request).* The significance of the coding in the reply request field shall be as follows:

Coding	
0-18	See Chapter 3, 3.1.2.6.1.2
19	Transmit a resolution advisory report
20-31	See Chapter 3, 3.1.2.6.1.2

4.3.8.4.2 *ACAS FIELDS AND SUBFIELDS*

Note.— The following paragraphs describe the location and coding of those fields and subfields that are not defined in Chapter 3, 3.1.2 but are used by aircraft equipped with ACAS.

4.3.8.4.2.1 *Subfield in MA*

4.3.8.4.2.1.1 *ADS (A-definition subfield).* This 8-bit (33-40) subfield shall define the remainder of MA.

Note.— For convenience of coding, ADS is expressed in two groups of four bits each, ADS1 and ADS2.

4.3.8.4.2.1.2 When ADS1 = 0 and ADS2 = 5, the following subfield shall be contained in MA:

4.3.8.4.2.1.3 *SLC (ACAS sensitivity level control (SLC) command).* This 4-bit (41-44) subfield shall denote a sensitivity level command for own ACAS.

Coding	
0	No command issued
1	Not assigned
2	Set ACAS sensitivity level to 2
3	Set ACAS sensitivity level to 3
4	Set ACAS sensitivity level to 4
5	Set ACAS sensitivity level to 5
6	Set ACAS sensitivity level to 6
7-14	Not assigned
15	Cancel previous SLC command from this ground station

Note.— Structure of MA for a sensitivity level control command:

33	37	41	45
ADS1 = 0	ADS2 = 5	SLC	- - - - - 44 - - - - -
36	40	44	88

4.3.8.4.2.2 *Subfields in MB*

4.3.8.4.2.2.1 *Subfields in MB for an RA report.* When BDS1=3 and BDS2=0, the subfields indicated below shall be contained in MB.

Note.— The requirements for communication of information relating to the current or recent RAs is described in 4.3.11.4.1.

4.3.8.4.2.2.1.1 *ARA (active RAs).* This 14-bit (41-54) subfield shall indicate the characteristics of the RA, if any, generated by the ACAS associated with the transponder transmitting the subfield (4.3.6.2.1 a)). The bits in ARA shall have meanings determined by the value of the MTE subfield (4.3.8.4.2.2.1.4) and, for vertical RAs, the value of bit 41 of ARA. The meaning of bit 41 of ARA shall be as follows:

Coding	
0	There is more than one threat and the RA is intended to provide separation below some threat(s) and above some other threat(s) or no RA has been generated (when MTE = 0)
1	Either there is only one threat or the RA is intended to provide separation in the same direction for all threats

When ARA bit 41 = 1 and MTE = 0 or 1, bits 42-47 shall have the following meanings:

Bit	*Coding*	
42	0	RA is preventive
	1	RA is corrective
43	0	Upward sense RA has been generated
	1	Downward sense RA has been generated
44	0	RA is not increased rate
	1	RA is increased rate
45	0	RA is not a sense reversal
	1	RA is a sense reversal
46	0	RA is not altitude crossing
	1	RA is altitude crossing
47	0	RA is vertical speed limit
	1	RA is positive
48-54		Reserved for ACAS III

When ARA bit 41 = 0 and MTE = 1, bits 42-47 shall have the following meanings:

Bit	*Coding*	
42	0	RA does not require a correction in the upward sense
	1	RA requires a correction in the upward sense
43	0	RA does not require a positive climb
	1	RA requires a positive climb
44	0	RA does not require a correction in the downward sense
	1	RA requires a correction in the downward sense
45	0	RA does not require a positive descend
	1	RA requires a positive descend
46	0	RA does not require a crossing
	1	RA requires a crossing
47	0	RA is not a sense reversal
	1	RA is a sense reversal
48-54		Reserved for ACAS III

Note.— When ARA bit 41 = 0 and MTE = 0, no vertical RA has been generated.

4.3.8.4.2.2.1.2 *RAC (RACs record).* This 4-bit (55-58) subfield shall indicate all the currently active RACs, if any, received from other ACAS aircraft. The bits in RAC shall have the following meanings:

Bit	*Resolution advisory complement*
55	Do not pass below
56	Do not pass above
57	Do not turn left
58	Do not turn right

A bit set to 1 shall indicate that the associated RAC is active. A bit set to 0 shall indicate that the associated RAC is inactive.

4.3.8.4.2.2.1.3 *RAT (RA terminated indicator).* This 1-bit (59) subfield shall indicate when an RA previously generated by ACAS has ceased being generated.

Coding

0	ACAS is currently generating the RA indicated in the ARA subfield
1	The RA indicated by the ARA subfield has been terminated (4.3.11.4.1)

Note 1.— After an RA has been terminated by ACAS, it is still required to be reported by the Mode S transponder for 18±1 s (4.3.11.4.1). The RA terminated indicator may be used, for example, to permit timely removal of an RA indication from an air traffic controller's display, or for assessments of RA duration within a particular airspace.

Note 2.— RAs may terminate for a number of reasons: normally, when the conflict has been resolved and the threat is diverging in range; or when the threat's Mode S transponder for some reason ceases to report altitude during the conflict. The RA terminated indicator is used to show that the RA has been removed in each of these cases.

4.3.8.4.2.2.1.4 *MTE (multiple threat encounter).* This 1-bit (60) subfield shall indicate whether two or more simultaneous threats are currently being processed by the ACAS threat resolution logic.

Coding

0	One threat is being processed by the resolution logic (when ARA bit 41 = 1); or no threat is being processed by the resolution logic (when ARA bit 41 = 0)
1	Two or more simultaneous threats are being processed by the resolution logic

4.3.8.4.2.2.1.5 *TTI (threat type indicator subfield).* This 2-bit subfield (61-62) shall define the type of identity data contained in the TID subfield.

Coding

0	No identity data in TID
1	TID contains a Mode S transponder address
2	TID contains altitude, range and bearing data
3	Not assigned

4.3.8.4.2.2.1.6 *TID (threat identity data subfield).* This 26-bit subfield (63-88) shall contain the Mode S address of the threat or the altitude, range, and bearing if the threat is not Mode S equipped. If two or more threats are simultaneously processed by the ACAS resolution logic, TID shall contain the identity or position data for the most recently declared threat. If TTI = 1, TID shall contain in bits 63-86 the aircraft address of the threat, and bits 87 and 88 shall be set to 0. If TTI = 2, TID shall contain the following three subfields.

4.3.8.4.2.2.1.6.1 *TIDA (threat identity data altitude subfield).* This 13-bit subfield (63-75) shall contain the most recently reported Mode C altitude code of the threat.

Coding

Bit	63	64	65	66	67	68	69	70	71	72	73	74	75
Mode C code bit	C_1	A_1	C_2	A_2	C_4	A_4	0	B_1	D_1	B_2	D_2	B_4	D_4

4.3.8.4.2.2.1.6.2 *TIDR (threat identity data range subfield).* This 7-bit subfield (76-82) shall contain the most recent threat range estimated by ACAS.

Coding (n)

n	*Estimated range (NM)*
0	No range estimate available
1	Less than 0.05
2-126	(*n*-1)/10 ±0.05
127	Greater than 12.55

4.3.8.4.2.2.1.6.3 *TIDB (threat identity data bearing subfield).* This 6-bit subfield (83-88) shall contain the most recent estimated bearing of the threat aircraft, relative to the ACAS aircraft heading.

Coding (n)

n	*Estimated bearing (degrees)*
0	No bearing estimate available
1-60	Between 6(*n*-1) and 6*n*
61-63	*Not assigned*

Note.— Structure of MB for an RA report:

33	37	41	55	59	60	61	63
BDS1 = 3	BDS2 = 0	ARA	RAC	RAT	MTE	TTI = 1	TID
36	40	54	58	59	60	62	88

33	37	41	55	59	60	61	63	76	83
BDS1 = 3	BDS2 = 0	ARA	RAC	RAT	MTE	TTI = 2	TIDA	TIDR	TIDB
36	40	54	58	59	60	62	75	82	88

4.3.8.4.2.2.2 *Subfields in MB for the data link capability report.* When BDS1 = 1 and BDS2 = 0, the following bit patterns shall be provided to the transponder for its data link capability report:

Bit	*Coding*
48	0 ACAS failed or on standby
	1ACAS operating
69	0 ACAS II
	1ACAS III
70	0 ACAS generating TAs only
	1 ACAS generating TAs and RAs
71	0 ACAS not fitted
	1 ACAS fitted
72	0 Hybrid surveillance not fitted
	1 Hybrid surveillance fitted

Note 1.— A summary of the MB subfields for the data link capability report structure is described in Chapter 3, 3.1.2.6.10.2.2.

Note 2.— The use of hybrid surveillance to limit ACAS active interrogations is described in 4.5.1. The ability only to support decoding of DF = 17 extended squitter messages is not sufficient to set bit 72.

4.3.8.4.2.3 *MU field.* This 56-bit (33-88) field of long air-air surveillance interrogations (Figure 4-1) shall be used to transmit resolution messages, ACAS broadcasts and RA broadcasts.

4.3.8.4.2.3.1 *UDS (U-definition subfield).* This 8-bit (33-40) subfield shall define the remainder of MU.

Note.— For convenience in coding, UDS is expressed in two groups of four bits each, UDS1 and UDS2.

4.3.8.4.2.3.2 *Subfields in MU for a resolution message.* When UDS1 = 3 and UDS2 = 0 the following subfields shall be contained in MU:

4.3.8.4.2.3.2.1 *MTB (multiple threat bit).* This 1-bit (42) subfield shall indicate the presence or absence of multiple threats.

Coding

0 Interrogating ACAS has one threat
1 Interrogating ACAS has more than one threat

4.3.8.4.2.3.2.2 *VRC (vertical RAC).* This 2-bit (45-46) subfield shall denote a vertical RAC relating to the addressed aircraft.

Coding

0 No vertical RAC sent
1 Do not pass below
2 Do not pass above
3 Not assigned

4.3.8.4.2.3.2.3 *CVC (cancel vertical RAC).* This 2-bit (43-44) subfield shall denote the cancellation of a vertical RAC previously sent to the addressed aircraft. This subfield shall be set to 0 for a new threat.

Coding

0 No cancellation
1 Cancel previously sent “Do not pass below”
2 Cancel previously sent “Do not pass above”
3 Not assigned

4.3.8.4.2.3.2.4 *HRC (horizontal RAC).* This 3-bit (50-52) subfield shall denote a horizontal RAC relating to the addressed aircraft.

Coding

0 No horizontal RAC or no horizontal resolution capability
1 Other ACAS sense is turn left; do not turn left
2 Other ACAS sense is turn left; do not turn right
3 Not assigned
4 Not assigned
5 Other ACAS sense is turn right; do not turn left
6 Other ACAS sense is turn right; do not turn right
7 Not assigned

4.3.8.4.2.3.2.5 *CHC (cancel horizontal RAC).* This 3-bit (47-49) subfield shall denote the cancellation of a horizontal RAC previously sent to the addressed aircraft. This subfield shall be set to 0 for a new threat.

Coding	
0	No cancellation or no horizontal resolution capability
1	Cancel previously sent "Do not turn left"
2	Cancel previously sent "Do not turn right"
3-7	Not assigned

4.3.8.4.2.3.2.6 *VSB (vertical sense bits subfield).* This 4-bit (61-64) subfield shall be used to protect the data in the CVC and VRC subfields. For each of the 16 possible combinations of bits 43-46 the following VSB code shall be transmitted:

	CVC		VRC		VSB			
Coding	43	44	45	46	61	62	63	64
0	0	0	0	0	0	0	0	0
1	0	0	0	1	1	1	1	0
2	0	0	1	0	0	1	1	1
3	0	0	1	1	1	0	0	1
4	0	1	0	0	1	0	1	1
5	0	1	0	1	0	1	0	1
6	0	1	1	0	1	1	0	0
7	0	1	1	1	0	0	1	0
8	1	0	0	0	1	1	0	1
9	1	0	0	1	0	0	1	1
10	1	0	1	0	1	0	1	0
11	1	0	1	1	0	1	0	0
12	1	1	0	0	0	1	1	0
13	1	1	0	1	1	0	0	0
14	1	1	1	0	0	0	0	1
15	1	1	1	1	1	1	1	1

Note.— The rule used to generate the VSB subfield bit setting is a distance 3 Hamming code augmented with a parity bit, producing the ability to detect up to three errors in the eight transmitted bits.

4.3.8.4.2.3.2.7 *HSB (horizontal sense bits subfield).* This 5-bit (56-60) subfield shall be used to protect the data in the CHC and HRC subfields. For each of the 64 possible combinations of bits 47-52 the following HSB code shall be transmitted:

	CHC			HRC			HSB				
Coding	47	48	49	50	51	52	56	57	58	59	60
0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	1	0	1	0	1	1
2	0	0	0	0	1	0	1	0	0	1	1
3	0	0	0	0	1	1	1	1	0	0	0
4	0	0	0	1	0	0	1	1	1	0	0
5	0	0	0	1	0	1	1	0	1	1	1
6	0	0	0	1	1	0	0	1	1	1	1
7	0	0	0	1	1	1	0	0	1	0	0
8	0	0	1	0	0	0	0	1	1	0	1
9	0	0	1	0	0	1	0	0	1	1	0
10	0	0	1	0	1	0	1	1	1	1	0
11	0	0	1	0	1	1	1	0	1	0	1
12	0	0	1	1	0	0	1	0	0	0	1
13	0	0	1	1	0	1	1	1	0	1	0

	CHC				HRC		HSB				
Coding	47	48	49	50	51	52	56	57	58	59	60
14	0	0	1	1	1	0	0	0	0	1	0
15	0	0	1	1	1	1	0	1	0	0	1
16	0	1	0	0	0	0	1	0	1	0	1
17	0	1	0	0	0	1	1	1	1	1	0
18	0	1	0	0	1	0	0	0	1	1	0
19	0	1	0	0	1	1	0	1	1	0	1
20	0	1	0	1	0	0	0	1	0	0	1
21	0	1	0	1	0	1	0	0	0	1	0
22	0	1	0	1	1	0	1	1	0	1	0
23	0	1	0	1	1	1	1	0	0	0	1
24	0	1	1	0	0	0	1	1	0	0	0
25	0	1	1	0	0	1	1	0	0	1	1
26	0	1	1	0	1	0	0	1	0	1	1
27	0	1	1	0	1	1	0	0	0	0	0
28	0	1	1	1	0	0	0	0	1	0	0
29	0	1	1	1	0	1	0	1	1	1	1
30	0	1	1	1	1	0	1	0	1	1	1
31	0	1	1	1	1	1	1	1	1	0	0
32	1	0	0	0	0	0	1	1	0	0	1
33	1	0	0	0	0	1	1	0	0	1	0
34	1	0	0	0	1	0	0	1	0	1	0
35	1	0	0	0	1	1	0	0	0	0	1
36	1	0	0	1	0	0	0	0	1	0	1
37	1	0	0	1	0	1	0	1	1	1	0
38	1	0	0	1	1	0	1	0	1	1	0
39	1	0	0	1	1	1	1	1	1	0	1
40	1	0	1	0	0	0	1	0	1	0	0
41	1	0	1	0	0	1	1	1	1	1	1
42	1	0	1	0	1	0	0	0	1	1	1
43	1	0	1	0	1	1	0	1	1	0	0
44	1	0	1	1	0	0	0	1	0	0	0
45	1	0	1	1	0	1	0	0	0	1	1
46	1	0	1	1	1	0	1	1	0	1	1
47	1	0	1	1	1	1	1	0	0	0	0
48	1	1	0	0	0	0	0	1	1	0	0
49	1	1	0	0	0	1	0	0	1	1	1
50	1	1	0	0	1	0	1	1	1	1	1
51	1	1	0	0	1	1	1	0	1	0	0
52	1	1	0	1	0	0	1	0	0	0	0
53	1	1	0	1	0	1	1	1	0	1	1
54	1	1	0	1	1	0	0	0	0	1	1
55	1	1	0	1	1	1	0	1	0	0	0
56	1	1	1	0	0	0	0	0	0	0	1
57	1	1	1	0	0	1	0	1	0	1	0
58	1	1	1	0	1	0	1	0	0	1	0
59	1	1	1	0	1	1	1	1	0	0	1
60	1	1	1	1	0	0	1	1	1	0	1
61	1	1	1	1	0	1	1	0	1	1	0
62	1	1	1	1	1	0	0	1	1	1	0
63	1	1	1	1	1	1	0	0	1	0	1

Note.— The rule used to generate the HSB subfield bit setting is a distance 3 Hamming code augmented with a parity bit, producing the ability to detect up to three errors in the eleven transmitted bits.

4.3.8.4.2.3.2.8 *MID (Aircraft address).* This 24-bit (65-88) subfield shall contain the 24-bit aircraft address of the interrogating ACAS aircraft.

Note.— Structure of MU for a resolution message:

33	37	41	42	43	45	47	50	53	56	61	65
UDS1 = 3	UDS2 = 0	-1-	MTB	CVC	VRC	CHC	HRC	-3-	HSB	VSB	MID
36	40	41	42	44	46	49	52	55	60	64	88

4.3.8.4.2.3.3 *Subfield in MU for an ACAS broadcast.* When UDS1 = 3 and UDS2 = 2, the following subfield shall be contained in MU:

4.3.8.4.2.3.3.1 *MID (Aircraft address).* This 24-bit (65-88) subfield shall contain the 24-bit aircraft address of the interrogating ACAS aircraft.

Note.— Structure of MU for an ACAS broadcast:

33	37	41	65
UDS1 = 3	UDS2 = 2	- - - - - - 24 - - - - - -	MID
36	40	64	88

4.3.8.4.2.3.4 *Subfields in MU for an RA broadcast.* When UDS1 = 3 and UDS2 = 1, the following subfields shall be contained in MU:

4.3.8.4.2.3.4.1 *ARA (active RAs).* This 14-bit (41-54) subfield shall be coded as defined in 4.3.8.4.2.2.1.1.

4.3.8.4.2.3.4.2 *RAC (RACs record).* This 4-bit (55-58) subfield shall be coded as defined in 4.3.8.4.2.2.1.2.

4.3.8.4.2.3.4.3 *RAT (RA terminated indicator).* This 1-bit (59) subfield shall be coded as defined in 4.3.8.4.2.2.1.3.

4.3.8.4.2.3.4.4 *MTE (multiple threat encounter).* This 1-bit (60) subfield shall be coded as defined in 4.3.8.4.2.2.1.4.

4.3.8.4.2.3.4.5 *AID (Mode A identity code).* This 13-bit (63-75) subfield shall denote the Mode A identity code of the reporting aircraft.

Coding

Bit	63	64	65	66	67	68	69	70	71	72	73	74	75
Mode A code bit	C_1	A_1	C_2	A_2	C_4	A_4	0	B_1	D_1	B_2	D_2	B_4	D_4

4.3.8.4.2.3.4.6 *CAC (Mode C altitude code).* This 13-bit (76-88) subfield shall denote the Mode C altitude code of the reporting aircraft.

Coding

Bit	76	77	78	79	80	81	82	83	84	85	86	87	88
Mode C code bit	C_1	A_1	C_2	A_2	C_4	A_4	0	B_1	D_1	B_2	D_2	B_4	D_4

Note.— Structure of MU for an RA broadcast:

33	37	41	55	59	60	61	63	76
UDS1 = 3	UDS2 = 1	ARA	RAC	RAT	MTE	-2-	AID	CAC
36	40	54	58	59	60	62	75	88

4.3.8.4.2.4 *MV field.* This 56-bit (33-88) field of long air-air surveillance replies (Figure 4-1) shall be used to transmit air-air coordination reply messages.

4.3.8.4.2.4.1 *VDS (V-definition subfield).* This 8-bit (33-40) subfield shall define the remainder of MV.

Note.— For convenience in coding, VDS is expressed in two groups of four bits each, VDS1 and VDS2.

4.3.8.4.2.4.2 *Subfields in MV for a coordination reply.* When VDS1 = 3 and VDS2 = 0, the following subfields shall be contained in MV:

4.3.8.4.2.4.2.1 *ARA (active RAs).* This 14-bit (41-54) subfield shall be coded as defined in 4.3.8.4.2.2.1.1.

4.3.8.4.2.4.2.2 *RAC (RACs record).* This 4-bit (55-58) subfield shall be coded as defined in 4.3.8.4.2.2.1.2.

4.3.8.4.2.4.2.3 *RAT (RA terminated indicator).* This 1-bit (59) subfield shall be coded as defined in 4.3.8.4.2.2.1.3.

4.3.8.4.2.4.2.4 *MTE (multiple threat encounter).* This 1-bit (60) subfield shall be coded as defined in 4.3.8.4.2.2.1.4.

Note.— Structure of MV for a coordination reply:

33	37	41	55	59	60	61
VDS1 = 3	VDS2 = 0	ARA	RAC	RAT	MTE	-28-
36	40	54	58	59	60	88

4.3.8.4.2.5 *SL (sensitivity level report).* This 3-bit (9-11) downlink field shall be included in both short and long air-air reply formats (DF = 0 and 16). This field shall denote the sensitivity level at which ACAS is currently operating.

Coding

0	ACAS inoperative
1	ACAS is operating at sensitivity level 1
2	ACAS is operating at sensitivity level 2
3	ACAS is operating at sensitivity level 3
4	ACAS is operating at sensitivity level 4
5	ACAS is operating at sensitivity level 5
6	ACAS is operating at sensitivity level 6
7	ACAS is operating at sensitivity level 7

4.3.9 ACAS equipment characteristics

4.3.9.1 *Interfaces.* As a minimum, the following input data shall be provided to the ACAS:

a) aircraft address code;

b) air-air and ground-air Mode S transmissions received by the Mode S transponder for use by ACAS (4.3.6.3.2);

c) own aircraft's maximum cruising true airspeed capability (Chapter 3, 3.1.2.8.2.2);

d) pressure-altitude; and

e) radio altitude.

Note.— Specific requirements for additional inputs for ACAS II and III are listed in the appropriate sections below.

4.3.9.2 *Aircraft antenna system.* ACAS shall transmit interrogations and receive replies via two antennas, one mounted on the top of the aircraft and the other on the bottom of the aircraft. The top-mounted antenna shall be directional and capable of being used for direction finding.

4.3.9.2.1 *Polarization.* Polarization of ACAS transmissions shall be nominally vertical.

4.3.9.2.2 *Radiation pattern.* The radiation pattern in elevation of each antenna when installed on an aircraft shall be nominally equivalent to that of a quarter-wave monopole on a ground plane.

4.3.9.2.3 *ANTENNA SELECTION*

4.3.9.2.3.1 *Squitter reception*. ACAS shall be capable of receiving squitters via the top and bottom antennas.

4.3.9.2.3.2 *Interrogations.* ACAS interrogations shall not be transmitted simultaneously on both antennas.

4.3.9.3 *Pressure-altitude source*. The altitude data for own aircraft provided to ACAS shall be obtained from the source that provides the basis for own Mode C or Mode S reports and they shall be provided at the finest quantization available.

4.3.9.3.1 **Recommendation.—** *A source providing a resolution finer than 7.62 m (25 ft) should be used.*

4.3.9.3.2 Where a source providing a resolution finer than 7.62 m (25 ft) is not available, and the only altitude data available for own aircraft is Gilham encoded, at least two independent sources shall be used and compared continuously in order to detect encoding errors.

4.3.9.3.3 **Recommendation.—** *Two altitude data sources should be used and compared in order to detect errors before provision to ACAS.*

4.3.9.3.4 The provisions of 4.3.10.3 shall apply when the comparison of the two altitude data sources indicates that one of the sources is in error.

4.3.10 Monitoring

4.3.10.1 *Monitoring function.* ACAS shall continuously perform a monitoring function in order to provide a warning if any of the following conditions at least are satisfied:

a) there is no interrogation power limiting due to interference control (4.3.2.2.2) and the maximum radiated power is reduced to less than that necessary to satisfy the surveillance requirements specified in 4.3.2; or

b) any other failure in the equipment is detected which results in a reduced capability of providing TAs or RAs; or

c) data from external sources indispensable for ACAS operation are not provided, or the data provided are not credible.

4.3.10.2 *Effect on ACAS operation.* The ACAS monitoring function shall not adversely affect other ACAS functions.

4.3.10.3 *Monitoring response.* When the monitoring function detects a failure (4.3.10.1), ACAS shall:

a) indicate to the flight crew that an abnormal condition exists;

b) prevent any further ACAS interrogations; and

c) cause any Mode S transmission containing own aircraft's resolution capability to indicate that ACAS is not operating.

4.3.11 Requirements for a Mode S transponder used in conjunction with ACAS

4.3.11.1 *Transponder capabilities.* In addition to the minimum transponder capabilities defined in Chapter 3, 3.1, the Mode S transponder used in conjunction with ACAS shall have the following capabilities:

a) ability to handle the following formats:

Format No.	*Format name*
UF = 16	Long air-air surveillance interrogation
DF = 16	Long air-air surveillance reply

b) ability to receive long Mode S interrogations (UF = 16) and generate long Mode S replies (DF = 16) at a continuous rate of 16.6 ms (60 per second);

c) means for delivering the ACAS data content of all accepted interrogations addressed to the ACAS equipment;

d) antenna diversity (as specified in Chapter 3, 3.1.2.10.4);

e) mutual suppression capability; and

f) inactive state transponder output power restriction.

When the Mode S transponder transmitter is in the inactive state, the peak pulse power at 1 090 MHz ±3 MHz at the terminals of the Mode S transponder antenna shall not exceed –70 dBm.

4.3.11.2 DATA TRANSFER BETWEEN ACAS AND ITS MODE S TRANSPONDER

4.3.11.2.1 *Data transfer from ACAS to its Mode S transponder:*

a) The Mode S transponder shall receive from its ACAS RA information for transmission in an RA report (4.3.8.4.2.2.1) and in a coordination reply (4.3.8.4.2.4.2);

b) the Mode S transponder shall receive from its ACAS current sensitivity level for transmission in a sensitivity level report (4.3.8.4.2.5);

c) the Mode S transponder shall receive from its ACAS capability information for transmission in a data link capability report (4.3.8.4.2.2.2) and for transmission in the RI field of air-air downlink formats DF = 0 and DF = 16 (4.3.8.4.1.2); and

d) the Mode S transponder shall receive from its ACAS an indication that RAs are enabled or inhibited for transmission in the RI field of downlink formats 0 and 16.

4.3.11.2.2 Data transfer from Mode S transponder to its ACAS:

a) The Mode S transponder shall transfer to its ACAS received sensitivity level control commands (4.3.8.4.2.1.1) transmitted by Mode S stations;

b) the Mode S transponder shall transfer to its ACAS received ACAS broadcast messages (4.3.8.4.2.3.3) transmitted by other ACASs;

c) the Mode S transponder shall transfer to its ACAS received resolution messages (4.3.8.4.2.3.2) transmitted by other ACASs for air-air coordination purposes; and

d) the Mode S transponder shall transfer to its ACAS own aircraft's Mode A identity data for transmission in an RA broadcast (4.3.8.4.2.3.4.5).

4.3.11.3 COMMUNICATION OF ACAS INFORMATION TO OTHER ACAS

4.3.11.3.1 *Surveillance reply.* The ACAS Mode S transponder shall use the short (DF = 0) or long (DF = 16) surveillance formats for replies to ACAS surveillance interrogations. The surveillance reply shall include the VS field as specified in Chapter 3, 3.1.2.8.2, the RI field as specified in Chapter 3, 3.1.2.8.2 and in 4.3.8.4.1.2, and the SL field as specified in 4.3.8.4.2.5.

4.3.11.3.2 *Coordination reply.* The ACAS Mode S transponder shall transmit a coordination reply upon receipt of a coordination interrogation from an equipped threat subject to the conditions of 4.3.11.3.2.1. The coordination reply shall use the long air-air surveillance reply format, DF = 16, with the VS field as specified in Chapter 3, 3.1.2.8.2, the RI field as specified in Chapter 3, 3.1.2.8.2 and in 4.3.8.4.1.2, the SL field as specified in 4.3.8.4.2.5 and the MV field as specified in 4.3.8.4.2.4. Coordination replies shall be transmitted even if the minimum reply rate limits of the transponder (Chapter 3, 3.1.2.10.3.7.2) are exceeded.

4.3.11.3.2.1 The ACAS Mode S transponder shall reply with a coordination reply to a coordination interrogation received from another ACAS if and only if the transponder is able to deliver the ACAS data content of the interrogation to its associated ACAS.

4.3.11.4 COMMUNICATION OF ACAS INFORMATION TO GROUND STATIONS

4.3.11.4.1 *RA reports to Mode S ground stations.* During the period of an RA and for 18±1 s following the end of the RA, the ACAS Mode S transponder shall indicate that it has an RA report by setting the appropriate DR field code in replies to a Mode S sensor as specified in 4.3.8.4.1.1. The RA report shall include the MB field as specified in 4.3.8.4.2.2.1. The RA report shall describe the most recent RA that existed during the preceding 18±1 s period.

Note 1.— The last sentence of 4.3.11.4.1 means that for 18±1 s following the end of an RA, all MB subfields in the RA report with the exception of bit 59 (RA terminated indicator) will retain the information reported at the time the RA was last active.

Note 2.— Upon receipt of a reply with DR = 2, 3, 6 or 7, a Mode S ground station may request downlink of the RA report by setting RR = 19 and either DI = 7, or DI = 7 and RRS = 0 in a surveillance or Comm-A interrogation to the ACAS aircraft. When this interrogation is received, the transponder replies with a Comm-B reply whose MB field contains the RA report.

4.3.11.4.2 *Data link capability report.* The presence of an ACAS shall be indicated by its Mode S transponder to a ground station in the Mode S data link capability report.

Note.— This indication causes the transponder to set codes in a data link capability report as specified in 4.3.8.4.2.2.2.

4.3.12 Indications to the flight crew

4.3.12.1 CORRECTIVE AND PREVENTIVE RAS

Recommendation.— *Indications to the flight crew should distinguish between preventive and corrective RAs.*

4.3.12.2 ALTITUDE CROSSING RAS

Recommendation.— *If ACAS generates an altitude crossing RA, a specific indication should be given to the flight crew that it is crossing.*

4.4 PERFORMANCE OF THE ACAS II COLLISION AVOIDANCE LOGIC

Note.— Caution is to be observed when considering potential improvements to the reference ACAS II system described in Section 4 of the guidance material in the Attachment since changes may affect more than one aspect of the system performance. It is essential that alternative designs would not degrade the performances of other designs and that such compatibility is demonstrated with a high degree of confidence.

4.4.1 Definitions relating to the performance of the collision avoidance logic

Note.— The notation [t_1, t_2] is used to indicate the interval between t_1 and t_2.

Altitude layer. Each encounter is attributed to one of six altitude layers as follows:

Layer	*1*	*2*	*3*	*4*	*5*	*6*
from		2 300 ft	5 000 ft	10 000 ft	20 000 ft	41 000 ft
to	2 300 ft	5 000 ft	10 000 ft	20 000 ft	41 000 ft	

The altitude layer of an encounter is determined by the average altitude of the two aircraft at closest approach.

Note.— For the purposes of defining the performance of the collision avoidance logic, there is no need to specify the physical basis of the altitude measurement or the relationship between altitude and ground level.

Approach angle. The difference in the ground headings of the two aircraft at closest approach, with 180 degrees defined as head on and 0 degrees defined as parallel.

Crossing encounter. An encounter in which the altitude separation of the two aircraft exceeds 100 ft at the beginning and at the end of the encounter window, and the relative vertical position of two aircraft at the end of the encounter window is reversed from that at the beginning of the encounter window.

Encounter. For the purposes of defining the performance of the collision avoidance logic, an encounter consists of two simulated aircraft trajectories. The horizontal coordinates of the aircraft represent the actual position of the aircraft but the vertical coordinate represents an altimeter measurement of altitude.

Encounter class. Encounters are classified according to whether or not the aircraft are transitioning at the beginning and end of the encounter window, and whether or not the encounter is crossing.

Encounter window. The time interval [*tca* – 40 s, *tca* + 10 s].

Horizontal miss distance (hmd). The minimum horizontal separation observed in an encounter.

Level aircraft. An aircraft that is not transitioning.

Original trajectory. The original trajectory of an ACAS-equipped aircraft is that followed by the aircraft in the same encounter when it was not ACAS equipped.

Original rate. The original rate of an ACAS-equipped aircraft at any time is its altitude rate at the same time when it followed the original trajectory.

Required rate. For the standard pilot model, the required rate is that closest to the original rate consistent with the RA.

tca. Nominally, the time of closest approach. For encounters in the standard encounter model (4.4.2.6), a reference time for the construction of the encounter at which various parameters, including the vertical and horizontal separation (*vmd* and *hmd*), are specified.

Note.— Encounters in the standard encounter model (4.4.2.6) are constructed by building the trajectories of the two aircraft outwards starting at tca. *When the process is complete,* tca *may not be the precise time of closest approach and differences of a few seconds are acceptable.*

Transitioning aircraft. An aircraft having an average vertical rate with a magnitude exceeding 400 feet per minute (ft/min), measured over some period of interest.

Turn extent. A heading difference defined as an aircraft's ground heading at the end of a turn minus its ground heading at the beginning of the turn.

Vertical miss distance (*vmd*). Notionally, the vertical separation at closest approach. For encounters in the standard encounter model (4.4.2.6), by construction the vertical separation at the time *tca*.

4.4.2 Conditions under which the requirements apply

4.4.2.1 The following assumed conditions shall apply to the performance requirements specified in 4.4.3 and 4.4.4:

a) range and bearing measurements and an altitude report are available for the intruder each cycle as long as it is within 14 NM, but not when the range exceeds 14 NM;

b) the errors in the range and bearing measurements conform to standard range and bearing error models (4.4.2.2 and 4.4.2.3);

c) the intruder's altitude reports, which are its Mode C replies, are expressed in 100 ft quanta;

d) an altitude measurement that has not been quantized and is expressed with a precision of 1 ft or better is available for own aircraft;

e) errors in the altitude measurements for both aircraft are constant throughout any particular encounter;

f) the errors in the altitude measurements for both aircraft conform to a standard altimetry error model (4.4.2.4);

g) the pilot responses to RAs conform to a standard pilot model (4.4.2.5);

h) the aircraft operate in an airspace in which close encounters, including those in which ACAS generates an RA, conform to a standard encounter model (4.4.2.6);

i) ACAS-equipped aircraft are not limited in their ability to perform the manoeuvres required by their RAs; and

j) as specified in 4.4.2.7:

   1) the intruder involved in each encounter is not equipped (4.4.2.7 a)); or

   2) the intruder is ACAS-equipped but follows a trajectory identical to that in the unequipped encounter (4.4.2.7 b)); or

   3) the intruder is equipped with an ACAS having a collision avoidance logic identical to that of own ACAS (4.4.2.7 c)).

Note.— The phrase "altitude measurement" refers to a measurement by an altimeter prior to any quantization.

4.4.2.1.1 The performance of the collision avoidance logic shall not degrade abruptly as the statistical distribution of the altitude errors or the statistical distributions of the various parameters that characterize the standard encounter model or the response of pilots to the advisories are varied, when surveillance reports are not available on every cycle or when the quantization of the altitude measurements for the intruder is varied or the altitude measurements for own aircraft are quantized.

4.4.2.2 STANDARD RANGE ERROR MODEL

The errors in the simulated range measurements shall be taken from a Normal distribution with mean 0 ft and standard deviation 50 ft.

4.4.2.3 STANDARD BEARING ERROR MODEL

The errors in the simulated bearing measurements shall be taken from a Normal distribution with mean 0.0 degrees and standard deviation 10.0 degrees.

4.4.2.4 STANDARD ALTIMETRY ERROR MODEL

4.4.2.4.1 The errors in the simulated altitude measurements shall be assumed to be distributed as a Laplacian distribution with zero mean having probability density

$$p(e) = \frac{1}{2\lambda} \exp\left(-\frac{|e|}{\lambda}\right)$$

4.4.2.4.2 The parameter λ required for the definition of the statistical distribution of altimeter error for each aircraft shall have one of two values, λ_1 and λ_2, which depend on the altitude layer of the encounter as follows:

Layer	*1*		*2*		*3*		*4*		*5*		*6*	
	m	*ft*	*m*	*ft*	*m*	*ft*	*m*	*ft*	*m*	*ft*	*m*	*ft*
λ_1	10	35	11	38	13	43	17	58	22	72	28	94
λ_2	18	60	18	60	21	69	26	87	30	101	30	101

4.4.2.4.3 For an aircraft equipped with ACAS the value of λ shall be λ_1.

4.4.2.4.4 For aircraft not equipped with ACAS, the value of λ shall be selected randomly using the following probabilities:

Layer	*1*	*2*	*3*	*4*	*5*	*6*
prob(λ_1)	0.391	0.320	0.345	0.610	0.610	0.610
prob(λ_2)	0.609	0.680	0.655	0.390	0.390	0.390

4.4.2.5 STANDARD PILOT MODEL

The standard pilot model used in the assessment of the performance of the collision avoidance logic shall be that:

a) any RA is complied with by accelerating to the required rate (if necessary) after an appropriate delay;

b) when the aircraft's current rate is the same as its original rate and the original rate complies with the RA, the aircraft continues at its original rate, which is not necessarily constant due to the possibility of acceleration in the original trajectory;

c) when the aircraft is complying with the RA, its current rate is the same as the original rate and the original rate changes and consequently becomes inconsistent with the RA, the aircraft continues to comply with the RA;

d) when an initial RA requires a change in altitude rate, the aircraft responds with an acceleration of 0.25 *g* after a delay of 5 s from the display of the RA;

e) when an RA is modified and the original rate complies with the modified RA, the aircraft returns to its original rate (if necessary) with the acceleration specified in g) after the delay specified in h);

f) when an RA is modified and the original rate does not comply with the modified RA, the aircraft responds to comply with the RA with the acceleration specified in g) after the delay specified in h);

g) the acceleration used when an RA is modified is 0.25 *g* unless the modified RA is a reversed sense RA or an increased rate RA in which case the acceleration is 0.35 *g*;

h) the delay used when an RA is modified is 2.5 s unless this results in the acceleration starting earlier than 5 s from the initial RA in which case the acceleration starts 5 s from the initial RA; and

i) when an RA is cancelled, the aircraft returns to its original rate (if necessary) with an acceleration of 0.25 *g* after a delay of 2.5 s.

4.4.2.6 STANDARD ENCOUNTER MODEL

4.4.2.6.1 *ELEMENTS OF THE STANDARD ENCOUNTER MODEL*

4.4.2.6.1.1 In order to calculate the effect of ACAS on the risk of collision (4.4.3) and the compatibility of ACAS with air traffic management (ATM) (4.4.4), sets of encounters shall be created for each of:

a) the two aircraft address orderings;

b) the six altitude layers;

c) nineteen encounter classes; and

d) nine or ten *vmd* bins as specified in 4.4.2.6.2.4.

The results for these sets shall be combined using the relative weightings given in 4.4.2.6.2.

4.4.2.6.1.1.1 Each set of encounters shall contain at least 500 independent, randomly generated encounters.

4.4.2.6.1.1.2 The two aircraft trajectories in each encounter shall be constructed with the following randomly selected characteristics:

a) in the vertical plane:

   1) a *vmd* from within the appropriate *vmd* bin;

   2) a vertical rate for each aircraft at the beginning of the encounter window, $\dot{z}_1$, and at the end of the encounter window, $\dot{z}_2$;

   3) a vertical acceleration; and

   4) a start time for the vertical acceleration; and

b) and in the horizontal plane:

   1) an *hmd*;

   2) an approach angle;

   3) a speed for each aircraft at closest approach;

   4) a decision for each aircraft whether or not it turns;

   5) the turn extent; the bank angle; and the turn end time;

   6) a decision for each aircraft whether or not its speed changes; and

   7) the magnitude of the speed change.

Note.— It is possible for the selections made for the various characteristics of an encounter to be irreconcilable. When this occurs, the problem can be resolved by discarding either the selection for a particular characteristic or the whole encounter, as most appropriate.

4.4.2.6.1.3 Two models shall be used for the statistical distribution of *hmd* (4.4.2.6.4.1). For calculations of the effect of ACAS on the risk of collision (4.4.3), *hmd* shall be constrained to be less than 500 ft. For calculations of the compatibility of ACAS with ATM (4.4.4), *hmd* shall be selected from a larger range of values (4.4.2.6.4.1.2).

Note.— 4.4.2.6.2 and 4.4.2.6.3 specify vertical characteristics for the aircraft trajectories in the standard encounter model that depend on whether the hmd *is constrained to be small ("for calculating risk ratio") or can take larger values ("for ATM compatibility"). Otherwise, the characteristics of the encounters in the vertical and horizontal planes are independent.*

4.4.2.6.2 ENCOUNTER CLASSES AND WEIGHTS

4.4.2.6.2.1 Aircraft address. Each aircraft shall be equally likely to have the higher aircraft address.

4.4.2.6.2.2 *Altitude layers.* The relative weights of the altitude layers shall be as follows:

Layer	*1*	*2*	*3*	*4*	*5*	*6*
prob(layer)	0.13	0.25	0.32	0.22	0.07	0.01

4.4.2.6.2.3 *Encounter classes*

4.4.2.6.2.3.1 The encounters shall be classified according to whether the aircraft are level (L) or transitioning (T) at the beginning *(before tca*) and end (after *tca*) of the encounter window and whether or not the encounter is crossing, as follows:

	Aircraft No. 1		*Aircraft No. 2*		
Class	*before* tca	*after* tca	*before* tca	*after* tca	*Crossing*
1	L	L	T	T	yes
2	L	L	L	T	yes
3	L	L	T	L	yes
4	T	T	T	T	yes
5	L	T	T	T	yes
6	T	T	T	L	yes
7	L	T	L	T	yes
8	L	T	T	L	yes
9	T	L	T	L	yes
10	L	L	L	L	no
11	L	L	T	T	no
12	L	L	L	T	no
13	L	L	T	L	no
14	T	T	T	T	no
15	L	T	T	T	no
16	T	T	T	L	no
17	L	T	L	T	no
18	L	T	T	L	no
19	T	L	T	L	no

4.4.2.6.2.3.2 The relative weights of the encounter classes shall depend on layer as follows:

	for calculating risk ratio		*for ATM compatibility*	
Class	*Layers 1-3*	*Layers 4-6*	*Layers 1-3*	*Layers 4-6*
1	0.00502	0.00319	0.06789	0.07802
2	0.00030	0.00018	0.00408	0.00440
3	0.00049	0.00009	0.00664	0.00220
4	0.00355	0.0027	0.04798	0.06593
5	0.00059	0.00022	0.00791	0.00549
6	0.00074	0.00018	0.00995	0.00440
7	0.00002	0.00003	0.00026	0.00082
8	0.00006	0.00003	0.00077	0.00082
9	0.00006	0.00003	0.00077	0.00082
10	0.36846	0.10693	0.31801	0.09011
11	0.26939	0.41990	0.23252	0.35386
12	0.06476	0.02217	0.05590	0.01868
13	0.07127	0.22038	0.06151	0.18571
14	0.13219	0.08476	0.11409	0.07143
15	0.02750	0.02869	0.02374	0.02418
16	0.03578	0.06781	0.03088	0.05714
17	0.00296	0.00098	0.00255	0.00082
18	0.00503	0.00522	0.00434	0.00440
19	0.01183	0.03651	0.01021	0.03077

4.4.2.6.2.4 vmd *bins*

4.4.2.6.2.4.1 The *vmd* of each encounter shall be taken from one of ten *vmd* bins for the non-crossing encounter classes, and from one of nine or ten *vmd* bins for the crossing encounter classes. Each *vmd* bin shall have an extent of 100 ft for calculating risk ratio, or an extent of 200 ft for calculating compatibility with ATM. The maximum *vmd* shall be 1 000 ft for calculating risk ratio, and 2 000 ft otherwise.

4.4.2.6.2.4.2 For non-crossing encounter classes, the relative weights of the *vmd* bins shall be as follows:

vmd *bin*	*for calculating risk ratio*	*for ATM compatibility*
1	0.013	0.128
2	0.026	0.135
3	0.035	0.209
4	0.065	0.171
5	0.100	0.160
6	0.161	0.092
7	0.113	0.043
8	0.091	0.025
9	0.104	0.014
10	0.091	0.009

Note.— The weights for the vmd *bins do not sum to 1.0. The weights specified are based on an analysis of encounters captured in ATC ground radar data. The missing proportion reflects the fact that the encounters captured included some with* vmd *exceeding the maximum* vmd *in the model.*

4.4.2.6.2.4.3 For the crossing classes, the relative weights of the *vmd* bins shall be as follows:

vmd *bin*	*for calculating risk ratio*	*for ATM compatibility*
1	0	0.064
2	0.026	0.144
3	0.036	0.224
4	0.066	0.183
5	0.102	0.171
6	0.164	0.098
7	0.115	0.046
8	0.093	0.027
9	0.106	0.015
10	0.093	0.010

Note.— For the crossing classes, vmd *must exceed 100 ft so that the encounter qualifies as a crossing encounter. Thus, for the calculation of risk ratio there is no* vmd *bin 1, and for calculations of the compatibility with ATM* vmd *bin 1 is limited to [100 ft, 200 ft].*

4.4.2.6.3 *CHARACTERISTICS OF THE AIRCRAFT TRAJECTORIES IN THE VERTICAL PLANE*

4.4.2.6.3.1 *vmd.* The *vmd* for each encounter shall be selected randomly from a distribution that is uniform in the interval covered by the appropriate *vmd* bin.

4.4.2.6.3.2 *Vertical rate*

4.4.2.6.3.2.1 For each aircraft in each encounter, either the vertical rate shall be constant ($\dot{z}$) or the vertical trajectory shall be constructed so that the vertical rate at tca – 35 s is $\dot{z}_1$ and the vertical rate at *tca* + 5 s is $\dot{z}_2$. Each vertical rate, $\dot{z}$, $\dot{z}_1$or $\dot{z}_2$, shall be determined by first selecting randomly an interval within which it lies and then selecting the precise value from a distribution that is uniform over the interval selected.

4.4.2.6.3.2.2 The intervals within which the vertical rates lie shall depend on whether the aircraft is level, i.e. marked “L” in 4.4.2.6.2.3.1, or transitioning, i.e. marked “T” in 4.4.2.6.2.3.1, and shall be as follows:

L	*T*
[240 ft/min, 400 ft/min]	[3200 ft/min, 6000 ft/min]
[80 ft/min, 240 ft/min]	[400 ft/min, 3200 ft/min]
[–80 ft/min, 80 ft/min]	[–400 ft/min, 400 ft/min]
[–240 ft/min, 80 ft/min]	[–3 200 ft/min, 400 ft/min]
[–400 ft/min, 240 ft/min]	[–6 000 ft/min, 3200 ft/min]

4.4.2.6.3.2.3 For aircraft that are level over the entire encounter window, the vertical rate $\dot{z}$ shall be constant. The probabilities for the intervals within which $\dot{z}$ lies shall be as follows:

$\dot{z}$ *(ft/min)*	*prob($\dot{z}$)*
[240 ft/min, 400 ft/min]	0.0382
[80 ft/min, 240 ft/min]	0.0989
[80 ft/min, 80 ft/min]	0.7040
[–240 ft/min, 80 ft/min]	0.1198
[–400 ft/min, 240 ft/min]	0.0391

4.4.2.6.3.2.4 For aircraft that are not level over the entire encounter window, the intervals for $\dot{z}_1$ and $\dot{z}_2$ shall be determined jointly by random selection using joint probabilities that depend on altitude layer and on whether the aircraft is transitioning at the beginning of the encounter window (Rate-to-Level), at the end of the encounter window (Level-to-Rate) or at both the beginning and the end (Rate-to-Rate). The joint probabilities for the vertical rate intervals shall be as follows:

for aircraft with Rate-to-Level trajectories in layers 1 to 3,

$\dot{z}_2$ interval	*joint probability of $\dot{z}_1$ and $\dot{z}_2$ interval*				
[240 ft/min, 400 ft/min]	0.0019	0.0169	0.0131	0.1554	0.0000
[80 ft/min, 240 ft/min]	0.0000	0.0187	0.0019	0.1086	0.0000
[–80 ft/min, 80 ft/min]	0.0037	0.1684	0.0094	0.1124	0.0075
[–240 ft/min, –80 ft/min]	0.0037	0.1461	0.0094	0.0243	0.0037
[–400 ft/min, –240 ft/min]	0.0000	0.1742	0.0094	0.0094	0.0019

–6 000 ft/min –3 200 ft/min –400 ft/min 400 ft/min 3 200 ft/min 6 000 ft/min $\dot{z}_1$

for aircraft with Rate-to-Level trajectories in layers 4 to 6,

$\dot{z}_2$ interval	*joint probability of $\dot{z}_1$ and $\dot{z}_2$ interval*				
[240 ft/min, 400 ft/min]	0.0105	0.0035	0.0000	0.1010	0.0105
[80 ft/min, 240 ft/min]	0.0035	0.0418	0.0035	0.1776	0.0279
[–80 ft/min, 80 ft/min]	0.0279	0.1219	0.0000	0.2403	0.0139
[–240 ft/min, –80 ft/min]	0.0035	0.0767	0.0000	0.0488	0.0105
[–400 ft/min, –240 ft/min]	0.0105	0.0453	0.0035	0.0174	0.0000

–6 000 ft/min –3 200 ft/min –400 ft/min 400 ft/min 3 200 ft/min 6 000 ft/min $\dot{z}_1$

for aircraft with Level-to-Rate trajectories in layers 1 to 3,

$\dot{z}_2$ interval	*joint probability of $\dot{z}_1$ and $\dot{z}_2$ interval*				
[3 200 ft/min, 6000 ft/min]	0.0000	0.0000	0.0000	0.0000	0.0000
[400 ft/min, 3200 ft/min]	0.0074	0.0273	0.0645	0.0720	0.1538
[–400 ft/min, 400 ft/min]	0.0000	0.0000	0.0000	0.0000	0.0000
[–3 200 ft/min, –400 ft/min]	0.2978	0.2084	0.1365	0.0273	0.005
[–6 000ft/min, –3 200ft/min]	0.0000	0.0000	0.0000	0.0000	0.0000

–400 ft/min –240 ft/min –80 ft/min 80 ft/min 240 ft/min 400 ft/min $\dot{z}_1$

for aircraft with Level-to-Rate trajectories in layers 4 to 6,

$\dot{z}_2$ interval	*joint probability of $\dot{z}_1$ and $\dot{z}_2$ interval*				
[3 200 ft/min, 6 000 ft/min]	0.0000	0.0000	0.0000	0.0000	0.0192
[400 ft/min, 3 200 ft/min]	0.0000	0.0000	0.0962	0.0577	0.1154
[–400 ft/min, 400 ft/min]	0.0000	0.0000	0.0000	0.0000	0.0000
[–3 200 ft/min, –400 ft/min]	0.1346	0.2692	0.2308	0.0577	0.0192
[–6 000 ft/min, –3 200 ft/min]	0.0000	0.0000	0.0000	0.0000	0.0000

–400 ft/min –240 ft/min –80 ft/min 80 ft/min 240 ft/min 400 ft/min $\dot{z}_1$

for aircraft with Rate-to-Rate trajectories in layers 1 to 3,

$\dot{z}_2$ interval	*joint probability of $\dot{z}_1$ and $\dot{z}_2$ interval*				
[3 200 ft/min, 6 000 ft/ min]	0.0000	0.0000	0.0007	0.0095	0.0018
[400 ft/min, 3 200 ft/min]	0.0000	0.0018	0.0249	0.2882	0.0066
[–400 ft/min, 400 ft/min]	0.0000	0.0000	0.0000	0.0000	0.0000
[–3 200 ft/min, –400 ft/min]	0.0048	0.5970	0.0600	0.0029	0.0011
[–6 000 ft/min, –3 200 ft/min]	0.0000	0.0007	0.0000	0.0000	0.0000

–6 000 ft/min –3 200 ft/min –400 ft/min 400 ft/min 3 200 ft/min 6 000 ft/min $\dot{z}_1$

for aircraft with Rate-to-Rate trajectories in layers 4 to 6,

$\dot{z}_2$ interval	*joint probability of $\dot{z}_1$ and $\dot{z}_2$ interval*				
[3 200 ft/min, 6 000 ft/ min]	0.0014	0.0000	0.0028	0.0110	0.0069
[400 ft/min, 3 200 ft/min]	0.0028	0.0028	0.0179	0.4889	0.0523
[–400 ft/min, 400 ft/min]	0.0000	0.0000	0.0000	0.0000	0
[–3 200 ft/min, –400 ft/min]	0.0317	0.3029	0.0262	0.0152	0.0028
[–6 000 ft/min, –3 200 ft/min]	0.0110	0.0220	0.0014	0.0000	0

–6 000 ft/min –3 200 ft/min –400 ft/min 400 ft/min 3 200 ft/min 6 000 ft/min $\dot{z}_1$

4.4.2.6.3.2.5 For a Rate-to-Rate track, if line $|\dot{z}_2 - \dot{z}_1| < 566$ ft/min then the track shall be constructed with a constant rate equal to $\dot{z}_1$.

4.4.2.6.3.3 *Vertical acceleration*

4.4.2.6.3.3.1 Subject to 4.4.2.6.3.2.5, for aircraft that are not level over the entire encounter window, the rate shall be constant and equal to $\dot{z}_1$ over at least the interval [tca – 40 s, *tca* – 35 s] at the beginning of the encounter window, and shall be constant and equal to $\dot{z}_2$ over at least the interval [*tca* + 5 s, *tca* + 10 s] at the end of the encounter window. The vertical acceleration shall be constant in the intervening period.

4.4.2.6.3.3.2 The vertical acceleration ($\ddot{z}$) shall be modelled as follows:

$$\ddot{z} = (A\dot{z}_2 - \dot{z}_1) + \varepsilon$$

where the parameter *A* is case-dependent as follows:

	$A(s^{-1})$	
Case	*Layers 1-3*	*Layers 4-6*
Rate-to-Level	0.071	0.059
Level-to-Rate	0.089	0.075
Rate-to-Rate	0.083	0.072

and the error ε is selected randomly using the following probability density:

$$p(\varepsilon) = \frac{1}{2\mu}\exp\left(-\frac{|\varepsilon|}{\mu}\right)$$

where $\mu = 0.3$ ft s^{-2}.

Note.— The sign of the acceleration $\ddot{z}$ is determined by $\dot{z}_1$ and $\dot{z}_2$. An error ε that reverses this sign must be rejected and the error reselected.

4.4.2.6.3.4 *Acceleration start time*. The acceleration start time shall be distributed uniformly in the time interval [*tca* – 35 *s*, *tca* – 5 s] and shall be such that $\dot{z}_2$ is achieved no later than *tca* + 5 s.

4.4.2.6.4 *CHARACTERISTICS OF THE AIRCRAFT TRAJECTORIES IN THE HORIZONTAL PLANE*

4.4.2.6.4.1 *Horizontal miss distance*

4.4.2.6.4.1.1 For calculations of the effect of ACAS on the risk of collision (4.4.3), hmd shall be uniformly distributed in the range [0, 500 ft].

4.4.2.6.4.1.2 For calculations concerning the compatibility of ACAS with ATM (4.4.4), *hmd* shall be distributed so that the values of *hmd* have the following cumulative probabilities:

	cumulative probability			*cumulative probability*	
hmd *(ft)*	*Layers 1-3*	*Layers 4-6*	hmd *(ft)*	*Layers 1-3*	*Layers 4-6*
0	0.000	0.000	17013	0.999	0.868
1215	0.152	0.125	18228	1.000	0.897
2430	0.306	0.195	19443		0.916
3646	0.482	0.260	20659		0.927
4860	0.631	0.322	21874		0.939
6076	0.754	0.398	23089		0.946
7921	0.859	0.469	24304		0.952
8506	0.919	0.558	25520		0.965
9722	0.954	0.624	26735		0.983
10937	0.972	0.692	27950		0.993
12152	0.982	0.753	29165		0.996
13367	0.993	0.801	30381		0.999
14582	0.998	0.821	31596		1.000
15798	0.999	0.848			

4.4.2.6.4.2 *Approach angle.* The cumulative distribution for the horizontal approach angle shall be as follows:

approach	*cumulative probability*		*approach*	*cumulative probability*	
angle (deg.)	*Layers 1-3*	*Layers 4-6*	*angle (deg.)*	*Layers 1-3*	*Layers 4-6*
0	0.00	0.00	100	0.38	0.28
10	0.14	0.05	110	0.43	0.31
20	0.17	0.06	120	0.49	0.35
30	0.18	0.08	130	0.55	0.43
40	0.19	0.08	140	0.62	0.50
50	0.21	0.10	150	0.71	0.59

approach angle (deg.)	*cumulative probability Layers 1-3*	*Layers 4-6*	*approach angle (deg.)*	*cumulative probability Layers 1-3*	*Layers 4-6*
60	0.23	0.13	160	0.79	0.66
70	0.25	0.14	170	0.88	0.79
80	0.28	0.19	180	1.00	1.00
90	0.32	0.22			

4.4.2.6.4.3 *Aircraft speed.* The cumulative distribution for each aircraft's horizontal ground speed at closest approach shall be as follows:

ground speed (kt)	*cumulative probability Layers 1-3*	*Layers 4-6*	*ground speed (kt)*	*cumulative probability Layers 1-3*	*Layers 4-6*
45	0.000		325	0.977	0.528
50	0.005		350	0.988	0.602
75	0.024	0.000	375	0.997	0.692
100	0.139	0.005	400	0.998	0.813
125	0.314	0.034	425	0.999	0.883
150	0.486	0.064	450	1.000	0.940
175	0.616	0.116	475		0.972
200	0.700	0.171	500		0.987
225	0.758	0.211	525		0.993
250	0.821	0.294	550		0.998
275	0.895	0.361	575		0.999
300	0.949	0.427	600		1.000

4.4.2.6.4.4 *Horizontal manoeuvre probabilities.* For each aircraft in each encounter, the probability of a turn, the probability of a speed change given a turn, and the probability of a speed change given no turn shall be as follows:

Layer	*Prob(turn)*	*Prob(speed change) given a turn*	*Prob(speed change) given no turn*
1	0.31	0.20	0.5
2	0.29	0.20	0.25
3	0.22	0.10	0.15
4, 5, 6	0.16	0.05	0.10

4.4.2.6.4.4.1 Given a speed change, the probability of a speed increase shall be 0.5 and the probability of a speed decrease shall be 0.5.

4.4.2.6.4.5 *Turn extent.* The cumulative distribution for the extent of any turn shall be as follows:

Turn extent (deg.)	*cumulative probability Layers 1-3*	*Layers 4-6*
15	0.00	0.00
30	0.43	0.58
60	0.75	0.90
90	0.88	0.97
120	0.95	0.99
150	0.98	1.00
180	0.99	
210	1.00	

4.4.2.6.4.5.1 The direction of the turn shall be random, with the probability of a left turn being 0.5 and the probability of a right turn being 0.5.

4.4.2.6.4.6 *Bank angle.* An aircraft's bank angle during a turn shall not be less than 15 degrees. The probability that it equals 15 degrees shall be 0.79 in layers 1-3 and 0.54 in layers 4-5. The cumulative distribution for larger bank angles shall be as follows:

	cumulative probability	
Bank angle (deg.)	*Layers 1-3*	*Layers 4-6*
15	0.79	0.54
25	0.96	0.82
35	0.99	0.98
50	1.00	1.00

4.4.2.6.4.7 *Turn end time.* The cumulative distribution for each aircraft's turn end time shall be as follows:

Turn end time	*cumulative probability*	
(seconds before tca*)*	*Layers 1-3*	*Layers 4-6*
0	0.42	0.28
5	0.64	0.65
10	0.77	0.76
15	0.86	0.85
20	0.92	0.94
25	0.98	0.99
30	1.00	1.00

4.4.2.6.4.8 *Speed change.* A constant acceleration or deceleration shall be randomly selected for each aircraft performing a speed change in a given encounter, and shall be applied for the duration of the encounter. Accelerations shall be uniformly distributed between 2 kt/s and 6 kt/s. Decelerations shall be uniformly distributed between 1 kt/s and 3 kt/s.

4.4.2.7 ACAS EQUIPAGE OF THE INTRUDER

The performance requirements specified in 4.4.3 and 4.4.4 each apply to three distinct situations in which the following conditions concerning the intruder's ACAS and trajectory shall apply:

a) where the intruder involved in each encounter is not equipped (4.4.2.1 j) 1)), it follows a trajectory identical to that which it follows when own aircraft is not equipped;

b) where the intruder is ACAS-equipped but follows a trajectory identical to that in the unequipped encounter (4.4.2.1 j) 2)):

   1) it follows the identical trajectory regardless of whether or not there is an RA;

   2) the intruder ACAS generates an RA and transmits an RAC that is received immediately after any RA is first announced to the pilot of own aircraft;

   3) the sense of the RAC generated by the intruder ACAS and transmitted to own aircraft is opposite to the sense of the first RAC selected and transmitted to the intruder by own aircraft (4.3.6.1.3);

   4) the RAC transmitted by the intruder is received by own aircraft; and

5) the requirements apply both when own aircraft has the lower aircraft address and when the intruder aircraft has the lower aircraft address; and

c) where the intruder is equipped with an ACAS having a collision avoidance logic identical to that of own ACAS (4.4.2.1 j) 3)):

1) the conditions relating to the performance of own aircraft, ACAS and pilot apply equally to the intruder aircraft, ACAS and pilot;

2) RACs transmitted by one aircraft are received by the other; and

3) the requirements apply both when own aircraft has the lower aircraft address and when the intruder aircraft has the lower aircraft address.

4.4.2.8 COMPATIBILITY BETWEEN DIFFERENT COLLISION AVOIDANCE LOGIC DESIGNS

Recommendation.— *When considering alternative collision avoidance logic designs, certification authorities should verify that:*

a) the performances of the alternative design are acceptable in encounters involving ACAS units that use existing designs; and

b) the performances of the existing designs are not degraded by the use of the alternative design.

Note.— To address the compatibility between different collision avoidance logic designs, the conditions described in 4.4.2.7 b) are the most severe that can be anticipated in this respect.

4.4.3 Reduction in the risk of collision

Under the conditions of 4.4.2, the collision avoidance logic shall be such that the expected number of collisions is reduced to the following proportions of the number expected in the absence of ACAS:

a)	when the intruder is not ACAS equipped	0.18;
b)	when the intruder is equipped but does not respond	0.32; and
c)	when the intruder is equipped and responds	0.04.

4.4.4 Compatibility with air traffic management (ATM)

4.4.4.1 NUISANCE ALERT RATE

4.4.4.1.1 Under the conditions of 4.4.2, the collision avoidance logic shall be such that the proportion of RAs which are a "nuisance" (4.4.4.1.2) shall not exceed:

.06 when own aircraft's vertical rate at the time the RA is first issued is less than 400 ft/min; or

.08 when own aircraft's vertical rate at the time the RA is first issued exceeds 400 ft/min.

Note.— This requirement is not qualified by the ACAS equipage of the intruder (4.4.2.7) since it has negligible effect on the occurrence and frequency of nuisance RAs.

4.4.4.1.2 An RA shall be considered a "nuisance" for the purposes of 4.4.4.1.1 unless, at some point in the encounter in the absence of ACAS, the horizontal separation and the vertical separation are simultaneously less than the following values:

	horizontal separation	*vertical separation*
above FL100	2.0 NM	750 ft
below FL100	1.2 NM	750 ft

4.4.4.2 COMPATIBLE SENSE SELECTION

Under the conditions of 4.4.2, the collision avoidance logic shall be such that the proportion of encounters in which following the RA results in an altitude separation at closest approach with the opposite sign to that occurring in the absence of ACAS shall not exceed the following values:

a) when the intruder is not ACAS equipped 0.08;
b) when the intruder is equipped but does not respond 0.08; and
c) when the intruder is equipped and responds 0.12.

4.4.4.3 DEVIATIONS CAUSED BY ACAS

4.4.4.3.1 Under the conditions of 4.4.2, the collision avoidance logic shall be such that the number of RAs resulting in "deviations" (4.4.4.3.2) greater than the values indicated shall not exceed the following proportions of the total number of RAs:

	when own aircraft's vertical rate at the time the RA is first issued	
	is less than 400ft/min	*exceeds 400ft/min*
when the intruder is not ACAS equipped,		
for deviations ≥300 ft	0.15	0.23
for deviations ≥600 ft	0.04	0.13
for deviations ≥1 000 ft	0.01	0.07
when the intruder is equipped but does not respond,		
for deviations ≥300 ft	0.23	0.35
for deviations ≥600 ft	0.06	0.16
for deviations ≥1 000 ft	0.02	0.07
when the intruder is equipped and responds,		
for deviations ≥300 ft	0.11	0.23
for deviations ≥600 ft	0.02	0.12
for deviations ≥1 000 ft	0.01	0.06

4.4.4.3.2 For the purposes of 4.4.4.3.1, the "deviation" of the equipped aircraft from the original trajectory shall be measured in the interval from the time at which the RA is first issued until the time at which, following cancellation of the RA, the equipped aircraft has recovered its original altitude rate. The deviation shall be calculated as the largest altitude difference at any time in this interval between the trajectory followed by the equipped aircraft when responding to its RA and its original trajectory.

4.4.5 Relative value of conflicting objectives

Recommendation.— *The collision avoidance logic should be such as to reduce as much as practicable the risk of collision (measured as defined in 4.4.3) and limit as much as practicable the disruption to ATM (measured as defined in 4.4.4).*

4.5 ACAS USE OF EXTENDED SQUITTER REPORTS

4.5.1 ACAS hybrid surveillance using extended squitter position data

Note.— Hybrid surveillance is the technique used by ACAS to take advantage of passive position information available via extended squitter. Using hybrid surveillance, ACAS validates the position provided by extended squitter through direct active range measurement. An initial validation is performed at track initiation. Revalidation is performed once per 10 seconds if the intruder becomes a near threat in altitude or range. Finally, regular active surveillance is performed once per second on intruders that become a near threat in both altitude and range. In this manner, passive surveillance (once validated) is used for non-threatening intruders thus lowering the ACAS interrogation rate. Active surveillance is used whenever an intruder becomes a near threat in order to preserve ACAS independence as an independent safety monitor.

4.5.1.1 DEFINITIONS

Active surveillance. The process of tracking an intruder by using the information gained from the replies to own aircraft's interrogations.

Active track. A track formed by measurements gained by active interrogation.

Hybrid surveillance. The process of using active surveillance to validate and monitor other aircraft being tracked principally using passive surveillance in order to preserve ACAS independence.

Initial acquisition. The process of starting the formation of a new track upon receipt of a squitter from a Mode S aircraft for which there is no track by making an active interrogation.

Initial validation. The process of verifying the relative position of a new track using passive information by comparing it to the relative position obtained by active interrogation.

Passive surveillance. The process of tracking another aircraft without interrogating it, by using the other aircraft's extended squitters. ACAS uses the information contained in passive tracks to monitor the need for active surveillance, but not for any other purpose.

Passive track. After initial acquisition, a track maintained without active interrogation, using information contained in extended squitters.

4.5.1.2 An ACAS equipped to receive extended squitter position reports for passive surveillance of non-threatening intruders shall utilize this passive position information in the following manner.

4.5.1.3 PASSIVE SURVEILLANCE

4.5.1.3.1 *Initial validation*. At initial acquisition of an aircraft reporting extended squitter information, ACAS shall determine the relative range and bearing as computed from the position of own aircraft and the intruder's position as reported in the extended squitter. This derived range and bearing and the altitude reported in the squitter shall be compared to the range, bearing and altitude determined by active ACAS interrogation of the aircraft. Differences between the derived and measured range and bearing and the squitter and squitter and reply altitude shall be computed and used in tests to determine whether the extended squitter data is valid. If these tests are satisfied the passive position shall be considered to be validated and the track shall be maintained on passive data. If any of the above tests fail, the track shall be declared an active track and no further use shall be made of the subsequent passive surveillance data received for this track.

4.5.1.3.2 **Recommendation.—** *The following tests should be used to validate the position reported in the extended squitter message:*

| slant range difference | ≤ 200 m; and

| bearing difference | ≤ 45 degrees; and

| altitude difference | ≤ 100 ft.

4.5.1.3.3 *Supplementary active interrogations*. In order to ensure that an intruder's track is updated at least as frequently as required in the absence of extended squitter data (4.3.7.1.2.2), each time a track is updated using squitter information the time at which an active interrogation would next be required shall be calculated. An active interrogation shall be made at that time if a further squitter has not been received before the interrogation is due.

4.5.1.4 *Revalidation and monitoring.* If the following condition is met for a track being updated using passive surveillance data:

a) $|a| \leq 10\,000$ ft and either;

b) $|a| \leq 3\,000$ ft or $|a - 3\,000 \text{ ft}| / |\dot{a}| \leq 60$ s; or

c) $r \leq 3$ NM or $(r - 3 \text{ NM}) / |\dot{r}| \leq 60$ s;

where:
a = intruder altitude separation in ft
$\dot{a}$ = altitude rate estimate in ft/s
r = intruder slant range in NM
$\dot{r}$ = range rate estimate in NM/s

an active interrogation shall be made every 10 seconds to continuously revalidate and monitor the extended squitter data for as long as the above condition is met. The tests required in 4.5.1.3.1 shall be performed for each active surveillance. If any of these tests fail, the track shall be declared an active track.

4.5.1.5 *Full active surveillance.* If the following condition is met for a track being updated via passive surveillance data:

a) $|a| \leq 10\,000$ ft and both;

b) $|a| \leq 3\,000$ ft or $|a - 3\,000 \text{ ft}| / |\dot{a}| \leq 60$ s; and

c) $r \leq 3$ NM or $(r - 3 \text{ NM}) / |\dot{r}| \leq 60$ s;

where:
a = intruder altitude separation in ft
$\dot{a}$ = altitude rate estimate in ft/s
r = intruder slant range in NM
$\dot{r}$ = range rate estimate in NM/s

the aircraft shall be declared an active track and shall be updated on active range measurements once per second for as long as the above condition is met.

4.5.2 ACAS operation with an improved receiver MTL

Note.— Applications of extended squitter that are independent of ACAS might be implemented (for convenience) using the ACAS receiver. The use of an improved receiver minimum triggering level (MTL) will make it possible to receive extended squitters from ranges of up to 60 NM and beyond in support of such applications.

4.5.2.1 An ACAS operating with a receiver having a MTL more sensitive than –74 dBm shall implement the capabilities specified in the following paragraphs.

4.5.2.2 *Dual minimum triggering levels*. The ACAS receiver shall be capable of setting an indication for each squitter reception as to whether the reply would have been detected by an ACAS operating with a conventional MTL (–74 dBm). Squitter receptions received at the conventional MTL shall be passed to the ACAS surveillance function for further processing. Squitter receptions that do not meet this condition shall not be passed to the ACAS surveillance function.

Note 1.— Extended squitters containing position report information will be disseminated for display in connection with an extended squitter application.

Note 2.— Use of the conventional MTL for the ACAS surveillance function preserves the current operation of ACAS surveillance when operating with a receiver with an improved MTL.

4.5.2.3 *Dual or re-triggerable reply processor.* The ACAS Mode S reply processing function shall:

a) use separate reply processors for Mode S reply formats received at or above the conventional MTL and a separate reply processor for Mode S reply formats received below the conventional MTL; or,

b) use a Mode S reply processor that will re-trigger if it detects a Mode S preamble that is 2 to 3 dB stronger than the reply that is currently being processed.

Note.— Care must be taken to ensure that low-level squitters (i.e. those below the conventional MTL) do not interfere with the processing of acquisition squitters for ACAS. This could happen if the low-level squitter is allowed to capture the reply processor. This can be prevented by using a separate reply processor for each function, or by requiring the reply processor to be re-triggered by a higher level squitter.

CHAPTER 5. MODE S EXTENDED SQUITTER

Note 1.— A functional model of Mode S extended squitter systems supporting ADS-B and/or TIS-B is depicted in Figure 5-1.

Note 2.— Airborne systems transmit ADS-B messages (ADS-B OUT) and may also receive ADS-B and TIS-B messages (ADS-B IN and TIS-B IN). Ground systems (i.e. ground stations) transmit TIS-B (as an option) and receive ADS-B messages.

Note 3.— Although not explicitly depicted in the functional model presented in Figure 5-1, extended squitter systems installed on aerodrome surface vehicles or fixed obstacles may transmit ADS-B messages (ADS-B OUT).

5.1 MODE S EXTENDED SQUITTER TRANSMITTING SYSTEM CHARACTERISTICS

Note.— Many of the requirements associated with the transmission of Mode S extended squitter are included in Chapter 2 and Chapter 3 for Mode S transponder and non-transponder devices using the message formats defined in the Technical Provisions for Mode S Services and Extended Squitter *(Doc 9871). The provisions presented within the following subsections are focused on requirements applicable to specific classes of airborne and ground transmitting systems that are supporting the applications of ADS-B and TIS-B.*

5.1.1 ADS-B out requirements

5.1.1.1 Aircraft, surface vehicles and fixed obstacles supporting an ADS-B capability shall incorporate the ADS-B message generation function and the ADS-B message exchange function (transmit) as depicted in Figure 5-1.

5.1.1.1.1 ADS-B transmissions from aircraft shall include position, aircraft identification and type, airborne velocity, and event driven messages including emergency/priority information.

Note.— The data formats and protocols for messages transferred via extended squitter are specified in the Technical Provisions for Mode S Services and Extended Squitter *(Doc 9871).*

5.1.1.2 *Extended squitter ADS-B transmission requirements.* Mode S extended squitter transmitting equipment shall be classified according to the unit's range capability and the set of parameters that it is capable of transmitting consistent with the following definition of general equipment classes and the specific equipment classes defined in Tables 5-1 and 5-2:

a) Class A extended squitter airborne systems support an interactive capability incorporating both an extended squitter transmission capability (i.e. ADS-B OUT) with a complementary extended squitter reception capability (i.e. ADS-B IN) in support of onboard ADS-B applications;

b) Class B extended squitter systems provide a transmission only (i.e. ADS-B OUT without an extended squitter reception capability) for use on aircraft, surface vehicles, or fixed obstructions; and

c) Class C extended squitter systems have only a reception capability and thus have no transmission requirements.

5.1.1.3 *Class A extended squitter system requirements.* Class A extended squitter airborne systems shall have transmitting and receiving subsystem characteristics of the same class (i.e. A0, A1, A2, or A3) as specified in 5.1.1.1 and 5.2.1.2.

Note.— Class A transmitting and receiving subsystems of the same specific class (e.g. Class A2) are designed to complement each other with their functional and performance capabilities. The minimum air-to-air range that extended squitter transmitting and receiving systems of the same class are designed to support are:

a) A0-to-A0 nominal air-to-air range is 10 NM;

b) A1-to-A1 nominal air-to-air range is 20 NM;

c) A2-to-A2 nominal air-to-air range is 40 NM; and

d) A3-to-A3 nominal air-to-air range is 90 NM.

The above ranges are design objectives and the actual effective air-to-air range of the Class A extended squitter systems may be larger in some cases (e.g. in environments with low levels of 1 090 MHz fruit) and shorter in other cases (e.g. in environments with very high levels of 1 090 MHz fruit).

5.1.2 TIS-B out requirements

5.1.2.1 Ground stations supporting a TIS-B capability shall incorporate the TIS-B message generation function and the TIS-B message exchange function (transmit).

5.1.2.2 The extended squitter messages for TIS-B shall be transmitted by an extended squitter ground station when connected to an appropriate source of surveillance data.

Note 1.— Extended squitter messages for TIS-B are specified in the Technical Provisions for Mode S Services and Extended Squitter *(Doc 9871).*

Note 2.— Ground stations supporting TIS-B use an extended squitter transmission capability. The characteristics of such ground stations, in terms of transmitter power, antenna gain, transmission rates, etc., are to be tailored to the desired TIS-B service volume of the specific ground station assuming airborne users are equipped with (at least) Class A1 receiving systems.

5.1.2.3 **Recommendation.—** *The maximum transmission rates and effective radiated power of the transmissions should be controlled to avoid unacceptable levels of RF interference to other 1 090 MHz systems (i.e. SSR and ACAS).*

5.2 MODE S EXTENDED SQUITTER RECEIVING SYSTEM CHARACTERISTICS (ADS-B IN AND TIS-B IN)

Note 1.— The paragraphs herein describe the required capabilities for 1 090 MHz receivers used for the reception of Mode S extended squitter transmissions that convey ADS-B and/or TIS-B messages. Airborne receiving systems support ADS-B and TIS-B reception while ground receiving systems support only ADS-B reception.

Note 2.— Detailed technical provisions for Mode S extended squitter receivers can be found within RTCA DO-260A, "Minimum Operational Performance Standards for 1 090 MHz Extended Squitter Automatic Dependent Surveillance – Broadcast (ADS-B) and Traffic Information Services – Broadcast (TIS-B)."

5.2.1 Mode S extended squitter receiving system functional requirements

5.2.1.1 Mode S extended squitter receiving systems shall perform the message exchange function (receive) and the report assembler function.

Note.— The extended squitter receiving system receives ADS-B Mode S extended squitter messages and outputs ADS-B reports to client applications. Airborne receiving systems also receive TIS-B extended squitter messages and output TIS-B reports to client applications. This functional model (shown in Figure 5-1) depicts both airborne and ground 1 090 MHz ADS-B receiving systems.

5.2.1.2 *Mode S extended squitter receiver classes*. The required functionality and performance characteristics for the Mode S extended squitter receiving system will vary depending on the ADS-B and TIS-B client applications to be supported and the operational use of the system. Airborne Mode S extended squitter receivers shall be consistent with the definition of receiving system classes shown in Table 5-3.

Note.— Different equipment classes of Mode S extended squitter installations are possible. The characteristics of the receiver associated with a given equipment class are intended to be appropriate to support the required level of operational capability. Equipment classes A0 through A3 are applicable to those Mode S extended airborne installations that include a Mode S extended squitter transmission (ADS-OUT) and reception (ADS-B IN) capability. Equipment classes B0 through B3 are applicable to Mode S extended installations with only a transmission (ADS-B OUT) capability and includes equipment classes applicable to airborne, surface vehicles and fixed obstructions. Equipment classes C1 through C3 are applicable to Mode S extended squitter ground receiving systems. Guidance on the Mode S extended squitter equipment classes is provided in the Manual on the Secondary Surveillance Radar (SSR) Systems *(Doc 9684).*

5.2.2 Message exchange function

5.2.2.1 The message exchange function shall include the 1 090 MHz receiving antenna and the radio equipment (receiver/demodulator/decoder/data buffer) sub-functions.

5.2.2.2 *Message exchange functional characteristics*. The airborne Mode S extended squitter receiving system shall support the reception and decoding of all extended squitter messages as listed in Table 5-3. The ground ADS-B extended squitter receiving system shall, as a minimum, support the reception and decoding of all of the extended squitter message types that convey information needed to support the generation of the ADS-B reports of the types required by the client ATM ground applications.

5.2.2.3 *Required message reception performance*. The airborne Mode S extended squitter receiver/demodulation/ decoder shall employ the reception techniques and have a receiver minimum trigger threshold level (MTL) as listed in Table 5-3 as a function of the airborne receiver class. The reception technique and MTL for extended squitter ground receiver shall be selected to provide the reception performance (i.e. range and update rates) as required by the client ATM ground applications.

5.2.2.4 *Enhanced reception techniques.* Class A1, A2 and A3 airborne receiving systems shall include the following features to provide improved probability of Mode S extended squitter reception in the presence of multiple overlapping Mode A/C fruit and/or in the presence of an overlapping stronger Mode S fruit, as compared to the performance of the standard reception technique required for Class A0 airborne receiving systems:

a) Improved Mode S extended squitter preamble detection.

b) Enhanced error detection and correction.

c) Enhanced bit and confidence declaration techniques applied to the airborne receiver classes as shown below:

1) Class A1 – Performance equivalent to or better than the use of the "Centre Amplitude" technique.

2) Class A2 – Performance equivalent to or better than the use of the "Multiple Amplitude Samples" baseline technique, where at least 8 samples are taken for each Mode S bit position and are used in the decision process.

3) Class A3 – Performance equivalent to or better than the use of the "Multiple Amplitude Samples" baseline technique, where at least 10 samples are taken for each Mode S bit position and are used in the decision process.

Note 1.— The above enhanced reception techniques are as defined in RTCA DO-260A, Appendix I.

Note 2.— The performance provided for each of the above enhanced reception techniques when used in a high fruit environment (i.e. with multiple overlapping Mode A/C fruit) is expected to be at least equivalent to that provided by the use of the techniques described in RTCA DO-260A, Appendix I.

Note 3.— It is considered appropriate for ground extended squitter receiving systems to employ the enhanced reception techniques equivalent to those specified for airborne Class A2 or A3 receiving systems.

5.2.3 Report assembler function

5.2.3.1 The report assembler function shall include the message decoding, report assembly, and output interface sub-functions.

5.2.3.2 When an extended squitter message is received, the message shall be decoded and the applicable ADS-B report(s) of the types defined in 5.2.3.3 shall be generated within 0.5 seconds.

Note 1.— Two configurations of extended squitter airborne receiving systems, which include the reception portion of the ADS-B message exchange function and the ADS-B/TIS-B report assembly function, are allowed:

a) Type I extended squitter receiving systems receive ADS-B and TIS-B messages and produce application-specific subsets of ADS-B and TIS-B reports. Type I extended squitter receiving systems are customized to the particular client applications using ADS-B and TIS-B reports. Type I extended squitter receiving systems may additionally be controlled by an external entity to produce installation-defined subsets of the reports that those systems are capable of producing.

b) Type II extended squitter receiving systems receive ADS-B and TIS-B messages and are capable of producing complete ADS-B and TIS-B reports in accordance with the equipment class. Type II extended squitter receiving systems may be controlled by an external entity to produce installation-defined subsets of the reports that those systems are capable of producing.

Note 2.— Extended squitter ground receiving systems receive ADS-B messages and produce either application-specific subsets or complete ADS-B reports based on the needs of the ground service provider, including the client applications to be supported.

Note 3.— The extended squitter message reception function may be physically partitioned into hardware separate from those that implement the report assembly function.

5.2.3.3 ADS-B REPORT TYPES

Note 1.— The ADS-B report refers to the restructuring of ADS-B message data received from Mode S extended squitter broadcasts into various reports that can be used directly by a set of client applications. Five ADS-B report types are defined by the following subparagraphs for output to client applications. Additional information on the ADS-B report contents and the *applicable mapping from extended squitter messages to ADS-B reports can be found in the* Manual on the Secondary Surveillance Radar (SSR) Systems *(Doc 9684) and RTCA DO-260A.*

Note 2.— The use of precision (e.g. GNSS UTC measured time) versus non-precision (e.g. internal receiving system clock) time sources as the basis for the reported time of applicability is described in 5.2.3.5.

5.2.3.3.1 *State vector report.* The state vector report shall contain time of applicability, information about an airborne or vehicle's current kinematic state (e.g. position, velocity), as well as a measure of the integrity of the navigation data, based on information received in airborne or ground position, airborne velocity, and identification and type extended squitter messages. Since separate messages are used for position and velocity, the time of applicability shall be reported individually for the position related report parameters and the velocity related report parameters. Also, the state vector report shall include a time of applicability for the estimated position and/or estimated velocity information (i.e. not based on a message with updated position or velocity information) when such estimated position and/or velocity information is included in the state vector report.

Note.— Specific requirements for the customization of this type of report may vary according to the needs of the client applications of each participant (ground or airborne). The state vector data is the most dynamic of the four ADS-B reports; hence, the applications require frequent updates of the state vector to meet the required accuracy for the operational dynamics of the typical airborne or ground operations of airborne and surface vehicles.

5.2.3.3.2 *Mode status report.* The mode status report shall contain time of applicability and current operational information about the transmitting participant, including airborne/vehicle address, call sign, ADS-B version number, airborne/vehicle length and width information, state vector quality information, and other information based on information received in operational status, airborne identification and type, airborne velocity and airborne status extended squitter messages. Each time that a mode status report is generated, the report assembler function shall update the report time of applicability. Parameters for which valid data is not available shall either be indicated as invalid or omitted from the mode status report.

Note 1.— Specific requirements for the customization of this type of report may vary according to the needs of the client applications of each participant (ground or airborne).

Note 2.— Once the target state and status message (as shown in the Manual on Mode S Specific Services *(Doc 9688)) becomes available, certain parameters conveyed in that message type are also to be included in the mode status reports.*

Note 3.— The age of the information being reported within the various data elements of a mode status report may vary as a result of the information having been received within different extended squitter messages at different times. Data being reported beyond the useful life of that parameter type may be either indicated as invalid or omitted from the mode status report as described in the Manual on the Secondary Surveillance Radar (SSR) Systems *(Doc 9684).*

5.2.3.3.3 *Air referenced velocity report.* Air referenced velocity reports shall be generated when air referenced velocity information is received in airborne velocity extended squitter messages. The air referenced velocity report shall contain time of applicability, airspeed and heading information. Only certain classes of extended squitter receiving systems, as defined in 5.2.3.5, are required to generate air referenced velocity reports. Each time that an individual mode status report is generated, the report assembly function shall update the report time of applicability.

Note 1.— The air referenced velocity report contains velocity information that is received in airborne velocity messages along with additional information received in airborne identification and type extended squitter messages. Air referenced velocity reports are not generated when ground referenced velocity information is being received in the airborne velocity extended squitter messages. Guidance on the air referenced velocity report contents is provided in the Manual on the Secondary Surveillance Radar (SSR) Systems *(Doc 9684).*

Note 2.— Specific requirements for the customization of this type of report may vary according to the needs of the client applications of each participant (ground or airborne).

5.2.3.3.4 *Resolution advisory (RA) report.* The RA report shall contain time of applicability and the contents of an active ACAS resolution advisory (RA) as received in a Type=28 and Subtype=2 extended squitter message.

Note.— The RA report is only intended to be generated by ground receiving subsystems when supporting a ground ADS-B client application(s) requiring active RA information. An RA report will nominally be generated each time a Type=28, Subtype=2 extended squitter message is received.

5.2.3.3.5 *TARGET STATE REPORT*

Note.— The requirements for reporting of target state information is not at the same level of maturity as for the other ADS-B report types. The reporting of target state information is currently not required, but may in the future be required for Class A2 and A3 airborne receiving systems. Once supported, the target state report will be generated when information is received in target state and status messages, along with additional information received in airborne identification and type extended squitter messages. The target state and status message is defined in the Manual on Mode S Specific Services *(Doc 9688). Specific requirements for the customization of this type of report may vary according to the needs of the client applications of each participant (ground or airborne). Guidance on the target state report contents is provided in the* Manual on Mode S Specific Services *(Doc 9688).*

5.2.3.4 TIS-B REPORT TYPES

5.2.3.4.1 As TIS-B messages are received by airborne receiving systems, the information shall be reported to client applications. Each time that an individual TIS-B report is generated, the report assembly function shall update the report time of applicability to the current time.

Note 1.— The TIS-B message formats are defined in the Technical Provisions for Mode S Services and Extended Squitter *(Doc 9871).*

Note 2.— The TIS-B report refers to the restructuring of TIS-B message data received from ground Mode S extended squitter broadcasts into reports that can be used by a set of client applications. Two ADS-B report types are defined by the following subparagraphs for output to client applications. Additional information on the TIS-B report contents and the applicable mapping from extended squitter messages to ADS-B reports can be found in the Manual on the Secondary Surveillance Radar (SSR) Systems *(Doc 9684).*

Note 3.— The use of precision (e.g. GNSS UTC measured time) versus non-precision (e.g. internal receiving system clock) time sources as the basis for the reported time of applicability is described in 5.2.3.5.

5.2.3.4.2 *TIS-B target report.* All received information elements, other than position, shall be reported directly, including all reserved fields for the TIS-B fine format messages and the entire message content of any received TIS-B management message. The reporting format is not specified in detail, except that the information content reported shall be the same as the information content received.

5.2.3.4.3 When a TIS-B position message is received, it is compared with tracks to determine whether it can be decoded into target position (i.e. correlated to an existing track). If the message is decoded into target position, a report shall be generated within 0.5 seconds. The report shall contain the received position information with a time of applicability, the most recently received velocity measurement with a time of applicability, the estimated position and velocity applicable to a common time of applicability, airborne/vehicle address, and all other information in the received message. The estimated values shall be based on the received position information and the track history of the target.

5.2.3.4.4 When a TIS-B velocity message is received, if it is correlated to a complete track, a report shall be generated, within 0.5 seconds of the message reception. The report shall contain the received velocity information with a time of applicability, the estimated position and velocity applicable to a common time of applicability, airborne/vehicle address, and all other information in the received message. The estimated values shall be based on the received ground reference velocity information and the track history of the target.

5.2.3.4.5 *TIS-B management report.* The entire message content of any received TIS-B management message shall be reported directly to the client applications. The information content reported shall be the same as the information content received.

5.2.3.4.5.1 The contents of any received TIS-B management message shall be reported bit-for-bit to the client applications.

Note.— The processing of TIS-B management messages is defined in the Technical Provisions for Mode S Services and Extended Squitter *(Doc 9871)*.

5.2.3.5 REPORT TIME OF APPLICABILITY

The receiving system shall use a local source of reference time as the basis for reporting the time of applicability, as defined for each specific ADS-B and TIS-B report type (see 5.2.3.3 and 5.2.3.4).

5.2.3.5.1 *Precision time reference.* Receiving systems intended to generate ADS-B and/or TIS-B reports based on the reception of surface position messages, airborne position messages, and/or TIS-B messages shall use GNSS UTC measured time for the purpose of generating the report time applicability for the following cases of received messages:

a) version zero (0) ADS-B messages, as defined in 3.1.2.8.6.2, when the navigation uncertainty category (NUC) is 8 or 9; or

b) version one (1) ADS-B or TIS-B messages, as defined in 3.1.2.8.6.2 and 3.1.2.8.7 respectively, when the navigation integrity category (NIC) is 10 or 11;

UTC measured time data shall have a minimum range of 300 seconds and a resolution of 0.0078125 (1/128) seconds.

5.2.3.5.2 *NON-PRECISION LOCAL TIME REFERENCE*

5.2.3.5.2.1 For receiving systems not intended to generate ADS-B and/or TIS-B reports based on reception of ADS-B or TIS-B messages meeting the NUC or NIC criteria as indicated in 5.2.3.5.1, a non-precision time source shall be allowed. In such cases, where there is no appropriate precision time source available, the receiving system shall establish an appropriate internal clock or counter having a maximum clock cycle or count time of 20 milliseconds. The established cycle or clock count shall have a minimum range of 300 seconds and a resolution of 0.0078125 (1/128) seconds.

Note.— The use of a non-precision time reference as described above is intended to allow the report time of applicability to accurately reflect the time intervals applicable to reports within a sequence. For example the applicable time interval between state vector reports could be accurately determined by a client application, even though the absolute time (e.g. UTC measured time) would not be indicated by the report.

5.2.3.6 REPORTING REQUIREMENTS

5.2.3.6.1 *Reporting requirements for Type I Mode S extended squitter airborne receiving systems.* As a minimum, the report assembler function associated with Type I Mode S extended squitter receiving systems, as defined in 5.2.3, shall support that subset of ADS-B and TIS-B reports and report parameters, that are required by the specific client applications being served by that receiving system.

5.2.3.6.2 *Reporting requirements for Type II Mode S extended squitter airborne receiving systems.* The report assembler function associated with Type II receiving systems, as defined in 5.2.3, shall generate ADS-B and TIS-B reports according to the class of the receiving system as shown in Table 5-4 when the prerequisite ADS-B and/or TIS-B messages are being received.

5.2.3.6.3 *Reporting requirements for Mode S extended squitter ground receiving systems.* As a minimum, the report assembler function associated with Mode S extended squitter ground receiving systems, as defined in 5.2.3, shall support that subset of ADS-B reports and report parameters, that are required by the specific client applications being served by that receiving system.

5.2.4 Interoperability

The Mode S extended squitter receiving system shall provide interoperability with both version 0 and version 1 extended squitter ADS-B message formats.

Note 1.— Version 0 and version 1 messages are defined in the Technical Provisions for Mode S Services and Extended Squitter *(Doc 9871).*

Note 2.— Techniques for providing interoperability of version 0 and version 1 ADS-B message formats are described in the Manual on the Secondary Surveillance Radar (SSR) Systems *(Doc 9684) and further information is provided in RTCA DO-260A, Appendix N.*

5.2.4.1 INITIAL MESSAGE DECODING

The Mode S extended squitter receiving system shall, upon acquiring a new ADS-B target, initially apply the decoding provisions applicable to version 0 (zero) ADS-B messages until or unless an operational status message is received indicating version 1 (one) message format is in use.

5.2.4.2 APPLYING VERSION NUMBER

The Mode S extended squitter receiving system shall decode the version number information conveyed in the operational status message and shall apply the corresponding decoding rules, version 0 (zero) or version 1 (one), for the decoding of the subsequent extended squitter ADS-B messages from that specific airborne or vehicle.

5.2.4.3 HANDLING OF RESERVED MESSAGE SUBFIELDS

The Mode S extended squitter receiving system shall ignore the contents of any message subfield defined as reserved.

Note.— This provision supports interoperability between message versions by allowing the definition of additional parameters that will be ignored by earlier receiver versions and correctly decoded by newer receiver versions.

TABLES FOR CHAPTER 5

Table 5-1. ADS-B Class A equipment characteristics

<table>
<tr><th>Equipment class</th><th>Minimum transmit power (at antenna terminal)</th><th>Maximum transmit power (at antenna terminal)</th><th>Airborne or surface</th><th>Minimum extended squitter message capability required (see Note 2)</th></tr>
<tr><td rowspan="2">A0
(Minimum)</td><td rowspan="2">18.5 dBW
(see Note 1)</td><td rowspan="2">27 dBW</td><td>Airborne</td><td>Airborne position
A/C identification and type
Airborne velocity
A/C operational status
Extended squitter A/C status</td></tr>
<tr><td>Surface</td><td>Surface position
A/C identification and type
A/C operational status
Extended squitter A/C status</td></tr>
<tr><td rowspan="2">A1
(Basic)</td><td rowspan="2">21 dBW</td><td rowspan="2">27 dBW</td><td>Airborne</td><td>Airborne position
A/C identification and type
Airborne velocity
A/C operational status
Extended squitter A/C status</td></tr>
<tr><td>Surface</td><td>Surface position
A/C identification and type
A/C operational status
Extended squitter A/C status</td></tr>
<tr><td rowspan="2">A2
(Enhanced)</td><td rowspan="2">21 dBW</td><td rowspan="2">27 dBW</td><td>Airborne</td><td>Airborne position
A/C identification and type
Airborne velocity
A/C operational status
Extended squitter A/C status
Reserved for target state and status</td></tr>
<tr><td>Surface</td><td>Surface position
A/C identification and type
A/C operational status
Extended squitter A/C status</td></tr>
<tr><td rowspan="2">A3
(Extended)</td><td rowspan="2">23 dBW</td><td rowspan="2">27 dBW</td><td>Airborne</td><td>Airborne position
A/C identification and type
Airborne velocity
A/C operational status
Extended squitter A/C status
Reserved for target state and status</td></tr>
<tr><td>Surface</td><td>Surface position
A/C identification and type
A/C operational status
Extended squitter A/C status</td></tr>
<tr><td colspan="5">Note 1.— See Chapter 3, 3.1.2.10.2 for restrictions on the use of this category of Mode S transponder.

Note 2.— The extended squitter messages applicable to Class A equipment are defined in Version 1 of extended squitter formats of the Technical Provisions for Mode S Services and Extended Squitter (Doc 9871).</td></tr>
</table>

Table 5-2. ADS-B Class B equipment characteristics

Equipment class	*Minimum transmit power (at antenna terminal)*	*Maximum transmit power (at antenna terminal)*	*Airborne or surface*	*Minimum extended squitter message capability required*
B0 (Airborne)	18.5 dBW (see Note 1)	27 dBW	Airborne	Airborne position A/C identification and type Airborne velocity A/C operational status Extended squitter A/C status
			Surface	Surface position A/C identification and type A/C operational status Extended squitter A/C status
B1 (Airborne)	21 dBW	27 dBW	Airborne	Airborne position A/C identification and type Airborne velocity A/C operational status Extended squitter A/C status
			Surface	Surface position A/C identification and type A/C operational status Extended squitter A/C status
B2 Low (Ground Vehicle)	8.5 dBW	< 18.5 dBW (see Note 2)	Surface	Surface position A/C identification and type A/C operational status
B2 (Ground Vehicle)	18.5 dBW	27 dBW (see Note 2)	Surface	Surface position A/C identification and type A/C operational status
B3 (Fixed Obstacle)	18.5 dBW	27 dBW (see Note 2)	Airborne (see Note 3)	Airborne position A/C identification and type A/C operational status

Note 1.— See Chapter 3, 3.1.2.10.2 for restrictions on the use of this category of Mode S transponder.

Note 2.— The appropriate ATS authority is expected to get the maximum power level permitted.

Note 3.— Fixed obstacles use the airborne ADS-B message formats since knowledge of their location is of primary interest to airborne aircraft.

Table 5-3. Reception performance for airborne receiving systems

Receiver class	*Intended air-to-air operational range*	*Receiver minimum trigger threshold level (MTL)*	*Reception technique*	*Required extended squitter ADS-B message support (see Note 3)*	*Required extended squitter TIS-B message support (see Note 4)*
A0 (Basic VFR)	10 nmi.	–72 dBm (see Note 1)	Standard (See Note 2)	Airborne position Surface position Airborne velocity Airborne identification and type Extended squitter airborne status Airborne operational status	Fine airborne position Coarse airborne position Fine surface position Identification and type Airborne velocity Management
A1 (Basic IFR)	20 nmi.	–79 dBm (see Note 1)	Enhanced (See Note 2)	Airborne position Surface position Airborne velocity Airborne identification and type Extended squitter airborne status Airborne operational status	Fine airborne position Coarse airborne position Fine surface position Identification and type Airborne velocity Management
A2 (Enhanced IFR)	40 nmi.	–79 dBm (see Note 1)	Enhanced (See Note 2)	Airborne position Surface position Airborne velocity Airborne identification and type Extended squitter airborne status Airborne operational status Reserved for target state and status	Fine airborne position Coarse airborne position Fine surface position Identification and type Airborne velocity Management
A3 (Extended capability)	90 nmi.	–84 dBm (and -87 dBm at 15% probability of reception – see Note 1)	Enhanced (See Note 2)	Airborne position Surface position Airborne velocity Airborne identification and type Extended squitter airborne status Airborne operational status Reserved for target state and status	Fine airborne position Coarse airborne position Fine surface position Identification and type Airborne velocity Management

Note 1.— Specific MTL is referenced to the signal level at the output terminal of the antenna, assuming a passive antenna. If electronic amplification is integrated into the antenna assembly, then the MTL is referenced at the input to the amplifier. For Class A3 receivers, a second performance level is defined at a received signal level of –87 dBm where 15 per cent of the messages are to be successfully received. MTL values refer to reception under non-interference conditions.

Note 2.— The extended squitter receiver reception techniques are defined in 5.2.2.4. "Standard" reception techniques refer to the baseline techniques, as required for ACAS 1 090 MHz receivers, that are intended to handle single overlapping Mode A/C fruit. "Enhanced" reception techniques refer to techniques intended to provide improved reception performance in the presence of multiple overlapping Mode A/C fruit and improved decoder re-triggering in the presence of overlapping stronger Mode S fruit. The requirements for the enhanced reception techniques that are applicable to the specific airborne receiver classes are defined in 5.2.2.4.

Note 3.— The extended squitter messages are defined in the Technical Provisions for Mode S Services and Extended Squitter *(Doc 9871). However, the target state and status message, as defined in the* Manual on Mode S Specific Services *(Doc 9688), is not yet at the same level of maturity as the other ADS-B messages.*

Note 4.— The TIS-B messages are defined in the Technical Provisions for Mode S Services and Extended Squitter *(Doc 9871).*

Table 5-4. Mode S extended squitter airborne receiving system reporting requirements

Receiver class	*Minimum ADS-B reporting requirements*	*Minimum TIS-B reporting requirements*
A0 (Basic VFR)	ADS-B state vector report (per 5.2.3.1.1) and ADS-B mode status report (per 5.2.3.1.2)	TIS-B state report and TIS-B management report
A1 (Basic IFR)	ADS-B state vector report (per 5.2.3.1.1) and ADS-B mode status report (per 5.2.3.1.2) and ADS-B air referenced velocity report (ARV) (per 5.2.3.1.3)	TIS-B state report and TIS-B management report
A2 (Enhanced IFR)	ADS-B state vector report (per 5.2.3.1.1) and ADS-B mode status report (per 5.2.3.1.2) and ADS-B ARV report (per 5.2.3.1.3) and Reserved for ADS-B target state report (per 5.2.3.1.4)	TIS-B state report and TIS-B management report
A3 (Extended capability)	ADS-B state vector report (per 5.2.3.1.1) and ADS-B mode status report (per 5.2.3.1.2) and ADS-B ARV report (per 5.2.3.1.3) and Reserved for ADS-B target state report (per 5.2.3.1.4)	TIS-B state report and TIS-B management report

FIGURE FOR CHAPTER 5

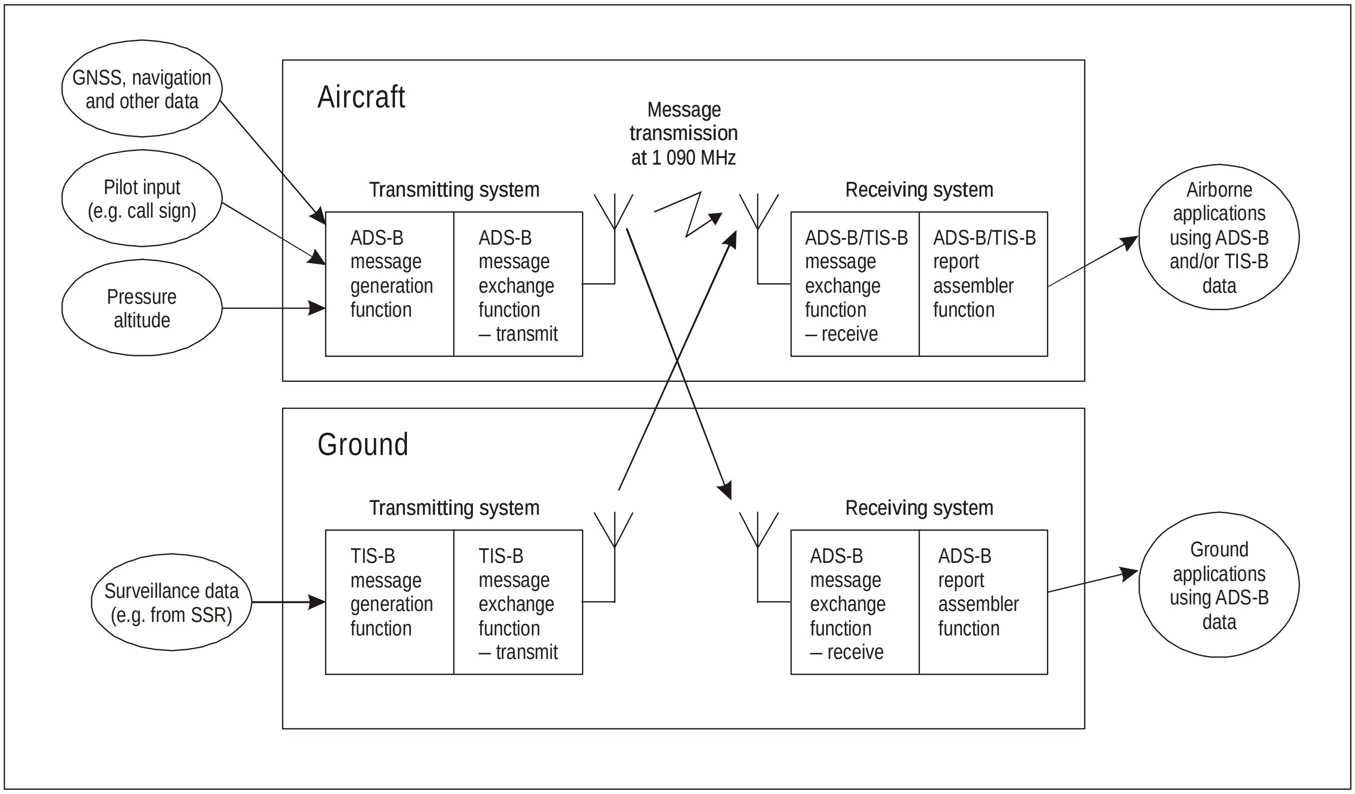


Figure 5-1. ADS-B/TIS-B system functional model

ATTACHMENT TO VOLUME IV

Guidance material related to airborne collision avoidance system (ACAS)

Note 1.— The following material is intended to provide guidance concerning the technical characteristics of the airborne collision avoidance system (ACAS) having vertical resolution capability (ACAS II, unless stated otherwise). ACAS SARPs are contained in Chapter 4.

Note 2.— Non-SI alternative units are used as permitted by Annex 5, Chapter 3, Section 3.2.2. In limited cases, to ensure consistency at the level of the logic calculations, units such as ft/s, NM/s and kt/s are used.

1. EQUIPMENT, FUNCTIONS AND CAPABILITIES

1.1 ACAS equipment characteristics

1.1.1 ACAS equipment includes an ACAS processing unit, Mode S transponder, control unit, appropriate antennas and means of providing advisories.

1.1.2 ACAS equipment in the aircraft interrogates SSR transponders on other aircraft in its vicinity and listens for the transponder replies. By computer analysis of these replies, the ACAS equipment determines which aircraft represent potential collision threats and provides appropriate indications (advisories) to the flight crew to avoid collisions.

1.1.3 ACAS equipment is capable of providing two classes of advisories. Traffic advisories (TAs) indicate the approximate positions of intruding aircraft that may later cause resolution advisories. Resolution advisories (RAs) propose vertical manoeuvres that are predicted to increase or maintain separation from threatening aircraft.

1.2 Advisories provided

1.2.1 TRAFFIC ADVISORIES

TAs may indicate the range, range rate, altitude, altitude rate, and bearing of the intruding aircraft relative to own aircraft. TAs without altitude information may also be provided on Mode C or Mode S-equipped aircraft that do not have an automatic altitude reporting capability. The information conveyed in ACAS TAs is intended to assist the flight crew in sighting nearby traffic.

1.2.2 RESOLUTION ADVISORIES

1.2.2.1 If the threat detection logic in the ACAS computer determines that an encounter with a nearby aircraft could lead to a near-collision or collision, the computer threat resolution logic determines an appropriate vertical manoeuvre that will ensure the safe vertical separation of the ACAS aircraft. The selected manoeuvre ensures adequate vertical separation within constraints imposed by the climb rate capability and proximity to the ground of the ACAS aircraft.

1.2.2.2 The RAs provided to the pilot can be divided into two categories: corrective advisories, which instruct the pilot to deviate from the current flight path (e.g. “CLIMB” when the aircraft is in level flight); and preventive advisories, which advise the pilot to maintain or avoid certain vertical speeds (e.g. “DON’T CLIMB” when the aircraft is in level flight).

1.2.2.3 Under normal circumstances, ACAS issues only one RA during an encounter with one or multiple intruders. The RA is issued when, or shortly after, the (first) intruder becomes a threat, is maintained as long as the (any) intruder remains a threat, and is cancelled when the (last) intruder ceases to be a threat. However, the indication given to the flight crew as part of that RA may be modified. It may be strengthened or even reversed when a threat modifies its altitude profile or when the detection of a second or third threat changes the initial assessment of the encounter. It may also be weakened when adequate separation has been achieved but the (any) intruder temporarily remains a threat.

1.2.3 WARNING TIMES

If a threat is detected, the ACAS equipment generates an RA some time before the closest approach of the aircraft. The amount of warning time depends on the protected volume selected for ACAS system use. The nominal resolution advisory time before closest approach used by ACAS varies from 15 to 35 seconds. A TA will nominally be issued between 5 and 20 seconds in advance of an RA. Warning times depend on sensitivity level as described in 3.5.12.

1.2.4 AIR-AIR COORDINATION OF RESOLUTION ADVISORIES

1.2.4.1 If the aircraft detected by the ACAS equipment has only a Mode A/C transponder and automatic pressure-altitude reporting equipment, its pilot will not be aware that it is being tracked by the ACAS-equipped aircraft. When the pilot of the ACAS aircraft receives an RA in an encounter with such an aircraft and manoeuvres as advised, the ACAS aircraft will be able to avoid the intruding aircraft provided the intruder does not accelerate so as to defeat the manoeuvre of the ACAS aircraft.

1.2.4.2 If the intruding aircraft is equipped with ACAS, a coordination procedure is performed via the air-to-air Mode S data link in order to ensure that the ACAS RAs are compatible.

1.2.5 AIR-GROUND COMMUNICATION

1.2.5.1 ACAS may communicate with ground stations using the Mode S air-ground data link. The transmission of sensitivity level control commands to ACAS equipment by Mode S ground stations is one aspect of communication. This feature permits a Mode S ground station to adapt the RA warning time to the local traffic environment as an ACAS aircraft moves through the region of coverage of the station. An effective trade-off between collision warning time and alert rate is thereby ensured.

1.2.5.2 The Mode S air-ground data link may also be used to transmit ACAS RAs to Mode S ground stations. This information can then be used by air traffic services to monitor ACAS RAs within an airspace of interest.

1.2.6 FUNCTIONS PERFORMED BY ACAS

1.2.6.1 The functions executed by ACAS are illustrated in Figure A-1. To keep the illustration simple, the functions “own aircraft tracking” and “intruder aircraft tracking” have been represented once in Figure A-1, under “surveillance”. However, the trackers that are intended to support the collision avoidance function may not be suitable to support the surveillance function. Separate tracking functions may be required to adequately support both the collision avoidance and the surveillance functions.

1.2.6.2 Surveillance is normally executed once per cycle; however, it may be executed more frequently or less frequently for some intruders. For example, surveillance may be executed less frequently for some non-threatening intruders to respect interference limiting inequalities or it may be executed more frequently for some intruders to improve the azimuth estimate.

1.2.6.3 Parameters used in the implementation of the ACAS functions are adjusted automatically or manually to maintain collision avoidance protection with minimal interference to normal air traffic control (ATC) operations.

1.3 Intruder characteristics

1.3.1 TRANSPONDER EQUIPAGE OF INTRUDER

ACAS provides RAs on aircraft equipped with altitude reporting Mode A/C or Mode S transponders. Some aircraft are equipped with SSR transponders but do not have altitude encoders. ACAS cannot generate RAs in conflicts with such aircraft because, without altitude information, a collision threat assessment cannot be made. ACAS equipment can generate only TAs on such aircraft, describing their ranges, range rates and bearings. Aircraft equipped with Mode A only transponders and those not equipped with or not operating Mode A/C or Mode S transponders cannot be tracked by ACAS.

1.3.2 INTRUDER CLOSING SPEEDS AND TRAFFIC DENSITIES

1.3.2.1 ACAS equipment designed for operation in high density airspace is capable of providing overall surveillance performance on intruders as defined in Chapter 4, 4.3.2 and Table 4-1.

1.3.2.2 The conditions enumerated in Table 4-1, which define two distinct density regions in the multi-dimensional condition space that affects ACAS performance, were extrapolated from airborne measurements of the performance of a typical ACAS. The airborne measurement data indicated that the track establishment probability will not drop abruptly when any of the condition bounds is exceeded.

1.3.2.3 The performance is stated in terms of probability of tracking a target of interest at a maximum closing speed in a given traffic density at least 30 seconds before the point of closest approach. The maximum traffic density associated with each of the two density regions is defined as:

$$\rho = n(r)/\pi r^2$$

where n(r) is the maximum 30-second time average of the count of SSR transponder-equipped aircraft (not counting own aircraft) above a circular area of radius r about the ACAS aircraft ground position. In the airborne measurements, the radii were different for the two density regions. In the high-density measurements the radius was 9.3 km (5 NM). In the low-density measurements the radius was 19 km (10 NM). Traffic density outside the limits of the circular area of constant density may be assumed to decrease inversely proportional to range so that the number of aircraft is given by:

$$n(r) = n(r_o)r/r_o$$

where r_o is the radius of the constant density region.

1.3.2.4 When the density is greater than 0.017 aircraft/km^2 (0.06 aircraft/NM^2), the nominal radius of uniform density r_o is taken to be 9.3 km (5 NM). When the density is equal to or less than indicated above, r_o is nominally 18.5 km (10 NM).

1.3.2.5 The table is based on an additional assumption that at least 25 per cent of the total transponder-equipped aircraft in the highest density 0.087 aircraft/km^2 (0.3 aircraft/NM^2) airspace are Mode S equipped. If fewer than 25 per cent are Mode S equipped, the track probability for Mode A/C aircraft may be less than 0.90 because of increased synchronous garble. If the traffic density within r_o exceeds the limits given in the table or if the traffic count outside of r_o continues increasing faster than r, the actual track establishment probability for Mode A/C aircraft may also be less than 0.90 because of increased synchronous garble. If the closing speed exceeds the given limits, the tracks for Mode A/C and Mode S aircraft may be established late. If the number of other ACAS in the area exceeds the limits given in the table, the interference limiting requirements of Chapter 4, 4.3.2.2 require that the ACAS transmitter power and receiver sensitivity be further reduced, thereby resulting in a later establishment time. However, the track probability is expected to degrade gradually as any of these limits is exceeded.

1.3.2.6 The table reflects the fact that the ACAS tracking performance involves a compromise between closing speed and traffic density. Although it may not be possible to maintain a high probability of track when the traffic density and the intruder closing speed are both simultaneously large, the ACAS design is capable of reliable track establishment on high-speed intruders when operating in relatively low-density en-route airspace (typically characterized by densities of less than 0.017 aircraft/km^2, i.e. 0.06 aircraft/NM^2) or when operating in higher density, low-altitude terminal airspace where the closing speeds are typically below 260 m/s (500 kt) for operational reasons.

1.3.2.7 The table also accounts for the fact that higher closing speeds are associated with the forward direction than with the side or back directions so that the ACAS surveillance design is not required to provide reliable detection for the highest closing speeds in the side or back directions.

1.3.3 SYSTEM RANGE LIMITATIONS

The required nominal tracking range of the ACAS is 26 km (14 NM). However, when operating in high density, the interference limiting feature may reduce system range to approximately 9.3 km (5 NM). A 9.3 km (5 NM) range is adequate to provide protection for a 260 m/s (500 kt) encounter.

1.4 Control of interference to the electromagnetic environment

1.4.1 The ACAS equipment is capable of operating in all traffic densities without degrading the electromagnetic environment. Each ACAS equipment knows the number of other ACAS units operating in the local airspace. This knowledge is used to ensure that no transponder is suppressed by ACAS activity for more than 2 per cent of the time and to ensure that ACAS does not contribute to an unacceptably high fruit rate that would degrade ground SSR surveillance performance. Multiple ACAS units in the vicinity cooperatively limit their own transmissions. As the number of such ACAS units increases, the interrogation allocation for each of them decreases. Thus, every ACAS unit monitors the number of other ACAS units within detection range. This information is then used to limit its own interrogation rate and power as necessary. When this limiting is in full effect, the effective range of the ACAS units may not be adequate to provide acceptable warning times in encounters in excess of 260 m/s (500 kt). This condition is normally encountered at low altitude where this closing speed capability is sufficient. Whenever the ACAS aircraft is on the ground, ACAS automatically limits the power of its interrogations. This limiting is done by setting the ACAS count (n_a) in the interference limiting inequalities to a value three times the measured value. This value is selected to ensure that an ACAS unit on the ground does not contribute any more interference to the electromagnetic environment than is unavoidable. This value will provide an approximate surveillance range of 5.6 km (3 NM) in the highest density terminal areas to support reliable ground ACAS surveillance of local airborne traffic and a 26 km (14 NM) range in very low density airspace to provide wide area surveillance in the absence of an SSR.

1.4.2 The presence of an ACAS unit is announced to other ACAS units by the periodic transmission of an ACAS interrogation containing a message that gives the address of the ACAS aircraft. This transmission is sent nominally every 8 to 10 seconds using a Mode S broadcast address. Mode S transponders are designed to accept message data from a broadcast interrogation without replying. The announcement messages received by the ACAS aircraft's Mode S transponder are monitored by the interference limiting algorithms to develop an estimate of the number of ACAS units in the vicinity.

2. FACTORS AFFECTING SYSTEM PERFORMANCE

2.1 Synchronous garble

When a Mode C interrogation is transmitted, all the transponders that detect it reply. Since the reply duration is 21 microseconds, aircraft whose ranges from ACAS are within about 2.8 km (1.5 NM) of each other generate replies that persistently and synchronously overlap each other at the interrogating aircraft. The number of overlapping replies is proportional to the density of aircraft and their range from ACAS. Ten or more overlapping replies might be received in moderate density terminal areas. It is possible to decode reliably only about three overlapping replies. Hence, there is a need to reduce the number of transponders that reply to each interrogation. Whisper-shout and directional transmit techniques are available for controlling such synchronous garble (see 3.2 and 3.3). They are both needed in ACAS equipment operating in the highest traffic densities.

2.2 Multipath from terrain reflections

2.2.1 SSR transponders use quarter-wave monopole antennas mounted on the bottom of the aircraft. A stub antenna of this sort has a peak elevation gain at an angle of 20 to 30 degrees below the horizontal plane. This is suitable for ground-air surveillance, but the direct air-air surveillance path may operate at a disadvantage relative to the ground reflection path, particularly over water.

2.2.2 If the ACAS unit uses a bottom-mounted antenna, there are geometries for which the reflected signal is consistently stronger than the direct signal. However, when a top-mounted antenna is used for interrogation, its peak gain occurs at a positive elevation angle and the signal-to-multipath ratio is improved. Thus, when ACAS transmits from the top-mounted antenna, the effects of multipath are reduced significantly. Even when a top-mounted antenna is used, the multipath will still occasionally exceed the receiver threshold. Thus, there is need to reject low-level multipath. ACAS can achieve this rejection through the use of variable receiver thresholds (see 3.4).

2.3 Altimetry data quality

2.3.1 MEASUREMENT ERRORS

2.3.1.1 The vertical separation between two conflicting aircraft is measured as the difference between own altitude and the intruder's altitude as reported in its Mode C or Mode S reply. If the ACAS aircraft is an air carrier, it will normally have accurate altimetry; an intruding aircraft might have less accurate altimetry.

2.3.1.2 Errors in altimetry can cause two types of effects: first, if the aircraft are on a near collision course, errors could indicate safe passage, and the impending near mid-air collision might not be resolved by ACAS; second, if the aircraft are on a near collision course, but are separated in altitude, errors could lead to an ACAS manoeuvre in the wrong direction which could induce an even closer encounter.

2.3.1.3 ACAS attempts to achieve a difference of at least 90 m (300 ft) between aircraft at closest approach based on reported altitude. Thus, if the combination of intruder and ACAS altimetry errors approached 90 m (300 ft), there would be finite risk of inadequate vertical separation despite the presence of ACAS. Studies of the expected altimetry errors of both ACAS and non-ACAS aircraft at altitudes from sea level to FL 400 have concluded that the risk is essentially negligible if both aircraft are equipped with high accuracy altimetry systems that can achieve root-sum-square (RSS) errors of approximately 15 m (50 ft). It was further concluded that if an ACAS with high accuracy altimetry operates in a traffic environment consisting of typical general aviation aircraft (with RSS errors of approximately 30 m (100 ft), normally distributed), then altimetry errors will occasionally lead to inadequate ACAS RAs. However, this will not occur often enough to seriously interfere with the effectiveness of the system. Performance was considered to be inadequate if both aircraft in an encounter had a low accuracy altimetry system. This led to the requirement that ACAS possess a high accuracy system.

2.3.2 ALTITUDE BIT FAILURE

If the Mode C or Mode S altitude reports from the intruding aircraft or the altitude data for own aircraft contain bit errors, ACAS may develop erroneous estimates of the corresponding vertical position or rate. These errors can have effects similar to the effects of measurement errors. Such errors are most likely to occur when the altitude data source is a Gilham encoder, and the use of Gilham encoded data for own aircraft altitude can have serious adverse consequences. When there is no alternative source than Gilham encoded data, two encoders must be used and a comparison function in the Mode S transponder used to detect errors in the altitude data before they are provided to ACAS.

2.3.3 CREDIBILITY OF OWN AIRCRAFT ALTITUDE

All sources of own altitude data are required to be checked for credibility, including fine altitude data (which can come from various sources: gyro, air data computer, etc.) and radar altitude data.

2.4 Potential for ground-based SSR site monitors (PARROTs) to cause spurious traffic and resolution advisories

An ACAS interrogates all SSR transponders within range, including ground-based transponder installations used to monitor the operation of ground radar systems, or test transponders. If these ground-based transponders reply with false altitude data, the potential exists for an ACAS to generate spurious TAs and RAs. To prevent this problem, information on the operation of position adjustable range reference orientation transponders (PARROTs) and transponder test facilities is provided in the *Manual of Secondary Surveillance Radar (SSR) Systems* (Doc 9684).

2.5 Allocation and assignment of SSR Mode S addresses

To ensure safe operation, the system requires that all Mode S-equipped aircraft have unique addresses. Multiple aircraft with the same address or aircraft with addresses not compliant with Annex 10, Volume III, Part I, Chapter 9, can adversely affect the surveillance and coordination functions.

2.6 Potential for TCAS I systems to affect ACAS II performance

Note.— For the purpose of this material, TCAS I is defined as a system that uses SSR interrogations to provide aircrew with traffic alert warning information as an aid to the "see and avoid" principle.

Some TCAS I systems employ ACAS II interference limiting techniques with resolution advisories suppressed. These systems do not comply with ACAS I SARPs. Because ACAS II interference limiting relies on direct interaction with other ACAS II aircraft (using the ACAS broadcast and Mode S transponder replies), the presence of such TCAS I aircraft can directly influence the surveillance performance of nearby ACAS II aircraft. If such TCAS I systems are fitted to aircraft that are known to operate in close proximity to each other (e.g. rotorcraft or gliders) then the effect may reduce the surveillance range of other ACAS II aircraft and delay the provision of collision avoidance warnings. In light of these concerns, TCAS I systems (which employ ACAS II interference limiting techniques) must not be used for aircraft which are known to operate in close proximity to each other for sustained periods of time. Care must be taken to ensure that the effect on the SSR electromagnetic environment is acceptable, since these TCAS I units may be fitted in very large numbers.

3. CONSIDERATIONS ON TECHNICAL IMPLEMENTATION

3.1 System operation

3.1.1 SURVEILLANCE OF INTRUDERS

3.1.1.1 The main purposes of the surveillance processes described below are to obtain position reports and to correlate these to form tracks. This involves the use of trackers and requires the estimation of rates.

3.1.1.2 The ACAS unit transmits an interrogation sequence nominally once per second. The interrogations are transmitted at a nominal effective radiated power level of +54 ±2 dBm as measured at zero degree elevation relative to the longitudinal axis of the aircraft. When these interrogations are received by Mode A/C and Mode S altitude reporting transponders, the transponders transmit replies that report their altitude. The ACAS unit computes the range of each intruding aircraft by using the round-trip time between the transmission of the interrogation and the receipt of the reply. Altitude rate and range rate are determined by tracking the reply information.

3.1.1.3 In the absence of interference, overload, interference-limiting conditions, or other degrading effects, the equipment will nominally be capable of providing surveillance for Mode A/C and Mode S targets out to a range of 26 km (14 NM). However, because the surveillance reliability degrades as the range increases, the equipment should assess as possible collision threats only those targets within a maximum range of 22 km (12 NM). No target outside of this range should be eligible to generate an RA. However, ACAS is able to detect ACAS broadcast interrogations from ACAS-equipped aircraft out to a nominal range of 56 km (30 NM).

3.1.1.4 The equipment should have the capacity for surveillance of any mix of Mode A/C or Mode S targets up to a total peak target capacity of 30 aircraft. ACAS equipment is nominally capable of reliable surveillance of high-closing-speed targets in a peak traffic density of up to 0.017 aircraft per square km (0.06 aircraft per square NM) or approximately 27 aircraft in a 26 km (14 NM) radius.

3.1.1.5 When the average traffic density exceeds the above value, the reliable surveillance range decreases. ACAS equipment is capable of providing reliable surveillance of targets closing only up to 260 m/s (500 kt) in an average traffic density of 0.087 aircraft per square km (0.3 aircraft per square NM). The surveillance range required for 260 m/s (500 kt) targets is about 9.3 km (5 NM). It is possible to provide 9.3 km (5 NM) surveillance in a short-term peak traffic density of 0.087 aircraft/km^2 (0.3 aircraft/NM^2) or more without exceeding a total target capacity of 30. If the overall target count ever exceeds 30 at any range up to 26 km (14 NM), the long-range targets may always be dropped without compromising the ability to provide reliable surveillance of lower-speed targets. Thus a peak capability of 30 targets (any mix of Mode A/C or Mode S) is adequate for ACAS and if the number of Mode A/C plus Mode S targets under surveillance exceeds 30, excess targets are to be deleted in order of decreasing range without regard to target type.

3.1.2 SURVEILLANCE OF INTRUDERS WITH MODE A/C TRANSPONDERS

3.1.2.1 Surveillance of Mode A/C transponders is accomplished by the periodic transmission of a Mode C-only all-call (intermode) interrogation (Chapter 3, 3.1.2.1.5.1.2). This elicits replies from Mode A/C transponders, but not from Mode S transponders, thus preventing the replies of Mode S transponders from synchronously garbling the replies of Mode A/C transponders. Other techniques for reducing synchronous garble are (1) the use of directional antennas to interrogate only those aircraft in an azimuth wedge, and (2) the use of a sequence of variable power suppressions and interrogations (known as "whisper-shout") that interrogates only aircraft that have similar link margins (see 3.2.2). The use of both of these techniques together provides a powerful tool for overcoming the effects of synchronous garble.

3.1.2.2 Whisper-shout employs a sequence of interrogations at different power levels transmitted during each surveillance update period. Each of the interrogations in the sequence, other than the one at lowest power, is preceded by a suppression transmission, where the first pulse of the interrogation serves as the second pulse of the suppression transmission. The suppression transmission pulse begins at a time 2 microseconds before the first pulse of the interrogation. The suppression pulse is transmitted at a power level lower than the accompanying interrogation so that the transponders that reply are only those that detect the interrogation and do not detect the suppression. To guard against the possibility that some transponders do not reply to any interrogation in the sequence, the suppression pulse is transmitted at a power level somewhat lower than that of the next lower interrogation. The time interval between successive interrogations should be at least 1 millisecond. This ensures that replies from transponders at long range are not mistaken for replies to the subsequent interrogation. All interrogations in the sequence are transmitted within a single surveillance update interval.

3.1.2.3 Responses to each Mode C-only all-call interrogation are processed to determine the range and altitude code of each reply. It is possible to determine the altitude codes for up to three overlapping replies if care is taken to identify the location of each of the received pulses.

3.1.2.4 After all of the replies are received in response to the whisper/shout sequence, duplicate replies should be merged so that only one "report" is produced for each detected aircraft. Reports may be correlated in range and altitude with the predicted positions of known intruders (i.e. with existing tracks). Since intruding aircraft are interrogated at a high rate (nominally once per second), good correlation performance is achieved using range and altitude. Mode A code is not needed for correlation. Reports that correlate are used to extend the associated tracks. Reports that do not correlate with existing tracks may be compared to previously uncorrelated reports to start new tracks. Before a new track is started, the replies that lead to its initiation may be tested to ensure that they agree in all of the most significant altitude code bits. A geometric calculation may be performed to identify and suppress specular false targets caused by multipath reflections from the terrain.

3.1.2.5 Tracks being initiated may be tested against track validity criteria prior to being passed to the collision avoidance algorithms. The purpose of these tests is to reject spurious tracks caused by garble and multipath. Spurious tracks are generally characterized by short track life.

3.1.2.6 Aircraft not reporting altitude in Mode C replies are detected using the Mode C reply framing pulses. These aircraft are tracked using range as the correlation criterion. The additional use of bearing for correlation will help to reduce the number of false non-Mode C tracks.

3.1.2.7 *Reply merging.* Multiple replies may be generated by a Mode A/C target that responds to more than one whisper-shout interrogation during each whisper-shout sequence or by a target that responds to interrogations from both the top and bottom antennas. The equipment is expected to generate no more than one position report for any target even though that target may respond to more than one interrogation during each surveillance update interval.

3.1.2.8 *Mode A/C surveillance initiation.* The equipment will pass the initial position reports to the collision avoidance algorithms only if the conditions in a) and b) below are satisfied:

a) initially, a Mode C reply is received from the target in each of three consecutive surveillance update periods, and:

   1) the replies do not correlate with surveillance replies associated with other tracks;

   2) the range rate indicated by the two most recent replies is less than 620 m/s (1 200 kt);

   3) the oldest reply is consistent with the above range rate in the sense that its range lies within 95.3 m (312.5 ft) of a straight line passing through the two most recent replies;

4) the replies correlate with each other in their altitude code bits;

b) a fourth correlating reply is received within five surveillance update intervals following the third reply of the three consecutive replies in a) above and is within ±60 m (±200 ft) of the predicted altitude code estimate determined in a) 4) above.

3.1.2.8.1 The following is an example of an acceptable set of rules for assessing correlation of reply code bits and determining the initial altitude track code estimate for a target. Three replies correlate only if:

a) all eight of their D, A and B code pulses agree; or

b) seven of their D, A, and B code pulses agree and at least one of their C code pulses agrees.

3.1.2.8.2 The test for code agreement among the three replies is made individually for each of the reply pulse positions. This test is based on the presence of code pulses alone; agreement occurs for a given reply pulse position if all three replies are detected with ONE in the position or all three replies are detected with a ZERO in that position. The confidence associated with those pulse detections does not affect agreement.

3.1.2.8.3 The confidence flag for a reply pulse position is set “low” whenever there exists another received reply (either real or phantom) that could have had a pulse within ±0.121 microsecond of the same position. Otherwise, the confidence flag is set “high”.

3.1.2.8.4 When agreement among the three replies does not occur for a given reply pulse position, the initial track pulse code estimate for that position is based on the values of the individual pulse codes and the confidence flags associated with those pulse codes in three replies.

3.1.2.8.5 When agreement fails for a given pulse position, the rules for estimating the initial track code for that position are based on the principle that “low” confidence ONEs are suspect. The rules are as follows:

a) If in the most recent (third) reply the detected code for a given pulse position is “high” confidence or a ZERO, the initial track pulse code estimate for that position is the same as the code detected in that position in the most recent reply.

b) If in the most recent reply the detected code for a given pulse position is a “low” confidence ONE, the initial track pulse code estimate for the position is the same as the code detected in that position in the second reply provided that was not also a “low” confidence ONE. If the second was also a “low” confidence ONE, the initial track pulse code estimate is the same as the code detected in that position in the first reply.

3.1.2.9 *MODE A/C SURVEILLANCE EXTENSION*

3.1.2.9.1 *General.* The equipment should continue to pass position reports for a target to the collision avoidance algorithms only if:

a) the track has not been identified as an image (see 3.1.2.9.6); and

b) the reply altitudes occur within an altitude window of ±60 m (200 ft) centred on the altitude predicted from previous reply history; and

c) all replies used for threat assessment after the initiation procedure occur within a range window centred on the range predicted from previous reply history.

3.1.2.9.2 *Range correlation.* The following is an example of an acceptable set of rules for determining the size of the range window:

a) The tracks are processed individually in increasing range order with input range precision of at least 15 m (50 ft) and retained computational accuracy of at least 1.8 m (6 ft). Range is estimated and predicted by a recursive (alpha-beta) tracker with alpha of 0.67 and beta of 0.25.

b) After each surveillance update a new range measurement is available for each target. Since the measurement includes errors, it must be smoothed based on previous measurements to obtain improved estimates of the current target position and velocity. The range and range rate estimation equations are as follows:

$$r(t) \text{ estimate} = r(t) \text{ prediction} + [\text{alpha} \times (r(t) \text{ measurement} - r(t) \text{ prediction})]$$

$$\dot{r}\ (\text{t}) \text{ estimate} = \dot{r}\ (t - T_p) \text{ estimate} + [(\text{beta}/T_p) \times (r(t) \text{ measurement} - r(t) \text{ prediction})],$$

where T_p is the time difference between the current and previous measurements.

c) The gains, alpha and beta determine the relative degree of reliance on current and previous measurements; gains of unity would place complete reliance on the current measurement and result in no smoothing.

d) The estimates obtained from the above equations are subsequently used to predict the range at the time of the next measurement as follows:

$$r(t + T_n) \text{ prediction} = r(t) \text{ estimate} + [\dot{r}\ (t) \text{ estimate} \times T_n]$$

where T_n is the time difference between the next measurement and the current measurement.

e) The range correlation window is centred at the predicted range and has a half-window width as follows:

$$\begin{bmatrix} \text{760 ft if coasted} \\ \text{last interval} \\ \\ \text{570 ft if updated} \\ \text{last interval} \end{bmatrix} + \begin{bmatrix} \text{if track is not established:} \\ 0 \\ \\ \text{if track is established:} \\ \\ \text{2 000 ft, if 0.00 NM} \le r < \text{0.17 NM} \\ \text{1 000 ft, if 0.17 NM} \le r < \text{0.33 NM} \\ \text{600 ft, if 0.33 NM} \le r < \text{1.00 NM} \\ \text{240 ft, if 1.00 NM} \le r < \text{1.50 NM} \\ \text{0 ft, if 1.50 NM} \le r \end{bmatrix}$$

f) If the track is above 3 050 m (10 000 ft), the term contained within the second pair of brackets is multiplied by four.

3.1.2.9.3 *Altitude correlation.* For the purposes of altitude correlation, altitude is estimated and predicted by an alpha-beta tracker with alpha of 0.28 and beta of 0.06. The tracker has retained computational accuracy of (30 m) (100 ft) divided by 16. The altitude prediction is rounded to the nearest 30 m (100 ft) increment and converted to grey code. The grey codes of the predicted altitude ±30 m (100 ft) are also computed. The longer-term altitude predictions performed by the threat detection logic require a more accurate altitude tracking procedure (see 3.5.3). The reply(ies) that lies in the range correlation window is tested for altitude correlation in increasing range order. The track is updated with the first reply that has exact agreement (in all bits) with any of the three grey codes computed above. If no reply matches, two additional grey codes are computed and the process tried again. The two codes are the predicted altitude ±60 m (200 ft).

3.1.2.9.4 *Track updating — establishment.* The updating reply (if any) is eliminated from further consideration in updating other tracks, or in the track initiation process. If there is no updating reply, the range and altitude estimates are set equal to the corresponding predicted values. If this is the sixth consecutive interval having no updating reply, the track is dropped. If there is an updating reply, and if the track is not identified as an image (see 3.1.2.9.6), the track is flagged as established, that is, it is now available for use by the threat detection logic. Once established, a track remains established until it is dropped, even if it subsequently satisfies the conditions for an image track.

3.1.2.9.5 *Test for track splits.* When all tracks have been processed, they are combined with the tracks that are newly initiated during the current scan, and then all the tracks are examined pairwise to determine if a given pair of tracks is likely to represent the same intruder. If:

a) the ranges differ by at most 150 m (500 ft)

b) the range rates differ by at most 4.6 m/s (8.9 kt)

c) either

   1) the altitudes differ by at most 30 m (100 ft), or

   2) the altitude rates differ by at most 3 m/s (10 ft/s) and both tracks were initiated during the same scan,

only one of the tracks is retained, preference being given to the track showing the larger number of replies since initiation.

3.1.2.9.6 *Image track processing.* Those tracks that could have been formed by replies specularly reflected from the ground are referred to as image tracks. A track is identified as an image if there exists a track at shorter range (referred to as the real track) such that:

a) the difference between the real altitude and the image altitude is less than or equal to 60 m (200 ft) for altitude-reporting targets, or both the image track and the real track are non-altitude-reporting; and

b) the difference between the measured image range rate and the calculated image range rate $\dot{r}_i$ is less than or equal to 21 m/s (40 kt), where the calculated image range rate is either (for the single-reflection case):

$$\dot{r}_i = \left(\frac{1}{2}\right)[\dot{r} + \left(\frac{1}{2r_i - r}\right)[((2r_i - r)^2 - r^2 + (Z_0 - Z)^2)^{\frac{1}{2}}(\dot{Z}_0 + \dot{Z}) + r\dot{r} - (Z_0 - Z)(\dot{Z}_0 + \dot{Z})]]$$

or (for the double-reflection case):

$$\dot{r}_i = \left(\frac{1}{r_i}\right)\left[\left(r_i^2 - r^2 + (Z_0 - Z)^2\right)^{\frac{1}{2}}(\dot{Z}_0 + \dot{Z}) + r\dot{r} - (Z_0 - Z)(\dot{Z}_0 - \dot{Z})\right]$$

where:

r_i is the image range,

r is the real range,

Z is the real altitude, for altitude reporting targets or Z is set to own altitude for non-altitude reporting targets, and

Z_0 is own altitude

If a track is identified as an image, it may be retained, but it cannot be flagged as established for use by the threat detection logic.

3.1.2.10 *Missing Mode A/C reports.* The equipment continues to pass to the collision avoidance algorithms predicted position reports for Mode A/C targets for six surveillance update intervals following the receipt of the last valid correlating reply. The equipment does not pass position reports for more than six surveillance update intervals following the receipt of the last valid correlating reply unless the target again satisfies the surveillance initiation criteria of 3.1.2.8.

3.1.3 SURVEILLANCE OF INTRUDERS WITH MODE S TRANSPONDERS

3.1.3.1 Efficient air-air surveillance techniques have been developed for intruders equipped with Mode S transponders. Because of Mode S selective address, there is no synchronous garble associated with surveillance of Mode S transponders. However, multipath must be dealt with and the surveillance of Mode S transponders should be accomplished with as few interrogations as possible to minimize interference.

3.1.3.2 The Mode S modulation formats are inherently more resistant to multipath than are the Mode A/C modulation formats. However, the greater length of the Mode S transmission makes it more likely to be overlapped by multipath. The use of top-mounted antennas and variable receiver thresholds (to protect the Mode S reply preamble) increases the multipath resistance to an acceptable level for reliable air-air surveillance. The use of antenna diversity transponders on ACAS aircraft provides an additional reliability margin for coordination between pairs of conflicting ACAS aircraft.

3.1.3.3 Mode S interrogation rates are kept low by passive detection of transponder transmissions and by interrogating once per second only those intruders that could become immediate threats. Intruders that are not likely to become immediate threats should be interrogated less frequently (i.e. once every 5 seconds). Passive address acquisition prevents unnecessary interference with other elements of the SSR and ACAS system. ACAS listens to Mode S all-call replies (DF = 11, acquisition squitter transmissions, Chapter 3, 3.1.2.8.5.1 or DF = 17, extended squitter transmissions, Chapter 3, 3.1.2.8.6.1). These may occur in response to Mode S ground station all-call interrogations or as spontaneous transmission (called squitters) at intervals ranging from 0.8 to 1.2 seconds for the acquisition squitter, and at shorter intervals for the extended squitter. Reception of squitters may be alternated between the top and bottom antennas. If reception is switched, it will be necessary to control the switching times to avoid undesirable synchronism with the squitters transmitted by Mode S antenna diversity transponders.

3.1.3.4 The 24-bit aircraft address in the squitter is protected by error coding to ensure a high probability of obtaining a correct address. Since the squitter transmission does not contain altitude information, ACAS attempts to obtain altitude passively from Mode S replies generated in response to ground interrogations or interrogations from other ACAS aircraft. If altitude is not received shortly after address detection, the Mode S aircraft is actively interrogated to obtain altitude.

3.1.3.5 After ACAS has determined the altitude of a detected Mode S aircraft, it compares the altitude of this aircraft to its own altitude to determine whether or not the target can be ignored or should be interrogated to determine its range and range rate. If the measured range and the estimated range rate indicate that it is (or could soon be) a collision threat, the intruder should be interrogated once per second and the resulting track data fed to the collision avoidance algorithms. An aircraft at longer range should be interrogated only as often as necessary to maintain track and ensure that it will be interrogated once per second before it becomes a collision threat.

3.1.3.6 The use of passive detection in combination with altitude comparison and a less frequent interrogation of non-threat intruders reduce the Mode S interrogation rate automatically when the local densities of other ACAS aircraft are very high. Therefore, a higher interrogation power level is available to improve surveillance performance.

3.1.3.7 *MODE S SURVEILLANCE INITIATION*

3.1.3.7.1 The equipment is intended to provide Mode S surveillance with a minimum of Mode S interrogations. The identity of Mode S targets is determined by passively monitoring transmissions received with DF = 11 or DF = 17. Error detection and correction is applied to the received squitters to reduce the number of addresses to be processed. The altitude of the Mode S targets from which a squitter has been received is determined by passive monitoring transmissions received with DF = 0 (short air-air surveillance replies, Chapter 3, 3.1.2.8.2) or DF = 4 (surveillance altitude replies, Chapter 3, 3.1.2.6.5) or active selective interrogations (air-air surveillance interrogation, Chapter 4, 4.3.8.4) and monitoring the corresponding air-air surveillance replies. The equipment monitors squitter and altitude replies whenever it is not transmitting, or receiving replies to, Mode S or Mode C interrogations. Each received reply is examined to determine what further action should be taken.

3.1.3.7.2 To reduce the number of unnecessary interrogations, a squitter target is not interrogated if so few squitters and altitude replies are received from it that no threat is indicated. Targets that might be a threat are called valid targets. The equipment is not intended to interrogate a target unless the altitude information indicates that it is within 3 050 m (10 000 ft) of own altitude. The ACAS aircraft interrogates targets from which it does not receive altitude information but does continue to receive error-free squitters. In order to establish timely acquisition of targets that transition the 3 050 m (10 000 ft) relative altitude boundary, the altitude of targets that are beyond 3 050 m (10 000 ft) of own altitude are monitored using unsolicited DF = 0 or DF = 4 replies, or in the absence of such replies, by periodically interrogating to elicit a DF = 0 reply.

3.1.3.7.3 The following is an example of one acceptable means of processing squitters and altitude replies to reduce unneeded interrogations:

a) When a valid squitter is first received, a running sum initialized at 0 is associated with it. During each succeeding surveillance update interval the sum is decremented by 1 if no squitters or altitude replies with a particular address are received, and the sum is incremented by 16 for each reception of either a squitter or an altitude reply. The process continues until the sum equals or exceeds 20. When the sum becomes less than or equal to –20, the address is removed from the system. When it equals or exceeds +20, the target is declared to be valid.

b) When a target has been declared to be valid, it is interrogated unless its altitude differed from the ACAS altitude by more than 3 050 m (10 000 ft). Otherwise, its altitude is monitored using DF = 0 or DF = 4 replies, or in the absence of such replies, by interrogating once every 10 seconds to elicit a DF = 0 reply.

c) When any of these conditions are satisfied, the running sum continues to be incremented and decremented even though its value may exceed 20.

3.1.3.8 *MODE S RANGE ACQUISITION*

3.1.3.8.1 The equipment should transmit an acquisition interrogation (UF = 0, 16, AQ = 1, Chapter 3, 3.1.2.8.1.1) to determine the range of each valid target with relative altitude as defined above, or from which inadequate altitude information has been received.

3.1.3.8.2 If an acquisition interrogation fails to elicit a valid reply, additional interrogations should be transmitted. The total number of acquisition interrogations addressed to a single target must not exceed three within a single surveillance update period. The first acquisition interrogation is to be transmitted using the top antenna. If two acquisition interrogations to a target fail to elicit valid replies, the next two acquisition interrogations to that target are to be transmitted using the bottom antenna. If in the acquisition attempt in the first surveillance update period, valid replies are not received, ACAS transmits a total of nine acquisition interrogations distributed over the first six successive surveillance update periods. If acquisition interrogations fail to elicit replies within six surveillance update intervals, the acquisition process is to cease until enough additional squitters/fruit are received indicating that a successful acquisition is likely. One means of accomplishing this is to process subsequent squitters/fruit as described in 3.1.3.7, but with the increment 16 replaced by 8. If a second failure to acquire occurs, the process is repeated with an increment of 4. After any subsequent failure, an increment of 2 is used.

3.1.3.8.3 If additional attempts are made to acquire the target, they conform to the pattern described above except that:

a) On the second and third attempt, only one interrogation is to be made during a single surveillance update interval; and in the absence of valid replies, six interrogations are to be transmitted during the first six surveillance update intervals.

b) Any further attempts consist of a single interrogation during the entire six update intervals.

3.1.3.8.4 When a valid acquisition reply is received, the VS field in the reply is examined to determine the vertical status of a target. If a target is determined to be on the ground, its vertical status is periodically monitored by interrogating as often as necessary to ensure timely acquisition when airborne. When a valid acquisition reply is received from an airborne target, one or more interrogations are to be transmitted to the target within two surveillance update intervals in order to confirm the reliability of the altitude data and the altitude quantization bit. When two replies have been received from an airborne target that have altitude values within 150 m (500 ft) of each other and within 3 050 m (10 000 ft) of own altitude and have identical quantization bit values, periodic surveillance interrogations (designated as "tracking" interrogations) are to be initiated for that target.

3.1.3.8.5 The range of the target is used with its estimated range rate to determine its potential threat to ACAS. If the target is not an immediate potential threat, it can be interrogated less frequently than if it were a potential threat for which an advisory would soon most likely be issued. Each 1-second surveillance update interval, the potential threat level *(TAU)* of the target is calculated as follows:

$$TAU = -(\mathrm{r} - \mathrm{SMOD}^2/r)/\dot{r},$$

where r is the tracked range, $\dot{r}$ is the estimated relative range rate and *SMOD* is a surveillance distance modifier which is equivalent to 5.6 km (3 NM). If the estimated relative range rate is either a negative value of less than –6 kt or positive (either a slow convergence or the aircraft are diverging), the $\dot{r}$ value used to calculate *TAU* is –6 kt. An *SMOD* value of 5.6 km ensures that ACAS will always use the nominal 1-second interrogation cycle in situations where the value of *TAU* can change rapidly, such as in a parallel approach. A target with a *TAU* value of equal to or less than 60 seconds is interrogated at the nominal rate of once every second. A target with a *TAU* value greater than 60 seconds is interrogated at a rate of once every five seconds if the altitude of the target and own aircraft are both less than 5 490 m (18 000 ft) and at a rate of at least once every five seconds if the altitude of the target or own aircraft is greater than 5 490 m (18 000 ft).

3.1.3.9 *MODE S SURVEILLANCE EXTENSION*

3.1.3.9.1 The equipment passes position reports for a Mode S target to the collision avoidance algorithms only if all replies used for threat assessment after the initial range acquisition occur within range and altitude windows centred on range and altitude predicted from previous reply history, the altitude quantization bit matches the previous value, and the VS field in the short special surveillance reply indicates the target to be airborne at least once during the previous three surveillance update cycles. The range and altitude windows are the same as those used for Mode A/C tracking in 3.1.2.9.2 and 3.1.2.9.3 respectively.

3.1.3.9.2 If a tracking interrogation fails to elicit a valid reply, additional interrogations are transmitted. The total number of tracking interrogations addressed to a single target is not expected to exceed five during a single surveillance update period or sixteen distributed over six successive surveillance update periods. The first tracking interrogation is transmitted using the antenna that was used in the last successful interrogation of that target. If two successive tracking interrogations fail to elicit valid replies from a target, the next two interrogations to that target are transmitted using the other antenna.

3.1.3.10 *Missing Mode S replies.* The equipment continues to pass to the collision avoidance algorithms predicted position reports for Mode S targets for six surveillance update intervals following the receipt of the last valid reply to a tracking interrogation if the target is interrogated once every second or for eleven 1-second surveillance update intervals following receipt of the last valid reply to a tracking interrogation if the target is interrogated once every five seconds. The equipment does not pass position reports for Mode S targets for more than six surveillance update intervals following the receipt of the last reply to a tracking interrogation whose rate is once every second or for more than eleven 1-second surveillance update intervals following receipt of the last reply to a tracking interrogation whose rate is once every five seconds unless the target again satisfies the range acquisition criteria of 3.1.3.7. The Mode S address of a dropped track is retained for four additional seconds to shorten the reacquisition process if squitters are received.

3.1.3.11 *Mode S overload.* The equipment passes position reports for all Mode S targets regardless of the distribution of targets in range, provided the total peak target count does not exceed 30.

3.1.3.12 *Mode S power programming.* The transmit power level of Mode S tracking interrogations to targets (but not air-to-air coordination interrogations) is to be automatically reduced as a function of range for targets within 18.5 km (10 NM) as follows:

$$P_T = P_{\max} + 20 \log \frac{r}{10},$$

where P_T is the adjusted power level, P_{max} is the nominal power level (typically 250 W), which is transmitted to targets at ranges of 18.5 km (10 NM) or more, and r is the predicted range of the target. The actual transmitted power is the lesser of P_T and the limit imposed by the interference limiting inequalities of Chapter 4, 4.3.2.2.2.2.

3.1.3.13 *Mode S track capacity.* When the aircraft density is nominally 0.087 Mode S aircraft per km^2 (0.3 aircraft per NM^2) in the vicinity of the ACAS aircraft, there will be about 24 aircraft within 9.3 km (5 NM) and about 142 aircraft within 56 km (30 NM) of the ACAS aircraft. Thus, the ACAS equipment is expected to have capacity for at least 150 aircraft addresses.

3.1.3.14 *USE OF BEARING ESTIMATES FOR MODE S SURVEILLANCE*

3.1.3.14.1 Bearing estimation capability is not required for high-density Mode S surveillance. However, if bearing estimates are available, it is seen that the use of directional Mode S interrogations significantly reduces the transmitter power requirement of the equipment. Directional Mode S interrogations may also be used in the absence of bearing information, provided the interference limits are not exceeded.

3.1.3.14.2 Bearing estimates may also be used in conjunction with knowledge of own airspeed to reduce the overall Mode S interrogation rate. The following is one possible way of achieving such a reduction.

3.1.3.14.3 Instead of calculating time-to-endanger based on the conservative assumption that the two aircraft are on a head-on collision course, the time-to-endanger can be increased by taking into account the threat bearing and the limited turn-rate of own aircraft and allowing for the time that would be required for own aircraft to turn in the direction of the threat. Such computation would continue to assume that the target aircraft is travelling at its reported maximum capable speed directly toward the collision point.

3.2 Transmitter

3.2.1 POWER LEVELS

3.2.1.1 In the absence of interference and when using an antenna whose pattern is identical to that of a quarter-wave monopole above a ground plane, it is possible to provide reliable air-to-air surveillance of transponders at ranges of 26 km (14 NM) by using a nominal effective radiated power of 54 dBm (250 W).

3.2.1.2 The transmitter output power is to be carefully limited between transmissions because any leakage may severely affect the performance of the Mode S transponder on board the ACAS aircraft. The leakage power into the transponder at 1 030 MHz is generally to be kept at a level below –90 dBm. If the physical separation between the transponder antenna and the ACAS antenna is no less than 50 cm, the coupling loss between the two antennas will exceed 20 dB. Thus, if the RF power at 1 030 MHz at the ACAS antenna terminal does not exceed –70 dBm in the inactive state, and if a minimum antenna spacing of

50 cm is adhered to, the direct interference from the ACAS antenna to the transponder antenna will not exceed –90 dBm. This requirement is to ensure that, when not transmitting an interrogation, ACAS does not radiate RF energy that could interfere with, or reduce the sensitivity of, the SSR transponder or other radio equipment in nearby aircraft or ground facilities.

3.2.1.3 Measures must also be taken to ensure that direct 1 030 MHz leakage from the ACAS enclosure to the transponder enclosure is below –110 dBm when the two units are mounted side-by-side in a typical aircraft installation.

3.2.1.4 It is expected that the ACAS equipment be tested side-by-side with Mode S transponders of equivalent classification to ensure that each unit meets its sensitivity requirements in the presence of transmitter leakage from the other.

3.2.2 CONTROL OF SYNCHRONOUS INTERFERENCE BY WHISPER-SHOUT

3.2.2.1 To control Mode A/C synchronous interference and facilitate ACAS operation in airspace with higher traffic densities, a sequence of interrogations at different power levels may be transmitted during each surveillance update period. Each of the interrogations in the sequence, other than the one at lowest power, is preceded by a suppression pulse (designated S_1) 2 microseconds preceding the P_1 pulse. The combination of S_1 and P_1 serves as a suppression transmission. S_1 is transmitted at a power level lower than that of P_1. The minimum time between successive interrogations is to be 1 millisecond. All interrogations in the sequence should be transmitted within a single surveillance update interval.

3.2.2.2 Because the suppression transmission in each step is always at a lower power level than the following interrogation, this technique is referred to as whisper-shout. The intended mechanism is that each aircraft replies to only one or two of the interrogations in a sequence. A typical population of Mode A/C transponders at any given range may have a large spread in effective sensitivity due to variation in receivers, cable losses, and antenna shielding. Ideally, each transponder in the population will respond to two interrogations in the sequence, and will be turned off by the higher power suppression transmissions accompanying higher-power interrogations in the sequence. Given a situation in which several aircraft are near enough to each other in range for their replies to synchronously interfere, it is unlikely they would all reply to the same interrogation and, as a result, the severity of synchronous interference is reduced. Use of whisper-shout also reduces the severity of the effects of multipath on the interrogation link.

3.2.2.3 Figure A-2a defines a whisper-shout sequence that is matched to the requirements for high-density Mode A/C surveillance and Figure A-2b defines a whisper-shout sequence that is matched to the requirements for low-density Mode A/C surveillance. Five distinct subsequences are defined; one for each of the four beams of the top-mounted antenna and one for the bottom-mounted omnidirectional antenna. The interrogations may be transmitted in any order. When the high density sequence of Figure A-2a is truncated to limit interference, the steps are dropped in the order shown in the column Interference limiting priority. When the low-density sequence of Figure A-2b is reduced in power to limit interference, each interrogation and its related MTL value, as indicated in the last column, is reduced by 1 dB in the order shown in the column Interference limiting priority. The lowest numbered steps in the sequence are dropped or reduced first. The timing of individual pulses or steps in either sequence is defined in Figure A-3 which illustrates the three lowest-power steps in the top-forward antenna sequence. The first pulse of the interrogation serves as the second pulse of the suppression.

3.2.2.4 The minimum triggering level (MTL) values tabulated in Figure A-2a and Figure A-2b are based on the assumption that replies to all interrogations are received omnidirectionally. If a directional-receive antenna is used, the MTL values must be adjusted to account for the antenna gain. For example, for a net antenna gain of 3 dB, all MTL values in the table would be raised by 3 dB; and the MTL for step number 1 would be –71 dBm rather than –74 dBm.

3.2.2.5 The power is defined as the effective radiated power for the interrogation. All power levels are to be within ±2 dB of nominal. The tolerance of the step increments is to be ±1/2 dB and the increments are to be monotonic throughout the entire power range of the sequence.

3.2.2.6 Most of the interrogations are transmitted from the top antenna because it is less susceptible to multipath interference from the ground.

3.2.2.7 Selection of the appropriate whisper-shout subsequence for a particular antenna beam is performed each interrogation cycle based on the current or anticipated level of Mode A/C synchronous garble in that beam as determined by ACAS surveillance. The high density whisper-shout subsequence is selected for an antenna beam whenever synchronous garble is present in that beam as evident from the existence of at least one low confidence altitude code bit in two consecutive Mode C replies. The 6-level whisper-shout sequence is selected for an antenna beam if either:

a) a single Mode A/C aircraft exists within the surveillance range of that beam and synchronous garble is not present; or

b) synchronous garble is not present, Mode A/C targets are not within garble range of each other, and the Mode A/C aircraft density within the reliable surveillance range is equal to or less than 0.23 aircraft/km (0.43 aircraft/NM). Whenever a TA is generated on a threat within a particular antenna beam, the high level sequence is used for that beam for the duration of the advisory. Whenever an RA is generated, the high level sequence is used for all antenna beams for the duration of the advisory.

3.2.2.8 If no established Mode A/C surveillance track nor any candidate track, consisting of three correlating Mode C acquisition replies, exists within the surveillance range of an antenna beam, degarbling is unnecessary and ACAS transmits a single Mode C interrogation in that beam. The power level of the single interrogation and its associated MTL in each beam is equivalent to the highest allowable power level of the corresponding low level whisper-shout subsequence as determined by interference limiting. Single Mode C interrogations are susceptible to uplink mode conversion due to multipath and may result in a mixture of Mode A and Mode C replies from an intruder that are separated by 13 microseconds. ACAS, therefore, selects the low level whisper-shout subsequence for a beam for reliable surveillance acquisition and tracking whenever:

a) a single interrogation in that beam results in a Mode A/C reply that occurs within a 1 525 m (5 000 ft) range window centred either at the measured range of a Mode A/C reply received in the previous surveillance update interval or at a range offset from the previous reply range by ±13 microseconds; or

b) an established Mode C track or a Mode C track in the process of being acquired traverses into that beam from another beam. ACAS switches back to the single interrogation after ten surveillance update intervals in which two correlating acquisition replies were not received.

3.2.3 INTERFERENCE LIMITING

3.2.3.1 ACAS equipment conforms to a set of three specific inequalities (Chapter 4, 4.3.2.2.2.2) for controlling interference effects. The three inequalities, applicable to ACAS operating below a pressure-altitude of 5 490 m (18 000 ft), are associated with the following physical mechanisms: (1) reduction in “on” time of other transponders caused by ACAS interrogations, (2) reduction in “on” time of own transponder caused by mutual suppression during transmission of interrogations, and (3) Mode A/C fruit caused by ACAS Mode A/C interrogations. Setting n_a to 1 in inequalities (1) and (3) for ACAS operating above pressure-altitude of 5 490 m (18 000 ft), prevents a single ACAS from transmitting unlimited power by providing an upper limit on the ACAS one-second interrogation power/rate product.

3.2.3.2 Inequality (1) ensures that a “victim” transponder will never detect more than 280 ACAS interrogations in a one-second period from all the ACAS interrogators within 56 km (30 NM) for any ACAS distribution, surrounding the “victim” transponder, within the limits of uniform-in-range to uniform-in-area. The left-hand side of the inequality allows an ACAS unit to increase its interrogation rate if it transmits at less than 250 W since low power transmissions are detected by fewer transponders. Each normalized power value within the summation in the left-hand side of this inequality contains an exponent α which serves to match the inequality to the localized ACAS distribution. The value of α defines the local ACAS aircraft distribution curve and is derived from own ACAS measurement of the distribution and number of other ACAS within 56 km (30 NM) range. As the ACAS distribution varies from uniform-in-area ($\alpha = 1$) to uniform-in-range ($\alpha = 0.5$), the density, and therefore the electromagnetic impact, of ACAS aircraft in the vicinity of a “victim” transponder becomes greater. This increased potential for ACAS interference is offset by the greater degree of interference limiting that results from using an exponent of less than one in the normalized power values of the inequality. The denominator of the first term on the right-hand side of this inequality accounts for other ACAS interrogators in the vicinity and the fact that all ACAS units must limit their interrogation rate and power in a similar manner so that, as the number of ACAS units in a region increases, the interrogation rate and power from each of them decreases and the total ACAS interrogation rate for any transponder remains less than 280 per second.

3.2.3.3 Within an airspace in which ACAS aircraft are distributed between the limits of uniform-in-range to uniform-in-area, and provided that the "victim" is taken off the air for 35 microseconds by suppression or reply dead time whenever it receives an ACAS interrogation, the total "off" time caused by ACAS interrogations will then never exceed 1 per cent. Measurements and simulations indicate that the total "off" time can be higher than 1 per cent in high-density terminal areas because of ACAS aircraft distributions that are beyond the region defined by uniform-in-area to uniform-in-range and because of a Mode S transponder recovery time to certain interrogations that is expected to be greater than 35 microseconds. The second term on the right-hand side of this inequality limits the maximum value of the interrogation power-rate product for ACAS II, regardless of n_a, in order to allow a portion of the total interference limiting allocation to be used by ACAS I. The term, which is matched to the ACAS distribution by the value of α in the denominator, ensures that an individual ACAS II unit never transmits more average power than it would if there were approximately 26 other ACAS II nearby distributed uniformly-in-area or approximately 6 other ACAS II nearby distributed nearly uniformly-in-range.

3.2.3.3.1 High-density terminal areas will suffer from higher loads due to violation of the 1 per cent estimate at approximately 14.8 – 18.5 km (8 – 10 NM) from touch down. To ensure sufficient surveillance performance for both ACAS and ground surveillance systems in such areas, ACAS flying below 610 m (2 000 ft) AGL include also ACAS II and ACAS III operating on ground in the calculation of n_b and n_c. This value was chosen for practical reasons:

a) the use of a radio altimeter allows sufficient measurement accuracy at and below 610 m (2 000 ft); and

b) it assumes aircraft are approaching on an ILS glide path. In that case, 610 m (2 000 ft) AGL corresponds to a distance of approximately 11.2 km (6 NM) from an airport.

New approach procedures (e.g. based on MLS or GNSS) may require additional considerations to limit interference. And even with ILS approach, it is recommended to establish procedures switching ACAS II and ACAS III to "stand-by" while the aircraft is not on an active runway.

3.2.3.4 Inequality (2) ensures that the transponder on board the ACAS aircraft will not be turned off by mutual suppression signals from the ACAS unit on the same aircraft more than 1 per cent of the time.

3.2.3.5 Inequality (3) ensures that a "victim" Mode A/C transponder will not generate more than 40 Mode A/C replies in a one-second period in response to interrogations from all the ACAS interrogators within its detection range. Like inequality (1) it includes terms to account for reduced transmit power, to account for the other ACAS interrogators in the vicinity, and to limit the power of a single ACAS unit. Forty Mode A/C replies per second is approximately 20 per cent of the reply rate for a transponder operating without ACAS in a busy area of multiple Mode A/C ground sensor coverage.

3.2.3.6 *EXAMPLE OF INTERFERENCE LIMITING*

3.2.3.6.1 As an example, when interrogation limiting is not invoked, the overall Mode A/C and Mode S interrogation rates of a directional ACAS unit would typically be as follows: the Mode A/C interrogation rate k_t is typically constant at 83 whisper-shout interrogations per second. Assume that the sum of the normalized whisper-shout powers, i.e. the Mode A/C contribution to the left-hand side of inequality (1), is approximately 3. The Mode S interrogation rate depends on the number of Mode S aircraft in the vicinity. In en-route airspace it is typically an average of about 0.08 interrogations per second for each Mode S aircraft within 56 km (30 NM). In a uniform aircraft density of 0.006 aircraft per square km (0.02 aircraft per square NM), the number of aircraft within 56 km (30 NM) is 57. If 20 per cent of these are ACAS equipped, n_a = 12 and the variable term on the right-hand side of inequality (1) is 21.5. If the number of ACAS aircraft in the area does not exceed 26, the fixed term continues to govern and no limiting occurs until there are approximately 100 Mode S aircraft within 56 km (30 NM).

3.2.3.6.2 Similar considerations hold for inequalities (2) and (3). In inequality (2) the mutual suppression interval associated with each top antenna interrogation is 70 microseconds. The bottom antenna mutual suppression interval is 90 microseconds. Thus the Mode A/C contribution to the left-hand side of inequality (2) is 0.0059 and the Mode S interrogation rate can be as high as 59 top antenna interrogations per second before violating the limit. With a typical whisper-shout sequence, the left-hand side of inequality (3) is approximately 3. The number of ACAS aircraft within 56 km (30 NM) can be as high as 26 without violating inequality (3).

3.2.3.6.3 When the interrogation rate or density increases to the point at which one of the limits is violated, either the Mode A/C or Mode S normalized interrogation rate or both must be reduced to satisfy the inequality. If the density were to reach 0.029 aircraft per km^2 (0.1 aircraft per NM^2) uniformly out to 56 km (30 NM), there would be 283 aircraft within a 56 km (30 NM) radius. If 10 per cent of these were equipped with ACAS, $n_a = 28$. The right-hand limits in inequalities (1) and (3) would then be 9.66 and 2.76 respectively. To satisfy these lower limits, the Mode A/C and Mode S contributions to the left-hand side of inequality (1) would both have to be reduced. As a result, the surveillance range of both Mode A/C and Mode S targets would be less.

3.2.3.6.4 Inequality (1) contains an exponent α which serves to match the inequalities to the specific local ACAS aircraft density such that a "victim" transponder operating in the vicinity of ACAS that are distributed within the limits of uniform-in-area to uniform-in-range will never detect more than 280 ACAS interrogations in a one-second period.

The value of α defines the local ACAS distribution characteristic within the vicinity of own ACAS.

It is based on the relative numbers of ACAS within 56 km (30 NM), within 11.2 km (6 NM) and within 5.6 km (3 NM) as derived from ACAS broadcast interrogations and from ACAS surveillance. The value of α is the minimum of:

a) the logarithm of the ratio of the number of ACAS aircraft, n_a , within 56 km (30 NM) to the number of ACAS aircraft, n_b, within 11.2 km (6 NM) divided by the logarithm of 25; and

b) one fourth of the ratio of the number of ACAS aircraft, n_b, within 11.2 km (6 NM) to the number of ACAS aircraft, n_c, within 5.6 km (3 NM).

A uniform-in-area distribution of ACAS aircraft within 56 km results in an α value of 1.0 and a uniform-in-range distribution results in a value of 0.5. Since decreasing values of α result in greater power reduction and therefore shorter surveillance ranges, the minimum value of α is constrained to 0.5 in order to preserve adequate surveillance range for collision avoidance in the highest density terminal areas. Additional constraints are imposed on the value of α_1 to account for special situations in which the measured local ACAS distribution is:

1) based on numbers so small as to be inconclusive ($n_b = 1$), in which case α_1 is constrained to 1;

2) is inconsistent with a relatively high overall ACAS count ($n_b \leq 4$, $n_c \leq 2$, $n_a > 25$), in which case α_1 is constrained to 1; or

3) is inconsistent with a relatively low overall ACAS count, ($n_c > 2$, $n_b > 2n_c$, $n_a < 40$), in which case α_1 is constrained to 0.5.

3.2.3.7 *INTERFERENCE LIMITING PROCEDURES*

3.2.3.7.1 At the beginning of each surveillance update interval, n_a, n_b and n_c are to be determined as indicated above. n_a is then used to evaluate the current right-hand limits in inequalities (1) and (3). Smoothed values of the Mode S variables in the inequalities are also to be calculated.

n_b and n_c are used to compute the value of α_1 according to the following expression:

$$\alpha_1 = 1/4\ [n_b/n_c]$$

n_a and n_b are used to compute the value of a α_2 according to the following expression:

$$\alpha_2 = \frac{Log_{10}[n_a/n_b]}{Log_{10}25}$$

In addition:

IF [($n_b \leq 1$) OR ($n_b > 4n_c$) OR ($n_b \leq 4$ AND $n_c \leq 2$ AND $n_a > 25$)] THEN $\alpha_1 = 1.0$;
IF [($n_b < 2n_c$) OR (($n_c > 2$) AND ($n_b > 2n_c$) AND ($n_a < 40$))] THEN $\alpha_1 = 0.5$;
IF ($n_a > 25n_b$) THEN $\alpha_2 = 1.0$;
IF ($n_a < 5n_b$) THEN $\alpha_2 = 0.5$;
the value of α is the minimum of α_1 and α_2.

3.2.3.7.2 All air-to-air coordination interrogations and RA and ACAS broadcast interrogations are transmitted at full power. Air-to-air coordination interrogations and RA and ACAS broadcast interrogations are not included in the summations of Mode S interrogations in the left-hand terms of these inequalities. Whenever an RA is posted, surveillance interrogations to that intruder may be transmitted at full power to allow for maximum link reliability. Because the frequency of RAs is very low, these transmissions do not result in a measurable increase in interference.

3.2.3.7.3 If the smoothed value of the left-hand side of either inequality (1) or (2) equals or exceeds the current limit and own ACAS aircraft are operating below a pressure-altitude of 5 490 m (18 000 ft), both the Mode S and Mode A/C surveillance parameters are to be modified to satisfy the inequalities. If the left-hand side of inequality (3) exceeds the current limit and own ACAS aircraft are operating below a pressure-altitude of 5 490 m (18 000 ft), Mode A/C surveillance parameters are modified to satisfy the inequalities.

3.2.3.7.4 Mode A/C surveillance can be modified by sequentially eliminating steps from the whisper-shout sequence described in 3.2.2. Each whisper-shout step is uniquely associated with a receiver MTL setting. Thus, the receiver sensitivity in Mode A/C surveillance periods will be automatically tailored to match these power reductions.

3.2.3.7.5 The overall surveillance sensitivity for Mode S targets can be reduced by reducing the interrogation power and by increasing the receiver MTL during all Mode S squitter listening periods. This will indirectly reduce the Mode S interrogation rate by reducing the target count. Many Mode S interrogations are acquisition interrogations transmitted to targets of unknown range. It is thus not effective to directly control the Mode S interrogation rate simply by dropping long-range targets from the track file.

3.2.3.7.6 For airborne ACAS, the Mode A/C and Mode S surveillance power and sensitivity reductions are to be accomplished such that equality between the surveillance ranges for Mode S and Mode A/C targets exists in the forward beam. In order to provide a reliable 11.2 km (6 NM) surveillance range in all directions for n_b, the maximum allowed interference limiting power reduction in any beam for an airborne ACAS unit is 10 dB for Mode S and 7 dB for Mode A/C. Mode A/C surveillance power and sensitivity reductions for ACAS on the ground are to be accomplished such as to achieve equal whisper-shout capability in each beam. This requires that Mode A/C power and sensitivity reduction be accomplished in the forward beam until it is equivalent to the side beams and then in the forward and side beams until they are equivalent to the rear beam. In order to provide a reliable 5.6 km (3 NM) surveillance range in all directions for surveillance prior to departure, the maximum allowed interference limiting power reduction for an ACAS unit on the ground is as follows:

a) forward beam: 13 dB for Mode S and 10 dB for Mode A/C;

b) side beam: 13 dB for Mode S and 6 dB for Mode A/C; and

c) rear beam: 13 dB for Mode S and 1 dB for Mode A/C.

In addition, the Mode A/C and Mode S surveillance power and sensitivity reductions for ACASs that are airborne or on the ground are to be accomplished such that the ACAS equipment is not prematurely limited and has the capability of using at least 75 per cent of the allowance specified in the three limiting equations for all mixes of target types and for all densities up to the maximum density capability of the system. When the value of any of the smoothed limits is exceeded, the appropriate action is required to limit interference within one surveillance update interval. Means are to be provided for gradually restoring the surveillance sensitivity when the environment subsequently improves enough to allow the interference limits to be relaxed.

3.2.3.7.7 ACAS cross-link interrogations are included in the summation of Mode S interrogations in the left-hand terms of the interference limiting inequalities.

3.2.3.8 *IMPLEMENTATION OF A TYPICAL INTERFERENCE LIMITING PROCEDURE*

3.2.3.8.1 The following describes one possible implementation of an interference limiting procedure. It varies the system parameters appearing in inequalities (1), (2) and (3) to maximize and maintain approximate equality between the estimated surveillance ranges for Mode S and Mode A/C targets. In evaluating these inequalities, 8-second averages of the Mode S parameters are used, and current or anticipated values of the Mode A/C parameters are used. The procedure is illustrated in the flow chart of Figure A-4.

3.2.3.8.2 *Step 1.* The first step in the control process is to reduce the number of whisper-shout steps tentatively scheduled for use during the present scan if either:

a) inequality (3) is violated; or

b) inequality (1) or (2) is violated and the Mode S surveillance range of the last scan does not exceed the Mode A/C surveillance range that would result from use of the scheduled whisper-shout sequence.

Whisper-shout steps are eliminated in the order dictated by the design of the Mode A/C processor and the number of steps eliminated is just large enough to ensure that neither of the above conditions is satisfied. The value of the number of whisper-shout steps tentatively scheduled for use is initialized at the number used on the last scan.

The relative magnitudes of the Mode S and Mode A/C surveillance ranges are determined from the estimated effective radiated power (ERP) seen by targets with Mode S and Mode A/C transponders located directly ahead of the ACAS aircraft. The ERP in a given direction is determined by the product of the power input to the antenna, and the antenna pattern gain in that direction. If the transponder sensitivities were identical, the Mode S range would be more or less than the Mode A/C range according to whether the Mode S transmitted power was more or less than the Mode A/C transmitted power. Since Mode A/C transponders may have somewhat lower sensitivities than Mode S transponders, the Mode A/C range is assumed to be greater than the Mode S range if, and only if, the Mode A/C power exceeds the Mode S power by 3 dB.

3.2.3.8.3 *Step 2.* The second step in the controlling process is to reduce the Mode S interrogation power for acquisition by 1 dB, and to increase the MTL for Mode S squitter listening by 1 dB from the values last used, if inequality (1) or (2) is violated and the Mode S surveillance range of the last scan exceeds the Mode A/C surveillance range that would result from use of the scheduled whisper-shout sequence.

Once such a change has been made, the only change allowed during the ensuing 8 seconds is a reduction in the number of whisper-shout steps if needed to satisfy inequality (3). This 8-second freeze allows the effect of the Mode S changes to become apparent since the 8-second averages used in inequalities (1) and (2) then will be determined by the behaviour of the system since the change.

3.2.3.8.4 *Step 3.* The third step is to add a whisper-shout step to those tentatively scheduled, when it is not prevented by an 8-second freeze, and the following conditions are satisfied:

a) inequalities (1), (2) and (3) are satisfied and will continue to be satisfied after the step is added; and

b) the Mode S surveillance range of the last scan exceeds the Mode A/C surveillance range that would result from use of the scheduled sequence; and

As many steps are added as possible without violating a) or b) above.

3.2.3.8.5 *Step 4.* Finally, if condition a) of 3.2.3.8.4 above is satisfied, but condition b) is not, an estimate is made of the effects of increasing the Mode S interrogation power for acquisition by 1 dB and reducing the MTL for Mode S squitters/fruit by 1 dB. If the estimate indicates that inequalities (1) and (2) will not continue to be satisfied, the 1 dB change is not made. If the estimate indicates that they will continue to be satisfied, the 1 dB change is made and no further changes in either the Mode A/C or Mode S parameters are made for the ensuing 8 seconds, except as described in 3.2.3.8.3 above.

3.2.4 INTERROGATION JITTER

Mode A/C interrogations from ACAS equipment are intentionally jittered to avoid chance synchronous interference with other ground-based and airborne interrogators. It is not necessary to jitter the Mode S surveillance interrogations because of the inherently random nature of the Mode S interrogation scheduling process for ACAS.

3.3 Antennas

3.3.1 USE OF DIRECTIONAL INTERROGATIONS

3.3.1.1 A directional antenna is recommended for reliable surveillance of Mode A/C targets in aircraft densities up to 0.087 aircraft per square km (0.3 aircraft per square NM). The recommended antenna system consists of a four-beam antenna mounted on top of the aircraft and an omnidirectional antenna on the bottom. A directional antenna may also be used instead of the omnidirectional antenna on the bottom of the aircraft. The directional antenna sequentially generates beams that point in the forward, aft, left, and right directions. Together these provide surveillance coverage for targets at all azimuth angles without the need for intermediate pointing angles.

3.3.1.2 The directional antenna typically has a 3-dB beam width (BW) in azimuth of 90 ±10 degrees for all elevation angles between +20 and –15 degrees. The interrogation beamwidth is to be limited by transmission of a P_2 side-lobe suppression pulse following each P_1 interrogation pulse by 2 microseconds. The P_2 pulse is transmitted on a separate control pattern (which may be omnidirectional).

3.3.1.3 There is need for timely detection of aircraft approaching with low closing speeds from above and below. Detection of such aircraft suggests a need for sufficient antenna gain within a ±10 degree elevation angle relative to the ACAS aircraft pitch plane. An ACAS directional antenna typically has a nominal 3 dB vertical beamwidth of 30 degrees.

3.3.1.4 The shape of the directional antenna patterns and the relative amplitude of the P_2 transmissions is controlled such that a) a maximum suppression transponder located at any azimuth angle between 0 and 360 degrees and at any elevation angle between +20 and –15 degrees would reply to interrogations from at least one of the four directional beams and b) a minimum suppression transponder would reply to interrogations from no more than two adjacent directional beams. A maximum suppression transponder is defined as one that replies only when the received ratio of P_1 to P_2 exceeds 3 dB. A minimum suppression transponder is defined as one that replies when the received ratio of P_1 to P_2 exceeds 0 dB.

3.3.1.5 The effective radiated power (ERP) from each antenna beam (forward, left, right, aft, omni) is expected to be within ±2 dB of its respective nominal value as given in Figure A-2a.

3.3.1.6 A forward directional transmission, for which TRP = 49 dBm and BW = 90^{o} has a power gain product at beam centre of approximately,

$$PG = \frac{TRP}{BW/360^{\circ}} = 55 \text{ dBm}$$

This is 1 dB greater than the nominal and allows for adequate coverage at the cross-over points of the directional beams. The TRP of the side and aft beams is reduced relative to the front beam to account for the lower closing speeds that occur when aircraft approach from these directions. Mode A/C surveillance performance will generally improve as the directivity (and hence the number of beams) is increased for the top-mounted antenna. However, the use of a directional antenna on the bottom would provide only marginal improvement in detectability and would, if used at full power, degrade the overall performance of the equipment by increasing the false track rate due to ground-bounce multipath.

3.3.2 DIRECTION FINDING

The angle-of-arrival of the transmissions from the replying transponders can be determined with better than 10-degree RMS accuracy by means of several simple and practical direction-finding techniques. These techniques typically employ a set of four or five monopole radiating elements mounted on the aircraft surface in a square array with quarter-wave spacing. The signals from these elements may be combined so as to generate from two to four distinct beams which may be compared in phase or amplitude to provide an estimate of the direction of arrival of the received signal. This level of direction-finding accuracy is adequate to provide the pilot with TAs to effectively aid the visual acquisition of intruding aircraft.

3.3.3 DIRECTIONAL TRANSMISSION FOR CONTROL OF SYNCHRONOUS GARBLE

3.3.3.1 The use of directional interrogation is one technique for reducing synchronous garble. The directional interrogation can reduce the size of the interrogation region. Coverage must be provided in all directions. Hence, multiple beams are used to elicit replies from all aircraft in the vicinity of the ACAS-equipped aircraft. Care must be taken to overlap the beams so that gaps in coverage do not exist between beams.

3.3.3.2 The antenna may be a relatively simple array capable of switching among typically four or eight discrete beam positions. For four beam positions, the antenna beamwidth is expected to be on the order of 100°. The effective antenna beamwidth for interrogating Mode A/C transponders can be made more narrow than the 3-dB beamwidth by means of transmitter side-lobe suppression.

3.3.4 ANTENNA LOCATION

The top-mounted directional antenna is to be located on the aircraft centre line and as far forward as possible. The ACAS antennas and the Mode S transponder antennas are to be mounted as far apart as possible on the airframe to minimize coupling of leakage energy from unit to unit. The spacing must never be less than 0.5 m (1.5 ft), as this spacing results in a coupling loss of at least 20 dB.

3.4 Receiver and processor

3.4.1 SENSITIVITY

A sensitivity equivalent to that of a Mode S transponder (minimum triggering level of –74 dBm) will provide adequate link margin to provide reliable detection of near co-altitude aircraft in level flight at a range of 26 km (14 NM) provided those aircraft are themselves equipped with transponders of nominal transmit power.

3.4.2 CONTROL OF RECEIVER THRESHOLD

3.4.2.1 ACAS receivers use a variable (dynamic) threshold to control the effects of multipath. When the first pulse of a reply is received, the variable receiver threshold technique raises the receiver threshold from the minimum triggering level (MTL) to a level at a fixed amount (e.g. 9 dB) below the peak level of the received pulse. The receiver threshold is maintained at this level for the duration of a Mode A/C reply, at which time it returns to the MTL. When multipath returns are weak compared to the direct-path reply, the first pulse of the direct-path reply raises the receiver threshold sufficiently so that the multipath returns are not detected.

3.4.2.2 Variable receiver thresholds have historically been avoided in Mode A/C reply processors because such thresholding tends to discriminate against weak replies. However, when used in conjunction with whisper-shout interrogations, this disadvantage is largely overcome. On any given step of the interrogation sequence it is possible for a strong reply to raise the threshold and cause the rejection of a weaker overlapping reply. However, with whisper-shout interrogations, the overlapping replies received in response to each interrogation are of approximately equal amplitudes since the whisper-shout process sorts the targets into groups by signal strength.

3.4.2.3 The ACAS receiver MTL used in the reply listening period following each whisper-shout interrogation relates to the interrogation power in a prescribed manner. In particular, less sensitive MTLs are used with the lower interrogation powers in order to control the Mode A/C fruit rate in the ACAS receiver while still maintaining a balance between the interrogation link and the reply link so that all elicited replies are detected.

3.4.3 PULSE PROCESSING

3.4.3.1 A relatively wide dynamic range receiver faithfully reproduces the received pulses. Provisions may be included for locating the edges of received pulses with accuracy, and logic may be provided for eliminating false framing pulses that are synthesized by code pulses from real replies. The processor is capable of resolving pulses in situations where overlapped pulse edges are clearly distinguishable. It is also capable of reconstructing the positions of hidden pulses when overlapping pulses of nearly the same amplitude cause the following pulses to be obscured. The reply processor has the capacity for handling and correctly decoding at least three overlapping replies. Means are also provided for rejecting out-of-band signals and for rejecting pulses with rise times exceeding 0.5 microsecond (typically, DME pulses).

3.4.3.2 If a Mode S reply is received during a Mode C listening period, a string of false Mode C fruit replies may be generated. The ACAS equipment is expected to reject these false replies.

3.4.4 ERROR DETECTION AND CORRECTION

3.4.4.1 ACAS avionics intended for use in airspace characterized by closing speeds greater than 260 m/s (500 kt) and densities greater than 0.009 aircraft per km^2 (0.03 aircraft per NM^2) or closing speeds less than 260 m/s (500 kt) and densities greater than 0.04 aircraft per km^2 (0.14 aircraft per NM^2) requires a capability for Mode S reply error correction. In these high densities, error correction is necessary to overcome the effects of Mode A/C fruit. Mode S error correction permits successful reception of a Mode S reply in the presence of one overlapping Mode A/C reply.

3.4.4.2 Error correction decoding is to be used for the following replies: DF = 11 all-call replies, DF = 0 short air-air surveillance replies, and DF = 16 long air-air surveillance replies (both acquisition and non-acquisition). In addition, passive monitoring of DF = 4 short surveillance altitude replies requires error correction decoding.

3.4.4.3 If two or more acquisition replies requiring error correction are received within the Mode S range acquisition window, it may be impractical to apply error correction to more than the first received reply. Acquisition replies other than the first do not need to be corrected when this occurs.

3.4.5 RECEIVER SIDE-LOBE SUPPRESSION

ACAS equipment that interrogates directionally may use receiver side-lobe suppression techniques to eliminate replies (fruit) generated by nearby aircraft that are outside the interrogated sector. This reduces the number of replies processed during the surveillance update period.

3.4.6 DUAL MINIMUM TRIGGERING LEVELS

If the MTL of the receiver used by ACAS is lowered to obtain longer range operation with extended squitter, provision must be made to label squitter receptions that were received at the MTL that would have been used by an unmodified ACAS receiver. Squitter receptions that are received at the conventional MTL or higher are fed to the ACAS surveillance function. Squitter receptions that are received below the conventional MTL are not used for ACAS surveillance but are routed directly to the extended squitter application. This filtering by MTL is necessary to prevent ACAS from attempting to interrogate aircraft that are beyond the range of its active surveillance capability. This would increase the ACAS interrogation rate without providing any improved surveillance performance. Use of the conventional MTL for the ACAS surveillance function preserves the current operation of ACAS surveillance when operating with a receiver with an improved MTL.

3.5 Collision avoidance algorithms

Note.— The guidance material on the collision avoidance logic of ACAS II is organized in two sections. This section addresses the Standards in the ACAS SARPs and elaborates on important concepts using the design features of a specific implementation of the ACAS logic as examples. Section 4 provides further details on the algorithms and parameters used by this particular ACAS implementation. As a consequence of this arrangement, paragraphs in this section often refer to paragraphs in the next one.

3.5.1 GENERAL

3.5.1.1 The ACAS algorithms operate in a cycle repeated nominally once per second. At the beginning of the cycle, surveillance reports are used to update the tracks of all intruders and to initiate new tracks as required. Each intruder is then represented by a current estimate of its range, range rate, altitude, altitude rate, and perhaps, its bearing. Own aircraft altitude and altitude rate estimates are also updated.

3.5.1.2 After the tracks have been updated, the threat detection algorithms are used to determine which intruders are potential collision threats. Two threat levels are defined: potential threat and threat. Potential threats warrant TAs while threats warrant RAs.

3.5.1.3 The resolution algorithms generate an RA intended to provide vertical separation from all threats identified by the threat-detection algorithms. Coordination with each equipped threat occurs as part of the process of selecting the RA. Pairwise coordination with each equipped threat is necessary to establish which aircraft is to pass above the other and thus guarantee avoidance manoeuvres that are compatible.

3.5.2 THREAT DETECTION

3.5.2.1 Collision threat detection is based on simultaneous proximity in range and altitude. ACAS uses range rate and altitude rate data to extrapolate the positions of the intruder and own aircraft. If within a short time interval (e.g. 25 seconds hence) the range of the intruder is expected to be “small” and the altitude separation is expected to be “small”, the intruder is declared a threat. Alternatively, the threat declaration may be based on current range and altitude separations which are “small”.

The algorithm parameters which establish how far into the future positions are extrapolated, and which establish thresholds for determining when separations are "small", are selected in accordance with the sensitivity level at which the threat detection algorithms are operating.

3.5.2.2 Each sensitivity level defines a specific set of values for the detection parameters used by the algorithms. These include threshold values for the predicted time to closest approach, the minimum slant range, and the vertical separation. Through the process of sensitivity level control, these parameters are assigned different values to account for the smaller aircraft separations that occur in dense terminal airspace. Sensitivity level may be selected automatically using the altitude of own aircraft, or may be selected by command from a Mode S ground station, or by a manual pilot switch (see 3.5.12).

3.5.2.3 The values used for threat detection parameters cannot be optimum for all situations because ACAS is handicapped by its lack of knowledge of intruder intent. The result is that a balance has to be struck between the need to give adequate warning of an impending collision and the possible generation of unnecessary alerts. The latter may result from encounters that are resolved at the last moment by intruder manoeuvres. A feature of ACAS that helps in this respect is the variability of the protected volume of airspace. This volume is automatically coupled in size to the relative speed between the two aircraft, and is automatically aligned in a direction parallel to the relative velocity vector. Bearing plays no part in this process. Each encounter gives rise to a protected volume tailored to that encounter. In a multi-aircraft situation there is an individual protected volume for the ACAS aircraft paired with each threat.

3.5.3 PROTECTED VOLUME

An intruder becomes a threat when it penetrates a protected volume enclosing own aircraft. The protected volume is defined by means of a range test (using range data only) and an altitude test (using altitude and range data). Application of these tests delivers a positive or a negative result (implying that the threat is inside or outside the appropriate part of the protected volume). An intruder is declared a threat when both tests give a positive result.

3.5.3.1 *PROTECTED VOLUME TERMS' DESCRIPTION*

Collision plane. The plane containing the range vector and the instantaneous relative velocity vector originating at the intruder.

Critical cross-sectional area. The maximum cross-sectional area of the protected volume in a plane orthogonal to the major axis.

Instantaneous relative velocity(ies). The modulus of the current value of relative velocity.

Linear miss distance (m_a). The minimum value that range will take on the assumption that both the intruder and own aircraft proceed from their current positions with unaccelerated motions.

Linear time to closest approach (t_a). The time it would take to reach closest approach if both the intruder and own aircraft proceed from their current positions with unaccelerated motions.

Given that the only information available to ACAS to make range predictions are range and range rate estimates, both the linear miss distance and the linear time to closest approach are unobservable quantities.

The unobservable quantities, linear miss distance and linear time to closest approach, are related to the observable quantities range r and range rate $\dot{r}$ by the following equality:

$$t_a = \frac{(r^2 - {m_a}^2)}{(-r\dot{r})}$$

Major axis. In the context of the protected volume, the line through the ACAS II aircraft which is parallel to the instantaneous relative velocity vector.

Range convergence. The aircraft is deemed to be converging in range if the range rate is less than or equal to zero.

3.5.4 RANGE TEST

3.5.4.1 The protected volume resulting from the range test used in the ACAS implementation described in Section 4 can be defined in terms of the maximum dimensions of a realizable implementation of the test which is illustrated by Figure A-5. This shows a section through the protected volume generated by a range test in the plane containing both aircraft and the instantaneous relative velocity vector. The protected volume is that which would be produced by rotating the solid curve about the x axis. Note that the length of the major axis is a function of the relative speed, s. For the realizable range test, the radius of the maximum cross section through the protected volume in a plane normal to the instantaneous relative velocity vector is m_c. This represents the maximum miss distance for which an alert can be generated if the relative velocity at the time of entry to the protected volume is maintained to closest approach. The length of the major axis is the principal feature determining warning time while m_c controls the projected miss distance which is likely to generate an alert. Ideally, the warning time would be T seconds and m_c would be such that only intruders projected to have miss distances less than D_m (the radius of the broken-line circle in Figure A-5) would qualify for an alert. The significance of D_m, when specified as in the ACAS implementation described in Section 4, is that, to a good approximation, it represents the lateral displacement experienced by an aircraft over the time T when turning with a constant acceleration of $g/3$ (bank angle = 18°). Thus an encounter with a projected miss distance of D_m when the time to closest approach is T can result in a collision if either aircraft is manoeuvring with an acceleration of $g/3$. In the absence of adequate bearing rate or range acceleration data, ACAS cannot achieve the ideal. Figure A-6 shows the maximum value for m_c (i.e. $\hat{m}_c$ as a function of relative speed and sensitivity level). When the relative speed is very low, as can occur in a tail-chase, the protected volume produced by the range test becomes a sphere of radius D_m centred on the ACAS aircraft.

3.5.4.2 Essentially, the range test gives a positive result if, when approximately T seconds remain before closest approach, the relative velocity vector can be projected to pass through a circle of radius m_c centred on the ACAS aircraft and placed in the plane normal to the relative velocity vector. Since the value of m_c is very large compared to the value for adequate vertical separation, the use of the range test alone would generate a large number of unnecessary alerts. It is therefore necessary to tailor the range test protected volume to more modest proportions using altitude data. Inevitably, this reduces the immunity to manoeuvres in the vertical plane.

3.5.4.3 The constraints on the range test are designed to give a nominal warning time of T seconds allowing for a manoeuvre producing a displacement of D_m normal to the relative velocity vector. It may be demonstrated that, for an encounter having a reasonably large relative velocity, the relative acceleration produced by a turning aircraft is nearly normal to the relative velocity vector. For low relative speed there can be a substantial component of acceleration in the direction of a relative velocity. Erosion of the warning time due to this component is compensated by having a minimum length for the major axis of the protected volume which is greater than sT.

3.5.5 ALTITUDE TEST

3.5.5.1 The objective of the altitude test is to filter out intruders that give a positive result for the range test but are nevertheless adequately separated in the vertical dimension. The altitude test is used to reduce alert rate in the knowledge that the standard vertical separation distances for aircraft are normally much less than the standard horizontal separation distances. An inevitable result is that the acceleration protection, nominally provided by the range test in all planes, is largely restricted to the horizontal plane. Also, even in the absence of relative acceleration, the altitude test can delay warnings if some vertical separation at closest approach is predicted to exist. A view in elevation of the relative motion of two aircraft is shown in Figure A-7. AOB represents a plane normal to the relative velocity vector and containing the ACAS aircraft. The intruder may be horizontally displaced from the ACAS so it is not necessarily in the plane of the diagram. The essential feature of the altitude test is that it aims to give a positive result if the projected vertical miss distance is less than Z_m. In the ACAS implementation described in Section 4, Z_m varies with altitude in steps from 180 m (600 ft) to 240 m (800 ft).

3.5.5.2 Since the main interest is in intruders with projected miss distances less than D_m, an ideal altitude test (in combination with an ideal range test) would give a positive result if, *inter alia*, the relative velocity vector were projected to pass through the critical area shown by the solid outline in Figure A-7. In practice, the altitude test and the range test outlined in 3.5.1.2 tend to be satisfied if the vector passes through the larger area defined by the broken outline. Those intruders passing through the shaded areas are likely to give rise to unnecessary alerts.

3.5.5.3 The altitude test is no better placed to predict the time to closest approach than is the range test. This means that, if no other conditions are applied, the range test determines the time of the alert. However, an additional feature of the altitude test of the ACAS implementation described in Section 4 attempts to guard against the eventuality that one of the aircraft levels off above or below the other, thus avoiding a close encounter. Two types of encounter are recognized: the first in which the current altitude separation is less than Z_t (see 4.3.4.2); and a second, in which the current altitude separation is greater than Z_t and the aircraft are converging in altitude. For the first type, the altitude test requires only that the critical area is projected to be penetrated. For the second an additional condition is that the time to reach co-altitude is to be less than or equal to a time threshold that is sometimes less than T, the nominal warning time. The effect is that warning time is controlled by the range test for intruders that are projected to cross in altitude before closest approach while later warnings are given for altitude crossings beyond closest approach.

3.5.6 ESTABLISHED THREATS

3.5.6.1 An established threat is an intruder that has been declared a threat and still merits a resolution advisory.

3.5.6.2 The need to give a positive result for both the range test and the altitude test on the same cycle of operation before declaring an intruder to be a threat (3.5.2.1) applies only for new threats. Subsequently, only the range test is applied and a positive result has the effect of maintaining threat status. The reason for omitting the altitude test is that a rapid pilot response, or the fact that the intruder initially only just satisfied the altitude criteria, may result in cancellation of threat status before reaching closest approach.

3.5.7 ALERT RATE

3.5.7.1 The principal variables controlling alert rate are relative velocity, miss distance and the ambient aircraft density. The principal parameters affecting alert rate are T, D_m and Z_m. Alert rates can be calculated for constant velocity random traffic but the influences of see-and-avoid and ATC make such calculations for real traffic very difficult. Figure A-6 gives some guidance on some features of an encounter that might give rise to an alert although it gives no assistance concerning the result of the altitude test. For example, it can be seen that, for sensitivity level 5 (altitudes between FL 50 and FL 100) there can be no alert if the horizontal separation is greater than 5.5 km (3 NM) and the relative speed is less than about 440 m/s (850 kt).

3.5.7.2 Simulations using ground-based radar surveillance data and initial experience with ACAS equipments have indicated that the overall alert rate ranges from about 1 in 30 flight hours to 1 in 50 flight hours in typical busy airspaces.

3.5.8 THREAT RESOLUTION

3.5.8.1 *COORDINATION*

If the threat aircraft is equipped with ACAS II or ACAS III, own ACAS is required to coordinate with the threat aircraft's ACAS via the Mode S data link to ensure that compatible RAs are selected. The nature of the advisory selected can also be influenced by the fact that the threat is ACAS-equipped.

3.5.8.2 *CLASSIFICATION OF RESOLUTION ADVISORIES*

3.5.8.2.1 ACAS escape manoeuvres are confined to the vertical plane and can be characterized by a sense (up or down) and a strength. The objective of an RA with an upward sense is to ensure that own aircraft will safely pass above the threat. The objective of an RA with a downward sense is to ensure that own aircraft will safely pass below the threat. Examples of RA strengths with the upward sense are "limit vertical speed" (to a specified target descent speed), "do not descend", or "climb". Examples of equivalent RA strengths with the downward sense are "limit vertical speed" (to a specified target climb speed), "do not climb", or "descend". RAs are of two types: "positive", meaning a requirement to climb or descend at a particular rate; and "vertical speed limit", meaning that a prescribed range of vertical speed must be avoided. Any advisory may be "corrective" or "preventive". A corrective advisory requires a change in own aircraft's current vertical rate whereas a preventive advisory does not.

3.5.8.2.2 It is expected that the RA generated be consistent with flight path limitations in some regimes of flight, due to flight envelope restrictions and aircraft configurations that reduce climb capability. It is expected that the aircraft's manoeuvre limitation indications available to ACAS will offer a conservative assessment of the actual aircraft performance capabilities. This is particularly true of climb inhibit. In the rare and urgent case of a high altitude downward sense RA being reversed to a climb, it is expected that, very often, the aircraft performance capabilities needed to comply with the RA will be available despite the climb inhibit. When such capabilities are not available, it is expected that the pilot will always be able to comply with the reversal at least partially by promptly levelling-off.

3.5.8.3 *ALTITUDE SEPARATION GOAL*

3.5.8.3.1 To be certain of avoiding a collision, ACAS must provide a true altitude separation at closest approach which is commensurate with aircraft dimensions and worst-case orientation of the aircraft. Since only measured altitude data are available, due allowance must be made for altimetry errors in both aircraft. Furthermore, the avoiding action must be commenced before closest approach so it is possible that this action will be based on predicted altitude separation at closest approach, which introduces a further source of error. These factors lead to a requirement that the RA provided to the pilot should be such that the desired altitude separation at closest approach can be achieved in the time available. This altitude separation goal, A_l, must vary as a function of altitude in order to adequately compensate for altimetry errors. In the ACAS implementation described in Section 4, A_l varies from 90 m (300 ft) to 210 m (700 ft).

3.5.8.3.2 The time to closest approach cannot be estimated accurately because the miss distance is not known, the threat could manoeuvre and the range observations are imperfect. However, limits that have been found useful and acceptable are the times to closest approach assuming the miss distance to take the largest value of concern (D_m) and the value zero, and that all other sources of error have been neglected. This interval is critical for encounters in which the range rate takes on very small values. By maintaining the altitude separation over the entire interval, the selection of the RA is made immune to potentially large errors in estimating the time of minimum range. Such errors can result from small absolute errors in estimating range rate. For preventive RAs, the assumption of an immediate change of rate to the limit recommended by the RA will cause the calculation to deliver a bound (upper for downward RAs, lower for upward RAs) on the altitude of own aircraft at closest approach.

3.5.8.4 *MINIMUM DISRUPTION*

3.5.8.4.1 In principle, the larger altitude separations goals could be achieved by a more vigorous escape manoeuvre but constraints are passenger comfort, aircraft capability and deviation from ATC clearance. The ACAS parameters described in Section 4 below are based on an anticipation that the typical altitude rate needed to avoid a collision is 1 500 ft/min.

3.5.8.4.2 The initial choice of the sense and strength of the RA is intended, subject to the exceptions described below, to require the smallest possible change in the vertical trajectory of the ACAS aircraft. And the advisory is expected to be appropriately weakened, if possible, at later stages of the encounter, and removed altogether when the desired separation has been achieved at closest approach. A prime consideration is the minimization of any departure from an ATC clearance.

3.5.8.5 *PILOT RESPONSE*

Since the pilot exercises such a major influence on the effectiveness of the system, it is necessary for any ACAS design to make certain assumptions concerning the response of the pilot. The ACAS implementation described in Section 4 uses a response delay of 5 seconds for a new advisory and a vertical acceleration of *g*/4 to establish the escape velocity. The response time reduces to 2.5 seconds for subsequent advisory changes. ACAS may not provide adequate vertical separation if the pilot response delay exceeds the expected pilot response delay assumed by the design.

3.5.8.6 *INTRUDERS IN LEVEL FLIGHT*

3.5.8.6.1 Intruders that are flying level at the time of the alert and continue thereafter in level flight present few problems for ACAS. If own aircraft is also in level flight, the altitude prediction problem does not exist. All the ACAS aircraft has to do is to move in the direction which increases the current altitude separation to the target value. Possible obstacles to this simple logic are that the ACAS aircraft may be unable to climb, or may be too close to the ground to descend safely.

3.5.8.6.2 The manoeuvre limitation problems largely disappear when the ACAS aircraft is in climb or descent since separation can then often be obtained simply by levelling-off. And the prediction problem is likely to be a minor one if ACAS is fed with high resolution data for own altitude.

3.5.8.7 *INTRUDERS IN CLIMB/DESCENT*

Intruders in climb or descent provide more difficulty than intruders in level flight. It is often a problem to determine their altitude rates. There is also evidence that a climbing or descending threat that is projected to pass close to own aircraft is more likely to level-off than to maintain its observed altitude rate thus avoiding the close encounter. Therefore the selection of RAs by ACAS should be biased by an expectation that threats might level-off, e.g. in response to ATC. A low confidence in the threat's tracked altitude rate may cause RA generation to be delayed pending a better estimate of this rate.

3.5.8.8 *ALTITUDE CROSSING RAs*

3.5.8.8.1 Intruders that are projected to cross the altitude of an ACAS aircraft make the design of a totally effective ACAS extremely difficult because such intruders might level-off. Some of the altitude crossing RAs occasionally generated have been found counter-intuitive by pilots. Indeed, such RAs require the pilot to initially manoeuvre toward the intruder, temporarily losing vertical separation. Nevertheless, encounters for which altitude crossing RAs are clearly appropriate have been observed, and it is not yet demonstrated that it is desirable or possible to avoid them entirely. The frequency of altitude crossing RAs is likely to depend on the management and behaviour of aircraft. It is known that aircraft climbing and descending at high rates more frequently give rise to RAs, including crossing RAs, than other aircraft. The potential effect of approaching a cleared flight level at high speed and then levelling-off in close horizontal and vertical proximity to another aircraft is described below. Measures to mitigate these effects are described in 3.5.8.9.

3.5.8.8.2 For the scenario illustrated in Figure A-8, suppose that the alert occurs while the intruder is climbing towards the level ACAS aircraft. Given that the climb continues, the best escape strategy would be for own aircraft to descend towards the threat, in so doing crossing through the threat's altitude. A climb away could possibly provide enough vertical clearance but, for the same escape velocity, a descent will give greater clearance. If own aircraft does descend it can be seen that a hazardous situation arises if the threat levels off at the cardinal flight level below own aircraft. Such manoeuvres are common-place in some controlled airspaces since they are used by controllers to cross aircraft safely with the required altitude separation in situations where the horizontal separation is small. An ACAS design based on the choice of sense likely to give the greatest altitude separation could induce a close encounter where one would not otherwise occur. An ACAS design must include provisions to make it as immune as possible to such an eventuality.

3.5.8.9 *Provisions for avoiding induced close encounters.* In the absence of any knowledge concerning the intent of the threat, it appears reasonable to assume that the threat will continue with its current altitude rate but chooses the RA in an attempt to mitigate the effect of a likely threat manoeuvre. Other features must provide for the contingency that a subsequent threat manoeuvre is detected. For example, the implementation described in Section 4 uses the logic described below.

3.5.8.9.1 *Biasing the choice of sense.* If a positive non-altitude crossing advisory is predicted to give at least adequate altitude separation at closest approach (A_l), then preference is given to the sense that prevents the aircraft from crossing in altitude before closest approach if the threat does not level-off. There is evidence that, in some circumstances, altitude crossing RAs are more disruptive than non-altitude-crossing RAs.

3.5.8.9.2 *Increased rate resolution advisory.* If the sense chosen as a result of the process described in 3.5.8.9.1 results in own aircraft moving away from the threat the encounter may still not be resolved if the threat increases its altitude rate. In such a case the pilot of the ACAS aircraft can be invited to increase own altitude rate in an attempt to outrun the threat.

3.5.8.9.3 *Altitude separation test.* Sense choice biasing will not always result in an RA to move away from the threat and the altitude separation test is provided further to decrease the chance of an induced close encounter due to a threat levelling off or reducing its altitude rate. The test involves delaying the issue of the RA until the intent of the threat can be deduced with greater confidence. It is therefore not without risk of causing ACAS to be unable to resolve the encounter. The ACAS implementation described in Section 4 balances these conflicting risks with the logic described below.

3.5.8.9.3.1 For a scenario of the type shown in Figure A-8 illustrating a threat with a significant altitude rate, the alert, without this delay, would be given when the aircraft were still well separated in altitude. For example, when the warning time is 25 seconds and the altitude rate is 900 m/min (3 000 ft/min), the initial separation is 380 m (1 250 ft). If the situation is such that an altitude crossing RA would be required, i.e. biased sense choice is ineffective, ACAS delays the issue of an advisory until the current altitude separation falls below a threshold (A_c) that is smaller than the standard IFR separation. If the threat actually levels off at any altitude before crossing that threshold, as is most likely, the alert state will either be cancelled (for level-offs outside Z_m), or a non-altitude crossing advisory will be generated. Otherwise, apart from the possibility that the threat has just overshot its cleared altitude, there is every indication that it is carrying on to, or through, own aircraft's level and the altitude crossing advisory can be issued with more confidence. If the situation is such that non-altitude crossing advisory would be required, a reduced time threshold (T_v) is used for the altitude test. This vertical threshold test (VTT) is designed to hold off the RA just long enough so that a level-off manoeuvre initiated by the intruder might be detected.

3.5.8.9.3.2 The altitude separation test was intended principally to alleviate problems experienced in an IFR traffic-only environment. It may appear to be desirable to select the value for A_c such that altitude overshoots or even non-IFR separations are covered. However, the risk of ACAS to be unable to resolve the encounters is to be taken into careful consideration.

3.5.8.9.3.3 The test takes advantage of the cooperation between two equipped aircraft by causing the ACAS in the level aircraft to delay the choice of an RA until it has received a resolution message from the equipped intruder. The ACAS in the latter must almost certainly choose a reduction in its own altitude rate and the coordination process would then result in the level aircraft being able to maintain its level status. In practice the delay in starting to resolve the encounter will be small, but the risk of failure to resolve is less sensitive to delay because both aircraft are taking avoiding action. The delay is limited to 3.0 s, which is normally sufficient for the threat to have initiated coordination.

3.5.8.9.4 *Sense reversal.* In spite of the precautions taken to avoid induced close encounters described above, there are still situations which are not covered. For example, in airspace containing VFR traffic, threat levelling-off can occur with a nominal separation of 150 m (500 ft). The altitude separation test could be less effective in such circumstances. When ACAS determines that a threat manoeuvre has defeated its initial choice of RA, the advisory sense can be reversed. The requirement to achieve the target altitude separation at closest approach may be relaxed when this course of action is taken.

3.5.8.10 *OTHER CAUSES OF INDUCED CLOSE ENCOUNTERS*

3.5.8.10.1 *Altimetry errors.* The altitude separation parameter representing the separation goal (A_l) must include an allowance for altimetry error that is sufficient to give a high probability of not causing an ACAS-equipped aircraft to provoke a close encounter where none really existed. For gross altimetry errors, however, there remains a low probability that a close encounter will be induced when the original separation is adequate. Similarly, there is a low probability that ACAS will be unable to resolve a close encounter due to altimetry error.

3.5.8.10.1.1 The use of Gilham encoded data for either aircraft is a particular cause of altitude report errors, and induced close encounters have resulted. In the case of own aircraft, such errors can be prevented by using an altitude source that has not been Gilham encoded.

3.5.8.10.2 *Mode C errors*

3.5.8.10.2.1 Errors in encoding the threat's altitude to provide Mode C data can, when sufficiently large, induce close encounters in much the same way as gross altimetry error. The incidence of such encounters will be very low in airspaces where ATC takes steps to advise the pilot that an aircraft's reported altitude is incorrect.

3.5.8.10.2.2 A more severe form of Mode C error occurs when the error is confined to the C-bits. These are unchecked by ATC, which is normally content to find that an aircraft is within the specified tolerance value of its reported altitude. A stuck or missing C-bit can produce an error of only 30 m (100 ft). However, such a fault can have a more serious effect on the intruder's altitude rate as perceived by ACAS and in this way can cause an induced close encounter or result in failure to resolve a close encounter.

3.5.8.10.3 *Contrary pilot response.* Manoeuvres opposite to the sense of an RA may result in a reduction in vertical separation with the threat aircraft and therefore must be avoided. This is particularly true in the case of an ACAS-ACAS coordinated encounter.

3.5.8.11 *MULTI-AIRCRAFT ENCOUNTERS*

3.5.8.11.1 ACAS takes account of the possibility of three or more aircraft being in close proximity and it is required to produce an overall RA that is consistent with each of the advisories that it would give against each threat treated on an individual basis. In such circumstances it cannot always be expected that the ACAS aircraft will achieve an altitude separation of A_l with respect to all threats.

3.5.8.11.2 Simulations based on recorded ground-based radar surveillance data and initial experience with ACAS equipment have indicated that multi-aircraft conflicts are rare. Also, there is no evidence of a "domino" effect whereby the ACAS aircraft's manoeuvre to avoid a threat brings it into an encounter with a third aircraft which is equipped and so on. Such an event might be expected to take place in a holding pattern, but the available evidence does not confirm this.

3.5.9 VERTICAL RATE ESTIMATION

3.5.9.1 The vertical tracking algorithm must be capable of using altitude information quantized in either 25 or 100 ft increments to produce estimates of aircraft vertical rates. This tracker must avoid overestimating vertical rate when a jump in reported altitude occurs because an aircraft with a small vertical rate moves from one quantized altitude level to another. But response limitation cannot be achieved by merely increasing tracker smoothing, since the tracker would then be slow to respond to actual rate changes. For altitude reports quantized to 100 ft, the altitude tracker (in Section 4) uses special track update procedures that suppress the response to an isolated altitude transition (altitude report that differs from the preceding altitude report) without sacrificing response to acceleration. The tracker also includes several features that contribute to reliability.

3.5.9.2 Some key features of the vertical tracking algorithm are as follows:

a) Before any altitude report is accepted for use by the update routines, tests are made to determine if the report appears reasonable, given the sequence of reports previously received. If the report appears unreasonable, it is discarded, although it may subsequently be used in checking the credibility of later reports.

b) The algorithm recursively averages the time between altitude transitions rather than altitude reports.

c) The tracker strictly limits the response to isolated altitude transitions (i.e. transitions that are not part of any trend in altitude). An isolated altitude transition results in initialization of the rate estimate to a specified modest rate in the direction of the transition. The rate estimate will be decayed toward zero on each successive scan without a transition.

d) When a transition is observed that is consistent in direction with the preceding transition, a trend is declared. The altitude rate is initialized to a value consistent with the time between the two transitions.

e) Rate oscillations due to quantization effects are suppressed when a trend or level track has been declared. During a trend period, altitude reports that indicate no altitude transition are tested to determine if the lack of a transition is consistent with the previously estimated rate. If not consistent, the rate is reset to a lower value. If consistent, the rate remains unchanged.

f) When a trend has been declared and a transition is observed, then a test is made to see if the transition is consistent in both direction and timing with the previously estimated rate. If not consistent, the rate is reset. If consistent, the rate is updated by smoothing. The transition may be due to jitter and in reality the trend may be continuing.

g) During each scan the tracker provides a track confidence index that indicates the degree of confidence that can be placed in the altitude rate estimate. “High” confidence is declared when recent altitude reports are consistent with both altitude and altitude rate estimates of the tracker. “Low” confidence is declared when altitude reports are not consistent, implying a possible vertical acceleration or when altitude reports are missing for two or more successive cycles. “Low” confidence might justify a delay in the generation of an RA.

h) The tracker provides upper and lower bounds within which the true altitude rate is expected to lie. The altitude rate bounds are used to determine if RA generation is to be delayed and in assessing the need for a sense reversal when the altitude rate confidence is “low”.

3.5.10 AIR-AIR COORDINATION

3.5.10.1 *Coordination interrogations.* When ACAS declares a similarly equipped intruder to be a threat, interrogations are transmitted to the latter for RA coordination via the Mode S data link. These interrogations, which contain resolution messages, are made once per processing cycle as long as the intruder remains a threat. The equipped threat always acknowledges receipt of a resolution message by transmitting a coordination reply.

3.5.10.2 *COORDINATION INTERROGATION PROCESSING*

3.5.10.2.1 ACAS processes a resolution message received from another ACAS-equipped intruder by storing the RAC for that intruder and by updating the RAC record.

3.5.10.2.2 RAC is a general term that is used to mean a vertical RAC (VRC) and/or a horizontal RAC (HRC) as appropriate. Specifically, the information provided in the Mode S interrogation is the VRC for ACAS II and the VRC and/or HRC for ACAS III.

3.5.10.2.3 The RAC record is a composite of all currently active RACs (VRCs and/or HRCs) that have been received by ACAS. The four bits in the RAC record correspond to the two VRC values (“do not pass below” and “do not pass above”) followed by the two HRC values ("do not turn left" and "do not turn right"). If a bit in the RAC record is set, it means that the corresponding RAC has been received from one or more ACAS. Each time an RAC is received from another ACAS, the corresponding bit(s) in the RAC record is (are) set. Each time an RAC cancellation is received from another ACAS, the corresponding bit(s) is (are) cleared so long as no other ACAS is also currently causing the bit(s) to be set.

3.5.10.3 *COORDINATION SEQUENCE*

The sequence of coordination messages and associated processing is illustrated in Figure A-9. Failure to complete the coordination may result in the choice by the threat of an incompatible RA sense.

3.5.10.4 *COORDINATION PROTOCOL*

3.5.10.4.1 After declaring an equipped intruder to be a threat, ACAS first checks to see if it has received a resolution message from that threat. If so, ACAS selects an RA that is compatible with the threat's vertical sense. If not, ACAS selects an RA based on the geometry of the encounter (3.5.2). In either case, ACAS begins to transmit vertical sense information to the threat once per scan in the form of an RA complement in a resolution message. The RA complement is "don't pass above" when ACAS has elected to pass above the threat and "don't pass below" when ACAS has elected to pass below the threat.

3.5.10.4.2 Upon detecting ACAS as a threat, the threat goes through a comparable process. If for any reason the two aircraft select the same (incompatible) separation sense, the aircraft with the higher 24-bit aircraft address reverses its sense. This could happen if the two aircraft detect each other as threats simultaneously or if there were a temporary link failure preventing successful communication.

3.5.10.5 *COORDINATION DATA PROTECTION*

ACAS stores the current RA and the active RAC(s) received from other ACAS-equipped aircraft that perceive own aircraft to be a threat. In order to ensure that the stored information is not modified in response to one or more ACAS while it is being used for RA selection by own ACAS, the data must be protected so that it is available to, or capable of being modified in response to, only one ACAS at a time. For example, this may be accomplished by entering the coordination lock state whenever the data store is accessed by own ACAS or offered new data from a threat ACAS. If a resolution message is received while the coordination lock state is active, the data is held until the current coordination lock state is ended. The potential for simultaneous data access by different processes within ACAS exists because incoming threat resolution messages are received asynchronously to the ACAS processing, effectively interrupting this processing.

3.5.11 GROUND COMMUNICATION

3.5.11.1 *Report of ACAS resolution advisories to the ground.* Whenever an RA exists, ACAS indicates to the aircraft's Mode S transponder that it has an RA report available for a Mode S ground station. This causes the transponder to set a flag indicating that a message is waiting to be transmitted to the ground. Upon receipt of this flag a Mode S sensor may request transmission of the RA report. When this request is received, own Mode S transponder provides the message in a Comm-B reply format. In addition, ACAS generates periodic broadcasts at 8-second intervals for the time during which an RA is indicated to the pilot. The broadcast reports the last values taken by the parameters of the RA during the previous 8-second period even if the advisory has been terminated. This allows ACAS RA activity to be monitored in areas where Mode S ground station surveillance coverage does not exist by using special RA broadcast signal receivers on the ground. RA broadcasts are normally destined for ground equipment but are defined as uplink transmissions.

3.5.11.2 *Ground station control of threat detection parameters.* Threat detection parameters can be controlled by one or more Mode S ground stations by transmitting interrogations containing sensitivity level control (SLC) command messages addressed to the ACAS aircraft. Upon receipt of an SLC command message from a given Mode S ground station, ACAS stores the SLC command value indexed by ground station number. ACAS uses the lowest of the values received if more than one ground station has sent such a message. ACAS times out each site's SLC command separately and cancels it if it is not refreshed by another message from that site within 4 minutes. ACAS can also immediately cancel an SLC command from a ground station if a specified cancellation code is received from that station. SLC commands cannot be used within linked Comm-A interrogations.

3.5.12 SENSITIVITY LEVEL CONTROL

Control of the ACAS threat detection parameters can be effected by means of SLC commands provided as follows:

a) an internally generated value based on altitude band;

b) from a Mode S ground station (see 3.5.11.2); and

c) from a pilot-operated switch.

The sensitivity level used by ACAS is set by the smallest non-zero SLC command provided by these three sources. When a Mode S ground station or the pilot has no particular interest in the sensitivity level setting, the value zero is delivered to ACAS from that source and it is not considered in the selection process. The sensitivity level will normally be set by the internally generated value based on altitude band. Hysteresis is used around the altitude thresholds to prevent fluctuations in the SLC command value when the ACAS aircraft remains in the region of an altitude threshold.

3.6 Compatibility with on-board Mode S transponders

3.6.1 Compatible operation of ACAS and the Mode S transponder is achieved by coordinating their activities via the avionics suppression bus. The Mode S transponder is suppressed during and shortly after an ACAS transmission. Typical suppression periods are a) 70 microseconds from the top antenna and b) 90 microseconds from the bottom antenna. These suppression periods prevent multipath caused by the ACAS interrogation from eliciting an SSR reply from the Mode S transponder.

3.6.2 Unwanted power restriction on a Mode S transponder associated with ACAS is more stringent than in Chapter 3, 3.1.2.10.2.1 in order to ensure that the Mode S transponder does not prevent ACAS from meeting its requirements. Assuming a transponder undesired radiation power level of –70 dBm (Chapter 4, 4.3.11.1) and a transponder to ACAS antenna isolation of –20 dBm, the resultant interference level at the ACAS RF port will then be below –90 dBm.

3.6.3 An additional compatibility requirement is to keep the leakage power of the ACAS transmitter at a low level (see 3.2.1).

3.7 Indications to the flight crew

3.7.1 DISPLAYS

3.7.1.1 ACAS implementations will typically display resolution advisory information on one or two displays. The TA display presents the crew with a plan view of nearby traffic. The RA display presents the crew with manoeuvres to be executed or avoided in the vertical plane. The TA display and the RA display may utilize separate indicators or instruments to convey information to the pilot, or the two functions may be combined on a single display. The displayed RA information can either be integrated with existing displays available on the flight deck or presented on a dedicated display.

3.7.1.2 *TRAFFIC ADVISORIES*

3.7.1.2.1 The TA display presents the flight crew with a plan view of nearby traffic. The information thus conveyed is intended to assist the flight crew in sighting nearby traffic. Simulation has demonstrated that tabular alphanumeric displays of traffic are difficult for the flight crew to read and assimilate, and the use of this type of display as the primary means of displaying traffic information is not recommended. The TA display provides the capability to display the following information for intruders:

a) position (range and bearing);

b) altitude (relative or absolute if the intruder is reporting altitude); and

c) altitude rate indication for an altitude reporting intruder (climbing or descending).

3.7.1.2.2 The TA display may use shapes and colours to indicate the threat level of each displayed intruder, i.e. RAs, TAs, and proximate traffic. The essential differences between the tests for TA generation and the tests for threat detection are the uses of larger values for warning time.

3.7.1.2.3 The continuous display of proximate traffic is not a required component of ACAS. However, pilots need guidance concerning proximate traffic as well as potential threats to ensure that they identify the correct aircraft as the potential threat. The word "display" is not intended to imply that a visual display is the only acceptable means of indicating the position of intruders.

3.7.1.2.4 Ideally, an RA would always be preceded by a TA, but this is not always possible; e.g. the RA criteria might be already satisfied when a track is first established, or a sudden and sharp manoeuvre by the intruder could cause the TA lead time to be less than a cycle.

3.7.1.3 *RESOLUTION ADVISORIES*

The RA display presents the flight crew with an indication of vertical speed to be attained or avoided. The RA display may be incorporated into the instantaneous vertical speed indicator (IVSI) or into the primary flight display (PFD). The RA display may provide a means to differentiate between preventive and corrective RAs.

3.7.2 AURAL AND VOICE ALERTS

Aural alerts are used to alert the flight crew that a TA or RA has been issued. When the vocabulary used to announce RAs is selected, care must be taken to select phrases that minimize the probability of a misunderstood command. An aural annunciation is also provided to the flight crew to indicate that the ACAS aircraft is clear of conflict with all threatening aircraft.

3.8 Crew control functions

As a minimum, it is expected that a means be provided manually through flight crew action for either selecting an "AUTOMATIC" mode in which sensitivity levels are based on other inputs, selecting a mode in which only TAs are able to be issued, or selecting specific sensitivity levels including at least sensitivity level 1. When sensitivity level 1 is selected, the ACAS equipment is essentially in a "stand-by" condition. The term STAND-BY may be used to designate this selection. The current ACAS sensitivity level may be different from that selected by the flight crew. Provisions are to be made for indicating to the flight crew when ACAS is in STAND-BY or when only TAs will be issued. The control for ACAS may be integrated with the controls for the Mode S transponder, or the two systems may have separate controls. If the ACAS and Mode S controls are integrated, a means must be provided to allow the flight crew to select a transponder-only mode of operation.

3.9 Performance monitoring

ACAS equipment is expected to include an automatic performance monitoring function for determining on a continuing basis the technical status of all critical ACAS functions without interfering with or otherwise interrupting the normal operation of the equipment. Provisions are to be made for indicating to the flight crew the existence of abnormal conditions as determined by this monitoring function.

4. TYPICAL ALGORITHMS AND PARAMETERS FOR THREAT DETECTION AND GENERATION OF ADVISORIES

Note 1.— The characteristics given below describe a reference design for the ACAS II collision avoidance logic. This description, however, does not preclude the use of alternative designs of equal or better performance.

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Note 2.— Lower case mathematical symbols are used to represent variables throughout this section. Upper case symbols are used for parameters. The dot notation used for some parameters does not indicate that they are derived quantities but rather that they have the dimensions suggested by the notation, e.g. distance/time for a speed parameter.

4.1 Tracking performance characteristics

4.1.1 RANGE TRACKING

Range, range rate, and range acceleration ($r, \dot{r}, \ddot{r}$) are estimated by means of an adaptive α-ß-γ tracker using for its coefficients α, ß, and γ values that are decreasing with each successive range measurement until they reach their minimum values equal to 0.40, 0.10 and 0.01, respectively. The range acceleration estimate is used to estimate the expected miss distance in range at closest approach, *m*, using the following formula:

$$m^2 = r^2 - \frac{r^2}{1 + r\ddot{r}/\dot{r}^2}$$

This estimate is not calculated when further calculations indicate that it may not be reliable either because of the magnitude of the estimation errors or because of a possible manoeuvre by one of the aircraft in the horizontal plane. The latter calculations rely on the age of the track, the observed accuracy of the successive range predictions, the observed consistency of the range acceleration estimates, the observed consistency of a second range track based on a linearized trajectory agreeing with the previously estimated miss distance, and the observed consistency of a rough bearing track.

4.1.2 ALTITUDE TRACKING

4.1.2.1 *Sources of altitude data.* Intruder aircraft's altitude is obtained from intruder Mode C or Mode S reports. Own aircraft's altitude is obtained from the source that provides the basis for own Mode C or Mode S reports and is required to be at the finest quantization available.

4.1.2.1.1 *Altitude report credibility.* Before any altitude report is accepted, a test is made to determine whether the report is credible. A credibility window is calculated on the basis of the previous estimated altitude and altitude rate. The altitude report is discarded and the altitude track updated as though the report was missing (4.1.2.3.7) if the report is outside the credibility window.

4.1.2.2 *Own altitude rate.* Own ACAS aircraft's altitude rate is obtained from a source having errors that are as small as possible and in any event no greater than those of the rate output of the tracker described in 4.1.2.3.6.

4.1.2.3 *INTRUDER ALTITUDE TRACKING*

4.1.2.3.1 *Altitude tracking terms' description*

Established rate track. An altitude track for which the pattern of the last few altitude reports received from the intruder allows the inference that that intruder is climbing or descending with a constant, non-zero altitude rate.

Level track. An altitude track for which the pattern of the last few altitude reports received from the intruder allows the inference that that intruder is level.

New track. An altitude track newly initialized.

Oscillating track. An altitude track for which the pattern of the last few altitude reports received from the intruder oscillates between two or more values in a way that allows the inference that that intruder is level.

Transition. An altitude report for a track that is different from the last credible altitude report for that track.

Trend. A trend exists for the altitude rate if the two most recent altitude level transitions were in the same direction.

Unconfirmed rate track. An altitude track for which the pattern of the last few altitude reports received from the intruder does not allow the track to be classified in any other way.

4.1.2.3.1.1 On any cycle of tracking, each track is attributed one and only one track classification.

4.1.2.3.1.2 Any track classification is maintained until conditions for another track classification are satisfied.

4.1.2.3.2 The ACAS II tracks the altitudes of intruders. Tracking is based on automatic pressure-altitude reports from their transponders, using altitude reports quantized as received. For every intruder on every cycle the tracker provides altitude and altitude rate estimates.

Note.— The function that associates Mode C altitude data with tracks is specified in Chapter 4, 4.3.2.1. The altitude tracker specified below assumes that this function has been performed prior to application of the tracker.

4.1.2.3.2.1 The reference altitude tracking design assumes that, for each track, altitude reports are received at the nominal rate of one altitude report per second. However, it allows for missing reports, in other words, cases in which no altitude report has been received for a given track prior to a tracking cycle.

4.1.2.3.2.2 Intruder altitude tracks of one of two types are created and maintained. So-called 100-ft tracks are obtained when altitude reports are supplied in units of 100 ft. Such tracks are updated by a dedicated tracker referred to as the 100-ft altitude tracker. So-called 25-ft tracks are obtained when altitude reports are supplied in units of 25 ft. Such tracks are updated by a dedicated tracker referred to as the 25-ft altitude tracker.

4.1.2.3.2.3 Special logic automatically switches intruder altitude tracks between the 100-ft altitude tracker and the 25-ft altitude tracker following a confirmed change in the units in which altitude reports are supplied. Such a change is considered confirmed when three successive valid altitude reports expressed in the same units have been received.

4.1.2.3.2.4 When an altitude reporting unit change has been observed but not yet been confirmed, the existing track is coasted and the altitude report is temporarily stored. Once the unit change is confirmed, the track is re-initialized using the last altitude rate estimate computed before the change as well as all temporarily stored altitude reports.

4.1.2.3.2.5 The 25-ft tracker is an adaptive alpha-beta tracker. It is briefly described in 4.1.2.3.5.

4.1.2.3.2.6 The design of the 100-ft altitude tracker is motivated by the need for a stable altitude rate estimate when the true altitude rate of the intruder is less than 100 ft/s, in other words, less than one quantization interval per tracking cycle. This tracker estimates the altitude rate indirectly by estimating the time taken to cross one quantization level. Further details on this design are provided in 4.1.2.3.6.

4.1.2.3.3 *Altitude rate confidence.* For every intruder on every cycle, the tracker provides an indication of either "high" or "low" confidence in the altitude rate estimate (4.1.2.3.6.9 and 4.1.2.3.6.10).

4.1.2.3.4 *Altitude rate reasonableness.* The tracker provides a "best estimate" altitude rate and upper and lower bounds for this altitude rate consistent with the received sequence of reports.

4.1.2.3.5 *25-ft quantization reports*

4.1.2.3.5.1 For altitude reports quantized to 25-ft increments, an adaptive α-ß tracker is used. This tracker is adaptive in the sense that it selects among three sets of α and ß values depending on the magnitude of the prediction error, i.e. the difference between the predicted altitude and the reported altitude, as well as on the magnitude of the rate estimate. These α and ß values are:

- α = 0.4 and ß = 0.100 when the current altitude rate estimate is less than 7.0 ft/s; otherwise,
- α = 0.5 and ß = 0.167 when the prediction error is less than 22.5 ft; and otherwise,
- α = 0.6 and ß = 0.257.

4.1.2.3.5.2 The tracker maintains two distinctive sets of altitude and altitude rate estimates. The first one is derived directly from the standard α-ß smoothing equations. This set is purely internal to the tracker. The second set contains the estimates passed to the collision avoidance logic. It differs from the first set as follows. The altitude estimate passed to the logic is constrained to be within one-half quantization interval of the reported altitude (±12.5 ft). The altitude rate estimate passed to the logic is set equal to zero when the internal estimate decreases below 2.5 ft/s in absolute value and is kept equal to zero until the internal estimate increases beyond 5.0 ft/s in absolute value.

4.1.2.3.5.3 The tracker uses only two of the previously defined track classifications: level track and established rate track (4.1.2.3.1). It declares a track to be a level track when at least seven tracking cycles have elapsed since the last altitude transition (4.1.2.3.1). The internal rate estimate is then reset to zero. It declares the track to be an established rate track when, following two sufficiently closely spaced altitude transitions, the internal rate estimate (and thus also the rate estimate passed to the logic) increases beyond 5.0 ft/s.

4.1.2.3.5.4 Confidence in the estimates is declared "high" when the track has existed for at least four tracking cycles and the prediction error has been no greater than 22.5 ft on at least two successive tracking cycles. It is set to "low" when the prediction error is larger than 22.5 ft. It is also set to "low" when altitude reports have been missing on two successive cycles.

4.1.2.3.6 *100-ft quantization reports.* For altitude reports quantized to 100-ft increments, the performance of the altitude tracker is, in all respects, equal to or better than that of a reference tracker setting the altitude rate estimate to have an appropriate sign and the magnitude as described in this paragraph.

4.1.2.3.6.1 *Tracker variables.* The reference tracker uses the following variables:

$\dot{z}$ altitude rate estimate, m/s (ft/s);

$\dot{Z}_{gu}$ see 4.1.2.3.6.5.1;

Δz altitude difference between the current report and the most recent credible report;

T_n 1 s;

Q 30.5 m (100 ft);

t_r time since the most recent credible report, *s*;

t_p time between the two most recent altitude level transitions or, for multiple transitions within one cycle, the average time between these transitions, *s*;

t_b estimated level occupancy time after the most recent transition, *s*;

t_{bm} calculated lower bound on level occupancy time, *s*;

ß computed smoothing coefficient for t_b;

$\beta_\int$ limit for ß based on t_b;

b_t number of altitude levels crossed between the two most recent altitude level transitions;

$b_{\dot{z}}$ number of altitude levels crossed at the most recent rate;

ε smoothed error estimate of t_b, s;

d_t sign of the most recent altitude transition (= +1 for an increase in altitude; = –1 for a decrease); and

x^* value of any variable x before being updated following an altitude level transition.

4.1.2.3.6.2 *Report credibility.* The altitude report is regarded as being credible if either of the following conditions is satisfied:

a) $\Delta z = 0$

b) $|\Delta z - \dot{z}t_r| - Q\, t_r / T_n - \dot{Z}_{gu}\, t_r \leq 0$

4.1.2.3.6.3 *Track classification scheme*

Established rate track. An altitude track is classified as established rate if two or more successive transitions are observed in the same direction and the time interval between the two transitions is sufficiently short that the track classification would not be changed to level track during that interval (see the definition of level track), or if an observed transition is opposite in direction to an existing trend and the time since the previous transition is “unexpectedly small” (4.1.2.3.6.8.1).

Level track. An altitude track is classified as level if reports are received at the same level for longer than T_1 after the time at which the next transition was expected, if one was expected, or for more than T_2 whether or not a transition was expected (4.1.2.3.6.3.1).

New track. An altitude track is classified as new during the period between the time of the first altitude report and the first transition or until T_2 has elapsed (4.1.2.3.6.3.1).

Oscillating track. An altitude track is classified as oscillating if a transition occurs in the opposite direction to that of the immediately preceding transition, only one level has been crossed, the time interval between the two transitions is sufficiently short that the track classification would not be changed to level track during that interval (see the definition of level track) and, if the track was classified as established rate, the time since that transition is not “unexpectedly small” (4.1.2.3.6.8.1).

Unconfirmed rate track. An altitude track is classified as unconfirmed rate if a transition occurs for a new or for a level track or if a transition in the opposite direction to the previous transition occurs and more than one level has been crossed for an established, oscillating or unconfirmed rate track.

4.1.2.3.6.3.1 The following values are used:

$T_1 = 4.0$ s

$T_2 = 20$ s

4.1.2.3.6.3.2 If a track is already classified as unconfirmed rate and a transition occurs in the opposite direction to the previous one and more than one level has been crossed, the altitude rate is determined as if the track had just become classified as unconfirmed rate (4.1.2.3.6.5).

4.1.2.3.6.3.3 The tracks are classified (4.1.2.3.6.3), and the transitions between track classifications are shown in Figure A-10. Tracks are classified in order to determine how new measurements should be used to update the altitude rate estimate.

4.1.2.3.6.4 The magnitude of the rate is set to zero if the track is new, level or oscillating.

4.1.2.3.6.4.1 The quantities ε and $b_{\dot{z}}$ are set to zero and t_b to 100 s.

4.1.2.3.6.4.2 When a track is classified as level, all earlier transitions and any current trend are disregarded.

4.1.2.3.6.5 The magnitude of the rate is set to $\dot{Z}_{gu}$ when a track first becomes unconfirmed rate and then decayed each cycle from the value determined the previous cycle until another transition is observed.

4.1.2.3.6.5.1 The value of $\dot{Z}_{gu}$ is 2.4 m/s (480 ft/min) and the decay constant is 0.9.

4.1.2.3.6.5.2 The quantities ε and $b_{\dot{z}}$ are set to zero and t_b to $Q/|\dot{z}|$

4.1.2.3.6.6 For established rate tracks the magnitude of the rate is set to the quantization interval divided by the estimated level occupancy time. The level occupancy time is estimated on receipt of transitions in the direction of the trend and held constant until the next transition either occurs or becomes overdue (4.1.2.3.6.7).

4.1.2.3.6.6.1 When a track is first established, the quantities ε, $b_{\dot{z}}$ and t_b are set as follows:

$$\varepsilon = 0,\ b_{\dot{z}} = 1,\ t_b = \text{maximum}\ (t_p,\ 1.4\ \text{s})$$

4.1.2.3.6.6.2 Unless the transition is early or late (4.1.2.3.6.6.3), the quantities ε, $b_{\dot{z}}$ and t_b are calculated by recursive averaging following the third and subsequent transitions as follows:

$$\varepsilon' = 0.8\varepsilon^* + (t_p - t_b^*)$$

$$\beta_{\int} = \frac{(t_b^* - T_n)^2}{[(t_b^*)^2 + 64T_n^2]}$$

$b_{\dot{z}} = b_{\dot{z}}* + b_t$ and

β = maximum $(\frac{b_t}{b_{\dot{z}}}, \beta_f)$ and

$\varepsilon = \varepsilon'$

for $|\varepsilon'| \leq 1.35$ (or 2.85 if the most recent transition was observed following one or more missing reports);

$b_{\dot{z}} = 3$ and

$ß = 0.5$ and

$\varepsilon = 0.3\varepsilon'$ otherwise;

and in both cases: $t_b = t_b^* + ß(t_p - t_b^*)$.

4.1.2.3.6.6.3 *Early or late transitions*

If $|t_p - t_b^*| > 1.5$ s (or 3.0 s if the most recent transition was observed following one or more missing reports) or b_t lies outside the range $(t_r/t_b^* + 1.1) \geq b_t \geq (t_r/t_b^* - 1.1)$, then the quantities ε, $b_{\dot{z}}$ and t_b are set as follows:

$b_{\dot{z}} = 1$
$\varepsilon = 0$
t_{bm} = minimum $((0.7t_p + 0.3t_b^*), 1.4 \text{ s})$
t_b = maximum (t_p, t_{bm}).

The rate is calculated as: $\dot{z} = d_tQ/t_b$.

4.1.2.3.6.7 *Overdue transition.* The magnitude of the rate is decayed on each cycle from the value obtained on the previous cycle if reports are received at the same level for at least T_3 after the time of the next expected transition (or T_4 if the most recent transition was observed following one or more missing reports). The value of t_b is not changed in these circumstances.

4.1.2.3.6.7.1 The following values are used:

$T_3 = 1.5$ s

$T_4 = 3.0$ s

The following formula for rate decay is used:

$$\dot{z} = d_tQ/[t_b + (0.3t_b + 0.5T_n)(0.7 + (t_l - t_b)/T_n)^2]$$

where t_l = time since the most recent transition, s.

4.1.2.3.6.7.2 The quantity $b_{\dot{z}}$ is set to maximum $(2, b_{\dot{z}}^* - 1)$.

4.1.2.3.6.8 *Transitions due to jitter.* The magnitude of the rate is set to the value obtained on the previous cycle if a transition is observed opposite in direction to that of the trend, the immediately preceding transition followed the trend, only one level has been crossed and the time since the immediately preceding transition is “unexpectedly small”. Such a transition is subsequently treated as missing except for the requirements of 4.1.2.3.4 and 4.1.2.3.6.10 e).

4.1.2.3.6.8.1 The time since the immediately preceding transition is declared "unexpectedly small" when $t_p \leq 0.24\ t_b^*$.
4.1.2.3.6.8.2 The quantities ε, $b_{\dot{z}}$ and t_b are not changed.

4.1.2.3.6.9 *Track high confidence declaration.* "High" confidence in the tracked rate is declared when the current altitude report is credible and one or more of the following conditions are met:

a) a new track has been observed for longer than T_5 (4.1.2.3.6.9.1) without an altitude transition; or

b) an unconfirmed rate track has been observed for longer than T_6 (4.1.2.3.6.9.1) without an altitude transition; or

c) a track is classified as level; or

d) a track is first classified as established rate; or

e) for an established rate track when a transition has occurred the ratio of the observed transition time to the expected transition time (before being updated) falls between $\Re_1$ and $\Re_2$ (4.1.2.3.6.9.1); or the absolute value of the difference between these times is less than T_8; or the time between the most recently observed and the previous transition is longer than T_8 (4.1.2.3.6.9.1); or

f) for an established rate track when a transition has occurred, the previous report was missing, $|t_p - t_b^*| \geq T_7$, $t_p/t_b^* \geq 1$ and $-t_p - T_9 \leq (t_b - t_p)\ b_t \leq T_9$; or

g) a track is classified as oscillating; or

h) confidence was previously set to "high" upon processing of the last credible altitude report and conditions a) to e) of 4.1.2.3.6.10 for "low" confidence declaration are not satisfied.

4.1.2.3.6.9.1 The following values are used:

T_5 = 9 s
T_6 = 9 s
T_7 = 1.1 s
T_8 = 8.5 s
T_9 = 1.25 s
$\Re_1$ = 2/3
$\Re_2$ = 3/2

4.1.2.3.6.10 *Track low confidence declaration.* "Low" confidence in the tracked rate is declared when one or more of the following conditions are satisfied:

a) for a new track until condition a) in 4.1.2.3.6.9 is satisfied; or

b) for an unconfirmed rate track until condition b) in 4.1.2.3.6.9 is satisfied; or

c) when an observed transition time for an established rate track does not satisfy condition e) or condition f) in 4.1.2.3.6.9; or

d) when an expected transition is more than T_{10} (4.1.2.3.6.10.1) late; or

e) for an established rate track when the condition in 4.1.2.3.6.8 is satisfied; or

f) confidence was previously "low" and the conditions for "high" confidence declaration are not satisfied (4.1.2.3.6.9).

4.1.2.3.6.10.1 The value T_{10} = 0.25 s is used.

4.1.2.3.7 *Missing altitude reports.* When altitude reports are missing:

a) the previous value of the altitude rate estimate is maintained; and

b) confidence in the tracked rate is declared "low" when altitude reports are missing for two or more successive cycles.

4.2 Traffic advisories (TAs)

4.2.1 TA GENERATION

4.2.1.1 A TA is generated for an intruder reporting Mode C altitude when the application of both a range test (4.2.3) and an altitude test (4.2.4) gives a positive result for each in the same cycle of operation.

4.2.1.2 A TA is generated for an intruder equipped with a non-altitude-reporting transponder when the result of applying a range test (4.2.3) is positive.

4.2.2 TA WARNING TIME

For intruders reporting altitude, the range test for TAs gives a nominal warning time as follows:

S	*2*	*3*	*4*	*5*	*6*	*7*
TA warning time	T+10	T+10	T+10	T+15	T+15	T+13

where S = sensitivity level

4.2.2.1 The values for T for sensitivity levels 3 to 7 are those given in 4.3.3.3.1. The value for T for sensitivity level 2 is 10 s.

4.2.3 TA RANGE TEST

The range test for TAs has the same form as that used for threat detection (4.3.3). The values used for D_m for sensitivity levels 3 to 7 are those given in 4.3.3.1.1 incremented by $g(T_w - T)^2/6$ where T_w is the desired TA warning time. The base value for D_m for sensitivity level 2 is 0.19 km (0.10 NM).

4.2.4 TA ALTITUDE TEST

The altitude test gives a positive result if one of the following sets of conditions is satisfied:

a) current altitude separation is "small"; or

b) the aircraft are converging in altitude and the time to co-altitude is "small".

These terms and conditions are defined in 4.3.4.1, 4.3.4.2, 4.3.4.3 and 4.3.4.5. The time threshold for time to co-altitude is the TA warning time (4.2.2) and the values used for Z_t are as follows:

z_o FL	below 300	above 300
Z_t m	260	370
(Z_t ft	850	1 200)

4.3 Threat definition

4.3.1 THREAT DETECTION CHARACTERISTICS

4.3.1.1 *Intruder characteristics.* The characteristics of an intruder that are used to define a threat are:

a) tracked altitude: z_i

b) tracked rate of change of altitude: $\dot{z}_i$

c) tracked slant range: r

d) tracked rate of change of slant range: $\dot{r}$

e) sensitivity level of intruder's ACAS: S_i

For an intruder not equipped with ACAS II or ACAS III, S_i is set to 1.

4.3.1.2 *Own aircraft characteristics.* The following characteristics of own aircraft are used in threat definition:

a) altitude: z_o

b) rate of change of altitude: $\dot{z}_o$

c) sensitivity level of own ACAS (Chapter 4, 4.3.4.3): S_o.

4.3.1.3 *Altitude-band SLC command.* The reference logic selects the SLC command based altitude band as indicated in Table A-1.

4.3.2 *Criteria for threat declaration.* An intruder becomes a threat if and only if both the following apply on the same cycle:

a) the range test gives a positive result; and

b) either:

1) the altitude test gives a positive result; or

2) an altitude-crossing RAC has been received from the threat.

4.3.2.1 *Established threat.* The threat status of an established threat is maintained on successive cycles if, as a minimum, the range test gives a positive result.

4.3.3 RANGE TEST

4.3.3.1 *Range convergence.* Aircraft are considered converging in range if the estimated range rate is less than $\dot{R}_t$. In this case the range rate estimate used in the range test is the minimum of the estimated range rate and $-\dot{R}_t$.

4.3.3.1.1 The value 3 m/s (6 kt) is used for $\dot{R}_t$.

4.3.3.2 *Range divergence.* Aircraft that are not considered converging in range are considered diverging in range. Range divergence is considered "slow" if the product of the estimated range multiplied by the estimated range rate is less than $\dot{P}_m$.

4.3.3.2.1 The following values are used for $\dot{P}_m$:

S	*3*	*4 to 6*	*7*
$\dot{P}_m$ km^2/s	0.0069	0.0096	0.0137
($\dot{P}_m$ NM^2/s	0.0020	0.0028	0.0040)

4.3.3.3 *Range test criteria.* The range test gives a positive result when one of the following conditions is satisfied:

a) both

1) the aircraft are converging in range; and

2) the following inequality is satisfied:

$$(r - D_m^2 / r) / |\dot{r}'| < T;$$

where $\dot{r}'$ = minimum $(\dot{r}, -\dot{R}_t)$; *or*

b) the aircraft are diverging in range but the range is less than D_m and the range divergence is "slow"; or

c) either a miss distance estimate could not be calculated on the current cycle or the calculated miss distance is less than H_m;

and for all other conditions the result of the range test is negative.

Note.— The formula in item a) 2) above provides a practical text for the following condition: the range and range rate estimates indicate that the encounter could be such that the linear miss distance is less than or equal to D_m and the linear time to closest approach is less than T.

4.3.3.3.1 The values of the parameters *T*, D_m and H_m are as follows:

S	*3*	*4*	*5*	*6*	*7*
T s	15	20	25	30	35
D_m (km)	0.37	0.65	1.0	1.5	2.0
(D_m (NM)	0.20	0.35	0.55	0.80	1.1)
H_m (m)	382	648	1 019	1 483	2 083
(H_m (ft)	1 251	2 126	3 342	4 861	6 683)

4.3.4 ALTITUDE TEST

4.3.4.1 *ALTITUDE TEST TERMS' DESCRIPTION*

Altitude divergence rate $(\dot{a})$. The rate of change of a.

Current altitude separation (a). The modulus of the current tracked altitude separation between own aircraft and the intruder.

Times to closest approach (τ_u, τ_m). The estimated time which will be taken to reach minimum range. τ_u is the maximum value (assuming rectilinear relative motion and zero miss distance) and τ_m is the minimum value (assuming rectilinear relative motion and the maximum miss distance of interest, D_m).

Time to co-altitude (τ_v). The estimated time which will be taken to reach co-altitude.

Vertical miss distance (v_m). An estimated lower bound for the projected altitude separation at the estimated time of closest approach.

4.3.4.2 *Current altitude separation.* Current altitude separation is declared "small" if $a < Z_t$ where Z_t is set equal to Z_m (4.3.4.4.2) in the reference logic.

4.3.4.3 *ALTITUDE CONVERGENCE*

4.3.4.3.1 $\dot{a}$ is calculated as follows:

$\dot{a} = \dot{z}_o - \dot{z}_i$ for $z_o - z_i \geq 0$

$\dot{a} = \dot{z}_i - \dot{z}_o$ for $z_o - z_i < 0$

4.3.4.3.2 The aircraft are declared converging in altitude if $\dot{a} < -\dot{Z}_c$.

4.3.4.3.3 The value of $-\dot{Z}_c$ is positive and not greater than 0.3 m/s (60 ft/min).

4.3.4.4 *VERTICAL MISS DISTANCE*

4.3.4.4.1 When the aircraft are converging in range ($\dot{r} \leq 0$), time to closest approach and vertical miss distance are calculated as follows:

$\dot{r}' = \text{minimum}(\dot{r}, -\dot{R}_t)$

$\tau_u = \text{minimum}(|r / \dot{r}'|, T)$

$\tau_u = |r - D_m^2/r) / \dot{r}'|$

for $r \geq D_m$

$= 0$ for $r < D_m$

v_{m1} $= (z_o - z_i) + (\dot{z}_o - \dot{z}_i)\ \tau_u$

v_{m2} $= (z_o - z_i) + (\dot{z}_o - \dot{z}_i)\ \tau_m$

v_m $= 0$ for $v_{m1}v_{m2} \le 0$, otherwise
v_m $=$ minimum (v_{m1}, v_{m2}) for $v_{m1} > 0$
$=$ maximum (v_{m1}, v_{m2}) for $v_{m1} < 0$

4.3.4.4.2 Vertical miss distance is declared "small" if $|v_m| < Z_m$. The maximum values for Z_m are given by:

z_o *FL*	*below 200*	*200 to 420*	*above 420*
Z_m (m)	183	213	244
(Z_m (ft)	600	700	800)

4.3.4.5 *TIME TO CO-ALTITUDE*

4.3.4.5.1 The time to co-altitude for $\dot{a}$ less than $-\dot{Z}_c$ is calculated as follows:

$$\tau_v = -a/\dot{a}$$

Note.— τ_v is not used if the aircraft are not converging in altitude and range.

4.3.4.5.2 τ_v is declared "small" if $\tau_v < T_v$ for encounters in which the magnitude of own aircraft's vertical rate is not more than 600 ft/min or own aircraft's vertical rate has the same sign as but smaller magnitude than that of the intruder. For all other encounters τ_v is declared "small" if $\tau_v < T$. The values of the parameters T_v are as follows:

S	*3*	*4*	*5*	*6*	*7*
T_v s	15	18	20	22	25

4.3.4.6 *Altitude test criteria.* The altitude test of the reference logic gives a positive result when any of the three following conditions are satisfied:

a) the aircraft are converging in range, the current altitude separation is "small" and the vertical miss distance is "small"; or

b) the aircraft are converging in range and altitude, the time to co-altitude is "small" and either the vertical miss distance is "small", or co-altitude is predicted to occur before closest approach ($\tau_v < \tau_u$); or

c) the aircraft are diverging in range and the current altitude separation is "small";

and for all other conditions the results of the altitude test are negative.

4.4 Generation of RAs

4.4.1 RA types are defined in Chapter 4, 4.1.

4.4.2 DELAY IN RA GENERATION

Note.— An RA will be generated for all threats except in the circumstances described here or for coordination purposes.

The reference logic does not generate a new RA or modify an existing RA for a new threat when any of the following conditions are satisfied:

a) an altitude-crossing RAC has not been received from the threat; and

b) either:

1) the altitude separation test (4.4.2.1) gives a negative result; or

2) confidence in the tracked altitude rate of the intruder is "low" and no resolution manoeuvre would provide a predicted separation of at least A_t (4.4.2.2), whether the threat had an altitude rate equal to the upper altitude rate bound, to the lower altitude rate bound, or to any altitude rate between these bounds (4.1.3.3.4); or

3) there is "low" confidence in the threat's tracked altitude rate, the current altitude separation is greater than 46 m (150 ft), and the RA that would be selected against the threat when considered separately from other possible threats would be altitude crossing.

4.4.2.1 *ALTITUDE SEPARATION TEST*

4.4.2.1.1 The altitude rate of own aircraft is declared "small" if $|\dot{z}_o| \le \dot{Z}_\ell$.

4.4.2.1.2 The value 3.0 m/s (600 ft/min) is used for $\dot{Z}_\ell$.

4.4.2.1.3 The delay in threat declaration is declared "acceptable" if it is less than 3.0 s.

4.4.2.1.4 The maximum altitude separation threshold, A_c, is given a value of 260 m (850 ft), when the vertical rates of own and of the threat are in the opposite directions and neither of them is "small", and a value of 183 m (600 ft) otherwise.

4.4.2.1.5 Altitude separation is declared "minimum" if it is equal to 100 ft.

4.4.2.1.6 An encounter is declared "slow closing" if the range rate is greater than D_m/T.

4.4.2.1.7 *Test conditions.* The altitude separation test gives a negative result if the threat is a new threat and the RA that would be selected against the new threat when considered separately from other possible simultaneous threats would be either:

a) altitude crossing and either:

1) the current altitude separation exceeds A_c; or

2) the threat is equipped, a valid RAC has not been received from it, the altitude rate of own aircraft is "small", the altitude rate of the threat is not "small", and the delay in issuing an RA or modifying the existing RA is "acceptable"; or

b) unable to generate at least "minimum" separation over the critical interval if the encounter is not "slow closing"; or

c) unable to generate at least "minimum" separation at closest approach (τ_u) if the encounter is "slow closing" and either range is less than D_m or time to a range of D_m, τ_m, is less than 5 s.

Otherwise, the result of the altitude separation test is positive.

4.4.2.2 The following values are used for A_t:

z_o	A_t m	(A_t ft)
less than FL 100	61	(200)
FL 100 to FL 200	73	(240)
FL 201 to FL 420	122	(400)
greater than FL 420	146	(480)

4.4.2.2.1 Hysteresis of ±500 ft is applied to the boundaries between adjacent altitude layers.

4.4.3 *Altitude separation goal.* The initial strength of the RA is selected to meet the goal of an altitude separation of at least A_l at closest approach except in the circumstances described in 4.4.3.2.

4.4.3.1 The following values are used for the parameter A_l:

z_o	A_t m	(A_t ft)
less than FL 50	91	(300)
FL 50 to FL 100	107	(350)
FL 100 to FL 200	122	(400)
FL 201 to FL 420	183	(600)
greater than FL 420	213	(700)

4.4.3.1.1 Hysteresis of ±500 ft is applied to the boundaries between adjacent altitude layers.

4.4.3.2 *Inadequate vertical separation.* If the restrictions on RAs (Chapter 4, 4.3.5 and 4.4.4 below) preclude the generation of an RA predicted to provide an altitude separation at closest approach of at least A_l, the RA is that predicted to provide the largest altitude separation at closest approach consistent with the other provisions in this chapter.

4.4.3.3 *Critical interval.* Predictions for closest approach are for the period of time during which a collision could occur.

4.4.3.3.1 The critical interval is that time between $\tau_{m\ell}$ and $\tau_{u\ell}$ where:

$$\dot{r}' = \text{minimum } (\dot{r}, -\dot{R}_t)$$

$$\tau_{u\ell} = \text{minimum } (\tau^*_{u\ell}, |r/\dot{r}'|, T_e)$$

$$\tau_{m\ell} = \text{minimum } (\tau^*_{m\ell}, |(r - D_m^2/r)/\dot{r}'|)$$

for $r \geq D_m$

$T_{ml} = 0$ for $r < D_m$

where $\tau^*_{u\ell}$ and $\tau^*_{m\ell}$ are both equal to T_e for a threat that has newly passed the range test (4.3.3) and are the values of $\tau_{u\ell}$ and $\tau_{m\ell}$, respectively, on the previous cycle otherwise.

4.4.3.3.1.1 The following parameter values are used:

S	*3*	*4*	*5*	*6*	*7*
T_e, s	25	30	30	35	40

4.4.3.4 *The threat trajectory.* The RA is designed to provide altitude separations sufficient to avoid collisions with threats that:

a) continue with their current altitude rates; or

b) are climbing or descending when they first become threats and reduce their altitude rates or manoeuvre to level flight.

4.4.3.4.1 Predicted altitude separation is based on the assumption that the threat will maintain its current altitude rate except as described in 4.4.4.4 for ACAS equipped threats.

4.4.3.5 *Own aircraft trajectory.* Predicted altitude separation at closest approach is based on the following assumptions concerning the response of the ACAS II aircraft to the RA:

a) for preventive RAs, the altitude rate of own aircraft will remain within the limits specified by the RA;

b) for corrective RAs, the trajectory of own aircraft will consist of unaccelerated flight at the current rate for $T_p + T_s$, followed by a constant acceleration $(\ddot{Z}_g)$ in the vertical plane to achieve the selected altitude rate ($\dot{Z}_g$) and thereafter unaccelerated motion at this rate.

Note.— The predicted time to closest approach might be so short that the selected altitude rate, $\dot{Z}_g$, cannot be achieved.

4.4.3.5.1 The parameter T_p, which represents pilot reaction time, takes the value 5 s for the initial RA strength or 2.5 s for any subsequent RA strength.

4.4.3.5.2 The value of the parameter T_s is chosen so that it models the system delay from receipt of the relevant SSR reply to the presentation of the RA to the pilot (Chapter 4, 4.3.5.10).

4.4.3.5.3 The parameter $\ddot{Z}_g$ takes the value 0.35g for a reversed sense RA or an increased rate RA or 0.25g otherwise.

4.4.3.5.4 If the selected altitude rate, $\dot{Z}_g$, exceeds the performance capabilities of the aircraft, a value suitable for the aircraft is substituted.

4.4.4 RESTRICTIONS ON RAs

4.4.4.1 *Range of available RA strengths.* The reference logic has a capability to provide the vertical RA strength options of Table A-2 in resolving encounters.

4.4.4.1.1 *Increased rate RAs.* The reference logic does not consider the increase climb and increase descend strength when selecting the initial strength of the RA. These RA strengths are only used when the predicted separation for the existing RA is inadequate and reversing the sense of the RA is not an acceptable option. These RA strengths are intended to convey an increased sense of urgency to the pilot. They correspond to increases in the selected altitude rate $\dot{Z}_g$ beyond $\dot{Z}_{clm}$ or $\dot{Z}_{des}$, as appropriate.

4.4.4.1.1.1 Increases in the selected altitude rate to 13 m/s (2 500 ft/min) are generated when all the following conditions are satisfied:

a) a positive RA with the same sense is currently displayed and has been displayed for more than one cycle; and either

1) if the threat is equipped or the current RA is not altitude crossing, confidence in the threat's tracked altitude rate is "high" (4.1.2.3.6.9), and the current RA strength is predicted to provide an altitude separation at closest approach of less than 61 m (200 ft); or

2) the threat is not equipped and the current RA is altitude crossing, and 10 s or less remain until closest approach and the threat's altitude at closest approach is currently predicted to be less than 61 m (200 ft) above or below the current altitude of own aircraft in the case of a descend or a climb RA respectively;

b) the time remaining to closest approach is less than T_{ir} and greater than 4 s;

c) own aircraft is either descending and above 1 450 ft AGL or climbing and above 1 650 ft AGL, and increase climb RAs are not inhibited by aircraft performance limits, and

d) either τ_u (4.3.4.4.1) is not increasing or, if it is, the range to the threat is less than 3.2 km (1.7 NM).

The following values are used for T_{ir}.

S	*3*	*4*	*5*	*6*	*7*
T_{ir}, *s*	13	18	20	24	26

Note 1.— Condition 2) of a) above allows the use of an increased rate RA against a levelling-off, unequipped threat in an altitude-crossing encounter which does not qualify for a sense reversal (4.4.4.3.1). This situation can arise because the threat is levelling off with a low deceleration such that its predicted altitude at the point of closest approach follows the ACAS II aircraft's current altitude on each succeeding cycle. An increased rate RA could generate additional altitude separation.

Note 2.— Condition c) prevents undesirable interactions between the collision avoidance logic and the ground proximity warning system (GPWS).

4.4.4.1.2 The default values for $\dot{Z}_{clm}$ and $\dot{Z}_{des}$ are 7.6 m/s (1 500 ft/min) and –7.6 m/s (–1 500 ft/min), respectively. If 7.6 m/s (1 500 ft/min) exceeds the aircraft's climb capability, a suitable value may be substituted to enable the generation of climb RAs. If the actual rate of climb or descent exceeds the default rate, the actual rate is substituted, if it is less than a maximum rate of 4 400 ft/min; otherwise the maximum rate of 4 400 ft/min is used.

Note.— Climbs may be inhibited in response to discrete indications e.g. that the aircraft is at its ceiling. However, it is possible that certain aircraft will have such limited climb capability that RAs to climb at 7.6 m/s (1 500 ft/min) have to be permanently inhibited to comply with Chapter 4, 4.3.5.4.

4.4.4.1.3 *RA retention.* Subject to the requirement that a descend RA is neither generated nor maintained below a specified altitude (Chapter 4, 4.3.5.4.1), the RA is not modified (Chapter 4, 4.3.5.6) if any of the following apply:

a) the range test has given a negative result but the intruder remains a threat (4.3.5.1.1); or

b) less than 2.5 s remain until closest approach; or

c) the intruder is diverging in range but the RA has not yet been cancelled (4.3.5.1.1).

4.4.4.1.4 *Weakening RAs.* Subject to the requirement that a descend RA is not generated at low altitude (Chapter 4, 4.3.5.4.1), an RA is not weakened (Chapter 4, 4.3.5.7) if any of the following conditions apply:

a) it is positive and current altitude separation is less than A_l; or

b) it (any strength) has been displayed for less than 10 s or, for a reversed sense RA, 5 s; or

c) there is "low" confidence in the threat's tracked altitude rate; or

d) the RA is a vertical speed limit RA.

Furthermore, positive RAs are not weakened beyond an RA strength allowing a return to level flight ("do not climb" for a downward RA; "do not descend" for an upward RA).

Note.— This limitation on weakening RAs does not apply to the declaration of an aircraft to be not a threat (Chapter 4, 4.3.5.1.1).

4.4.4.2 *Initial bias against altitude crossing.* A newly generated RA is non-crossing provided:

a) a non-crossing RA is predicted to provide an altitude separation of at least A_l at closest approach; and

b) responding to a non-crossing RA with a standard response (4.4.3.5) is predicted to preserve at least "minimum" vertical separation (4.4.2.1) throughout the entire time interval until closest approach.

4.4.4.3 *Sense reversal for an established threat.* Sense reversals are generated when the following conditions apply:

a) the threat is not equipped or the threat is equipped, has a higher aircraft address, and at least 9 s have elapsed since it became a threat and own ACAS has not previously reversed its RA; and

b) more than 4 s remain before closest approach; and

c) the value of τ_u (4.3.4.4.1) was not already rising by the time the range to the threat was 3.2 km (1.7 NM); and

d) either:

1) i) the current RA is altitude crossing; and

ii) current altitude separation is at least 61 m (200 ft), or 30 m (100 ft) if more than 10 s remain before closest approach; and

iii) either

— at the time the RA was generated the threat was predicted to cross the initial altitude of own aircraft, but currently the threat's altitude at closest approach is predicted to be above or below the current altitude of own aircraft in the case of a climb or descend RA, respectively; or

— at the time the RA was generated the threat was not predicted to cross the initial altitude of own aircraft, but current estimates of the separations predicted to be achievable for climb and descend RAs at closest approach show that greater separation will be obtained for a reversed sense RA; and

iv) by the time of reaching closest approach, own aircraft will, with reversed sense, be able to exceed the maximum bound on the threat's altitude at closest approach (projected using the maximum altitude rate bound (4.1.2.3.4)); or

2) i) the current RA is not altitude crossing; and

ii) at least one of the following:

— the threat has crossed own aircraft's altitude by at least 30 m (100 ft) in the direction of the RA sense; or

— the threat is not equipped and own aircraft has not yet crossed the altitude of the threat, but its vertical rate is opposite to the RA and an immediate manoeuvre to comply with the RA would not prevent an altitude crossing before closest approach; or

— the threat is not equipped and current separation does not exceed A_c (4.4.2.1.4), the vertical rates of own and the threat exceed 1 000 ft/min in the same direction, the RA has been positive for at least 9 s, confidence in the tracked rate of the threat is high, and either an altitude crossing is predicted to occur before closest approach or vertical separation at closest approach is predicted to be less than 30 m (100 ft).

Note.— The sense of an RA for an established threat cannot be reversed except for coordination purposes or because the predicted separation at closest approach for the existing sense is inadequate (Chapter 4, 4.3.5.5).

4.4.4.3.1 Climb RAs occurring as a result of reversals of downward-sense RAs are issued regardless of manoeuvre limitation indications.

4.4.4.4 *Strength selection for non-crossing RAs against ACAS-equipped threats.* In a conflict with an ACAS-equipped threat, in which the reference logic would normally generate a non-crossing climb or descend RA that is opposite in direction to own aircraft's existing vertical rate, an RA to limit the vertical rate to 0 ft/min will be generated instead, if the following conditions are met:

a) own aircraft and the threat are converging vertically;

b) own aircraft's vertical rate exceeds $\dot{Z}_{lo}$;

c) the threat aircraft's vertical rate is less than $\dot{Z}_{lo}$; and

d) the vertical separation that would be achieved at closest approach if both aircraft were to level off exceeds Z_{losep}.

4.4.4.4.1 The vertical speed limit 0 ft/min RA generated in accordance with 4.4.4.4 is retained if neither aircraft accelerates vertically toward the other with a change in rate in excess of $\dot{Z}_l$. Otherwise, the reference logic will immediately generate a climb or descend RA as appropriate for the RA sense.

4.4.4.4.2 The value 6 m/s (1 000 ft/min) is used for $\dot{Z}_{lo}$. The value 244 m (800 ft) is used for Z_{losep}.

5. ACAS II USE OF HYBRID SURVEILLANCE TECHNIQUES

5.1 Overview

5.1.1 Hybrid surveillance is the technique used by ACAS to take advantage of passive position information available via extended squitter. Using hybrid surveillance, ACAS validates the position provided by extended squitter through direct active range measurement. Initial validation is performed at track initiation. Revalidation is performed once per 10 seconds if the intruder becomes a near threat in altitude or range. Finally, regular once-per-second active surveillance is performed on intruders that become a near threat in both altitude and range. In this manner, passive surveillance (once validated) is used for non-threatening intruders thus lowering the ACAS interrogation rate. Active surveillance is used whenever an intruder becomes a near threat in order to preserve ACAS independence as an independent safety monitor. A block diagram of the hybrid surveillance algorithm is presented in Figure A-11.

5.1.2 The reported altitude in the extended squitter position report is loaded within the Mode S transponder from the same source used to provide the altitude reported in the reply to an ACAS addressed interrogation. The altitude reported in an extended squitter position report may therefore be used to update the altitude of a track undergoing active surveillance, in the event that the transponder fails to reply to active interrogations.

5.2 Hybrid surveillance equipment characteristics

5.2.1 INITIAL VALIDATION

5.2.1.1 A passive track is initiated by the receipt of an extended squitter with a 24-bit address that is not in the track file, nor is associated with a track undergoing active surveillance. This latter case can occur if the short squitter established an active track before an extended squitter containing position reports is received.

5.2.1.2 ACAS will handle an extended squitter acquisition the same way that it handles a short squitter acquisition. After receiving the required number of squitters at the ACAS MTL (the same number as specified for short squitters in Chapter 3, 3.1.2.8.5), an attempt is made at active surveillance for a prescribed number of times. A successful reply will lead to track acquisition. An unsuccessful attempt will lead to discarding acquisition for this aircraft address, since the ADS data could not be validated. Continued receipt of extended squitters will lead to a subsequent acquisition attempt.

5.2.1.3 In the case of an aircraft providing extended squitter information, a successful acquisition reply will provide the opportunity to validate the information. But in either case (short or long squitter), the same criteria for track acquisition are followed, in terms of the number of correlating squitters that are required and the number of interrogation attempts that are made.

5.2.1.4 Initial ADS information validation is performed at passive track initiation to determine if the track can be maintained on passive data. An active surveillance measurement is made using a short addressed interrogation which carries an ACAS cross-link command to provide the contents of register 05[HEX] (extended squitter airborne position) in the reply. The reply to this interrogation also provides the aircraft speed capability and the reported barometric altitude in addition to the ADS-B airborne position report. The relative range and bearing computed from own and intruder reported positions is compared to the active range and bearing measurements and the altitude provided in the position report is compared to the altitude obtained from the active interrogation. If the reported information does not agree with the range, bearing or altitude obtained via the active interrogation within limits recommended in Chapter 4, 4.5.1.3.2, the track is declared to be an active track and future extended squitters from this aircraft are ignored by ACAS.

5.2.2 REVALIDATION AND MONITORING

If the following condition is met for an aircraft with a relative altitude ≤ 10 000 ft:

(Intruder altitude difference ≤ 3 000 ft OR vertical *TAU* to 3 000 ft ≤ 60 seconds) OR
(Range difference ≤ 3 NM OR range *TAU* to 3 NM ≤ 60 seconds)

an active interrogation is made every 10 seconds to continuously revalidate and monitor the position reports. Any detected difference will result in the aircraft being declared an active track.

5.2.3 ACTIVE SURVEILLANCE

If the following condition is met for an aircraft with a relative altitude ≤ 10 000 ft:

(Intruder altitude difference ≤ 3 000 ft OR vertical *TAU* to 3 000 ft ≤ 60 seconds) AND

(Range difference ≤ 3 NM OR range *TAU* to 3 NM ≤ 60 seconds)

the aircraft is declared an active track and is updated on active range measurements once per second.

5.2.4 THREAT EVALUATION DECLARATION

If the intruder aircraft is declared to be a threat or potential threat, active range measurement continues.

6. PERFORMANCE OF THE COLLISION AVOIDANCE LOGIC

6.1 Purpose of the performance requirements

6.1.1 The ACAS collision avoidance logic is the part of ACAS that receives information relating to identified intruders (i.e. any aircraft for which ACAS has established a track) and generates collision avoidance advisories on the basis of that information. In any ACAS equipment it is likely to take the form of software residing in a microprocessor and this software will implement a collection of mathematical algorithms. These algorithms might vary from one ACAS to another and the purpose of the performance requirements for the collision avoidance logic is to ensure that the performance of the mathematical algorithms is acceptable.

6.1.2 The development of the collision avoidance algorithms and their implementation as software are thought of as separate processes and these standards relate to the algorithms, even though, in practice, the software used to demonstrate that the algorithms are satisfactory might be closely related to that installed with ACAS. The performance requirements for the collision avoidance logic are not intended to guarantee that the collision avoidance software is satisfactory as software, though they are an essential ingredient of such a guarantee. Satisfactory performance of the software is to be achieved by using sound software engineering practices to ensure that the algorithms are implemented reliably.

6.1.3 The interoperability of the collision avoidance logics in any two equipments is achieved by ensuring that their RAs are consistent and that either RA alone is sufficient for the purpose of the system as a whole. Consistency is ensured by the requirements relating to coordination (Chapter 4, 4.3.5.5.1, 4.3.5.8 and 4.3.6.1.3). That either RA is sufficient is guaranteed by the collision avoidance logic performance requirements and, in particular, the requirement of satisfactory performance when the other aircraft is ACAS equipped but does not cooperate (Chapter 4, 4.4.2.1 j) 2)).

6.1.4 The performance requirements are intended to provide a global guarantee that the ACAS logic in question has an overall performance that is comparable with or superior to that of other ACAS logics. They do not describe the performance of the logic in any particular airspace. For many purposes, the best method of determining or studying the performance of an ACAS logic in a particular airspace is by means of simulations based on ATC ground radar data. This possibility is discussed further in 6.4.4.

6.2 Conditions under which the requirements apply

6.2.1 COMMENT

The conditions given in Chapter 4, 4.4.2 are specified in order to define the subsequent requirements, but satisfactory performance is required in all normal operating conditions. This is to be demonstrated by varying the conditions in which the performance measures are calculated in a way that reflects the normal variations that might be expected and ensuring that the calculated performance measures are robust, i.e. that they do not degrade sharply as the conditions assumed deteriorate.

6.2.2 SURVEILLANCE ERRORS

6.2.2.1 Surveillance errors can take a number of forms:

a) a track is not formed for the intruder;

b) a track is formed late;

c) a track is dropped prematurely;

d) a track is formed but reports are not available each cycle; and

e) the reports, e.g. of range, will be subject to measurement errors.

6.2.2.2 While any assessment of the effectiveness of ACAS as a whole must take failure to form tracks, item a), into account, there is no need to prove that the logic is effective when it has no data.

6.2.2.3 Late track formation, item b), could delay the generation of RAs (perhaps because the various trackers in the logic have not converged and the RA is delayed by low confidence) or result in an inappropriate initial RA (perhaps because the output of the trackers is used before it has converged). Best practice would be to determine the frequency of late track formation for the actual surveillance system to be used with the logic being tested.

6.2.2.4 Once a track is formed, missing reports can degrade the accuracy of the track or cause low confidence in the track, both of which could delay the initial RA, result in an inappropriate RA or delay changes in an RA after it has been generated. Best practice would be to determine the frequency of missing reports for the actual surveillance system to be used with the logic being tested. The probability that a report is missing on any given cycle will be a function of the range of the intruder, altitude and whether or not a report was missing on the previous cycle.

6.2.2.5 Actual bearing measurement errors are highly dependant on the airframe and the siting of the ACAS antenna and other antennas and obstacles fitted to the same airframe. The bearing measurements are characteristically so poor that early ACAS designs made no use of them in the collision avoidance logic. A later design, which includes a filter that inhibits RAs when the sequence of range measurements indicates a significant horizontal miss distance, used the bearing and bearing rate measurements to verify that neither aircraft is accelerating; the filter is disabled if the bearing measurements are not consistent with the diagnosed miss distance. The conditions specified in Chapter 4, 4.4.2 are intended to cover this sort of feature in the logic.

6.2.2.6 It is most unlikely that any ACAS installation will provide bearing measurements of sufficient accuracy to provide the primary basis of a miss distance filter or any other aspect of the collision avoidance logic.

6.2.2.7 Range and bearing measurements are also used to determine the relative position of the intruder for use in the traffic display. The requirements for this use are much less stringent than those of the collision avoidance logic, and the models specified in Chapter 4, 4.4.2.2 and 4.4.2.3 have no bearing on this use.

6.2.3 ALTITUDE QUANTIZATION

6.2.3.1 The intruder's altitude could be available as either Mode C or Mode S reports and is thus expressed in 100 ft or 25 ft quanta. Chapter 4, 4.4.2.1 c) specifies that 100 ft quanta be assumed for the purposes of confirming that the performance requirements are met. The performance of the collision avoidance logic is expected to be improved when the intruder's altitude is available as 25 ft quanta and it is desirable to confirm that this is the case.

6.2.3.2 In most cases, the altitude of own aircraft will be available to ACAS as a measurement prior to the formation of a Mode C or Mode S report and Chapter 4, 4.4.2.1 d) specifies that this is assumed. For installations where it is not possible to provide the original altitude measurement to ACAS, the collision avoidance logic will have to use the Mode C or Mode S reports made by own aircraft. This is expected to degrade the performance of the logic but Chapter 4, 4.4.2.1.1 requires that this degradation be acceptable. The logic is not expected to meet the performance requirement when altitude reports (as opposed to measurements) are used for own aircraft. The test is whether the resulting measures are judged acceptable given that they result from an installation where it has been necessary to compromise performance by using input that does not match the normal standards, and whether they indicate that the logic is unduly sensitive to quantization of the altitude data for own aircraft.

6.2.4 STANDARD ALTIMETRY ERROR MODEL

6.2.4.1 The standard altimetry error model is needed for the calculation of the effect of ACAS on the risk of collision (6.3.2). Although it is based on the observed performance of operational altimeters, there is no intention that the model be used as a reference recording that performance. Still less is there an implied requirement for altimeters to match the performance described in the model whether or not they are used in conjunction with ACAS. The model is standardized solely for the purpose of defining the conditions under which the requirements relating to the performance of the collision avoidance logic apply.

6.2.4.2 The model describes the distribution that is to be assumed for the errors in altimeter measurements. It excludes the effect of the quantization that is needed to create Mode C or Mode S altitude reports. Nevertheless, the calculation of the effect of ACAS on the risk of collision must take full account of this quantization and this is to be achieved by quantizing the simulated altitude measurements and thus forming simulated reports that are provided to the simulated ACAS logic.

6.2.4.3 The simulations of the effect of ACAS will include precise knowledge of the aircrafts' measured altitudes. Their actual altitudes are not known either to ATC or to the aircraft; they are the sum of the simulated measurement and the random altimeter error. In every encounter where the horizontal miss distance is very small, there is some risk of collision and it equals the probability that the difference in the actual altitudes of the two aircraft is small enough for them to collide. Thus the calculation of the effect of ACAS on the risk of collision (6.3.2) involves forming the statistical distribution of the error in the measured difference in the altitudes of the two aircraft: the convolution of two statistical distributions, one for each aircraft.

6.2.4.4 For the standard altimetry error model specified in Chapter 4, 4.4.2.4, the probability that the actual vertical separation *d* is less than a threshold value *h* (which is taken to be 100 ft in 6.3.2) is as follows:

for $\lambda_1 = \lambda_2$ and $a \geq h$

$$Prob(|d| \leq h) = \frac{1}{4\lambda}\exp\left(\frac{-(a+h)}{\lambda}\right)\left[\exp\left(\frac{2h}{\lambda}\right)(2\lambda + a - h) - (2\lambda + a + h)\right]$$

for $\lambda_1 = \lambda_2$ and $a < h$

$$Prob(|d| \leq h) = 1 - \frac{1}{4\lambda}\exp\left(\frac{-(a+h)}{\lambda}\right)\left[\exp\left(\frac{2h}{\lambda}\right)(2\lambda - a + h) + (2\lambda + a + h)\right]$$

for $\lambda_1 \neq \lambda_2$ and $a \geq h$

$$\frac{Prob(|d| \leq h) = \lambda_1^2 \exp\left(\frac{-a}{\lambda_1}\right)\sinh\left(\frac{h}{\lambda_1}\right) - \lambda_2^2 \exp\left(\frac{-a}{\lambda_2}\right)\sinh\left(\frac{h}{\lambda_2}\right)}{\lambda_1^2 - \lambda_2^2}$$

and for $\lambda_1 \neq \lambda_2$ and $a < h$

$$\frac{Prob(|d| \leq h) = \lambda_1^2\left[1-\exp\left(\frac{-h}{\lambda_1}\right)\cosh\left(\frac{a}{\lambda_1}\right)\right]-\lambda_2^2\left[1-\exp\left(\frac{-h}{\lambda_2}\right)\cosh\left(\frac{a}{\lambda_2}\right)\right]}{\lambda_1^2-\lambda_2^2}$$

where λ_1 and λ_2 are the values of λ for the two aircraft, and a is the apparent vertical separation as in 6.3.2, i.e. the altitude separation as measured by the altimeters in the two aircraft.

6.2.5 STANDARD PILOT MODEL

6.2.5.1 The standard pilot model represents a reasonable expectation of pilots' normal reaction to RAs. However, it does not capture the full range of potential responses, for example, slow responses that undermine collision avoidance and excessively violent reactions that cause large deviations from clearance. For some responses, for example, failure to respond or a decision to move to the next flight level in response to a climb RA, it is not appropriate to examine the performance of the logic, but the following modifications to the standard model will provide an indication whether the logic is unduly dependent on an accurate pilot response.

6.2.5.2 In the context of Chapter 4, 4.4.3, the reduction in the risk of collision, a suggested deficient pilot response is:

a) the pilot responds slowly, *viz.* in 8 s to an initial RA and in 5 s to a changed RA; and

b) the pilot aims for an inadequate rate, *viz.* 200 ft/min less than the rate required.

6.2.5.3 In the context of Chapter 4, 4.4.4, the effect of ACAS on air traffic management (ATM), a suggested excessive response is:

a) the pilot responds quickly, *viz.* in 3 s to an initial RA and in 1 s to a changed RA;

b) the pilot aims for an excessive rate, *viz.* 500 ft/min more than the rate required; and

c) the pilot fails to respond to weakening RAs.

6.2.5.4 The logic is not expected to meet the performance requirements when the pilot responds as described above, but calculation of the performance measures using these non-standard pilot responses will provide some insight into the sensitivity of the logic to the accuracy of the pilot's response. The test is whether the changes in the measures are judged acceptable given that they result from an inaccurate response, and whether they indicate that the logic is unduly sensitive to the response assumed from the pilot.

6.2.6 STANDARD ENCOUNTER MODEL

6.2.6.1 Effectively, there are two encounter models, one for use in risk ratio calculations (where the horizontal miss distance is small) and the other for use when assessing the compatibility of the logic design with ATM (where the horizontal miss distance can be comparable with the ATC horizontal separation minimum). This overcomes what would otherwise be an unacceptable simplification: both models treat the horizontal and vertical characteristics of the encounters independently.

6.2.6.2 The standard model is the result of an analysis of a large amount of ground radar data collected in two States. This means that one can expect the performance measures calculated using this standard model to be related to operational reality even though that is not the purpose of the calculations. The data analysed revealed very considerable variation in the airspace characteristics expressed in the encounter model depending on the location of the radar providing the data. The characteristics of the data from the two States were radically different. This implies that a standard encounter model cannot provide predictions of performance that will be valid for any specific location. However, given that a standard model is essential to the definition of standard performance, the model standardized is considered sufficiently complex and representative.

6.2.6.3 To determine the parameters of the standard encounter model (Chapter 4, 4.4.2.6), for example the relative weights of the encounter classes, encounters were reconstructed from ground radar data. This required a reinterpretation of aspects of the encounters, examples of which are given below.

6.2.6.3.1 The definition of "Altitude layer" given for the standard encounter model (Chapter 4, 4.4.1) is simple because it is made solely for the purpose of standardizing the collision avoidance logic. When, in the real encounters observed in the ground radar data, ground level did not correspond to a pressure-altitude of 0 ft, it was necessary to distinguish between height above the ground and pressure-altitude with respect to mean sea level (MSL). The method used to determine the altitude layer appropriate for an encounter observed in real radar data was to place it in Layer 1 if it occurred less than 2 300 ft above ground level (AGL), and to use the pressure-altitude with respect to MSL otherwise. At locations of high altitude, one or more layers were sometimes missing.

6.2.6.3.2 The vertical rates of an aircraft at the beginning and the end of an encounter, $\dot{z}_1$ and $\dot{z}_2$ are, in the standard encounter model, values at precise times, *viz.* $tca - 35$ s and $tca + 5$ s. When processing the data for real encounters observed in the ground radar data, the values used for $\dot{z}_1$ and $\dot{z}_2$ were the average vertical rates over the first 10 s, i.e. [$tca - 40$ s, $tca - 30$ s], and the last 10 s, i.e. [tca, $tca + 10$ s], of the encounter.

6.2.6.3.3 In similar vein, in the real encounters *tca* was the actual time of closest approach, and *hmd* was the actual horizontal separation at closest approach. The vertical miss distance, *vmd*, was either the vertical separation at closest approach, for encounters in which $hmd \geq 500$ ft, or it was the minimum vertical separation during the period of time in which the horizontal separation of the two aircraft was less than 500 ft.

6.2.6.3.4 Some aspects of the standard encounter model, e.g. the magnitude of speed changes during an encounter, could not be determined from examination of the ground radar data (because of the nature of the data) and had to be specified using a general understanding of aircraft dynamics.

6.2.6.3.5 To put the lack of precise correspondence between the model encounters and those observed in radar data into context, it is necessary to bear in mind that the purpose of the standard encounter model is to provide a basis for standardizing the performance of the collision avoidance logic. While, naturally, every realistic effort was made to ensure that the model is as faithful as possible to operational reality, precise fidelity is not required and will not have been achieved. This is not a reason for using an alternative model; the only model that is valid for assessing the performance of the collision avoidance logic against the requirements stated here is the model specified here for that purpose.

6.2.6.4 Any construction of the standard encounter model that can be proved equivalent to that specified in Chapter 4, 4.4.2.6 is acceptable. Two examples of such equivalent alternatives are given below.

6.2.6.4.1 Chapter 4, 4.4.2.6.1 specifies that the performance measures be calculated by creating sets of encounters defined by broad characteristics (specifically: the ordering of the aircraft addresses; the altitude layer; the encounter class; and the approximate value for the vertical miss distance) and combining the results from these sets by using the weights specified in Chapter 4, 4.4.2.6.2. This will involve as many simulations of relatively rare types of encounters, e.g. crossing encounters, as of the more common types of encounters, e.g. non-crossing encounters. This approach ensures that the full range of possibilities within each set is properly investigated. However, the same end can be achieved by creating a number of encounters for each set that is proportional to the specified weight and combining all the encounters into one much larger pool. The only caveat on this alternative approach is that the total number of encounters must be large enough to ensure that the results from the smallest set, considered in isolation, are statistically reliable.

6.2.6.4.2 The statistical distributions for each of the vertical rates have been specified by requiring that first an interval is selected within which the final value is to lie, and then the final value is selected using a distribution that is uniform within the interval. This is merely a device adopted for the sake of clear presentation of the tables in Chapter 4, 4.4.2.6.3.2.4. It would be equivalent to select the value directly using a statistical distribution that is linear within each of the intervals and for which the cumulative probability increases across each interval by an amount equal to the specified probability for that interval.

6.2.6.5 The encounters in the standard encounter model are constructed from a notional closest approach outwards. The time of this notional closest approach is fixed and written "*tca*" in Chapter 4, 4.4.2.6. In the vertical plane, the vertical rates 35 s before *tca* and 5 s after *tca* are selected and joined by a period of acceleration if necessary, and then the altitudes in the trajectory are fixed by requiring that the vertical separation at *tca* equals the selected value for "*vmd*". In the horizontal plane, selected values for "*hmd*", the approach angle, and the aircraft speeds define the relative trajectories of the two aircraft at the time *tca*. The aircraft turns and speed changes are then imposed by modifying the trajectories before and after *tca*. At the conclusion of this process, the time of closest approach only approximates *tca*.

6.2.7 ACAS EQUIPAGE OF THE INTRUDER

6.2.7.1 The standards specify three sets of conditions concerning the equipage of the intruder and the way the intruder aircraft is to be assumed to behave:

a) the other aircraft involved in each encounter is not equipped;

b) the other aircraft is ACAS equipped but follows a trajectory identical to that in the unequipped encounter; and

c) the other aircraft is equipped with an ACAS having a collision avoidance logic identical to that of own ACAS.

6.2.7.2 The first circumstance a) ensures that the logic performs satisfactorily in encounters with an unequipped intruder. The other two circumstances both test the collision avoidance logic when the other aircraft is equipped but do so from different perspectives. Circumstance b) ensures that the logic performs satisfactorily under the constraints of the coordination process, while circumstance c) ensures that the benefits to be expected when both aircraft are equipped are realized.

6.2.7.3 The conditions applying in circumstance b) are intended to allow own ACAS to select its initial RA but to then apply the most pessimistic reasonable assumptions about the effect of the need for coordination on the performance of the own ACAS logic. When own aircraft has the lower aircraft address, the conditions of the test imply that the sense of the RA cannot be reversed. Furthermore, the intruder does not generate an RA and an RAC until the own ACAS RA is announced because an early design included an initial coordination delay (the purpose of which was to allow the coordination to complete and avoid the pilot seeing rapid changes in the RA); the intention of the requirement is to ensure that performance is satisfactory in spite of the deleterious effects of any such delay.

6.2.7.4 Circumstance c) requires that the behaviour of the two aircraft be fully cooperative, but the fact that both ACAS are using the subject logic ensures that the performance measure relates to the subject logic and that the subject logic is effective.

6.2.7.5 As discussed above, the performance specifications are intended to ensure satisfactory operation of the logic and not the system as a whole. To the extent that they are capable of wider interpretation in terms of the benefits of the system as a whole in an operational environment, circumstance c) might be thought to provide the more credible performance measure for ACAS-ACAS encounters. The specified performance of the logic in circumstance b) is worse than that where the intruder is not equipped, because circumstance b) invokes only the constraints imposed by coordination. However, the fact that the cooperation of an intruder cannot be guaranteed and that some pilots will fail to respond to RAs on occasion means that all three measures have operational relevance.

6.3 Reduction in the risk of collision

6.3.1 STATUS OF THE LOGIC RISK RATIO

6.3.1.1 The risk ratio calculated for the purposes of Chapter 4, 4.4.3 is a measure of the performance of the logic and not the ACAS as a whole. For example, ACAS can prevent a collision by prompting the pilot to carry out a successful visual search for the intruder and it can fail because a track is not established or the pilot ignores the RA; these are aspects of the total system that are not reflected in the calculations required for Chapter 4, 4.4.3.

6.3.1.2 When considering the relevance of the "logic risk ratio" figures calculated for Chapter 4, 4.4.3 to operations or policy decisions, it might be helpful to regard them as solely the reliability that can be attached to RAs. They express the effect that following an RA will have on the immediate risk of collision when, at the time it is issued, the pilot has no information other than the RA on which to base a decision whether to follow the RA or ignore it. As a rough guide, the collision risk created by ACAS arises from following the RA so the logic risk ratio overstates this "induced risk ratio"; on the other hand, it also overstates the capability of ACAS to prevent collisions because of the many other failure modes in the total system.

6.3.1.3 The figures calculated for the purposes of Chapter 4, 4.4.3 are unsuitable as guidance concerning the effect of ACAS on the overall risk of collision in an airspace or faced by an airline.

6.3.2 CALCULATION OF THE LOGIC RISK RATIO

6.3.2.1 The risk ratio *R* can be written:

$$R = \frac{\sum \textit{probability of a collision with ACAS}}{\sum \textit{probability of a collision without ACAS}}$$

where the summation is over all encounters, or, more practically, all encounters that contribute to the total risk of collision with or without ACAS. The need for the characteristics and statistics of the encounters to be representative of operational realities is standardized in Chapter 4, 4.4.2.6 and discussed in 6.2.6.

6.3.2.2 The estimated risk of collision depends on the interpretation of the word "collision". While this problem is largely avoided by expressing the requirement in terms of the ratio between the risks of collision with and without ACAS, it is important that realistic allowance is made for the size of the largest aircraft. It would be reasonable to treat a vertical separation of less than 100 ft between the centre points of the two aircraft as if it were small enough to allow a collision. It would not be advisable to use significantly larger miss distances as approximations to collisions because it has been found that the calculated risk ratio is sensitive to the definition of "collision" even though it is a ratio.

6.3.2.3 If the approximation is made that a collision occurs when

$|d| < 100$ ft, where d is the actual vertical separation

Then

$$R = \frac{\sum \text{prob}\,(|d| < 100 \textit{ ft with ACAS})}{\sum \text{prob}\,(|d| < 100 \textit{ ft without ACAS})}$$

where now the summation is over all encounters with zero or extremely small horizontal miss distance.

6.3.2.4 Now introduce e, the altimeter error and a, the apparent vertical separation and note that

$$a = d + e$$

a is conceptually the altitude separation as measured by altimeters. It should not be necessary to consider quantization errors because the modelled altimeter readings can be known with arbitrary precision in the computer simulations. They are quantized before they are provided to ACAS as modelled Mode C reports, which ACAS tracks. This is why the standard Chapter 4, 4.4.2 excludes quantization effects.

6.3.2.5 Define a_{with} to be the apparent vertical separation with ACAS and $a_{without}$ to be the apparent vertical separation without ACAS. Then

$|d| < 100\ ft$ with ACAS

if and only if $|a_{with} - e| < 100\ ft$

i.e. $a_{with} - 100\ ft < e < a_{with} + 100\ ft$

and similarly

$|d| < 100\ ft$ without ACAS

if and only if $|a_{without} - 100\ ft < e < a_{without} + 100\ ft$

6.3.2.6 Risk ratio is thus given by

$$R = \frac{\sum \text{prob}(a_{with} - 100\ \ ft < e < a_{with} + 100\ \ ft)}{\sum \text{prob}(a_{without} - 100\ \ ft < e < a_{without} + 100\ \ ft)}$$

In order to use this formula to calculate risk ratio, the values of a_{with} and $a_{without}$ must be determined for a collection of encounters that is fully representative of all the potential actual encounters in which there is both a risk of collision without ACAS and a risk that ACAS will induce a collision. When these values of hypothetically measured altitude separation are known, knowledge of the errors in altitude measurement completes the calculation.

6.3.3 INDUCED AND UNRESOLVED RISK

6.3.3.1 It is not sufficient to demonstrate that ACAS will prevent collisions that might occur in its absence. The risk that ACAS logic could cause collisions in otherwise safe circumstances must be fully considered, not least because in managed airspace the number of encounters potentially facing an induced risk greatly exceeds the number of near collisions.

6.3.3.2 The upper limit on the logic risk ratio standardized at Chapter 4, 4.4.3 effectively places an approximate upper limit on the ACAS induced risk of collision. Although some other failures could cause ACAS to induce a collision, e.g. pilots manoeuvring on a TA or an RA directing the aircraft into the trajectory of an unseen third party, the induced risk is largely attributable to following RAs. In operational conditions, failure to raise or follow an RA will reduce the risk of an induced collision (even though it increases the absolute risk).

6.3.3.3 The requirement is that the logic is designed to reduce the risk of collision and no distinction is drawn between risk induced by the logic and risk that it is unable to resolve. It is possible to draw such a distinction and even to subdivide the risk into that due to altimeter error and that due to inappropriate operation of the logic but it is considered that this exercise has little value for the design of the logic.

6.3.4 USE OF GROUND RADAR DATA TO CALCULATE RISK RATIO

It is possible to use encounters observed in ground radar data as the basis of the safety calculations described in 6.3.2. However, it is difficult to interpret the results because the calculation concerns extremely rare events and, even when many months of data are used, trajectories have to be modified to insert a risk of collision that was absent in the actual encounters. It is more practicable to use the radar data to inform the choice of the weights to be ascribed to the various encounter classes in the encounter model and thus produce a version of the idealized encounter model that is more representative of the airspace in question than the standard model presented here.

6.4 Compatibility with ATM

6.4.1 NUISANCE ALERT RATE

6.4.1.1 ACAS is required to diagnose a risk of imminent collision on the basis of incomplete information. Furthermore, this information has to be independent of that providing the primary basis for aircraft separation. It follows that there will be alerts in encounters where, from an operational perspective, there would seem to be no risk of collision. Standard Chapter 4, 4.4.4.1 requires that these nuisance alerts be as infrequent as possible.

6.4.1.2 The specification of a nuisance RA given in Chapter 4, 4.4.4.1.2 is made with the view that an RA is a nuisance if normal standard separation is not clearly lost. Additionally, it is intended that the horizontal separation threshold is sufficiently stringent to require the use of a horizontal miss distance filter. The horizontal separation threshold has been set at 40 per cent of normal separation, and the vertical separation threshold has been set at a figure based on an ATC tolerance of deviations of 200 ft from altitude clearance.

6.4.2 COMPATIBLE SENSE SELECTION

The requirement at Chapter 4, 4.4.4.2 is not intended to constrain the manner in which dangerous encounters are resolved, but rather is based on an appreciation that the majority of RAs are likely to be generated in encounters where there is no danger of collision. It places a statistical limit on the frequency with which ACAS disrupts ATC or the normal operation of the aircraft by inverting the vertical separation of two aircraft.

6.4.3 DEVIATIONS CAUSED BY ACAS

The restrictions on the deviations that may be caused by following RAs, Chapter 4, 4.4.4.3, limit the disruption to normal aircraft operation as well as to ATC. While deviations from altitude clearances are the most obviously disruptive to ATC, other deviations, such as that caused by an RA to climb when the aircraft is descending, could be viewed equally seriously by ATC.

6.4.4 USE OF GROUND RADAR DATA OR THE STANDARD ENCOUNTER MODEL

6.4.4.1 Conformance with the requirement for compatibility with ATM can be tested most convincingly using simulations based on reconstructions of actual operational encounters occurring within the coverage of ATC ground radars, provided that only a small proportion of the aircraft thus observed are equipped with ACAS. However, the results of such simulations based on actual data will reflect the particular properties of the airspace (or airspaces) in which the data were collected as much as those of the collision avoidance logic used. Thus, there are considerable practical difficulties in using real encounter data to validate collision avoidance logic, and the provisions of Chapter 4, 4.4.4 assume the use of artificial encounters based on the standard encounter model specified in Chapter 4, 4.4.2.6.

6.4.4.2 The use of the standard encounter model to obtain performance measures describing the operation of the collision avoidance logic will provide only indirect evidence concerning its operation in any particular airspace. Authorities that have access to ground radar data and wish to understand the interaction of ACAS with local ATC practices are advised to use simulations based on their ground radar data rather than the standard encounter model. In doing so, they need to note that the results can be subverted if the aircraft observed are already equipped with ACAS. They will also need to collect sufficient data to ensure that the simulated RAs derived from the data are statistically representative; for example, data collected over 100 days in one State contained very few examples of some types of RAs.

6.5 Relative value of conflicting objectives

The design of the collision avoidance logic for ACAS must strike an operationally acceptable balance between the reduction in the risk of collision and the disruption caused by ACAS alerts. The requirements relating to the risk of collision (Chapter 4, 4.4.3) and the disruption to ATC (Chapter 4, 4.4.4) are minimum standards that are known to be achievable from work with a prototype system. Other designs are only acceptable when it can be demonstrated that the risk of collision and the disruption to ATC have both been minimized as much as practicable in the context of a need to minimize the other.

TABLES

Table A-1

Nominal altitude band	*SLC command code*	*Altitude threshold at which sensitivity level value changes*	*Hysteresis values*
0 to 1 000 ft AGL	2	1 000 ft AGL	±100 ft
1 000 ft to 2 350 ft AGL	3	2 350 ft AGL	±200 ft
2 350 ft AGL to FL 50	4	FL 50	±500 ft
FL 50 to FL 100	5	FL 100	±500 ft
FL 100 to FL 200	6	FL 200	±500 ft
above FL 200	7		

Table A-2. RA strength options

Constraint	*Type*	$\dot{Z}_g$
Upward sense RA		
Increased climb	Positive	$>\dot{Z}_{clm}$
Climb	Positive	$\dot{Z}_{clm}$
Do not descend	VSL	0
Do not descend faster than 2.5 m/s	VSL	–2.5 m/s (–500 ft/min)
Do not descend faster than 5.1 m/s	VSL	–5.1 m/s (–1 000 ft/min)
Do not descend faster than 10 m/s	VSL	–10 m/s (–2 000 ft/min)
Downward sense RA		
Increased climb	Positive	$<\dot{Z}_{des}$
Descend	Positive	$\dot{Z}_{des}$
Do not climb	VSL	0
Do not climb faster than 2.5 m/s	VSL	+2.5 m/s (+500 ft/min)
Do not climb faster than 5.1 m/s	VSL	+5.1 m/s (+1 000 ft/min)
Do not climb faster than 10 m/s	VSL	+10 m/s (+2 000 ft/min)

FIGURES

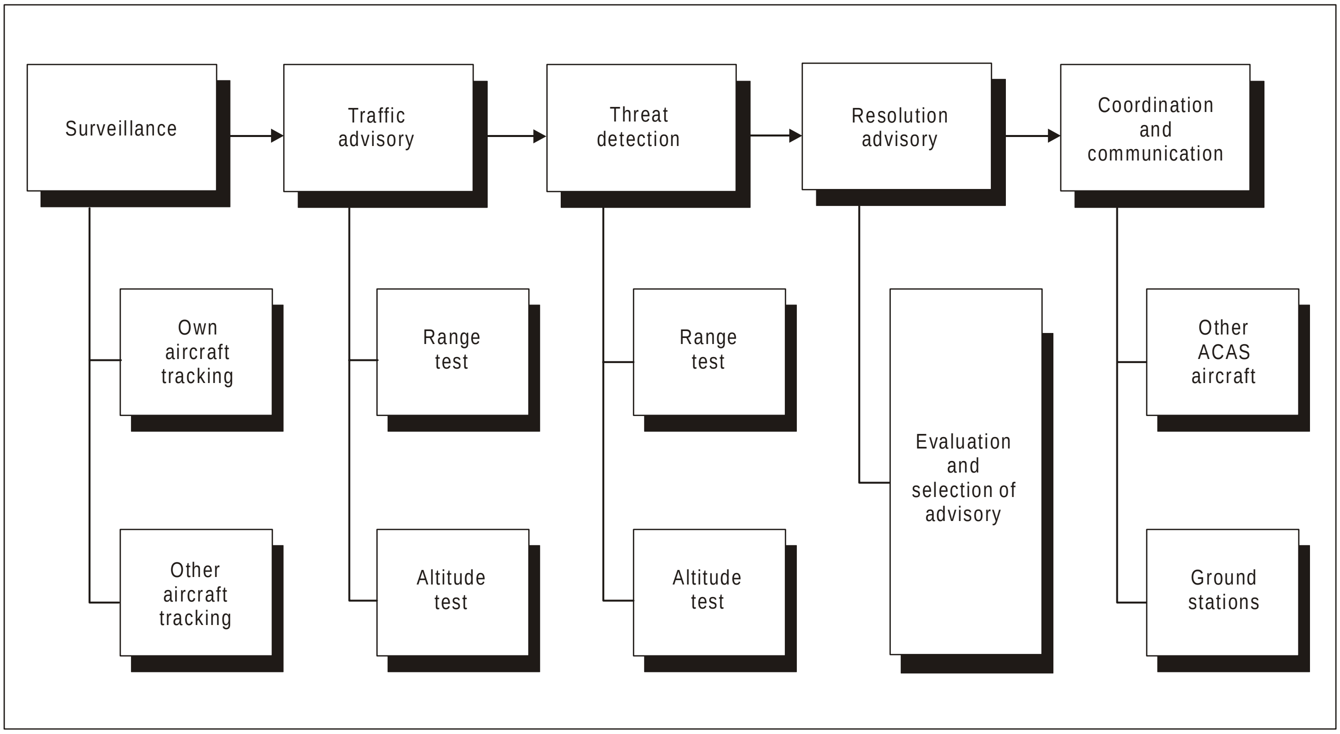

Figure A-1. Illustration of ACAS functions

TOP ANTENNA

FORWARD DIRECTION

STEP NUMBER	EFFECTIVE RADIATED POWER (dBm)	MINIMUM EFFECTIVE RADIATED INTERROGATION POWER (dBm)	INTERFERENCE LIMITING PRIORITY	MTL (-dBm)
1	S • • I	52	1	74
2	S • I	51	5	74
3	S • • I	50	9	74
4	S • I	49	13	74
5	S • • I	48	17	74
6	S • I	47	21	74
7	S • • I	46	25	74
8	S • I	45	29	73
9	S • • I	44	33	72
10	S • I	43	37	71
11	S • • I	42	41	70
12	S • I	41	45	69
13	S • • I	40	49	68
14	S • I	39	53	67
15	S • • I	38	57	66
16	S • I	37	61	65
17	S • • I	36	64	64
18	S • I	35	67	63
19	S • • I	34	70	62
20	S • I	33	73	61
21	S • • I	32	76	60
22	S • I	31	77	59
23	S • • I	30	78	58
24	• • • I	29	79	57

27 37 47 57

EFFECTIVE RADIATED POWER (dBm)

NOTES.— "I" indicates ERP of P_1, P_3, and P_4 interrogation pulses.

"S" indicates ERP of S_1 suppression pulse.

"S • I" means that the S_1 ERP is 2 dB less than the interrogation ERP.

"S • • I" means that the S_1 ERP is 3 dB less than the interrogation ERP.

In steps 24, 63, 64, 79 and 83, no S_1 pulses are transmitted.

Figure A-2a. Example of high-density whisper-shout sequence

STEP NUMBER	EFFECTIVE RADIATED POWER (dBm)	MINIMUM EFFECTIVE RADIATED INTERROGATION POWER (dBm)	INTERFERENCE LIMITING PRIORITY	MTL (-dBm)
	TOP ANTENNA — LEFT & RIGHT DIRECTIONS			
25, 26	S • • I	48	2, 3	74
27, 28	S • I	47	6, 7	74
29, 30	S • • I	46	10, 11	74
31, 32	S • I	45	14, 15	73
33, 34	S • • I	44	18, 19	72
35, 36	S • I	43	22, 23	71
37, 38	S • • I	42	26, 27	70
39, 40	S • I	41	30, 31	69
41, 42	S • • I	40	34, 35	68
43, 44	S • I	39	38, 39	67
45, 46	S • • I	38	42, 43	66
47, 48	S • I	37	46, 47	65
49, 50	S • • I	36	50, 51	64
51, 52	S • I	35	54, 55	63
53, 54	S • • I	34	58, 59	62
55, 56	S • I	33	62, 63	61
57, 58	S • • I	32	65, 66	60
59, 60	S • I	31	68, 69	59
61, 62	S • • I	30	71, 72	58
63, 64	• • • • I	29	74, 75	57
	TOP ANTENNA — AFT DIRECTION			
65	S • I	43	4	71
66	S • • I	42	8	70
67	S • I	41	12	69
68	S • • I	40	16	68
69	S • I	39	20	67
70	S • • I	38	24	66
71	S • I	37	28	65
72	S • • I	36	32	64
73	S • I	35	36	63
74	S • • I	34	40	62
75	S • I	33	44	61
76	S • • I	32	48	60
77	S • I	31	52	59
78	S • • I	30	56	58
79	• • • • I	29	60	57
	BOTTOM OMNI ANTENNA			
80	S • • I	34	80	62
81	S • • I	32	81	60
82	S • • I	30	82	58
83	• • I	28	83	56

27 37 47 57

EFFECTIVE RADIATED POWER (dBm)

NOTES.— "I" indicates ERP of P_1, P_3, and P_4 interrogation pulses.

"S" indicates ERP of S_1 suppression pulse.

"S • I" means that the S_1 ERP is 2 dB less than the interrogation ERP.

"S • • I" means that the S_1 ERP is 3 dB less than the interrogation ERP.

In steps 24, 63, 64, 79 and 83, no S_1 pulses are transmitted.

Figure A-2a. Example of high-density whisper-shout sequence (cont)

STEP NUMBER		MINIMUM EFFECTIVE RADIATED INTERROGATION POWER (dBm)	INTERFERENCE LIMITING PRIORITY	MTL (-dBm)
1	Top Antenna, Forward Direction: S • • • • • • • • • I	52	*Note.— Each 1 dB reduction in the sequence follows the priority for the forward beam in Figure A-2a.*	74
2	S • • • • • • • • • I	48		74
3	S • • • • • • • • • I	44		72
4	S • • • • • • • • • I	40		68
5	S • • • • • • • • • I	36		64
6	• • • • • • • • • I	32		60
7, 8	Top Antenna, Left & Right Direction: S • • • • • • • • • I	48	*Note.— Each 1 db reduction in the sequence follows the priority for the right/left beam in Figure A-2a.*	74
9, 10	S • • • • • • • • • I	44		72
11, 12	S • • • • • • • • • I	40		68
13, 14	S • • • • • • • • • I	36		64
15, 16	• • • • • • • • • I	32		60
17	Top Antenna, Rear Direction: S • • • • • • • • • I	43	*Note.— Each 1 db reduction in the sequence follows the priority for the rear beam in Figure A-2a.*	71
18	S • • • • • • • • • I	39		67
19	S • • • • • • • • • I	35		63
20	• • • • • • • • • I	31		59
21	Bottom Omni: S • • I	34	*Note.— Each 1 db reduction in the sequence follows the priority for the bottom beam in Figure A-2a.*	62
22	S • • I	32		60
23	S • • I	30		58
24	• • • I	28		56

22 32 42 52

MIN EFFECTIVE RADIATED POWER (dBm)

NOTES.— "I" indicates ERP of P_1, P_3, and P_4 interrogation pulses.

"S" indicates ERP of S_1 suppression pulse.

"S • • I" means that the S_1 ERP is 3 dB less than the interrogation ERP.

"S • • • • • • • • • I" means that the S_1 ERP is 10 dB less than the interrogation ERP.

In the last steps of each quadrant, no S_1 pulses are transmitted.

Figure A-2b. Example of low-density whisper-shout sequence

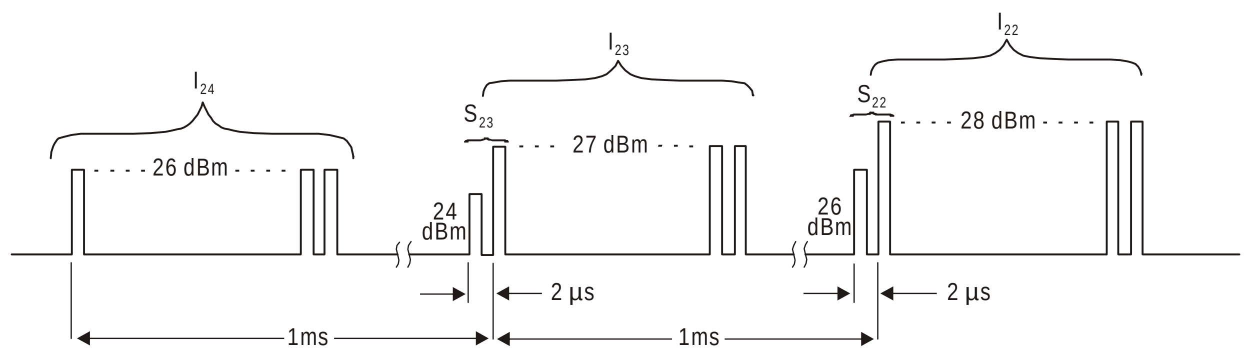

Figure A-3. Timing for lowest power steps in omnidirectional whisper-shout sequence for top antenna

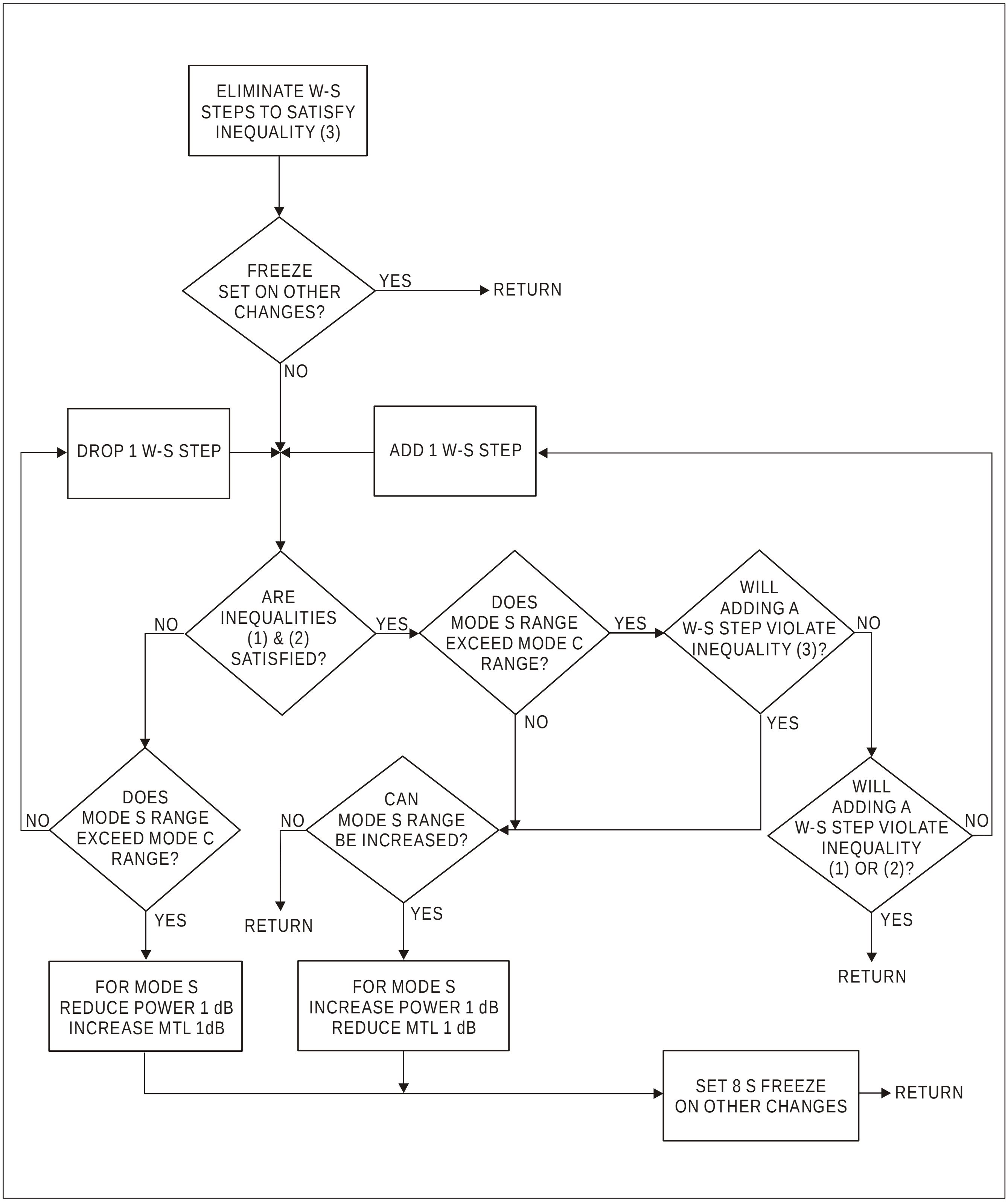

Figure A-4. Interference limiting flow diagram

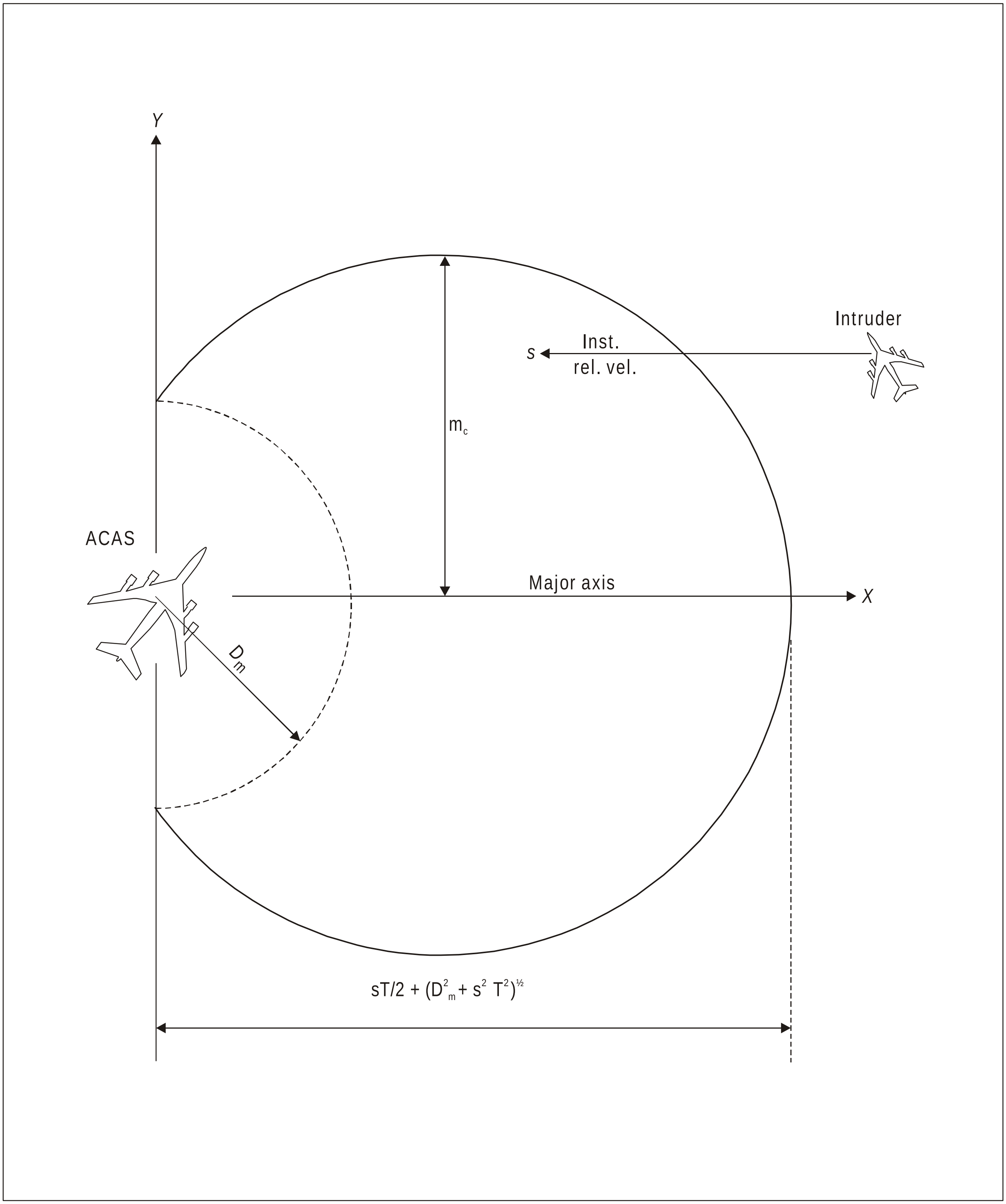

Figure A-5. Section through protected volume in the instantaneous collision plane

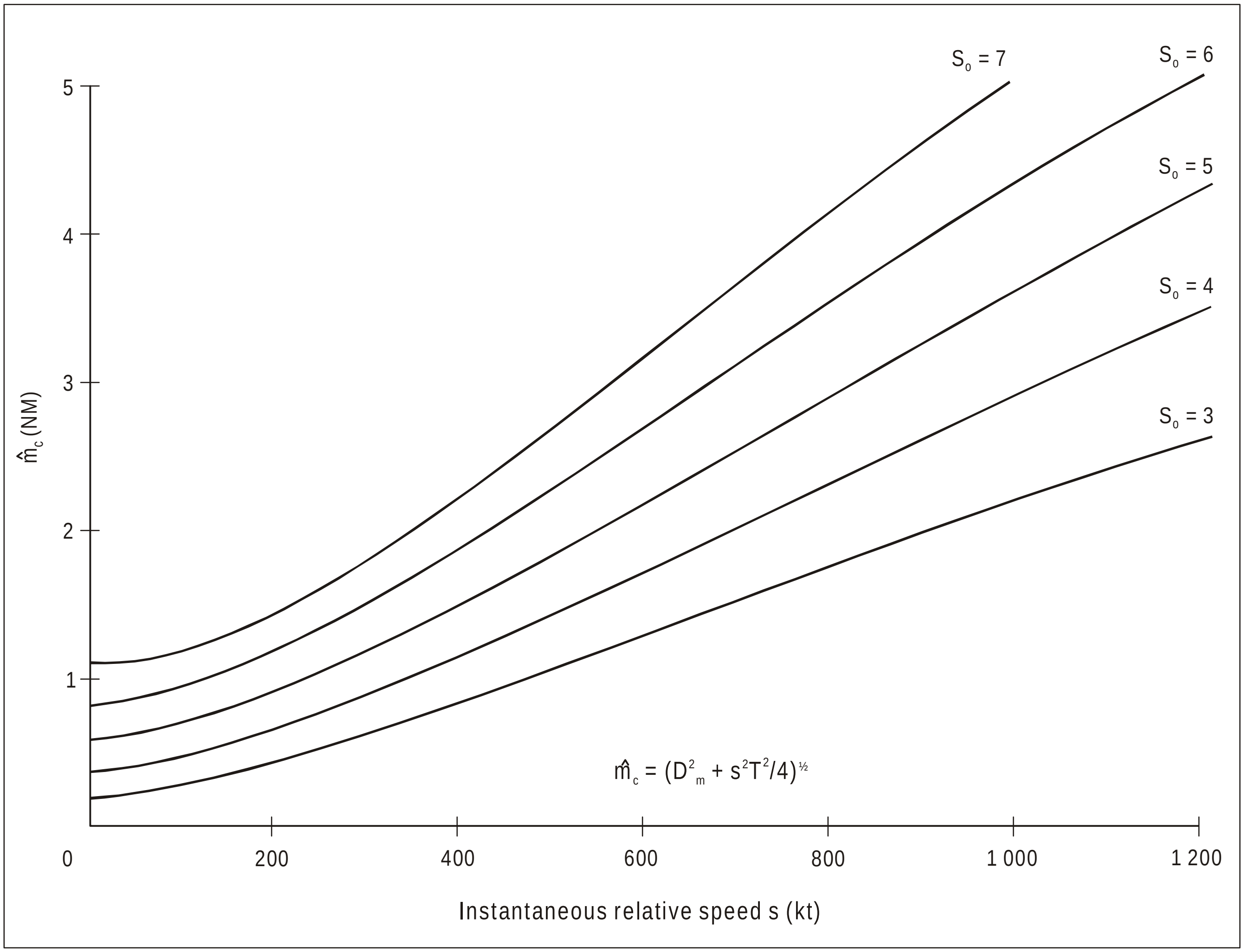

Figure A-6. Critical miss distance

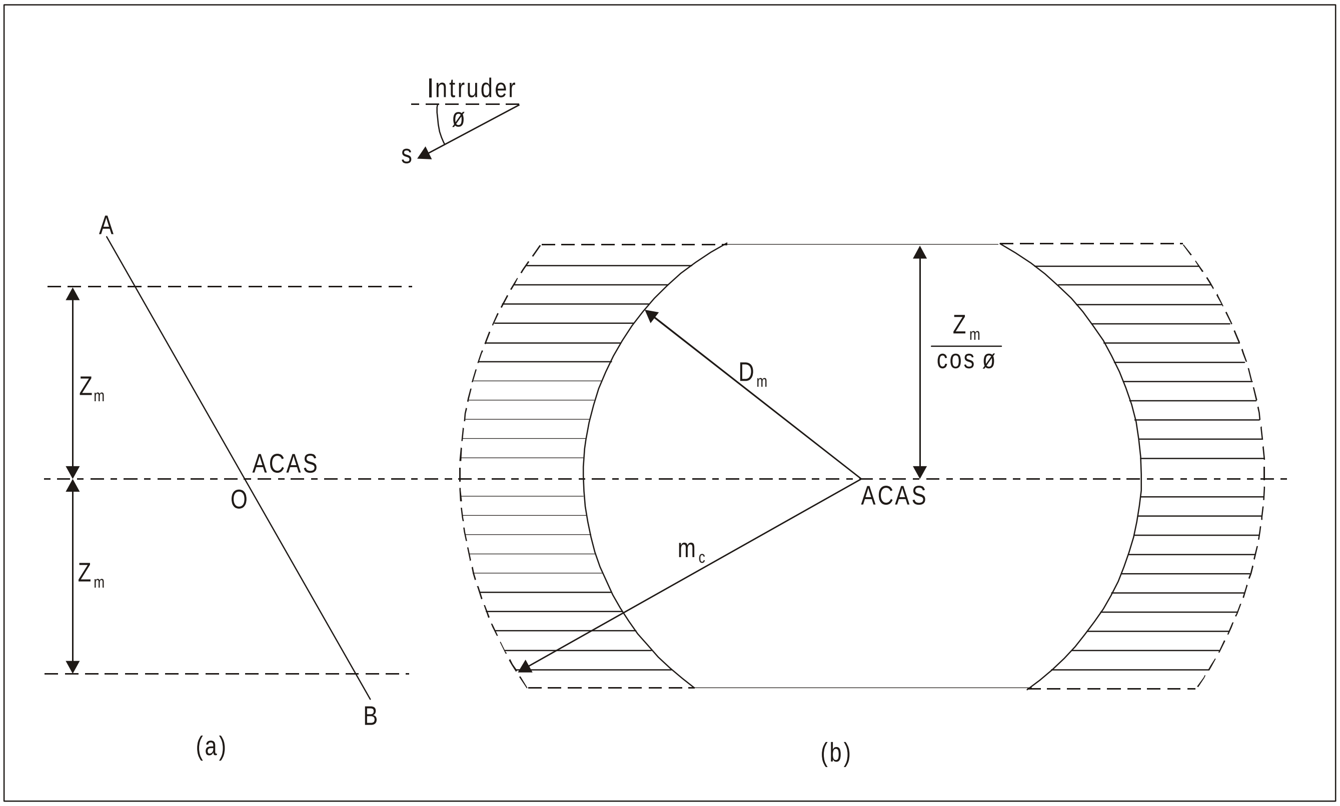

Figure A-7. Critical area for ideal altitude test

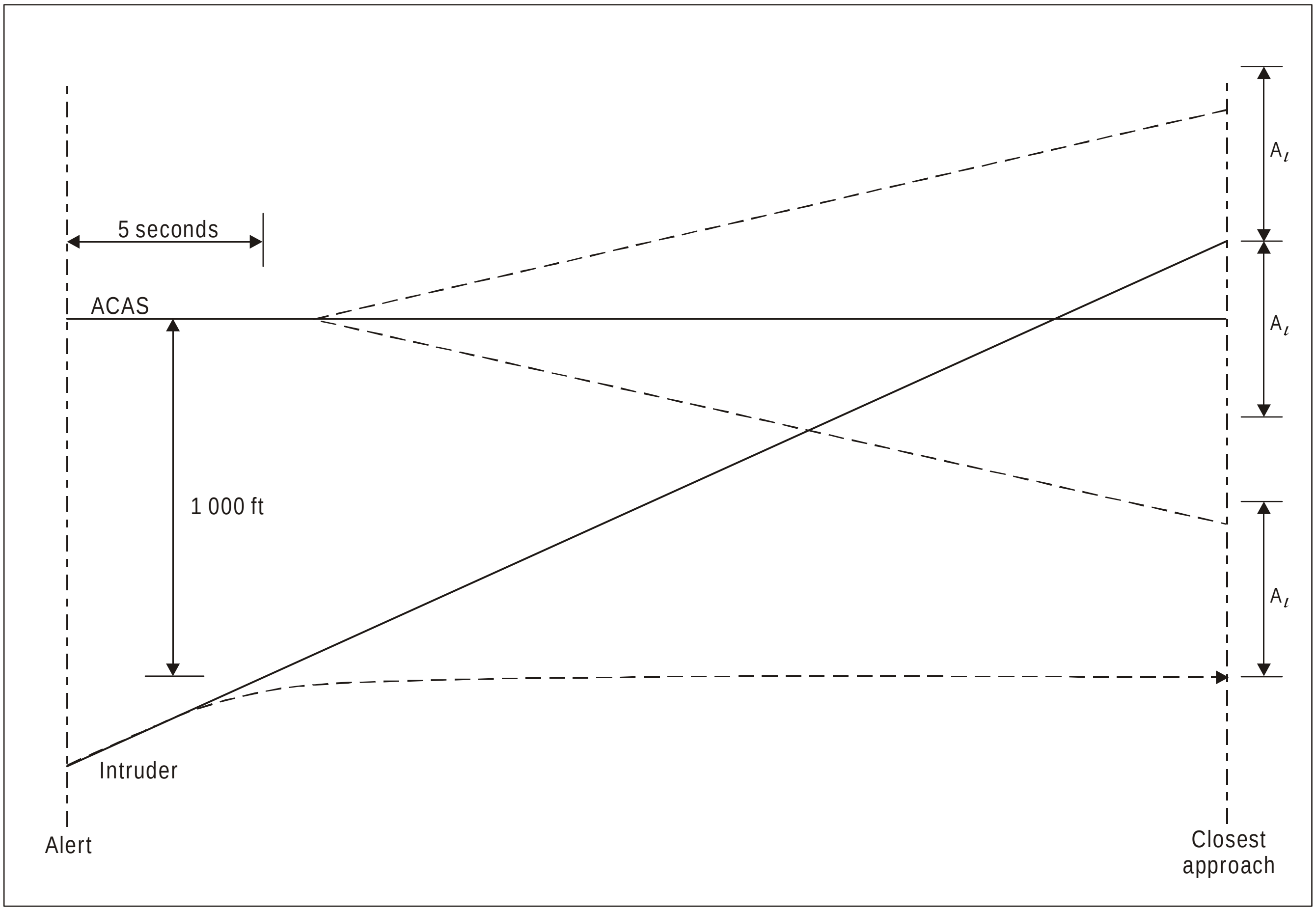

Figure A-8. Induced close encounter

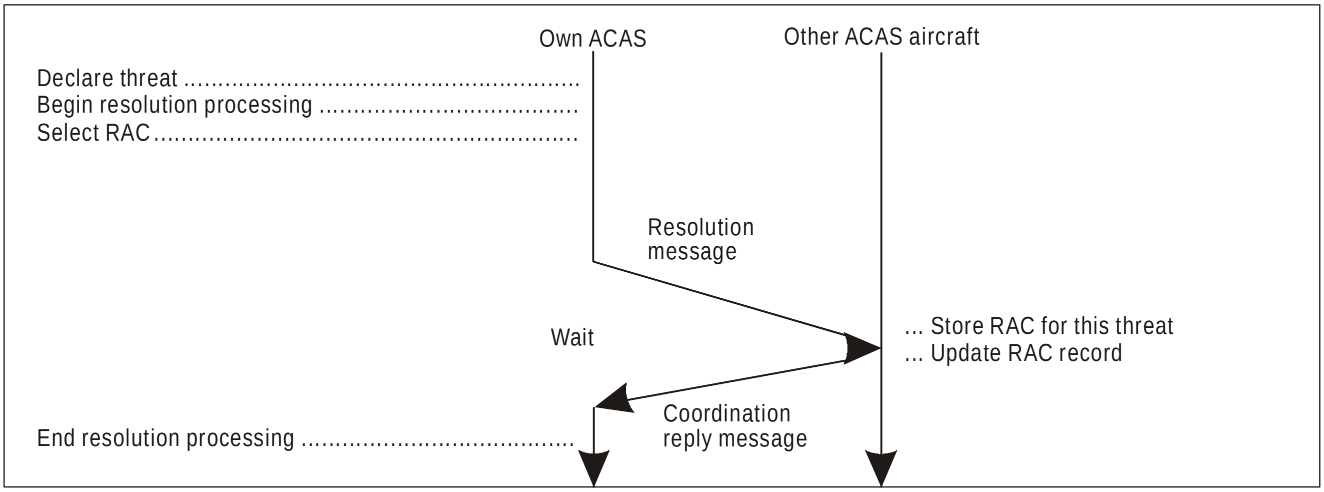

Figure A-9. Coordination sequence

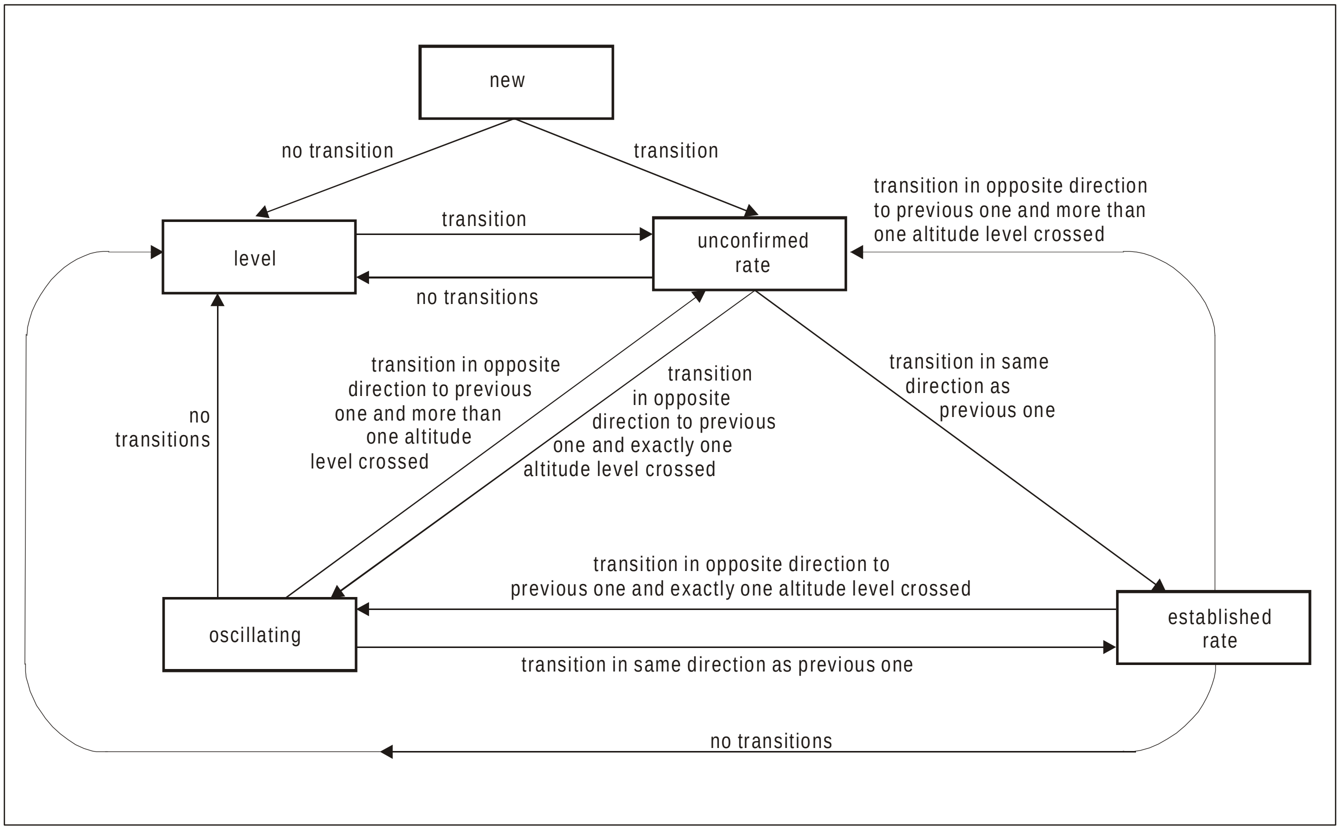

Figure A-10. Changes between track classifications

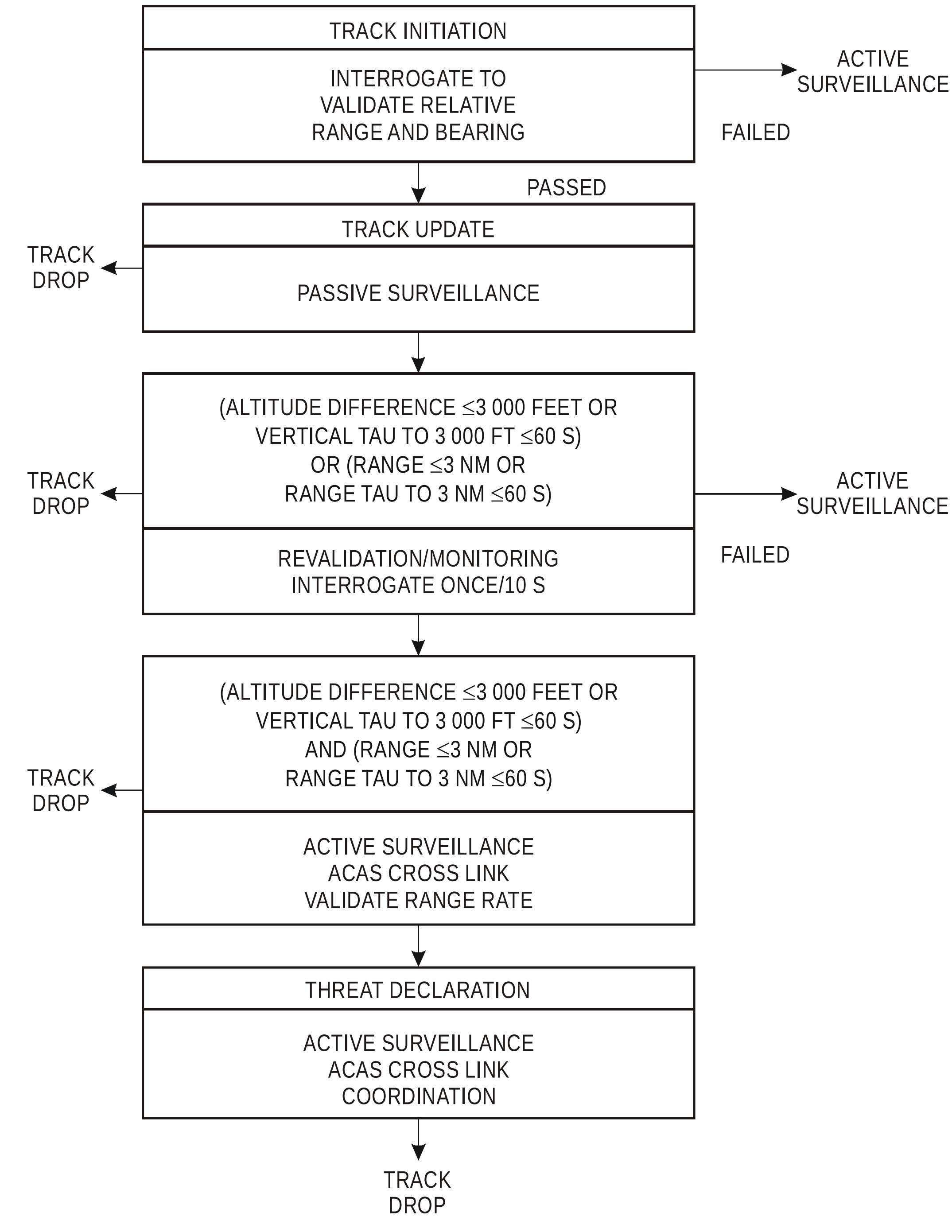

Figure A-11. ACAS hybrid surveillance algorithm

— END —

ICAO TECHNICAL PUBLICATIONS

The following summary gives the status, and also describes in general terms the contents of the various series of technical publications issued by the International Civil Aviation Organization. It does not include specialized publications that do not fall specifically within one of the series, such as the Aeronautical Chart Catalogue *or the* Meteorological Tables for International Air Navigation.

International Standards and Recommended Practices are adopted by the Council in accordance with Articles 54, 37 and 90 of the Convention on International Civil Aviation and are designated, for convenience, as Annexes to the Convention. The uniform application by Contracting States of the specifications contained in the International Standards is recognized as necessary for the safety or regularity of international air navigation while the uniform application of the specifications in the Recommended Practices is regarded as desirable in the interest of safety, regularity or efficiency of international air navigation. Knowledge of any differences between the national regulations or practices of a State and those established by an International Standard is essential to the safety or regularity of international air navigation. In the event of non-compliance with an International Standard, a State has, in fact, an obligation, under Article 38 of the Convention, to notify the Council of any differences. Knowledge of differences from Recommended Practices may also be important for the safety of air navigation and, although the Convention does not impose any obligation with regard thereto, the Council has invited Contracting States to notify such differences in addition to those relating to International Standards.

Procedures for Air Navigation Services (PANS) are approved by the Council for worldwide application. They contain, for the most part, operating procedures regarded as not yet having attained a sufficient degree of maturity for adoption as International Standards and Recommended Practices, as well as material of a more permanent character which is considered too detailed for incorporation in an Annex, or is susceptible to frequent amendment, for which the processes of the Convention would be too cumbersome.

Regional Supplementary Procedures (SUPPS) have a status similar to that of PANS in that they are approved by the Council, but only for application in the respective regions. They are prepared in consolidated form, since certain of the procedures apply to overlapping regions or are common to two or more regions.

The following publications are prepared by authority of the Secretary General in accordance with the principles and policies approved by the Council.

Technical Manuals provide guidance and information in amplification of the International Standards, Recommended Practices and PANS, the implementation of which they are designed to facilitate.

Air Navigation Plans detail requirements for facilities and services for international air navigation in the respective ICAO Air Navigation Regions. They are prepared on the authority of the Secretary General on the basis of recommendations of regional air navigation meetings and of the Council action thereon. The plans are amended periodically to reflect changes in requirements and in the status of implementation of the recommended facilities and services.

ICAO Circulars make available specialized information of interest to Contracting States. This includes studies on technical subjects.

COVER SHEET TO AMENDMENT 82

INTERNATIONAL STANDARDS
AND RECOMMENDED PRACTICES

AERONAUTICAL TELECOMMUNICATIONS

ANNEX 10
TO THE CONVENTION ON INTERNATIONAL CIVIL AVIATION

VOLUME V
AERONAUTICAL RADIO FREQUENCY SPECTRUM UTILIZATION

SECOND EDITION OF VOLUME V — JULY 2001

INTERNATIONAL CIVIL AVIATION ORGANIZATION

Checklist of Amendments to Annex 10, Volume V

	Effective date	*Date of applicability*
Second Edition (incorporates Amendments 71 to 76)	16 July 2001	1 November 2001
Amendment 77 (adopted by the Council on 27 February 2002)	15 July 2002	28 November 2002
Amendment 78 (did not affect Volume V)	—	—
Amendment 79 (did not affect Volume V)	—	—
Amendment 80 (did not affect Volume V)	—	—
Amendment 81 (did not affect Volume V)	—	—
Amendment 82 (did not affect Volume V)	—	—

Transmittal note

Amendment 82

to the

International Standards and
Recommended Practices

AERONAUTICAL TELECOMMUNICATIONS

(Annex 10, Volume V, to the Convention on International Civil Aviation)

1. Replace page (vii) of Annex 10, Volume V (Second Edition) with the attached page, updated to indicate the issuance of Amendment 82 which becomes applicable on 22 November 2007.

2. Record the entry of this amendment on page (ii).

Table A. Amendments to Annex 10, Volume V

Amendment	*Source(s)*	*Subject(s)*	*Adopted* *Effective* *Applicable*
71	Air Navigation Commission; SP COM/OPS/95 Divisional Meeting; third meeting of the Aeronautical Mobile Communications Panel (AMCP)	Introduction of new Volume V consisting of existing Annex material and addition of material relating to the introduction of 8.33 kHz channel spacing and changes to material related to the protection of air-ground communications in the VHF band.	12 March 1996 15 July 1996 7 November 1996
72	Air Navigation Commission; fourth meeting of the Aeronautical Mobile Communications Panel (AMCP)	Definition for VHF digital link; amendment to Table 4-1 *(bis)*.	12 March 1997 21 July 1997 6 November 1997
73	—	No change.	—
74	Air Navigation Commission	Introduction of: a) an interpilot air-to-air channel; and b) changes to specifications on emergency locator transmitters.	18 March 1999 19 July 1999 4 November 1999
75	Air Navigation Commission; sixth meeting of the Aeronautical Mobile Communications Panel (AMCP)	Clarification of guidance material on VDL interference immunity performance.	13 March 2000 17 July 2000 2 November 2000
76 (2nd Edition)	Seventh meeting of the Aeronautical Mobile Communications Panel (AMCP)	Integrated voice and data link system (VDL Mode 3); data link satisfying surveillance applications (VDL Mode 4); update of references to the ITU Radio Regulations.	12 March 2001 16 July 2001 1 November 2001
77	Secretariat	Consequential changes resulting from GNSS SARPs which provide for GBAS data broadcast in the band 108 – 117.975 MHz.	27 February 2002 15 July 2002 28 November 2002
78	—	No change.	—
79	—	No change.	—
80	—	No change.	—
81	—	No change.	—
82	—	No change.	—

COVER SHEET TO AMENDMENT 45

INTERNATIONAL STANDARDS
AND RECOMMENDED PRACTICES

AIR TRAFFIC SERVICES

AIR TRAFFIC CONTROL SERVICE
FLIGHT INFORMATION SERVICE
ALERTING SERVICE

ANNEX 11
TO THE CONVENTION ON INTERNATIONAL CIVIL AVIATION

THIRTEENTH EDITION — JULY 2001

INTERNATIONAL CIVIL AVIATION ORGANIZATION

Checklist of Amendments to Annex 11

	Effective date	*Date of applicability*
Thirteenth Edition	16 July 2001	1 November 2001
Amendment 41 (adopted by the Council on 21 February 2002)	15 July 2002	28 November 2002
Amendment 42 (adopted by the Council on 7 March 2003)	14 July 2003	27 November 2003
Amendment 43 (adopted by the Council on 2 March 2005)	11 July 2005	24 November 2005
Amendment 44 (adopted by the Council on 14 March 2006)	17 July 2006	23 November 2006
Amendment 45 (adopted by the Council on 26 February 2007) Replacement pages (iii), (xiii), 1-1 to 1-7, 2-2 to 2-12, 3-4, 3-6, 6-1 to 6-4, 7-1 to 7-3, APP 1-1, APP 2-1 to APP 2-3, APP 3-1, ATT A-1, ATT A-4, ATT A-5, ATT B-1, ATT B-3 and ATT B-4.	16 July 2007	22 November 2007

Transmittal note

Amendment 45

to the

International Standards and
Recommended Practices

AIR TRAFFIC SERVICES

(Annex 11 to the Convention on International Civil Aviation)

1. Insert the following replacement pages in Annex 11 (Thirteenth Edition) to incorporate Amendment 45 which becomes applicable on 22 November 2007:

    a) Page (iii) — Table of Contents

    b) Page (xiii) — Foreword

    c) Pages 1-1 to l-7 — Chapter 1

    d) Pages 2-2 to 2-12 — Chapter 2

    e) Pages 3-4 and 3-6 — Chapter 3

    f) Pages 6-1 to 6-4 — Chapter 6

    g) Pages 7-1 to 7-3 — Chapter 7

    h) Page APP 1-1 — Appendix 1

    i) Pages APP 2-1 to APP 2-3 — Appendix 2

    j) Page APP 3-1 — Appendix 3

    k) Pages ATT A-1, ATT A-4 and ATT A-5 — Attachment A

    l) Page ATT B-1, ATT B-3 and ATT B-4 — Attachment B

2. Record the entry of this amendment on page (ii).

TABLE OF CONTENTS

Amendment(s)	*Source(s)*	*Subject(s)*	*Adopted/approved Effective Applicable*
41	Tenth meeting of the Review of the General Concept of Separation Panel (RGCSP/10); Seventeenth meeting of the Dangerous Goods Panel (DGP/17)	Spacing between parallel area navigation (RNAV) routes; and notification of dangerous goods information to rescue coordination centres (RCCs).	21 February 2002 15 July 2002 28 November 2002
42	Laser Emitters and Flight Safety Study Group; Secretariat; the Proficiency Requirements in Common English Study Group; Air Navigation Commission	Laser beam emissions; language proficiency requirements; and air traffic contingency measures.	7 March 2003 14 July 2003 27 November 2003
43	Secretariat; Aeronautical Information Services/ Aeronautical Charts (AIS/MAP) Divisional Meeting (1998)	Definitions; use of surface movement radar; ATS requirements for communications; meteorology information; height-keeping performance by aircraft; ATS safety management; electronic terrain and obstacle data; editorial amendments.	2 March 2005 11 July 2005 24 November 2005
44	35th Session of the ICAO Assembly; Eleventh Air Navigation Conference; Air Navigation Commission	ATS safety management; recording devices.	14 March 2006 17 July 2006 23 November 2006
45	Air Navigation Commission	Definitions and associated procedures for ADS-B, ADS-C and RCP; coordination procedures between ATS and other entities; name-code designators; introduction of wind shear alerts.	26 February 2007 16 July 2007 22 November 2007

INTERNATIONAL STANDARDS AND RECOMMENDED PRACTICES

CHAPTER 1. DEFINITIONS

Note 1.— Throughout the text of this document the term "service" is used as an abstract noun to designate functions, or service rendered; the term "unit" is used to designate a collective body performing a service.

Note 2.— The designation (RR) in these definitions indicates a definition which has been extracted from the Radio Regulations of the International Telecommunication Union (ITU) (see Handbook on Radio Frequency Spectrum Requirements for Civil Aviation including statement of approved ICAO policies (*Doc 9718)).*

When the following terms are used in the Standards and Recommended Practices for Air Traffic Services, they have the following meanings:

Accepting unit. Air traffic control unit next to take control of an aircraft.

Accident. An occurrence associated with the operation of an aircraft which takes place between the time any person boards the aircraft with the intention of flight until such time as all such persons have disembarked, in which:

a) a person is fatally or seriously injured as a result of:

— being in the aircraft, or

— direct contact with any part of the aircraft, including parts which have become detached from the aircraft, or

— direct exposure to jet blast,

except when the injuries are from natural causes, self-inflicted or inflicted by other persons, or when the injuries are to stowaways hiding outside the areas normally available to the passengers and crew; or

b) the aircraft sustains damage or structural failure which:

— adversely affects the structural strength, performance or flight characteristics of the aircraft, and

— would normally require major repair or replacement of the affected component,

except for engine failure or damage, when the damage is limited to the engine, its cowlings or accessories; or for damage limited to propellers, wing tips, antennas, tires, brakes, fairings, small dents or puncture holes in the aircraft skin; or

c) the aircraft is missing or is completely inaccessible.

Note 1.— For statistical uniformity only, an injury resulting in death within thirty days of the date of the accident is classified as a fatal injury by ICAO.

Note 2.— An aircraft is considered to be missing when the official search has been terminated and the wreckage has not been located.

Accuracy. A degree of conformance between the estimated or measured value and the true value.

Note.— For measured positional data the accuracy is normally expressed in terms of a distance from a stated position within which there is a defined confidence of the true position falling.

ADS-C agreement. A reporting plan which establishes the conditions of ADS-C data reporting (i.e. data required by the air traffic services unit and frequency of ADS-C reports which have to be agreed to prior to using ADS-C in the provision of air traffic services).

Note.— The terms of the agreement will be exchanged between the ground system and the aircraft by means of a contract, or a series of contracts.

Advisory airspace. An airspace of defined dimensions, or designated route, within which air traffic advisory service is available.

Advisory route. A designated route along which air traffic advisory service is available.

Aerodrome. A defined area on land or water (including any buildings, installations and equipment) intended to be used either wholly or in part for the arrival, departure and surface movement of aircraft.

Aerodrome control service. Air traffic control service for aerodrome traffic.

Aerodrome control tower. A unit established to provide air traffic control service to aerodrome traffic.

Aerodrome traffic. All traffic on the manoeuvring area of an aerodrome and all aircraft flying in the vicinity of an aerodrome.

Note.— An aircraft is in the vicinity of an aerodrome when it is in, entering or leaving an aerodrome traffic circuit.

Aeronautical fixed service (AFS). A telecommunication service between specified fixed points provided primarily for the safety of air navigation and for the regular, efficient and economical operation of air services.

Aeronautical Information Publication (AIP). A publication issued by or with the authority of a State and containing aeronautical information of a lasting character essential to air navigation.

Aeronautical mobile service (RR S1.32). A mobile service between aeronautical stations and aircraft stations, or between aircraft stations, in which survival craft stations may participate; emergency position-indicating radio beacon stations may also participate in this service on designated distress and emergency frequencies.

Aeronautical telecommunication station. A station in the aeronautical telecommunication service.

Airborne collision avoidance system (ACAS). An aircraft system based on secondary surveillance radar (SSR) transponder signals which operates independently of ground-based equipment to provide advice to the pilot on potential conflicting aircraft that are equipped with SSR transponders.

Aircraft. Any machine that can derive support in the atmosphere from the reactions of the air other than the reactions of the air against the earth's surface.

Air-ground communication. Two-way communication between aircraft and stations or locations on the surface of the earth.

AIRMET information. Information issued by a meteorological watch office concerning the occurrence or expected occurrence of specified en-route weather phenomena which may affect the safety of low-level aircraft operations and which was not already included in the forecast issued for low-level flights in the flight information region concerned or sub-area thereof.

Air-taxiing. Movement of a helicopter/VTOL above the surface of an aerodrome, normally in ground effect and at a ground speed normally less than 37 km/h (20 kt).

Note.— The actual height may vary, and some helicopters may require air-taxiing above 8 m (25 ft) AGL to reduce ground effect turbulence or provide clearance for cargo slingloads.

Air traffic. All aircraft in flight or operating on the manoeuvring area of an aerodrome.

Air traffic advisory service. A service provided within advisory airspace to ensure separation, in so far as practical, between aircraft which are operating on IFR flight plans.

Air traffic control clearance. Authorization for an aircraft to proceed under conditions specified by an air traffic control unit.

Note 1.— For convenience, the term "air traffic control clearance" is frequently abbreviated to "clearance" when used in appropriate contexts.

Note 2.— The abbreviated term "clearance" may be prefixed by the words "taxi", "take-off", "departure", "en route", "approach" or "landing" to indicate the particular portion of flight to which the air traffic control clearance relates.

Air traffic control service. A service provided for the purpose of:

a) preventing collisions:

   1) between aircraft, and

   2) on the manoeuvring area between aircraft and obstructions; and

b) expediting and maintaining an orderly flow of air traffic.

Air traffic control unit. A generic term meaning variously, area control centre, approach control unit or aerodrome control tower.

Air traffic flow management (ATFM). A service established with the objective of contributing to a safe, orderly and expeditious flow of air traffic by ensuring that ATC capacity is utilized to the maximum extent possible and that the traffic volume is compatible with the capacities declared by the appropriate ATS authority.

Air traffic service. A generic term meaning variously, flight information service, alerting service, air traffic advisory service, air traffic control service (area control service, approach control service or aerodrome control service).

Air traffic services airspaces. Airspaces of defined dimensions, alphabetically designated, within which specific types of flights may operate and for which air traffic services and rules of operation are specified.

Note.— ATS airspaces are classified as Class A to G as described in 2.6.

Air traffic services reporting office. A unit established for the purpose of receiving reports concerning air traffic services and flight plans submitted before departure.

Note.— An air traffic services reporting office may be established as a separate unit or combined with an existing unit, such as another air traffic services unit, or a unit of the aeronautical information service.

Air traffic services unit. A generic term meaning variously, air traffic control unit, flight information centre or air traffic services reporting office.

Airway. A control area or portion thereof established in the form of a corridor.

ALERFA. The code word used to designate an alert phase.

Alerting service. A service provided to notify appropriate organizations regarding aircraft in need of search and rescue aid, and assist such organizations as required.

Alert phase. A situation wherein apprehension exists as to the safety of an aircraft and its occupants.

Alternate aerodrome. An aerodrome to which an aircraft may proceed when it becomes either impossible or inadvisable to proceed to or to land at the aerodrome of intended landing. Alternate aerodromes include the following:

Take-off alternate. An alternate aerodrome at which an aircraft can land should this become necessary shortly after take-off and it is not possible to use the aerodrome of departure.

En-route alternate. An aerodrome at which an aircraft would be able to land after experiencing an abnormal or emergency condition while en route.

ETOPS en-route alternate. A suitable and appropriate alternate aerodrome at which an aeroplane would be able to land after experiencing an engine shutdown or other abnormal or emergency condition while en route in an ETOPS operation.

Destination alternate. An alternate aerodrome to which an aircraft may proceed should it become either impossible or inadvisable to land at the aerodrome of intended landing.

Note.— The aerodrome from which a flight departs may also be an en-route or a destination alternate aerodrome for that flight.

Altitude. The vertical distance of a level, a point or an object considered as a point, measured from mean sea level.

Approach control service. Air traffic control service for arriving or departing controlled flights.

Approach control unit. A unit established to provide air traffic control service to controlled flights arriving at, or departing from, one or more aerodromes.

Appropriate ATS authority. The relevant authority designated by the State responsible for providing air traffic services in the airspace concerned.

Apron. A defined area, on a land aerodrome, intended to accommodate aircraft for purposes of loading or unloading passengers, mail or cargo, fuelling, parking or maintenance.

Apron management service. A service provided to regulate the activities and the movement of aircraft and vehicles on an apron.

Area control centre. A unit established to provide air traffic control service to controlled flights in control areas under its jurisdiction.

Area control service. Air traffic control service for controlled flights in control areas.

Area navigation (RNAV). A method of navigation which permits aircraft operation on any desired flight path within the coverage of station-referenced navigation aids or within the limits of the capability of self-contained aids, or a combination of these.

Area navigation route. An ATS route established for the use of aircraft capable of employing area navigation.

ATS route. A specified route designed for channelling the flow of traffic as necessary for the provision of air traffic services.

Note 1.— The term "ATS route" is used to mean variously, airway, advisory route, controlled or uncontrolled route, arrival or departure route, etc.

Note 2.— An ATS route is defined by route specifications which include an ATS route designator, the track to or from significant points (waypoints), distance between significant points, reporting requirements and, as determined by the appropriate ATS authority, the lowest safe altitude.

Automatic dependent surveillance — broadcast (ADS-B). A means by which aircraft, aerodrome vehicles and other objects can automatically transmit and/or receive data such as identification, position and additional data, as appropriate, in a broadcast mode via a data link.

Automatic dependent surveillance — contract (ADS-C). A means by which the terms of an ADS-C agreement will be exchanged between the ground system and the aircraft, via a data link, specifying under what conditions ADS-C reports would be initiated, and what data would be contained in the reports.

Note.— The abbreviated term "ADS contract" is commonly used to refer to ADS event contract, ADS demand contract, ADS periodic contract or an emergency mode.

Automatic terminal information service (ATIS). The automatic provision of current, routine information to arriving and departing aircraft throughout 24 hours or a specified portion thereof:

Data link-automatic terminal information service (D-ATIS). The provision of ATIS via data link.

Voice-automatic terminal information service (Voice-ATIS). The provision of ATIS by means of continuous and repetitive voice broadcasts.

Base turn. A turn executed by the aircraft during the initial approach between the end of the outbound track and the beginning of the intermediate or final approach track. The tracks are not reciprocal.

Note.— Base turns may be designated as being made either in level flight or while descending, according to the circumstances of each individual procedure.

Calendar. Discrete temporal reference system that provides the basis for defining temporal position to a resolution of one day (ISO 19108*).

Change-over point. The point at which an aircraft navigating on an ATS route segment defined by reference to very high frequency omnidirectional radio ranges is expected to transfer its primary navigational reference from the facility behind the aircraft to the next facility ahead of the aircraft.

Note.— Change-over points are established to provide the optimum balance in respect of signal strength and quality between facilities at all levels to be used and to ensure a common source of azimuth guidance for all aircraft operating along the same portion of a route segment.

Clearance limit. The point to which an aircraft is granted an air traffic control clearance.

Conference communications. Communication facilities whereby direct speech conversation may be conducted between three or more locations simultaneously.

Control area. A controlled airspace extending upwards from a specified limit above the earth.

Controlled aerodrome. An aerodrome at which air traffic control service is provided to aerodrome traffic.

Note.— The term "controlled aerodrome" indicates that air traffic control service is provided to aerodrome traffic but does not necessarily imply that a control zone exists.

Controlled airspace. An airspace of defined dimensions within which air traffic control service is provided in accordance with the airspace classification.

Note.— Controlled airspace is a generic term which covers ATS airspace Classes A, B, C, D and E as described in 2.6.

Controlled flight. Any flight which is subject to an air traffic control clearance.

Controller-pilot data link communications (CPDLC). A means of communication between controller and pilot, using data link for ATC communications.

Control zone. A controlled airspace extending upwards from the surface of the earth to a specified upper limit.

Cruising level. A level maintained during a significant portion of a flight.

Cyclic redundancy check (CRC). A mathematical algorithm applied to the digital expression of data that provides a level of assurance against loss or alteration of data.

Data link communications. A form of communication intended for the exchange of messages via a data link.

Data quality. A degree or level of confidence that the data provided meets the requirements of the data user in terms of accuracy, resolution and integrity.

Datum. Any quantity or set of quantities that may serve as a reference or basis for the calculation of other quantities (ISO 19104*).

Declared capacity. A measure of the ability of the ATC system or any of its subsystems or operating positions to provide service to aircraft during normal activities. It is expressed as the number of aircraft entering a specified portion of airspace in a given period of time, taking due account of weather, ATC unit configuration, staff and equipment available, and any other factors that may affect the workload of the controller responsible for the airspace.

DETRESFA. The code word used to designate a distress phase.

Distress phase. A situation wherein there is reasonable certainty that an aircraft and its occupants are threatened by grave and imminent danger or require immediate assistance.

* All ISO Standards are listed at the end of this chapter.

Downstream clearance. A clearance issued to an aircraft by an air traffic control unit that is not the current controlling authority of that aircraft.

Emergency phase. A generic term meaning, as the case may be, uncertainty phase, alert phase or distress phase.

Final approach. That part of an instrument approach procedure which commences at the specified final approach fix or point, or where such a fix or point is not specified,

a) at the end of the last procedure turn, base turn or inbound turn of a racetrack procedure, if specified; or

b) at the point of interception of the last track specified in the approach procedure; and

ends at a point in the vicinity of an aerodrome from which:

1) a landing can be made; or

2) a missed approach procedure is initiated.

Flight crew member. A licensed crew member charged with duties essential to the operation of an aircraft during a flight duty period.

Flight information centre. A unit established to provide flight information service and alerting service.

Flight information region. An airspace of defined dimensions within which flight information service and alerting service are provided.

Flight information service. A service provided for the purpose of giving advice and information useful for the safe and efficient conduct of flights.

Flight level. A surface of constant atmospheric pressure which is related to a specific pressure datum, 1 013.2 hectopascals (hPa), and is separated from other such surfaces by specific pressure intervals.

Note 1.— A pressure type altimeter calibrated in accordance with the Standard Atmosphere:

a) when set to a QNH altimeter setting, will indicate altitude;

b) when set to a QFE altimeter setting, will indicate height above the QFE reference datum;

c) when set to a pressure of 1 013.2 hPa, may be used to indicate flight levels.

Note 2.— The terms "height" and "altitude", used in Note 1 above, indicate altimetric rather than geometric heights and altitudes.

Flight plan. Specified information provided to air traffic services units, relative to an intended flight or portion of a flight of an aircraft.

Note.— Specifications for flight plans are contained in Annex 2. When the expression "flight plan form" is used it denotes the model flight plan form at Appendix 2 to the PANS-ATM.

Forecast. A statement of expected meteorological conditions for a specified time or period, and for a specified area or portion of airspace.

Geodetic datum. A minimum set of parameters required to define location and orientation of the local reference system with respect to the global reference system/frame.

Gregorian calendar. Calendar in general use; first introduced in 1582 to define a year that more closely approximates the tropical year than the Julian calendar (ISO 19108*).

Note.— In the Gregorian calendar, common years have 365 days and leap years 366 days divided into twelve sequential months.

Height. The vertical distance of a level, a point or an object considered as a point, measured from a specified datum.

Human Factors principles. Principles which apply to aeronautical design, certification, training, operations and maintenance and which seek safe interface between the human and other system components by proper consideration to human performance.

Human performance. Human capabilities and limitations which have an impact on the safety and efficiency of aeronautical operations.

IFR. The symbol used to designate the instrument flight rules.

IFR flight. A flight conducted in accordance with the instrument flight rules.

IMC. The symbol used to designate instrument meteorological conditions.

INCERFA. The code word used to designate an uncertainty phase.

Incident. An occurrence, other than an accident, associated with the operation of an aircraft which affects or could affect the safety of operation.

Note.— The types of incidents which are of main interest to the International Civil Aviation Organization for accident prevention studies are listed in the Accident/Incident Reporting Manual (ADREP Manual) *(Doc 9156).*

Instrument meteorological conditions (IMC). Meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling, less than the minima specified for visual meteorological conditions.

Note.— The specified minima for visual meteorological conditions are contained in Annex 2.

Integrity (aeronautical data). A degree of assurance that an aeronautical data and its value has not been lost nor altered since the data origination or authorized amendment.

International NOTAM office. An office designated by a State for the exchange of NOTAM internationally.

Level. A generic term relating to the vertical position of an aircraft in flight and meaning variously, height, altitude or flight level.

Manoeuvring area. That part of an aerodrome to be used for the take-off, landing and taxiing of aircraft, excluding aprons.

Meteorological office. An office designated to provide meteorological service for international air navigation.

Movement area. That part of an aerodrome to be used for the take-off, landing and taxiing of aircraft, consisting of the manoeuvring area and the apron(s).

NOTAM. A notice distributed by means of telecommunication containing information concerning the establishment, condition or change in any aeronautical facility, service, procedure or hazard, the timely knowledge of which is essential to personnel concerned with flight operations.

Obstacle. All fixed (whether temporary or permanent) and mobile objects, or parts thereof, that are located on an area intended for the surface movement of aircraft or that extend above a defined surface intended to protect aircraft in flight.

Operator. A person, organization or enterprise engaged in or offering to engage in an aircraft operation.

Pilot-in-command. The pilot designated by the operator, or in the case of general aviation, the owner, as being in command and charged with the safe conduct of a flight.

Printed communications. Communications which automatically provide a permanent printed record at each terminal of a circuit of all messages which pass over such circuit.

Radiotelephony. A form of radiocommunication primarily intended for the exchange of information in the form of speech.

RCP type. A label (e.g. RCP 240) that represents the values assigned to RCP parameters for communication transaction time, continuity, availability and integrity.

Reporting point. A specified geographical location in relation to which the position of an aircraft can be reported.

Required communication performance (RCP). A statement of the performance requirements for operational communication in support of specific ATM functions.

Required navigation performance (RNP). A statement of the navigation performance necessary for operation within a defined airspace.

Note.— Navigation performance and requirements are defined for a particular RNP type and/or application.

Rescue coordination centre. A unit responsible for promoting efficient organization of search and rescue services and for coordinating the conduct of search and rescue operations within a search and rescue region.

RNP type. A containment value expressed as a distance in nautical miles from the intended position within which flights would be for at least 95 per cent of the total flying time.

Example.— RNP 4 represents a navigation accuracy of plus or minus 7.4 km (4 NM) on a 95 per cent containment basis.

Runway. A defined rectangular area on a land aerodrome prepared for the landing and take-off of aircraft.

Runway visual range (RVR). The range over which the pilot of an aircraft on the centre line of a runway can see the runway surface markings or the lights delineating the runway or identifying its centre line.

Safety programme. An integrated set of regulations and activities aimed at improving safety.

Safety management system. A systematic approach to managing safety, including the necessary organizational structures, accountabilities, policies and procedures.

SIGMET information. Information issued by a meteorological watch office concerning the occurrence or expected occurrence of specified en-route weather phenomena which may affect the safety of aircraft operations.

Significant point. A specified geographical location used in defining an ATS route or the flight path of an aircraft and for other navigation and ATS purposes.

Special VFR flight. A VFR flight cleared by air traffic control to operate within a control zone in meteorological conditions below VMC.

Station declination. An alignment variation between the zero degree radial of a VOR and true north, determined at the time the VOR station is calibrated.

Taxiing. Movement of an aircraft on the surface of an aerodrome under its own power, excluding take-off and landing.

Terminal control area. A control area normally established at the confluence of ATS routes in the vicinity of one or more major aerodromes.

Track. The projection on the earth's surface of the path of an aircraft, the direction of which path at any point is usually expressed in degrees from North (true, magnetic or grid).

Traffic avoidance advice. Advice provided by an air traffic services unit specifying manoeuvres to assist a pilot to avoid a collision.

Traffic information. Information issued by an air traffic services unit to alert a pilot to other known or observed air traffic which may be in proximity to the position or intended route of flight and to help the pilot avoid a collision.

Transfer of control point. A defined point located along the flight path of an aircraft, at which the responsibility for providing air traffic control service to the aircraft is transferred from one control unit or control position to the next.

Transferring unit. Air traffic control unit in the process of transferring the responsibility for providing air traffic control service to an aircraft to the next air traffic control unit along the route of flight.

Uncertainty phase. A situation wherein uncertainty exists as to the safety of an aircraft and its occupants.

VFR. The symbol used to designate the visual flight rules.

VFR flight. A flight conducted in accordance with the visual flight rules.

Visual meteorological conditions (VMC). Meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling, equal to or better than specified minima.

Note.— The specified minima are contained in Annex 2.

VMC. The symbol used to designate visual meteorological conditions.

Waypoint. A specified geographical location used to define an area navigation route or the flight path of an aircraft employing area navigation. Waypoints are identified as either:

Fly-by waypoint. A waypoint which requires turn anticipation to allow tangential interception of the next segment of a route or procedure, or

Flyover waypoint. A waypoint at which a turn is initiated in order to join the next segment of a route or procedure.

* ISO Standard
19104 — *Geographic information — Terminology*
19108 — *Geographic information — Temporal schema*

CHAPTER 2. GENERAL

2.1 Establishment of authority

2.1.1 Contracting States shall determine, in accordance with the provisions of this Annex and for the territories over which they have jurisdiction, those portions of the airspace and those aerodromes where air traffic services will be provided. They shall thereafter arrange for such services to be established and provided in accordance with the provisions of this Annex, except that, by mutual agreement, a State may delegate to another State the responsibility for establishing and providing air traffic services in flight information regions, control areas or control zones extending over the territories of the former.

Note.— If one State delegates to another State the responsibility for the provision of air traffic services over its territory, it does so without derogation of its national sovereignty. Similarly, the providing State's responsibility is limited to technical and operational considerations and does not extend beyond those pertaining to the safety and expedition of aircraft using the concerned airspace. Furthermore, the providing State in providing air traffic services within the territory of the delegating State will do so in accordance with the requirements of the latter which is expected to establish such facilities and services for the use of the providing State as are jointly agreed to be necessary. It is further expected that the delegating State would not withdraw or modify such facilities and services without prior consultation with the providing State. Both the delegating and providing States may terminate the agreement between them at any time.

2.1.2 Those portions of the airspace over the high seas or in airspace of undetermined sovereignty where air traffic services will be provided shall be determined on the basis of regional air navigation agreements. A Contracting State having accepted the responsibility to provide air traffic services in such portions of airspace shall thereafter arrange for the services to be established and provided in accordance with the provisions of this Annex.

Note 1.— The phrase "regional air navigation agreements" refers to the agreements approved by the Council of ICAO normally on the advice of Regional Air Navigation Meetings.

Note 2.— The Council, when approving the Foreword to this Annex, indicated that a Contracting State accepting the responsibility for providing air traffic services over the high seas or in airspace of undetermined sovereignty may apply the Standards and Recommended Practices in a manner consistent with that adopted for airspace under its jurisdiction.

2.1.3 When it has been determined that air traffic services will be provided, the States concerned shall designate the authority responsible for providing such services.

Note 1.— The authority responsible for establishing and providing the services may be a State or a suitable Agency.

Note 2.— Situations which arise in respect of the establishment and provision of air traffic services to either part or whole of an international flight are as follows:

Situation 1: *A route, or portion of a route, contained within airspace under the sovereignty of a State establishing and providing its own air traffic services.*

Situation 2: *A route, or portion of a route, contained within airspace under the sovereignty of a State which has, by mutual agreement, delegated to another State, responsibility for the establishment and provision of air traffic services.*

Situation 3: *A portion of a route contained within airspace over the high seas or in airspace of undetermined sovereignty for which a State has accepted the responsibility for the establishment and provision of air traffic services.*

For the purpose of this Annex, the State which designates the authority responsible for establishing and providing the air traffic services is:

in Situation 1: *the State having sovereignty over the relevant portion of the airspace;*

in Situation 2: *the State to whom responsibility for the establishment and provision of air traffic services has been delegated;*

in Situation 3: *the State which has accepted the responsibility for the establishment and provision of air traffic services.*

2.1.4 Where air traffic services are established, information shall be published as necessary to permit the utilization of such services.

2.2 Objectives of the air traffic services

The objectives of the air traffic services shall be to:

a) prevent collisions between aircraft;

b) prevent collisions between aircraft on the manoeuvring area and obstructions on that area;

c) expedite and maintain an orderly flow of air traffic;

d) provide advice and information useful for the safe and efficient conduct of flights;

e) notify appropriate organizations regarding aircraft in need of search and rescue aid, and assist such organizations as required.

2.3 Divisions of the air traffic services

The air traffic services shall comprise three services identified as follows.

2.3.1 The *air traffic control service*, to accomplish objectives a), b) and c) of 2.2, this service being divided in three parts as follows:

a) *Area control service:* the provision of air traffic control service for controlled flights, except for those parts of such flights described in 2.3.1 b) and c), in order to accomplish objectives a) and c) of 2.2;

b) *Approach control service:* the provision of air traffic control service for those parts of controlled flights associated with arrival or departure, in order to accomplish objectives a) and c) of 2.2;

c) *Aerodrome control service:* the provision of air traffic control service for aerodrome traffic, except for those parts of flights described in 2.3.1 b), in order to accomplish objectives a), b) and c) of 2.2.

2.3.2 The *flight information service*, to accomplish objective d) of 2.2.

2.3.3 The *alerting service*, to accomplish objective e) of 2.2.

2.4 Determination of the need for air traffic services

2.4.1 The need for the provision of air traffic services shall be determined by consideration of the following:

a) the types of air traffic involved;

b) the density of air traffic;

c) the meteorological conditions;

d) such other factors as may be relevant.

Note.— Due to the number of elements involved, it has not been possible to develop specific data to determine the need for air traffic services in a given area or at a given location. For example:

a) a mixture of different types of air traffic with aircraft of varying speeds (conventional jet, etc.) might necessitate the provision of air traffic services, whereas a relatively greater density of traffic where only one type of operation is involved would not;

b) meteorological conditions might have considerable effect in areas where there is a constant flow of air traffic (e.g. scheduled traffic), whereas similar or worse meteorological conditions might be relatively unimportant in an area where air traffic would be discontinued in such conditions (e.g. local VFR flights);

c) open stretches of water, mountainous, uninhabited or desert areas might necessitate the provision of air traffic services even though the frequency of operations is extremely low.

2.4.2 The carriage of airborne collision avoidance systems (ACAS) by aircraft in a given area shall not be a factor in determining the need for air traffic services in that area.

2.5 Designation of the portions of the airspace and controlled aerodromes where air traffic services will be provided

2.5.1 When it has been determined that air traffic services will be provided in particular portions of the airspace or at particular aerodromes, then those portions of the airspace or those aerodromes shall be designated in relation to the air traffic services that are to be provided.

2.5.2 The designation of the particular portions of the airspace or the particular aerodromes shall be as follows:

2.5.2.1 *Flight information regions.* Those portions of the airspace where it is determined that flight information service and alerting service will be provided shall be designated as flight information regions.

2.5.2.2 *Control areas and control zones*

2.5.2.2.1 Those portions of the airspace where it is determined that air traffic control service will be provided to IFR flights shall be designated as control areas or control zones.

Note.— The distinction between control areas and control zones is made in 2.10.

2.5.2.2.1.1 Those portions of controlled airspace wherein it is determined that air traffic control service will also be provided to VFR flights shall be designated as Classes B, C, or D airspace.

2.5.2.2.2 Where designated within a flight information region, control areas and control zones shall form part of that flight information region.

2.5.2.3 *Controlled aerodromes.* Those aerodromes where it is determined that air traffic control service will be provided to aerodrome traffic shall be designated as controlled aerodromes.

2.6 Classification of airspaces

2.6.1 ATS airspaces shall be classified and designated in accordance with the following:

Class A. IFR flights only are permitted, all flights are provided with air traffic control service and are separated from each other.

Class B. IFR and VFR flights are permitted, all flights are provided with air traffic control service and are separated from each other.

Class C. IFR and VFR flights are permitted, all flights are provided with air traffic control service and IFR flights are separated from other IFR flights and from VFR flights. VFR flights are separated from IFR flights and receive traffic information in respect of other VFR flights.

Class D. IFR and VFR flights are permitted and all flights are provided with air traffic control service, IFR flights are separated from other IFR flights and receive traffic information in respect of VFR flights, VFR flights receive traffic information in respect of all other flights.

Class E. IFR and VFR flights are permitted, IFR flights are provided with air traffic control service and are separated from other IFR flights. All flights receive traffic information as far as is practical. Class E shall not be used for control zones.

Class F. IFR and VFR flights are permitted, all participating IFR flights receive an air traffic advisory service and all flights receive flight information service if requested.

Note.— Where air traffic advisory service is implemented, this is considered normally as a temporary measure only until such time as it can be replaced by air traffic control. (See also PANS-ATM, Chapter 9.)

Class G. IFR and VFR flights are permitted and receive flight information service if requested.

2.6.2 States shall select those airspace classes appropriate to their needs.

2.6.3 The requirements for flights within each class of airspace shall be as shown in the table in Appendix 4.

Note.— Where the ATS airspaces adjoin vertically, i.e. one above the other, flights at a common level would comply with requirements of, and be given services applicable to, the less restrictive class of airspace. In applying these criteria, Class B airspace is therefore considered less restrictive than Class A airspace; Class C airspace less restrictive than Class B airspace, etc.

2.7 Required navigation performance (RNP) for en-route operations

2.7.1 RNP types shall be prescribed by States. When applicable, the RNP type(s) for designated areas, tracks or ATS routes shall be prescribed on the basis of regional air navigation agreements.

2.7.2 **Recommendation.—** *For the en-route phase of flight, RNP types RNP 1, RNP 4, RNP 10, RNP 12.6 and RNP 20 should be implemented as soon as practicable.*

2.7.3 The prescribed RNP type shall be appropriate to the level of communications, navigation and air traffic services provided in the airspace concerned.

Note.— Applicable RNP types and associated procedures are published in the Manual on Required Navigation Performance (RNP) *(Doc 9613).*

2.8 Required communication performance (RCP)

2.8.1 RCP types shall be prescribed by States. When applicable, the RCP type(s) shall be prescribed on the basis of regional air navigation agreements.

2.8.2 The prescribed RCP type shall be appropriate to the air traffic services provided in the airspace concerned.

Note.— Applicable RCP types and associated procedures will be published in the Manual on Required Communication Performance (RCP) *(Doc 9869) (in preparation).*

2.9 Establishment and designation of the units providing air traffic services

The air traffic services shall be provided by units established and designated as follows:

2.9.1 Flight information centres shall be established to provide flight information service and alerting service within flight information regions, unless the responsibility of providing such services within a flight information region is assigned to an air traffic control unit having adequate facilities for the discharge of such responsibility.

Note.— This does not preclude delegating to other units the function of providing certain elements of the flight information service.

2.9.2 Air traffic control units shall be established to provide air traffic control service, flight information service and alerting service within control areas, control zones and at controlled aerodromes.

Note.— The services to be provided by various air traffic control units are indicated in 3.2.

2.10 Specifications for flight information regions, control areas and control zones

2.10.1 **Recommendation.—** *The delineation of airspace, wherein air traffic services are to be provided, should be related to the nature of the route structure and the need for efficient service rather than to national boundaries.*

Note 1.— Agreements to permit the delineation of airspace lying across national boundaries are advisable when such action will facilitate the provision of air traffic services (see 2.1.1). Agreements which permit delineation of airspace boundaries by straight lines will, for example, be most convenient where data processing techniques are used by air traffic services units.

Note 2.— Where delineation of airspace is made by reference to national boundaries there is a need for suitably sited transfer points to be mutually agreed upon.

2.10.2 Flight information regions

2.10.2.1 Flight information regions shall be delineated to cover the whole of the air route structure to be served by such regions.

2.10.2.2 A flight information region shall include all airspace within its lateral limits, except as limited by an upper flight information region.

2.10.2.3 Where a flight information region is limited by an upper flight information region, the lower limit specified for the upper flight information region shall constitute the upper vertical limit of the flight information region and shall coincide with a VFR cruising level of the tables in Appendix 3 to Annex 2.

Note.— In cases where an upper flight information region is established the procedures applicable therein need not be identical with those applicable in the underlying flight information region.

2.10.3 Control areas

2.10.3.1 Control areas including, *inter alia*, airways and terminal control areas shall be delineated so as to encompass sufficient airspace to contain the flight paths of those IFR flights or portions thereof to which it is desired to provide the applicable parts of the air traffic control service, taking into account the capabilities of the navigation aids normally used in that area.

Note.— In a control area other than one formed by a system of airways, a system of routes may be established to facilitate the provision of air traffic control.

2.10.3.2 A lower limit of a control area shall be established at a height above the ground or water of not less than 200 m (700 ft).

Note.— This does not imply that the lower limit has to be established uniformly in a given control area (see Figure A-5 of the Air Traffic Services Planning Manual *(Doc 9426), Part I, Section 2, Chapter 3).*

2.10.3.2.1 **Recommendation.—** *The lower limit of a control area should, when practicable and desirable in order to allow freedom of action for VFR flights below the control area, be established at a greater height than the minimum specified in 2.10.3.2.*

2.10.3.2.2 **Recommendation.—** *When the lower limit of a control area is above 900 m (3 000 ft) MSL it should coincide with a VFR cruising level of the tables in Appendix 3 to Annex 2.*

Note.— This implies that the selected VFR cruising level be such that expected local atmospheric pressure variations do not result in a lowering of this limit to a height of less than 200 m (700 ft) above ground or water.

2.10.3.3 An upper limit of a control area shall be established when either:

a) air traffic control service will not be provided above such upper limit; or

b) the control area is situated below an upper control area, in which case the upper limit shall coincide with the lower limit of the upper control area.

When established, such upper limit shall coincide with a VFR cruising level of the tables in Appendix 3 to Annex 2.

2.10.4 Flight information regions or control areas in the upper airspace

Recommendation.— *Where it is desirable to limit the number of flight information regions or control areas through which high flying aircraft would otherwise have to operate, a* *flight information region or control area, as appropriate, should be delineated to include the upper airspace within the lateral limits of a number of lower flight information regions or control areas.*

2.10.5 Control zones

2.10.5.1 The lateral limits of control zones shall encompass at least those portions of the airspace, which are not within control areas, containing the paths of IFR flights arriving at and departing from aerodromes to be used under instrument meteorological conditions.

Note.— Aircraft holding in the vicinity of aerodromes are considered as arriving aircraft.

2.10.5.2 The lateral limits of a control zone shall extend to at least 9.3 km (5 NM) from the centre of the aerodrome or aerodromes concerned in the directions from which approaches may be made.

Note.— A control zone may include two or more aerodromes situated close together.

2.10.5.3 If a control zone is located within the lateral limits of a control area, it shall extend upwards from the surface of the earth to at least the lower limit of the control area.

Note.— An upper limit higher than the lower limit of the overlying control area may be established when desired.

2.10.5.4 **Recommendation.—** *If a control zone is located outside of the lateral limits of a control area, an upper limit should be established.*

2.10.5.5 **Recommendation.—** *If it is desired to establish the upper limit of a control zone at a level higher than the lower limit of the control area established above it, or if the control zone is located outside of the lateral limits of a control area, its upper limit should be established at a level which can easily be identified by pilots. When this limit is above 900 m (3 000 ft) MSL it should coincide with a VFR cruising level of the tables in Appendix 3 to Annex 2.*

Note.— This implies that, if used, the selected VFR cruising level be such that expected local atmospheric pressure variations do not result in a lowering of this limit to a height of less than 200 m (700 ft) above ground or water.

2.11 Identification of air traffic services units and airspaces

2.11.1 **Recommendation.—** *An area control centre or flight information centre should be identified by the name of a nearby town or city or geographic feature.*

2.11.2 **Recommendation.—** *An aerodrome control tower or approach control unit should be identified by the name of the aerodrome at which it is located.*

2.11.3 **Recommendation.—** *A control zone, control area or flight information region should be identified by the name of the unit having jurisdiction over such airspace.*

2.12 Establishment and identification of ATS routes

2.12.1 When ATS routes are established, a protected airspace along each ATS route and a safe spacing between adjacent ATS routes shall be provided.

2.12.2 **Recommendation**.— *When warranted by density, complexity or nature of the traffic, special routes should be established for use by low-level traffic, including helicopters operating to and from helidecks on the high seas. When determining the lateral spacing between such routes, account should be taken of the navigational means available and the navigation equipment carried on board helicopters*.

2.12.3 ATS routes shall be identified by designators.

2.12.4 Designators for ATS routes other than standard departure and arrival routes shall be selected in accordance with the principles set forth in Appendix 1.

2.12.5 Standard departure and arrival routes and associated procedures shall be identified in accordance with the principles set forth in Appendix 3.

Note 1.— Guidance material relating to the establishment of ATS routes is contained in the Air Traffic Services Planning Manual *(Doc 9426).*

Note 2.— Guidance material relating to the establishment of ATS routes defined by VOR is contained in Attachment A.

Note 3.— The spacing between parallel tracks or between parallel ATS route centre lines for which an RNP type is required will be dependent upon the relevant RNP type specified. Guidance material relating to the establishment of ATS routes for use by RNAV-equipped aircraft and to the spacing between routes based on RNP type is contained in Attachment B.

2.13 Establishment of change-over points

2.13.1 **Recommendation.—** *Change-over points should be established on ATS route segments defined by reference to* *very high frequency omnidirectional radio ranges where this will assist accurate navigation along the route segments. The establishment of change-over points should be limited to route segments of 110 km (60 NM) or more, except where the complexity of ATS routes, the density of navigation aids or other technical and operational reasons warrant the establishment of change-over points on shorter route segments.*

2.13.2 **Recommendation.—** *Unless otherwise established in relation to the performance of the navigation aids or frequency protection criteria, the change-over point on a route segment should be the mid-point between the facilities in the case of a straight route segment or the intersection of radials in the case of a route segment which changes direction between the facilities.*

Note.— Guidance on the establishment of change-over points is contained in Attachment A.

2.14 Establishment and identification of significant points

2.14.1 Significant points shall be established for the purpose of defining an ATS route and/or in relation to the requirements of air traffic services for information regarding the progress of aircraft in flight.

2.14.2 Significant points shall be identified by designators.

2.14.3 Significant points shall be established and identified in accordance with the principles set forth in Appendix 2.

2.15 Establishment and identification of standard routes for taxiing aircraft

2.15.1 **Recommendation.—** *Where necessary, standard routes for taxiing aircraft should be established on an aerodrome between runways, aprons and maintenance areas. Such routes should be direct, simple and where practicable, designed to avoid traffic conflicts.*

2.15.2 **Recommendation.—** *Standard routes for taxiing aircraft should be identified by designators distinctively different from those of the runways and ATS routes.*

2.16 Coordination between the operator and air traffic services

2.16.1 Air traffic services units, in carrying out their objectives, shall have due regard for the requirements of the operators consequent on their obligations as specified in Annex 6, and, if so required by the operators, shall make available to them or their designated representatives such information as may be available to enable them or their designated representatives to carry out their responsibilities.

2.16.2 When so requested by an operator, messages (including position reports) received by air traffic services units and relating to the operation of the aircraft for which operational control service is provided by that operator shall, so far as practicable, be made available immediately to the operator or a designated representative in accordance with locally agreed procedures.

Note.— For aircraft subjected to unlawful interference, see 2.23.3.

2.17 Coordination between military authorities and air traffic services

2.17.1 Air traffic services authorities shall establish and maintain close cooperation with military authorities responsible for activities that may affect flights of civil aircraft.

2.17.2 Coordination of activities potentially hazardous to civil aircraft shall be effected in accordance with 2.18.

2.17.3 Arrangements shall be made to permit information relevant to the safe and expeditious conduct of flights of civil aircraft to be promptly exchanged between air traffic services units and appropriate military units.

2.17.3.1 Air traffic services units shall, either routinely or on request, in accordance with locally agreed procedures, provide appropriate military units with pertinent flight plan and other data concerning flights of civil aircraft. In order to eliminate or reduce the need for interceptions, air traffic services authorities shall designate any areas or routes where the requirements of Annex 2 concerning flight plans, two-way communications and position reporting apply to all flights to ensure that all pertinent data is available in appropriate air traffic services units specifically for the purpose of facilitating identification of civil aircraft.

Note.— For aircraft subjected to unlawful interference, see 2.23.3 and 2.24.1.3.

2.17.3.2 Special procedures shall be established in order to ensure that:

a) air traffic services units are notified if a military unit observes that an aircraft which is, or might be, a civil aircraft is approaching, or has entered, any area in which interception might become necessary;

b) all possible efforts are made to confirm the identity of the aircraft and to provide it with the navigational guidance necessary to avoid the need for interception.

2.18 Coordination of activities potentially hazardous to civil aircraft

2.18.1 The arrangements for activities potentially hazardous to civil aircraft, whether over the territory of a State or over the high seas, shall be coordinated with the appropriate air traffic services authorities. The coordination shall be effected early enough to permit timely promulgation of information regarding the activities in accordance with the provisions of Annex 15.

2.18.1.1 **Recommendation.—** *If the appropriate ATS authority is not that of the State where the organization planning the activities is located, initial coordination should be effected through the ATS authority responsible for the airspace over the State where the organization is located.*

2.18.2 The objective of the coordination shall be to achieve the best arrangements which will avoid hazards to civil aircraft and minimize interference with the normal operations of such aircraft.

2.18.2.1 **Recommendation.—** *In determining these arrangements the following should be applied:*

a) the locations or areas, times and durations for the activities should be selected to avoid closure or realignment of established ATS routes, blocking of the most economic flight levels, or delays of scheduled aircraft operations, unless no other options exist;

b) the size of the airspace designated for the conduct of the activities should be kept as small as possible;

c) direct communication between the appropriate ATS authority or air traffic services unit and the organization or unit conducting the activities should be provided for use in the event that civil aircraft emergencies or other unforeseen circumstances require discontinuation of the activities.

2.18.3 The appropriate ATS authorities shall be responsible for initiating the promulgation of information regarding the activities.

2.18.4 **Recommendation.—** *If activities potentially hazardous to civil aircraft take place on a regular or continuing basis, special committees should be established as required to ensure that the requirements of all parties concerned are adequately coordinated.*

2.18.5 Adequate steps shall be taken to prevent emission of laser beams from adversely affecting flight operations.

Note 1.— Guidance material regarding the hazardous effects of laser emitters on flight operations is contained in the Manual on Laser Emitters and Flight Safety (*Doc 9815*).

Note 2.— See also Annex 14 — Aerodromes, *Volume I —* Aerodrome Design and Operations, *Chapter 5.*

2.18.6 **Recommendation.—** *In order to provide added airspace capacity and to improve efficiency and flexibility of aircraft operations, States should establish procedures providing for a flexible use of airspace reserved for military or other special activities. The procedures should permit all airspace users to have safe access to such reserved airspace.*

2.19 Aeronautical data

2.19.1 Determination and reporting of air traffic services-related aeronautical data shall be in accordance with the accuracy and integrity requirements set forth in Tables 1 to 5 contained in Appendix 5 while taking into account the established quality system procedures. Accuracy requirements for aeronautical data are based upon a 95 per cent confidence level, and in that respect three types of positional data shall be identified: surveyed points (e.g. navigation aids positions), calculated points (mathematical calculations from the known surveyed points of points in space/fixes) and declared points (e.g. flight information region boundary points).

Note.— Specifications governing the quality system are given in Annex 15, Chapter 3.

2.19.2 Contracting States shall ensure that integrity of aeronautical data is maintained throughout the data process from survey/origin to the next intended user. Aeronautical data integrity requirements shall be based upon the potential risk resulting from the corruption of data and upon the use to which the data item is put. Consequently, the following classifications and data integrity levels shall apply:

a) critical data, integrity level 1×10^{-8}: there is a high probability when using corrupted critical data that the continued safe flight and landing of an aircraft would be severely at risk with the potential for catastrophe;

b) essential data, integrity level 1×10^{-5}: there is a low probability when using corrupted essential data that the continued safe flight and landing of an aircraft would be severely at risk with the potential for catastrophe; and

c) routine data, integrity level 1×10^{-3}: there is a very low probability when using corrupted routine data that the continued safe flight and landing of an aircraft would be severely at risk with the potential for catastrophe.

2.19.3 Protection of electronic aeronautical data while stored or in transit shall be totally monitored by the cyclic redundancy check (CRC). To achieve protection of the integrity level of critical and essential aeronautical data as classified in 2.19.2, a 32- or 24-bit CRC algorithm shall apply respectively.

2.19.4 **Recommendation.—** *To achieve protection of the integrity level of routine aeronautical data as classified in 2.19.2, a 16-bit CRC algorithm should apply.*

Note.— Guidance material on the aeronautical data quality requirements (accuracy, resolution, integrity, protection and traceability) is contained in the World Geodetic System — 1984 (WGS-84) Manual *(Doc 9674). Supporting material in respect of the provisions of Appendix 5 related to accuracy and integrity of aeronautical data is contained in RTCA Document DO-201A and European Organization for Civil Aviation Equipment (EUROCAE) Document ED-77 —* Industry Requirements for Aeronautical Information.

2.19.5 Geographical coordinates indicating latitude and longitude shall be determined and reported to the aeronautical information services authority in terms of the World Geodetic System — 1984 (WGS-84) geodetic reference datum, identifying those geographical coordinates which have been transformed into WGS-84 coordinates by mathematical means and whose accuracy of original field work does not meet the requirements in Appendix 5, Table 1.

2.19.6 The order of accuracy of the field work and determinations and calculations derived therefrom shall be such that the resulting operational navigation data for the phases of flight will be within the maximum deviations, with respect to an appropriate reference frame, as indicated in the tables contained in Appendix 5.

Note 1.— An appropriate reference frame is that which enables WGS-84 to be realized on a given position and with respect to which all coordinate data are related.

Note 2.— Specifications governing the publication of aeronautical data are given in Annex 4, Chapter 2 and Annex 15, Chapter 3.

Note 3.— For those fixes and points that are serving a dual purpose, e.g. holding point and missed approach point, the higher accuracy applies.

2.20 Coordination between meteorological and air traffic services authorities

2.20.1 To ensure that aircraft receive the most up-to-date meteorological information for aircraft operations, arrangements shall be made, where necessary, between meteorological and air traffic services authorities for air traffic services personnel:

a) in addition to using indicating instruments, to report, if observed by air traffic services personnel or communicated by aircraft, such other meteorological elements as may be agreed upon;

b) to report as soon as possible to the associated meteorological office meteorological phenomena of operational significance, if observed by air traffic services personnel or communicated by aircraft, which have not been included in the aerodrome meteorological report;

c) to report as soon as possible to the associated meteorological office pertinent information concerning pre-eruption volcanic activity, volcanic eruptions and information concerning volcanic ash cloud. In addition, area control centres and flight information centres shall report the information to the associated meteorological watch office and volcanic ash advisory centres (VAACs).

Note 1.— VAACs are designated by regional air navigation agreements in accordance with Annex 3, Chapter 3, 3.5.1.

Note 2.— See 4.2.3 regarding transmission of special air-reports.

2.20.2 Close coordination shall be maintained between area control centres, flight information centres and associated meteorological watch offices to ensure that information on volcanic ash included in NOTAM and SIGMET messages is consistent.

2.21 Coordination between aeronautical information services and air traffic services authorities

2.21.1 To ensure that aeronautical information services units obtain information to enable them to provide up-to-date pre-flight information and to meet the need for in-flight information, arrangements shall be made between aeronautical information services and air traffic services authorities responsible for air traffic services to report to the responsible aeronautical information services unit, with a minimum of delay:

a) information on aerodrome conditions;

b) the operational status of associated facilities, services and navigation aids within their area of responsibility;

c) the occurrence of volcanic activity observed by air traffic services personnel or reported by aircraft; and

d) any other information considered to be of operational significance.

2.21.2 Before introducing changes to the air navigation system, due account shall be taken by the services responsible for such changes of the time needed by the aeronautical information service for the preparation, production and issuance of relevant material for promulgation. To ensure timely provision of the information to the aeronautical information service, close coordination between those services concerned is therefore required.

2.21.3 Of particular importance are changes to aeronautical information that affect charts and/or computer-based navigation systems which qualify to be notified by the Aeronautical Information Regulation and Control (AIRAC) system, as specified in Annex 15, Chapter 6 and Appendix 4. The predetermined, internationally agreed AIRAC effective dates in addition to 14 days postage time shall be observed by the responsible air traffic services when submitting the raw information/data to aeronautical information services.

2.21.4 The air traffic services responsible for the provision of raw aeronautical information/data to the aeronautical information services shall do so while taking into account accuracy and integrity requirements for aeronautical data as specified in Appendix 5 to this Annex.

Note 1.— Specifications for the issue of a NOTAM, SNOWTAM and ASHTAM are contained in Annex 15, Chapter 5.

Note 2.— Reports of volcanic activity comprise the information detailed in Annex 3, Chapter 4.

Note 3.— AIRAC information is distributed by the aeronautical information service at least 42 days in advance of the AIRAC effective dates with the objective of reaching recipients at least 28 days in advance of the effective date.

Note 4.— The schedule of the predetermined, internationally agreed AIRAC common effective dates at intervals of 28 days, including 6 November 1997, and guidance for the AIRAC use are contained in the Aeronautical Information Services Manual *(Doc 8126, Chapter 2, 2.6).*

2.22 Minimum flight altitudes

Minimum flight altitudes shall be determined and promulgated by each Contracting State for each ATS route and control area over its territory. The minimum flight altitudes determined shall provide a minimum clearance above the controlling obstacle located within the areas concerned.

Note.— The requirements for publication by States of minimum flight altitudes and of the criteria used to determine them are contained in Annex 15, Appendix 1. Detailed obstacle clearance criteria are contained in PANS-OPS (Doc 8168), Volume II.

2.23 Service to aircraft in the event of an emergency

2.23.1 An aircraft known or believed to be in a state of emergency, including being subjected to unlawful interference, shall be given maximum consideration, assistance and priority over other aircraft as may be necessitated by the circumstances.

Note.— To indicate that it is in a state of emergency, an aircraft equipped with an appropriate data link capability and/or an SSR transponder might operate the equipment as follows:

a) on Mode A, Code 7700; or

b) on Mode A, Code 7500, to indicate specifically that it is being subjected to unlawful interference; and/or

c) activate the appropriate emergency and/or urgency capability of ADS-B or ADS-C; and/or

d) transmit the appropriate emergency message via CPDLC.

2.23.1.1 **Recommendation.—** *In communications between ATS units and aircraft in the event of an emergency, Human Factors principles should be observed.*

Note.— Guidance material on Human Factors principles can be found in the Human Factors Training Manual *(Doc 9683).*

2.23.2 When an occurrence of unlawful interference with an aircraft takes place or is suspected, ATS units shall attend promptly to requests by the aircraft. Information pertinent to the safe conduct of the flight shall continue to be transmitted and necessary action shall be taken to expedite the conduct of all phases of the flight, especially the safe landing of the aircraft.

2.23.3 When an occurrence of unlawful interference with an aircraft takes place or is suspected, ATS units shall, in accordance with locally agreed procedures, immediately inform the appropriate authority designated by the State and exchange necessary information with the operator or its designated representative.

Note 1.— A strayed or unidentified aircraft may be suspected as being the subject of unlawful interference. See 2.24.1.3.

Note 2.— Procedures relating to the handling of strayed or unidentified aircraft are contained in 2.24.1.

Note 3.— PANS-ATM *(Doc 4444), Chapter 15, 15.1.3 contains more specific procedures related to unlawful interference.*

2.24 In-flight contingencies

2.24.1 Strayed or unidentified aircraft

Note 1.— The terms "strayed aircraft" and "unidentified aircraft" in this paragraph have the following meanings:

Strayed aircraft. *An aircraft which has deviated significantly from its intended track or which reports that it is lost.*

Unidentified aircraft. *An aircraft which has been observed or reported to be operating in a given area but whose identity has not been established.*

Note 2.— An aircraft may be considered, at the same time, as a "strayed aircraft" by one unit and as an "unidentified aircraft" by another unit.

Note 3.— A strayed or unidentified aircraft may be suspected as being the subject of unlawful interference.

2.24.1.1 As soon as an air traffic services unit becomes aware of a strayed aircraft it shall take all necessary steps as outlined in 2.24.1.1.1 and 2.24.1.1.2 to assist the aircraft and to safeguard its flight.

Note.— Navigational assistance by an air traffic services unit is particularly important if the unit becomes aware of an aircraft straying, or about to stray, into an area where there is a risk of interception or other hazard to its safety.

2.24.1.1.1 If the aircraft's position is not known, the air traffic services unit shall:

a) attempt to establish two-way communication with the aircraft, unless such communication already exists;

b) use all available means to determine its position;

c) inform other ATS units into whose area the aircraft may have strayed or may stray, taking into account all the factors which may have affected the navigation of the aircraft in the circumstances;

d) inform, in accordance with locally agreed procedures, appropriate military units and provide them with pertinent flight plan and other data concerning strayed aircraft;

e) request from the units referred to in c) and d) and from other aircraft in flight every assistance in establishing communication with the aircraft and determining its position.

Note.— The requirements in d) and e) apply also to ATS units informed in accordance with c).

2.24.1.1.2 When the aircraft's position is established, the air traffic services unit shall:

a) advise the aircraft of its position and corrective action to be taken; and

b) provide, as necessary, other ATS units and appropriate military units with relevant information concerning the strayed aircraft and any advice given to that aircraft.

2.24.1.2 As soon as an air traffic services unit becomes aware of an unidentified aircraft in its area, it shall endeavour to establish the identity of the aircraft whenever this is necessary for the provision of air traffic services or required by the appropriate military authorities in accordance with locally agreed procedures. To this end, the air traffic services unit shall take such of the following steps as are appropriate in the circumstances:

a) attempt to establish two-way communication with the aircraft;

b) inquire of other air traffic services units within the flight information region about the flight and request their assistance in establishing two-way communication with the aircraft;

c) inquire of air traffic services units serving the adjacent flight information regions about the flight and request their assistance in establishing two-way communication with the aircraft;

d) attempt to obtain information from other aircraft in the area.

2.24.1.2.1 The air traffic services unit shall, as necessary, inform the appropriate military unit as soon as the identity of the aircraft has been established.

2.24.1.3 Should the ATS unit consider that a strayed or unidentified aircraft may be the subject of unlawful interference, the appropriate authority designated by the State shall immediately be informed, in accordance with locally agreed procedures.

2.24.2 Interception of civil aircraft

2.24.2.1 As soon as an air traffic services unit learns that an aircraft is being intercepted in its area of responsibility, it shall take such of the following steps as are appropriate in the circumstances:

a) attempt to establish two-way communication with the intercepted aircraft via any means available, including the emergency radio frequency 121.5 MHz, unless such communication already exists;

b) inform the pilot of the intercepted aircraft of the interception;

c) establish contact with the intercept control unit maintaining two-way communication with the intercepting aircraft and provide it with available information concerning the aircraft;

d) relay messages between the intercepting aircraft or the intercept control unit and the intercepted aircraft, as necessary;

e) in close coordination with the intercept control unit take all necessary steps to ensure the safety of the intercepted aircraft;

f) inform ATS units serving adjacent flight information regions if it appears that the aircraft has strayed from such adjacent flight information regions.

2.24.2.2 As soon as an air traffic services unit learns that an aircraft is being intercepted outside its area of responsibility, it shall take such of the following steps as are appropriate in the circumstances:

a) inform the ATS unit serving the airspace in which the interception is taking place, providing this unit with available information that will assist in identifying the aircraft and requesting it to take action in accordance with 2.24.2.1;

b) relay messages between the intercepted aircraft and the appropriate ATS unit, the intercept control unit or the intercepting aircraft.

2.25 Time in air traffic services

2.25.1 Air traffic services units shall use Coordinated Universal Time (UTC) and shall express the time in hours and minutes and, when required, seconds of the 24-hour day beginning at midnight.

2.25.2 Air traffic services units shall be equipped with clocks indicating the time in hours, minutes and seconds, clearly visible from each operating position in the unit concerned.

2.25.3 Air traffic services unit clocks and other time-recording devices shall be checked as necessary to ensure correct time to within plus or minus 30 seconds of UTC. Wherever data link communications are utilized by an air traffic services unit, clocks and other time-recording devices shall be checked as necessary to ensure correct time to within 1 second of UTC.

2.25.4 The correct time shall be obtained from a standard time station or, if not possible, from another unit which has obtained the correct time from such station.

2.25.5 Aerodrome control towers shall, prior to an aircraft taxiing for take-off, provide the pilot with the correct time, unless arrangements have been made for the pilot to obtain it from other sources. Air traffic services units shall, in addition, provide aircraft with the correct time on request. Time checks shall be given to the nearest half minute.

2.26 Establishment of requirements for carriage and operation of pressure-altitude reporting transponders

States shall establish requirements for carriage and operation of pressure-altitude reporting transponders within defined portions of airspace.

Note.— This provision is intended to improve the effectiveness of air traffic services as well as airborne collision avoidance systems.

2.27 Safety management

2.27.1 States shall establish a safety programme, in order to achieve an acceptable level of safety in the provision of ATS.

2.27.2 The acceptable level of safety to be achieved shall be established by the State(s) concerned.

Note.— Guidance on safety programmes and on defining acceptable levels of safety is contained in Attachment E and the Safety Management Manual (SMM) *(Doc 9859).*

2.27.3 States shall require, as part of their safety programme, that an air traffic services provider implements a safety management system acceptable to the State that, as a minimum:

a) identifies safety hazards;

b) ensures that remedial action necessary to maintain an acceptable level of safety is implemented;

c) provides for continuous monitoring and regular assessment of the safety level achieved; and

d) aims to make continuous improvement to the overall level of safety.

2.27.4 A safety management system shall clearly define lines of safety accountability throughout the air traffic services provider, including a direct accountability for safety on the part of senior management.

Note.— Guidance on safety management systems is contained in the Safety Management Manual (SMM) *(Doc 9859), and associated procedures are contained in the* PANS-ATM *(Doc 4444).*

2.27.5 Any significant safety-related change to the ATS system, including the implementation of a reduced separation minimum or a new procedure, shall only be effected after a safety assessment has demonstrated that an acceptable level of safety will be met and users have been consulted. When appropriate, the responsible authority shall ensure that adequate provision is made for post-implementation monitoring to verify that the defined level of safety continues to be met.

Note.— When, due to the nature of the change, the acceptable level of safety cannot be expressed in quantitative terms, the safety assessment may rely on operational judgment.

2.28 Common reference systems

2.28.1 Horizontal reference system

World Geodetic System — 1984 (WGS-84) shall be used as the horizontal (geodetic) reference system for air navigation. Reported aeronautical geographical coordinates (indicating latitude and longitude) shall be expressed in terms of the WGS-84 geodetic reference datum.

Note.— Comprehensive guidance material concerning WGS-84 is contained in the World Geodetic System — 1984 (WGS-84) Manual *(Doc 9674).*

2.28.2 Vertical reference system

Mean sea level (MSL) datum, which gives the relationship of gravity-related height (elevation) to a surface known as the geoid, shall be used as the vertical reference system for air navigation.

Note.— The geoid globally most closely approximates MSL. It is defined as the equipotential surface in the gravity field of the Earth which coincides with the undisturbed MSL extended continuously through the continents.

2.28.3 Temporal reference system

2.28.3.1 The Gregorian calendar and Coordinated Universal Time (UTC) shall be used as the temporal reference system for air navigation.

2.28.3.2 When a different temporal reference system is used, this shall be indicated in GEN 2.1.2 of the Aeronautical Information Publication (AIP).

2.29 Language proficiency

2.29.1 An air traffic services provider shall ensure that air traffic controllers speak and understand the language(s) used for radiotelephony communications as specified in Annex 1.

2.29.2 Except when communications between air traffic control units are conducted in a mutually agreed language, the English language shall be used for such communications.

2.30 Contingency arrangements

Air traffic services authorities shall develop and promulgate contingency plans for implementation in the event of disruption, or potential disruption, of air traffic services and related supporting services in the airspace for which they are responsible for the provision of such services. Such contingency plans shall be developed with the assistance of ICAO as necessary, in close coordination with the air traffic services authorities responsible for the provision of services in adjacent portions of airspace and with airspace users concerned.

Note 1.— Guidance material relating to the development, promulgation and implementation of contingency plans is contained in Attachment D.

Note 2.— Contingency plans may constitute a temporary deviation from the approved regional air navigation plans; such deviations are approved, as necessary, by the President of the ICAO Council on behalf of the Council.

b) to pilots and operators through aeronautical information publications, where separation is based on the use by aircraft of specified navigation aids or specified navigation techniques.

3.5 Responsibility for control

3.5.1 Responsibility for control of individual flights

A controlled flight shall be under the control of only one air traffic control unit at any given time.

3.5.2 Responsibility for control within a given block of airspace

Responsibility for the control of all aircraft operating within a given block of airspace shall be vested in a single air traffic control unit. However, control of an aircraft or groups of aircraft may be delegated to other air traffic control units provided that coordination between all air traffic control units concerned is assured.

3.6 Transfer of responsibility for control

3.6.1 Place or time of transfer

The responsibility for the control of an aircraft shall be transferred from one air traffic control unit to another as follows:

3.6.1.1 *Between two units providing area control service.* The responsibility for the control of an aircraft shall be transferred from a unit providing area control service in a control area to the unit providing area control service in an adjacent control area at the time of crossing the common control area boundary as estimated by the area control centre having control of the aircraft or at such other point or time as has been agreed between the two units.

3.6.1.2 *Between a unit providing area control service and a unit providing approach control service.* The responsibility for the control of an aircraft shall be transferred from a unit providing area control service to a unit providing approach control service, and vice versa, at a point or time agreed between the two units.

3.6.1.3 *Between a unit providing approach control service and an aerodrome control tower*

3.6.1.3.1 *Arriving aircraft.* The responsibility for the control of an arriving aircraft shall be transferred from the unit providing approach control service to the aerodrome control tower, when the aircraft:

a) is in the vicinity of the aerodrome, and:

   1) it is considered that approach and landing will be completed in visual reference to the ground, or

   2) it has reached uninterrupted visual meteorological conditions, or

b) is at a prescribed point or level, as specified in letters of agreement or ATS unit instructions; or

c) has landed.

Note.— Even though there is an approach control unit, control of certain flights may be transferred directly from an area control centre to an aerodrome control tower and vice versa, by prior arrangement between the units concerned for the relevant part of approach control service to be provided by the area control centre or the aerodrome control tower, as applicable.

3.6.1.3.2 *Departing aircraft.* The responsibility for control of a departing aircraft shall be transferred from the aerodrome control tower to the unit providing approach control service:

a) *when visual meteorological conditions prevail in the vicinity of the aerodrome:*

   1) prior to the time the aircraft leaves the vicinity of the aerodrome, or

   2) prior to the aircraft entering instrument meteorological conditions, or

   3) at a prescribed point or level,

as specified in letters of agreement or ATS unit instructions;

b) *when instrument meteorological conditions prevail at the aerodrome:*

   1) immediately after the aircraft is airborne, or

   2) at a prescribed point or level,

as specified in letters of agreement or ATS unit instructions.

Note.— See Note following 3.6.1.3.1.

3.6.1.4 *Between control sectors/positions within the same air traffic control unit*

The responsibility for control of an aircraft shall be transferred from one control sector/position to another control sector/position within the same air traffic control unit at a point, level or time, as specified in ATS unit instructions.

3.6.2 Coordination of transfer

3.6.2.1 Responsibility for control of an aircraft shall not be transferred from one air traffic control unit to another without the consent of the accepting control unit, which shall be obtained in accordance with 3.6.2.2, 3.6.2.2.1, 3.6.2.2.2 and 3.6.2.3.

3.6.2.2 The transferring control unit shall communicate to the accepting control unit the appropriate parts of the current flight plan and any control information pertinent to the transfer requested.

3.6.2.2.1 Where transfer of control is to be effected using radar or ADS-B data, the control information pertinent to the transfer shall include information regarding the position and, if required, the track and speed of the aircraft, as observed by radar or ADS-B immediately prior to the transfer.

3.6.2.2.2 Where transfer of control is to be effected using ADS-C data, the control information pertinent to the transfer shall include the four-dimensional position and other information as necessary.

3.6.2.3 The accepting control unit shall:

a) indicate its ability to accept control of the aircraft on the terms specified by the transferring control unit, unless by prior agreement between the two units concerned, the absence of any such indication is understood to signify acceptance of the terms specified, or indicate any necessary changes thereto; and

b) specify any other information or clearance for a subsequent portion of the flight, which it requires the aircraft to have at the time of transfer.

3.6.2.4 The accepting control unit shall notify the transferring control unit when it has established two-way voice and/or data link communications with and assumed control of the aircraft concerned, unless otherwise specified by agreement between the two control units concerned.

3.6.2.5 Applicable coordination procedures, including transfer of control points, shall be specified in letters of agreement and ATS unit instructions as appropriate.

3.7 Air traffic control clearances

Air traffic control clearances shall be based solely on the requirements for providing air traffic control service.

3.7.1 Contents of clearances

3.7.1.1 An air traffic control clearance shall indicate:

a) aircraft identification as shown in the flight plan;

b) clearance limit;

c) route of flight;

d) level(s) of flight for the entire route or part thereof and changes of levels if required;

Note.— If the clearance for the levels covers only part of the route, it is important for the air traffic control unit to specify a point to which the part of the clearance regarding levels applies whenever necessary to ensure compliance with 3.6.5.2.2 a) of Annex 2.

e) any necessary instructions or information on other matters such as approach or departure manoeuvres, communications and the time of expiry of the clearance.

Note.— The time of expiry of the clearance indicates the time after which the clearance will be automatically cancelled if the flight has not been commenced.

3.7.1.2 **Recommendation.—** *Standard departure and arrival routes and associated procedures should be established when necessary to facilitate:*

a) the safe, orderly and expeditious flow of air traffic;

b) the description of the route and procedure in air traffic control clearances.

Note.— Material relating to the establishment of standard departure and arrival routes and associated procedures is contained in the Air Traffic Services Planning Manual *(Doc 9426). The design criteria are contained in PANS-OPS, Volume II (Doc 8168).*

3.7.2 Clearances for transonic flight

3.7.2.1 The air traffic control clearance relating to the transonic acceleration phase of a supersonic flight shall extend at least to the end of that phase.

3.7.2.2 **Recommendation.—** *The air traffic control clearance relating to the deceleration and descent of an aircraft from supersonic cruise to subsonic flight should provide for uninterrupted descent, at least during the transonic phase.*

3.7.3 Read-back of clearances and safety-related information

3.7.3.1 The flight crew shall read back to the air traffic controller safety-related parts of ATC clearances and instructions which are transmitted by voice. The following items shall always be read back:

a) ATC route clearances;

b) clearances and instructions to enter, land on, take off from, hold short of, cross and backtrack on any runway; and

c) runway-in-use, altimeter settings, SSR codes, level instructions, heading and speed instructions and, whether issued by the controller or contained in ATIS broadcasts, transition levels.

3.7.3.1.1 Other clearances or instructions, including conditional clearances, shall be read back or acknowledged in a manner to clearly indicate that they have been understood and will be complied with.

3.7.3.1.2 The controller shall listen to the read-back to ascertain that the clearance or instruction has been correctly acknowledged by the flight crew and shall take immediate action to correct any discrepancies revealed by the read-back.

3.7.3.2 Unless specified by the appropriate ATS authority, voice read-back of CPDLC messages shall not be required.

Note.— The procedures and provisions relating to the exchange and acknowledgement of CPDLC messages are contained in Annex 10, Volume II, and PANS-ATM, Chapter 14.

3.7.4 Coordination of clearances

An air traffic control clearance shall be coordinated between air traffic control units to cover the entire route of an aircraft or a specified portion thereof as follows.

3.7.4.1 An aircraft shall be cleared for the entire route to the aerodrome of first intended landing:

a) when it has been possible, prior to departure, to coordinate the clearance between all the units under whose control the aircraft will come; or

b) when there is reasonable assurance that prior coordination will be effected between those units under whose control the aircraft will subsequently come.

Note.— Where a clearance is issued covering the initial part of the flight solely as a means of expediting departing traffic, the succeeding en-route clearance will be as specified above even though the aerodrome of first intended landing is under the jurisdiction of an area control centre other than the one issuing the en-route clearance.

3.7.4.2 When coordination as in 3.7.4.1 has not been achieved or is not anticipated, the aircraft shall be cleared only to that point where coordination is reasonably assured; prior to reaching such point, or at such point, the aircraft shall receive further clearance, holding instructions being issued as appropriate.

3.7.4.2.1 When prescribed by the appropriate ATS authority, aircraft shall contact a downstream air traffic control unit, for the purpose of receiving a downstream clearance prior to the transfer of control point.

3.7.4.2.1.1 Aircraft shall maintain the necessary two-way communication with the current air traffic control unit whilst obtaining a downstream clearance.

3.7.4.2.1.2 A clearance issued as a downstream clearance shall be clearly identifiable as such to the pilot.

3.7.4.2.1.3 Unless coordinated, downstream clearances shall not affect the aircraft's original flight profile in any airspace, other than that of the air traffic control unit responsible for the delivery of the downstream clearance.

Note.— Requirements relating to the application of downstream clearance delivery service are specified in Annex 10, Volume II. Guidance material is contained in the Manual of Air Traffic Services Data Link Applications *(Doc 9694).*

3.7.4.2.1.4 **Recommendation.—** *Where practicable, and where data link communications are used to facilitate downstream clearance delivery, two-way voice communications between the pilot and the air traffic control unit providing the downstream clearance should be available.*

3.7.4.3 When an aircraft intends to depart from an aerodrome within a control area to enter another control area within a period of thirty minutes, or such other specific period of time as has been agreed between the area control centres concerned, coordination with the subsequent area control centre shall be effected prior to issuance of the departure clearance.

3.7.4.4 When an aircraft intends to leave a control area for flight outside controlled airspace, and will subsequently re-enter the same or another control area, a clearance from point of departure to the aerodrome of first intended landing may be issued. Such clearance or revisions thereto shall apply only to those portions of the flight conducted within controlled airspace.

3.7.5 Air traffic flow management

3.7.5.1 Air traffic flow management (ATFM) shall be implemented for airspace where air traffic demand at times exceeds, or is expected to exceed, the declared capacity of the air traffic control services concerned.

Note.— The capacity of the air traffic control services concerned will normally be declared by the appropriate ATS authority.

3.7.5.2 **Recommendation**.— *ATFM should be implemented on the basis of regional air navigation agreements or, if appropriate, through multilateral agreements. Such agreements should make provision for common procedures and common methods of capacity determination.*

3.7.5.3 When it becomes apparent to an ATC unit that traffic additional to that already accepted cannot be accommodated within a given period of time at a particular location or in a particular area, or can only be accommodated at a given rate, that unit shall so advise the ATFM unit, when such is established, as well as, when appropriate, ATS units concerned. Flight crews of aircraft destined to the location or area in question and operators concerned shall also be advised of the delays expected or the restrictions that will be applied.

Note.— Operators concerned will normally be advised, in advance where possible, of restrictions imposed by the air traffic flow management unit when such is established.

3.8 Control of persons and vehicles at aerodromes

3.8.1 The movement of persons or vehicles including towed aircraft on the manoeuvring area of an aerodrome shall be controlled by the aerodrome control tower as necessary to avoid hazard to them or to aircraft landing, taxiing or taking off.

3.8.2 In conditions where low visibility procedures are in operation:

a) persons and vehicles operating on the manoeuvring area of an aerodrome shall be restricted to the essential minimum, and particular regard shall be given to the requirements to protect the ILS/MLS sensitive area(s) when Category II or Category III precision instrument operations are in progress;

b) subject to the provisions in 3.8.3, the minimum separation between vehicles and taxiing aircraft shall be as prescribed by the appropriate ATS authority taking into account the aids available;

c) when mixed ILS and MLS Category II or Category III precision instrument operations are taking place to the same runway continuously, the more restrictive ILS or MLS critical and sensitive areas shall be protected.

Note.— The period of application of low visibility procedures is determined in accordance with ATS unit instructions. Guidance on low visibility operations on an aerodrome is contained in the Manual of Surface Movement Guidance and Control Systems (SMGCS) *(Doc 9476).*

3.8.3 Emergency vehicles proceeding to the assistance of an aircraft in distress shall be afforded priority over all other surface movement traffic.

3.8.4 Subject to the provisions in 3.8.3, vehicles on the manoeuvring area shall be required to comply with the following rules:

a) vehicles and vehicles towing aircraft shall give way to aircraft which are landing, taking off or taxiing;

b) vehicles shall give way to other vehicles towing aircraft;

c) vehicles shall give way to other vehicles in accordance with ATS unit instructions;

d) notwithstanding the provisions of a), b) and c), vehicles and vehicles towing aircraft shall comply with instructions issued by the aerodrome control tower.

3.9 Provision of radar and ADS-B

Recommendation.— *Radar and ADS-B ground systems should provide for the display of safety-related alerts and warnings, including conflict alert, conflict prediction, minimum safe altitude warning and unintentionally duplicated SSR codes.*

3.10 Use of surface movement radar (SMR)

Recommendation.— *In the absence of visual observation of all or part of the manoeuvring area or to supplement visual observation, surface movement radar (SMR) provided in accordance with the provisions of Annex 14, Volume I, or other suitable surveillance equipment, should be utilized to:*

a) monitor the movement of aircraft and vehicles on the manoeuvring area;

b) provide directional information to pilots and vehicle drivers as necessary; and

c) provide advice and assistance for the safe and efficient movement of aircraft and vehicles on the manoeuvring area.

Note.— See the Manual of Surface Movement Guidance and Control Systems (SMGCS) *(Doc 9476), the* Advanced-Surface Movement Guidance and Control Systems (A-SMGCS) Manual *(Doc 9830) and the* Air Traffic Services Planning Manual *(Doc 9426) for guidance on the use of SMR.*

CHAPTER 6. AIR TRAFFIC SERVICES REQUIREMENTS FOR COMMUNICATIONS

6.1 Aeronautical mobile service (air-ground communications)

6.1.1 General

6.1.1.1 Radiotelephony and/or data link shall be used in air-ground communications for air traffic services purposes.

Note.— Requirements for ATS units to be provided with and to maintain guard on the emergency channel 121.5 MHz are specified in Annex 10, Volumes II and V.

6.1.1.2 Where RCP types have been prescribed by States for ATM functions, ATS units shall, in addition to the requirements specified in 6.1.1.1, be provided with communication equipment which will enable them to provide ATS in accordance with the prescribed RCP type(s).

Note.— Information on RCP and associated procedures, and guidance concerning the approval process, will be contained in the Manual on Required Communication Performance (RCP) (*Doc 9869) (in preparation). This document also contains references to other documents produced by States and international bodies concerning communication systems and RCP.*

6.1.1.3 When direct pilot-controller two-way radiotelephony or data link communications are used for the provision of air traffic control service, recording facilities shall be provided on all such air-ground communication channels.

Note.— Requirements for retention of all automatic recordings of communications in ATC are specified in Annex 10, Volume II, 3.5.1.5.

6.1.1.4 Recordings of communications channels as required in paragraph 6.1.1.3 shall be retained for a period of at least thirty days.

6.1.2 For flight information service

6.1.2.1 Air-ground communication facilities shall enable two-way communications to take place between a unit providing flight information service and appropriately equipped aircraft flying anywhere within the flight information region.

6.1.2.2 **Recommendation.—** *Whenever practicable, air-ground communication facilities for flight information service should permit direct, rapid, continuous and static-free two-way communications.*

6.1.3 For area control service

6.1.3.1 Air-ground communication facilities shall enable two-way communications to take place between a unit providing area control service and appropriately equipped aircraft flying anywhere within the control area(s).

6.1.3.2 **Recommendation.—** *Whenever practicable, air-ground communication facilities for area control service should permit direct, rapid, continuous and static-free two-way communications.*

6.1.3.3 **Recommendation.—** *Where air-ground voice communication channels are used for area control service and are worked by air-ground communicators, suitable arrangements should be made to permit direct pilot-controller voice communications, as and when required.*

6.1.4 For approach control service

6.1.4.1 Air-ground communication facilities shall enable direct, rapid, continuous and static-free two-way communications to take place between the unit providing approach control service and appropriately equipped aircraft under its control.

6.1.4.2 Where the unit providing approach control service functions as a separate unit, air-ground communications shall be conducted over communication channels provided for its exclusive use.

6.1.5 For aerodrome control service

6.1.5.1 Air-ground communication facilities shall enable direct, rapid, continuous and static-free two-way communications to take place between an aerodrome control tower and appropriately equipped aircraft operating at any distance within 45 km (25 NM) of the aerodrome concerned.

6.1.5.2 **Recommendation.—** *Where conditions warrant, separate communication channels should be provided for the control of traffic operating on the manoeuvring area.*

6.2 Aeronautical fixed service (ground-ground communications)

6.2.1 General

6.2.1.1 Direct-speech and/or data link communications shall be used in ground-ground communications for air traffic services purposes.

Note 1.— Indication by time of the speed with which the communication should be established is provided as a guide to communication services, particularly to determine the types of communication channels required, e.g. that "instantaneous" is intended to refer to communications which effectively provide for immediate access between controllers; "fifteen seconds" to accept switchboard operation and "five minutes" to mean methods involving retransmission.

Note 2.— Requirements for retention of all automatic recordings of communications in ATC are specified in Annex 10, Volume II, 3.5.1.5.

6.2.1.2 Where RCP types have been prescribed by States for ATM functions, ATS units shall, in addition to the requirements specified in 6.2.1.1, be provided with communication equipment which will enable them to provide ATS in accordance with the prescribed RCP type(s).

Note.— Information on RCP and associated procedures, and guidance concerning the approval process, will be contained in the Manual on Required Communication Performance (RCP) *(Doc 9869) (in preparation). This document also contains references to other documents produced by States and international bodies concerning communication systems and RCP.*

6.2.2 Communications within a flight information region

6.2.2.1 *Communications between air traffic services units*

6.2.2.1.1 A flight information centre shall have facilities for communications with the following units providing a service within its area of responsibility:

a) the area control centre, unless collocated;

b) approach control units;

c) aerodrome control towers.

6.2.2.1.2 An area control centre, in addition to being connected to the flight information centre as prescribed in 6.2.2.1.1, shall have facilities for communications with the following units providing a service within its area of responsibility:

a) approach control units;

b) aerodrome control towers;

c) air traffic services reporting offices, when separately established.

6.2.2.1.3 An approach control unit, in addition to being connected to the flight information centre and the area control centre as prescribed in 6.2.2.1.1 and 6.2.2.1.2, shall have facilities for communications with the associated aerodrome control tower(s) and, when separately established, the associated air traffic services reporting office(s).

6.2.2.1.4 An aerodrome control tower, in addition to being connected to the flight information centre, the area control centre and the approach control unit as prescribed in 6.2.2.1.1, 6.2.2.1.2 and 6.2.2.1.3, shall have facilities for communications with the associated air traffic services reporting office, when separately established.

6.2.2.2 *Communications between air traffic services units and other units*

6.2.2.2.1 A flight information centre and an area control centre shall have facilities for communications with the following units providing a service within their respective area of responsibility:

a) appropriate military units;

b) the meteorological office serving the centre;

c) the aeronautical telecommunications station serving the centre;

d) appropriate operator's offices;

e) the rescue coordination centre or, in the absence of such centre, any other appropriate emergency service;

f) the international NOTAM office serving the centre.

6.2.2.2.2 An approach control unit and an aerodrome control tower shall have facilities for communications with the following units providing a service within their respective area of responsibility:

a) appropriate military units;

b) rescue and emergency services (including ambulance, fire, etc.);

c) the meteorological office serving the unit concerned;

d) the aeronautical telecommunications station serving the unit concerned;

e) the unit providing apron management service, when separately established.

6.2.2.2.3 The communication facilities required under 6.2.2.2.1 a) and 6.2.2.2.2 a) shall include provisions for rapid and reliable communications between the air traffic services unit concerned and the military unit(s) responsible for control of interception operations within the area of responsibility of the air traffic services unit.

6.2.2.3 *Description of communication facilities*

6.2.2.3.1 The communication facilities required under 6.2.2.1, 6.2.2.2.1 a) and 6.2.2.2.2 a), b) and c) shall include provisions for:

a) communications by direct speech alone, or in combination with data link communications, whereby for the purpose of transfer of control using radar or ADS-B, the communications can be established instantaneously and for other purposes the communications can normally be established within fifteen seconds; and

b) printed communications, when a written record is required; the message transit time for such communications being no longer than five minutes.

6.2.2.3.2 **Recommendation.—** *In all cases not covered by 6.2.2.3.1, the communication facilities should include provisions for:*

a) communications by direct speech alone, or in combination with data link communications, whereby the communications can normally be established within fifteen seconds; and

b) printed communications, when a written record is required; the message transit time for such communications being no longer than five minutes.

6.2.2.3.3 In all cases where automatic transfer of data to and/or from air traffic services computers is required, suitable facilities for automatic recording shall be provided.

6.2.2.3.4 **Recommendation.—** *The communication facilities required in accordance with 6.2.2.1 and 6.2.2.2 should be supplemented, as and where necessary, by facilities for other forms of visual or audio communications, for example, closed circuit television or separate information processing systems.*

6.2.2.3.5 The communication facilities required under 6.2.2.2.2 a), b) and c) shall include provisions for communications by direct speech arranged for conference communications.

6.2.2.3.6 **Recommendation.—** *The communication facilities required under 6.2.2.2.2 d) should include provisions for communications by direct speech arranged for conference communications, whereby the communications can normally be established within fifteen seconds.*

6.2.2.3.7 All facilities for direct-speech or data link communications between air traffic services units and between air traffic services units and other units described under 6.2.2.2.1 and 6.2.2.2.2 shall be provided with automatic recording.

6.2.2.3.8 Recordings of data and communications as required in 6.2.2.3.3 and 6.2.2.3.7 shall be retained for a period of at least thirty days.

6.2.3 Communications between flight information regions

6.2.3.1 Flight information centres and area control centres shall have facilities for communications with all adjacent flight information centres and area control centres.

6.2.3.1.1 These communication facilities shall in all cases include provisions for messages in a form suitable for retention as a permanent record, and delivery in accordance with transit times specified by regional air navigation agreements.

6.2.3.1.2 Unless otherwise prescribed on the basis of regional air navigation agreements, facilities for communications between area control centres serving contiguous control areas shall, in addition, include provisions for direct-speech and, where applicable, data link communications, with automatic recording, whereby for the purpose of transfer of control using radar, ADS-B or ADS-C data, the communications can be established instantaneously and for other purposes the communications can normally be established within fifteen seconds.

6.2.3.1.3 When so required by agreement between the States concerned in order to eliminate or reduce the need for interceptions in the event of deviations from assigned track, facilities for communications between adjacent flight information centres or area control centres other than those mentioned in 6.2.3.1.2 shall include provisions for direct speech alone, or in combination with data link communications. The communication facilities shall be provided with automatic recording.

6.2.3.1.4 **Recommendation.—** *The communication facilities in 6.2.3.1.3 should permit communications to be established normally within fifteen seconds.*

6.2.3.2 **Recommendation.—** *Adjacent ATS units should be connected in all cases where special circumstances exist.*

Note.— Special circumstances may be due to traffic density, types of aircraft operations and/or the manner in which the airspace is organized and may exist even if the control areas and/or control zones are not contiguous or have not (yet) been established.

6.2.3.3 **Recommendation.—** *Wherever local conditions are such that it is necessary to clear aircraft into an adjacent control area prior to departure, an approach control unit and/ or aerodrome control tower should be connected with the area control centre serving the adjacent area.*

6.2.3.4 **Recommendation.—** *The communication facilities in 6.2.3.2 and 6.2.3.3 should include provisions for communications by direct speech alone, or in combination with data link communications, with automatic recording, whereby for the purpose of transfer of control using radar, ADS-B or ADS-C data, the communications can be established instantaneously and for other purposes the communications can normally be established within fifteen seconds.*

6.2.3.5 In all cases where automatic exchange of data between air traffic services computers is required, suitable facilities for automatic recording shall be provided.

6.2.3.6 Recordings of data and communications as required in 6.2.3.5 shall be retained for a period of at least thirty days.

6.2.4 Procedures for direct-speech communications

Recommendation.— *Appropriate procedures for direct-speech communications should be developed to permit immediate connections to be made for very urgent calls concerning the safety of aircraft, and the interruption, if necessary, of less urgent calls in progress at the time.*

6.3 Surface movement control service

6.3.1 Communications for the control of vehicles other than aircraft on manoeuvring areas at controlled aerodromes

6.3.1.1 Two-way radiotelephony communication facilities shall be provided for aerodrome control service for the control of vehicles on the manoeuvring area, except where communication by a system of visual signals is deemed to be adequate.

6.3.1.2 Where conditions warrant, separate communication channels shall be provided for the control of vehicles on the manoeuvring area. Automatic recording facilities shall be provided on all such channels.

6.3.1.3 Recordings of communications as required in 6.3.1.2 shall be retained for a period of at least thirty days.

Note.— See also Annex 10, Volume II, 3.5.1.5.

6.4 Aeronautical radio navigation service

6.4.1 Automatic recording of surveillance data

6.4.1.1 Surveillance data from primary and secondary radar equipment or other systems (e.g. ADS-B, ADS-C), used as an aid to air traffic services, shall be automatically recorded for use in accident and incident investigations, search and rescue, air traffic control and surveillance systems evaluation and training.

6.4.1.2 Automatic recordings shall be retained for a period of at least thirty days. When the recordings are pertinent to accident and incident investigations, they shall be retained for longer periods until it is evident that they will no longer be required.

CHAPTER 7. AIR TRAFFIC SERVICES REQUIREMENTS FOR INFORMATION

7.1 Meteorological information

7.1.1 General

7.1.1.1 Air traffic services units shall be supplied with up-to-date information on existing and forecast meteorological conditions as necessary for the performance of their respective functions. The information shall be supplied in such a form as to require a minimum of interpretation on the part of air traffic services personnel and with a frequency which satisfies the requirements of the air traffic services units concerned.

7.1.1.2 **Recommendation.—** *Air traffic services units should be supplied with available detailed information on the location, vertical extent, direction and rate of movement of meteorological phenomena in the vicinity of the aerodrome, and particularly in the climb-out and approach areas, which could be hazardous to aircraft operations.*

Note.— The meteorological phenomena are listed in Annex 3, Chapter 4, 4.6.8.

7.1.1.3 **Recommendation.—** *When computer-processed upper air data are made available to air traffic services units in digital form for use by air traffic services computers, the contents, format and transmission arrangements should be as agreed between the Meteorological Authority and the appropriate ATS Authority.*

7.1.2 Flight information centres and area control centres

7.1.2.1 Flight information centres and area control centres shall be supplied with meteorological information as described in Annex 3, Appendix 9, 1.3, particular emphasis being given to the occurrence or expected occurrence of weather deterioration as soon as this can be determined. These reports and forecasts shall cover the flight information region or control area and such other areas as may be determined on the basis of regional air navigation agreements.

Note.— For the purpose of this provision, certain changes in meteorological conditions are construed as deterioration in a weather element, although they are not ordinarily considered as such. An increase in temperature may, for example, adversely affect the operation of certain types of aircraft.

7.1.2.2 Flight information centres and area control centres shall be provided, at suitable intervals, with current pressure data for setting altimeters, for locations specified by the flight information centre or area control centre concerned.

7.1.3 Units providing approach control service

7.1.3.1 Units providing approach control service shall be supplied with meteorological information as described in Annex 3, Appendix 9, 1.2 for the airspace and the aerodromes with which they are concerned. Special reports and amendments to forecasts shall be communicated to the units providing approach control service as soon as they are necessary in accordance with established criteria, without waiting for the next routine report or forecast. Where multiple anemometers are used, the indicators to which they are related shall be clearly marked to identify the runway and section of the runway monitored by each anemometer.

Note.— See Note following 7.1.2.1.

7.1.3.2 Units providing approach control service shall be provided with current pressure data for setting altimeters, for locations specified by the unit providing approach control service.

7.1.3.3 Units providing approach control service for final approach, landing and take-off shall be equipped with surface wind display(s). The display(s) shall be related to the same location(s) of observation and be fed from the same sensor(s) as the corresponding display(s) in the aerodrome control tower and in the meteorological station, where such a station exists.

7.1.3.4 Units providing approach control service for final approach, landing and take-off at aerodromes where runway visual range values are assessed by instrumental means shall be equipped with display(s) permitting read-out of the current runway visual range value(s). The display(s) shall be related to the same location(s) of observation and be fed from the same sensor(s) as the corresponding displays in the aerodrome control tower and in the meteorological station, where such a station exists.

7.1.3.5 **Recommendation**.— *Units providing approach control service for final approach, landing and take-off at aerodromes where the height of cloud base is assessed by instrumental means should be equipped with display(s) permitting read-out of the current value(s) of the height of cloud base. The displays should be related to the same location(s) of* *observations and be fed from the same sensor(s) as the corresponding display(s) in the aerodrome control tower and in the meteorological station, where such a station exists.*

7.1.3.6 Units providing approach control service for final approach, landing and take-off shall be supplied with information on wind shear which could adversely affect aircraft on the approach or take-off paths or during circling approach.

Note.— Provisions concerning the issuance of wind shear warnings and alerts and ATS requirements for meteorological information are given in Annex 3, Chapter 7 and Appendices 6 and 9.

7.1.4 Aerodrome control towers

7.1.4.1 Aerodrome control towers shall be supplied with meteorological information as described in Annex 3, Appendix 9, 1.1 for the aerodrome with which they are concerned. Special reports and amend-ments to forecasts shall be communicated to the aerodrome control towers as soon as they are necessary in accordance with established criteria, without waiting for the next routine report or forecast.

Note.— See Note following 7.1.2.1.

7.1.4.2 Aerodrome control towers shall be provided with current pressure data for setting altimeters for the aerodrome concerned.

7.1.4.3 Aerodrome control towers shall be equipped with surface wind display(s). The display(s) shall be related to the same location(s) of observation and be fed from the same sensor(s) as the corresponding display(s) in the meteorological station, where such a station exists. Where multiple sensor(s) are used, the displays to which they are related shall be clearly marked to identify the runway and section of the runway monitored by each sensor.

7.1.4.4 Aerodrome control towers at aerodromes where runway visual range values are measured by instrumental means shall be equipped with display(s) permitting read-out of the current runway visual range value(s). The display(s) shall be related to the same location(s) of observation and be fed from the same sensor(s) as the corresponding display(s) in the meteorological station, where such a station exists.

7.1.4.5 **Recommendation**.— *Aerodrome control towers at aerodromes where the height of cloud base is assessed by instrumental means should be equipped with display(s) permitting read-out of the current value(s) of the height of cloud base. The displays should be related to the same location(s) of observations and be fed from the same sensor(s) as the corresponding display(s) in the meteorological station, where such a station exists.*

7.1.4.6 Aerodrome control towers shall be supplied with information on wind shear which could adversely affect aircraft on the approach or take-off paths or during circling approach and aircraft on the runway during the landing roll or take-off run.

7.1.4.7 **Recommendation.—** *Aerodrome control towers and/or other appropriate units should be supplied with aerodrome warnings.*

Note.— The meteorological conditions for which aerodrome warnings are issued are listed in Annex 3, Appendix 6, 5.1.3.

7.1.5 Communication stations

Where necessary for flight information purposes, current meteorological reports and forecasts shall be supplied to communication stations. A copy of such information shall be forwarded to the flight information centre or the area control centre.

7.2 Information on aerodrome conditions and the operational status of associated facilities

Aerodrome control towers and units providing approach control service shall be kept currently informed of the operationally significant conditions of the movement area, including the existence of temporary hazards, and the operational status of any associated facilities at the aerodrome(s) with which they are concerned.

7.3 Information on the operational status of navigation aids

7.3.1 ATS units shall be kept currently informed of the operational status of non-visual navigation aids, and those visual aids essential for take-off, departure, approach and landing procedures within their area of responsibility and those visual and non-visual aids essential for surface movement.

7.3.2 **Recommendation.—** *Information on the operational status, and any changes thereto, of visual and non-visual aids as referred to in 7.3.1 should be received by the appropriate ATS unit(s) on a timely basis consistent with the use of the aid(s) involved.*

Note.— Guidance material regarding the provision of information to ATS units in respect to visual and non-visual navigation aids is contained in the Air Traffic Services Planning Manual *(Doc 9426). Specifications for monitoring visual aids are contained in Annex 14, Volume I, and related guidance material is in the* Aerodrome Design Manual *(Doc 9157), Part 5. Specifications for monitoring non-visual aids are contained in Annex 10, Volume I.*

7.4 Information on unmanned free balloons

Operators of unmanned free balloons shall keep the appropriate air traffic services units informed of details of flights of unmanned free balloons in accordance with the provisions contained in Annex 2.

7.5 Information concerning volcanic activity

7.5.1 ATS units shall be informed, in accordance with local agreement, of pre-eruption volcanic activity, volcanic eruptions and volcanic ash cloud which could affect airspace used by flights within their area of responsibility.

7.5.2 Area control centres and flight information centres shall be provided with volcanic ash advisory information issued by the associated VAAC.

Note.— VAACs are designated by regional air navigation agreements in accordance with Annex 3, 3.5.1.

7.6 Information concerning radioactive materials and toxic chemical "clouds"

ATS units shall be informed, in accordance with local agreement, of the release into the atmosphere of radioactive materials or toxic chemicals which could affect airspace used by flights within their area of responsibility.

APPENDIX 1. PRINCIPLES GOVERNING THE IDENTIFICATION OF RNP TYPES AND THE IDENTIFICATION OF ATS ROUTES OTHER THAN STANDARD DEPARTURE AND ARRIVAL ROUTES

(Chapter 2, Sections 2.7 and 2.12 refer)

Note.— See Appendix 3 concerning the identification of standard departure and arrival routes and associated procedures. Guidance material on the establishment of these routes and procedures is contained in the Air Traffic Services Planning Manual *(Doc 9426).*

1. Designators for ATS routes and RNP types

1.1 The purpose of a system of route designators and required navigation performance (RNP) type(s) applicable to specified ATS route segment(s), route(s) or area is to allow both pilots and ATS, taking into account automation requirements:

a) to make unambiguous reference to any ATS route without the need to resort to the use of geographical coordinates or other means in order to describe it;

b) to relate an ATS route to a specific vertical structure of the airspace, as applicable;

c) to indicate a required level of navigation performance accuracy, when operating along an ATS route or within a specified area; and

d) to indicate that a route is used primarily or exclusively by certain types of aircraft.

Note 1.— Prior to the global introduction of RNP, all references in this appendix to RNP also apply to area navigation (RNAV) routes, where navigation performance accuracy requirements have been specified.

Note 2.— Specifications governing the publication of RNP types are given in Annex 4, Chapter 7, and Annex 15, Appendix 1.

Note 3.— In relation to this appendix and for flight planning purposes, a prescribed RNP type is not considered an integral part of the ATS route designator.

1.2 In order to meet this purpose, the designation system shall:

a) permit the identification of any ATS route in a simple and unique manner;

b) avoid redundancy;

c) be usable by both ground and airborne automation systems;

d) permit utmost brevity in operational use; and

e) provide sufficient possibility of extension to cater for any future requirements without the need for fundamental changes.

1.3 Controlled, advisory and uncontrolled ATS routes, with the exception of standard arrival and departure routes, shall therefore be identified as specified hereafter.

2. Composition of designator

2.1 The ATS route designator shall consist of a basic designator supplemented, if necessary, by:

a) one prefix as prescribed in 2.3; and

b) one additional letter as prescribed in 2.4.

2.1.1 The number of characters required to compose the designator shall not exceed six characters.

2.1.2 The number of characters required to compose the designator should, whenever possible, be kept to a maximum of five characters.

2.2 The basic designator shall consist of one letter of the alphabet followed by a number from 1 to 999.

2.2.1 Selection of the letter shall be made from those listed hereunder:

a) A, B, G, R for routes which form part of the regional networks of ATS routes and are not area navigation routes;

b) L, M, N, P for area navigation routes which form part of the regional networks of ATS routes;

c) H, J, V, W for routes which do not form part of the regional networks of ATS routes and are not area navigation routes;

d) Q, T, Y, Z for area navigation routes which do not form part of the regional networks of ATS routes.

2.3 Where applicable, one supplementary letter shall be added as a prefix to the basic designator in accordance with the following:

a) K to indicate a low-level route established for use primarily by helicopters;

b) U to indicate that the route or portion thereof is established in the upper airspace;

c) S to indicate a route established exclusively for use by supersonic aircraft during acceleration, deceleration and while in supersonic flight.

2.4 When prescribed by the appropriate ATS authority or on the basis of regional air navigation agreements, a supplementary letter may be added after the basic designator of the ATS route in question in order to indicate the type of service provided or the turn performance required on the route in question in accordance with the following:

a) for RNP 1 routes at and above FL 200, the letter Y to indicate that all turns on the route between 30 and 90 degrees shall be made within the allowable RNP tolerance of a tangential arc between the straight leg segments defined with a radius of 22.5 NM (e.g. A123Y[1]);

b) for RNP 1 routes at and below FL 190, the letter Z to indicate that all turns on the route between 30 and 90 degrees shall be made within the allowable RNP tolerance of a tangential arc between the straight leg segments defined with a radius of 15 NM (e.g. G246Z[1]);

c) the letter F to indicate that on the route or portion thereof advisory service only is provided;

d) the letter G to indicate that on the route or portion thereof flight information service only is provided.

Note 1.— Due to limitations in the display equipment on board aircraft, the supplementary letters "F", "G", "Y" or "Z" may not be displayed to the pilot.

Note 2.— Implementation of a route or a portion thereof as controlled route, advisory route or flight information route is indicated in aeronautical charts and aeronautical information publications in accordance with the provisions in Annexes 4 and 15.

Note 3.— The conditions under which States may specify the controlled turn performance referred to in 2.4 a) and b) are discussed in the Manual on Required Navigation Performance (RNP) *(Doc 9613).*

3. Assignment of basic designators

3.1 Basic ATS route designators shall be assigned in accordance with the following principles.

3.1.1 The same basic designator shall be assigned to a main trunk route throughout its entire length, irrespective of terminal control areas, States or regions traversed.

Note.— This is of particular importance where automated ATS data processing and computerized airborne navigation equipment is used.

3.1.2 Where two or more trunk routes have a common segment, the segment in question shall be assigned each of the designators of the routes concerned, except where this would present difficulties in the provision of air traffic service, in which case, by common agreement, one designator only shall be assigned.

3.1.3 A basic designator assigned to one route shall not be assigned to any other route.

3.1.4 States' requirements for designators shall be notified to the Regional Offices of ICAO for coordination.

4. Use of designators in communications

4.1 In printed communications, the designator shall be expressed at all times by not less than two and not more than six characters.

4.2 In voice communications, the basic letter of a designator shall be spoken in accordance with the ICAO spelling alphabet.

4.3 Where the prefixes K, U or S specified in 2.3 are used, they shall, in voice communications, be spoken as follows:

K — KOPTER
U — UPPER
S — SUPERSONIC

The word "kopter" shall be pronounced as in the word "helicopter" and the words "upper" and "supersonic" as in the English language.

4.4 Where the letters "F", "G", "Y" or "Z" specified in 2.4 above are used, the flight crew should not be required to use them in voice communications.

APPENDIX 2. PRINCIPLES GOVERNING THE ESTABLISHMENT AND IDENTIFICATION OF SIGNIFICANT POINTS

(Chapter 2, Section 2.14 refers)

1. Establishment of significant points

1.1 Significant points should, whenever possible, be established with reference to ground-based radio navigation aids, preferably VHF or higher frequency aids.

1.2 Where such ground-based radio navigation aids do not exist, significant points shall be established at locations which can be determined by self-contained airborne navigation aids, or, where navigation by visual reference to the ground is to be effected, by visual observation. Specific points may be designated as ‘‘transfer of control’’ points by agreement between adjacent air traffic control units or control positions concerned.

2. Designators for significant points marked by the site of a radio navigation aid

2.1 Plain language name for significant points marked by the site of a radio navigation aid

2.1.1 Whenever practicable, significant points shall be named with reference to an identifiable and preferably prominent geographical location.

2.1.2 In selecting a name for the significant point, care shall be taken to ensure that the following conditions are met:

a) the name shall not create difficulties in pronunciation for pilots or ATS personnel when speaking in the language used in ATS communications. Where the name of a geographical location in the national language selected for designating a significant point gives rise to difficulties in pronunciation, an abbreviated or contracted version of this name, which retains as much of its geographical significance as possible, shall be selected;

   Example: FUERSTENFELDBRUCK = FURSTY

b) the name shall be easily recognizable in voice communications and shall be free of ambiguity with those of other significant points in the same general area. In addition, the name shall not create confusion with respect to other communications exchanged between air traffic services and pilots;

c) the name should, if possible, consist of at least six letters and form two syllables and preferably not more than three;

d) the selected name shall be the same for both the significant point and the radio navigation aid marking it.

2.2 Composition of coded designators for significant points marked by the site of a radio navigation aid

2.2.1 The coded designator shall be the same as the radio identification of the radio navigation aid. It shall be so composed, if possible, as to facilitate association with the name of the point in plain language.

2.2.2 Coded designators shall not be duplicated within 1 100 km (600 NM) of the location of the radio navigation aid concerned, except as noted hereunder.

Note.— When two radio navigation aids operating in different bands of the frequency spectrum are situated at the same location, their radio identifications are normally the same.

2.3 States’ requirements for coded designators shall be notified to the Regional Offices of ICAO for coordination.

3. Designators for significant points not marked by the site of a radio navigation aid

3.1 Where a significant point is required at a position not marked by the site of a radio navigation aid, the significant point shall be designated by a unique five-letter pronounceable “name-code”. This name-code designator then serves as the name as well as the coded designator of the significant point.

3.2 This name-code designator shall be selected so as to avoid any difficulties in pronunciation by pilots or ATS personnel when speaking in the language used in ATS communications.

Examples: ADOLA, KODAP

3.3 The name-code designator shall be easily recognizable in voice communications and shall be free of ambiguity with those used for other significant points in the same general area.

3.4 The name-code designator assigned to a significant point shall not be assigned to any other significant point. When there is a need to relocate a significant point, a new name-code designator shall be chosen. In cases when a State wishes to keep the allocation of specific name-codes for re-use at a different location, such name-codes shall not be used until after a period of at least six months.

3.5 States' requirements for name-code designators shall be notified to the Regional Offices of ICAO for coordination.

3.6 In areas where no system of fixed routes is established or where the routes followed by aircraft vary depending on operational considerations, significant points shall be determined and reported in terms of World Geodetic System — 1984 (WGS-84) geographical coordinates, except that permanently established significant points serving as exit and/or entry points into such areas shall be designated in accordance with the applicable provisions in 2 or 3.

4. Use of designators in communications

4.1 Normally the name selected in accordance with 2 or 3 shall be used to refer to the significant point in voice communications. If the plain language name for a significant point marked by the site of a radio navigation aid selected in accordance with 2.1 is not used, it shall be replaced by the coded designator which, in voice communications, shall be spoken in accordance with the ICAO spelling alphabet.

4.2 In printed and coded communications, only the coded designator or the selected name-code shall be used to refer to a significant point.

5. Significant points used for reporting purposes

5.1 In order to permit ATS to obtain information regarding the progress of aircraft in flight, selected significant points may need to be designated as reporting points.

5.2 In establishing such points, consideration shall be given to the following factors:

a) the type of air traffic services provided;

b) the amount of traffic normally encountered;

c) the accuracy with which aircraft are capable of adhering to the current flight plan;

d) the speed of the aircraft;

e) the separation minima applied;

f) the complexity of the airspace structure;

g) the control method(s) employed;

h) the start or end of significant phases of a flight (climb, descent, change of direction, etc.);

i) transfer of control procedures;

j) safety and search and rescue aspects;

k) the cockpit and air-ground communication workload.

5.3 Reporting points shall be established either as "compulsory" or as "on-request".

5.4 In establishing "compulsory" reporting points the following principles shall apply:

a) compulsory reporting points shall be limited to the minimum necessary for the routine provision of information to air traffic services units on the progress of aircraft in flight, bearing in mind the need to keep cockpit and controller workload and air-ground communications load to a minimum;

b) the availability of a radio navigation aid at a location should not necessarily determine its designation as a compulsory reporting point;

c) compulsory reporting points should not necessarily be established at flight information region or control area boundaries.

5.5 "On-request" reporting points may be established in relation to the requirements of air traffic services for additional position reports when traffic conditions so demand.

5.6 The designation of compulsory and on-request reporting points shall be reviewed regularly with a view to keeping the requirements for routine position reporting to the minimum necessary to ensure efficient air traffic services.

5.7 Routine reporting over compulsory reporting points should not systematically be made mandatory for all flights in all circumstances. In applying this principle, particular attention shall be given to the following:

a) high-speed, high-flying aircraft should not be required to make routine position reports over all reporting points established as compulsory for low-speed, low-flying aircraft;

b) aircraft transiting through a terminal control area should not be required to make routine position reports as frequently as arriving and departing aircraft.

5.8 In areas where the above principles regarding the establishment of reporting points would not be practicable, a reporting system with reference to meridians of longitude or parallels of latitude expressed in whole degrees may be established.

APPENDIX 3. PRINCIPLES GOVERNING THE IDENTIFICATION OF STANDARD DEPARTURE AND ARRIVAL ROUTES AND ASSOCIATED PROCEDURES

(See Chapter 2, 2.12.3)

Note.— Material relating to the establishment of standard departure and arrival routes and associated procedures is contained in the Air Traffic Services Planning Manual *(Doc 9426).*

1. Designators for standard departure and arrival routes and associated procedures

Note.— In the following text the term "route" is used in the meaning of "route and associated procedures".

1.1 The system of designators shall:

a) permit the identification of each route in a simple and unambiguous manner;

b) make a clear distinction between:

— departure routes and arrival routes;

— departure or arrival routes and other ATS routes;

— routes requiring navigation by reference to ground-based radio aids or self-contained airborne aids, and routes requiring navigation by visual reference to the ground;

c) be compatible with ATS and aircraft data processing and display requirements;

d) be of utmost brevity in its operational application;

e) avoid redundancy;

f) provide sufficient possibility for extension to cater for any future requirements without the need for fundamental changes.

1.2 Each route shall be identified by a plain language designator and a corresponding coded designator.

1.3 The designators shall, in voice communications, be easily recognizable as relating to a standard departure or arrival route and shall not create any difficulties in pronunciation for pilots and ATS personnel.

2. Composition of designators

2.1 Plain language designator

2.1.1 The plain language designator of a standard departure or arrival route shall consist of:

a) a basic indicator; followed by

b) a validity indicator; followed by

c) a route indicator, where required; followed by

d) the word "departure" or "arrival"; followed by

e) the word "visual", if the route has been established for use by aircraft operating in accordance with the visual flight rules (VFR).

2.1.2 The basic indicator shall be the name or name-code of the significant point where a standard departure route terminates or a standard arrival route begins.

2.1.3 The validity indicator shall be a number from 1 to 9.

2.1.4 The route indicator shall be one letter of the alphabet. The letters "I" and "O" shall not be used.

2.2 Coded designator

The coded designator of a standard departure or arrival route, instrument or visual, shall consist of:

a) the coded designator or name-code of the significant point described in 2.1.1 a); followed by

b) the validity indicator in 2.1.1 b); followed by

c) the route indicator in 2.1.1 c), where required.

Note.— Limitations in the display equipment on board aircraft may require shortening of the basic indicator, if that indicator is a five-letter name-code, e.g. KODAP. The manner in which such an indicator is shortened is left to the discretion of operators.

3. Assignment of designators

3.1 Each route shall be assigned a separate designator.

3.2 To distinguish between two or more routes which relate to the same significant point (and therefore are assigned the same basic indicator), a separate route indicator as described in 2.1.4 shall be assigned to each route.

4. Assignment of validity indicators

4.1 A validity indicator shall be assigned to each route to identify the route which is currently in effect.

4.2 The first validity indicator to be assigned shall be the number "1".

4.3 Whenever a route is amended, a new validity indicator, consisting of the next higher number, shall be assigned. The number "9" shall be followed by the number "1".

5. Examples of plain language and coded designators

5.1 *Example 1*: Standard departure route — instrument:

a) Plain language designator: BRECON ONE DEPARTURE

b) Coded designator: BCN 1

5.1.1 *Meaning*: The designator identifies a standard instrument departure route which terminates at the significant point BRECON (basic indicator). BRECON is a radio navigation facility with the identification BCN (basic indicator of the coded designator). The validity indicator ONE (1 in the coded designator) signifies either that the original version of the route is still in effect or that a change has been made from the previous version NINE (9) to the now effective version ONE (1) (see 4.3). The absence of a route indicator (see 2.1.4 and 3.2) signifies that only one route, in this case a departure route, has been established with reference to BRECON.

5.2 *Example 2*: Standard arrival route — instrument:

a) Plain language designator: KODAP TWO ALPHA ARRIVAL

b) Coded designator: KODAP 2 A

5.2.1 *Meaning*: This designator identifies a standard instrument arrival route which begins at the significant point KODAP (basic indicator). KODAP is a significant point not marked by the site of a radio navigation facility and therefore assigned a five-letter name-code in accordance with Appendix 2. The validity indicator TWO (2) signifies that a change has been made from the previous version ONE (1) to the now effective version TWO (2). The route indicator ALPHA (A) identifies one of several routes established with reference to KODAP and is a specific character assigned to this route.

5.3 *Example 3*: Standard departure route — visual:

a) Plain language designator ADOLA FIVE BRAVO DEPARTURE VISUAL

b) Coded designator: ADOLA 5 B

5.3.1 *Meaning*: This designator identifies a standard departure route for controlled VFR flights which terminates at ADOLA, a significant point not marked by the site of a radio navigation facility. The validity indicator FIVE (5) signifies that a change has been made from the previous version FOUR (4) to the now effective version FIVE (5). The route indicator BRAVO (B) identifies one of several routes established with reference to ADOLA.

6. Composition of designators for MLS/RNAV approach procedures

6.1 Plain language designator

6.1.1 The plain language designator of an MLS/RNAV approach procedure shall consist of:

a) "MLS"; followed by

b) a basic indicator; followed by

c) a validity indicator; followed by

d) a route indicator; followed by

e) the word "approach"; followed by

f) the designator of the runway for which the procedure is designed.

6.1.2 The basic indicator shall be the name or name-code of the significant point where the approach procedure begins.

6.1.3 The validity indicator shall be a number from 1 to 9.

6.1.4 The route indicator shall be one letter of the alphabet. The letters "I" and "O" shall not be used.

6.1.5 The designator of the runway shall be in accordance with Annex 14, Volume I, 5.2.2.

ATTACHMENT A. MATERIAL RELATING TO A METHOD OF ESTABLISHING ATS ROUTES DEFINED BY VOR

(Paragraph 2.7.1 and Section 2.12 refer)

1. Introduction

1.1 The guidance material in this Attachment results from comprehensive studies, carried out in Europe in 1972 and the United States in 1978, which were in general agreement.

Note.— Details of the European studies are contained in Circular 120 — Methodology for the Derivation of Separation Minima Applied to the Spacing between Parallel Tracks in ATS Route Structures.

1.2 In applying the guidance material in 3 and 4, it should be recognized that the data on which it is based are generally representative of navigation using VOR meeting the full requirements of Doc 8071 — *Manual on Testing of Radio Navigation Aids*, Volume I. Any additional factors, such as those due to particular operational requirements, frequency of aircraft passings or information available regarding the actual track-keeping performance of aircraft within a given portion of airspace should be taken into account.

1.3 Attention is also invited to the basic assumptions in 4.2 and to the fact that the values given in 4.1 represent a conservative approach. Before applying these values, account should therefore be taken of any practical experience gained in the airspace under consideration, as well as the possibility of achieving improvements in the overall navigation performance of aircraft.

1.4 States are encouraged to keep ICAO fully informed of the results of the application of this guidance material.

2. Determination of VOR system performance values

The large variability of the values which are likely to be associated with each of the factors that make up the total VOR system, and the limitation of presently available methods to measure all these effects individually with the required precision, have led to the conclusion that an assessment of the total system error provides a more realistic method for determining the VOR system performance. The material contained in 3 and 4 should be applied only after study of Circular 120 especially with respect to the environmental conditions.

Note.— Guidance material on overall VOR system accuracy is also contained in Annex 10, Volume I, Attachment C.

3. Determination of protected airspace along VOR-defined routes

Note 1.— The material of this section has not been derived by means of the collision-risk/target level of safety method.

Note 2.— The word "containment" as used in this section is intended to indicate that the protected airspace provided will contain the traffic for 95 per cent of the total flying time (i.e. accumulated over all aircraft) for which the traffic operates along the route in question. Where, for example 95 per cent containment is provided, it is implicit that for 5 per cent of the total flying time traffic will be outside *the protected airspace. It is not possible to quantify the maximum distance which such traffic is likely to deviate beyond the protected airspace.*

3.1 For VOR-defined routes where radar or ADS-B is not used to assist aircraft in remaining within the protected airspace, the following guidance is provided. However, when the lateral deviations of aircraft are being controlled with the aid of radar or ADS-B monitoring, the size of the protected airspace required may be reduced, as indicated by practical experience gained in the airspace under consideration.

3.2 As a minimum, protection against activity in airspace adjacent to the routes should provide 95 per cent containment.

3.3 The work described in Circular 120 indicates that a VOR system performance based on the probability of 95 per cent containment would require the following protected airspace around the centre line of the route to allow for possible deviations:

— VOR routes with 93 km (50 NM) or less between VORs: ±7.4 km (4 NM);

— VOR routes with up to 278 km (150 NM) between VORs: ±7.4 km (4 NM) up to 46 km (25 NM) from the VOR then expanding protected airspace up to ±11.1 km (6 NM) at 139 km (75 NM) from the VOR.

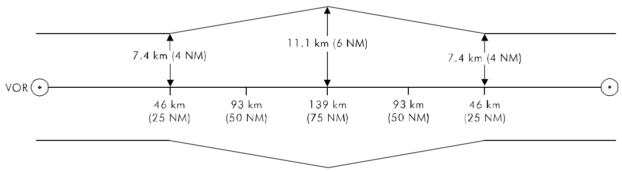

Figure A-1

3.4 If the appropriate ATS authority considers that a better protection is required, e.g. because of the proximity of prohibited, restricted or danger areas, climb or descent paths of military aircraft, etc., it may decide that a higher level of containment should be provided. For delineating the protected airspace the following values should then be used:

— for segments with 93 km (50 NM) or less between VORs, use the values in line A of the table below;

— for segments with more than 93 km (50 NM) and less than 278 km (150 NM) between the VORs use the values given in line A of the table up to 46 km (25 NM), then expand linearly to the value given in line B at 139 km (75 NM) from the VOR.

	Percentage containment					
	95	*96*	*97*	*98*	*99*	*99.5*
A (km)	±7.4	±7.4	±8.3	±9.3	±10.2	±11.1
(NM)	±4.0	±4.0	±4.5	±5.0	±5.5	±6.0
B (km)	±11.1	±11.1	±12.0	±12.0	±13.0	±15.7
(NM)	±6.0	±6.0	±6.5	±6.5	±7.0	±8.5

For example, the protected area for a route of 222 km (120 NM) between VORs and for which 99.5 per cent containment is required should have the following shape:

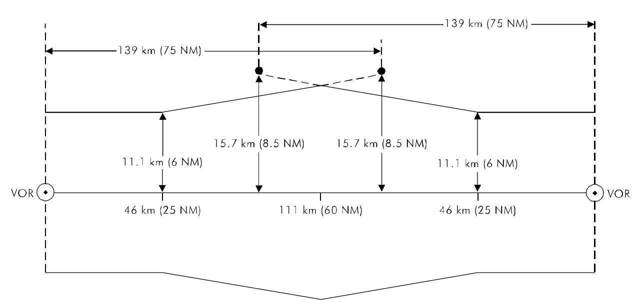

Figure A-2

3.5 If two segments of a VOR-defined ATS route intersect at an angle of more than 25 degrees, additional protected airspace should be provided on the outside of the turn and also on the inside of the turn as necessary. This additional space is to act as a buffer for increased lateral displacement of aircraft, observed in practice, during changes of direction exceeding 25 degrees. The amount of airspace added varies with the angle of intersection. The greater the angle, the greater the additional airspace to be used. Guidance is provided for protected airspace required at turns of no more than 90 degrees. For the exceptional circumstances which require an ATS route with a turn of more than 90 degrees, States should ensure that adequate protected airspace is provided on both the inside and outside of such turns.

3.6 The following examples have been synthesized from the practices of two States which use templates to facilitate the diagramming of airspace for planning purposes. Design of the turning area templates took into account factors such as aircraft speed, bank angle in turns, probable wind velocity, position errors, pilot delays and an intercept angle of at least 30 degrees to achieve the new track, and provides at least 95 per cent containment.

3.7 A template was used to establish the additional airspace required on the outside of turns to contain aircraft executing turns of 30, 45, 60, 75 and 90 degrees. The simplified figures below represent the outer limits of this airspace with the fairing curves removed to allow easy construction. In each case, the additional airspace is shown for aircraft flying in the direction of the large arrow. Where routes are used in both directions, the same additional airspace should be provided on the other outside boundary.

3.8 Figure A-3 illustrates the application of two segments intersecting at a VOR, at an angle of 60 degrees.

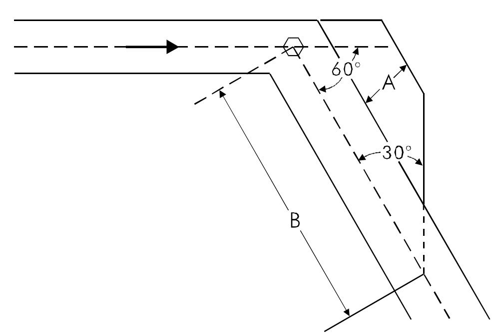

Figure A-3

3.9 Figure A-4 illustrates the application for two segments meeting at a VOR intersection at an angle of 60 degrees beyond the point where boundary splay is required in order to comply with 3.3 and Figure A-1.

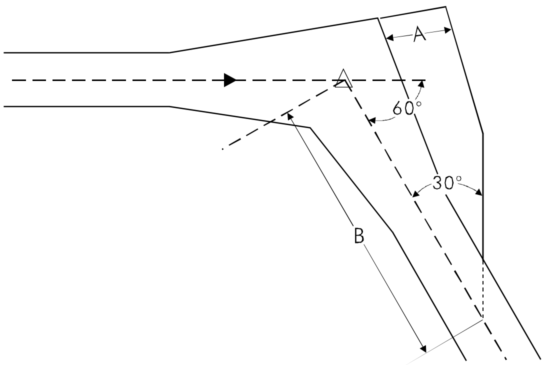

Figure A-4

3.10 The following table outlines the distances to be used in sample cases when providing additional protected airspace for route segments at and below FL 450, intersecting at a VOR or meeting at a VOR intersection not more than 139 km (75 NM) from each VOR.

Note.— Refer to Figures A-3 and A-4.

Angle of intersection		*30°*	*45°*	*60°*	*75°*	*90°*
VOR						
*Distance "A"	(km)	5	9	13	17	21
	(NM)	3	5	7	9	11
*Distance "B"	(km)	46	62	73	86	92
	(NM)	25	34	40	46	50
Intersection						
*Distance "A"	(km)	7	11	17	23	29
	(NM)	4	6	9	13	16
*Distance "B"	(km)	66	76	88	103	111
	(NM)	36	41	48	56	60

*Distances are rounded up to the next whole kilometre/nautical mile.

Note.— For behaviour of aircraft at turns, see Circular 120, 4.4.

3.11 Figure A-5 illustrates a method to construct the required additional protected airspace on the inside of turns for turns of 90 degrees or less:

Locate a point on the airway centre line, equal to the radius of turn plus the along-track tolerance prior to the nominal turning point.

From this point, drop a perpendicular line to intersect the edge of the airway on the inside of the turn.

From this point on the inner edge of the airway, construct a line to intersect the airway centre line beyond the turn at an angle of half of the angle of turn.

The resulting triangle on the inside of the turn depicts the additional airspace which should be protected for the change of direction. For any turn of 90 degrees or less, the extra space on the inside will serve for aircraft approaching the turn from either direction.

Note 1.— Criteria for the calculation of the along-track tolerance are contained in PANS-OPS (Doc 8168), Volume II, Part III, Appendix to Chapter 31.

Note 2.— Guidance on the calculation of radius of turn is provided in Section 7.

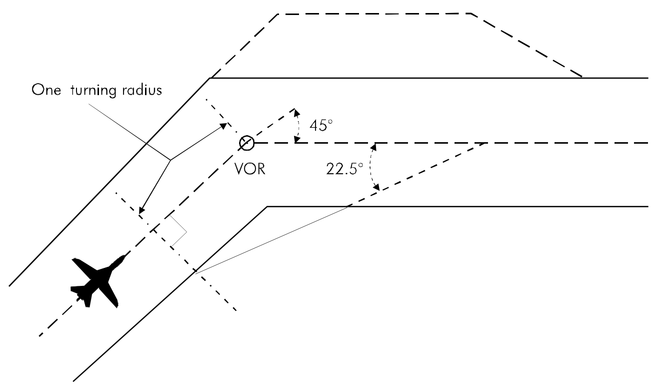

Figure A-5

3.12 For turns at VOR intersections, the principles of construction for extra airspace on the inside of a turn as described in 3.11 can be applied. Depending on the distance of the intersection from one or both VORs, one or both airways may have a splay at the intersection. Depending upon the situation, the extra airspace may be inside, partially inside, or outside of the 95 per cent containment. If the route is used in both directions, the construction should be completed separately for each direction.

3.13 Measured data for routes longer than 278 km (150 NM) between VORs are not yet available. To determine protected airspace beyond 139 km (75 NM) from the VOR, the use of an angular value of the order of 5 degrees as representing the probable system performance would appear satisfactory. The following figure illustrates this application.

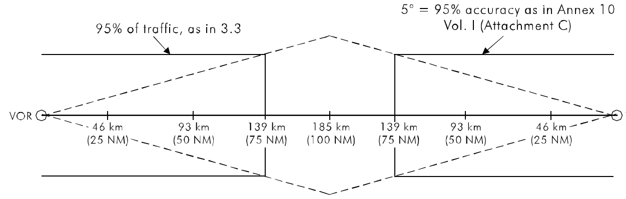

Figure A-6

4. Spacing of parallel routes defined by VORs

Note.— The material of this section has been derived from measured data using the collision-risk/target level of safety method.

4.1 The collision risk calculation, performed with the data of the European study mentioned in 1.1 indicates that, in the type of environment investigated, the distance between route centre lines (S in Figure A-7) for distances between VORs of 278 km (150 NM) or less should normally be a minimum of:

a) 33.3 km (18 NM) for parallel routes where the aircraft on the routes fly in opposite direction; and

b) 30.6 km (16.5 NM) for parallel routes where the aircraft on the two routes fly in the same direction.

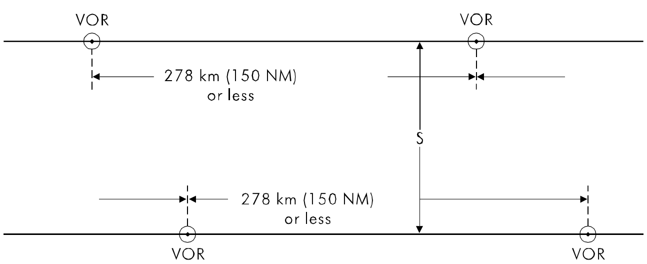

Figure A-7

Note.— Two route segments are considered parallel when:

— *they have about the same orientation, i.e. the angular difference does not exceed 10 degrees;*

— *they are not intersecting, i.e. another form of separation must exist at a defined distance from the intersection;*

— *traffic on each route is independent of traffic on the other route, i.e. it does not lead to restrictions on the other route.*

4.2 This spacing of parallel routes assumes:

a) aircraft may either during climb or descent or during level flight be at the same flight levels on the two routes;

b) traffic densities of 25 000 to 50 000 flights per busy two-month period;

c) VOR transmissions which are regularly flight checked in accordance with Doc 8071 — *Manual on Testing of Radio Navigation Aids*, Volume I, and have been found to be satisfactory in accordance with the procedures in that document for navigational purposes on the defined routes; and

d) no real-time radar or ADS-B monitoring or control of the lateral deviations is exercised.

4.3 Preliminary work indicates that, in the circumstances described in a) to c) below, it may be possible to reduce the minimum distance between routes. However, the figures given have not been precisely calculated and in each case a detailed study of the particular circumstances is essential:

a) if the aircraft on adjacent routes are not assigned the same flight levels, the distance between the routes may be reduced; the magnitude of the reduction will depend on the vertical separation between aircraft on the adjacent tracks and on the percentage of climbing and descending traffic, but is not likely to be more than 5.6 km (3 NM);

b) if the traffic characteristics differ significantly from those contained in Circular 120, the minima contained in 4.1 may require adjustment. For example, for traffic densities of about 10 000 flights per busy two-month period a reduction of 900 to 1 850 m (0.5 to 1.0 NM) may be possible;

c) the relative locations of the VORs defining the two tracks and the distance between the VORs will have an effect on the spacing, but this has not been quantified.

4.4 Application of radar or ADS-B monitoring and control of the lateral deviations of the aircraft may have a large effect on the minimum allowable distance between routes. Studies on the effect of radar monitoring indicate that:

— further work is necessary before a fully satisfactory mathematical model can be developed;

— any reduction of separation is closely related to:

  — traffic (volume, characteristics);
  — coverage and data processing, availability of an automatic alarm;
  — monitoring continuity;
  — sector workload; and
  — radiotelephony quality.

According to these studies and taking into account the experience some States have accumulated over many years with parallel route systems under continuous radar control, it can be expected that a reduction to the order of 15 to 18.5 km (8 to 10 NM), but most probably not less than 13 km (7 NM), may be possible as long as radar monitoring workload is not increased substantially by that reduction. Actual operations of such systems using reduced lateral spacing have shown that:

— it is very important to define and publish change-over points (see also 6);

— large turns should be avoided when possible; and

— where large turns cannot be avoided, required turn profiles should be defined for turns larger than 20 degrees.

Even where the probability of total radar or ADS-B failure is very small, procedures to cover that case should be considered.

5. Spacing of adjacent VOR-defined routes that are not parallel

Note 1.— The material of this section is intended to provide guidance for situations where non-intersecting VOR-defined routes are adjacent and have an angular difference exceeding 10 degrees.

Note 2.— The material of this section has not been derived by means of the collision-risk/target level of safety method.

5.1 For adjacent non-intersecting VOR-defined routes that are not parallel, the collision-risk/target level of safety method is not, at its present state of development, fully appropriate. For this reason use should be made of the material in 3.

5.2 The protected airspace between such routes should not be less than that which will provide, without overlap, the 99.5 per cent containment values given in the table in 3.4 (see example in Figure A-8).

5.3 Where there is an angular difference of more than 25 degrees between route segments, additional protected airspace, as indicated in 3.5 to 3.10, should be provided.

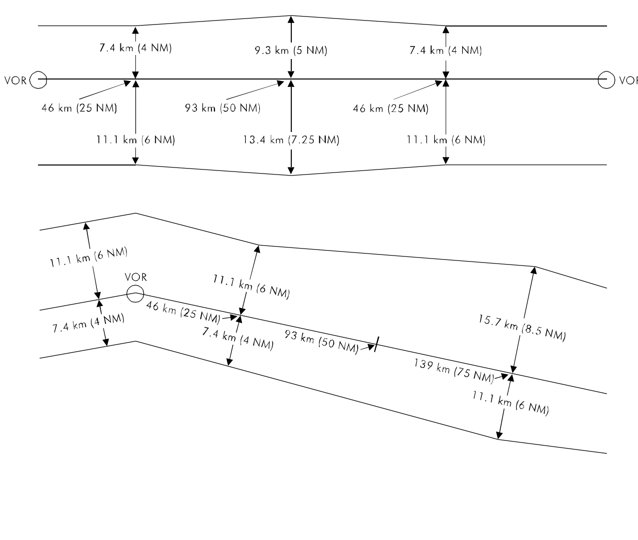

Figure A-8

6. Change-over points for VORs

6.1 When considering the establishment of points for changeover from one VOR to another for primary navigational guidance on VOR-defined ATS routes, States should bear in mind that:

a) the establishment of change-over points should be made on the basis of performance of the VOR stations concerned, including an evaluation of the interference protection criteria. The process should be verified by flight checking (see Doc 8071, Volume I, Part II);

b) where frequency protection is critical, flight inspection should be undertaken at the highest altitudes to which the facility is protected.

6.2 Nothing in 6.1 should be interpreted as placing a restriction on the service ranges of VOR installations meeting the specifications in Annex 10, Volume I, 3.3.

7. Calculation of radius of turn

7.1 The method used to calculate turn radii and the turn radii indicated below are applicable to aircraft performing a constant radius turn. The material has been derived from the turn performance criteria developed for RNP 1 ATS routes and can be used in the construction of the required additional protected airspace on the inside of turns also for ATS routes other than those defined by VOR.

7.2 Turn performance is dependent on two parameters — ground speed and bank angle. Due to the effect of the wind component changing with the change of heading, the ground speed and hence bank angle will change during a constant radius turn. However, for turns not greater than approximately 90 degrees and for the speed values considered below, the following formula can be used to calculate the achievable constant radius of turn, where the ground speed is the sum of the true airspeed and the wind speed:

$$\text{Radius of turn} = \frac{(\text{Ground speed})^2}{\text{Constant 'G'} * \text{TAN(bank angle)}}$$

7.3 The greater the ground speed, the greater will be the required bank angle. To ensure that the turn radius is representative for all foreseeable conditions, it is necessary to consider extreme parameters. A true airspeed of 1 020 km/h (550 kt) is considered probably the greatest to be encountered in the upper levels. Combined with maximum anticipated wind speeds in the medium and upper flight levels of 370 km/h (200 kt) [99.5 per cent values based on meteorological data], a maximum ground speed of 1 400 km/h (750 kt) should be considered. Maximum bank angle is very much a function of individual aircraft. Aircraft with high wing loadings flying at or near their maximum flight level are highly intolerant of extreme angles. Most transport aircraft are certified to fly no slower than 1.3 times their stall speed for any given configuration. Because the stall speed rises with TAN(bank angle), many operators try not to cruise below 1.4 times the stall speed to protect against gusts or turbulence. For the same reason, many transport aircraft fly at reduced maximum angles of bank in cruise conditions. Hence, it can be assumed that the highest bank angle which can be tolerated by all aircraft types is in the order of 20 degrees.

7.4 By calculation, the radius of turn of an aircraft flying at 1 400 km/h (750 kt) ground speed, with a bank angle of 20 degrees, is 22.51 NM (41.69 km). For purposes of expediency, this has been reduced to 22.5 NM (41.6 km). Following the same logic for the lower airspace, it is considered that up to FL 200 (6 100 m) the maximum figures to be encountered are a true airspeed of 740 km/h (400 kt), with a tailwind of 370 km/h (200 kt). Keeping the maximum bank angle of 20 degrees, and following the same formula, the turn would be defined along a radius of 14.45 NM (26.76 km). For expediency, this figure may be rounded up to 15 NM (27.8 km).

7.5 Given the above, the most logical break point between the two ground speed conditions is between FL 190 (5 800 m) and FL 200 (6 100 m). In order to encompass the range of turn anticipation algorithms used in current flight management systems (FMS) under all foreseeable conditions, the turn radius at FL 200 and above should be defined as 22.5 NM (41.6 km) and at FL 190 and below as 15 NM (27.8 km).

ATTACHMENT B. METHOD OF ESTABLISHING ATS ROUTES FOR USE BY RNAV-EQUIPPED AIRCRAFT

(Paragraph 2.7.1 and Section 2.12 refer)

1. Introduction

1.1 This guidance material is the result of studies carried out in several States. It also reflects the long existence of RNAV criteria in several States. It must be noted that some of the values contained herein have not been derived by means of the collision-risk/target level of safety method. This is indicated where applicable.

1.2 States are encouraged to keep ICAO fully informed of the results of their application of the provisions of this guidance material.

2. Operational applications of RNAV routes based on RNP 4

2.1 General

2.1.1 This guidance material is meant for use on RNAV routes that are established within the coverage area of electronic navigation aids that will provide necessary updates and guard against RNAV "blunder" errors.

2.1.2 Only those aircraft that have been granted airworthiness/operational approval in accordance with Sections 5.5 and 5.6, *Manual on Required Navigation Performance (RNP)* (Doc 9613) are to be afforded air traffic services on RNAV routes developed in accordance with this material.

2.1.3 The use of RNAV equipment should be permitted for navigation along ATS routes defined by VOR. Additionally, RNAV routes may be provided where practicable and when justified by the number of aircraft with RNAV capability. The routes may be:

a) fixed RNAV routes;

b) contingency RNAV routes; and

c) random RNAV routings.

2.1.4 The navigational performance required of such RNAV equipment envisages a level of navigational accuracy for en-route purposes having a navigation performance equal to or better than a track-keeping accuracy of ±11.1 km (6 NM) for 99.5 per cent of the flight time of all aircraft using RNAV equipment. Navigational performance of this type is expected to be consistent with a track-keeping accuracy of ±7.4 km (4 NM) for 95 per cent of flight time of all aircraft using RNAV equipment. This level is similar to that currently achieved by aircraft without RNAV capability operating on existing routes defined by VOR or VOR/DME, where the VORs are less than 93 km (50 NM) apart.

2.2 Protected airspace for RNAV ATS routes based on RNP 4

2.2.1 The minimum protected airspace provided for RNAV ATS routes should be 11.1 km (6 NM) either side of the intended track, within which RNAV-equipped aircraft can be expected to remain for 99.5 per cent of the flight time. Before applying the values stemming from this concept, account should be taken of any practical experience gained in the airspace under consideration as well as the possibility of achieving improvements in the overall navigation performance of aircraft. In this context, when lateral deviations are being controlled with the aid of radar monitoring, the size of the protected airspace required may be reduced in accordance with the following:

	Percentage containment					
	95	*96*	*97*	*98*	*99*	*99.5*
km	±7.4	±7.4	±8.3	±9.3	±10.2	±11.1
NM	±4.0	±4.0	±4.5	±5.0	±5.5	±6.0

2.2.2 Radar monitoring studies indicate that any potential reduction of the protected airspace is closely related to traffic characteristics, information available to the controller, and sector workload. Finally, it is worth considering that the analysis of RNAV accuracy performed in terms of containment measurements by some European States has shown that flights with RNAV capability were within 5 NM of the route centre line for 99.5 per cent of the time (EUR Doc 001, RNAV/4 refers). If the appropriate ATS authority considers that more protection is required, e.g. because of proximity of prohibited, restricted or danger areas, climb and descent paths of military aircraft, etc., additional buffers should be provided.

2.2.3 Where there is an angular difference of more than 25 degrees between route segments, additional protected airspace, as indicated in Attachment A, 3.5 to 3.12 and Section 7, should be provided.

Note.— Different levels of navigation accuracy may be required by States for operations of RNAV-equipped aircraft. These requirements are not covered by this guidance material and may necessitate changes to protected airspace criteria.

2.3 Spacing between parallel RNAV routes based on RNP 4

When utilizing protected airspace as described in 2.2, route centre lines may be spaced such that the protected airspaces encompassing the 99.5 per cent containment values do not overlap. When implementing a spacing encompassing less than the 99.5 per cent containment values, radar monitoring is required.

3. Spacing between parallel tracks or between parallel RNAV route centre lines based on RNP type

3.1 It should be noted that, where indicated, the spacings depicted below are based on safety assessments performed specifically for a particular network of tracks or routes. As such, the assessments evaluated traffic characteristics which might be unique to the network being assessed. For example, some of these characteristics are traffic density, the frequency of aircraft passing with minimum separation, communication and surveillance facilities, etc. Additional information on performing safety assessments is contained in the *Manual on Airspace Planning Methodology for the Determination of Separation Minima* (Doc 9689).

3.2 When determining the spacing between parallel tracks or ATS routes (hereinafter referred to as a "system"), the safety assessment, involving an examination of items such as those listed in 3.1 above, should be performed against a minimum acceptable safety level.

3.2.1 Where "fatal accidents per flight hour" is considered to be an appropriate metric, a target level of safety (TLS) of 5×10^{-9} fatal accidents per flight hour per dimension should be applied for determining the acceptability of future en-route systems that will be implemented after the year 2000. Until then, a TLS of 2×10^{-8} fatal accidents per flight hour per dimension may be applied for this purpose.

3.2.2 However, where "fatal accidents per flight hour" is not considered to be an appropriate metric, justifiable alternative metrics and methods of assessment providing an acceptable level of safety may be established by States and, as appropriate, be implemented by regional agreements.

3.3 If, at the time a system is established or upon a subsequent system safety assessment, it is determined that the system does not meet the appropriate level of safety for the method of assessment being used, a reassessment should be considered. This assessment should be undertaken in accordance with Doc 9689 to determine if a level of safety equivalent to or better than the minimum acceptable level can be met.

3.4 Examples of spacings for systems in specific areas or regions based on RNP type are provided below. Where these spacings are based on the characteristics of a specific area or region (reference system), other States or regions will need to evaluate their own systems for comparability with the reference system.

3.4.1 For procedural environments:

a) **RNP 20**

Spacing: 185 km (100 NM);

Basis: Existing usage, based on long-standing, operational experience; and

Minimum ATS requirements:

NAV — All aircraft need RNP type 20 approval appropriate for the routes/tracks to be flown

COM — Voice communications through a third party

SUR — Procedural-pilot position reports.

b) **RNP 12.6**

Spacing: 110 km (60 NM);

Basis: Collision risk model performed for NAT Organized Track Structure (*Report of the Limited/North Atlantic Regional Air Navigation Meeting (1976)* (Doc 9182)); and

Minimum ATS requirements:

NAV — All aircraft need RNP type 12.6 approval appropriate for the routes/tracks to be flown

COM — Voice communications through a third party

SUR — Procedural-pilot position reports

Other — System safety must be evaluated periodically.

Note.— Direct controller/pilot communications may be desirable in certain areas, such as areas of known convective weather.

c) **RNP 10**

Spacing: 93 km (50 NM);

Basis: Collision risk model performed by the United States Federal Aviation Administration for the Pacific Region based on North Pacific traffic characteristics; and

Minimum ATS requirements:

NAV — All aircraft need RNP type 10 approval appropriate for the routes/tracks to be flown

COM — Voice communications through a third party

SUR — Procedural-pilot position reports

Other — System safety must be evaluated periodically.

Note.— Direct controller/pilot communications may be desirable in certain areas, such as areas of known convective weather.

d) **RNP 5 (or RNP 4 or better)**

Spacing: 30.6 km (16.5 NM) in a unidirectional system
33.3 km (18 NM) in a bi-directional system;

Basis: Comparison to a high-density continental reference system (VOR spacing) as described in Attachment A; and

Minimum ATS requirements:

NAV — All aircraft need RNP type 5 approval appropriate for the routes/tracks to be flown, and the NAVAID infrastructure must be provided sufficient to support RNP 5 operations

COM — Direct VHF controller/pilot voice communications

SUR — Procedural-pilot position reports.

Note 1.— Guidance material relating to the use of RNP 5 is contained in the Manual on Required Navigation Performance (RNP) *(Doc 9613).*

Note 2.— This spacing was not developed for applicability in remote and/or oceanic airspace where an appropriate VOR infrastructure is not available.

e) **RNP 4**

Spacing: 55.5 km (30 NM);

Basis 1: Safety assessment performed by the United States Federal Aviation Administration based on analysis of acceptable rate of gross lateral errors in a parallel route system using 55.5 km (30 NM) track spacing while meeting a target level of safety of 5×10^{-9} fatal accidents per flight hour.

Basis 2: Minimum requirements for communications and surveillance listed below are operationally necessary to manage contingency and emergency events in a 55.5 km (30 NM) route system.

Note.— Further information on the safety assessment performed is contained in the Manual on Airspace Planning Methodology for the Determination of Separation Minima *(Doc 9689).*

Minimum ATS requirements:

NAV — RNP 4 shall be prescribed for the designated area, tracks or ATS routes

COM — Direct controller-pilot voice communications or controller-pilot data link communications (CPDLC)

SUR — An ADS-C system in which an event contract must be set that includes a lateral deviation event report whenever a deviation from track centre line greater than 9.3 km (5 NM) occurs.

Other — Prior to implementation, a system verification of sufficient duration and integrity shall be performed to demonstrate that the maximum acceptable rate of lateral deviations greater than or equal to 27.8 km (15 NM) will not exceed those listed in Table B-1 and that the system meets operational and technical requirements. The verification should be conducted after the minimum navigation, communications and surveillance requirements listed above have been met. Following implementation, a monitoring programme must be established to periodically verify that the system's actual rate of lateral deviations greater than or equal to 27.8 km (15 NM) does not exceed the maximum prescribed in Table B-1 (information pertaining to monitoring can be found in the *Manual on Airspace Planning Methodology for the Determination of Separation Minima* (Doc 9689), Chapter 8.

Note 1.— The airspace planner should first decide which of the four system descriptions applies in the airspace under consideration. If the system is not identical to one of the four cases described in Table B-1, the planner should conservatively interpolate between the cases by taking from the two cases that resemble the system, the one with the lower lateral deviation rate. Next, select from the first column, the value of system lateral occupancy that the system is not expected to exceed over the planning horizon. By reading the table at the row and column selected, the airspace planner obtains the value of the lateral deviation rate that should not be exceeded in the system to meet the TLS of 5×10^{-9} fatal accidents per flight hour.

Note 2.— Lateral deviations that should be considered for the purposes of assessing the system safety are any deviation from track of a magnitude greater than or equal to 27.8 km (15 NM) which are not associated with the execution of an approved contingency procedure.

Note 3.— Procedures pertaining to the use of ADS-C and CPDLC are contained in the PANS-ATM (Doc 4444), Chapters 13 and 14, respectively. Criteria for CPDLC and ADS-C should be established by an appropriate safety assessment. Information on safety assessments is contained in the Manual on Airspace Planning Methodology for the Determination of Separation Minima *(Doc 9689).*

Note 4.— This spacing was developed for applicability in remote and/or oceanic airspace where an appropriate VOR infrastructure is not available.

Note 5.— In this material, lateral occupancy means a number equal to twice the number of laterally proximate pairs of aircraft divided by the total number of aircraft. A detailed explanation of the terms used in collision risk modelling is contained in the Air Traffic Services Planning Manual *(Doc 9426), Part II, Chapter 4, Appendices A and C.*

3.4.2 For radar environments:

a) **RNP 4**

Spacing: 14.8-22.2 km (8-12 NM);

Basis: Comparison to a reference system — containment areas, determined in accordance with 2.2.1, do not overlap; and

Minimum ATS requirements:

NAV — All aircraft need at least RNP type 4 approval appropriate for the routes/tracks to be flown, and the NAVAID infrastructure must be provided sufficient to support RNP 4 operations

COM — Direct VHF controller/pilot voice communications

SUR — Radar which meets existing standards

Other — System safety, including controller workload, must be evaluated.

b) **RNP 5**

Spacing: 18.5-27.8 km (10-15 NM);

Basis: Comparison to a reference system — containment areas, adapted from the provisions of 2.2.1 above to reflect RNP 5, do not overlap; and

Minimum ATS requirements:

NAV — All aircraft need at least RNP type 5 appropriate for the routes/tracks to be flown, and the NAVAID infrastructure must be provided sufficient to support RNP 5 operations

COM — Direct VHF controller/pilot voice communications

SUR — Radar which meets existing standards

Other — System safety, including controller workload, must be evaluated.

COVER SHEET TO AMENDMENT 18

INTERNATIONAL STANDARDS
AND RECOMMENDED PRACTICES

SEARCH AND RESCUE

ANNEX 12
TO THE CONVENTION ON INTERNATIONAL CIVIL AVIATION

EIGHTH EDITION — JULY 2004

INTERNATIONAL CIVIL AVIATION ORGANIZATION

Checklist of Amendments to Annex 12

	Effective date	*Date of applicability*
Eighth Edition (incorporates Amendments 1 to 17)	12 July 2004	25 November 2004
Amendment 18 (adopted by the Council on 16 March 2007) Replacement pages (viii), 4-1 and 4-2	16 July 2007	22 November 2007

Transmittal note

Amendment 18

to the

International Standards and
Recommended Practices

SEARCH AND RESCUE

(Annex 12 to the Convention on International Civil Aviation)

1. Insert the following replacement pages in Annex 12 (Eighth Edition) to incorporate Amendment 18 which becomes applicable on 22 November 2007:

   a) Page (viii) — Foreword

   b) Pages 4-1 and 4-2 — Chapter 4

2. Record the entry of this amendment on page (ii).

Table A. Amendments to Annex 12

Amendment	*Source(s)*	*Subject(s)*	*Adopted/approved* *Effective* *Applicable*
1st Edition	Search and Rescue Division, Second Session (1946) Air Navigation Commission	International Standards and Recommended Practices — Search and Rescue Services.	25 May 1950 1 December 1950 1 March 1951
1 (2nd Edition)	Search and Rescue Division, Third Session (1951)	Search and rescue organization; communications; appraisals of search and rescue operations; procedures for search and rescue; air-to-ground signals.	31 March 1952 1 September 1952 1 January 1953
2 (3rd Edition)	Second Air Navigation Conference (1955)	Rescue sub-centres; servicing and refuelling rescue units of other Contracting States.	8 May 1956 1 September 1956 1 December 1956
3	Third Air Navigation Conference (1956). Amendment 140 to Annex 6, Chapter 6	Marking of areas of the fuselage suitable for break-in.	13 June 1957 1 October 1957 1 December 1957
4 (4th Edition)	Rules of the Air, Air Traffic Services and Search and Rescue Divisions (1958)	Cooperation between States; information concerning emergencies; procedures for rescue coordination centres.	8 December 1959 1 May 1960 1 August 1960
5	Amendment 13 to Annex 11	Notification of rescue coordination centres by air traffic services units.	13 April 1962 — 1 November 1962
6	Amendment 4 to Annex 9	Temporary entry of rescue units from other Contracting States.	— — 1 July 1964
7	Amendment 14 to Annex 11, Chapter 5	Alerting of surface vessels and en-route aircraft to assist an aircraft in distress.	19 June 1964 1 November 1964 1 February 1965
8	International Convention for the Safety of Life at Sea. Amendment 15 to Annex 11	Updating of reference; alerting service.	10 December 1965 — 25 August 1966
9 (5th Edition)	Air Navigation Commission review of the Regional Supplementary Procedures	Cooperation between Contracting States; servicing and refuelling of rescue units of other Contracting States; testing search and rescue communications facilities; assistance in search and rescue operations by additional units or services.	25 May 1970 25 September 1970 4 February 1971
10	Air Navigation Commission	Carriage of the International Code of Signals by search and rescue aircraft; equipment of search and rescue aircraft with frequency 2182 kHz; information on position of merchant ships.	11 December 1972 11 April 1973 16 August 1973

Amendment	*Source(s)*	*Subject(s)*	*Adopted/approved* *Effective* *Applicable*
11 (6th Edition)	Complete review of the Annex by the Air Navigation Commission	New signal to surface craft; provision of search and rescue services on a 24-hour basis; dissemination of information on position of merchant ships; appraisals of search and rescue operations; improvement of cooperation between neighbouring States; equipment of rescue units; availability of information on air traffic services; location of droppable survival equipment; methods for assisting aircraft in distress and being compelled to ditch to rendezvous with surface craft; methods for assisting search and rescue or other aircraft to rendezvous with aircraft in distress.	25 November 1974 25 March 1975 9 October 1975
12	Amendment 60 to Annex 3	Supplementary communication facilities between meteorological offices and search and rescue units.	8 December 1975 8 April 1976 12 August 1976
13	Air Navigation Commission	Ground-air visual signal code for use by survivors.	15 December 1980 15 April 1981 26 November 1981
14	Air Navigation Commission	Rescue coordination centre (RCC) responsibilities regarding preparatory measures in the event an aircraft is subject to unlawful interference.	12 March 1990 30 July 1990 15 November 1990
15	Air Navigation Commission	Definition for search and rescue aircraft; communications requirements for rescue coordination centres (RCCs) and equipment of search and rescue (SAR) aircraft; SAR point of contact (SPOC).	12 March 1993 26 July 1993 11 November 1993
16 (7th Edition)	Amendments 25, 20 and 7 to Annex 6, Parts I, II and III, respectively; Air Navigation Commission	Revised definition of "pilot-in-command"; editorial amendments.	12 March 2001 16 July 2001 1 November 2001
17 (8th Edition)	ICAO Secretariat/Air Navigation Commission	Updating to align provisions with the IMO Convention to the extent practicable; harmonization of definitions between aeronautical and maritime SAR documents; regional approach to SAR system establishment; policy agreement between States and operational coordination between aeronautical and maritime SAR services; ready availability of essential data to RCC.	23 February 2004 12 July 2004 25 November 2004
18	Air Navigation Commission	Rescue coordination centre (RCC) responsibilities.	16 March 2007 16 July 2007 22 November 2007

CHAPTER 4. PREPARATORY MEASURES

4.1 Preparatory information

4.1.1 Each rescue coordination centre shall have readily available at all times up-to-date information concerning the following in respect of its search and rescue region:

a) search and rescue units, rescue subcentres and alerting posts;

b) air traffic services units;

c) means of communication that may be used in search and rescue operations;

d) addresses and telephone numbers of all operators, or their designated representatives, engaged in operations in the region; and

e) any other public and private resources including medical and transportation facilities that are likely to be useful in search and rescue.

4.1.2 **Recommendation.—** *Each rescue coordination centre should have readily available all other information of interest to search and rescue, including information regarding:*

a) the locations, call signs, hours of watch, and frequencies of all radio stations likely to be employed in support of search and rescue operations;

b) the locations and hours of watch of services keeping radio watch, and the frequencies guarded;

c) locations where supplies of droppable emergency and survival equipment are stored; and

d) objects which it is known might be mistaken for unlocated or unreported wreckage, particularly if viewed from the air.

4.1.3 **Recommendation.—** *Each rescue coordination centre whose search and rescue region includes maritime areas should have ready access to information regarding the position, course and speed of ships within such areas that may be able to provide assistance to aircraft in distress and information on how to contact them.*

Note.— This information may either be kept in the rescue coordination centres or be readily accessible

4.1.4 **Recommendation**.— *Contracting States should, individually or in cooperation with other States, either establish ship reporting systems in cooperation with maritime authorities or arrange communication links with Amver or regional ship reporting systems to facilitate search and rescue operations at sea.*

Note.— Amver is a cooperative international ship reporting system with worldwide coverage that is available for interrogation by all rescue coordination centres. A number of Contracting States also operate regional ship reporting systems.

4.2 Plans of operation

4.2.1 Each rescue coordination centre shall prepare detailed plans of operation for the conduct of search and rescue operations within its search and rescue region.

4.2.2 **Recommendation**.— *Search and rescue plans of operations should be developed jointly with representatives of the operators and other public or private services that may assist in providing search and rescue services or benefit from them, taking into account that the number of survivors could be large.*

4.2.3 The plans of operation shall specify arrangements for the servicing and refuelling, to the extent possible, of aircraft, vessels and vehicles employed in search and rescue operations, including those made available by other States.

4.2.4 The search and rescue plans of operation shall contain details regarding actions to be taken by those persons engaged in search and rescue, including:

a) the manner in which search and rescue operations are to be conducted in the search and rescue region;

b) the use of available communication systems and facilities;

c) the actions to be taken jointly with other rescue coordination centres;

d) the methods of alerting en-route aircraft and ships at sea;

e) the duties and prerogatives of persons assigned to search and rescue;

f) the possible redeployment of equipment that may be necessitated by meteorological or other conditions;

g) the methods for obtaining essential information relevant to search and rescue operations, such as weather reports and forecasts, appropriate NOTAM, etc.;

h) the methods for obtaining, from other rescue coordination centres, such assistance, including aircraft, vessels, persons or equipment, as may be needed;

i) the methods for assisting distressed aircraft being compelled to ditch to rendezvous with surface craft;

j) the methods for assisting search and rescue or other aircraft to proceed to aircraft in distress; and

k) cooperative actions to be taken in conjunction with air traffic services units and other authorities concerned to assist aircraft known or believed to be subject to unlawful interference.

4.2.5 **Recommendation.—** *Search and rescue plans of operation should be integrated with airport emergency plans to provide for rescue services in the vicinity of aerodromes including, for coastal aerodromes, areas of water.*

4.3 Search and rescue units

4.3.1 Each search and rescue unit shall:

a) be cognizant of all parts of the plans of operation prescribed in 4.2 that are necessary for the effective conduct of its duties; and

b) keep the rescue coordination centre informed of its preparedness.

4.3.2 Contracting States shall:

a) maintain in readiness the required number of search and rescue facilities; and

b) maintain adequate supplies of rations, medical stores, signalling devices and other survival and rescue equipment.

4.4 Training and exercises

To achieve and maintain maximum efficiency in search and rescue, Contracting States shall provide for regular training of their search and rescue personnel and arrange appropriate search and rescue exercises.

4.5 Wreckage

Recommendation.— *Each Contracting State should ensure that wreckage resulting from aircraft accidents within its territory or, in the case of accidents on the high seas or in areas of undetermined sovereignty, within the search and rescue regions for which it is responsible, is removed, obliterated or charted following completion of the accident investigation, if its presence might constitute a hazard or confuse subsequent search and rescue operations.*

Annex 13
Ninth Edition
Corrigendum No. 3
(English only)
15/11/06

INTERNATIONAL STANDARDS
AND RECOMMENDED PRACTICES

AIRCRAFT ACCIDENT AND INCIDENT INVESTIGATION

ANNEX 13

TO THE CONVENTION ON INTERNATIONAL CIVIL AVIATION

NINTH EDITION — JULY 2001

CORRIGENDUM NO. 3

1. Please replace existing page 8-1 dated 23/11/06 by the attached new page bearing the notation "Corr. 3".

2. Record the entry of this corrigendum on page (ii).

CHAPTER 8. ACCIDENT PREVENTION MEASURES

Note.— The objective of these specifications is to promote accident prevention by analysis of accident and incident data and by a prompt exchange of information.

Incident reporting systems

8.1 A State shall establish a mandatory incident reporting system to facilitate collection of information on actual or potential safety deficiencies.

8.2 **Recommendation.—** *A State should establish a voluntary incident reporting system to facilitate the collection of information that may not be captured by a mandatory incident reporting system.*

8.3 A voluntary incident reporting system shall be non-punitive and afford protection to the sources of the information.

Note 1.— A non-punitive environment is fundamental to voluntary reporting.

Note 2.— States are encouraged to facilitate and promote the voluntary reporting of events that could affect aviation safety by adjusting their applicable laws, regulations and policies, as necessary.

Note 3.— Guidance related to both mandatory and voluntary incident reporting systems is contained in the Safety Management Manual (SMM) *(Doc 9859).*

Note 4.— Attachment E contains legal guidance for the protection of information from safety data collection and processing systems.

Database systems

8.4 **Recommendation.—** *A State should establish an accident and incident database to facilitate the effective analysis of information obtained, including that from its incident reporting systems.*

8.5 **Recommendation.—** *The database systems should use standardized formats to facilitate data exchange.*

Note 1.— Guidance material related to the specification for such databases will be provided by ICAO upon request from States.

Note 2.— States are encouraged to foster regional arrangements, as appropriate, when implementing 8.4.

Analysis of data — Preventive actions

8.6 A State having established an accident and incident database and an incident reporting system shall analyse the information contained in its accident/incident reports and the database to determine any preventive actions required.

Note.— Additional information on which to base preventive actions may be contained in the Final Reports on investigated accidents and incidents.

8.7 **Recommendation.—** *If a State, in the analysis of the information contained in its database, identifies safety matters considered to be of interest to other States, that State should forward such safety information to them as soon as possible.*

8.8 **Recommendation.—** *In addition to safety recommendations arising from accident and incident investigations, safety recommendations may result from diverse sources, including safety studies. If safety recommendations are addressed to an organization in another State, they should also be transmitted to that State's investigation authority.*

Exchange of safety information

8.9 **Recommendation.—** *States should promote the establishment of safety information sharing networks among all users of the aviation system and should facilitate the free exchange of information on actual and potential safety deficiencies.*

Note.— Standardized definitions, classifications and formats are needed to facilitate data exchange. Guidance material on the specifications for such information-sharing networks will be provided by ICAO upon request.

COVER SHEET TO AMENDMENT 34

INTERNATIONAL STANDARDS
AND RECOMMENDED PRACTICES

AERONUTICAL INFORMATION SERVICES

ANNEX 15
TO THE CONVENTION ON INTERNATIONAL CIVIL AVIATION

TWELFTH EDITION — JULY 2004

INTERNATIONAL CIVIL AVIATION ORGANIZATION

Checklist of Amendments to Annex 15

	Effective date	*Date of applicability*
Twelfth Edition (incorporates Amendments 1-33)	12 July 2004	25 November 2004; 20 November 2008; 18 November 2010
Amendment 34 (adopted by the Council on 2 March 2007) Replacement pages (x), 1-1, 2-1 to 2-5, 4-1 to 4-3, 5-3, 6-1, 7-1, 8-1, APP 1-2 to APP 1-25, APP 3-3, APP 6-3 and APP 8-7	16 July 2007	22 November 2007

Transmittal note

Amendment 34

to the

International Standards and
Recommended Practices

AERONAUTICAL INFORMATION SERVICES

(Annex 15 to the Convention on International Civil Aviation)

1. Insert the following replacement pages in Annex 15 (Twelfth Edition) to incorporate Amendment 34 which becomes applicable on 22 November 2007:

a)	Page (x)	— Foreword
b)	Page 1-1	— Chapter 1
c)	Pages 2-1 to 2-5	— Chapter 2
d)	Pages 4-1 to 4-3	— Chapter 4
e)	Page 5-3	— Chapter 5
f)	Page 6-1	— Chapter 6
g)	Page 7-1	— Chapter 7
h)	Page 8-1	— Chapter 8
i)	Pages APP 1-2 to APP 1-25	— Appendix 1
j)	Page APP 3-3	— Appendix 3
k)	Page APP 6-3	— Appendix 6
l)	Page APP 8-7	— Appendix 8

2. Record the entry of this amendment on page (ii).

Amendment	*Source(s)*	*Subject(s)*	*Adopted Effective Applicable*
26	Various sources, including Conclusions 22/24 and 24/20 of the European Air Navigation Planning Group (EANPG); Recommendation 9 of All Weather Operations Panel (AWOP); Recommendation 1/4 of the Obstacle Clearance Panel (OCP); Amendments 64, 47 and 38 to Annexes 3, 4 and 14 respectively; proposals submitted by the United Kingdom and by the Secretariat	Updating of the provisions relating to the use of A-4 sheet size paper in the AIP; origination and distribution of NOTAM and AIC; adequacy and authenticity of aeronautical information and the regulated system (AIRAC); changes to predetermined distribution system for NOTAM Class I; introduction of an abbreviated heading and changes to the SNOWTAM format and the guidance for its completion; publication in the AIP of the location of the DME zero-range indication point; updating of the list of charts forming part of the AIP; publication in the AIP of additional operational data concerning standard routes for taxiing aircraft, highest elevation of the touchdown zone of a precision approach runway, and geographical coordinates of thresholds and aircraft stands; inclusion of references to the seventh and eighth letters in the address indicators in the predetermined distribution system; and volcanic ash cloud warnings.	6 March 1987 27 July 1987 22 October 1987
27	Various sources, including Conclusion 30/15 of the European Air Navigation Planning Group (EANPG); Air Navigation Commission's review of the Annexes; Recommendation 3/3 of the Visual Flight Rules Operations Panel (VFOP); proposal submitted by some European States; and Amendment 39 to Annex 14	Introduction of Integrated Aeronautical Information Package and revised NOTAM Format; promulgation of information on areas or routes where the possibility of interception exists and information relating to safeguarding international civil aviation against acts of unlawful interference; introduction of new ATS airspace classification; bird hazard reduction; updating of terminology and list of friction devices associated with measuring of paved surfaces; introduction of heliport data.	4 March 1991 28 July 1991 14 November 1991
28	Various sources, including Conclusion 34/12 of the European Air Navigation Planning Group (EANPG); adoption by the Council of WGS-84 as the standard geodetic reference system for international aviation; proposal by RGCSP/8; and the Secretariat	Introduction in Chapter 2 of new and revised definitions relating to heliport and Integrated Aeronautical Information Package; amendments to Chapter 3 related to the exchange of aeronautical information and introduction of new provisions concerning the promulgation of WGS-84 related geographical coordinates; amendments and rearrangements of Chapter 4 concerning the restructured contents and general specifications of AIP, AIP Amendment and AIP Supplement specifications and their distribution; amendments to Chapter 5 concerning NOTAM origination and distribution and introduction of a new provision governing the promulgation of information on the release into the atmosphere of radioactive materials and toxic chemicals; upgrading in Chapter 6 to a Standard, of a provision concerning the use of AIRAC dates for the promulgation of changes requiring cartographic work and for updating of navigation databases; deletion in Chapter 8 of a Recommended Practice relating to the format of pre-flight information bulletins; substitution, in Chapter 9, of the specific term "aeronautical fixed telecommunication network (AFTN)" by the general term "aeronautical fixed service (AFS)"; introduction in Appendix 1 of completely restructured contents of AIP.	28 February 1994 28 June 1994 10 November 1994; 25 April 1996; 1 January 1998
29 (Tenth Edition)	Air Navigation Commission and Volcanic Ash Warnings Study Group (VAWSG)	Aeronautical databases, humanitarian flights, a special series NOTAM for volcanic activity and vertical component of the World Geodetic System — 1984 (WGS-84).	20 March 1997 21 July 1997 6 November 1997; 1 January 1998; 5 November 1998

Amendment	*Source(s)*	*Subject(s)*	*Adopted Effective Applicable*
30	Recommendations 1.2/1, 3.3/2 and 4.1/2 of the Aeronautical Information Services/ Aeronautical Charts (AIS/MAP) Divisional Meeting (1998); Air Navigation Commission	Introduction into Chapter 2 of new definitions for aeronautical data, aeronautical information, aeronautical information service, air defence identification zone (ADIZ), AIS product, Human Factors principles, and quality management; new provisions in Chapter 3 concerning the quality system, exchange of aeronautical information/data, copyright, cost recovery, and Human Factors considerations; restructured and new provisions in Chapter 6 dealing with the provision of AIRAC information in electronic form; and introduction into Appendix 1 of new provisions concerning ADIZ.	21 February 2000 17 July 2000 2 November 2000
31	Secretariat	New provisions in Chapter 8 concerning automated aeronautical information systems and harmonized AIS/MET pre-flight briefing and revision of Appendix 1 concerning the provision of information on activities of a dangerous nature and other potential hazards.	7 March 2001 16 July 2001 1 November 2001
32 (Eleventh Edition)	Various sources, including Conclusion 40/51 b) of the European Air Navigation Planning Group (EANPG); Conclusion 13/51 of the AFI Planning and Implementation Regional Group (APIRG); Air Navigation Commission; and the Secretariat	Introduction in Chapter 2 of a revised definition for Integrated Aeronautical Information Package; upgrading to a Standard of a provision in Chapter 3 concerning the use of English text; amendments to Chapter 4 concerning specifications for AIP Amendments and Supplements; restructuring and amending of provisions in Chapter 5 and Appendix 6; promulgation by NOTAM of contingency measures; new provisions in Chapter 8 concerning collection of information on the presence of bird hazards to aircraft operations at aerodromes/heliports; and alignment of Appendix 1 with the provisions of Annex 3.	28 February 2003 14 July 2003 27 November 2003
33 (Twelfth Edition)	Recommendation 4/6 of OCP/12; Recommendation 5.3/2 of OCP/13; Recommendation 3/1 of GNSSP/4; Air Navigation Commission; and the Secretariat	New provisions concerning definitions; the vertical reference system and the temporal reference system for international civil aviation; electronic terrain and obstacle data; aeronautical data quality requirements; inclusion of GNSS-related elements in aeronautical information; and the Radar Minimum Altitude Chart — ICAO; and updating of existing provisions related to the World Geodetic System — 1984 (WGS-84) and the Aeronautical Information Publication (AIP).	23 February 2004 12 July 2004 25 November 2004; 20 November 2008; 18 November 2010
34	Various sources, including EANPG Conclusion 44/19, Recommendation 2.3/2 of the AIS/MAP Divisional Meeting (1998), and recommendations of the IAWVOPSG/1, OCP/14 and OPLINKP/1 meetings	Definitions and introduction of a new Aerodrome Terrain and Obstacle Chart — ICAO (Electronic). Updating of existing provisions related to the distribution of NOTAM on volcanic activity; use of the AIRAC system; information included in pre-flight briefings; and information to be included in the AIP.	2 March 2007 16 July 2007 22 November 2007

INTERNATIONAL STANDARDS AND RECOMMENDED PRACTICES

CHAPTER 1. INTRODUCTION

The object of the aeronautical information service is to ensure the flow of information/data necessary for the safety, regularity and efficiency of international air navigation. The role and importance of aeronautical information/data changed significantly with the implementation of area navigation (RNAV), required navigation performance (RNP), airborne computer-based navigation systems and data link systems. Corrupt or erroneous aeronautical information/data can potentially affect the safety of air navigation.

To satisfy the uniformity and consistency in the provision of aeronautical information/data that is required for the operational use by computer-based navigation systems, States shall, as far as practicable, avoid standards and procedures other than those established for international use.

These Standards and Recommended Practices are to be used in conjunction with the *Procedures for Air Navigation Services — ICAO Abbreviations and Codes* (PANS-ABC, Doc 8400).

It is recognized that Supplementary Procedures may be required in certain cases in order to meet particular requirements of the ICAO Regions.

Guidance material on the organization and operation of aeronautical information services is contained in the *Aeronautical Information Services Manual* (Doc 8126).

CHAPTER 2. DEFINITIONS

When the following terms are used in the Standards and Recommended Practices for aeronautical information services, they have the following meanings:

Accuracy. A degree of conformance between the estimated or measured value and the true value.

Note.— For measured positional data the accuracy is normally expressed in terms of a distance from a stated position within which there is a defined confidence of the true position falling.

Aeronautical data. A representation of aeronautical facts, concepts or instructions in a formalized manner suitable for communication, interpretation or processing.

Aeronautical information. Information resulting from the assembly, analysis and formatting of aeronautical data.

Aeronautical Information Circular (AIC). A notice containing information that does not qualify for the origination of a NOTAM or for inclusion in the AIP, but which relates to flight safety, air navigation, technical, administrative or legislative matters.

Aeronautical Information Publication (AIP). A publication issued by or with the authority of a State and containing aeronautical information of a lasting character essential to air navigation.

Aeronautical information service (AIS). A service established within the defined area of coverage responsible for the provision of aeronautical information/data necessary for the safety, regularity and efficiency of air navigation.

AIP Amendment. Permanent changes to the information contained in the AIP.

AIP Supplement. Temporary changes to the information contained in the AIP which are published by means of special pages.

AIRAC. An acronym (aeronautical information regulation and control) signifying a system aimed at advance notification based on common effective dates, of circumstances that necessitate significant changes in operating practices.

Air defence identification zone (ADIZ). Special designated airspace of defined dimensions within which aircraft are required to comply with special identification and/or reporting procedures additional to those related to the provision of air traffic services (ATS).

AIS product. Aeronautical information provided in the form of the elements of the Integrated Aeronautical Information Package (except NOTAM and PIB), including aeronautical charts, or in the form of suitable electronic media.

Application. Manipulation and processing of data in support of user requirements (ISO 19104*).

ASHTAM. A special series NOTAM notifying by means of a specific format change in activity of a volcano, a volcanic eruption and/or volcanic ash cloud that is of significance to aircraft operations.

Assemble. A process of merging data from multiple sources into a database and establishing a baseline for subsequent processing.

Note.— The assemble phase includes checking the data and ensuring that detected errors and omissions are rectified.

ATS surveillance service. Term used to indicate a service provided directly by means of an ATS surveillance system.

ATS surveillance system. A generic term meaning variously, ADS-B, PSR, SSR or any comparable ground-based system that enables the identification of aircraft.

Note.— A comparable ground-based system is one that has been demonstrated, by comparative assessment or other methodology, to have a level of safety and performance equal to or better than monopulse SSR.

Automatic dependent surveillance — broadcast (ADS-B). A means by which aircraft, aerodrome vehicles and other objects can automatically transmit and/or receive data such as identification, position and additional data, as appropriate, in a broadcast mode via a data link.

Automatic dependent surveillance — contract (ADS-C). A means by which the terms of an ADS-C agreement will be exchanged between the ground system and the aircraft, via a data link, specifying under what conditions ADS-C reports would be initiated, and what data would be contained in the reports.

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* All ISO Standards are listed at the end of this chapter.

Note.— The abbreviated term "ADS contract" is commonly used to refer to ADS event contract, ADS demand contract, ADS periodic contract or an emergency mode.

Automatic terminal information service (ATIS). The automatic provision of current, routine information to arriving and departing aircraft throughout 24 hours or a specified portion thereof:

Data link-automatic terminal information service (D-ATIS). The provision of ATIS via data link.

Voice-automatic terminal information service (Voice-ATIS). The provision of ATIS by means of continuous and repetitive voice broadcasts.

Bare Earth. Surface of the Earth including bodies of water and permanent ice and snow, and excluding vegetation and man-made objects.

Calendar. Discrete temporal reference system that provides the basis for defining temporal position to a resolution of one day (ISO 19108*).

Canopy. Bare Earth supplemented by vegetation height.

Controller-pilot data link communications (CPDLC). A means of communication between controller and pilot, using data link for ATC communications.

Culture. All man-made features constructed on the surface of the Earth, such as cities, railways and canals.

Cyclic redundancy check (CRC). A mathematical algorithm applied to the digital expression of data that provides a level of assurance against loss or alteration of data.

Danger area. An airspace of defined dimensions within which activities dangerous to the flight of aircraft may exist at specified times.

Database. One or more files of data so structured that appropriate applications may draw from the files and update them.

Note.— This primarily refers to data stored electronically and accessed by computer rather than in files of physical records.

Data product. Data set or data set series that conforms to a data product specification (ISO 19131*).

Data product specification. Detailed description of a data set or data set series together with additional information that will enable it to be created, supplied to and used by another party (ISO 19131*).

Note.— A data product specification provides a description of the universe of discourse and a specification for mapping the universe of discourse to a data set. It may be used for production, sales, end-use or other purpose.

Data quality. A degree or level of confidence that the data provided meets the requirements of the data user in terms of accuracy, resolution and integrity.

Data set. Identifiable collection of data (ISO 19101*).

Data set series. Collection of data sets sharing the same product specification (ISO 19115*).

Datum. Any quantity or set of quantities that may serve as a reference or basis for the calculation of other quantities (ISO 19104*).

Digital Elevation Model (DEM). The representation of terrain surface by continuous elevation values at all intersections of a defined grid, referenced to common datum.

Note.— Digital Terrain Model (DTM) is sometimes referred to as DEM.

Direct transit arrangements. Special arrangements approved by the public authorities concerned by which traffic which is pausing briefly in its passage through the Contracting State may remain under their direct control.

Ellipsoid height (Geodetic height). The height related to the reference ellipsoid, measured along the ellipsoidal outer normal through the point in question.

Feature. Abstraction of real world phenomena (ISO 19101*).

Feature attribute. Characteristic of a feature (ISO 19101*).

Note.— A feature attribute has a name, a data type and a value domain associated with it.

Feature operation. Operation that every instance of a feature type may perform (ISO 19110*).

Note.— An operation upon the feature type dam is to raise the dam. The result of this operation is to raise the level of water in the reservoir.

Feature relationship. Relationship that links instances of one feature type with instances of the same or a different feature type (ISO 19101*).

Feature type. Class of real world phenomena with common properties (ISO 19110*).

Note.— In a feature catalogue, the basic level of classification is the feature type.

Geodesic distance. The shortest distance between any two points on a mathematically defined ellipsoidal surface.

Geodetic datum. A minimum set of parameters required to define location and orientation of the local reference system with respect to the global reference system/frame.

Geoid. The equipotential surface in the gravity field of the Earth which coincides with the undisturbed mean sea level (MSL) extended continuously through the continents.

Note.— The geoid is irregular in shape because of local gravitational disturbances (wind tides, salinity, current, etc.) and the direction of gravity is perpendicular to the geoid at every point.

Geoid undulation. The distance of the geoid above (positive) or below (negative) the mathematical reference ellipsoid.

Note.— In respect to the World Geodetic System — 1984 (WGS-84) defined ellipsoid, the difference between the WGS-84 ellipsoidal height and orthometric height represents WGS-84 geoid undulation.

Gregorian calendar. Calendar in general use; first introduced in 1582 to define a year that more closely approximates the tropical year than the Julian calendar (ISO 19108*).

Note.— In the Gregorian calendar, common years have 365 days and leap years 366 days divided into twelve sequential months.

Height. The vertical distance of a level, point or an object considered as a point, measured from a specific datum.

Heliport. An aerodrome or a defined area on a structure intended to be used wholly or in part for the arrival, departure and surface movement of helicopters.

Human Factors principles. Principles which apply to aeronautical design, certification, training, operations and maintenance and which seek safe interface between the human and other system components by proper consideration to human performance.

Integrated Aeronautical Information Package. A package which consists of the following elements:

— AIP, including amendment service;

— Supplements to the AIP;

— NOTAM and PIB;

— AIC; and

— checklists and lists of valid NOTAM.

Integrity (aeronautical data). A degree of assurance that an aeronautical data and its value has not been lost or altered since the data origination or authorized amendment.

International airport. Any airport designated by the Contracting State in whose territory it is situated as an airport of entry and departure for international air traffic, where the formalities incident to customs, immigration, public health, animal and plant quarantine and similar procedures are carried out.

International NOTAM office (NOF). An office designated by a State for the exchange of NOTAM internationally.

Logon address. A specified code used for data link logon to an ATS unit.

Manoeuvring area. That part of an aerodrome to be used for the take-off, landing and taxiing of aircraft, excluding aprons.

Metadata. Data about data (ISO 19115*).

Note.— Data that describes and documents data.

Minimum en-route altitude (MEA). The altitude for an en-route segment that provides adequate reception of relevant navigation facilities and ATS communications, complies with the airspace structure and provides the required obstacle clearance.

Minimum obstacle clearance altitude (MOCA). The minimum altitude for a defined segment of flight that provides the required obstacle clearance.

Movement area. That part of an aerodrome to be used for the take-off, landing and taxiing of aircraft, consisting of the manoeuvring area and the apron(s).

NOTAM. A notice distributed by means of telecommunication containing information concerning the establishment, condition or change in any aeronautical facility, service, procedure or hazard, the timely knowledge of which is essential to personnel concerned with flight operations.

Obstacle. All fixed (whether temporary or permanent) and mobile objects, or parts thereof, that are located on an area intended for the surface movement of aircraft or that extend above a defined surface intended to protect aircraft in flight.

Obstacle/terrain data collection surface. A defined surface intended for the purpose of collecting obstacle/terrain data.

Orthometric height. Height of a point related to the geoid, generally presented as an MSL elevation.

Portrayal. Presentation of information to humans (ISO 19117*).

Position (geographical). Set of coordinates (latitude and longitude) referenced to the mathematical reference ellipsoid which define the position of a point on the surface of the Earth.

Post spacing. Angular or linear distance between two adjacent elevation points.

Precision. The smallest difference that can be reliably distinguished by a measurement process.

Note.— In reference to geodetic surveys, precision is a degree of refinement in performance of an operation or a degree of perfection in the instruments and methods used when taking measurements.

Pre-flight information bulletin (PIB). A presentation of current NOTAM information of operational significance, prepared prior to flight.

Prohibited area. An airspace of defined dimensions, above the land areas or territorial waters of a State, within which the flight of aircraft is prohibited.

Quality. Degree to which a set of inherent characteristics fulfils requirements (ISO 9000*).

Note 1.— The term "quality" can be used with adjectives such as poor, good or excellent.

Note 2.— "Inherent", as opposed to "assigned", means existing in something, especially as a permanent characteristic.

Quality assurance. Part of quality management focused on providing confidence that quality requirements will be fulfilled (ISO 9000*).

Quality control. Part of quality management focused on fulfilling quality requirements (ISO 9000*).

Quality management. Coordinated activities to direct and control an organization with regard to quality (ISO 9000*).

Relief. The inequalities in elevation of the surface of the Earth represented on aeronautical charts by contours, hypsometric tints, shading or spot elevations.

Requirement. Need or expectation that is stated, generally implied or obligatory (ISO 9000*).

Note 1.— "Generally implied" means that it is custom or common practice for the organization, its customers and other interested parties, that the need or expectation under consideration is implied.

Note 2.— A qualifier can be used to denote a specific type of requirement, e.g. product requirement, quality management requirement, customer requirement.

Note 3.— A specified requirement is one which is stated, for example, in a document.

Note 4.— Requirements can be generated by different interested parties.

Resolution. A number of units or digits to which a measured or calculated value is expressed and used.

Restricted area. An airspace of defined dimensions, above the land areas or territorial waters of a State, within which the flight of aircraft is restricted in accordance with certain specified conditions.

Route stage. A route or portion of a route flown without an intermediate landing.

SNOWTAM. A special series NOTAM notifying the presence or removal of hazardous conditions due to snow, ice, slush or standing water associated with snow, slush and ice on the movement area, by means of a specific format.

Station declination. An alignment variation between the zero degree radial of a VOR and true north, determined at the time the VOR station is calibrated.

Terrain. The surface of the Earth containing naturally occurring features such as mountains, hills, ridges, valleys, bodies of water, permanent ice and snow, and excluding obstacles.

Note.— In practical terms, depending on the method of data collection used, terrain represents the continuous surface that exists at the bare Earth, the top of the canopy or something in-between, also known as "first reflective surface".

Traceability. Ability to trace the history, application or location of that which is under consideration (ISO 9000*).

Note.— When considering product, traceability can relate to:

— the origin of materials and parts;

— the processing history; and

— the distribution and location of the product after delivery.

Validation. Confirmation, through the provision of objective evidence, that the requirements for a specific intended use or application have been fulfilled (ISO 9000*).

Verification. Confirmation, through the provision of objective evidence, that specified requirements have been fulfilled (ISO 9000*).

Note 1.— The term "verified" is used to designate the corresponding status.

Note 2.— Confirmation can comprise activities such as:

— *performing alternative calculations;*

— *comparing a new design specification with a similar proven design specification;*

— *undertaking tests and demonstrations; and*

— *reviewing documents prior to issue.*

VOLMET. Meteorological information for aircraft in flight.

Data link-VOLMET (D-VOLMET). Provision of current aerodrome routine meteorological reports (METAR) and aerodrome special meteorological reports (SPECI), aerodrome forecasts (TAF), SIGMET, special air-reports not covered by a SIGMET and, where available, AIRMET via data link.

VOLMET broadcast. Provision, as appropriate, of current METAR, SPECI, TAF and SIGMET by means of continuous and repetitive voice broadcasts.

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* ISO Standard
9000 — *Quality Management Systems — Fundamentals and Vocabulary*
19101 — *Geographic information — Reference model*
19104 — *Geographic information — Terminology*
19108 — *Geographic information — Temporal schema*
19109 — *Geographic information — Rules for application schema*
19110 — *Geographic information — Feature cataloguing schema*
19115 — *Geographic information — Metadata*
19117 — *Geographic information — Portrayal*
19131 — *Geographic information — Data product specification*

CHAPTER 4. AERONAUTICAL INFORMATION PUBLICATIONS (AIP)

Note 1.— AIP are intended primarily to satisfy international requirements for the exchange of aeronautical information of a lasting character essential to air navigation. When practicable, the form of presentation is designed to facilitate their use in flight.

Note 2.— AIP constitute the basic information source for permanent information and long duration temporary changes.

4.1 Contents

4.1.1 An Aeronautical Information Publication shall contain, in three parts, sections and subsections uniformly referenced to allow for standardized electronic data storage and retrieval, current information relating to, and arranged under, those subjects enumerated in Appendix 1 that appear in Roman type, except that when the AIP, or volume of the AIP, is designed basically to facilitate operational use in flight, the precise format and arrangement may be left to the discretion of the State provided that an adequate table of contents is included.

4.1.1.1 **Recommendation.—** *Aeronautical Information Publications should, in addition, contain current information relating to those subjects enumerated in Appendix 1 that appear in italic type.*

4.1.2 Aeronautical Information Publications shall include in Part 1 — General (GEN):

a) a statement of the competent authority responsible for the air navigation facilities, services or procedures covered by the AIP;

b) the general conditions under which the services or facilities are available for international use;

c) a list of significant differences between the national regulations and practices of the State and the related ICAO Standards, Recommended Practices and Procedures, given in a form that would enable a user to differentiate readily between the requirements of the State and the related ICAO provisions;

d) the choice made by a State in each significant case where an alternative course of action is provided for in ICAO Standards, Recommended Practices and Procedures.

4.1.3 The aeronautical charts listed alphabetically below shall, when available for designated international aerodromes/heliports, form part of the AIP, or be distributed separately to recipients of the AIP:

a) Aerodrome/Heliport Chart — ICAO;

b) Aerodrome Ground Movement Chart — ICAO;

c) Aerodrome Obstacle Chart — ICAO Type A;

d) Aerodrome Terrain and Obstacle Chart — ICAO (Electronic);

e) Aircraft Parking/Docking Chart — ICAO;

f) Area Chart — ICAO;

g) ATC Surveillance Minimum Altitude Chart — ICAO;

h) Instrument Approach Chart — ICAO;

i) Precision Approach Terrain Chart — ICAO;

j) Standard Arrival Chart — Instrument (STAR) — ICAO;

k) Standard Departure Chart — Instrument (SID) — ICAO;

l) Visual Approach Chart — ICAO.

Note.— A page pocket may be used in the AIP to include the Aerodrome Terrain and Obstacle Chart — ICAO (Electronic) on appropriate electronic media.

4.1.4 Charts, maps or diagrams shall be used, when appropriate, to complement or as a substitute for the tabulations or text of Aeronautical Information Publications.

Note.— Where appropriate, charts produced in conformity with Annex 4 — Aeronautical Charts, *may be used to fulfil this requirement. Guidance material as to the specifications of index maps and diagrams included in Aeronautical Information Publications is contained in the* Aeronautical Information Services Manual *(Doc 8126).*

4.2 General specifications

4.2.1 Each Aeronautical Information Publication shall be self-contained and shall include a table of contents.

Note.— If it is necessary by reason of bulk or for convenience, to publish an AIP in two or more parts or volumes, each of them will indicate that the remainder of the information is to be found in the other part(s) or volume(s).

4.2.1.1 Each AIP shall not duplicate information within itself or from other sources.

4.2.1.2 When two or more States combine to issue a joint AIP, this shall be made clear both on the cover and in the table of contents.

4.2.2 **Recommendation.—** *AIP should be published in loose-leaf form unless the complete publication is reissued at frequent intervals.*

4.2.3 Each Aeronautical Information Publication shall be dated. In the case of Aeronautical Information Publications issued in loose-leaf form, each page shall be dated. The date, consisting of the day, month (by name) and year, shall be the publication date or the effective date of the information.

4.2.4 A checklist giving the current date of each page in the Aeronautical Information Publication series shall be reissued frequently to assist the user in maintaining a current publication. The page number/chart title and date of the checklist shall appear on the checklist itself.

4.2.5 Each Aeronautical Information Publication issued as a bound volume and each page of an Aeronautical Information Publication issued in loose-leaf form shall be so annotated as to indicate clearly:

a) the identity of the Aeronautical Information Publication;

b) the territory covered and subdivisions when necessary;

c) the identification of the issuing State and producing organization (authority);

d) page numbers/chart titles;

e) the degree of reliability if the information is doubtful.

4.2.6 **Recommendation.—** *The sheet size should be no larger than 210 × 297 mm, except that larger sheets may be used provided they are folded to the same size.*

4.2.7 All changes to the AIP, or new information on a reprinted page, shall be identified by a distinctive symbol or annotation.

4.2.8 Operationally significant changes to the AIP shall be published in accordance with AIRAC procedures and shall be clearly identified by the acronym — AIRAC.

4.2.9 AIP shall be amended or reissued at such regular intervals as may be necessary to keep them up to date. Recourse to hand amendments or annotations shall be kept to the minimum. The normal method of amendment shall be by means of replacement sheets.

4.2.9.1 The regular interval referred to in 4.2.9 shall be specified in the AIP, Part 1 — General (GEN).

Note.— Guidance material on the establishment of intervals between publication dates of AIP Amendments is contained in the Aeronautical Information Services Manual *(Doc 8126).*

4.3 Specifications for AIP Amendments

4.3.1 Permanent changes to the AIP shall be published as AIP Amendments.

4.3.2 Each AIP Amendment shall be allocated a serial number, which shall be consecutive.

4.3.3 Each AIP Amendment page, including the cover sheet, shall display a publication date.

4.3.4 Each AIRAC AIP Amendment page, including the cover sheet, shall display an effective date.

4.3.5 When an AIP Amendment is issued, it shall include references to the serial number of those elements, if any, of the Integrated Aeronautical Information Package which have been incorporated into the amendment.

4.3.6 A brief indication of the subjects affected by the amendment shall be given on the AIP Amendment cover sheet.

4.3.7 When an AIP Amendment will not be published at the established interval or publication date, a NIL notification shall be originated and distributed by the monthly printed plain-language list of valid NOTAM required by 5.2.13.3.

4.4 Specifications for AIP Supplements

4.4.1 Temporary changes of long duration (three months or longer) and information of short duration which contains extensive text and/or graphics shall be published as AIP Supplements.

Note.— Guidance material on the use of AIP Supplements together with examples of such use is contained in the Aeronautical Information Services Manual *(Doc 8126).*

4.4.2 Each AIP Supplement shall be allocated a serial number which shall be consecutive and based on the calendar year.

4.4.3 AIP Supplement pages shall be kept in the AIP as long as all or some of their contents remain valid.

4.4.4 When an AIP Supplement is sent in replacement of a NOTAM, it shall include a reference to the serial number of the NOTAM.

4.4.5 A checklist of valid AIP Supplements shall be issued at intervals of not more than one month. This information shall be issued through the medium of the monthly printed plain-language list of valid NOTAM required by 5.2.13.3.

4.4.6 **Recommendation.—** *AIP Supplement pages should be coloured in order to be conspicuous, preferably in yellow.*

4.4.7 **Recommendation.—** *AIP Supplement pages should be kept as the first item in the AIP parts.*

4.5 Distribution

AIP, AIP Amendments and AIP Supplements shall be made available by the most expeditious means.

5.2.5 The NOTAM originator shall allocate to each NOTAM a series identified by a letter and a four-digit number followed by a stroke and a two-digit number for the year. The four-digit number shall be consecutive and based on the calendar year.

Note.— Letters A to Z, with the exception of S and T, may be used to identify a NOTAM series.

5.2.6 When errors occur in a NOTAM, a NOTAM with a new number to replace the erroneous NOTAM shall be issued.

5.2.7 When a NOTAM is issued which cancels or replaces a previous NOTAM, the series and number of the previous NOTAM shall be indicated. The series, location indicator and subject of both NOTAM shall be the same. Only one NOTAM shall be cancelled or replaced by a NOTAM.

5.2.8 Each NOTAM shall deal with only one subject and one condition of the subject.

Note.— Guidance concerning the combination of a subject and a condition of the subject in accordance with the NOTAM Selection Criteria is contained in the Aeronautical Information Services Manual *(Doc 8126).*

5.2.9 Each NOTAM shall be as brief as possible and so compiled that its meaning is clear without the need to refer to another document.

5.2.10 Each NOTAM shall be transmitted as a single telecommunication message.

5.2.11 A NOTAM containing permanent or temporary information of long duration shall carry appropriate AIP or AIP Supplement references.

5.2.12 Location indicators included in the text of a NOTAM shall be those contained in *Location Indicators* (Doc 7910).

5.2.12.1 In no case shall a curtailed form of such indicators be used.

5.2.12.2 Where no ICAO location indicator is assigned to the location, its place name spelt in accordance with 3.6.2 shall be entered in plain language.

5.2.13 A checklist of valid NOTAM shall be issued as a NOTAM over the Aeronautical Fixed Service (AFS) at intervals of not more than one month using the NOTAM Format specified in Appendix 6. One NOTAM shall be issued for each series.

5.2.13.1 A checklist of NOTAM shall refer to the latest AIP Amendments, AIP Supplements and at least the internationally distributed AIC.

5.2.13.2 A checklist of NOTAM shall have the same distribution as the actual message series to which they refer and shall be clearly identified as checklist.

5.2.13.3 A monthly printed plain-language list of valid NOTAM, including indications of the latest AIP Amendments, AIC issued and a checklist of AIP Supplements, shall be prepared with a minimum of delay and forwarded by the most expeditious means to recipients of the Integrated Aeronautical Information Package.

5.3 Distribution

5.3.1 NOTAM shall be distributed on the basis of a request.

5.3.2 NOTAM shall be prepared in conformity with the relevant provisions of the ICAO communication procedures.

5.3.2.1 The AFS shall, whenever practicable, be employed for NOTAM distribution.

5.3.2.2 When a NOTAM exchanged as specified in 5.3.4 is sent by means other than the AFS, a six-digit date-time group indicating the date and time of NOTAM origination, and the identification of the originator shall be used, preceding the text.

5.3.3 The originating State shall select the NOTAM that are to be given international distribution.

5.3.3.1 **Recommendation.—** *Selective distribution lists should be used when practicable.*

Note.— These lists are intended to obviate superfluous distribution of information. Guidance material relating to this is contained in the Aeronautical Information Services Manual *(Doc 8126).*

5.3.4 International exchange of NOTAM shall take place only as mutually agreed between the international NOTAM offices concerned. The international exchange of ASHTAM (see 5.2.4), and NOTAM where States continue to use NOTAM for distribution of information on volcanic activity, shall include volcanic ash advisory centres and the centres designated by regional air navigation agreement for the operation of AFS satellite distribution systems (satellite distribution system for information relating to air navigation (SADIS) and international satellite communications system (ISCS)), and shall take account of the requirements of long-range operations.

Note.— Arrangements may be made for direct exchange of SNOWTAM (see Appendix 2) between aerodromes/heliports.

5.3.4.1 These exchanges of NOTAM between international NOTAM offices shall, as far as practicable, be limited to the requirements of the receiving States concerned by means of separate series providing for at least international and domestic flights.

5.3.4.2 A predetermined distribution system for NOTAM transmitted on the AFS in accordance with Appendix 5 shall be used whenever possible, subject to the requirements of 5.3.4.

CHAPTER 6. AERONAUTICAL INFORMATION REGULATION AND CONTROL (AIRAC)

6.1 General specifications

6.1.1 Information concerning the circumstances listed in Appendix 4, Part 1, shall be distributed under the regulated system (AIRAC), i.e. basing establishment, withdrawal or significant changes upon a series of common effective dates at intervals of 28 days, including 29 January 1998. The information notified therein shall not be changed further for at least another 28 days after the effective date, unless the circumstance notified is of a temporary nature and would not persist for the full period.

Note.— Guidance material on the procedures applicable to the AIRAC system is contained in the Aeronautical Information Services Manual *(Doc 8126).*

6.1.2 **Recommendation.—** *The regulated system (AIRAC) should also be used for the provision of information relating to the establishment and withdrawal of, and premeditated significant changes in, the circumstances listed in Appendix 4, Part 2.*

6.1.3 When information has not been submitted by the AIRAC date, a NIL notification shall be originated and distributed by NOTAM or other suitable means, not later than one cycle before the AIRAC effective date concerned.

6.1.4 Implementation dates other than AIRAC effective dates shall not be used for pre-planned operationally significant changes requiring cartographic work and/or for updating of navigation databases.

6.1.5 **Recommendation.—** *The use of the date in the AIRAC cycle which occurs between 21 December and 17 January inclusive should be avoided as an effective date for the introduction of significant changes under the AIRAC system.*

6.2 Provision of information in paper copy form

6.2.1 In all instances, information provided under the AIRAC system shall be published in paper copy form and shall be distributed by the AIS unit at least 42 days in advance of the effective date with the objective of reaching recipients at least 28 days in advance of the effective date.

6.2.2 **Recommendation.—** *Whenever major changes are planned and where advance notice is desirable and practicable, information published in paper copy form should be distributed by the AIS unit at least 56 days in advance of the effective date.*

Note.— Guidance on what constitutes a major change is included in Doc 8126.

6.3 Provision of information in electronic form

6.3.1 States that have established an aeronautical database shall, when updating its contents concerning the circumstances listed in Appendix 4, Part 1, ensure that the effective dates of data coincide with the established AIRAC effective dates used for the provision of information in paper copy form.

6.3.2 Information provided in electronic form, concerning the circumstances listed in Appendix 4, Part 1, shall be distributed/made available by the AIS unit so as to reach recipients at least 28 days in advance of the AIRAC effective date.

6.3.3 **Recommendation.—** *Whenever major changes are planned and where advance notice is desirable and practicable, information provided in electronic form should be distributed/made available at least 56 days in advance of the effective date.*

Note.— Guidance on what constitutes a major change is included in Doc 8126.

CHAPTER 7. AERONAUTICAL INFORMATION CIRCULARS (AIC)

7.1 Origination

7.1.1 An AIC shall be originated whenever it is necessary to promulgate aeronautical information which does not qualify:

a) under the specifications in 4.1 for inclusion in an AIP; or

b) under the specifications in 5.1 for the origination of a NOTAM.

7.1.1.1 An AIC shall be originated whenever it is desirable to promulgate:

a) a long-term forecast of any major change in legislation, regulations, procedures or facilities;

b) information of a purely explanatory or advisory nature liable to affect flight safety;

c) information or notification of an explanatory or advisory nature concerning technical, legislative or purely administrative matters.

This shall include:

1) forecasts of important changes in the air navigation procedures, services and facilities provided;

2) forecasts of implementation of new navigational systems;

3) significant information arising from aircraft accident/incident investigation which has a bearing on flight safety;

4) information on regulations relating to the safeguarding of international civil aviation against acts of unlawful interference;

5) advice on medical matters of special interest to pilots;

6) warnings to pilots concerning the avoidance of physical hazards;

7) effect of certain weather phenomena on aircraft operations;

8) information on new hazards affecting aircraft handling techniques;

9) regulations relating to the carriage of restricted articles by air;

10) reference to the requirements of, and publication of changes in, national legislation;

11) aircrew licensing arrangements;

12) training of aviation personnel;

13) application of, or exemption from, requirements in national legislation;

14) advice on the use and maintenance of specific types of equipment;

15) actual or planned availability of new or revised editions of aeronautical charts;

16) carriage of communication equipment;

17) explanatory information relating to noise abatement;

18) selected airworthiness directives;

19) changes in NOTAM series or distribution, new editions of AIP or major changes in their contents, coverage or format;

20) advance information on the snow plan (see 7.1.1.2);

21) other information of a similar nature.

Note.— The publication of an AIC does not remove the obligations set forth in Chapters 4 and 5.

7.1.1.2 The snow plan published under AD 1.2.2 of Appendix 1 shall be supplemented by seasonal information, to be issued well in advance of the beginning of each winter — not less than one month before the normal onset of winter conditions — and shall contain information such as that listed below:

a) a list of aerodromes/heliports where snow clearance is expected to be performed during the coming winter:

   *1) in accordance with the runway and taxiway systems; or

   *2) planned snow clearing, deviating from the runway system (length, width and number of runways, affected taxiways and aprons or portions thereof);

* This information, or any part of it, may be included in the AIP, if so desired.

*b) information concerning any centre designated to coordinate information on the current state of progress of clearance and on the current state of runways, taxiways and aprons;

c) a division of the aerodromes/heliports into SNOWTAM distribution lists in order to avoid excessive NOTAM distribution;

*d) an indication, as necessary, of minor changes to the standing snow plan;

*e) a descriptive list of clearance equipment;

*f) a listing of what will be considered as the minimum critical snow bank to be reported at each aerodrome/heliport at which reporting will commence.

7.2 General specifications

7.2.1 AIC shall be issued in printed form.

Note.— Both text and diagrams may be included.

7.2.1.1 The originating State shall select the AIC that are to be given international distribution.

7.2.1.2 Each AIC shall be allocated a serial number which shall be consecutive and based on the calendar year.

7.2.1.3 When AIC are distributed in more than one series, each series shall be separately identified by a letter.

7.2.1.4 **Recommendation.—** *Differentiation and identification of AIC topics according to subjects using colour coding should be practised where the numbers of AIC in force are sufficient to make identification in this form necessary.*

Note.— Guidance on colour coding of AIC by subject can be found in the Aeronautical Information Services Manual *(Doc 8126)*.

7.2.2 A checklist of AIC currently in force shall be issued at least once a year, with distribution as for the AIC.

7.3 Distribution

States shall give AIC selected for international distribution the same distribution as for the AIP.

* This information, or any part of it, may be included in the AIP, if so desired.

CHAPTER 8. PRE-FLIGHT AND POST-FLIGHT INFORMATION/DATA

8.1 Pre-flight information

8.1.1 At any aerodrome/heliport normally used for international air operations, aeronautical information essential for the safety, regularity and efficiency of air navigation and relative to the route stages originating at the aerodrome/heliport shall be made available to flight operations personnel, including flight crews and services responsible for pre-flight information.

8.1.2 Aeronautical information provided for pre-flight planning purposes at the aerodromes/heliports referred to in 8.1.1 shall include relevant:

a) elements of the Integrated Aeronautical Information Package;

b) maps and charts.

Note.— The documentation listed in a) and b) may be limited to national publications and when practicable, those of immediately adjacent States, provided a complete library of aeronautical information is available at a central location and means of direct communications are available between the aerodrome AIS unit and that library.

8.1.2.1 Additional current information relating to the aerodrome of departure shall be provided concerning the following:

a) construction or maintenance work on or immediately adjacent to the manoeuvring area;

b) rough portions of any part of the manoeuvring area, whether marked or not, e.g. broken parts of the surface of runways and taxiways;

c) presence and depth of snow, ice or water on runways and taxiways, including their effect on surface friction;

d) snow drifted or piled on or adjacent to runways or taxiways;

e) parked aircraft or other objects on or immediately adjacent to taxiways;

f) presence of other temporary hazards;

g) presence of birds constituting a potential hazard to aircraft operations;

h) failure or irregular operation of part or all of the aerodrome lighting system including approach, threshold, runway, taxiway, obstruction and manoeuvring area unserviceability lights and aerodrome power supply;

i) failure, irregular operation and changes in the operational status of ILS (including markers), MLS, basic GNSS, SBAS, GBAS, SRE, PAR, DME, SSR, ADS-B, ADS-C, CPDLC, D-ATIS, D-VOLMET, VOR, NDB, VHF aeromobile channels, RVR observing system, and secondary power supply; and

j) presence and operation of humanitarian relief missions, such as those undertaken under the auspices of the United Nations, together with any associated procedures and/or limitations applied thereof.

8.1.3 A recapitulation of current NOTAM and other information of urgent character shall be made available to flight crews in the form of plain-language pre-flight information bulletins (PIB).

Note.— Guidance on the preparation of PIB is contained in the Aeronautical Information Services Manual *(Doc 8126).*

8.2 Automated aeronautical information systems

8.2.1 Where the civil aviation authority or the agency to which the authority to provide service has been delegated in accordance with 3.1.1 c) uses automated pre-flight information systems to make aeronautical information/data available to operations personnel including flight crew members for self-briefing, flight planning and flight information service purposes, the information/data made available shall comply with the provisions of 8.1.2 and 8.1.3.

8.2.2 **Recommendation.—** *Automated pre-flight information systems providing a harmonized, common point of access by operations personnel, including flight crew members and other aeronautical personnel concerned, to aeronautical information in accordance with 8.2.1 and meteorological information in accordance with 9.5.1 of Annex 3 —* Meteorological Service for International Air Navigation, *should be established by an agreement between the civil aviation authority or the agency to which the authority to provide service has been delegated in accordance with 3.1.1 c) and the relevant meteorological authority.*

8.2.3 Where automated pre-flight information systems are used to provide the harmonized, common point of access by operations personnel, including flight crew members and other aeronautical personnel concerned, to aeronautical information/data and meteorological information, the civil aviation authority or the agency to which the authority to provide service has been delegated in accordance with 3.1.1 c) shall remain responsible for the quality and timeliness of the aeronautical information/ data provided by means of such a system.

Note.— The meteorological authority concerned remains responsible for the quality of the meteorological information provided by means of such system in accordance with 9.5.1 of Annex 3.

8.2.4 Self-briefing facilities of an automated pre-flight information system shall provide for access by operations personnel, including flight crew members and other aeronautical personnel concerned, to consultation as necessary with the aeronautical information service by telephone or other suitable telecommunications means. The human/machine interface of such facilities shall ensure easy access in a guided manner to all relevant information/data.

8.2.5 **Recommendation.—** *Automated pre-flight information systems for the supply of aeronautical information/data for self-briefing, flight planning and flight information service should:*

a) provide for continuous and timely updating of the system database and monitoring of the validity and quality of the aeronautical information stored;

b) permit access to the system by operations personnel including flight crew members, aeronautical personnel concerned and other aeronautical users through suitable telecommunications means;

c) ensure provision, in paper copy form, of the aeronautical information/data accessed, as required;

d) use access and interrogation procedures based on abbreviated plain language and ICAO location indicators, as appropriate, or based on a menu-driven user interface or other appropriate mechanism as agreed between the civil aviation authority and operator concerned; and

e) provide for rapid response to a user request for information.

Note.— ICAO abbreviations and codes and location indicators are given respectively in the Procedures for Air Navigation Services — ICAO Abbreviations and Codes (*PANS-ABC, Doc 8400*) *and* Location Indicators (*Doc 7910*).

8.3 Post-flight information

8.3.1 States shall ensure that arrangements are made to receive at aerodromes/heliports information concerning the state and operation of air navigation facilities noted by aircrews and shall ensure that such information is made available to the aeronautical information service for such distribution as the circumstances necessitate.

8.3.2 States shall ensure that arrangements are made to receive at aerodromes/heliports information concerning the presence of birds observed by aircrews and shall ensure that such information is made available to the aeronautical information service for such distribution as the circumstances necessitate.

Note.— See Annex 14, Volume I, Chapter 9, Section 9.4.

APPENDIX 1. CONTENTS OF AERONAUTICAL INFORMATION PUBLICATION (AIP)

(see Chapter 4)

PART 1 — GENERAL (GEN)

If an AIP is produced and made available in more than one volume with each having a separate amendment and supplement service, a separate preface, record of AIP Amendments, record of AIP Supplements, checklist of AIP pages and list of current hand amendments must be included in each volume.

GEN 0.1 Preface

Brief description of the Aeronautical Information Publication (AIP), including:

1) name of the publishing authority;

2) applicable ICAO documents;

3) the AIP structure and established regular amendment interval; and

4) service to contact in case of detected AIP errors or omissions.

GEN 0.2 Record of AIP Amendments

A record of AIP Amendments and AIRAC AIP Amendments (published in accordance with the AIRAC system) containing:

1) amendment number;

2) publication date;

3) date inserted (for the AIRAC AIP Amendments, effective date); and

4) initials of officer who inserted the amendment.

GEN 0.3 Record of AIP Supplements

A record of issued AIP Supplements containing:

1) Supplement number;

2) Supplement subject;

3) AIP section(s) affected;

4) period of validity; and

5) cancellation record.

GEN 0.4 Checklist of AIP pages

A checklist of AIP pages containing:

1) page number/chart title; and

2) publication or effective date (day, month by name and year) of the aeronautical information.

GEN 0.5 List of hand amendments to the AIP

A list of current hand amendments to the AIP containing:

1) AIP page(s) affected;

2) amendment text; and

3) AIP Amendment number by which a hand amendment was introduced.

GEN 0.6 Table of contents to Part 1

A list of sections and subsections contained in Part 1 — General (GEN).

Note.— Subsections may be listed alphabetically.

GEN 1. NATIONAL REGULATIONS AND REQUIREMENTS

GEN 1.1 Designated authorities

The addresses of designated authorities concerned with the facilitation of international air navigation (civil aviation, meteorology, customs, immigration, health, en-route and aerodrome/heliport charges, agricultural quarantine and aircraft accident investigation) containing, for each authority:

1) designated authority;

2) name of the authority;

3) postal address;

4) telephone number;

5) telefax number;

6) telex number; and

7) aeronautical fixed service (AFS) address.

GEN 1.2 Entry, transit and departure of aircraft

Regulations and requirements for advance notification and applications for permission concerning entry, transit and departure of aircraft on international flights.

GEN 1.3 Entry, transit and departure of passengers and crew

Regulations (including customs, immigration and quarantine, and requirements for advance notification and applications for permission) concerning entry, transit and departure of non-immigrant passengers and crew.

GEN 1.4 Entry, transit and departure of cargo

Regulations (including customs, and requirements for advance notification and applications for permission) concerning entry, transit and departure of cargo.

Note.— Provisions for facilitating entry and departure for search, rescue, salvage, investigation, repair or salvage in connection with lost or damaged aircraft are detailed in section GEN 3.6, Search and rescue.

GEN 1.5 Aircraft instruments, equipment and flight documents

Brief description of aircraft instruments, equipment and flight documents, including:

1) instruments, equipment (including aircraft communication, navigation and surveillance equipment) and flight documents to be carried on aircraft, including any special requirement in addition to the provisions specified in Annex 6, Part I, Chapters 6 and 7; and

2) emergency locator transmitter (ELT), signalling devices and life-saving equipment as presented in Annex 6, Part I, 6.6 and Part II, 6.4 where so determined by regional air navigation meetings, for flights over designated land areas.

GEN 1.6 Summary of national regulations and international agreements/conventions

A list of titles and references and, where applicable, summaries of national regulations affecting air navigation, together with a list of international agreements/conventions ratified by State.

GEN 1.7 Differences from ICAO Standards, Recommended Practices and Procedures

A list of significant differences between national regulations and practices of the State and related ICAO provisions, including:

1) provision affected (Annex and edition number, paragraph); and

2) difference in full text.

All significant differences must be listed under this subsection. All Annexes must be listed in numerical order even if there is no difference to an Annex, in which case a NIL notification must be provided. National differences or the degree of non-application of the regional supplementary procedures (SUPPS) must be notified immediately following the Annex to which the supplementary procedure relates.

GEN 2. TABLES AND CODES

GEN 2.1 Measuring system, aircraft markings, holidays

GEN 2.1.1 Units of measurement

Description of units of measurement used including table of units of measurement.

GEN 2.1.2 Temporal reference system

Description of the temporal reference system (calendar and time system) employed, together with an indication of whether or not daylight saving hours are employed and how the temporal reference system is presented throughout the AIP.

GEN 2.1.3 Horizontal reference system

Brief description of the horizontal (geodetic) reference system used, including:

1) name/designation of the reference system;

2) identification of the projection;

3) identification of the ellipsoid used;

4) identification of the datum used;

5) area(s) of application; and

6) an explanation, if applicable, of the asterisk used to identify those coordinates that do not meet Annex 11 and 14 accuracy requirements.

GEN 2.1.4 Vertical reference system

Brief description of the vertical reference system used, including:

1) name/designation of the reference system;

2) description of the geoid model used including the parameters required for height transformation between the model used and EGM-96; and

3) an explanation, if applicable, of the asterisk used to identify those elevations/geoid undulations that do not meet Annex 14 accuracy requirements.

GEN 2.1.5 Aircraft nationality and registration marks

Indication of aircraft nationality and registration marks adopted by the State.

GEN 2.1.6 Public holidays

A list of public holidays with indication of services being affected.

GEN 2.2 Abbreviations used in AIS publications

A list of alphabetically arranged abbreviations and their respective significations used by the State in its AIP and in the distribution of aeronautical information/data with appropriate annotation for those national abbreviations that are different from those contained in the *Procedures for Air Navigation Services — ICAO Abbreviations and Codes* (PANS-ABC, Doc 8400).

Note.— A list of alphabetically arranged definitions/glossary of terms may also be added.

GEN 2.3 Chart symbols

A list of chart symbols arranged according to the chart series where symbols are applied.

GEN 2.4 Location indicators

A list of alphabetically arranged location indicators assigned to the locations of aeronautical fixed stations to be used for encoding and decoding purposes. An annotation to locations not connected to the Aeronautical Fixed Service (AFS) must be provided.

GEN 2.5 List of radio navigation aids

A list of radio navigation aids arranged alphabetically, containing:

1) identifier;

2) name of the station;

3) type of facility/aid; and

4) indication whether aid serves en-route (E), aerodrome (A) or dual (AE) purposes.

GEN 2.6 Conversion tables

Tables for conversion between:

1) nautical miles and kilometres and vice versa;

2) feet and metres and vice versa;

3) decimal minutes of arc and seconds of arc and vice versa; and

4) other conversion tables, as appropriate.

GEN 2.7 Sunrise/sunset tables

Brief description of criteria used for determination of the times given in the sunrise/sunset tables, together with an alphabetical list of locations for which the times are given with a reference to the related page in the table and the sunrise/sunset tables for the selected stations/locations, including:

1) station name;

2) ICAO location indicator;

3) geographical coordinates in degrees and minutes;

4) date(s) for which times are given;

5) time for the beginning of morning civil twilight;

6) time for sunrise;

7) time for sunset; and

8) time for the end of evening civil twilight.

GEN 3. SERVICES

GEN 3.1 Aeronautical information services

GEN 3.1.1 Responsible service

Description of the Aeronautical Information Service (AIS) provided and its major components, including:

1) service/unit name;

2) postal address;

3) telephone number;

4) telefax number;

5) telex number;

6) AFS address;

7) a statement concerning the ICAO documents on which the service is based and a reference to the AIP location where differences, if any, are listed; and

8) an indication if service is not H24.

GEN 3.1.2 Area of responsibility

The area of responsibility for the aeronautical information service.

GEN 3.1.3 Aeronautical publications

Description of the elements of the Integrated Aeronautical Information Package, including:

1) AIP and related amendment service;

2) AIP Supplements;

3) AIC;

4) NOTAM and pre-flight information bulletins (PIB);

5) checklists and lists of valid NOTAM; and

6) how they may be obtained.

When an AIC is used to promulgate publication prices, that must be indicated in this section of the AIP.

GEN 3.1.4 AIRAC system

Brief description of the AIRAC system provided including a table of present and near future AIRAC dates.

GEN 3.1.5 Pre-flight information service at aerodromes/heliports

A list of aerodromes/heliports at which pre-flight information is routinely available, including an indication of relevant:

1) elements of the Integrated Aeronautical Information Packages held;

2) maps and charts held; and

3) general area of coverage of such data.

GEN 3.1.6 Electronic terrain and obstacle data

Details of how electronic terrain and obstacle data may be obtained, containing:

1) name of the individual, service or organization responsible;

2) street address and e-mail address of the individual, service or organization responsible;

3) telefax number of the individual, service or organization responsible;

4) contact telephone number of the individual, service or organization responsible;

5) hours of service (time period including time zone when contact can be made);

6) online information that can be used to contact the individual, service or organization; and

7) supplemental information, if necessary, on how and when to contact the individual, service or organization.

GEN 3.2 Aeronautical charts

GEN 3.2.1 Responsible service(s)

Description of service(s) responsible for the production of aeronautical charts, including:

1) service name;

2) postal address;

3) telephone number;

4) telefax number;

5) telex number;

6) AFS address;

7) a statement concerning the ICAO documents on which the service is based and a reference to the AIP location where differences, if any, are listed; and

8) an indication if service is not H24.

GEN 3.2.2 Maintenance of charts

Brief description of how aeronautical charts are revised and amended.

GEN 3.2.3 Purchase arrangements

Details of how charts may be obtained, containing:

1) service/sales agency(ies);

2) postal address;

3) telephone number;

4) telefax number;

5) telex number; and

6) AFS address.

GEN 3.2.4 Aeronautical chart series available

A list of aeronautical chart series available followed by a general description of each series and an indication of the intended use.

GEN 3.2.5 List of aeronautical charts available

A list of aeronautical charts available, including:

1) title of series;

2) scale of series;

3) name and/or number of each chart or each sheet in a series;

4) price per sheet; and

5) date of latest revision.

GEN 3.2.6 Index to the World Aeronautical Chart (WAC) — ICAO 1:1 000 000

An index chart showing coverage and sheet layout for the WAC 1:1 000 000 produced by a State. If Aeronautical Chart — ICAO 1:500 000 is produced instead of WAC 1:1 000 000, index charts must be used to indicate coverage and sheet layout for the Aeronautical Chart — ICAO 1:500 000.

GEN 3.2.7 Topographical charts

Details of how topographical charts may be obtained, containing:

1) name of service/agency(ies);

2) postal address;

3) telephone number;

4) telefax number;

5) telex number; and

6) AFS address.

GEN 3.2.8 Corrections to charts not contained in the AIP

A list of corrections to aeronautical charts not contained in the AIP, or an indication where such information can be obtained.

GEN 3.3 Air traffic services

GEN 3.3.1 Responsible service

Description of the air traffic service and its major components, including:

1) service name;

2) postal address;

3) telephone number;

4) telefax number;

5) telex number;

6) AFS address;

7) a statement concerning the ICAO documents on which the service is based and a reference to the AIP location where differences, if any, are listed; and

8) an indication if service is not H24.

GEN 3.3.2 Area of responsibility

Brief description of area of responsibility for which air traffic services are provided.

GEN 3.3.3 Types of services

Brief description of main types of air traffic services provided.

GEN 3.3.4 Coordination between the operator and ATS

General conditions under which coordination between the operator and air traffic services is effected.

GEN 3.3.5 Minimum flight altitude

The criteria used to determine minimum flight altitudes.

GEN 3.3.6 ATS units address list

A list of ATS units and their addresses arranged alphabetically, containing:

1) unit name;

2) postal address;

3) telephone number;

4) telefax number;

5) telex number; and

6) AFS address.

GEN 3.4 Communication services

GEN 3.4.1 Responsible service

Description of the service responsible for the provision of telecommunication and navigation facilities, including:

1) service name;

2) postal address;

3) telephone number;

4) telefax number;

5) telex number;

6) AFS address;

7) a statement concerning the ICAO documents on which the service is based and a reference to the AIP location where differences, if any, are listed; and

8) an indication if service is not H24.

GEN 3.4.2 Area of responsibility

Brief description of area of responsibility for which telecommunication service is provided.

GEN 3.4.3 Types of service

Brief description of the main types of service and facilities provided, including:

1) radio navigation services;

2) voice and/or data link services;

3) broadcasting service;

4) language(s) used; and

5) an indication of where detailed information can be obtained.

GEN 3.4.4 Requirements and conditions

Brief description concerning the requirements and conditions under which the communication service is available.

GEN 3.5 Meteorological services

GEN 3.5.1 Responsible service

Brief description of the meteorological service responsible for the provision of meteorological information, including:

1) service name;

2) postal address;

3) telephone number;

4) telefax number;

5) telex number;

6) AFS address;

7) a statement concerning the ICAO documents on which the service is based and a reference to the AIP location where differences, if any, are listed; and

8) an indication if service is not H24.

GEN 3.5.2 Area of responsibility

Brief description of area and/or air routes for which meteorological service is provided.

GEN 3.5.3 Meteorological observations and reports

Detailed description of the meteorological observations and reports provided for international air navigation, including:

1) name of the station and the ICAO location indicator;

2) type and frequency of observation including an indication of automatic observing equipment;

3) types of meteorological reports (e.g. METAR) and availability of a trend forecast;

4) specific type of observation system and number of observation sites used to observe and report surface wind, visibility, runway visual range, cloud base, temperature and, where applicable, wind shear (e.g. anemometer at intersection of runways, transmissometer next to touchdown zone, etc.);

5) hours of operation; and

6) indication of aeronautical climatological information available.

GEN 3.5.4 Types of services

Brief description of the main types of service provided, including details of briefing, consultation, display of meteorological information, flight documentation available for operators and flight crew members, and of the methods and means used for supplying the meteorological information.

GEN 3.5.5 Notification required from operators

Minimum amount of advance notice required by the meteorological authority from operators in respect of briefing, consultation and flight documentation and other meteorological information they require or change.

GEN 3.5.6 Aircraft reports

As necessary, requirements of the meteorological authority for the making and transmission of aircraft reports.

GEN 3.5.7 VOLMET service

Description of VOLMET and/or D-VOLMET service, including:

1) name of transmitting station;

2) call sign or identification and abbreviation for the radio communication emission;

3) frequency or frequencies used for broadcast;

4) broadcasting period;

5) hours of service;

6) list of aerodromes/heliports for which reports and/or forecasts are included; and

7) reports, forecasts and SIGMET information included and remarks.

GEN 3.5.8 SIGMET and AIRMET service

Description of the meteorological watch provided within flight information regions or control areas for which air traffic services are provided, including a list of the meteorological watch offices with:

1) name of the meteorological watch office, ICAO location indicator;

2) hours of service;

3) flight information region(s) or control area(s) served;

4) SIGMET validity periods;

5) specific procedures applied to SIGMET information (e.g. for volcanic ash and tropical cyclones);

6) procedures applied to AIRMET information (in accordance with relevant regional air navigation agreements);

7) the air traffic services unit(s) provided with SIGMET and AIRMET information; and

8) additional information (e.g. concerning any limitation of service, etc.).

GEN 3.5.9 Other automated meteorological services

Description of available automated services for the provision of meteorological information (e.g. automated pre-flight information service accessible by telephone and/or computer modem) including:

1) service name;

2) information available;

3) areas, routes and aerodromes covered; and

4) telephone, telex and telefax number(s).

GEN 3.6 Search and rescue

GEN 3.6.1 Responsible service(s)

Brief description of service(s) responsible for the provision of search and rescue (SAR), including:

1) service/unit name;

2) postal address;

3) telephone number;

4) telefax number;

5) telex number;

6) AFS address; and

7) a statement concerning the ICAO documents on which the service is based and a reference to the AIP location where differences, if any, are listed.

GEN 3.6.2 Area of responsibility

Brief description of area of responsibility within which search and rescue services are provided.

GEN 3.6.3 Types of service

Brief description and geographical portrayal, where appropriate, of the type of service and facilities provided including indications where SAR aerial coverage is dependent upon significant deployment of aircraft.

GEN 3.6.4 SAR agreements

Brief description of SAR agreements in force, including provisions for facilitating entry and departure of other States' aircraft for search, rescue, salvage, repair or salvage in connection with lost or damaged aircraft, either with airborne notification only or after flight plan notification.

GEN 3.6.5 Conditions of availability

Brief description of provisions for search and rescue, including the general conditions under which the service and facilities are available for international use, including an indication of whether a facility available for search and rescue is specialized in SAR techniques and functions, or is specially used for other purposes but adapted for SAR purposes by training and equipment, or is only occasionally available and has no particular training or preparation for SAR work.

GEN 3.6.6 Procedures and signals used

Brief description of the procedures and signals employed by rescue aircraft and a table showing the signals to be used by survivors.

GEN 4. CHARGES FOR AERODROMES/HELIPORTS AND AIR NAVIGATION SERVICES

Reference may be made to where details of actual charges may be found, if not itemized in this chapter.

GEN 4.1 Aerodrome/heliport charges

Brief description of type of charges which may be applicable at aerodromes/heliports available for international use, including:

1) landing of aircraft;

2) parking, hangarage and long-term storage of aircraft;

3) passenger service;

4) security;

5) noise-related items;

6) other (customs, health, immigration, etc.);

7) exemptions/reductions; and

8) methods of payment.

GEN 4.2 Air navigation services charges

Brief description of charges which may be applicable to air navigation services provided for international use, including:

1) *approach control;*

2) *route air navigation services;*

3) *cost basis for air navigation services and exemptions/reductions; and*

4) *methods of payment.*

PART 2 — EN-ROUTE (ENR)

If an AIP is produced and made available in more than one volume with each having a separate amendment and supplement service, a separate preface, record of AIP Amendments, record of AIP Supplements, checklist of AIP pages and list of current hand amendments must be included in each volume. In the case of an AIP being published as one volume, the annotation "not applicable" must be entered against each of the above subsections.

Reference must be made in the appropriate subsection to indicate that differences between national regulations and ICAO SARPs and procedures exist and that they are detailed in GEN 1.7.

ENR 0.6 Table of contents to Part 2

A list of sections and subsections contained in Part 2 — En-route.

Note.— Subsections may be listed alphabetically.

ENR 1. GENERAL RULES AND PROCEDURES

ENR 1.1 General rules

The requirement is for publication of the general rules as applied within the State.

ENR 1.2 Visual flight rules

The requirement is for publication of the visual flight rules as applied within the State.

ENR 1.3 Instrument flight rules

The requirement is for publication of the instrument flight rules as applied within the State.

ENR 1.4 ATS airspace classification

The description of ATS airspace classes in the form of the ATS airspace classification table in Annex 11, Appendix 4, appropriately annotated to indicate those airspace classes not used by the State.

ENR 1.5 Holding, approach and departure procedures

ENR 1.5.1 General

The requirement is for a statement concerning the criteria on which holding, approach and departure procedures are established. If different from ICAO provisions, the requirement is for presentation of criteria used in a tabular form.

ENR 1.5.2 Arriving flights

The requirement is to present procedures (conventional or area navigation or both) for arriving flights which are common to flights into or within the same type of airspace. If different procedures apply within a terminal airspace, a note to this effect must be given together with a reference to where the specific procedures can be found.

ENR 1.5.3 Departing flights

The requirement is to present procedures (conventional or area navigation or both) for departing flights which are common to flights departing from any aerodrome/heliport.

ENR 1.6 ATS surveillance services and procedures

ENR 1.6.1 Primary radar

Description of primary radar services and procedures, including:

1) supplementary services;

2) the application of radar control service;

3) radar and air-ground communication failure procedures;

4) voice and CPDLC position reporting requirements; and

5) graphic portrayal of area of radar coverage.

ENR 1.6.2 Secondary surveillance radar (SSR)

Description of secondary surveillance radar (SSR) operating procedures, including:

1) emergency procedures;

2) air-ground communication failure and unlawful interference procedures;

3) the system of SSR code assignment;

4) voice and CPDLC position reporting requirements; and

5) graphic portrayal of area of SSR coverage.

Note.— The SSR description is of particular importance in areas or routes where the possibility of interception exists.

ENR 1.6.3 Automatic dependent surveillance — broadcast (ADS-B)

Description of automatic dependent surveillance — broadcast (ADS-B) operating procedures, including:

1) emergency procedures;

2) air-ground communication failure and unlawful interference procedures;

3) aircraft identification requirements;

4) voice and CPDLC position reporting requirements; and

5) graphic portrayal of area of ADS-B coverage.

Note.— The ADS-B description is of particular importance in areas or routes where the possibility of interception exists.

ENR 1.7 Altimeter setting procedures

The requirement is for a statement of altimeter setting procedures in use, containing:

1) brief introduction with a statement concerning the ICAO documents on which the procedures are based together with differences to ICAO provisions, if any;

2) basic altimeter setting procedures;

3) description of altimeter setting region(s);

4) procedures applicable to operators (including pilots); and

5) table of cruising levels.

ENR 1.8 Regional supplementary procedures

The requirement is for presentation of regional supplementary procedures (SUPPS) affecting the entire area of responsibility, with properly annotated national differences, if any.

ENR 1.9 Air traffic flow management

Brief description of air traffic flow management (ATFM) system, including:

1) ATFM structure, service area, service provided, location of unit(s) and hours of operation;

2) types of flow messages and descriptions of the formats; and

3) procedures applicable for departing flights, containing:

   a) service responsible for provision of information on applied ATFM measures;

   b) flight plan requirements; and

   c) slot allocations.

ENR 1.10 Flight planning

The requirement is to indicate any restriction, limitation or advisory information related to the flight planning stage which may assist the user in the presentation of the intended flight operation, including:

1) procedures for the submission of a flight plan;

2) repetitive flight plan system; and

3) changes to the submitted flight plan.

ENR 1.11 Addressing of flight plan messages

The requirement is for an indication, in tabular form, of the addresses allocated to flight plans, showing:

1) category of flight (IFR, VFR or both);

2) route (into or via FIR and/or TMA); and

3) message address.

ENR 1.12 Interception of civil aircraft

The requirement is for a complete statement of interception procedures and visual signals to be used with a clear indication of whether ICAO provisions are applied and if not, a complete presentation of differences.

ENR 1.13 Unlawful interference

The requirement is for presentation of appropriate procedures to be applied in case of unlawful interference.

ENR 1.14 Air traffic incidents

Description of air traffic incidents reporting system, including:

1) definition of air traffic incidents;

2) use of the "Air Traffic Incident Reporting Form";

3) reporting procedures (including in-flight procedures); and

4) purpose of reporting and handling of the form.

ENR 2. AIR TRAFFIC SERVICES AIRSPACE

ENR 2.1 FIR, UIR, TMA

Detailed description of flight information regions (FIR), upper flight information regions (UIR), and terminal control areas (TMA), including:

1) name, geographical coordinates in degrees and minutes of the FIR/UIR lateral limits and in degrees, minutes and seconds of the TMA lateral limits, vertical limits and class of airspace;

2) identification of unit providing the service;

3) call sign of aeronautical station serving the unit and language(s) used, specifying the area and conditions, when and where to be used, if applicable;

4) frequencies supplemented by indications for specific purposes; and

5) remarks.

Control zones around military air bases not otherwise described in the AIP must be included in this subsection. Where the requirements of Annex 2 concerning flight plans, two-way communications and position reporting apply to all flights in order to eliminate or reduce the need for interceptions and/or where the possibility of interception exists and the maintenance of guard on the VHF emergency channel 121.5 MHz is required, a statement to this effect must be included for the relevant area(s) or portion(s) thereof.

A description of designated areas over which the carriage of an emergency locator transmitter (ELT) is required and where aircraft shall continuously guard the VHF emergency frequency 121.5 MHz, except for those periods when aircraft are carrying out communications on other VHF channels or when airborne equipment limitations or cockpit duties do not permit simultaneous guarding of two channels.

Note.— Other types of airspace around civil aerodromes/ heliports such as control zones and aerodrome traffic zones are described in the relevant aerodrome or heliport section.

ENR 2.2 Other regulated airspace

Where established, a detailed description of other types of regulated airspace and airspace classification.

ENR 3. ATS ROUTES

Note 1.— Bearings, tracks and radials are normally magnetic. In areas of high latitude, where it is determined by the appropriate authority that reference to Magnetic North is impractical, another suitable reference, i.e. True North or Grid North, may be used.

Note 2.— Changeover points established at the midpoint between two radio navigation aids, or at the intersection of the two radials in the case of a route which changes direction between the navigation aids, need not be shown for each route segment if a general statement regarding their existence is made.

ENR 3.1 Lower ATS routes

Detailed description of lower ATS routes, including:

1) route designator, required navigation performance (RNP) type(s) applicable to a specified segment(s), names, coded designators or name-codes and the geographical coordinates in degrees, minutes and seconds of all significant points defining the route including "compulsory" or "on-request" reporting points;

2) tracks or VOR radials to the nearest degree, geodesic distance to the nearest tenth of a kilometre or tenth of a nautical mile between each successive designated significant point and, in the case of VOR radials, changeover points;

3) upper and lower limits or minimum en-route altitudes, to the nearest higher 50 m or 100 ft, and airspace classification;

4) lateral limits and minimum obstacle clearance altitudes;

5) direction of cruising levels; and

6) remarks, including an indication of the controlling unit, its operating channel and, if applicable, its logon address.

Note.— In relation to Annex 11, Appendix 1, and for flight planning purposes, the specified RNP type is not considered to be an integral part of the route designator.

ENR 3.2 Upper ATS routes

Detailed description of upper ATS routes, including:

1) route designator, required navigation performance (RNP) type(s) applicable to a specified segment(s), names, coded

designators or name-codes and the geographical coordinates in degrees, minutes and seconds of all significant points defining the route including "compulsory" or "on-request" reporting points;

2) tracks or VOR radials to the nearest degree, geodesic distance to the nearest tenth of a kilometre or tenth of a nautical mile between each successive designated significant point and, in the case of VOR radials, changeover points;

3) upper and lower limits and airspace classification;

4) lateral limits;

5) direction of cruising levels; and

6) remarks, including an indication of the controlling unit, its operating channel and, if applicable, its logon address.

Note.— In relation to Annex 11, Appendix 1, and for flight planning purposes, the specified RNP type is not considered to be an integral part of the route designator.

ENR 3.3 Area navigation routes

Detailed description of area navigation (RNAV) routes, including:

1) route designator, required navigation performance (RNP) type(s) applicable to a specified segment(s), names, coded designators or name-codes and the geographical coordinates in degrees, minutes and seconds of all significant points defining the route including "compulsory" or "on-request" reporting points;

2) in respect of waypoints defining a VOR/DME area navigation route, additionally:

   a) station identification of the reference VOR/DME;

   b) bearing to the nearest degree and the distance to the nearest tenth of a kilometre or tenth of a nautical mile from the reference VOR/DME, if the waypoint is not collocated with it; and

   c) elevation of the transmitting antenna of DME to the nearest 30 m (100 ft);

3) geodesic distance to the nearest tenth of a kilometre or tenth of a nautical mile between defined end-points and distance between each successive designated significant point;

4) upper and lower limits and airspace classification;

5) direction of cruising levels; and

6) remarks, including an indication of the controlling unit, its operating channel and, if applicable, its logon address.

Note.— In relation to Annex 11, Appendix 1, and for flight planning purposes, the specified RNP type is not considered to be an integral part of the route designator.

ENR 3.4 Helicopter routes

Detailed description of helicopter routes, including:

1) route designator, required navigation performance (RNP) type(s) applicable to a specified segment(s), names, coded designators or name-codes and the geographical coordinates in degrees, minutes and seconds of all significant points defining the route including "compulsory" or "on-request" reporting points;

2) tracks or VOR radials to the nearest degree, geodesic distance to the nearest tenth of a kilometre or tenth of a nautical mile between each successive designated significant point and, in the case of VOR radials, changeover points;

3) upper and lower limits and airspace classification;

4) minimum flight altitudes to the nearest higher 50 m or 100 ft; and

5) remarks, including an indication of the controlling unit and its operating frequency.

Note.— In relation to Annex 11, Appendix 1, and for flight planning purposes, the specified RNP type is not considered to be an integral part of the route designator.

ENR 3.5 Other routes

The requirement is to describe other specifically designated routes which are compulsory within specified area(s).

Note.— Arrival, transit and departure routes which are specified in connection with procedures for traffic to and from aerodromes/heliports need not be described since they are described in the relevant section of Part 3 — Aerodromes.

ENR 3.6 En-route holding

The requirement is for a detailed description of en-route holding procedures, containing:

1) holding identification (if any) and holding fix (navigation aid) or waypoint with geographical coordinates in degrees, minutes and seconds;

2) inbound track;

3) direction of the procedure turn;

4) maximum indicated airspeed;

5) minimum and maximum holding level;

6) time/distance outbound; and

7) indication of the controlling unit and its operating frequency.

Note.— Obstacle clearance criteria related to holding procedures are contained in Procedures for Air Navigation Services, Aircraft Operations *(PANS-OPS, Doc 8168), Volumes I and II.*

ENR 4. RADIO NAVIGATION AIDS/SYSTEMS

ENR 4.1 Radio navigation aids — en-route

A list of stations providing radio navigation services established for en-route purposes and arranged alphabetically by name of the station, including:

1) name of the station and magnetic variation to the nearest degree and for VOR, station declination to the nearest degree used for technical line-up of the aid;

2) identification;

3) frequency/channel for each element;

4) hours of operation;

5) geographical coordinates in degrees, minutes and seconds of the position of the transmitting antenna;

6) elevation of the transmitting antenna of DME to the nearest 30 m (100 ft); and

7) remarks.

If the operating authority of the facility is other than the designated governmental agency, the name of the operating authority must be indicated in the remarks column. Facility coverage must be indicated in the remarks column.

ENR 4.2 Special navigation systems

Description of stations associated with special navigation systems (DECCA, LORAN, etc.), including:

1) name of station or chain;

2) type of service available (master signal, slave signal, colour);

3) frequency (channel number, basic pulse rate, recurrence rate, as applicable);

4) hours of operation;

5) geographical coordinates in degrees, minutes and seconds of the position of the transmitting station; and

6) remarks.

If the operating authority of the facility is other than the designated governmental agency, the name of the operating authority must be indicated in the remarks column. Facility coverage must be indicated in the remarks column.

ENR 4.3 Global navigation satellite system (GNSS)

A list and description of elements of the global navigation satellite system (GNSS) providing the navigation service established for en-route purposes and arranged alphabetically by name of the element, including:

1) the name of the GNSS element (GPS, GLONASS, EGNOS, MSAS, WAAS, etc.);

2) frequency(ies), as appropriate;

3) geographical coordinates in degrees, minutes and seconds of the nominal service area and coverage area; and

4) remarks.

If the operating authority of the facility is other than the designated governmental agency, the name of the operating authority must be indicated in the remarks column.

ENR 4.4 Name-code designators for significant points

An alphabetically arranged list of name-code designators (five-letter pronounceable “name-code”) established for significant points at positions not marked by the site of radio navigation aids, including:

1) name-code designator;

2) geographical coordinates in degrees, minutes and seconds of the position; and

3) reference to ATS or other routes where the point is located.

ENR 4.5 Aeronautical ground lights — en-route

A list of aeronautical ground lights and other light beacons designating geographical positions which are selected by the State as being significant, including:

1) name of the city or town or other identification of the beacon;

2) type of beacon and intensity of the light in thousands of candelas;

3) characteristics of the signal;

4) operational hours; and

5) remarks.

ENR 5. NAVIGATION WARNINGS

ENR 5.1 Prohibited, restricted and danger areas

Description, supplemented by graphic portrayal where appropriate, of prohibited, restricted and danger areas together with information regarding their establishment and activation, including:

1) identification, name and geographical coordinates of the lateral limits in degrees, minutes and seconds if inside and in degrees and minutes if outside control area/control zone boundaries;

2) upper and lower limits; and

3) remarks, including time of activity.

Type of restriction or nature of hazard and risk of interception in the event of penetration must be indicated in the remarks column.

ENR 5.2 Military exercise and training areas and air defence identification zone (ADIZ)

Description, supplemented by graphic portrayal where appropriate, of established military training areas and military exercises taking place at regular intervals, and established air defence identification zone (ADIZ), including:

1) geographical coordinates of the lateral limits in degrees, minutes and seconds if inside and in degrees and minutes if outside control area/control zone boundaries;

2) upper and lower limits and system and means of activation announcements together with information pertinent to civil flights and applicable ADIZ procedures; and

3) remarks, including time of activity and risk of interception in the event of penetration of ADIZ.

ENR 5.3 Other activities of a dangerous nature and other potential hazards

ENR 5.3.1 Other activities of a dangerous nature

Description, supplemented by charts where appropriate, of activities that could affect flights including:

1) geographical coordinates in degrees and minutes of centre of area and range of influence;

2) vertical limits;

3) advisory measures;

4) authority responsible for the provision of information; and

5) remarks, including time of activity.

ENR 5.3.2 Other potential hazards

Description, supplemented by charts where appropriate, of other potential hazards that could affect flights (e.g. active volcanoes, nuclear power stations, etc.) including:

1) geographical coordinates in degrees and minutes of location of potential hazard;

2) vertical limits;

3) advisory measures;

4) authority responsible for the provision of information; and

5) remarks.

ENR 5.4 Air navigation obstacles

The list of obstacles affecting air navigation in Area 1 (the entire State territory), including:

1) obstacle identification or designation;

2) type of obstacle;

3) obstacle position, represented by geographical coordinates in degrees, minutes and seconds;

4) obstacle elevation and height to the nearest metre or foot;

5) type and colour of obstacle lighting (if any); and

6) if appropriate, an indication that the list of obstacles is available in electronic form, and a reference to GEN 3.1.6.

Note 1.— An obstacle whose height above the ground is 100 m and higher is considered an obstacle for Area 1.

Note 2.— Specifications governing the determination and reporting (accuracy of field work and data integrity) of positions (latitude and longitude) and elevations/heights for obstacles in Area 1 are given in Annex 11, Appendix 5, Tables 1 and 2, respectively.

ENR 5.5 Aerial sporting and recreational activities

Brief description, supplemented by graphic portrayal where appropriate, of intensive aerial sporting and recreational activities together with conditions under which they are carried out, including:

1) designation and geographical coordinates of the lateral limits in degrees, minutes and seconds if inside and in degrees and minutes if outside control area/control zone boundaries;

2) vertical limits;

3) operator/user telephone number; and

4) remarks, including time of activity.

Note.— This paragraph may be subdivided into different sections for each different category of activity, giving the indicated details in each case.

ENR 5.6 Bird migration and areas with sensitive fauna

Description, supplemented by charts where practicable, of movements of birds associated with migration, including migration routes and permanent resting areas and areas with sensitive fauna.

ENR 6. EN-ROUTE CHARTS

The requirement is for the En-route Chart — ICAO and index charts to be included in this section.

PART 3 — AERODROMES (AD)

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AD 0.6 Table of contents to Part 3

A list of sections and subsections contained in Part 3 — Aerodromes (AD).

Note.— Subsections may be listed alphabetically.

AD 1. AERODROMES/HELIPORTS — INTRODUCTION

AD 1.1 Aerodrome/heliport availability

Brief description of the State's designated authority responsible for aerodromes and heliports, including:

1) the general conditions under which aerodromes/heliports and associated facilities are available for use;

2) a statement concerning the ICAO documents on which the services are based and a reference to the AIP location where differences, if any, are listed;

3) regulations, if any, concerning civil use of military air bases;

4) the general conditions under which the low visibility procedures applicable to Cat II/III operations at aerodromes, if any, are applied;

5) friction measuring device used and the runway friction level below which the State will declare the runway to be slippery when wet; and

6) other information of a similar nature.

AD 1.2 Rescue and firefighting services and snow plan

AD 1.2.1 Rescue and firefighting services

Brief description of rules governing the establishment of rescue and firefighting services at aerodromes and heliports available for public use together with an indication of rescue and firefighting categories established by a State.

AD 1.2.2 Snow plan

Brief description of general snow plan considerations for aerodromes/heliports available for public use at which snow conditions are normally liable to occur, including:

1) organization of the winter service;

2) surveillance of movement areas;

3) measuring methods and measurements taken;

4) actions taken to maintain the usability of movement areas;

5) system and means of reporting;

6) the cases of runway closure; and

7) distribution of information about snow conditions.

Note.— Where different snow plan considerations apply at aerodromes/heliports, this subparagraph may be subdivided accordingly.

AD 1.3 Index to aerodromes and heliports

A list, supplemented by graphic portrayal, of aerodromes and heliports within a State, including:

1) aerodrome/heliport name and ICAO location indicator;

2) type of traffic permitted to use the aerodrome/heliport (international/national, IFR/VFR, scheduled/non-scheduled, private); and

3) reference to AIP, Part 3 subsection in which aerodrome/heliport details are presented.

AD 1.4 Grouping of aerodromes/heliports

Brief description of the criteria applied by the State in grouping aerodromes/heliports for the production/distribution/provision of information purposes (e.g. international/national; primary/secondary; major/other; civil/military; etc.).

AD 2. AERODROMES

Note.— **** is to be replaced by the relevant ICAO location indicator.

**** AD 2.1 Aerodrome location indicator and name

The requirement is for the ICAO location indicator allocated to the aerodrome and the name of aerodrome. An ICAO location indicator must be an integral part of the referencing system applicable to all subsections in section AD 2.

**** AD 2.2 Aerodrome geographical and administrative data

The requirement is for aerodrome geographical and administrative data including:

1) aerodrome reference point (geographical coordinates in degrees, minutes and seconds) and its site;

2) direction and distance of aerodrome reference point from centre of the city or town which the aerodrome serves;

3) aerodrome elevation to the nearest metre or foot, and reference temperature;

4) geoid undulation at the aerodrome elevation position to the nearest metre or foot;

5) magnetic variation to the nearest degree, date of information and annual change;

6) name of aerodrome administration, address, telephone, telefax and telex numbers and AFS address;

7) types of traffic permitted to use the aerodrome (IFR/VFR); and

8) remarks.

**** AD 2.3 Operational hours

Detailed description of the hours of operation of services at the aerodrome, including:

1) aerodrome administration;

2) customs and immigration;

3) health and sanitation;

4) AIS briefing office;

5) ATS reporting office (ARO);

6) MET briefing office;

7) air traffic service;

8) fuelling;

9) handling;

10) security;

11) de-icing; and

12) remarks.

**** AD 2.4 Handling services and facilities

Detailed description of the handling services and facilities available at the aerodrome, including:

1) cargo-handling facilities;

2) fuel and oil types;

3) fuelling facilities and capacity;

4) de-icing facilities;

5) hangar space for visiting aircraft;

6) repair facilities for visiting aircraft; and

7) remarks.

**** AD 2.5 Passenger facilities

Brief description of passenger facilities available at the aerodrome, including:

1) *hotel(s) at or in the vicinity of aerodrome;*

2) *restaurant(s) at or in the vicinity of aerodrome;*

3) *transportation possibilities;*

4) medical facilities;

5) *bank and post office at or in the vicinity of aerodrome;*

6) *tourist office;* and

7) remarks.

**** AD 2.6 Rescue and firefighting services

Detailed description of the rescue and firefighting services and equipment available at the aerodrome, including:

1) aerodrome category for firefighting;

2) rescue equipment;

3) *capability for removal of disabled aircraft;* and

4) remarks.

**** AD 2.7 Seasonal availability — clearing

Detailed description of the equipment and operational priorities established for the clearance of aerodrome movement areas, including:

1) type(s) of clearing equipment;

2) clearance priorities; and

3) remarks.

**** AD 2.8 Aprons, taxiways and check locations/positions data

Details related to the physical characteristics of aprons, taxiways and locations/positions of designated checkpoints, including:

1) surface and strength of aprons;

2) width, surface and strength of taxiways;

3) location and elevation to the nearest metre or foot of altimeter checkpoints;

4) location of VOR checkpoints;

5) position of INS checkpoints in degrees, minutes, seconds and hundredths of seconds; and

6) remarks.

If check locations/positions are presented on an aerodrome chart, a note to that effect must be provided under this subsection.

**** AD 2.9 Surface movement guidance and control system and markings

Brief description of the surface movement guidance and control system and runway and taxiway markings, including:

1) use of aircraft stand identification signs, taxiway guide lines and visual docking/parking guidance system at aircraft stands;

2) runway and taxiway markings and lights;

3) stop bars (if any); and

4) remarks.

**** AD 2.10 Aerodrome obstacles

Detailed description of obstacles, including:

1) obstacles in Area 2:

   a) obstacle identification or designation;

   b) type of obstacle;

c) obstacle position, represented by geographical coordinates in degrees, minutes, seconds and tenths of seconds;

d) obstacle elevation and height to the nearest metre or foot;

e) obstacle marking, and type and colour of obstacle lighting (if any);

f) if appropriate, an indication that the list of obstacles is available in electronic form, and a reference to GEN 3.1.6; and

g) NIL indication, if appropriate.

Note 1.— Chapter 10, 10.2.2, provides a description of Area 2 while Appendix 8, Figure A8-2, contains graphical illustrations of obstacle data collection surfaces and criteria used to identify obstacles in Area 2.

Note 2.— Specifications governing the determination and reporting (accuracy of field work and data integrity) of positions (latitude and longitude) and elevations for obstacles in Area 2 are given in Annex 11, Appendix 5, Tables 1 and 2, and in Annex 14, Volume I, Appendix 5, Tables A5-1 and A5-2, respectively.

2) obstacles in Area 3:

a) obstacle identification or designation;

b) type of obstacle;

c) obstacle position, represented by geographical coordinates in degrees, minutes, seconds and tenths of seconds;

d) obstacle elevation and height to the nearest metre or foot;

e) obstacle marking, and type and colour of obstacle lighting (if any);

f) if appropriate, an indication that the list of obstacles is available in electronic form, and a reference to GEN 3.1.6; and

g) NIL indication, if appropriate.

Note 1.— Chapter 10, 10.2.3, provides a description of Area 3 while Appendix 8, Figure A8-3, contains graphical illustrations of obstacle data collection surfaces and criteria used to identify obstacles in Area 3.

Note 2.— Specifications governing the determination and reporting (accuracy of field work and data integrity) of positions (latitude and longitude) and elevations for obstacles in Area 3 are given in Annex 14, Volume I, Appendix 5, Tables A5-1 and A5-2, respectively.

****** AD 2.11 Meteorological information provided**

Detailed description of meteorological information provided at the aerodrome and an indication of which meteorological office is responsible for the service enumerated, including:

1) name of the associated meteorological office;

2) hours of service and, where applicable, the designation of the responsible meteorological office outside these hours;

3) office responsible for preparation of TAFs and periods of validity and interval of issuance of the forecasts;

4) availability of the trend forecasts for the aerodrome, and interval of issuance;

5) information on how briefing and/or consultation is provided;

6) types of flight documentation supplied and language(s) used in flight documentation;

7) charts and other information displayed or available for briefing or consultation;

8) supplementary equipment available for providing information on meteorological conditions, e.g. weather radar and receiver for satellite images;

9) the air traffic services unit(s) provided with meteorological information; and

10) additional information (e.g. concerning any limitation of service, etc.).

****** AD 2.12 Runway physical characteristics**

Detailed description of runway physical characteristics, for each runway, including:

1) designations;

2) true bearings to one-hundredth of a degree;

3) dimensions of runways to the nearest metre or foot;

4) strength of pavement (PCN and associated data) and surface of each runway and associated stopways;

5) geographical coordinates in degrees, minutes, seconds and hundredths of seconds for each threshold and runway end, and geoid undulation to the nearest one-half metre or foot for each threshold;

6) elevations of:

— thresholds of a non-precision approach runway to the nearest metre or foot; and

— thresholds and the highest elevation of the touchdown zone of a precision approach runway to the nearest one-half metre or foot;

7) slope of each runway and associated stopways;

8) dimensions of stopway (if any) to the nearest metre or foot;

9) dimensions of clearway (if any) to the nearest metre or foot;

10) dimensions of strips;

11) the existence of an obstacle-free zone; and

12) remarks.

****** AD 2.13 Declared distances**

Detailed description of declared distances to the nearest metre or foot for each direction of each runway, including:

1) runway designator;

2) take-off run available;

3) take-off distance available;

4) accelerate-stop distance available;

5) landing distance available; and

6) remarks.

If a runway direction cannot be used for take-off or landing, or both, because it is operationally forbidden, then this must be declared and the words “not usable” or the abbreviation “NU” entered (Annex 14, Volume I, Attachment A, Section 3).

****** AD 2.14 Approach and runway lighting**

Detailed description of approach and runway lighting, including:

1) runway designator;

2) type, length and intensity of approach lighting system;

3) runway threshold lights, colour and wing bars;

4) type of visual approach slope indicator system;

5) length of runway touchdown zone lights;

6) length, spacing, colour and intensity of runway centre line lights;

7) length, spacing, colour and intensity of runway edge lights;

8) colour of runway end lights and wing bars;

9) length and colour of stopway lights; and

10) remarks.

****** AD 2.15 Other lighting, secondary power supply**

Description of other lighting and secondary power supply, including:

1) location, characteristics and hours of operation of aerodrome beacon/identification beacon (if any);

2) location and lighting (if any) of anemometer/landing direction indicator;

3) taxiway edge and taxiway centre line lights;

4) secondary power supply including switch-over time; and

5) remarks.

****** AD 2.16 Helicopter landing area**

Detailed description of helicopter landing area provided at the aerodrome, including:

1) geographical coordinates in degrees, minutes, seconds and hundredths of seconds and geoid undulation to the nearest one-half metre or foot of the geometric centre of touch-down and lift-off (TLOF) or of each threshold of final approach and take-off (FATO) area (where appropriate);

2) TLOF and/or FATO area elevation:

— for non-precision approaches, to the nearest metre or foot; and

— for precision approaches, to the nearest one-half metre or foot;

3) TLOF and FATO area dimensions to the nearest metre or foot, surface type, bearing strength and marking;

4) true bearings to one-hundredth of a degree of FATO;

5) declared distances available, to the nearest metre or foot;

6) approach and FATO lighting; and

7) remarks.

****** AD 2.17 Air traffic services airspace**

Detailed description of air traffic services (ATS) airspace organized at the aerodrome, including:

1) airspace designation and geographical coordinates in degrees, minutes and seconds of the lateral limits;

2) vertical limits;

3) airspace classification;

4) call sign and language(s) of the ATS unit providing service;

5) transition altitude; and

6) remarks.

****** AD 2.18 Air traffic services communication facilities**

Detailed description of air traffic services communication facilities established at the aerodrome, including:

1) service designation;

2) call sign;

3) channel(s);

4) logon address, as appropriate;

5) hours of operation; and

6) remarks.

****** AD 2.19 Radio navigation and landing aids**

Detailed description of radio navigation and landing aids associated with the instrument approach and the terminal area procedures at the aerodrome, including:

1) type of aids, magnetic variation to the nearest degree, as appropriate, and type of supported operation for ILS/MLS, basic GNSS, SBAS, and GBAS and for VOR/ILS/MLS also station declination to the nearest degree used for technical line-up of the aid;

2) identification, if required;

3) frequency(ies), as appropriate;

4) hours of operation, as appropriate;

5) geographical coordinates in degrees, minutes, seconds and tenths of seconds of the position of the transmitting antenna, as appropriate;

6) elevation of the transmitting antenna of DME to the nearest 30 m (100 ft) and of DME/P to the nearest 3 m (10 ft); and

7) remarks.

When the same aid is used for both en-route and aerodrome purposes, a description must also be given in section ENR 4. If the ground-based augmentation system (GBAS) serves more than one aerodrome, description of the aid must be provided under each aerodrome. If the operating authority of the facility is other than the designated governmental agency, the name of the operating authority must be indicated in the remarks column. Facility coverage must be indicated in the remarks column.

****** AD 2.20 Local traffic regulations**

Detailed description of regulations applicable to the traffic at the aerodrome including standard routes for taxiing aircraft, parking regulations, school and training flights and similar but excluding flight procedures.

****** AD 2.21 Noise abatement procedures**

Detailed description of noise abatement procedures established at the aerodrome.

****** AD 2.22 Flight procedures**

Detailed description of the conditions and flight procedures, including radar and/or ADS-B procedures, established on the basis of airspace organization at the aerodrome. When established, detailed description of the low visibility procedures at the aerodrome, including:

1) runway(s) and associated equipment authorized for use under low visibility procedures;

2) defined meteorological conditions under which initiation, use and termination of low visibility procedures would be made; and

3) description of ground marking/lighting for use under low visibility procedures.

****** AD 2.23 Additional information**

Additional information at the aerodrome, such as an indication of bird concentrations at the aerodrome, together with an indication of significant daily movement between resting and feeding areas, to the extent practicable.

**** AD 2.24 Charts related to an aerodrome

The requirement is for charts related to an aerodrome to be included in the following order:

1) Aerodrome/Heliport Chart — ICAO;

2) Aircraft Parking/Docking Chart — ICAO;

3) Aerodrome Ground Movement Chart — ICAO;

4) Aerodrome Obstacle Chart — ICAO Type A (for each runway);

5) Aerodrome Terrain and Obstacle Chart — ICAO (Electronic);

6) Precision Approach Terrain Chart — ICAO (precision approach Cat II and III runways);

7) Area Chart — ICAO (departure and transit routes);

8) Standard Departure Chart — Instrument — ICAO;

9) Area Chart — ICAO (arrival and transit routes);

10) Standard Arrival Chart — Instrument — ICAO;

11) ATC Surveillance Minimum Altitude Chart — ICAO;

12) Instrument Approach Chart — ICAO (for each runway and procedure type);

13) Visual Approach Chart — ICAO; and

14) bird concentrations in the vicinity of the aerodrome.

If some of the charts are not produced, a statement to this effect must be given in section GEN 3.2, Aeronautical charts.

Note.— A page pocket may be used in the AIP to include the Aerodrome Terrain and Obstacle Chart — ICAO (Electronic) on appropriate electronic media.

AD 3. HELIPORTS

When a helicopter landing area is provided at the aerodrome, associated data must be listed only under **** AD 2.16.

Note.— **** is to be replaced by the relevant ICAO location indicator.

**** AD 3.1 Heliport location indicator and name

The requirement is for the ICAO location indicator assigned to the heliport and the name of heliport. An ICAO location indicator must be an integral part of the referencing system applicable to all subsections in section AD 3.

**** AD 3.2 Heliport geographical and administrative data

The requirement is for heliport geographical and administrative data, including:

1) heliport reference point (geographical coordinates in degrees, minutes and seconds) and its site;

2) direction and distance of heliport reference point from centre of the city or town which the heliport serves;

3) heliport elevation to the nearest metre or foot, and reference temperature;

4) geoid undulation at the heliport elevation position to the nearest metre or foot;

5) magnetic variation to the nearest degree, date of information and annual change;

6) name of heliport administration, address, telephone, telefax and telex numbers and AFS address;

7) types of traffic permitted to use the heliport (IFR/VFR); and

8) remarks.

**** AD 3.3 Operational hours

Detailed description of the hours of operation of services at the heliport, including:

1) heliport administration;

2) customs and immigration;

3) health and sanitation;

4) AIS briefing office;

5) ATS reporting office (ARO);

6) MET briefing office;

7) air traffic service;

8) fuelling;

9) handling;

10) security;

11) de-icing; and

12) remarks.

****** AD 3.4 Handling services and facilities**

Detailed description of the handling services and facilities available at the heliport, including:

1) cargo-handling facilities;

2) fuel and oil types;

3) fuelling facilities and capacity;

4) de-icing facilities;

5) hangar space for visiting helicopter;

6) repair facilities for visiting helicopter; and

7) remarks.

****** AD 3.5 Passenger facilities**

Brief description of passenger facilities available at the heliport, including:

1) *hotel(s) at or in the vicinity of the heliport;*

2) *restaurant(s) at or in the vicinity of the heliport;*

3) *transportation possibilities;*

4) medical facilities;

5) *bank and post office at or in the vicinity of the heliport;*

6) *tourist office;* and

7) remarks.

****** AD 3.6 Rescue and firefighting services**

Detailed description of the rescue and firefighting services and equipment available at the heliport, including:

1) heliport category for firefighting;

2) rescue equipment;

3) *capability for removal of disabled helicopter;* and

4) remarks.

****** AD 3.7 Seasonal availability — clearing**

Detailed description of the equipment and operational priorities established for the clearance of heliport movement areas, including:

1) type(s) of clearing equipment;

2) clearance priorities; and

3) remarks.

****** AD 3.8 Aprons, taxiways and check locations/positions data**

Details related to the physical characteristics of aprons, taxiways and locations/positions of designated checkpoints, including:

1) surface and strength of aprons, helicopter stands;

2) width, surface type and designation of helicopter ground taxiways;

3) width and designation of helicopter air taxiway and air transit route;

4) location and elevation to the nearest metre or foot of altimeter checkpoints;

5) location of VOR checkpoints;

6) position of INS checkpoints in degrees, minutes, seconds and hundredths of seconds; and

7) remarks.

If check locations/positions are presented on a heliport chart, a note to that effect must be provided under this subsection.

****** AD 3.9 Markings and markers**

Brief description of final approach and take-off area and taxiway markings and markers, including:

1) final approach and take-off markings;

2) taxiway markings, air taxiway markers and air transit route markers; and

3) remarks.

****** AD 3.10 Heliport obstacles**

Detailed description of obstacles, including:

1) obstacles in Area 2:

   a) obstacle identification or designation;

   b) type of obstacle;

   c) obstacle position, represented by geographical coordinates in degrees, minutes, seconds and tenths of seconds;

   d) obstacle elevation and height to the nearest metre or foot;

   e) obstacle marking, and type and colour of obstacle lighting (if any);

   f) if appropriate, an indication that the list of obstacles is available in electronic form, and a reference to GEN 3.1.6; and

   g) NIL indication, if appropriate.

Note 1.— Chapter 10, 10.2.2, provides a description of Area 2 while Appendix 8, Figure A8-2, contains graphical illustrations of obstacle data collection surfaces and criteria used to identify obstacles in Area 2.

Note 2.— Specifications governing the determination and reporting (accuracy of field work and data integrity) of positions (latitude and longitude) and elevations for obstacles in Area 2 are given in Annex 11, Appendix 5, Tables 1 and 2, and in Annex 14, Volume II, Appendix 1, Tables 1 and 2, respectively.

2) obstacles in Area 3:

   a) obstacle identification or designation;

   b) type of obstacle;

   c) obstacle position, represented by geographical coordinates in degrees, minutes, seconds and tenths of seconds;

   d) obstacle elevation and height to the nearest metre or foot;

   e) obstacle marking, and type and colour of obstacle lighting (if any);

   f) if appropriate, an indication that the list of obstacles is available in electronic form, and a reference to GEN 3.1.6; and

   g) NIL indication, if appropriate.

Note 1.— Chapter 10, 10.2.3, provides a description of Area 3 while Appendix 8, Figure A8-3, contains graphical illustrations of obstacle data collection surfaces and criteria used to identify obstacles in Area 3.

Note 2.— Specifications governing the determination and reporting (accuracy of field work and data integrity) of positions (latitude and longitude) and elevations for obstacles in Area 3 are given in Annex 14, Volume II, Appendix 1, Tables 1 and 2, respectively.

**** AD 3.11 Meteorological information provided

Detailed description of meteorological information provided at the heliport and an indication of which meteorological office is responsible for the service enumerated, including:

1) name of the associated meteorological office;

2) hours of service and, where applicable, the designation of the responsible meteorological office outside these hours;

3) office responsible for preparation of TAFs, and periods of validity of the forecasts;

4) availability of the trend forecasts for the heliport, and interval of issuance;

5) information on how briefing and/or consultation is provided;

6) type of flight documentation supplied and language(s) used in flight documentation;

7) charts and other information displayed or available for briefing or consultation;

8) supplementary equipment available for providing information on meteorological conditions, e.g. weather radar and receiver for satellite images;

9) the air traffic services unit(s) provided with meteorological information; and

10) additional information (e.g. concerning any limitation of service, etc.).

**** AD 3.12 Heliport data

Detailed description of heliport dimensions and related information, including:

1) heliport type — surface-level, elevated or helideck;

2) touchdown and lift-off (TLOF) area dimensions to the nearest metre or foot;

3) true bearings to one-hundredth of a degree of final approach and take-off (FATO) area;

4) dimensions to the nearest metre or foot of FATO, and surface type;

5) surface and bearing strength in tonnes (1 000 kg) of TLOF;

6) geographical coordinates in degrees, minutes, seconds and hundredths of seconds and geoid undulation to the nearest one-half metre or foot of the geometric centre of TLOF or of each threshold of FATO (where appropriate);

7) TLOF and/or FATO slope and elevation:

   — for non-precision approaches to the nearest metre or foot; and

   — for precision approaches to the nearest one-half metre or foot;

8) dimensions of safety area;

9) dimensions, to the nearest metre or foot, of helicopter clearway;

10) the existence of an obstacle-free sector; and

11) remarks.

****** AD 3.13 Declared distances**

Detailed description of declared distances to the nearest metre or foot, where relevant for a heliport, including:

1) take-off distance available;

2) rejected take-off distance available;

3) landing distance available; and

4) remarks.

****** AD 3.14 Approach and FATO lighting**

Detailed description of approach and FATO lighting, including:

1) type, length and intensity of approach lighting system;

2) type of visual approach slope indicator system;

3) characteristics and location of FATO area lights;

4) characteristics and location of aiming point lights;

5) characteristics and location of TLOF lighting system; and

6) remarks.

****** AD 3.15 Other lighting, secondary power supply**

Description of other lighting and secondary power supply, including:

1) location, characteristics and hours of operation of heliport beacon;

2) location and lighting of wind direction indicator (WDI);

3) taxiway edge and taxiway centre line lights;

4) secondary power supply including switch-over time; and

5) remarks.

****** AD 3.16 Air traffic services airspace**

Detailed description of air traffic services (ATS) airspace organized at the heliport, including:

1) airspace designation and geographical coordinates in degrees, minutes and seconds of the lateral limits;

2) vertical limits;

3) airspace classification;

4) call sign and language(s) of ATS unit providing service;

5) transition altitude; and

6) remarks.

****** AD 3.17 Air traffic services communication facilities**

Detailed description of air traffic services communication facilities established at the heliport, including:

1) service designation;

2) call sign;

3) frequency(ies);

4) hours of operation; and

5) remarks.

****** AD 3.18 Radio navigation and landing aids**

Detailed description of radio navigation and landing aids associated with the instrument approach and the terminal area procedures at the heliport, including:

1) type of aids, magnetic variation (for VOR, station declination used for technical line-up of the aid) to the nearest degree, and type of operation for ILS, MLS, basic GNSS, SBAS, and GBAS;

2) identification, if required;

3) frequency(ies), as appropriate;

4) hours of operation, as appropriate;

5) geographical coordinates in degrees, minutes, seconds and tenths of seconds of the position of the transmitting antenna, as appropriate;

6) elevation of the transmitting antenna of DME to the nearest 30 m (100 ft) and of DME/P to the nearest 3 m (10 ft); and

7) remarks.

When the same aid is used for both en-route and heliport purposes, a description must also be given in section ENR 4. If the ground-based augmentation system (GBAS) serves more than one heliport, description of the aid must be provided under each heliport. If the operating authority of the facility is other than the designated governmental agency, the name of the operating authority must be indicated in the remarks column. Facility coverage must be indicated in the remarks column.

**** AD 3.19 Local traffic regulations

Detailed description of regulations applicable to traffic at the heliport, including standard routes for taxiing helicopters, parking regulations, school and training flights and similar but excluding flight procedures.

**** AD 3.20 Noise abatement procedures

Detailed description of noise abatement procedures established at the heliport.

**** AD 3.21 Flight procedures

Detailed description of the conditions and flight procedures, including radar and/or ADS-B procedures, established on the basis of airspace organization established at the heliport. When established, detailed description of the low visibility procedures at the heliport, including:

1) touchdown and lift-off (TLOF) area(s) and associated equipment authorized for use under low visibility procedures;

2) defined meteorological conditions under which initiation, use and termination of low visibility procedures would be made; and

3) description of ground marking/lighting for use under low visibility procedures.

**** AD 3.22 Additional information

Additional information about the heliport, such as an indication of bird concentrations at the heliport together with an indication of significant daily movement between resting and feeding areas, to the extent practicable.

**** AD 3.23 Charts related to a heliport

The requirement is for charts related to a heliport to be included in the following order:

1) Aerodrome/Heliport Chart — ICAO;

2) Area Chart — ICAO (departure and transit routes);

3) Standard Departure Chart — Instrument — ICAO;

4) Area Chart — ICAO (arrival and transit routes);

5) Standard Arrival Chart — Instrument — ICAO;

6) ATC Surveillance Minimum Altitude Chart — ICAO;

7) Instrument Approach Chart — ICAO (for each procedure type);

8) Visual Approach Chart — ICAO; and

9) bird concentrations in the vicinity of heliport.

If some of the charts are not produced, a statement to this effect must be given in section GEN 3.2, Aeronautical charts.

Level of alert colour code	Status of activity of volcano
GREEN ALERT	Volcano is in normal, non-eruptive state. *or, after a change from a higher alert level:* Volcanic activity considered to have ceased, and volcano reverted to its normal, non-eruptive state.
YELLOW ALERT	Volcano is experiencing signs of elevated unrest above known background levels. *or, after a change from higher alert level:* Volcanic activity has decreased significantly but continues to be closely monitored for possible renewed increase.
ORANGE ALERT	Volcano is exhibiting heightened unrest with increased likelihood of eruption. *or,* Volcanic eruption is underway with no or minor ash emission *[specify ash-plume height if possible]*.
RED ALERT	Eruption is forecasted to be imminent with significant emission of ash into the atmosphere likely. *or,* Eruption is underway with significant emission of ash into the atmosphere *[specify ash-plume height if possible]*.

Note.— The colour code for the level of alert indicating the status of activity of the volcano and any change from a previous status of activity should be provided to the area control centre by the responsible vulcanological agency in the State concerned, e.g. "RED ALERT FOLLOWING YELLOW" OR "GREEN ALERT FOLLOWING ORANGE".

3.6 *Item F* — If volcanic ash cloud of operational significance is reported, indicate the horizontal extent and base/top of the ash cloud using latitude/longitude (in whole degrees) and altitudes in thousands of metres (feet) and/or radial and distance from source volcano. Information initially may be based only on special air-report, but subsequent information may be more detailed based on advice from the responsible meteorological watch office and/or volcanic ash advisory centre.

3.7 *Item G* — Indicate forecast direction of movement of the ash cloud at selected levels based on advice from the responsible meteorological watch office and/or volcanic ash advisory centre.

3.8 *Item H* — Indicate air routes and portions of air routes and flight levels affected, or expected to become affected.

3.9 *Item I* — Indicate closure of airspace, air routes or portions of air routes, and availability of alternative routes.

3.10 *Item J* — Source of the information, e.g. "special air-report" or "vulcanological agency", etc. The source of information should always be indicated, whether an eruption has actually occurred or ash cloud reported, or not.

3.11 *Item K* — Include in plain language any operationally significant information additional to the foregoing.

5) SCOPE

A = Aerodrome
E = En-route
W = Nav Warning
K = NOTAM is a checklist

Note.— Depending on the NOTAM subject and content, the qualifier field SCOPE may contain combined qualifiers. For possible combinations refer to the NOTAM Selection Criteria in the Aeronautical Information Services Manual *(Doc 8126). If the subject is qualified AE, the aerodrome location indicator must be reported in Item A).*

6) and 7) LOWER/UPPER

LOWER and UPPER limits shall always be filled and shall only be expressed in flight levels (FL). In the case of navigation warnings and airspace restrictions, values entered shall be consistent with those provided under Items F) and G).

If the subject does not contain specific height information, insert "000" for LOWER and "999" for UPPER as default values.

8) COORDINATES, RADIUS

The latitude and longitude accurate to one minute, as well as a three-digit distance figure giving the radius of influence in NM (e.g. 4700N01140E043). Coordinates present approximate centre of circle whose radius encompasses the whole area of influence, and if the NOTAM affects the entire FIR/UIR or more than one FIR/UIR, enter the default value "999" for radius.

4. Item A)

Insert the location indicator as contained in ICAO Doc 7910 of the aerodrome or FIR in which the facility, airspace, or condition being reported on is located. More than one FIR/UIR may be indicated when appropriate. If there is no available ICAO location indicator, use the ICAO nationality letter as given in ICAO Doc 7910, Part 2, plus "XX" and followed up in Item E) by the name, in plain language.

If information concerns GNSS, insert the appropriate ICAO location indicator allocated for a GNSS element or the common location indicator allocated for all elements of GNSS (except GBAS).

Note.— In the case of GNSS, the location indicator may be used when identifying a GNSS element outage (e.g. KNMH for a GPS satellite outage).

5. Item B)

For date-time group use a ten-figure group, giving year, month, day, hours and minutes in UTC. This entry is the date-time at which the NOTAMN, NOTAMR OR NOTAMC comes into force.

6. Item C)

With the exception of NOTAMC, a date-time group (a ten-figure group giving year, month, day, hours and minutes in UTC) indicating duration of information shall be used unless the information is of a permanent nature in which case the abbreviation "PERM" is inserted instead. If the information on timing is uncertain, the approximate duration shall be indicated using a date-time group followed by the abbreviation "EST". Any NOTAM which includes an "EST" shall be cancelled or replaced before the date-time specified in Item C).

7. Item D)

If the hazard, status of operation or condition of facilities being reported on will be active in accordance with a specific time and date schedule between the dates-times indicated in Items B) and C), insert such information under Item D). If Item D) exceeds 200 characters, consideration shall be given to providing such information in a separate, consecutive NOTAM.

Note.— Guidance concerning a harmonized definition of Item D) content is provided in Doc 8126.

8. Item E)

Use decoded NOTAM Code, complemented where necessary by ICAO abbreviations, indicators, identifiers, designators, call signs, frequencies, figures and plain language. When NOTAM is selected for international distribution, English text shall be included for those parts expressed in plain language. This entry shall be clear and concise in order to provide a suitable PIB entry. In the case of NOTAMC, a subject reference and status message shall be included to enable accurate plausibility checks.

9. Items F) and G)

These items are normally applicable to navigation warnings or airspace restrictions and are usually part of the PIB entry. Insert both lower and upper height limits of activities or restrictions, clearly indicating reference datum and units of measurement.

Note.— For NOTAM examples see Doc 8126 and the PANS-ABC (Doc 8400).

Table A8-4. Obstacle attributes

Obstacle attribute	Mandatory/Optional
Area of coverage	Mandatory
Data originator identifier	Mandatory
Obstacle identifier	Mandatory
Horizontal accuracy	Mandatory
Horizontal confidence level	Mandatory
Horizontal position	Mandatory
Horizontal resolution	Mandatory
Horizontal extent	Mandatory
Horizontal reference system	Mandatory
Elevation	Mandatory
Vertical accuracy	Mandatory
Vertical confidence level	Mandatory
Elevation reference	Mandatory
Vertical resolution	Mandatory
Vertical reference system	Mandatory
Obstacle type	Mandatory
Geometry type	Mandatory
Integrity	Mandatory
Date and time stamp	Mandatory
Unit of measurement used	Mandatory
Operations	Optional
Effectivity	Optional
Lighting	Mandatory
Marking	Mandatory

— END —

COVER SHEET TO AMENDMENT 9

INTERNATIONAL STANDARDS
AND RECOMMENDED PRACTICES

THE SAFE TRANSPORT OF DANGEROUS GOODS BY AIR

ANNEX 18
TO THE CONVENTION ON INTERNATIONAL CIVIL AVIATION

THIRD EDITION — JULY 2001

INTERNATIONAL CIVIL AVIATION ORGANIZATION

Checklist of Amendments to Annex 18

	Effective date	*Date of applicability*
Third Edition (incorporates Amendments 1 to 6)	16 July 2001	1 November 2001
Amendment 7 (adopted by the Council on 24 February 2003)	14 July 2003	27 November 2003
Amendment 8 (adopted by the Council on 16 February 2005)	11 July 2005	24 November 2005
Amendment 9 (adopted by the Council on 19 February 2007) Replacement pages (viii) and 12-1	16 July 2007	20 November 2008

Transmittal note

Amendment 9

to the

International Standards and
Recommended Practices

THE SAFE TRANSPORT OF DANGEROUS GOODS BY AIR

(Annex 18 to the Convention on International Civil Aviation)

1. Insert the following replacement pages in Annex 18 (Third Edition) to incorporate Amendment 9 which becomes applicable on 20 November 2008:

   a) Page (viii) — Foreword

   b) Page 12-1 — Chapter 12

2. Record the entry of this amendment on page (ii).

16/7/07

Table A. Amendments to Annex 18

Amendment	*Source(s)*	*Subject(s)*	*Adopted/approved* *Effective* *Applicable*
1st Edition	Air Navigation Commission Study		26 June 1981 1 January 1983 1 January 1984
1	Sixth Meeting of the Dangerous Goods Panel	Miscellaneous amendments for alignment with Recommendations of the UN Committee of Experts and IAEA.	26 November 1982 26 March 1983 1 January 1984
2	Fifth, Sixth and Seventh Meetings of the Dangerous Goods Panel	Improved definitions for overpack and unit load device. Definitions of package and packaging aligned with Recommendations of the UN Committee of Experts. Addition of a paragraph covering surface transport to or from aerodromes. The requirement to provide information to the pilot-in-command revised to indicate when this information should be given.	1 June 1983 1 October 1983 1 January 1984
3	Eighth Meeting of the Dangerous Goods Panel	Clarification of the circumstances when exemptions may be granted. Clarification of the segregation requirements of poisons or infectious substances from animals or foodstuffs.	25 March 1985 29 July 1985 1 January 1986
4 (2nd Edition)	Eleventh Meeting of the Dangerous Goods Panel	General simplification of the provisions of Annex 18 through the removal of technical detail. Miscellaneous amendments to various provisions.	24 February 1989 23 July 1989 16 November 1989
5	Fourteenth and Sixteenth Meetings of the Dangerous Goods Panel	Clarification of the responsibility of States to achieve compliance with any amendment to the *Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Doc 9284). Clarification of the exceptions to dangerous goods carried by passengers and crew members.	10 March 1999 19 July 1999 4 November 1999
6 (3rd Edition)	Seventeenth Meeting of the Dangerous Goods Panel and Amendment 25 to Annex 6, Part I	a) revised definitions of dangerous goods, crew member, flight crew member and pilot-in-command; b) revision of the provisions to grant exemptions in special circumstances by the States of Overflight to facilitate the movement of dangerous goods in an aircraft overflying its territory; c) alignment of provisions regarding packaging with the Technical Instructions; d) introduction of provisions to cover the requirement to load and stow dangerous goods in accordance with the Technical Instructions; e) revision of the provisions to place the overall responsibility with States to provide information to passengers; f) revision of the provisions to ensure that emergency response personnel are informed without delay, after an accident or incident, about the dangerous goods carried as cargo on board the aircraft; g) revision of the provisions to enhance cooperation between States in taking action against shippers who wilfully violate the dangerous goods transport regulations; and h) revision of the provisions of the pilot to provide information on dangerous goods on board in the event of an emergency.	7 March 2001 16 July 2001 1 November 2001

Amendment	*Source(s)*	*Subject(s)*	*Adopted/approved Effective Applicable*
7	Eighteenth Meeting of the Dangerous Goods Panel	a) notification to ICAO of appropriate national authorities responsible for dangerous goods; and b) provision of emergency response information regarding dangerous goods.	24 February 2003 14 July 2003 27 November 2003
8	Nineteenth Meeting of the Dangerous Goods Panel	a) a refinement of paragraph 9.6.1 to make it clear that the presence of dangerous goods needs to be reported only in the case of a serious incident in which the dangerous goods were likely to have been involved; and b) introduction of a new Chapter 13 requiring States to establish dangerous goods security measures.	16 February 2005 11 July 2005 24 November 2005
9	Twentieth Meeting of the Dangerous Goods Panel	The extension of the provisions in Chapter 12 relating to the investigation of dangerous goods accidents and incidents to include cases of misdeclared and undeclared dangerous goods.	19 February 2007 16 July 2007 20 November 2008

CHAPTER 12. DANGEROUS GOODS ACCIDENT AND INCIDENT REPORTING

12.1 With the aim of preventing the recurrence of dangerous goods accidents and incidents, each Contracting State shall establish procedures for investigating and compiling information concerning such accidents and incidents which occur in its territory and which involve the transport of dangerous goods originating in or destined for another State. Reports on such accidents and incidents shall be made in accordance with the detailed provisions of the Technical Instructions.

12.2 **Recommendation.—** *With the aim of preventing the recurrence of dangerous goods accidents and incidents, each Contracting State should establish procedures for investigating and compiling information concerning such accidents and incidents which occur in its territory other than those described in 12.1. Reports on such accidents and incidents should be made in accordance with the detailed provisions of the Technical Instructions.*

12.3 With the aim of preventing the recurrence of instances of undeclared or misdeclared dangerous goods in cargo, each Contracting State shall establish procedures for investigating and compiling information concerning such occurrences which occur in its territory and which involve the transport of dangerous goods originating in or destined for another State. Reports on such instances shall be made in accordance with the detailed provisions of the Technical Instructions.

12.4 **Recommendation.—** *With the aim of preventing the recurrence of instances of undeclared or misdeclared dangerous goods in cargo, each Contracting State should establish procedures for investigating and compiling information concerning such occurrences which occur in its territory other than those described in 12.3. Reports on such instances should be made in accordance with the detailed provisions of the Technical Instructions.*

NEMZETKÖZI SZABVÁNYOK ÉS
AJÁNLOTT ELJÁRÁSOK

SZEMÉLYI ALKALMASSÁG

ANNEX 1

A NEMZETKÖZI POLGÁRI REPÜLÉS EGYEZMÉNYÉHEZ

10. KIADÁS — 2006. JÚLIUS

NEMZETKÖZI POLGÁRI REPÜLÉSI SZERVEZET

Ellenőrző jegyzék az Annex 1.
módosításához

	Hatálybalépés kelte	*Alkalmazhatóság kelte*
Tizedik kiadás (tartalmazza az 1-től 167. sz. módosításokat)	2006. július 17.	2006. november 23.
168. sz.módosítás (a Tanács által elfogadásra került 2007. február 23-án) Pótlapok (iii), (ix), 1-1 től 1-8-ig és 4-2-től 4-7 ig 2007. július 16.	2007. július 16.	2007. november 22.

168. sz. módosítás

a

Nemzetközi Szabványok és
Ajánlott Eljárásokhoz

SZEMÉLYI ALKALMASSÁG

.Annex 1. a Nemzetközi Polgári
Repülési Egyezményhez

1. Az Annex 1-hez (Tizedik kiadás) az alábbi cserelapokat kell behelyezni a 168. sz. módosításhoz, amelyek 2007. november 22-i hatállyal alkalmazandók:

   a) Oldal (iii) —Tartalomjegyzék

   b) Oldal (ix) —Előszó

   c) Oldalak 1-1 től 1-8-ig —1.Fejezet

   d) Oldalak 4-2 től 4-7-ig — 4. Fejezet

2. A módosítást a (ii) oldalon kell regisztrálni.

TARTALOMJEGYZÉK

Módosítás	*Forrás(ok)*	*Tárgykör*	*Elfogadva Hatályos Alkalmazandó*
167 (10.kiadás)	Léginavigáció Bizottság tanulmányok; A repülési személyzet szakszolgálati és oktatási bizottságának második ülése	Átdolgozott és új egészségügyi rendelkezések a repülési személyzet felső korhatárával kapcsolatban; új szakszolgálati követelmények léghajókra és helyből felszálló repülőgépekre; az MCP pilóta szakszolgálati engedély bevezetése; módosítások a jelenlegi repülési személyzet szakszolgálati engedély szabvány részleteiben; módosítások a szimulátor tréning-berendezések szerepével kapcsolatos rendelkezésekben, a szaktudás megszerzéséhez és megőrzéséhez, amelyre szükség van a különféle szintű szakszolgálati engedélyek és jogosítások megszerzéséhez.	2006.03.10. 2006.07.17. 2006.11.23
168	Léginavigáció Bizottság Tanulmány;	A módosítás az alábbiakra vonatkozik: a) a bevezető radarirányítási jogosítás felváltása körzeti irányítás ellenőrzési jogosításra, rávilágítva arra a tényre, hogy a felügyeleti rendszerek nem korlátozódhatnak a radarra; b) az emberi tényezők ismereti követelményeinek harmonizálása a légiforgalmi irányítók számára az 1 Annex 167 számú módosításában a közelmúltban került elfogadásra a repülési személyzetek számára; c) a meglévő szabványok alkalmazhatósága a repülési személyzet részére jóváhagyott kiképzés keretein belül (Annex 1, 1.2.8 és a 2.sz. Függelék) a légiforgalmi irányítók számára, amely előírás a szakszolgálati engedély és jogosítás megszerzéséhez; valamint d) új rendelkezések növendék légiforgalmi irányítók munkahelyi környezetben történő képzésével kapcsolatban.	2007.02.23. 2007.07.16 2007.11.22

NEMZETKÖZI SZABVÁNYOK ÉS AJÁNLOTT ELJÁRÁSOK

1. FEJEZET – MEGHATÁROZÁSOK ÉS AZ ENGEDÉLYEKRE VONATKOZÓ ÁLTALÁNOS SZABÁLYOK

1. 1. Meghatározások

Ahol a szakszolgálati engedélyezésre vonatkozó Szabványokban és Ajánlott Eljárásokban az alábbi kifejezéseket használtuk, ezek jelentése a következő:

Hiteles orvosi minősítés - (Accredited medical conclusion) Az engedélyt kiadó Hatóság által elfogadott egy vagy több orvos szakértő által, - a végeredmény elérése céljából, szükség szerint repülési, vagy egyéb szakértők bevonásával - az adott eset tárgyában levont végeredmény.

Repülőgép - (Aeroplane) A levegőnél nehezebb, erőgép meghajtású légijármű, amely repülés közben a felhajtóerőt elsősorban a repülés adott szakaszaiban rögzített helyzetben maradó felületeire ható aerodinamikai reakciók révén nyeri.

Légijármű - (Aircraft) Bármely szerkezet, mely a légkörben a levegő reakciójából nyeri a felhajtóerőt, mely nem azonos a talajfelszínre ható levegő reakciójával.

Légijármű repülési elektronika - (Aircraft avionics) Bármilyen elektronikus szerkezet meghatározására vonatkozó fogalom - annak elektromos részeit is beleértve - amelyet egy légijárműben alkalmaznak, ide értve a rádiót, az automatikus repülésvezérlést, és a műszer rendszereket.

Légijármű - osztály - (Aircraft - category) A légijárművek osztályba sorolása meghatározott alapjellemzők szerint, pl. repülőgép, helikopter, vitorlázó repülőgép, szabadon repülő ballon.

Egy pilótás üzemelésre hitelesített légijármű - (Aircraft certificated for single-pilot operation) A légijárművek azon típusa, amelyről a lajstromozó állam a légi alkalmassági vizsgálatok alapján megállapította, hogy egy pilótás minimum létszámú személyzettel biztonságosan üzemeltethető.

Másodpilótás üzemelésre hitelesített légijármű (Aircraft required to be operated with a co-pilot) A légijárművek azon típusa, amelyet másodpilóta vezethet a repülési kézikönyvben foglaltak szerint

A légijármű típusa - (Aircraft – type of) Azonos alapkonstrukciójú légijárművek összessége, beleértve azok minden változatát, kivéve, ha olyan módosításokat hajtottak végre, amelynek következtében a légijármű vezetési vagy repülési jellemzői megváltoztak.

Légijármű-vezetői tevékenység (Airmanship) A légijármű-vezető a légijármű irányítására vonatkozó repülési feladatot a megfelelő döntéshozatali képesség és a megtanult elméleti ismeretek következetes használatával, megfelelő jártassággal és felelősségtudattal hajtja végre.

Léghajó – (Airship) A levegőnél könnyebb, erőgép-meghajtású légijármű

Jogosított karbantartó szervezet - (Approved maintenance organization) A Szerződő Állam által a 6. Annex I. Részének 8. Fejezete (Repülőgép Karbantartás) előírásai alapján jogosított, és az illető állam jóváhagyott felügyelete alatt működő szervezet, melynek feladata a légijármű, vagy részeinek karbantartása.

Megjegyzés. Jelen meghatározásban semmi sem zárja ki azt, hogy a szervezetet és annak felügyeletét egynél több Állam hagyja jóvá.

Jóváhagyott kiképzés - (Approved training) A Szerződő Állam által jóváhagyott speciális tanterv és felügyelet szerint végzett képzés az Annex 1. 1. 2. 8. 2 és a 2. sz. Függelékben foglaltak szerint, amelynek értelmében a repülési személyzet képzése az Állam felügyelete alá tartozik

Bevezetés irányító szolgálat (ATS surveillance service). Ez a kifejezés használatos a bevezetés irányító szolgálat által közvetlenül nyújtott szolgáltatást
.
Bevezetés irányító rendszer (ATS surveillance system). Általánosító meghatározás, amely különböző ADS-B, PSR, SSR, vagy hasonló földi telepítésű rendszer, amely lehetővé teszi légijárművek azonosítását.

Megjegyzés. Hasonló földi telepítésű rendszer, összehasonlító értékelés és más módszerek együttes alkalmazásával, bizonyította, hogy biztonsági szintje és teljesítménye egyenlő, vagy jobb, mint az egyimpulzusos SSR.

Ballon – (Balloon) A levegőnél könnyebb, erőgép meghajtással nem rendelkező légijármű.

Megjegyzés: Jelen Annex céljára ez a meghatározás a szabadon repülő ballonra vonatkozik.

Légi-alkalmassá nyilvánítás - (Certify as airworthy (to) Annak igazolása, hogy a légijármű, vagy annak részei a rajtuk elvégzett karbantartást követően az érvényes légi alkalmassági előírásoknak megfelel.

Kereskedelmi légiszállítás (Commercial Air Transport)
Utas-, légiáru vagy postai küldemények szállítása díjazás, vagy bérleti díj ellenében.

Szaktudás (Competency)
Szakértelem, tudás és magatartásformák együttese, amelyek szükségesek az egyes feladatok elvégzéséhez az előírt szabványok szerint.

Az alkalmasság alapeleme (Competency element)
Cselekvés, amely olyan feladatot képez, amely meghatározott kezdő-és befejező eseményhez kapcsolódik, világosan meghatározza korlátait és eredménye megfigyelhető.

Az alkalmasság egysége (Competency Unit)
Számos alkalmassági alapelemből álló diszkrét funkció

Másodpilóta - (Co-pilot) Szakszolgálati engedéllyel rendelkező, a légijármű fedélzetén a repülőgép parancsnok feladatain kívül bármely más pilóta-feladatot ellátó pilóta, kivéve azt a személyt, aki a légijármű fedélzetén kizárólag repülésoktatás céljából tartózkodik.

Jóváírás (Credit) Korábban megszerzett képesítés, képzettség vagy más, az adott személy által elért eredmény beszámítása.

Útvonalrepülés, távrepülés (Cross-Country) egy indulási és egy érkezési pont közötti repülés, egy előre eltervezett útvonalon, szabvány navigációs eljárások alkalmazásával.

Kétkormányos képzési idő - (Dual instruction time) Az a repülési időtartam, amely alatt a légijármű fedélzetén egy adott személyt megfelelő jogosítással rendelkező pilóta oktatott.

Hiba (Error). A repülési személyzet részéről végrehajtott tevékenység vagy annak hiánya, amelynek következménye eltér a szervezet, vagy a repülési személyzet szándékától vagy elvárásaitól

*Megjegyzés (Note**)** lásd az Annex 13 E mellékletét –„Légijármű balesetek és események kivizsgálása." Leírás üzemeltető személyzetek részére.*

Hiba kezelése (Error management) az a folyamat, amelynek során a hibák felderítése és az ellenintézkedések segítségével rájuk adott válasz olyan, hogy csökkenti, vagy kiküszöböli a hibák következményeit, és csökkenti a további hibák, vagy a nemkívánatos légijármű helyzetek valószínűségét

Megjegyzés (Note): lásd a C. Melléklet 3. Fejezetét (PANS- Doc. 9868TRG), valamint a 314 értesítőt TEM (Threat and Error Management) (Fenyegetés és Hibakezelés) az ATC-ben a nemkívánatos államok leírásban.

Hajózó személyzeti tag - (Flight crew member) Szakszolgálati engedéllyel rendelkező olyan repülőszemélyzeti tag, akit a repülés időtartama alatt a légijármű üzemeltetéséhez nélkülözhetetlen kötelmek elvégzésével bíztak meg.

Repülési terv - (Flight plan) A légiforgalmi szolgálatok egységei számára biztosított meghatározott tartalmú tájékoztatás, mely egy tervezett repülésre, vagy annak egy részére vonatkozik.

Replülési eljárást gyakorló berendezés (Flight procedures trainer) – lásd **a *Repülési és navigációs eljárás-gyakorló berendezés (Flight procedures training device)*** címszó alatt

Repülési és navigációs eljárás-gyakorló berendezés (Flight procedures training device)
Az alábbi három készülék típus bármelyike, ha a repülési feltételeket a földön szimulálják:

Repülési szimulátor - (Flight simulator) *(FFS),* amely egy adott típusú légijármű pilótafülkéjének olyannyira pontos megfelelője, hogy a mechanikus, elektromos, elektronikus, stb. légijármű rendszerek szervei, a pilóták munkakörnyezete, a teljesítmény és az adott típus repülési jellemzői valósághűen előállíthatók.

Repülési eljárást gyakorló berendezés - (Flight procedure trainer) amely egy adott típusú légijármű pilótafülkéjének pontos megfelelője, a mechanikus, elektromos, elektronikus, stb. légijármű rendszerek szervei, a pilóták munkakörnyezete, a teljesítmény és az adott típus repülési jellemzői valósághűen előállíthatók.

Alapszintű műszerrepülés gyakorló berendezés (A basic instrument flight trainer
(BITD), amelyet felszereltek a megfelelő műszerekkel, és amely megjeleníti valamely légijármű pilótafülke környezetét műszerek szerinti repülési körülményekre.

Repülési szimulátor (Flight simulator)- lásd a ***Repülési és navigációs eljárás-gyakorló berendezés (Flight simulation training device)*** címszó alatt.

Repülési idő – repülőgépek - (Flight Time – aeroplanes) Az a teljes időtartam, mely a repülőgép felszállás céljából történő megmozdulásának első pillanatával kezdődik és azzal a pillanattal végződik, amikor a repülőgép a repülés befejeződésével végső nyugalomba jut.

Megjegyzés: A fentiekben meghatározott repülési idő általánosan használt értelemben megegyezik a „fékoldástól – befékezésig”, vagy a „féktuskó elvételétől a visszahelyezéséig” kifejezésekkel, és időtartamát attól a pillanattól mérik, amikor a repülőgép felszállás céljából először mozdul meg és tart addig a pillanatig, amikor a repülés befejeződésével a repülőgép véglegesen leáll
.

Repülési idő – helikopterek (Flight time – Helicopters) Az a teljes időtartam, mely akkor kezdődik, amikor a helikopter rotor-lapátjai forogni kezdenek és tart addig a pillanatig, amikor a repülés befejeződésével a helikopter véglegesen megáll, rotor-lapátjainak forgása teljesen megszűnik.

Vitorlázó repülőgép - (Glider) Erőgép meghajtással nem rendelkező, a levegőnél nehezebb légijármű, mely repülés közben a felhajtóerőt elsősorban a repülés adott szakaszaiban rögzített helyzetben maradó felületeire ható aerodinamikai reakciók révén nyeri.

Vitorlázó repülési idő - (Glider Flight Time) Attól függetlenül, hogy a vitorlázó repülőgép vontatással, vagy szabadon tartózkodik a levegőben, a repüléssel eltöltött teljes időtartam kezdete az a pillanat, amikor a vitorlázógép felszállás céljából először megmozdul és addig a pillanatig tart, amikor a repülés befejeztével a repülőgép nyugalmi helyzetbe kerül.

Helikopter - (Helicopter) Olyan a levegőnél nehezebb légijármű, melynek levegőben maradását egy általában függőleges tengelyre szerelt egy vagy több motormeghajtású rotor-lapáton képződő légreakció biztosítja.

Emberi tényezők -(Human performance) Az emberi képességeknek és korlátainak összessége, mely befolyást gyakorol a légiforgalmi tevékenységek biztonságára és hatékonyságára.

Műszeres repülési idő - (Instrument flight time) Az az időtartam, mely alatt a pilóta valamely légijárművet kizárólag a műszerek alapján vezet, külső vizuális támpontok felhasználása nélkül.

Műszeres földi idő - (Instrument ground time) Az az időtartam, amely alatt a pilóta szimulált műszeres repülést gyakorol a földön egy olyan mesterséges repülésoktató berendezésben, melyet az Engedélyező Hatóság jóváhagyott.

Műszeres idő - (Instrument time) Műszeres repülési idő, vagy műszeres földi idő.

Engedélyező Hatóság - (Licensing Authority) A Szerződő Állam által kijelölt hatóság, amely felelős a szakszemélyzet engedéllyel történő ellátásáért.

Megjegyzés- Jelen *Annex rendelkezései feltételezik, hogy a Szerződő Állam az engedélyező hatóságot az alábbi jogkörökkel ruházta fel:*

a) *engedély vagy jogosítás megszerzéséhez a folyamodó alkalmasságának felmérése,*

b) *engedélyek és jogosítások kiadása és korlátozó bejegyzésekkel való ellátása,*

c) *jóváhagyott személyek kijelölése és felhatalmazása,*

d) *kiképző tanfolyamok jóváhagyása,*

e) *mesterséges repülést gyakorló berendezés jóváhagyása, illetve a berendezés használatának* *engedélyezése a szükséges tapasztalat megszerzése céljából, vagy az engedély vagy jogosítás kiadásához a megkívánt jártasság bizonyítására, és*

f) *más Szerződő Állam által kiadott szakszolgálati engedélyek érvényesítése.*

Valószínű - (Likely) a 6. Fejezetben, az egészségügyi előírásokkal kapcsolatban a 'valószínű' kifejezés azt jelenti, hogy az előfordulás valószínűsége nem elfogadható az orvos szakértő számára.

Karbantartás - (Maintenance) A légijármű folyamatos légialkalmasságának fenntartásához szükséges feladatok ellátása, beleértve a külön-külön, vagy bármely kombinációban végzett nagyjavítást, az átvizsgálást, a cserét, hiánypótlást és a módosítást vagy a javítást.

Egészségügyi minősítés - (Medical Assessment) A Szerződő Állam által kiadott olyan bizonyítvány, amely szerint a szakszolgálati engedély birtokosa az egészségügyi alkalmasság meghatározott követelményeinek megfelel. Azt követően adják ki, hogy az Engedélyező Hatóság értékelte az engedélyért folyamodó személy vizsgálatát végző kijelölt vizsgálóorvos által benyújtott jelentést.

Egészségügyi minősítő (Medical assessor) – olyan szakorvos, akinek szakterülete a repülési orvosi praxis, aki kiértékeli az egészségügyi jelentéseket, amelyet az Engedélyező Hatóság orvos szakértője részére továbbított.

Orvos szakértő (Medical examiner) széleskörű tapasztalatokkal és nagy jártassággal rendelkezik a repülési orvostan területein, akit az Engedélyező hatóság nevez ki szakorvosi vizsgálatok elvégzésére a szakszolgálati engedélyért folyamodók alkalmasságának elbírálására.

Éjszaka - (Night) Az esti szürkület vége és a hajnali szürkület kezdete között eltelt idő, vagy olyan egyéb időtartam a napnyugta és a napkelte között, melyet az illetékes Hatóság állapított meg.

Megjegyzés- Az esti szürkület *akkor fejeződik be, amikor a napkorong középpontja 6°-kal a horizont alá süllyedt, a hajnali szürkület pedig reggel akkor kezdődik, amikor a napkorong középpontja 6°-kal a horizont alatt van.*

Teljesítmény kritériumok (Performance criteria) Az alkalmassági elemek előírt végeredményének egyszerű, értékelhető megállapításai, és azon kritériumok ismertetése, amelyeket annak megítéléséhez alkalmaztak, hogy a teljesítmény előírt szintje teljesült-e.

A légijármű vezetése - (Pilot (to) Valamely légijármű repülési kormányszerveinek működtetése a repülési idő alatt.
Parancsnokpilóta - (Pilot-in-command) Az üzemeltető, vagy kisgépes (általános célú) repülésben a tulajdonos által parancsnokpilótának kijelölt pilóta, akit megbíznak a repülés biztonságos végrehajtásával.

Felügyelet alatt álló parancsnokpilóta (Pilot-in-command under supervision)- PICUS, az a másodpilóta, aki parancsnokpilóta felügyelete alatt parancsnokpilótai beosztást és feladatot lát el. A beosztás akkor látható el, ha a felügyelet ellátására vonatkozó módszert, eljárást a légiközlekedési hatóság jóváhagyta.

Helyből felszálló repülőgép (Powered-lift)- a levegőnél nehezebb olyan légijármű, amely képes a függőleges felszállásra, a függőleges leszállásra és a kis sebességgel történő repülésre, és amely elsődlegesen a motormeghajtású emelőszerkezettől, vagy az emeléshez szerepet nem játszó nem-forgó légijármű felület (ek)-től a vízszintes repülés alatt

Káros szerek problémát okozó használata - (Problematic use of substances)
A repülési szakszemélyzet által fogyasztott olyan egy vagy több pszichoaktív szer, mely:

a) használójára nézve közvetlen veszélyt jelent, vagy mások életét, egészségét, illetve jólétét veszélyezteti, és/vagy
b) foglalkozási, szociális, mentális, fizikai problémát, vagy rendellenességet okoz, illetve azt súlyosbítja.

Pszichoaktív szerek - (Psichoactive substances) Az alkohol, az ópium-rokon-, a cannabis-rokon-anyagok, a nyugtató és hipnotikus anyagok, a kokain, a tudatállapotot befolyásoló egyéb szerek, a hallucinogén anyagok és az illó oldószerek a kávé és a dohány kivételével.

Minőségbiztosítási rendszer (Quality system) – a szervezet dokumentált eljárásai és irányelvei, és ezen irányelvek és eljárások belső auditjai, a minőség tökéletesítése érdekében hozott ajánlások és felülvizsgálatok kezelése.

Jogosított légiforgalmi irányító - (Rated air traffic controller) Olyan légiforgalmi irányító, aki szakszolgálati engedéllyel és az általa gyakorolt tevékenységre érvényes jogosítással rendelkezik.

Jogosítás - (Rating) A szakszolgálati engedélybe bejegyzett, vagy a szakszolgálati engedélyhez tartozó, annak részét képező felhatalmazás, amely a szakszolgálati engedélyt érintő külön feltételeket, jogosításokat vagy a korlátozásokat rögzíti.

Érvényesség elismerése (szakszolgálati engedély) - (Rendering (a licence) valid) Valamely Szerződő Állam saját szakszolgálati engedély kiadását helyettesítő olyan tevékenység, amellyel a más Szerződő Állam által kiadott szakszolgálati engedélyt saját kiadású szakszolgálati engedélyével egyenértékűnek ismer el.

Karbantartási nyilatkozat aláírása - (Sign a maintenance release (to) A 6. Annexben szereplő karbantartási nyilatkozat kiadásával annak igazolása, hogy a karbantartási munkát a vonatkozó légialkalmassági szabványokkal megegyezően kielégítő módon elvégezték.

Szignifikáns (Significant) – a 6. fejezetben szereplő egészségügyi előírások szövegvonatkozásaiban a „szignifikáns" kifejezés olyan természetű dologra utal, amely valószínűsíthetően veszélyeztetheti a repülés biztonságát.

Egyedül- repülési idő - (Solo flight time) Az az időtartam, amely alatt a növendék pilóta egyedül tartózkodik a légijárműben.

Fenyegetés (Threat) – olyan események, vagy hibák, amelyek függetlenek a repülési személyzet cselekedeteitől, megnövelik az üzemeltetés bonyolultságát, és amelyeket kezelni kell a biztonság megfelelő szintjének fenntartása érdekében.

Megjegyzés: lásd az Annex 13 E mellékletét –„Légijármű balesetek és események kivizsgálása." leírás üzemeltető személyzetek részére.

Fenyegetés kezelése (Threat management) –a fenyegetések felderítése, és a válaszul tett ellenintézkedések annak érdekében, hogy a fenyegetések következményei csökkenjenek vagy kiküszöbölhetőek legyenek, valamint a hibák vagy a nemkívánatos légijármű helyzetek előfordulási valószínűsége csökkenjen.

Megjegyzés (Note): lásd a C. Melléklet 3. Fejezetét (PANS- Doc. 9868TRG), valamint a 314 értesítőt TEM (Threat and Error Management) (Fenyegetés és Hibakezelés) az ATC-ben a nemkívánatos államok leírásban.

1. 2. Az engedélyekre vonatkozó általános szabályok

1. Megjegyzés: Annak ellenére, hogy a Nemzetközi Polgári Repülés Egyezménye a Lajstromozó Államot olyan feladatokkal ruházza fel, amelyeket ez az állam – a helyzetnek megfelelően – jogosult, vagy köteles gyakorolni, a Közgyűlés az A23-13 Határozatában elismerte, hogy a lajstromozó állam esetenként képtelen megfelelően eleget tenni kötelezettségének akkor, amikor más állam által üzemeltetett légijárművet - elsősorban hajózó személyzet nélkül- vesz bérbe, szerződésbe vagy cserébe, és elismerte továbbá azt, hogy az Egyezmény esetleg nem megfelelően írja elő az üzemeltető államának ilyen esetekre vonatkozó jogait és kötelezettségeit mindaddig, amíg az Egyezmény függőben lévő 83. Cikkelye érvénybe nem lép. Ezért a Tanács arra ösztönöz,- ha a fenti körülmények között a Lajstromozó Állam képtelennek vagy nem teljes értékűnek ítéli meg a rá vonatkozó előírt feladatok ellátását,- hogy utalja át az üzemeltető államának hatáskörébe (ha ezt az utóbbi elfogadja) a Lajstromozó Állam azon feladatait, amelyeket az üzemeltető állama sokkal megfelelőbben képes gyakorolni. Habár az Egyezmény függőben lévő 83. Cikkelye 1997. június 20.-án életbe lépett mindazon államokra vonatkozólag, amelyek a kapcsolódó Protokollt (DOC 9318) aláírták, a fentiekben említett lépések elsősorban azokra a Szerződő Államokra vonatkoznak, amelyek a függőben lévő 83. Cikkely hatálya alá eső szerződéses kapcsolattal nem rendelkeznek. Nyilvánvaló, hogy a függőben lévő 83. Cikkely érvénybe lépése után az előzőekben említett tevékenységek a gyakorlati célszerűséget segítik elő, és nem érintik sem a Chicago-i Egyezménynek a Lajstromozó Állam, sem bármely harmadik állam kötelezettségeket előíró rendelkezéseit. Az Egyezmény 83. Cikkelye ugyan érvénybe lépett 1997. június 20.-án, az ilyen átruházási egyezmények csak azokat a Szerződő Államokat fogják érinteni, amelyek ratifikálták a Protokollt (DOC 9318) a 83. Cikkelyben foglalt feltételek teljesítését követően.

2. Megjegyzés: A nemzetközi szabványokat és ajánlott gyakorlatokat az alábbi szakszolgálati engedélyekre alakították ki:
a) Hajózó személyzet

- *magánpilóta – repülőgép,*
- *kereskedelmi pilóta – repülőgép,*
- *közforgalmi pilóta – repülőgép,*
- *magánpilóta – helikopter,*
- *kereskedelmi pilóta – helikopter,*
- *közforgalmi pilóta – helikopter,*
- *vitorlázó repülőgép pilóta,*
- *szabadon repülő ballon pilótája,*
- *hajózó navigátor,*
- *hajózó mérnök*

b) egyéb személyzet
- *légijármű szerelő (technikus /mérnök /mechanikus),*
- *légiforgalmi irányító,*
- *repülésüzemi tiszt,*
- *légiforgalmi állomásüzemeltető.*

1. 2. 1. Hajózó személyzeti tagként való ténykedés joga

Valamely személy légijárművön csak abban az esetben tevékenykedhet hajózó személyzet tagjaként, ha rendelkezik a feladatkörének megfelelő és ezen Annex előírásait kielégítő érvényes szakszolgálati engedéllyel. A szakszolgálati engedélyt az adott légijárművet Lajstromozó Államnak kell kiállítania, vagy érvényesítenie kell a más Szerződő Állam által kiadott szakszolgálati engedélyt.

Megjegyzés: A Nemzetközi Polgári Repülési Egyezmény 29. Cikkelye előírja, hogy a hajózó személyzeti tagoknak a megfelelő engedélyeket magukkal kell vinniük a fedélzetre minden olyan légijármű esetében, amely részt vesz a nemzetközi légi navigációban

1. 2. 2. Az engedély érvényességének elismerése

1. 2. 2. 1. Ha egy Szerződő Állam egy másik Állam által kibocsátott szakszolgálati engedélyt érvényesnek ismer el a saját kibocsátású szakszolgálati engedélye alternatívájaként, az érvényességet az előbbi engedéllyel együtt viselendő megfelelő kiterjesztéssel határozza meg, melyben a másik állam szakszolgálati engedélyét a sajátjával egyenértékűnek elismeri. A kiterjesztés érvényessége nem haladhatja meg a szakszolgálati engedély lejárati idejét.

Megjegyzés: Ez a kitétel nem szándékozik megakadályozni a szakszolgálati engedélyt kibocsátó államot abban, hogy megfelelő bejelentéssel meghosszabbítsa az engedély érvényességi időtartamát anélkül, hogy megkövetelné akár a szakszolgálati engedély fizikai visszaküldését, akár a szakszolgálati engedély tulajdonosának megjelenését az adott állam hatóságai előtt.

1. 2. 2. 2. A Szerződő Állam által az 1. 2. 2. 1 pontban szereplő kibocsátott pilóta szakszolgálati engedélyt a többi Szerződő Állam részéről érvényesnek kell elismerni magánrepülések esetére.

1. 2. 2. 3. **Ajánlás –** Valamely Szerződő Állam által kibocsátott pilóta szakszolgálati engedély érvényesnek tekintendő bármely más Szerződő Államban magán célú repülésre.

Megjegyzés: A más Szerződő Állam által kiadott szakszolgálati engedélyt magánrepülések céljára hivatalos formaságok nélkül elismerő Szerződő Államot arra ösztönözzük, hogy ezt a lehetőséget saját Légiforgalmi Tájékoztató Kiadványában (AIP) tegye közzé

1. 2. 3. A szakszolgálati engedély birtokosának jogai

A Szerződő Állam ne engedélyezze, hogy az engedély birtokosa a szakszolgálati engedélyében biztosított jogain kívül egyéb jogokat is gyakorolhasson.

1. 2. 4. Egészségügyi alkalmasság

1. Megjegyzés: Tájékoztató anyagot a Polgári Repülés Egészségügyi Kézikönyve (DOC 8984) tartalmaz.

2. Megjegyzés: A folyamodónak az „Egészségügyi Minősítés"-ben foglalt és három külön osztályba sorolt követelmény közül a megfelelőt kell teljesítenie a különböző típusú szakszolgálati engedélyek egészségügyi feltételeinek kielégítéséhez. Az erre vonatkozó részleteket a 6. 2, 6. 3, 6. 4, és a 6. 5 pontok tartalmazzák.

Az 1. 2. 4. 1 pontban leírt követelmények teljesítésének bizonyítékául az Engedélyező Hatóság megadja a folyamodónak a megfelelő (1., 2., illetve 3. osztályú) Egészségügyi Minősítést. Ez többféle módon történhet, mint például: megfelelő megnevezésű külön bizonyítvány kiadásával, a szakszolgálati engedélybe történő bejegyzéssel, állami szabályba foglalással, miszerint az egészségügyi minősítés a szakszolgálati engedély szerves része, stb.
1. 2. 4. 1. Az engedélyért folyamodónak, ahol ez alkalmazható, a 6. Fejezetben részletezett követelményeknek megfelelően kiállított egészségügyi minősítéssel kell rendelkeznie.

1. 2. 4. 2. Az adott egészségügyi minősítés folyamatos érvényességi időtartamának meg kell felelnie az 1. 2. 5. 2 pont előírásainak. Az érvényesség időtartama az egészségügyi minősítés kiállításának napjával kezdődik.

1. 2. 4. 2. 1. Az egészségügyi minősítés érvényességi ideje meghosszabbítható 45 nappal az Engedélyező Hatóság jóváhagyása alapján.

Megjegyzés: ajánlatos meghagyni azt a naptári napot fix időpontnak, amikor az egészségügyi minősítés lejár.

1. 2. 4. 3. A hajózó személyzet tagjai, vagy a légiforgalmi irányítók csak akkor gyakorolhatják a szakszolgálati engedélyükkel együtt járó jogaikat, ha a szakszolgálati engedélyüknek megfelelő, érvényes egészségügyi minősítéssel rendelkeznek, az 1. 2. 5. 2. 3. pontban foglaltak kivételével.

1. 2. 4. 4. A Szerződő Állam jelöljön ki megfelelő képesítéssel és orvosi gyakorlattal rendelkező orvosokat, akik a folyamodó egészségi állapotának orvosi vizsgálatait elvégzik a 2. és a 3. Fejezetben ismertetett szakszolgálati engedélyek vagy jogosítások kiadásához, megújításához, és a 4. Fejezetben szereplő megfelelő engedélyek kiadásához és megújításához.

1. 2. 4. 4. 1. A vizsgáló orvosoknak repülő-orvosi képzettséggel kell rendelkezniük, vagy részt kell venniük ilyen képzésben, illetve időszakonként ismereteiket frissíteniük kell szaktanfolyamok elvégzése által.

1. 2. 4. 4. 2. - A vizsgáló orvosok szerezzenek gyakorlati ismereteket és tapasztalatokat azokról a körülményekről, amelyek között a szakszolgálati engedélyek és jogosítások birtokosai a feladatkörüket ellátják.

Megjegyzés: a gyakorlati tudás, valamint a repülési, szimulációs és egyéb gyakorlati példák, megfigyelések összhangban az Engedélyező Hatóság követelményeivel.

1. 2. 4. 5. Bármilyen szakszolgálati engedélyért vagy jogosításért (mely kiadásának alapfeltétele az orvosi alkalmasság) folyamodó személy köteles aláírásával ellátott nyilatkozatot eljuttatni vizsgáló orvosának, amelyben közli, hogy korábban hasonló vizsgálaton vett-e részt, és ha igen, milyen eredménnyel. Fel kell tüntetni, hogy a folyamodónak korábban volt-e elutasított, visszavont, vagy felfüggesztett egészségügyi minősítése, és ha igen ezek okai.

1. 2. 4. 5. 1. Ha a szakszolgálati engedélyért vagy jogosításért folyamodó a vizsgáló orvosnak valótlan nyilatkozatot tesz, az orvos ezt jelenteni köteles az állam Engedélyező Hatóságának, hogy az megtehesse a szükségesnek ítélt lépéseket.

1. 2. 4. 6. Amikor a folyamodó 6. Fejezet szerinti orvosi vizsgálata befejeződött, a vizsgáló orvos az Engedélyező Hatóság részére, ezen hatóság előírásaival egyező vizsgálat eredményéről megfelelő részletességű és aláírt jelentést köteles küldeni.

1. 2. 4. 6. 1. Ha az orvosi jelentést az Engedélyező Hatóság részére elektronikus úton továbbítják, szükséges a vizsgálatot végző orvos megfelelő azonosítását elvégezni.

1. 2. 4. 6. 2. Abban az esetben, ha az orvosi vizsgálatot két, vagy több vizsgáló orvos végzi, a Szerződő Államok a vizsgálatok eredményeinek koordinálására az egyik vizsgáló orvost jelöli ki az orvosi alkalmasság megállapítására és a jelentés aláírására.

1. 2. 4. 7. A Szerződő Államoknak repülő-orvosi gyakorlatban jártas orvosok szolgálatait kell igénybe venniük, ha szükségesnek látszik a vizsgáló orvosok által az Engedélyező Hatóságnak küldött jelentések értékelése.

1. 2. 4. 7. 1 A vizsgáló orvos köteles az egészségügyi információt az Engedélyező Hatóságnak megküldeni, hogy a Hatóság az egészségügyi minősítés auditálását elvégezhesse.

Megjegyzés: az ilyen jellegű auditálás elvégzése annak igazolására szolgál, hogy az orvos szakértők megfelelnek-e az orvosi gyakorlat általános követelményeinek.

1. 2. 4. 8. Ha a 6. Fejezetben foglalt, az adott szakszolgálati engedély kiadásához előírt egészségügyi követelmények valamelyike nem teljesül, akkor a Szerződő Állam egészségügyi minősítést addig nem adja meg, vagy nem újítja meg, amíg a következő feltételek nem teljesülnek:

a) csatolt orvosi vélemény jelzi, hogy a folyamodó azon hibája, miszerint speciális esetekben valamely követelménynek – akár számszerűségben, akár más módon – nem tesz eleget , ez olyan hiba, mely a kért szakszolgálati engedélyben szereplő jogosítványok gyakorlása során a repülés biztonságára valószínűleg nem jelent veszélyt,

b) a kérelmező adott képességeit, ismereteit és gyakorlottságát, illetve az üzemi körülményeket alaposan mérlegelték,

c) ha a kérelmező feladatainak biztonságos teljesítése korlátozás, vagy korlátozások betartásától függ, a szakszolgálati engedélyt külön korlátozással kell ellátni.

1. 2. 4. 9. Az orvosi titoktartást mindenkor be kell tartani.

1. 2. 4. 9. 1. Minden egyes orvosi jelentést és nyilvántartást biztonságos helyen kell tartani és azokhoz kizárólag csak meghatalmazással rendelkező személyek férhetnek hozzá.

1. 2. 4. 9. 2. Ha üzemeltetési megfontolások igazolják, az egészségügyi minősítő dönti el, hogy milyen szinten továbbítja az egészségügyi információt az Engedélyező Hatóság illetékes tisztségviselőjének.

1. 2. 5. A szakszolgálati engedélyek érvényessége

1. 2. 5. 1. Ha a Szerződő Állam szakszolgálati engedélyt adott ki, akkor köteles megbizonyosodni arról, hogy a tulajdonos a szakszolgálati engedélyben, vagy a vele kapcsolatban biztosított jogait csak akkor gyakorolja, ha alkalmasságát fenntartotta és rendelkezik az Állam által előírt előzetes tapasztalatokkal.

1. 2. 5. 1. 1. **Ajánlás**. *A Szerződő Állam határozza meg a pilóta szakszolgálati engedélyhez és jogosításához szükséges szakértelemmel és gyakorlattal összefüggő követelményeket.*

1. 2. 5. 1. 2 A szolgálati engedélyt kiadó Szerződő Államnak biztosítania kell, hogy a többi Szerződő

Államnak módjában álljon a szakszolgálati engedély érvényességéről meggyőződni.

1. Megjegyzés: A kereskedelmi légi-szállításban részt vevő hajózó személyzeti tagok szakképzettségének meglétéről kielégítő módon lehet meggyőződni az Annex 6 szerint végrehajtott gyakorló repüléseken.

2. Megjegyzés: A szakképzettség megléte kielégítően dokumentálható az üzemeltető nyilvántartásában, vagy a hajózó személyzet tagjainak személyi repülési naplójában, vagy a szakszolgálati engedélyben.

3. Megjegyzés: A hajózó személyzet tagjai – a Lajstromozó Állam által kívánatosnak tartott mértékig – bizonyíthatják szakképzettségük folyamatos meglétét a Lajstromozó Állam által jóváhagyott szintetikus repülés-gyakorló berendezésben is.

4. Megjegyzés: Lásd A Repülési Szimulátor Minősítési Kritériumai Kézikönyvet (DOC 9625)

5. Megjegyzés: Lásd (Doc 9379) kézikönyvet.

1. 2. 5. 2. Az 1. 2. 4. 5 és az 1. 2. 4. 6. pontokkal összhangban meghatározott egészségügyi alkalmasságról szóló jelentést az alábbiaknál nem hosszabb időközönként kell benyújtani (kivéve az 1. 2. 5. 2. 1, az 1. 2. 5. 2. 2. és 1. 2. 5. 2. 3 pontokban foglaltakat):

60 hónap a magánpilóta – repülőgép, léghajó, helikopter és helyből felszálló repülőgépre vonatkozó szakszolgálati engedély esetében;

12 hónap a kereskedelmi pilóta – repülőgép, léghajó, helikopter és helyből felszálló repülőgépre vonatkozó szakszolgálati engedély esetében;

12 hónap a közforgalmi pilóta – repülőgép szakszolgálati engedély esetében;

24 hónap a magánpilóta – helikopter szakszolgálati engedély esetében;

12 hónap a kereskedelmi pilóta – repülőgép szakszolgálati engedély esetében;

12 hónap a közforgalmi pilóta – repülő, helikopter és helyből felszálló repülőgép szakszolgálati engedély esetében;

60 hónap a vitorlázó repülőgép pilóta szakszolgálati engedély esetében;

60 hónap a szabadon repülő ballon pilóta szakszolgálati engedély esetében;

12 hónap a hajózó navigátor szakszolgálati engedély esetében;

12 hónap a hajózó fedélzeti mérnök szakszolgálati engedély esetében;

48 hónap a légiforgalmi irányító szakszolgálati engedély esetében;

Megjegyzés: 1. a fent felsorolt érvényességi idők 45 nappal meghosszabbíthatók az 1. 2. 4. 1. pontban foglaltak szerint.

Megjegyzés 2. Ha a számítást az 1. 2. 5. 2. pont és annak pontjai szerint végzik el, az érvényesség ideje-

beszámítva az utolsó hónapot- magában foglalja azt a napot, amely egybe esik az orvosi vizsgálat keltével, illetve ha a tárgyhóban olyan nap nem nincsen, akkor a hónap utolsónapjával.

1. 2. 5. 2 1. Az egészségügyi minősítés érvényesség ideje csökkenthető amennyiben orvosilag indokolt.

1. 2. 5. 2. 2. – Ha a repülőgép, helikopter, helyből felszálló repülőgépre érvényes szakszolgálati engedéllyel rendelkező pilóták, valamint a repülőgép, léghajó, helikopter és helyből felszálló repülőgép szakszolgálati engedéllyel rendelkező kereskedelmi pilóták, akik kereskedelmi üzemelésben lévő járatokon utasokat szállítanak és betöltötték 40. életévüket, szakszolgálati engedélyük érvényessége az 1. 2. 5. 2 pontban foglaltak szerint 6 hónapra csökken.

1. 2. 5. 2. 3. Ha a repülőgép, helikopter, helyből felszálló repülőgépre érvényes szakszolgálati engedéllyel rendelkező pilóták, valamint a repülőgép, léghajó, helikopter és helyből felszálló repülőgép szakszolgálati engedéllyel rendelkező kereskedelmi pilóták, akik kereskedelmi üzemelésben lévő járatokon utasokat szállítanak és betöltötték 60. életévüket, szakszolgálati engedélyük érvényessége az 1. 2. 5. 2 pontban foglaltak szerint 6 hónapra csökken.

1. 2. 5. 2. 4. Magánpilóták, akik repülőgép, léghajó, helikopter és helyből felszálló repülőgép, ballon, vitorlázórepülő és légiforgalmi irányító szakszolgálati engedéllyel rendelkeznek és betöltötték 40. életévüket szakszolgálati engedélyük érvényessége az 1. 2. 5. 2 pontban foglaltak szerint 6 hónapra csökken.

1. 2. 5. 2. 5. **Ajánlás** -. Magánpilóták, akik repülőgép, léghajó, helikopter és helyből felszálló repülőgép, ballon, vitorlázórepülő és légiforgalmi irányító szakszolgálati engedéllyel rendelkeznek és betöltötték 50. életévüket szakszolgálati engedélyük érvényessége az 1. 2. 5. 2 pontban foglaltak szerint további 12 hónapra csökken.

Megjegyzés: A fenti érvényességi idők attól számítanak, amikor a jelentkezőn az orvosi vizsgálatokat elvégzik

1. 2. 5. 2. 6. *Az orvosi vizsgálat halaszthatóságának feltételei.* Ha a szakszolgálati engedély birtokosa a kijelölt orvosi vizsgálat helyszínétől távol tevékenykedik, az Engedélyező Hatóság döntése szerint az előírt újra-vizsgálat halasztható feltéve, hogy ezt csak kivételesen alkalmazzák, és nem haladja meg az alábbi időtartamot:

a) kereskedelmi légiszállítási tevékenységet nem végző hajózó személyzeti tag esetében egyszeri hat hónapos időtartam,

b) kereskedelmi légi-szállítási tevékenységben részt vevő hajózó személyzeti tag esetében két egymást követő három hónapos időtartam, feltéve, hogy mindkét esetben kedvező orvosi jelentést kapott a szóban forgó terület kijelölt vizsgáló orvosánál végrehajtott vizsgálatot követően, vagy olyan esetekben, amikor ilyen személy nem áll rendelkezésre, akkor egy olyan orvos által elvégzett vizsgálat után, aki törvényes minősítéssel rendelkezik orvosi gyakorlat folytatására ezen a területen. Az orvosi vizsgálatról szóló jelentést a szakszolgálati engedélyt kiállító Engedélyező Hatóság számára kell megküldeni.

c) magánpilóta esetében egyetlen, de 24 hónapot meg nem haladó időtartam olyan esetben, amikor az orvosi vizsgálatot az azon a területen tevékenykedő, a Szerződő Állam által az 1. 2. 4. 4. pontban meghatározottak szerint kijelölt vizsgáló orvos végezte el, ahol a kérelmező ideiglenesen tartózkodik. Az orvosi vizsgálat zárójelentését az Engedélyező Hatósághoz kell eljuttatni.

1. 2. 6. Az egészségi állapot romlása

1. 2. 6. 1. Jelen Annex-ben szereplő szakszolgálati engedélyek birtokosai nem gyakorolhatják szakszolgálati engedélyeik és a hozzá kapcsolódó jogosításokból eredő jogaikat, ha tudomásukra jut, hogy egészségi állapotuk bármilyen mértékben romlott, és ennek következtében az engedélyezett feladatkörök biztonságos és megfelelő végzésére esetleg képtelenné válhatnak.

1. 2. 6. 1. 1. ***Ajánlás –*** *A szakszolgálati engedélyek birtokosainak tájékoztatniuk kell az Engedélyező Hatóságot akár igazolt terhességükről, vagy minden egyéb, 20 napot meghaladó egészségi állapotukban történő változásról, szükségük van-e folyamatos kezelésekre és gyógyszereke, illetve szükségük van-e kórházi ápolásra.*

1. 2. 6. 1. 2. ***Ajánlás –*** *Minden egyes Szerződő Államnak gondoskodnia kell arról, hogy a szakszolgálati engedélyek birtokosai ne gyakorolhassák szakszolgálati engedélyeik és jogosítványaik biztosította jogokat olyan időszakban, amikor egészségi állapotuk romlása egészségügyi minősítésük kiadását, vagy megújítását nem tehette volna lehetővé.*

1. 2. 7. Pszichoaktív anyagok használata

1. 2. 7. 1. Ezen Annex-ben szereplő szakszolgálati engedélyek birtokosai nem gyakorolhatják szakszolgálati engedélyeik és a hozzá kapcsolódó jogosítványaik biztosította jogokat, ha olyan pszichoaktív szer hatása alatt állnak, mely esetleg képtelenné tehetik őket jogosításaik biztonságos és megfelelő gyakorlására.

1. 2. 7. 2. Jelen Annex-ben felsorolt szakszolgálati engedélyek birtokosai problémát okozó káros szereket nem használhatnak.

1. 2. 7. 3**. Ajánlás -** *A Szerződő Államnak a legmesszebbmenőkig gondoskodnia kell arról, hogy minden egyes szakszolgálati engedély birtokosa, aki bármilyen problémás káros szert használ, felderítésre és eltávolításra kerüljön a biztonságot veszélyeztető, kritikus feladatkörökből. A biztonság szempontjából a kritikus feladatkörbe való visszatérés sikeres kezelés esetén fontolóra vehető, vagy kezelést nem igénylő esetekben, ha a problematikus szerek használatát abbahagyta és megállapítást nyert, hogy feladatköre ellátása során nem valószínű, hogy veszélyezteti a biztonságot.*

Megjegyzés.-   A Repülési Munkahelyeken Káros Szerek Problémát Okozó Használatának Megelőzési Kézikönyvében (DOC 9654) útmutató található a felderítés megfelelő módszereiről (amely biokémiai ellenőrzést is magában foglalhat, mint például az alkalmazást megelőzően, vagy alapos gyanú esetén, balesetet/eseményt követően, időszakosan és véletlenszerűen), továbbá más, megelőzési témákról.

1. 2. 8. Jóváhagyott kiképzés

Megjegyzés- A szakszolgálati engedély megszerzéséhez szükséges képzettség sokkal gyorsabban és könnyebben szerezhető meg, ha a kérelmező egy szigorúan ellenőrzött, szisztematikus és folyamatos kiképzési tanfolyamon vesz részt, mely egy tervezett tantervre és tematikára épült fel. A tapasztalatra vonatkozó követelmények bizonyos fokú csökkentésére már történt előkészület jelen Szabványokban és Ajánlott Eljárásokban ismertetett bizonyos szakszolgálati engedélyek és jogosítások kiadásához, olyan folyamodó esetében, aki már egy jóváhagyott kiképzést sikeresen befejezett.

1. 2. 8. 1. A jóváhagyott kiképzésnek legalább olyan képzettségi szintet kell biztosítania, mint a

jóváhagyott képzésben nem részesült személyekre vonatkozó minimális képzettségi követelmény.

1. 2. 8. 2. A kiképzési szervezet Állam által történő jóváhagyása attól függ, hogy a kérelmező megfelel-e a 2. sz. Függelékben foglalt követelményeknek.

Megjegyzés: a repülési személyzet kiképző szervezet engedélyezésével kapcsolatos útmutatás a repülési személyzet kiképző szervezeteinek engedélyezési kézikönyvben található.

1. 2. 9 Nyelvtudás

1. 2. 9. 1. A repülőgépen és helikopteren tevékenykedő pilótáknak, valamint azon hajózó navigátoroknak, akiknek használniuk kell a fedélzeti rádiótelefont, bizonyítaniuk kell azt, hogy képesek beszélni és megérteni a rádió-távbeszélő összeköttetésben használatos nyelvet.

Megjegyzés.- A Nemzetközi Polgári Repülési Egyezmény 42. Cikkelye értelmében az 1. 2. 9. 1 pont nem alkalmazható azon személyre, akinek szakszolgálati engedélyét eredetileg 2004. március 5. előtt adták ki, de minden esetben vonatkozik azokra a személyzeti tagokra, akiknek szakszolgálati engedélye 2008. március 5. után is érvényben marad.

1. 2. 9. 2. A légiforgalmi irányítóknak és a légiforgalmi állomásüzemeltetőknek bizonyítaniuk kell, hogy képesek beszélni és megérteni a rádió-távbeszélő összeköttetésben használatos nyelvet.

1. 2. 9. 3. **Ajánlás.-** *A hajózó mérnököknek és a vitorlázó vagy szabadon repülő ballonok pilótáinak beszélniük és érteniük kell a rádió-távbeszélő összeköttetésben használatos nyelvet.*

1. 2. 9. 4. 2008. március 5.-től a repülőgép és helikopter pilótáknak, a légiforgalmi irányítóknak és a légiforgalmi állomásüzemeltetőknek bizonyítaniuk kell, hogy beszélik és értik a rádió-távbeszélő összeköttetésben használatos nyelvet a Mellékletben meghatározott nyelvtudás szinten.

1. 2. 9. 5. **Ajánlás.-** *Mindazon repülőgép-vezetőknek és helikopter pilótáknak, helyből felszálló repülőgép pilótáknak, hajózó navigátoroknak, akiknek használniuk kell a légijármű fedélzeti rádiótelefonját, a légiforgalmi irányítóknak és a légiforgalmi állomásüzemeltetőknek bizonyítaniuk kell, hogy olyan szinten értik és beszélik a rádió-távbeszélő összeköttetésben használatos nyelvet, melyet az 1. Melléklet nyelvtudás követelményként meghatároz.*

1. 2. 9. 6. 2008. március 5.-vel kezdődően mindazon repülőgép-vezetők és helikopter pilóták, légiforgalmi irányítók és légiforgalmi állomásüzemeltetők nyelvismeretét, akiknek nyelvtudása nem éri el a Jártasság Szintjét (6 Szint), időszakonként az előírásoknak megfelelően értékelni kell a jártassági szint egyénileg történő bizonyításával.

1. 2. 9. 7. **Ajánlás.-** *Azon repülőgép-vezetőknek és helikopter pilótáknak, hajózó navigátoroknak nyelvtudását, akiknek használniuk kell a légijármű fedélzeti rádiótelefonját, valamint a légiforgalmi irányítók és a légiforgalmi állomásüzemeltetők nyelvismeretét, akik nem érik el a Jártasság Szintjét (6 Szint), időszakonként az előírásoknak megfelelően értékelni kell a jártassági szint egyénileg történő bizonyításával a következők szerint:*

a) mindazokat, akiknek bizonyított nyelvtudása eléri az Operatív Szintet (4 Szint), háromévenként legalább egyszer értékelni kell, és *b) mindazokat, akiknek bizonyított nyelvtudása eléri a Bővített Szintet (5 Szint), hatévenként legalább egyszer értékelni kell.*

1. Megjegyzés Előírásszerű értékelés nem szükséges olyan folyamodók esetében, akik bizonyítják magas szintű nyelvtudásukat, például anyanyelvük, és akik magas szinten beszélik, de nem anyanyelvük, tájszólással vagy olyan hangsúlyozással, amelyet a nemzetközi légiforgalom közössége meg tud érteni.

2. Megjegyzés Az 1. 2. 9 pont előírásai, ahol hivatkoznak az Annex 10 II. Kötet 5. Fejezetre, a rádió-távbeszélő összeköttetésben használt nyelv lehet az a nyelv, amelyet rendszerint a földi állomások használnak, vagy az angol nyelv. Ezért a gyakorlatban lesznek olyan helyzetek, ahol a hajózó személyzet tagjainak csak azt a nyelvet szükséges beszélniük, amelyet a földi állomások rendszerint használnak.

4. FEJEZET NEM HAJÓZÓ SZEMÉLYZET TAGJAINAK SZAKSZOLGÁLATI ENGEDÉLYEI ÉS JOGOSÍTÁSAI

4. 1. A nem hajózó személyzet tagjainak szakszolgálati engedélyére és jogosításaira vonatkozó általános szabályok

4. 1. 1. Bármely nem hajózó személyzeti tagra vonatkozó szakszolgálati engedély vagy jogosítás kiadása előtt a folyamodónak ki kell elégítenie az életkorra, szakismeretre, tapasztalatra és – ahol alkalmazható, - az egészségügyi alkalmasságra, jártasságra vonatkozó követelményeket, úgy, ahogy azokat az adott szakszolgálati engedélyhez vagy jogosításhoz előírták.

4. 1. 2. Ha egy nem hajózó személyzeti tag bármilyen szakszolgálati engedélyért vagy jogosításért folyamodik, demonstrálnia kell az Engedélyező Hatóság által meghatározott módon az ilyen szakszolgálati engedélyre vagy jogosításra előírt szakismeretet és jártasságot.

4. 2. Légijármű karbantartó (technikus /mérnök /szerelő)

Megjegyzés: - A zárójelben lévő meghatározásokat a szakszolgálati engedély címéhez elfogadható kiegészítésként adtuk meg. Minden egyes Szerződő Állam az általa elfogadhatónak talált kifejezést használja fel saját előírásaiban.

4. 2. 1. A szakszolgálati engedély kiadásának feltételei

4. 2. 1. 1. *Életkor*

A folyamodó nem lehet 18 évesnél fiatalabb.

4. 2. 1. 2. *Szakismeret*

A folyamodónak bizonyítania kell, hogy tudásszintje megfelel az adandó jogosítványoknak és a légijármű karbantartó szakszolgálati engedély birtokosa felelősségi körének legalább az alábbi témakörökben:

Légi jog és légi alkalmassági követelmények

a) a légijármű karbantartó szakszolgálati engedély birtokosára vonatkozó szabályok és előírások, beleértve a légi-alkalmassá nyilvánítást és a folyamatos légi alkalmasság körét szabályozó előírásokat, illetve a jóváhagyott légijármű karbantartó szervezetet és eljárásokat,

Természettudományi ismeretek és általános légijármű-ismeret

b) alapfokú matematika, mértékegységek, a fizika és a kémia elmélete és alapelvei, melyek a légijármű karbantartóra vonatkozhatnak,

Légijármű mérnökszolgálat (engineering)

c) a légijármű építéséhez használt anyagok jellemzői és alkalmazásuk, beleértve az építés alapelveit és a légijármű szerkezetének működését, a rögzítési módszereket, a hajtóműveket és a hozzájuk tartozó rendszereket, mechanikus, folyadékos, elektromos és elektronikus erőforrásokat, légijármű műszereket és kijelző rendszereket, légijármű vezérlési rendszereket, fedélzeti navigációs és kommunikációs rendszereket,

Légijármű karbantartás

d) egy légijármű folyamatos légi alkalmasságának fenntartásához előírt tevékenységek, beleértve a légijármű szerkezetének, elemeinek és rendszereinek nagyjavítására, javítására, felülvizsgálatára, cserélésére, módosítására és a hibaelhárításra vonatkozó eljárásokat és módszereket a vonatkozó Karbantartási Kézikönyvben, valamint az alkalmazandó légi alkalmassági Szabványokban előírt módszereknek megfelelően, és

Emberi tényezők

e) a légijármű karbantartó szakszolgálati engedély birtokosára vonatkozó emberi tényezők

Megjegyzés: Az emberi tényezőkre vonatkozó kiképzési program megtervezéséhez tájékoztató anyag az Emberi Tényezők Kiképzési Kézikönyvben (9683) található.

.
4. 2. 1. 3. *Tapasztalat*

A folyamodónak mind a légijármű, mind pedig alkatrészeinek karbantartásában, szervizelésében, felülvizsgálatában az alábbi tapasztalattal kell rendelkeznie:

a) szakszolgálati engedély kiadásához a légijármű teljes egészére vonatkozó jogosítványokkal legalább:

1) négy év, vagy

2) két év, ha a folyamodó kielégítően elvégzett egy jóváhagyott kiképzési tanfolyamot, és

b) a 4. 2. 2. 2. a) 2) vagy 3) pontoknak megfelelő korlátozott jogosítványokkal kiadott szakszolgálati engedélyhez olyan időtartam, mely lehetővé teszi az a) alpontban előírt szakértelem szint elérését feltéve, hogy ez nem rövidebb, mint: 1) két év, vagy

2) egy olyan időtartam, melyet az Állam szükségesnek tart ahhoz, hogy a folyamodó egy jóváhagyott kiképzési tanfolyamot elvégzett személlyel azonos szintű gyakorlati tapasztalatot szerezzen.

4. 2. 1. 4. *Kiképzés*

Ajánlás - *A folyamodónak a kért jogosítványoknak megfelelő kiképzési tanfolyamot kell elvégeznie. Megjegyzés: - Légijármű karbantartó szakszolgálati engedélyért folyamodók számára a kiképzési tanfolyamra vonatkozó tájékoztató anyagot a Kiképzési Kézikönyv (DOC 7192) D-1 Része tartalmazza.*

4. 2. 1. 5. *Jártasság*

A folyamodónak bizonyítania kell, hogy képes ellátni a megadandó jogosítványoknak megfelelő funkciókat.

4. 2. 2. A szakszolgálati engedély birtokosának jogosítványai és ezek gyakorlásakor figyelembe veendő feltételek

4. 2. 2. 1. Ha a 4. 2. 2. 2 és a 4. 2. 2. 3 pontokban előírt követelményeknek megfelel, a légijármű karbantartó szakszolgálati engedély birtokosának joga van a légijármű vagy részeinek légi alkalmasságát igazolni jóváhagyott javítás, módosítás után, vagy egy hajtómű, tartozékok, műszer és/vagy berendezés tétel beépítését követően és aláírni a karbantartási okmányt felülvizsgálat, karbantartási munkák elvégzése és/vagy rutin szervizmunkák elvégzése után.

4. 2. 2. 2. A 4. 2. 2. 1. pontban meghatározott légijármű karbantartó szakszolgálati engedély birtokosának jogosítványai csak akkor gyakorolhatók, ha:

a) ezekre nézve:

1) a szakszolgálati engedélybe teljes egészében be van jegyezve a légijármű akár specifikusan, akár egy átfogó kategóriába sorolva; vagy

2) a szakszolgálati engedélybe akár specifikusan, akár egy átfogó kategóriába sorolva bejegyezték a sárkány és hajtóműveket, a légijármű rendszereket vagy részegységeket; és/vagy

3) a szakszolgálati engedélybe akár specifikusan, akár egy átfogó kategóriába sorolva bejegyezték a légijármű elektronikai rendszereket vagy részegységeket;

b) biztosított, hogy a szakszolgálati engedély birtokosa ismeri az adott légijármű karbantartására és légi-alkalmasságára vonatkozó összes olyan információt, amelyek alapján a szakszolgálati engedély birtokosa aláírja a Karbantartási Okmányt, vagy a sárkányra, hajtóműre, légijármű rendszerre vagy részegységre, valamint a légijármű elektronikai rendszerére, vagy annak részegységére vonatkozó minden olyan információt, amelyeknek légi alkalmasságát a szakszolgálati engedély birtokosa igazolja; és

c) feltéve, hogy a megelőző 24 hónapon belül a szakszolgálati engedély birtokosa tapasztalatot szerzett egy légijármű vagy alkotóelemei felülvizsgálata, szervizelése vagy karbantartása terén, és a kiadott szakszolgálati engedélye jogosítványait nem kevesebb, mint 6 hónapja gyakorolja, vagy eleget tett a szakszolgálati engedély megfelelő jogosítványokkal történő kiadása feltételeinek az Engedélyező Hatóság megelégedésére.

4. 2. 2. 3. A Szerződő Államnak a szakszolgálati engedély birtokosa jogosítványainak körét le kell írnia a feladatok komplexitásának azon fogalmaiban, amelyekre a szakszolgálati engedély kiadása vonatkozik.

4. 2. 2. 3. 1. **Ajánlás -** *A szakszolgálati engedély jogosítványainak részleteit vagy be kell vezetni a szakszolgálati engedélybe, vagy ahhoz kell csatolni akár közvetlenül, akár a Szerződő Állam által kiadott másik dokumentumra történő hivatkozással.*

4. 2. 2. 4. Ha a Szerződő Állam felhatalmaz egy jóváhagyott karbantartó szervezetet szakszolgálati engedéllyel nem rendelkező személyzet kijelölésére a 4. 2. 2 pont jogosítványainak gyakorlására, a kijelölt személynek ki kell elégítenie a 4. 2. 1 pont előírásait.

4. 3. Növendék légiforgalmi irányító

4. 3. 1.A Szerződő Államoknak megfelelő intézkedéseket kell foganatosítania, hogy a növendék légiforgalmi irányítók ne okozzanak veszélyt a légiközlekedésben.

4. 3. 2. Egészségügyi alkalmasság

A Szerződő Állam nem engedi meg a növendék légiforgalmi irányítónak, hogy utasításokat fogadjon üzemelési környezetben, ha a növendék légiforgalmi irányító nem rendelkezik érvényes 3. osztályú egészségügyi minősítéssel.

4. 4. A légiforgalmi irányító szakszolgálati engedély

4. 4. 1 Követelmények az engedély kiadására

A légiforgalmi irányító jogosításainak a következő kategóriákat kell magába foglalnia:
A légiforgalmi irányító szakszolgálati engedélyének kiállítása előtt a Szerződő Állam előírja, hogy a folyamodónak meg kell felelnie a 4. 4. 1 pontban szereplő követelményeknek és a 4. 5. pontban foglalt legalább egy jogosításnak. Engedéllyel nem rendelkező állami alkalmazottak is dolgozhatnak légiforgalmi irányítóként abban az esetben, ha ugyanazoknak a követelményeknek megfelelnek.

4. 4. 1. 1. *Életkor*

A folyamodó nem lehet 21 évesnél fiatalabb.

4. 4. 1. 2. Szakismeret

A folyamodónak bizonyítania kell, hogy tudásszintje megfelel a légiforgalmi irányító szakszolgálati engedélyéhez kötött ismereteknek legalább az alábbi témakörökben**:**
Légi jog

a) a légiforgalmi irányítóra vonatkozó szabályok és rendeletek*:*

Légiforgalmi irányítás berendezései

b) a légiforgalmi irányításban használt berendezések alapelvei és korlátozásai

Általános ismeretek

c) a repülés alapelvei, a légijármű, a hajtóművek és rendszerek működésének és üzemeltetésének alapelvei, a légijárműnek a légiforgalmi irányításra vonatkozó teljesítmény jellemzői,

Az emberi tényezők

d) az emberi tényezők a fenyegetés és hibák kezelésénél;

Megjegyzés: útmutató anyag az emberi tényezők képzés megtervezéséről a fenyegetés és hibák kezelésével kapcsolatban megtalálható az Emberi Tényezők Kiképzési Kézikönyvben (DOC 9683)

Meteorológia

e) repülési meteorológia; meteorológiai dokumentációk és információk elemzése és használata, a repülés végrehajtását és biztonságát befolyásoló időjárási jelenségek keletkezési helye és jellemzői, magasságmérés,

Navigáció

f) a repülési navigáció alapelvei, a navigációs rendszerek és a látás utáni navigáció segédeszközeinek alapelve, pontossága és korlátai, és

Üzemeltetési eljárások

g) a légiforgalmi irányítás, a rádióösszeköttetés, a rádió-távbeszélés és kifejezések eljárásai (szokványos, nem szokványos, vészhelyzeti), a vonatkozó légiforgalmi dokumentációk használata, a repüléssel kapcsolatos biztonsági gyakorlati eljárások

4. 4. 1. 3. Tapasztalat

A folyamodónak egy jóváhagyott kiképzési tanfolyamot kell elvégeznie és legalább három hónapig kielégítően kell tevékenykednie a tényleges légiforgalmi irányításban egy megfelelő jogosítással rendelkező légiforgalmi irányító felügyelete alatt. A légiforgalmi irányító jogosításaira a 4. 5. pontban meghatározott tapasztalat követelményeket a jelen pontban előírt tapasztalat részének lehet tekinteni.

4. 4. 1. 4. Egészségügyi alkalmasság

A folyamodónak érvényes 3. osztályú egészségügyi minősítéssel kell rendelkeznie.

4. 5. A légiforgalmi irányító jogosításai

4. 5. 1. A légiforgalmi irányító jogosításának kategóriái

A légiforgalmi irányító jogosításainak a következő kategóriákat kell magába foglalnia:

a) repülőtéri irányító jogosítás;

b) bevezetés irányító jogosítás;
c) radarbevezetés irányító jogosítás;

d) precíziós radarbevezetés irányító jogosítás;

e) távolkörzeti irányító jogosítás; és

f) távolkörzeti radarirányító jogosítás.

Megjegyzés: A Meteorológiai Világszervezet (WMO) a meteorológiai észleléseket végző személyzetre követelményeket írt elő, amelyek vonatkoznak az ugyanilyen feladatot ellátó légiforgalmi irányítókra is.

4. 5. 2. A légiforgalmi irányító jogosítások feltételei

4. 5. 2. 1 Szaktudás
A folyamodónak bizonyítania kell, hogy tudásszintje megfelel a megadandó jogosítványoknak az alábbi témakörökben és olyan mértékig, amennyire ezek érintik a felelősségi körét:

a) *repülőtéri irányító jogosultsághoz*:

1) a repülőtér kialakítása, fizikai jellemzői és a látás utáni navigáció segédeszközei;

2) a légtér szerkezete;

3) alkalmazandó szabályok, eljárások, és információforrások;

4) léginavigációs berendezések;

5) a légiforgalmi irányítás berendezései és azok használata;

6) domborzati és jellegzetes tereppontok;

7) a légiforgalom jellemzői;

8) időjárási jelenségek; és

9) vészhelyzeti, valamint kutatási és mentési tervek;

b) bevezetés irányító és távolkörzet irányító jogosításokhoz:

1) a légtér szerkezete;

2) alkalmazandó szabályok, eljárások és információforrás;

3) léginavigációs berendezések;

4) a légiforgalmi irányítás berendezései és használata;
5) domborzati és jellegzetes tereppontok;

6) a légiforgalom és a forgalomáramlás jellemzői;

7) időjárási jelenségek; és

8) vészhelyzeti, valamint kutatási és mentési tervek; és

c) radarberendezés irányító, precíziós radarbevezetés irányító és távolkörzeti radarirányító jogosításhoz:
A folyamodónak ki kell elégítenie a b) pontban előírt követelményeket a felelősségi körét érintő mértékben és bizonyítania kell az adandó jogosítványoknak megfelelő tudásszintet az alább felsorolt további témakörökben:

1) a radar, egyéb légtérellenőrző rendszerek, és a hozzájuk tartozó berendezések alapelve, használata és korlátai; és

2) a bevezetés, a precíziós bevezetés vagy a távolkörzeti radarirányítás szolgálatok biztosításának eljárásai, - amennyiben alkalmazhatók – beleértve a domborzattól való megfelelő elkülönítés megvalósításának eljárásait.

4. 5. 2. 2. *Szakismeret*

4. 5. 2. 2. 1. A folyamodónak:

a) sikeresen el kell végeznie egy jóváhagyott kiképzési tanfolyamot;

b) megfelelően jogosított légiforgalmi irányító felügyelete alatt irányítói szolgálatot kell kielégítően ellátnia:

1) *repülőtéri irányítói jogosítás esetében:* 90 óránál vagy egy hónapnál nem rövidebb ideig, attól függően, hogy melyik a hosszabb időtartam, egy repülőtéri irányító szolgálat azon egységénél, amelyre a jogosítását kéri;

2) *bevezetés irányító, radarbevezetés irányító, távolkörzeti vagy távolkörzeti radarirányító jogosítás esetében:* legalább 180 óra, vagy három hónap – attól függően, hogy melyik a hosszabb időtartam – azon irányítási egységnél, amelyre a jogosítását kéri;

3*) precíziós radarbevezetés irányító jogosítás esetében*: legalább 200 precíziós bevezetést, amelyből maximum 100 bevezetést lehet az Engedélyező Hatóság által erre a célra jóváhagyott szimulátoron teljesíteni. A fennmaradó precíziós bevezetésekből legalább ötvenet annál a szolgálati egységnél és azon az irányítóberendezésen kell teljesítenie, amelyre a jogosítását kéri; és

c) ha a radarbevezetés irányító jogosítás magába foglalja a légtérellenőrző radarbevezetés jogosítványát is, akkor a folyamodónak megfelelően jogosított bevezető irányító felügyelete alatt legalább 25 PPI (síkhelyzet kiértékelő) bevezetést kell végrehajtania olyan légtérellenőrző berendezés típuson, amelyet annál az egységnél használnak, amelyre a jogosítását kéri.

4. 5. 2. 2. 2. A 4. 5. 2. 2. 1 b) pontban meghatározott tapasztalatot az alkalmazását közvetlenül megelőző hat hónapon belül kell megszereznie.

4. 5. 2. 2. 3. Ha a folyamodó már rendelkezik légiforgalmi irányítói jogosítással egy másik kategóriában, vagy ugyanazzal a jogosítással egy másik irányító szolgálati egységnél, az Engedélyező Hatóságnak kell meghatároznia, hogy a 4. 5. 2. 2. pontban előírt gyakorlat csökkenthető-e, és ha igen, akkor milyen mértékben.

4. 5. 2. 3. *Jártasság*
A folyamodónak bizonyítania kell – a megadandó jogosítványoknak megfelelő szinten – az irányítói feladatok biztonságos, rendszeres és gyors ellátásához szükséges jártasságát, ítélőképességét és teljesítőképességét.

4. 5. 2. 4. *Két légiforgalmi irányító jogosítás egyidejű kiadása*

Ha a folyamodó egyidejűleg két légiforgalmi irányítói jogosítást kér, az Engedélyező Hatóságnak kell kialakítania az alkalmazható követelményeket az egyes jogosítások megszerzésének feltételei alapján. Az így meghatározott követelmények szintje nem lehet alacsonyabb, mint a magasabb követelményszintű jogosításé.

4. 5. 3. **A légiforgalmi irányító jogosítás (ok) birtokosainak jogai és ezek gyakorlásakor betartandó feltételek**

4. 5. 3. 1. Ha a szakszolgálati engedély birtokosa az 1. 2. 5, az 1. 2. 6. 1. 2. 7. 1. és 1. 2. 9. pontokban meghatározott követelményeknek eleget tett, és az alábbi jogosításokból egyet vagy többet bejegyeztek a légiforgalmi irányító szakszolgálati engedélyébe, akkor joga van:

a) repülőtéri irányító jogosítás esetében: repülőtéri irányító szolgálatot ellátni, vagy felügyeletet azon a repülőtéren, amelyre a jogosítása szól;

b) bevezetés irányító jogosítás esetében: bevezetés irányító szolgálatot, vagy felügyeletet ellátni a bevezetés irányító szolgálat illetékességi területébe vagy annak egy szektorába tartozó repülőtéren, vagy repülőtereken, amelyekre a szakszolgálati engedély birtokosa a jogosítást megszerezte;

c) radarbevezetés irányító jogosítás esetében: a bevezetés irányító szolgálat illetékessége alá tartozó, vagy annak meghatározott szektorában lévő repülőtéren, vagy repülőtéren radarral, vagy egyéb légtérellenőrző berendezéssel biztosított bevezetés irányító szolgálatot ellátni és/vagy felügyeletet, amelyekre a szakszolgálati engedély birtokosa a jogosítást megszerezte;

1) ha a 4. 5. 2. 2. 1. c) pont előírásainak megfelelt, a jogosítványoknak magukba kell foglalni a légtérellenőrző radarral (SRA) történő bevezetéseket is;

d) precíziós radarbevezetés irányító jogosítás esetében: precíziós radarbevezetés szolgálatot ellátni és/vagy felügyeletet azon a repülőtéren, amelyre a szakszolgálati engedély birtokosa jogosítást szerzett, és/vagy felügyeletet azon a repülőtéren, amelyre a szakszolgálati engedély birtokosa jogosítást szerzett;

e) távolkörzeti irányító jogosítás esetében: távolkörzeti irányító szolgálatot ellátni és/vagy felügyeletet gyakorolni azon irányítási körzetben vagy annak egy adott részében, amelyre a szakszolgálati engedély birtokosa jogosítást kapott; és *f) távolkörzeti radarirányítás jogosítás esetében*: az irányítási körzetben, vagy annak egy részében radar használatával irányító szolgálatot ellátni és/vagy felügyeletet gyakorolni, amelyre a szakszolgálati engedély birtokosa jogosítást szerzett.

4. 5. 3. 2. Mielőtt a 4. 5. 3. 1. pontban jelzett jogosítványait gyakorolná, a szakszolgálati engedély birtokosának meg kell ismernie az összes vonatkozó és érvényben lévő információt.

4. 5. 3. 3. A Szerződő Állam, ha már kiadott egy légiforgalmi irányító szakszolgálati engedélyt, ne engedje meg, hogy a szolgálati engedély birtokosa oktatást végezzen üzemi körülmények között feltéve, ha megfelelő felhatalmazást kapott erre a Szerződő Államtól.

4. 5. 3. 4. *A jogosítások érvényessége*
Egy jogosítás akkor válik érvénytelenné, ha egy légiforgalmi irányító az Engedélyező Hatóság által meghatározott időtartam alatt nem gyakorolja jogosítványait. Ez az időtartam nem haladhatja meg a hat hónapot. A jogosítás érvénytelensége fennáll addig, amíg az irányítóról újra meg nem állapítják, hogy képes a jogosítványok gyakorlására.

4. 6. Repülésüzemi tiszt/diszpécser szakszolgálati engedély

4. 6. 1. A szakszolgálati engedély kiadásának feltételei

4. 6. 1. 1. *Életkor*

A folyamodó nem lehet 21 évesnél fiatalabb.

4. 6. 1. 2. *Szakismeret*

A folyamodónak bizonyítania kell, hogy rendelkezik a repülésüzemi tiszt szakszolgálati engedély birtokosának megadott jogosítványoknak megfelelő tudásszinttel, legalább az alábbi témakörökben:

Légi jog

a) a repülésüzemi tiszt szakszolgálati engedély birtokosára vonatkozó szabályok és előírások, megfelelő légiforgalmi szolgálatok gyakorlatai és eljárásai;

Általános légijármű ismeret

b) a repülőgép hajtóműveinek, rendszereinek és műszereinek üzemeltetési alapelvei;

c) a repülőgépek és a hajtóművek üzemi korlátozásai;

d) minimálisan elégséges berendezések jegyzéke;

Repülési jellemzők kiszámítása és a repüléstervezés eljárásai

e) a terhelés és a tömegelosztás hatásai a légijármű teljesítményére és repülési jellemzőire, tömeg és tömegközéppont számítások;

f) a repülés részletes megtervezése, tüzelőanyag fogyasztás és tüzelőanyag időtartam számítások, kitérő repülőtér kiválasztási eljárásai, utazórepülés szabályozása az útvonalon, kiterjesztett hatótávolságú üzemelés;

g) repülési terv összeállítása és kitöltése a légiforgalmi szolgálatok részére;

h) a számítógépes repüléstervezési rendszerek alapelvei;

Emberi tényezők

i) a diszpécser kötelmekre vonatkozó emberi tényezők;

Megjegyzés: Az emberi tényezők kiképzési program megtervezéséhez tájékoztató anyag az Emberi Tényezők Kiképzési Kézikönyvben (DOC 9683) található.

Meteorológia

j) repülési meteorológia, a nyomásrendszerek mozgása, a frontok szerkezete, szignifikáns időjárási jelenségek keletkezési helye és jellemzői, amelyek befolyásolják a felszállás, az útvonalrepülés és a leszállás körülményeit;

k) a légiforgalmi meteorológiai jelentések, térképek és előrejelzések, a kódok és rövidítések értelmezése és alkalmazása, a meteorológiai információ használata és beszerzésének eljárásai;

Navigáció

l) a léginavigáció alapelvei, különös tekintettel a műszeres repülésre;

Üzemeltetési eljárások

m) a légiforgalmi dokumentáció használata;

n) áru és veszélyes anyagok szállításának üzemi eljárásai;

o) légijármű balesetekre és eseményekre vonatkozó eljárások, veszélyhelyzeti repülési eljárások;

p) a légijárműben elkövetett jogellenes cselekményekre és szabotázsakcióra vonatkozó eljárások;

Repüléselmélet

q) a megfelelő kategóriájú légijárműre vonatkozó repüléselmélet; és

Rádióösszeköttetés

r) a légijárművel és a vonatkozó földi állomásokkal történő rádióösszeköttetés eljárásai.

4. 6. 1. 3. *Tapasztalat*

4. 6. 1. 3. 1. A folyamodónak az alábbi tapasztalattal kell rendelkeznie:

a) két teljes év szolgálati idő az 1) - 3) alpontokban (mindkettőt beleértve) meghatározott munkakörök

bármelyikében, vagy ezek kombinációjában feltéve, hogy bármilyen kombináció esetében a szolgálati időnek bármelyik munkakörben legalább egy évnek kell lenni:
1) közforgalmi hajózó személyzet tagja; vagy

2) közforgalmi légijárművek diszpécser teendőit ellátó szervezetnél meteorológus; vagy

3) légiforgalmi irányító, vagy a repülésüzemi tisztek vagy közforgalmi repülésüzemi rendszerek műszaki ellenőre; vagy

b) legalább 1 évet eltöltött gyakornokként közforgalmi légijárművek diszpécser feladatainak ellátásában; vagy

c) sikeresen elvégzett egy jóváhagyott kiképzési tanfolyamot.

4. 6. 1. 3. 2. A folyamodónak az alkalmazását közvetlenül megelőzően 6 (hat) hónapon belül legalább 90 munkanapot kell teljesítenie egy repülésüzemi tiszt felügyelete alatt.

4. 6. 1. 4. *Jártasság*
A folyamodónak bizonyítania kell, hogy képes:

a) a napi időjárási térképekből és jelentésekből pontos és az üzemeltetés szempontjából elfogadható időjárás- analízist készíteni, egy adott útvonal általános környezetében uralkodó időjárási körülményekről üzemeltetési szempontból érvényes tájékoztatást adni, a repülést érintő időjárás tendenciát előre jelezni, különös tekintettel a cél- és kitérő repülőterekre;

b) egy adott járatszakasz optimális repülési útvonalát meghatározni, és kézzel és/vagy számítógéppel pontos repülési útvonaltervet készíteni; és

c) operatív felügyeletet gyakorolni, és minden egyéb segítséget megadni a tényleges vagy szimulált hátrányos időjárási körülmények között lévő járatnak, oly módon, ahogy a repülésüzemi tiszt szakszolgálati engedély birtokosának kötelmei ezt megkívánják.

4. 6. 2. A szakszolgálati engedély birtokosának jogosítványai és ezek gyakorlásakor betartandó követelmények
Ha az 1. 2. 5 pontban előírt követelményeknek megfelelt, a repülésüzemi tiszt szakszolgálati engedély birtokosának joga van ebbeli minőségében szolgálatot ellátni bármely olyan körzetre kiterjedő felelősséggel, amelyre nézve a folyamodó eleget tett az Annex 6-ban meghatározott feltételeknek.

4. 7. Légiforgalmi állomásüzemeltető szakszolgálati engedély

Megjegyzés: - Ez a szakszolgálati engedély nem a repülőtéri repüléstájékoztató szolgálat (AFIS) személyzete számára szolgál. Az ilyen személyzetek képesítésére vonatkozó tájékoztató anyag az ICAO 211 számú Körlevelében Repülőtéri Repüléstájékoztató Szolgálat (AFIS) címmel található meg.

4. 7. 1. A szakszolgálati engedély kiadásának feltételei

4. 7. 1. 1. Mielőtt a Szerződő Állam egy légiforgalmi állomásüzemeltető szakszolgálati engedélyt kiadna, meg kell követelnie a folyamodótól, hogy az eleget tegyen a 4. 6. 1 pont követelményeinek. Szakszolgálati engedély nélküli személyek azzal a feltétellel tevékenykedhetnek légiforgalmi állomásüzemeltetőként, hogy az az állam, amelynek területéről üzemelnek biztosítja, hogy ezen személyek megfelelnek

ugyanezen követelményeknek.

4. 7. 1. 2. *Életkor*
A folyamodó nem lehet 18 évesnél fiatalabb.

4. 7. 1. 3. *Szaktudás*

A folyamodónak demonstrálnia kell a légiforgalmi állomásüzemeltető szakszolgálati engedély birtokosára előírt tudásszintet legalább az alábbi témakörökben:

Általános ismeretek

a) az Állam területén belül biztosított légiforgalmi szolgálatok;

Üzemeltetési eljárások

b) rádió-távbeszélő eljárások, kifejezések, távközlési hálózat;

Szabályok és előírások

c) a légiforgalmi állomásüzemeltetőre vonatkozó szabályok és előírások; és

Távközlési berendezések

d) a légiforgalmi állomáson lévő távközlési berendezések alapelvei, használata és korlátozásai.

4. 7. 1. 4. *Tapasztalat*

4. 7. 1. 4. 1. A folyamodónak:

a) sikeresen el kell végeznie egy jóváhagyott kiképzési tanfolyamot az alkalmazását közvetlenül megelőző 12 hónapos időszak alatt, és kielégítően kell tevékenykednie egy minősített légforgalmi állomásüzemeltető mellett legalább két hónapig; vagy

b) egy minősített légiforgalmi állomásüzemeltető mellett kielégítően kell tevékenykednie legalább hat hónap időtartamig az alkalmazását közvetlenül megelőző 12 hónapon belül.

4. 7. 1. 5. *Jártasság*

A kérelmezőnek demonstrálnia kell, vagy már előzőleg demonstrálta jártasságát:

a) a használatos távközlési berendezések üzemeltetésében; és

b) a rádiótelefon üzenetek hatékony és pontos adásában és vételében.

4. 7. 2. A légiforgalmi állomásüzemeltető szakszolgálati engedély birtokosának jogosítványai és ezen jogosítványok gyakorlásakor figyelembe veendő feltételek

4. 7. 2. 1.Ha az 1. 2. 5 és 1. 2. 9. pontokban előírt követelményeket teljesítette, a légiforgalmi állomásüzemeltető szakszolgálati engedély birtokosának joga van egy légiforgalmi állomáson

ANNEX 2.
Repülési szabályok

10. kiadás – 2005 július
40. módosítás

Jelen kiadvány magában foglalja a Tanács által 2005. február 24-ét megelőzően elfogadott módosításokat, és 2005. november 24-től hatálytalanítja a 2. Annex összes megelőző kiadását.
A nemzetközi szabványok alkalmazhatóságával kapcsolatosan lásd az Előszót.

Nemzetközi Polgári Légi-közlekedési Szervezet

ICAO

Tartalomjegyzék

22) – Légi-navigációs Bizottság
Személyzet nélküli szabad léggömbök; várható érkezési idő.
1981. március 2. 1981. július 2. 1981. november 26.

23) – Hetedik kiadás – Légi-navigációs Bizottság
Polgári légi-jármű elfogása.
1981. április 1. 1981. augusztus 1. 1981. november 26.

24) – Légi-navigációs Bizottság
Légi-jármű külső fények.
1982. március 19. 1982. július 19. 1982. november 25.

25) – AGA bizottsági ülés (1981) – Légi-navigációs bizottság
Földfelszín feletti magasság; műszeres megközelítési eljárások; mozgási és munkaterület; gurulás és guruló út meghatározások; a „HIJACK" kifejezés használata a polgári légi-jármű elfogásánál; a légi-jármű bérletére; cseréjére és különjárati üzemeltetésére vonatkozó megjegyzés; előírások a légi-jármű földi mozgására és gurulására; 2. sorozatú jelzések; amelyeket a forgószárnyas légi-jármű elfogás esetén használ; mértékegységek.
1983. március 21. 1983. július 29. 1983. november 24.

26) – Adatfeldolgozási Munkacsoport 1981 évi harmadik ülése – Légi-navigációs Bizottság
Meghatározások; a légiforgalmi szolgálati egységeknek benyújtott repülési terv tartalma; az ismétlődő repülési tervek; ATS adatcsere; az elfogó légi-jármű által használt kifejezések kiejtése; rádiótelefon sürgősségi jelzés egyeztetése a 10. Annex II. kötetével; UTC – Egyeztetett Egységes Idő.
1984. június 22. 1984. október 22. 1985. november 21.

27) – Nyolcadik kiadás – Tanács – Légi-navigációs Bizottság
Polgári légi-jármű azonosítása és elfogása.
1986. március 10. 1986. július 27. 1986. november 20.

28) – Légi-navigációs Bizottság

A forgalmi előtér meghatározása; különleges eljárások a jogtalan beavatkozás esetére
1987. március 16. 1987. július 27. 1987. november 19.

29) – Kilencedik kiadás – Látva repülési szabályok szerinti üzemeltetés munkacsoport 1986 évi harmadik ülése – Titkárság – Látás utáni segédeszközök munkacsoport 1987 évi 11. ülése – Légi-navigációs Bizottság – A 6. Annex elfogadása miatt szükséges módosítások
Légi-jármű üzemeltetés VFR/IFR vegyes körülmények között; a légi-jármű földi mozgása, irányítása és ellenőrzése; a jogtalan beavatkozási eseményei; forgószárnyas légi-jármű elfogóként történő igénybevétele.
1990. március 12. 1990. július 30. 1991. november 14.

30) – SSR Fejlesztési és Összeütközés Megelőzési Rendszerek Munkacsoport 1989 évi negyedik ülése
Meghatározások; összeütközés elkerülését biztosító fedélzeti rendszer (ACAS).
1993. február 26. 1993. július 26. 1993. november 11.

31) – Az Elkülönítés Általános Elmélete munkacsoport 1990 évi hetedik ülése – Légi-navigációs Bizottság – Automatikus légtérfelderítés munkacsoport 1992 évi második ülése
Meghatározások; légi gurulás; elkülönítés a légi-járművek között; polgári légi-járművek kötelék repülése ellenőrzött légtérben; automatikus légtérfelderítés.
1994. március 18. 1994. július 25. 1994. november 10.

32) – Légi-navigációs Bizottság
Megjegyzés az összeütközés elkerülését biztosító fedélzeti rendszer (ACAS) elhelyezésére és alkalmazására vonatkozó előírásokhoz.
1996. február 19. 1996. február 19. --------------------

33) – Légi-navigációs Bizottság
Összeköttetés megszakadása esetén alkalmazott eljárások.
1997. február 26. 1997. július 21. 1997. november 6.

34) – Automatikus **L**égtérfelderítés Munkacsoport negyedik ülése (1996), Az elkülönítés általános elméletével foglalkozó munkacsoport kilencedik ülése (1996), az 1. Annex 162. kiegészítésének megfelelő módosítások.
Meghatározások; automatikus légtér-felderítési rendszerek és eljárások; adatcsere az automatizált légiforgalmi szolgálati rendszerek között; a levegő–föld adat-összeköttetés alkalmazása az ATS területén; a szellemi tevékenységet befolyásoló anyagok használatával kapcsolatos kérdések.
1998. március 19. 1998. július 20. 1998. november 5.

35) – Légi-navigációs Bizottság – Látás utáni segédeszközök munkacsoport 1997 évi 13. ülése
Légiforgalmi szolgálati légterek osztályozása; VMC időjárási körülmények között kiadott légiforgalmi irányítói engedély; futópálya várakozási hely.
1999. március 10. 1999. július 19. 1999. november 4.

36) – A legutóbbi módosításoknak megfelelő változások: 11. Annex 40.sz. módosítása., – 6. Annex I. rész 23–25. sz. módosítása, – 6. Annex II. rész 20. és III. rész 7. sz. módosítása., – 3. Annex 72. sz. módosítása.
Módosított meghatározások: légiforgalmi irányító egység, bevezető irányító egység, kitérő repülőtér, hajózószemélyzeti tag, légi-jármű parancsnok, látástávolság; továbbá szerkesztői módosítások.
2001. március 12. 2001. július 16. 2001. november 1.

37) – Elkülönítési és Légtérbiztonsági Munkacsoport (SASP) Repülőgép-vezető eljárásai a jogtalan beavatkozás esetén; szerkesztői módosítások.
2003 február 28. ------------------- --------------------

38) – Titkársági meghatározások; beállítói jelzések; rádióösszeköttetés megszakadási eljárások;

elfogási manőverek; szerkesztői módosítások
2005. február. 23. 2005. július 11. 2005. november 24.

39) – Titkársági átszövegezés annak érdekében, hogy nagyobb hangsúlyt kapjon a légi-jármű parancsnok felelőssége az összeütközések elkerülésében.
2006. február 20. 2006. július 17. 2006. november 23.

40) – Légi-navigációs Bizottság; Az ADS-B, ADS-C-re és az ADS-C egyezményre vonatozó meghatározások és hozzátartozó eljárások.
2007. február 26. 2007. július 16. 2007. november 22.

1. fejezet

Meghatározások

1. Megjegyzés - A jelen dokumentum szövegében a "szolgálat" kifejezés mindvégig a feladatkörök vagy biztosított szolgáltatások megjelölésre vonatkozó elvont fogalom, míg az "egység" kifejezés egy szolgálatot ellátó kollektív testület megjelölésére szolgál.
2. Megjegyzés - Ezen meghatározásokban az (RR) jelölés a Nemzetközi Távközlési Egyesülés (ITU) Rádió-berendezésre vonatkozó Rendelkezésére utal (lásd a jóváhagyott ICAO irányelveket (DOC 9718) magában foglaló „Rádiófrekvencia Spektrum Követelmények a Polgári Légi-közlekedés számára" című Kézikönyvet).

Amikor a Repülési Szabályokra vonatkozó nemzetközi szabványok szövegében a következő kifejezéseket használjuk, azok jelentése a következő:

Adat összeköttetési távközlés — Data link communications
Olyan távközlési összeköttetés, amelynek célja az adathálózaton keresztül történő közleményváltás.

ADS-C (*Automatikus légtér felderítési) megállapodás – *ADS-C agreement
Jelentési terv, amely megteremti az ADS-C adatjelentés (azaz a légiforgalmi szolgáltató egység által igényelt adatok és az ADS-C jelentések gyakorisága, amelyben a légiforgalmi szolgálatok által biztosított ADS-C használatot megelőzően kell megállapodni) feltételeit

Megjegyzés – A megállapodás tartalmának üzenetváltása a földi rendszer és a légi-jármű között szerződés, vagy szerződéssorozat segítségével megy végbe

Anyagok (szellemi tevékenységet befolyásoló) használatából származó veszélyek — Problematic use of substances
Egy vagy több, a szellemi tevékenységet befolyásoló anyag olyan jellegű felhasználása a légi-közlekedés szakszemélyzete részéről, amely:
a) közvetlen veszélyt jelent az anyagot felhasználó számára vagy veszélyezteti mások életét, egészségét illetve vagyontárgyait; és/vagy
b) foglalkozásbeli, társadalmi, szellemi vagy fizikai nehézséget illetve rendellenességet okoz.

Átállási pont — Change over point
Az a pont, ahol az ultrarövid hullámú (VHF) körsugárzó VOR berendezéssel kijelölt ATS útvonalszakaszon üzemelő légi-járműtől elvárják, hogy a már átrepült berendezés — mint elsődleges navigációs vonatkozási hely — követéséről átáll az előtt levő berendezés követésére.

Megjegyzés - Az átállási pontokat azért jelölik ki, hogy a jelek erőssége és minősége a legmegfelelőbb egyensúlyban legyen a navigációs berendezések között minden használatos szinten, továbbá hogy azonos berendezéstől származó irányszög vezetést biztosítsanak az azonos útvonalszakaszon üzemelő összes légi-jármű számára.

Átváltási magasság — Transition altitude
Az a magasság, amelyen vagy amely alatt a légi-jármű függőleges helyzetét a közepes tengerszint feletti magassághoz viszonyítva ellenőrzik.

Automatikus légtérfelderítés – rádióforgalmazás (ADS-B) — Automatic dependent surveillance – broadcast (ADS-B)
Egy eszköz, amelynek révén a légi-jármű, repülőtéri járművek és egyéb objektumok adattovábbítási összeköttetés rádióforgalmazási üzemmódjában olyan adatok automatikus adására és vételre képesek, mint az azonosítási, helyzet-meghatározási és egyéb megfelelő adatok.

Automatikus légtérfelderítés - adatszolgáltatási szerződés (ADS-C) — Automatic dependent surveillance – contract (ADS-C)
Egy eszköz, amelynek révén adat-összeköttetés útján egy ADS-C megállapodási üzenetváltás jön létre a földi rendszer és a légi-jármű között, meghatározva, hogy milyen feltételek mellett lehet kezdeményezni az ADS-C jelentést, és a jelentések milyen adattartalmúak lehetnek.

Megjegyzés - Az "ADS szerződés" rövidített gyűjtőfogalom, amelynek jelentése: ADS eseti szerződés, ADS igény szerinti szerződés, ADS időszakos szerződés vagy egy vészhelyzeti üzemmód.

Benyújtott repülési terv — Filed flight plan
A repülőgép-vezető vagy kijelölt képviselője által a légiforgalmi szolgálati egységnek (ATS) benyújtott repülési terv bármely egyéb, későbbi módosítás nélkül.

Bevezető irányító egység — Approach control unit
Egy vagy több repülőtér érkező vagy induló ellenőrzött repülés számára légiforgalmi irányító szolgálat biztosítása céljából létesített egység.

Bevezető irányító szolgálat — Approach control service
Az érkező vagy induló ellenőrzött forgalom irányítására létesített légiforgalmi irányító szolgálat.

Biztonsági szempontból fontos személyek — Safety-sensitive personnel
A légi-közlekedés biztonságát veszélyeztethető személyek, amennyiben feladataikat és kötelességeiket nem megfelelő módon látják el. E személyek közé tartoznak - de nem kizárólagosan - a hajózószemélyzetek tagjai, a légi-jármű karbantartó személyzet és a légiforgalmi irányítók.

Ellenőrzött légtér — Controlled airspace
Meghatározott kiterjedésű légtér, amelyen belül - a légtérosztályozásnak megfelelően - az IFR és VFR repülések számára légiforgalmi irányító szolgálatot biztosítanak.

Megjegyzés - Az ellenőrzött légtér olyan gyűjtőfogalom, amelybe a 11. Annex 2.6 pontjában ismertetett A, B, C, D és E osztályú (ATS) légiforgalmi szolgálati légterek tartoznak.

Ellenőrzött repülés — Controlled flight
Bármely repülés, amely légiforgalmi irányítói engedély függvénye.

Ellenőrzött repülőtér — Controlled aerodrome
Olyan repülőtér, amelyen a repülőtéri forgalom számára légiforgalmi irányító szolgálatot biztosítanak.

Megjegyzés - Az "ellenőrzött repülőtér" kifejezés azt jelzi, hogy a repülőtéri forgalom számára légiforgalmi irányító szolgálatot biztosítanak, azonban ez nem jelenti szükségszerűen azt, hogy ott repülőtéri irányítói körzet is van.

Engedélyhatár — Clearance limit
Az a pont, ameddig egy légi-jármű részére légiforgalmi irányítói engedélyt adtak ki.

Érvényes repülési terv — Current flight plan
A későbbi engedélyekből (ha van ilyen) adódó módosításokat is magába foglaló repülési terv.
Felhőalap — Ceiling
6 000 méter (20 000 ft) alatt, az égbolt több mint felét beborító föld- vagy vízfelszín feletti legalacsonyabb felhőréteg alapjának magassága.

Forgalmi előtér — Apron
A szárazföldi repülőtéren kijelölt terület, amely az utasok, posta vagy teheráru küldemények be- és kirakodására valamint a légi-jármű üzemanyaggal történő feltöltésére, parkírozására vagy karbantartására szolgál.

Forgalmi tájékoztatás — Traffic information
A légiforgalmi szolgálati egységtől származó, az adott légi-jármű közelében vagy annak tervezett útvonalán előforduló ismert vagy észlelt légi forgalomról szóló tájékoztatás annak érdekében, hogy a repülőgép-vezetőt figyelmeztessék, és ezzel segítséget nyújtsanak számára az összeütközés elkerüléséhez.

Forgalomkerülési tanács — Traffic avoidance advice
Repülési műveletek végrehajtására vonatkozó tanács a légiforgalmi szolgálati egységtől annak érdekében, hogy ezzel segítséget nyújtsanak a repülőgép-vezető számára az összeütközés elkerüléséhez.

Földi látástávolság — Ground visibility
A repülőtérre akkreditált észlelő vagy automata rendszerek által jelentett látástávolság.

Futópálya — Runway
Egy szárazföldi repülőtéren meghatározott derékszögű terület, amelyet a légi-jármű le és felszállására alakítottak ki.

Futópálya várakozási hely — Runway-holding position
A futópálya, egy akadálykorlátozási felület vagy az ILS/MLS kritikus/érzékeny terület védelmére kijelölt hely, amelynél a guruló légi-járműveknek és egyéb járműveknek a repülőtéri irányító torony ettől eltérő engedélyének hiányában meg kell állniuk és várakozniuk kell.

Megjegyzés – A rádiótelefonos szóhasználatban a „várakozási pont" kifejezést a futópálya várópont megjelölésére alkalmazzák.

Gurulás — Taxiing
A légi-jármű mozgása a repülőtér területén saját hajtóművei segítségével, a fel és leszállás eseteit kivéve.

Guruló út — Taxiway
Egy szárazföldi repülőtéren a légi-járművek gurulására kialakított út, amelynek feladata a repülőtér egyes részei közötti összeköttetés biztosítása, beleértve:
a) Légi-jármű állóhely gurulási nyomvonal — A forgalmi előtér guruló útként kijelölt része, amelynek kizárólagos feladata a légi-jármű állóhelyek megközelítésének biztosítása.
b) Forgalmi előtér guruló út — A guruló út rendszer forgalmi előtéren átvezető része, amelynek

feladata a forgalmi előtéren történő átgurulás biztosítása.

c) Gyors leguruló út — Egy futópályához hegyes szögben csatlakozó guruló út, amely lehetővé teszi, hogy a leszállt repülőgépek más legurulásra használható guruló utakkal szemben nagyobb sebességgel hagyják el a futópályát, ily módon csökkentve annak foglaltsági idejét.

Hajózószemélyzeti tag — Flight crew member
Szakszolgálati engedéllyel rendelkező személyzeti tag, aki a repülés időtartama alatt a légi-jármű üzemeltetéséhez nélkülözhetetlen feladatokkal van megbízva.

IFR — Instrument Flight Rules
A műszerrepülési szabályok jelzésére alkalmazott rövidítés.

IFR repülés — IFR flight
A műszerrepülési szabályok szerint végrehajtott repülés.

Illetékes hatóság — Appropriate authority

a) *A nyílt tenger feletti repülés esetén*: a lajstromozó állam megfelelő hatósága.

b) A nem nyílt tenger feletti repülés esetén: Az átrepült terület felett fennhatósággal rendelkező állam megfelelő hatósága.

Illetékes légiforgalmi szolgálati hatóság — Appropriate ATS authority
Az adott légtérben a légiforgalmi szolgálatok biztosításáért felelős, az állam által kijelölt megfelelő hatóság.

IMC — Instrument Meteorological Conditions
A műszeres időjárási körülmények jelzésére alkalmazott rövidítés.

Irányítói terület — Control area
A földfelszín felett meghatározott határtól felfelé terjedő ellenőrzött légtér.

Irányítói körzet — Control zone
A földfelszíntől egy meghatározott felső magasság határig terjedő ellenőrzött légtér.

Irányszög — Heading
Az általában északtól (földrajzi, mágneses, iránytű vagy hálózati) fokokban kifejezett irány, amelyre a légi-jármű hossztengelye mutat.

Ismétlődő repülési terv — Repetitive flight plan (RPL)
Azonos alapjellemzőkkel rendelkező, rendszeresen üzemeltetett egyedi repülések sorozatára vonatkozó repülési terv, amelyet a járató elfogadásra és ismétlődő felhasználásra nyújt be a légiforgalmi szolgálati egységek számára.

Jel terület — Signal area
A repülőtéren a földi látási jelek kihelyezésére használt terület.

Jelentő-pont — Reporting point
Meghatározott földrajzi hely, amelyhez viszonyítva egy légi-jármű helyzete jelenthető.

Kitérő repülőtér — Alternate aerodrome
Olyan repülőtér, amelyre a légi-jármű abban az esetben folytathatja az útját, ha a tervezett célállomás repülőtere felé történő repülés folytatása vagy az oda történő leszállás végrehajtása lehetetlenné válik vagy nem tanácsos. A kitérő repülőterek köze tartoznak az alábbiak:

Felszállási kitérő — Take-off alternate
Olyan kitérő repülőtér, amelyen a légi-jármű leszállhat, ha ez röviddel a felszállás után szükségessé válik és erre az indulási repülőtér nem használható.

Útvonal kitérő — En-route alternate
Olyan kitérő repülőtér, amelyen egy légi-jármű leszállhat, ha az útvonal-repülés közben a hajózószemélyzet szokásostól eltérő vagy vészhelyzetet tapasztal.

ETOPS útvonal kitérő — ETOPS en-route alternate
Olyan alkalmas és megfelelő kitérő repülőtér, amelyen egy légi-jármű szükség esetén leszállhat, ha az ETOPS üzemeltetés közben egy hajtómű leáll vagy a hajózószemélyzet egyéb, a szokásostól eltérő vagy vészhelyzetet tapasztal.

Célállomás kitérő (célkitérő) — Destination alternate
Olyan kitérő repülőtér, amely felé a légi-jármű folytathatja az útját, ha a tervezett célállomás repülőterén a leszállás végrehajtása lehetetlenné válik vagy nem tanácsos.

Megjegyzés - Az a repülőtér, amelyről a repülés elindult, az adott repülés számára útvonal vagy célállomás kitérőként is megjelölhető.

Korlátozott terület — Restricted area
Egy állam föld területe vagy felségvizei felett elhelyezkedő meghatározott kiterjedésű légtér, amelyen belül a légi-jármű repülését bizonyos meghatározott körülmények alapján korlátozzák.

Körzeti irányító központ — Area control centre
Az illetékessége alá tartozó irányítói területeken üzemelő ellenőrzött repülések számára légiforgalmi irányító szolgálat biztosítása céljából létesített egység.

Körzeti irányító szolgálat — Area control service
Az irányítói körzetekben üzemelő ellenőrzött repülések számára létesített légiforgalmi irányító szolgálat.

Közel-körzet — Terminal control area
Egy vagy több nagy repülőtér közelében, általában az ATS útvonalak egyesülésénél létesített irányítói körzet.

Különleges VFR repülés — Special VFR flight
A repülőtéri irányítói körzeten belül, a látás utáni időjárási körülményeknél rosszabb időjárási helyzetben a légiforgalmi irányító szolgálat által engedélyezett VFR repülés.

Látás szerinti időjárási körülmények — Visual meteorological conditions (VMC)
Látástávolsággal, felhőzettől mért távolsággal és felhőalappal kifejezett időjárási körülmények, ha azok a látás szerinti időjárási körülményekre meghatározott minimum értékeknél jobbak.

Megjegyzés - A látás szerinti időjárási körülményekre meghatározott minimum értékeket a 4. fejezet tartalmazza.

Látástávolság — Visibility
Légi-navigációs célokra szolgáló látástávolság, az alábbiak közül a nagyobb:

a) az a legnagyobb távolság, amelyen egy megfelelő méretű, a földfelszínhez közel elhelyezkedő fekete tárgy a fényes háttérből látható és felismerhető;
b) az a legnagyobb távolság, amelyen a kb. 1000 gyertyafényerejű fények kivilágítatlan háttérből láthatók és azonosíthatók.

1. Megjegyzés - A két távolság a levegőben egy adott kioltási együttható mellett különböző értékű. A b) pont értéke a háttérvilágítás függvényében változó. Az a) pont értéke jelenti a meteorológiai optikai távolságot (MOR).

2. Megjegyzés – A meghatározás a látástávolság helyi rutinon és megfigyelésen alapuló jelentésre, a METAR-ban és SPECI-ben jelentett érvényes és minimális látástávolságokra és a földfelület menti látástávolságra vonatkozik

Leszállási terület — Landing area
A mozgási terület azon része, amelyet a légi-jármű le és felszállására kívánnak igénybe venni.

Légi gurulás — Air-taxiing
A forgószárnyas vagy VTOL légi-jármű mozgása a repülőtér felszíne felett, általában földpárna-hatás mellett és 37 km/h (20 csomó) értéknél kisebb földfelszín feletti sebességgel.

Megjegyzés - A tényleges magasság változhat és bizonyos forgószárnyas légi-járművek a földpárna-hatás turbulencia csökkentése, valamint a függő mozgó teheráru rakományok védelme érdekében 8 méter (25 lábnál) AGL nagyobb magasságot igényelhetnek.

Légifolyosó — Airway
Folyosó formájában kijelölt irányítói terület vagy ennek egy része.

Légiforgalmi irányító és repülőgép-vezető közötti adatcsere — Controller - pilot data link communications (CPDLC)
A légiforgalmi irányító és a repülőgép-vezető közötti távközlési módszer, amelyben a légiforgalmi irányítói szolgálati közleményeket adatátviteli összeköttetéssel továbbítják.

Légiforgalmi szolgálat — Air traffic service
Különböző; repüléstájékoztató, riasztó, tanácsadó és légiforgalmi irányító szolgálatokat (körzeti irányító, közel-körzeti irányító vagy repülőtéri irányító szolgálatokat) magába foglaló gyűjtőfogalom.

Légiforgalmi szolgálati (ATS) útvonal — ATS route
A légiforgalmi szolgáltatás biztosítására, a forgalom irányításához szükséges meghatározott repülési útvonal.

1. Megjegyzés - A "légiforgalmi szolgálati (ATS) útvonal" kifejezés általános megnevezés, amely többek között légifolyosót, tanácsadói, ellenőrzött vagy nem ellenőrzött, érkezési vagy indulási útvonalat is jelenthet.

2. Megjegyzés - A légiforgalmi szolgálati (ATS) útvonalat útvonal leírással határozzák meg, amely tartalmazza az ATS útvonal jelölést, a jelentős pontok (útvonal pontok) közötti rárepülési vagy kirepülési irányszöget, a helyzetjelentési előírásokat valamint, az illetékes légiforgalmi szolgálati hatóság által megállapított legalacsonyabb biztonságos tengerszint feletti repülési magasságot.

Légiforgalmi állomás (RR S1.81) — Aeronautical station (RR S1.81)
A légiforgalmi mozgó szolgálat földi állomása. Bizonyos esetekben a légiforgalmi állomás hajó fedélzetén vagy vízfelszínen létesített építményen is elhelyezhető.

Légiforgalmi irányító szolgálat — Air traffic control service
A következő célokra létesített szolgálat:
a) összeütközés megelőzése:
1) a légi-járművek között; és
2) a munkaterületen üzemelő légi-járművek és az akadályok között;

b) a légi forgalom rendszeres és folyamatos áramlásának elősegítése.

Légiforgalmi irányító szolgálati egység — Air traffic control unit
Különböző, körzeti irányító, közel körzeti irányító vagy repülőtéri irányító egységeket magába foglaló gyűjtőfogalom.

Légiforgalmi irányítói engedély — Air traffic control clearance
Felhatalmazás (engedély) a légi-jármű részére ahhoz, hogy valamely légiforgalmi irányító szolgálati egység által meghatározott feltételek szerint üzemeljen.

1. Megjegyzés - A „légiforgalmi irányítói engedély" kifejezést, megfelelő szövegkörnyezetben gyakran „engedély"-re rövidítik.
2. Megjegyzés - A rövidített „engedély" kifejezést gyakran megelőzhetik a "gurulási", "felszállási", "indulási", "útvonal", "megközelítési" vagy "leszállási" szavak, amelyek a repülés engedélyezett szakaszát jelzik.

Légiforgalmi szolgálati egység — Air traffic services unit
Különböző, légiforgalmi irányító egységet, repüléstájékoztató központot vagy légiforgalmi szolgálatok bejelentő irodáját magába foglaló gyűjtőfogalom.

Légiforgalmi szolgálati légterek — Air traffic services airspace
Meghatározott kiterjedésű, az ABC betűivel azonosított légterek, amelyeken belül adott típusú repülések hajthatók végre, és amelyek számára légiforgalmi szolgálatokat jelöltek ki valamint üzemeltetési előírásokat határoztak meg.

Megjegyzés - A légiforgalmi szolgálati légterek az A — G osztályokba tartoznak.

Légiforgalmi szolgálatok bejelentő irodája — Air traffic services reporting office
A légiforgalmi szolgálatokat érintő jelentések valamint az indulás előtt a légiforgalmi szolgálati egységeknek benyújtott repülési tervek átvételére létesített egység.

Megjegyzés - A légiforgalmi szolgálatok bejelentő irodája különálló vagy egy már meglevővel — mint például egy másik légiforgalmi szolgálati egység vagy a légiforgalmi tájékoztató szolgálat irodája — együtt kialakított egység is lehet.

Légiforgalmi tájékoztató Kiadvány — Aeronautical Information Publication (AIP)
a légi-navigáció szempontjából fontos és tartós jellegű légiforgalmi tájékoztatásokat tartalmazó kiadvány, amelyet az érintett állam vagy annak megbízott szervezete tesz közzé.

Légiforgalmi tanácsadó szolgálat — Air traffic advisory service
A tanácsadói légtéren belül nyújtott szolgálat, amely az IFR repülési tervek alapján üzemelő légi-járművek között a lehetséges mértékben elkülönítést biztosít.

Légi forgalom — Air traffic
A levegőben levő valamint a repülőtér munkaterületén üzemelő légi-járművek összessége.

Légi-jármű — Aircraft
Bármely szerkezet, amelynek levegőben maradása a levegővel kialakuló olyan kölcsönhatásokból származik, amelyek különböznek a föld felszínére ható légköri hatásoktól.

Légi-jármű parancsnoka — Pilot-in-command
A repülés biztonságos végrehajtásáért felelős, a járató vagy az általános célú légi-közlekedés esetében a légi-jármű tulajdonosa részéről parancsnoknak kijelölt repülőgép-vezető.

Légi összeütközés elkerülését biztosító fedélzeti rendszer — Airborne collision avoidance system (ACAS)
A másodlagos légtérfelderítő radarberendezés válaszjel-adó egysége jeleinek segítségével működő fedélzeti rendszer, amely a földi berendezésektől függetlenül tájékoztatja a légi-jármű vezetőjét az SSR válaszjel-adóval felszerelt, összeütközési veszélyt jelentő egyéb légi-járművekről.

Levegő - föld irányítási rádióállomás — Air-ground control radio station
Légiforgalmi távközlési állomás, amely elsősorban az adott területen belül üzemelő légi-járművek üzemeltetéséhez és irányításához szükséges távközlés lebonyolításáért felelős.

Magasság – Height
Egy pontként vett szint, tárgy vagy pont valamint egy meghatározott vonatkozási alap (alapadat) közötti függőleges távolság.

Mozgási terület — Movement area
Egy repülőtérnek a légi-járművek fel és leszállására valamint gurulására használandó része, amely a munkaterületet és a forgalmi előtere(ke)t foglalja magába.

Munkaterület — Manoeuvring area
Egy repülőtérnek a légi-járművek fel és leszállására valamint gurulására használandó része a forgalmi előterek kivételével.

Műrepülés — Acrobatic flight
A légi-járművel szándékosan végrehajtott olyan repülési műveletek sorozata, amely hirtelen repülési helyzetváltoztatással, a szokásostól eltérő repülési helyzetekkel vagy rendkívüli sebesség változtatással jár.

Műszeres időjárási körülmények — Instrument meteorological conditions (IMC)
Látástávolsággal, felhőzettől mért távolsággal és felhőalappal kifejezett időjárási körülmények, amelyek a látás szerinti időjárási körülményekre meghatározott minimum értékeknél alacsonyabbak.

Megjegyzés - A látás szerinti időjárási körülményekre meghatározott minimum értékeket a 4. fejezet tartalmazza.

Műszeres megközelítési eljárás — Instrument approach procedure
A repülési műszerek segítségével, az akadályoktól megfelelő biztonsági távolságban végrehajtott, előre meghatározott repülési műveletek sorozata, amely a kezdeti megközelítés navigációs pontjától vagy — ahol ez alkalmazható — egy meghatározott érkezési útvonal kezdetétől addig a pontig tart, amelytől a leszállás végrehajtható, illetve amennyiben a leszállást nem hajtják végre, addig, ahonnan a várakozási vagy útvonal akadálymentességi előírásokat alkalmazzák.

A műszeres megközelítési eljárások besorolása:
Nem precíziós megközelítési (NPA) eljárás. Műszeres megközelítési eljárás, amely vízszintes útmutatást alkalmaz, ugyanakkor függőleges útmutatást nem.

Függőleges útmutatásos megközelítési (APV) eljárás. Műszeres megközelítési eljárás, amely mind vízszintes mind függőleges útmutatást alkalmaz, azonban nem felel meg a precíziós megközelítés és leszállás végrehajtásához megállapított követelményeknek.

Precíziós megközelítési (PA) eljárás. Az üzemelési kategória által meghatározott minimummal precíziós vízszintes és függőleges útmutatást alkalmazó műszeres megközelítési eljárás.

Megjegyzés – A vízszintes és függőleges útmutatás az alábbiak bármelyikének az útmutatására vonatkozik:

a) földi navigációs berendezés, vagy
b) számítógép által előállított navigációs adat

Nyomás-magasság — Pressure-altitude
A Nemzetközi Műlégkör[8. Annex alapján*] szerinti nyomás értéknek megfelelő magasság értékben kifejezett légköri nyomás.

Rádió-távbeszélés — Radiotelephony
Olyan rádió-távközlési módszer, amelynek során a tájékoztatás csere elsősorban szóbeli közleményváltással történik.

Repülési látástávolság — Flight visibility
A repülés közben egy légi-jármű pilótafülkéjéből előre irányba észlelt látástávolság.

Repülési szint — Flight level
Meghatározott 1013.2 hektopaszkál (hPa) alap-nyomás értékhez viszonyított állandó atmoszférikus légnyomású felület, amely más ilyen felületektől meghatározott légnyomáskülönbséggel van elválasztva.

1. Megjegyzés - Az egyezményes nemzetközi műlégkörnek megfelelően kalibrált nyomásmagasság-mérő:
a) QNH beállításra állítva tengerszint feletti magasság;
b) QFE beállításra állítva a QFE földfelszín feletti magasság;
c) 1013.2 hektopaszkál (hPa) beállításra állítva a repülési szint (FL) kijelzésére használható.
2. Megjegyzés - A fenti 1. megjegyzésben használt tengerszint és földfelszín feletti magasság kifejezések inkább barometrikus, azaz nyomásmagasságot, mint geometrikus, azaz földméréssel számított terepmagasságot jelentenek.

Repülési terv — Flight plan
A légiforgalmi szolgálati egységek rendelkezésére bocsátott, a légi-jármű tervezett repülésére vagy a repülés egy szakaszára vonatkozó meghatározott tájékoztatás.

Repüléstájékoztató körzet — Flight information region
Meghatározott kiterjedésű légtér, amelyen belül repüléstájékoztató és riasztó szolgálatot biztosítanak.

Repüléstájékoztató központ — Flight information centre
Repüléstájékoztató és riasztó szolgálat biztosítására létrehozott egység.

Repüléstájékoztató szolgálat — Flight information service
A repülések biztonságos és eredményes végrehajtásához hasznos tanácsok és tájékoztatások nyújtása céljából biztosított szolgálat.

Repülőgép — Aeroplane
Levegőnél nehezebb, hajtóművel működő légi-jármű, amely felhajtóerejét repülés közben főként az olyan felületekre ható aerodinamikai reakciókból nyeri, amelyek a repülés adott körülményei között rögzített helyzetben maradnak.

Repülőtér — Aerodrome
Szárazföldön vagy vízfelszínen kijelölt terület (beleértve bármely épületet, létesítményt és berendezést) amely egészében vagy részben a légi-járművek érkezésére, indulására és felszíni mozgására kívánnak felhasználni.

Repülőtéri forgalom — Aerodrome traffic

A repülőtér munkaterületén működő összes légi-jármű és egyéb járművek valamint a repülőtér körzetében repülő összes légi-jármű forgalma.

Megjegyzés - A repülőtér körzetében repülő légi-járművön a repülőtér forgalmi körén működő, az oda besoroló és az onnan kilépő légi-jármű értendő.

Repülőtéri forgalmi körzet — Aerodrome traffic zone
A repülőtér körül a repülőtéri forgalom védelmére kialakított meghatározott kiterjedésű légtér.

Repülőtéri irányító szolgálat — Aerodrome control service
A repülőtéri forgalom számára létesített légiforgalmi irányító szolgálat.

Repülőtéri irányító torony — Aerodrome control tower
A repülőtéri forgalom számára légiforgalmi irányító szolgálat biztosítása céljából létesített egység.

Riasztó szolgálat — Alerting service
A kutatásra és mentésre szoruló légi-járművek vonatkozásában a megfelelő szervek értesítésére és szükség esetén az ezekkel történő együttműködésre létesített szolgálat.

Számított érkezési idő — Estimated time of arrival
A műszerrepülési szabályok szerint végrehajtott repülések esetében az az időpont, amikor a légi-jármű a számítások szerint azon navigációs berendezéssel meghatározott kijelölt pont fölé érkezik, ahonnan a műszeres megközelítési eljárás megkezdődik; vagy amennyiben nincs ilyen a repülőteret kiszolgáló navigációs berendezés, azon időpont, amikor a légi-jármű a repülőtér fölé érkezik. A látás utáni szabályok szerint végzett repülések esetében azon időpont, amikor a légi-jármű a repülőtér fölé érkezik.

Számított fékoldási idő — Estimated off-block time
Az a számított időpont, amikor a légi-jármű megkezdi az indulással összefüggő mozgását.

Szellemi tevékenységet befolyásoló anyagok — Psychoactive substances
Alkohol, ópiumból vagy kenderből készített kábítószer, kokain, nyugtatók és altatók, egyéb izgató, serkentő, élénkítő-szerek, képzeteket keltő erős izgatószerek és illékony oldószerek a kávé és a dohányféleségek kivételével.

Személyzet nélküli szabad léggömb — Unmanned free balloon
Hajtómű és személyzet nélkül szabadon repülő, levegőnél könnyebb légi-jármű.

Megjegyzés - A személyzet nélküli szabad léggömbök a 4. Függelék előírásai alapján nehéz, közepes és könnyű osztályba tartoznak.

Szint — Level
A levegőben levő légi-jármű függőleges helyzetére vonatkozó általános kifejezés, amely jelenthet földfelszín feletti vagy tengerszinthez viszonyított magasságot, illetve repülési szintet.

Tanácsadói légtér — Advisory airspace
Meghatározott kiterjedésű légtér vagy kijelölt útvonal, amelyen belül légiforgalmi tanácsadói szolgálat áll rendelkezésre.

Tanácsadói útvonal — Advisory route
Kijelölt légi útvonal, amelyen légiforgalmi tanácsadói szolgálat áll rendelkezésre.

Teljes számított repülési idő — Total estimated elapsed time
IFR repülések esetében az a számított időtartam, amely a felszállástól addig szükséges, amíg a légi-

jármű azon navigációs berendezéssel meghatározott kijelölt pont fölé érkezik, ahonnan a műszeres megközelítési eljárás megkezdődik; vagy amennyiben nincs ilyen a rendeltetési repülőteret kiszolgáló navigációs berendezés, azon időtartam, amely alatt a légi-jármű a rendeltetési repülőtér fölé érkezik. A VFR repülések esetében a felszállástól a rendeltetési repülőtér fölé érkezésig számított időtartam.

Tengerszint feletti magasság — Altitude
Egy szint, egy pont vagy egy tárgy a közepes tengerszinthez viszonyított függőleges magassága.

Tiltott terület — Prohibited area
Egy állam földfelszíni területe vagy felségvizei felett elhelyezkedő meghatározott kiterjedésű légtér, amelyen belül a légi-jármű repülése tilos.

Utazó emelkedés — Cruise climb
Olyan repülőgép utazó repülés-végrehajtási módszer, amelynek során az útvonalon a tengerszint feletti repülési magasság a repülőgép tömegének csökkenésével növekszik.

Utazószint — Cruising level
Az a repülési szint, amelyet a légi-jármű a repülés jelentős szakasza során tart.

Útirány — Track
A légi-jármű repülési útvonalának vetülete a föld felületén, amelynek irányát bármely adott pontban általában északhoz (földrajzi, mágneses vagy földrajzi hálózati) viszonyított fok értékben fejezik ki.

VFR
A látva repülési szabályok szerint történő üzemeltetés jelzésére használt rövidítés.

VFR repülés — VFR flight
A látva repülési szabályok szerint végrehajtott repülés.

VMC — Visual Meteorological Conditions
A látás szerinti időjárási körülmények jelzésére alkalmazott rövidítés.

Várható megközelítési idő — Expected approach time
Azon időpont, amikor légiforgalmi irányító szolgálat számítása szerint egy késve érkező légi-jármű a leszálláshoz történő megközelítés végrehajtásához elhagyja a várakozási pontot.

Megjegyzés - A várakozási pont elhagyásának tényleges időpontja a bevezetési engedélytől függ.

Veszélyes légtér — Danger area
Meghatározott méretű légtér, amelyen belül bizonyos kijelölt időpontokban a légi-jármű repülésére veszélyes tevékenység folyhat.

3.6.1.4 Az ellenőrzött repülőtéren üzemelő légi-jármű a munkaterületen nem hajthat végre gurulást a repülőtéri irányító torony engedélye nélkül, és be kell tartania az ezen egység által adott bármely utasítást.

3.6.2 A repülési terv betartása

3.6.2.1 A 3.6.2.2 és 3.6.2.4 pontokban ismertetett előírások kivételével, a légi-jármű tartsa magát az ellenőrzött repülésre benyújtott érvényes repülési tervéhez vagy annak megfelelő részéhez, hacsak valamilyen módosítást nem kértek, és erre az illetékes légiforgalmi szolgálati egységtől engedélyt nem kaptak; vagy a légi-járműtől azonnali cselekvést megkövetelő vészhelyzet nem alakul ki, mely esetben - mihelyst az ilyen vészhelyzeti felhatalmazás gyakorlását követően a körülmények lehetővé teszik,- haladéktalanul értesíteni kell az illetékes légiforgalmi szolgálati egységet a megtett intézkedésről és, hogy azt vészhelyzeti felhatalmazás alatt végezték.

3.6.2.1.1 Hacsak az illetékes ATS hatóságtól más felhatalmazást, vagy az illetékes légiforgalmi irányító egységtől más utasítást nem kaptak, az ellenőrzött repüléseket, amennyire gyakorlatilag lehetséges

a) a kijelölt ATS útvonalon történő repülés alkalmával az adott útvonal meghatározott középvonalán; vagy
b) bármely más útvonalon történő repülés alkalmával, közvetlenül az útvonalat kijelölő navigációs berendezések és/vagy pontok között kell végrehajtani.

3.6.2.1.2 A 3.6.2.1.1 pontban ismertetett elsődleges fontosságú előírás figyelembevétele mellett VOR berendezésekre hivatkozással kijelölt ATS útvonal szakaszon repülő légi-járműnek a légi-jármű mögöttiről az előtte lévőre elsődleges navigációs irányítóeszközre kell átváltania az átváltási ponton (ahol ilyet kialakítottak) vagy olyan közel hozzá, amennyire üzemeltetési szempontból megvalósítható.

3.6.2.1.3 A 3.6.2.1.1 pontban előírtaktól való eltérésről értesíteni kell az illetékes légiforgalmi szolgálati egységet.

3.6.2.2 *Nem szándékos eltérések* – Amennyiben az ellenőrzött repülés nem szándékosan tér el az érvényes repülési tervétől, a következő intézkedéseket kell megtenni:

a)Letérés az útvonalról: ha a légi-jármű letér az útvonalról, haladéktalanul helyesbítse géptengely irányszögét úgy, hogy a lehető legrövidebb időn belül visszatérjen az útirányra;
b) Tényleges repülési sebesség eltérése esetén: ha a jelentőpontok között az utazószinten az átlagos tényleges repülési sebesség a repülési tervben meghatározott repülési sebességhez viszonyítva ± 5 %-kal ténylegesen vagy előreláthatóan eltér, tájékoztatni kell az illetékes légiforgalmi szolgálati egységet;
c) Számított idők eltérése esetén: ha a következő használandó jelentőpontra, repüléstájékoztató körzet határra vagy célrepülőtérre – amelyik előbb következik – számított idő három percnél többel, vagy az illetékes ATS hatóság által meghatározott illetve a körzeti légi-közlekedési egyezményben kijelölt más időtartammal eltér a légiforgalmi szolgálatok számára megadott időtől, a módosított számított időt a lehető legrövidebb időn belül közölni kell az illetékes légiforgalmi szolgálati egységgel.

3.6.2.2.1 Ezen túlmenően, amikor ADS egyezmény van érvényben, az adathálózaton keresztül automatikusan tájékoztatni kell az illetékes légiforgalmi szolgálati egységet (ATSU) a változásról abban az esetben, ha a változás meghaladja az ADS eseti adatszolgáltatási megállapodásban meghatározott határértéket.

3.6.2.3 *Szándékos eltérések* – A repülési terv megváltoztatására irányuló kéréseknek az alább ismertetett tájékoztatást kell tartalmazniuk:
a) Az utazómagasság megváltoztatása esetén: a légi-jármű azonosító jele; a kért új utazószint és utazósebesség ezen a szinten; a módosított számított idők (amikor alkalmazható) a következő repüléstájékoztató körzet határokra.
b) Az útvonal megváltoztatása esetén:

1) *A* célrepülőtér *változatlan:* a légi-jármű azonosító jele; repülési szabályok; a repülés új útvonalának leírása, beleértve a repülési terv vonatkozó adatait attól a helytől kezdődően, ahonnan a kért útvonal változtatás kezdődik; módosított számított idők; bármely más ide tartozó tájékoztatás.

2) *A* célrepülőtér meg*változott:* a légi-jármű azonosító jele; repülési szabályok; a repülés új útvonalának leírása a módosított célrepülőtérre, beleértve a repülési terv vonatkozó adatait attól a helytől kezdődően, ahonnan a kért útvonal változtatás kezdődik; módosított számított idők; kitérő repülőtér (repülőterek); bármely más ide tartozó tájékoztatás.

3.6.2.4 *Időjárásromlás a VMC értékek alá* – Amikor nyilvánvalóvá válik, hogy a repülést az érvényes repülési tervet követve látás szerinti időjárási körülmények (VMC) között végrehajtani nem lehet, a látva repülési szabályok szerint ellenőrzött repülést végző légi-jármű
a) kérjen módosított engedélyt, amely lehetővé teszi, hogy a légi-jármű repülését VMC körülmények között folytathassa a cél- vagy kitérő repülőtérig, vagy elhagyja azt a légteret, amelyben a repülést légiforgalmi irányítói engedély alapján végezheti; vagy
b) amennyiben a fenti *a)* alpontban meghatározott engedély nem szerezhető be, folytassa üzemelését VMC körülmények között, és értesítse az illetékes légiforgalmi irányító egységet az érintett légtér elhagyása vagy a legközelebbi alkalmas repülőtéren történő leszállás végrehajtása céljából foganatosított intézkedésről; vagy
c) a repülőtéri irányító körzeten belül történő üzemelés esetén, kérjen engedélyt különleges VFR repülésre; vagy
d) kérjen engedélyt a műszerrepülési szabályok szerint történő üzemelésre.

3.6.3 Helyzetjelentések

3.6.3.1 Hacsak az illetékes ATS hatóság, vagy az általa meghatározott feltételek alapján az illetékes légiforgalmi szolgálati egység e kötelezettség alól felmentést nem ad, az ellenőrzött repülésről a lehető legrövidebb időn belül jelentést kell adni az illetékes légiforgalmi szolgálati egység felé minden egyes kijelölt kötelező jelentőpont átrepülésének időpontjáról és repülési szintjéről, egyéb előírt tájékoztatással egyetemben. Az illetékes légiforgalmi szolgálati egység felkérésére hasonló helyzetjelentéseket kell adni kiegészítő pontokhoz kapcsolódóan is. Kijelölt jelentőpontok hiányában az ellenőrzött repülés helyzetjelentéseit az illetékes ATS hatóság által előírt vagy az illetékes légiforgalmi szolgálati egység által meghatározott időközökben köteles megtenni.

3.6.3.1.1 Az adathálózati összeköttetésen keresztül az illetékes légiforgalmi szolgálati egység felé helyzetéről tájékoztatást adó légi-járműnek szóbeli helyzetjelentést csak kérésre kell adnia.

Megjegyzés: Azok a feltételek és körülmények, amelyek között a nyomás-magasság ADS-B vagy SSR C módban történő adása megfelel a helyzetjelentés magassági tájékoztatásra vonatkozó követelményének, a PANS-ATM (Doc 4444) kiadványban találhatók.

3.6.4 Az irányítás megszűnése

Az ellenőrzött repülés – az ellenőrzött repülőtéren történő leszállás kivételével – a lehető legrövidebb időn belül köteles értesíteni az illetékes légiforgalmi irányító egységet, mihelyst megszűnik számára a légiforgalmi irányító szolgáltatás.

3.6.5 Összeköttetések

3.6.5.1 Az ellenőrzött repülést végrehajtó légi-jármű tartson fenn folyamatos figyelést a megfelelő rádió frekvencián, és szükség szerint létesítsen két-oldalú szóbeli rádióösszeköttetést az illetékes légiforgalmi irányító egységgel kivéve, ha az illetékes ATS hatóság az ellenőrzött repülőtér repülőtéri forgalmában résztvevő légi-járművek számára mást ír elő.

1. Megjegyzés: A SELCAL vagy más hasonló automatikus jelzőeszközök eleget tesznek a folyamatos levegő-föld beszédkommunikációs figyelés tartására vonatkozó előírásnak.
2. Megjegyzés: A levegő-föld beszédkommunikációs figyelés tartására vonatkozó előírás érvényben marad azt követően is, hogy a CPDLC összeköttetést létrejön.
3.6.5.2 *Az összeköttetés megszakadása* – Amennyiben az összeköttetés megszakadása miatt lehetetlen a 3.6.5.1 pont előírásának teljesítése, a légi-jármű hajtsa végre a 10. Annex II. kötetében található rádióösszeköttetés megszakadására vonatkozó, valamint - szükség szerint - a következőkben ismertetett eljárásokat, ezeken túlmenően az ellenőrzött repülőtér repülőtéri forgalmában résztvevő légi-jármű köteles figyelni a látási jelek útján kiadható utasításokra is.

3.6.5.2.1 Látási időjárási körülmények (VMC) között a légi-jármű:

a) folytassa repülését látási időjárási körülmények között; szálljon le a legközelebbi alkalmas repülőtéren; és érkezését a lehető leggyorsabb módon jelentse az illetékes légiforgalmi irányító egységnek;

b) ha tanácsosnak gondolják, teljesítsen IFR repülést a 3.6.5.2.2 szerint.

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3.6.5.2.2 Műszeres időjárási körülmények (IMC) között vagy olyan esetben, ha a repülés befejezése a 3.6.5.2.1 a) pont alapján nem látszik lehetségesnek, a légi-jármű:

a) hacsak a helyi körzeti légi-közlekedési egyezmény másként nem rendelkezik, olyan légtérben, ahol a légiforgalmi irányítás használatába radar nem tartozik, tartsa az utoljára kijelölt sebességét és repülési szintjét vagy legalacsonyabb tengerszint feletti repülési magasságát — amelyik a nagyobb érték — húsz percen át azt követően, hogy nem tudta jelenteni helyzetét egy kötelező jelentőpont felett, majd ezután repülési szintjét és sebességét a légiforgalmi szolgálati egységeknek benyújtott repülési tervnek megfelelően állítsa be;

b) olyan légtérben, ahol a légiforgalmi irányítás használatába radar tartozik, tartsa az utoljára kijelölt sebességet és repülési szintet, vagy ha nagyabb, a minimális tengerszint feletti magasságot 7 percen át azt követően, hogy

1) elérte az utoljára kijelölt repülési szintet vagy tengerszint feletti magasságot; vagy

2) a válaszjel-adón beállította a 7600-os kódot; vagy

3) egy kötelező jelentőpont felett nem adott helyzetjelentést

attól függően, hogy melyik történt később, majd ezután a szintet és sebességet a benyújtott repülési tervnek megfelelően állítsa be.

c) radar vektoráláskor, vagy amikor az ATC meghatározott korlát nélkül az RNAV felhasználásával kitérésre ad utasítást, legkésőbb a következő kiemelt pontnál vissza kell térni az érvényes repülési terv szerinti útvonalra, tekintetbe véve az alkalmazható minimális repülési magasságot;

d) a célrepülőteret szolgáló alkalmas navigációs berendezésig vagy pontig kövesse az érvényes repülési terv szerinti útvonalat, és amikor tartania kell magát az alábbi e) pontban foglaltakhoz, e berendezés vagy pont felett várakozzon a süllyedés megkezdéséig;

e) a d) pontban meghatározott navigációs berendezéstől vagy ponttól kezdjen süllyedni, amennyire lehetséges az utoljára kapott és nyugtázott számított megközelítési vagy ahhoz legközelebbi időpontban; vagy, ha nem kapott és nyugtázott számított megközelítési időt, akkor az érvényes repülési tervből következően számított érkezési időhöz igazodva;

f) hajtson végre egy normál műszeres megközelítési eljárást, követve a kijelölt navigációs berendezésre vagy pontra meghatározottakat;

g) lehetőség szerint, az e) pontban meghatározott számított érkezési időhöz vagy - attól függően, hogy melyik esik későbbre,- az utoljára nyugtázott várható megközelítési időhöz viszonyított 30 percen belül szálljon le.

1. Megjegyzés - A légiforgalmi irányító szolgáltatás nyújtása az érintett légtérben működő többi légi-járműre vonatkozóan azon a feltételezésen alapul, hogy az összeköttetés megszakadását elszenvedett légi-jármű eleget tesz a 3.6.5.2.2 pontban foglalt szabályoknak.
2. Megjegyzés - Lásd még az 5.1.2 pontot is.

3.7 Jogtalan beavatkozás

A jogtalan beavatkozás alatt álló légi-jármű kísérelje meg értesíteni az illetékes légiforgalmi szolgálati egységet erről a tényről, valamint az ezzel kapcsolatos bármely lényeges körülményről, és az érvényes repülési tervétől így szükségessé váló bármely eltérésről annak érdekében, hogy az ATS egység biztosítani tudja számára az elsőbbséget, és a többi légi-járművel való konfliktus lehetőségét a lehető legcsekélyebbre csökkentse.

1. Megjegyzés – A légiforgalmi szolgálati egységek jogtalan beavatkozáskor fennálló felelősségét a 11. Annex tartalmazza.
2. Megjegyzés - A jogtalan beavatkozás alatt álló, azonban az ATS egységet erről értesíteni nem tudó légi-járművel kapcsolatos intézkedésekre vonatkozó tájékoztató a jelen Annex B. Mellékletében található.
3. Megjegyzés - A másodlagos válasz-jeladóval (SSR), ADS-B-vel vagy ADS-C-vel felszerelt - jogtalan beavatkozás alatt álló - légi-jármű által követendő eljárás a 11. Annex-ben, a PANS-ATM (Doc 4444) és PANS-OPS (Doc 8168) kiadványokban található.
4. Megjegyzés – A jogtalan beavatkozás alatt álló - CPDLC_vel felszerelt - légi-jármű által követendő cselekvések a 11. Annex-ben, a PANS-ATM (Doc 4444)-ben, és e tárgyban útmutatások a „Légiforgalmi szolgálatok adat-összeköttetési alkalmazások" Kézikönyve (Doc 9694) kiadványokban találhatók.

3.7.2. Amennyiben egy légi-jármű jogtalan beavatkozásnak van kitéve, a parancsnok-pilóta köteles a lehető leghamarabb megkísérelni a leszállást a legközelebbi alkalmas repülőtéren vagy egy meghatározott repülőtéren, amelyet az illetékes hatóság jelölt ki, hacsak a légi-jármű fedélzetén a helyzetértékelés más cselekvésre nem készteti.

1. Megjegyzés – Az állami hatóságokra – a jogtalan beavatkozásnak kitett földön tartózkodó légi-jármű tekintetében - vonatkozó követelményeket az Annex 17, 5. Fejezetének 5.2.4. tartalmazza.
2. Megjegyzés – Lásd a 2.4. pontot a légi-jármű parancsnokának hatásköre tekintetében.

3.8 Elfogás

Megjegyzés: Az „elfogás" kifejezés ebben az értelemben nem foglalja magában azt az esetet, amikor a veszélyben levő légi-jármű számára és kérésére a Nemzetközi Légi-közlekedési és Tengerhajózási Kutatási és Mentési Kézikönyv (IAMSAR – Doc 9731) II. és III. kötete alapján biztosítanak légi megközelítést és kíséretet.

3.8.1 A polgári légi-jármű elfogását a szerződő államok által kiadott megfelelő előírások és adminisztratív iránymutatások szerint hajtsák végre, amelyek megfelelnek a Nemzetközi Polgári Légi-közlekedési Egyezmény és különösen annak 3 (d) cikkelye rendelkezéseinek, miszerint a szerződő államok kötelezettséget vállalnak arra, hogy állami légi-járműveikre vonatkozó előírásaik kiadásakor kellő figyelmet fordítanak a polgári légi-közlekedésben működő légi-járművek biztonságára. Ennek megfelelően a vonatkozó előírások és adminisztratív iránymutatások kidolgozása alkalmával, kellő figyelmet kell fordítani az 1. Függelék 2. részében és a 2. Függelék 1. részében található előírásokra.
Megjegyzés: Elismerve, hogy a repülésbiztonság érdekében alapvető fontosságú, hogy a csak végső eszközként alkalmazott elfogás esetében használt bármilyen vizuális jelzéseket a polgári és katonai légi-járművek az egész világon helyesen értelmezik és viszonozzák, a Nemzetközi Polgári Légi-közlekedési Szervezet Tanácsa a jelen Annex 1. Függelékéhez tartozó látási jelek elfogadása alkalmával sürgette a szerződő államokat annak biztosítására, hogy állami légi-járműveik szigorúan tartsák magukat azokhoz. Arra tekintettel, hogy a polgári légi-járművek elfogása minden esetben gyakorlati veszélyt jelent, a Tanács különleges ajánlásokat dolgozott ki és nyomatékosan kéri, hogy azokat a szerződő államok egységesen alkalmazzák. E különleges ajánlásokat az A. Melléklet tartalmazza.

3.8.2 A polgári légi-jármű parancsnoka az elfogás alkalmával tegyen eleget a 2. Függelék 2. és 3. részében található nemzetközi előírásoknak, és a látási jeleket az 1. Függelék 2. részében meghatározottak szerint értelmezze és viszonozza.

Megjegyzés: Lásd még 2.1.1 és 3.4 pontokat.

3.9 VMC látástávolság és felhőzettől való távolság minimum

A látás szerinti időjárási körülményekre vonatkozó látástávolság és felhőzettől való távolság minimum értékeket a 3-1. táblázat tartalmazza.

3-1. táblázat *

(lásd 4.1 pont)

Magassági sáv	Légtér osztály	Repülési látástávolság	Távolság a felhőtől
3050m (10000ft) AMSL-en vagy afelett	A***BCDEFG	8 km	Vízszintesen 1500m Függőlegesen 300m (1000ft)
3050m (10000ft) AMSL alatt és 900m(3000ft) felett, vagy a terep feletti 300m (1000ft) felett – amelyik magasabb	A***BCDEFG	5 km	Vízszintesen 1500m Függőlegesen 300m (1000ft)
900m (3000ft) AMSL-en vagy felette, vagy a terep feletti 300m (1000ft) felett – amelyik magasabb	A***BCDE	5 km	Vízszintesen 1500m Függőlegesen 300m (1000ft)
	FG	5 km**	Felhőn kívül és talajlátással

* Amikor az átváltási magasság 3050 méter (10000 láb) AMSL értéknél alacsonyabb, a 10000 láb magasság helyett FL 100 használandó.
** Amikor az illetékes légiforgalmi szolgálati hatóság így írja elő:
a) 1500 méterig terjedő alacsonyabb repülési látástávolság engedélyezhető a repülések számára,

1) amelyeket olyan sebességgel hajtanak végre, amely az uralkodó látástávolság mellett lehetővé teszi az egyéb forgalom és bármely akadály időben történő észlelését és az összeütközés elkerülését; vagy

2) ha a körülmények olyanok, hogy az egyéb forgalommal történő találkozás valószínűsége csekély, például olyan területeken, ahol a forgalom kicsi vagy egészen alacsony magasságon végrehajtott munkarepülés esetén.

b) A forgószárnyas légi-jármű üzemeltetése engedélyezhető *1500 méter repülési látástávolság alatt*, ha olyan sebességgel repül, amely lehetővé teszi az egyéb forgalom és bármely akadály időben történő észlelését és az összeütközés elkerülését.
*** Az A osztályú légtér VMC minimuma útmutatást biztosít a repülőgép-vezetők részére, és nem teszi kötelezővé a látva repülési szabályok szerinti repülés elfogadását az „A” légtér osztályban.

4. fejezet
Látás szerinti repülés szabályai

4.1 A különleges VFR repülésként történő üzemelés kivételével a látás szerinti repülés szabályai közt történő (VFR) repüléseket úgy hajtsák végre, hogy a légi-jármű a 3-1. táblázatban meghatározott látástávolság és felhőzettől való távolsági értékek vagy azoknál nagyobb értékek mellett repüljön.

4.2 Kivéve, ha egy légiforgalmi irányító egység erre engedélyt adott, a látva repülési szabályok szerint üzemelő (VFR) repülés nem szállhat fel vagy le repülőtéri irányító körzetben levő repülőtéren vagy nem léphet be a repülőtér forgalmi körzetébe vagy körébe, amikor:

a) a felhőalap 450 méternél (1500 láb) alacsonyabb; vagy
b) a földi látástávolság kevesebb, mint 5 km.

4.3 Napkelte és napnyugta között vagy az illetékes légiforgalmi szolgálati hatóság által előírt eltérő időszakban a látva repülési szabályok szerint üzemelő (VFR) repüléseket az ilyen hatóság által előírt feltételekkel kell végrehajtani.

4.4 Kivéve, ha az illetékes légiforgalmi szolgálati hatóság erre engedélyt ad, a látva repülési szabályok szerinti (VFR) repülések nem végezhetők

a) FL 200 repülési szint felett;
b) transzszonikus és szuperszonikus repülési sebességgel.

4.5 Látva repülési szabályok szerinti (VFR) repülések végrehajtása nem engedélyezhető FL 290 felett azokon a területeken, amelyeken FL 290 repülési szint felett 300 méter (1000 láb) csökkentett függőleges elkülönítési minimumot alkalmaznak.

4.6 Kivéve, ha az a fel és leszállás végrehajtásához szükséges vagy az illetékes hatóság erre engedélyt ad, VFR repülés nem hajtható végre:

a) városok, falvak vagy települések sűrűn lakott területei vagy szabadban levő ember-csoportok felett, a légi-járműtől - mint középponttól - számított 600 méter sugarú körben található legmagasabb akadály felett 300 méternél (1000 láb) alacsonyabban;
b) a 4.6 *a)* pontban meghatározottaktól eltérő bármely más föld- vagy vízfelszín felett 150 méternél (500 láb) alacsonyabban.

Megjegyzés: Lásd még 3.1.2 pont.

4.7 Kivéve, ha a légiforgalmi irányítói engedély másként nem jelzi, vagy az illetékes légiforgalmi szolgálati hatóság másként nem rendelkezik, a föld- vagy vízfelszín felett 900 méternél (3000 láb) vagy az illetékes légiforgalmi szolgálati hatóság által meghatározott ennél magasabb alapmagasságnál végrehajtott szinttartó utazó VFR repüléseket a 3. Függelék utazómagasság táblázatában meghatározott, az útiránynak megfelelő utazási szinteken kell végezni.

4.8 A látva repülési szabályok szerint végrehajtott repülés tegyen eleget a 3.6 pont előírásainak, amennyiben azt

a) B, C, és D osztályú légtérben végzik;
b) az ellenőrzött repülőterek repülőtéri forgalmának részeként végzik; vagy
c) különleges VFR repülésként végzik.

4.9 Az illetékes légiforgalmi szolgálati hatóság által a 3.3.1.2 *c)* vagy *d)* pont alapján kijelölt területeken belül vagy útvonalakon üzemelő illetve azokra belépő VFR légi-jármű tartson fenn folyamatos figyelést a megfelelő rádió frekvencián, és szükség szerint jelentse helyzetét a repülés-tájékoztató szolgálatot ellátó légiforgalmi szolgálati egységnek.

Megjegyzés: Lásd a 3.6.5.1 pontot követő megjegyzéseket.

4.10 Amikor a látva repülési szabályok szerint üzemeltetett légi-jármű műszerrepülési szabályok (IFR) szerinti üzemelésre kíván áttérni:

a) amennyiben repülés tervet nyújtott be, közölje az érvényes repülési tervét érintő szükséges módosításokat; vagy
b) ha ez a 3.3.1.2 pont alapján szükséges, nyújtson be repülési tervet az illetékes légiforgalmi szolgálati egységeknek, és az ellenőrzött légtérben történő IFR repülés megkezdése előtt szerezzen be engedélyt.

2. FÜGGELÉK – POLGÁRI LÉGI-JÁRMŰVEK ELFOGÁSA

(Lásd az Annex 3. Fejezet 3.8 pontját)

1. Betartandó irányelvek az Államok számára

1.1 A polgári légi-járművek biztonságos navigációjához szükséges szabályozási egységesség eléréséhez a Szerződő Államoknak kellő figyelmet kell fordítaniuk az alábbi irányelvekre, amikor előírásokat és adminisztratív intézkedéseket dolgoznak ki:

a) polgári légi-járművek elfogását csak végső eszközként alkalmazzák;
b) amennyiben elfogást hajtanak végre, az elfogást csak a légi-jármű azonosításra korlátozzák, hacsak nem szükséges a légi-jármű visszavezetése annak tervezett útvonalára, a légi-járműnek az ország légteréből történő kivezetése, tiltott, korlátozott vagy veszélyes légterekből történő elvezetése, vagy nem szükséges a légi-járművek kijelölt repülőtérre történő leszállíttatása.
c) polgári légi-jármű elfogást gyakorlás céljából ne hajtsanak végre;
d) ha rádióösszeköttetés létesíthető, az elfogott légi-jármű részére a navigációs segítséget és az ezzel kapcsolatos tájékoztatást rádió-távbeszélőn keresztül biztosítsák;
e) abban az esetben, ha egy elfogott légi-járműtől megkívánják, hogy leszálljon az átrepült területen, a leszállás céljára kijelölt repülőtér alkalmas legyen az érintett légi-jármű típus biztonságos leszállására.

Megjegyzés. – Az ICAO tagállamok közgyűlésének 1984. május 10-én tartott 25. (rendkívüli) ülésén egyöntetűen elfogadott Nemzetközi Polgári Repülési Egyezmény 3 (b) cikkelye értelmében a Szerződő Államok elfogadták, hogy "minden államnak tartózkodnia kell a fegyverhasználattól, repülést folytató polgári légi-járművekkel szemben".

1.2 A Szerződő Államoknak közzé kell tenniük a polgári légi-járművet elfogó légi-jármű részére kialakított szabványos manőverezési módszert. Az ilyen módszert úgy kell kidolgozni, hogy az elfogott légi-jármű számára ne jelentsen semmiféle veszélyt.

Megjegyzés. – A manőverezési módszerre vonatkozó különleges ajánlásokat az „A" melléklet 3. pontja tartalmazza.

1.3 A Szerződő Államoknak biztosítaniuk kell, hogy ahol másodlagos radar vagy ADS-B rendelkezésre áll, ott azt használják fel a polgári légi-jármű azonosításához azokon a területeken, ahol elfogásnak lehetnek alávetve.

2. Az elfogott légi-jármű ténykedése

2.1 Egy másik légi-jármű által elfogott légi-járműnek azonnal

a) követnie kell az elfogó légi-jármű utasításait, a látási jeleket az „1" függelékben megadott előírások szerint értelmezve és viszonozva.
b) ha lehetséges, értesítse az illetékes légiforgalmi szolgálati egységet;
c) kísérelje meg a rádióösszeköttetés felvételét az elfogó légi-járművel, vagy az illetékes, elfogást irányító egységgel, általános hívással a 121,5 MHz vészhelyzeti frekvencián, megadva az elfogott légi-jármű azonosító jelét és a repülés fajtáját; és ha nem jött létre az összeköttetés és gyakorlatilag lehetséges, ismételje meg ezt a hívást a 243 MHz vészfrekvencián is;
d) ha fel van szerelve SSR válaszjel-adóval, állítsa be az „A" mód 7700 kódot, hacsak más utasítást nem kapott az illetékes légiforgalmi szolgálati egységtől.
e) ha fel van szerelve ADS-B-vel vagy ADS-C-vel, válassza ki a megfelelő vészhelyzeti funkciót, amennyiben rendelkezésre áll, hacsak más utasítást nem kap az illetékes légiforgalmi szolgálati egységtől.

2.2 Ha bármely rádión kapott utasítás ellentétes az elfogó légi-jármű által látási jelek útján adott utasítással, az elfogott légi-jármű kérjen azonnali tisztázást, mialatt továbbra is követi az elfogó légi-jármű látási jelekkel adott utasításait.

2.3 Ha bármely rádión vett utasítás ellentétes az elfogó légi-jármű által rádión adott utasítással, az elfogott légi-jármű kérjen azonnali tisztázást, mialatt továbbra is követi az elfogó légi-jármű rádión adott utasításait.

3. Rádióösszeköttetés az elfogás során

Ha létrejön a rádiókapcsolat, de nincs lehetőség közös nyelven a kommunikációra, az A 2.1 Táblázatban lévő kifejezéseket és kiejtések használatával és minden egyes kifejezést kétszer ismételve kell megkísérelni az utasításokat, az utasítások és alapvető információk tudomásulvételét továbbítani.

A2.1 táblázat

Az ELFOGÓ légi-jármű kifejezései

Kifejezés	Kiejtés	Jelentés
CALL SIGN	KOL SZAIN	Mi a hívójele?
FOLLOW	FOL-LO	Kövessen
DESCEND	DI-SZEND	Süllyedjen leszálláshoz
YOU LAND	JU LEEND	Szálljon le ezen a repülőtéren
PROCEED	PRO-SZID	Tovább haladhat

Az ELFOGOTT légi-jármű kifejezései

Kifejezés	Kiejtés	Jelentés
CALL SIGN	KOL SZAIN	Hívójelem…
WILCO	VILL-KO	Megértettem, végrehajtom
CAN NOT	KANN NOT	Nem tudom teljesíteni
REPEAT	RI-PIIT	Ismételje meg utasítását
AM LOST	EM LOSZT	Eltévedtem
MAYDAY	MÉJDÉJ	Vészhelyzetben vagyok
HIJACK	HÁJDZSEK	Eltérítettek
LAND (…)	LEEND (…)	Kérek leszállást (… helyen)
DESCEND	DI-SZEND	Süllyedést kérek

1. Megjegyzés. – A második oszlopban a hangsúlyozandó szótag alá van húzva.
2. Megjegyzés. – A megadandó hívójel az legyen, amelyet a légiforgalmi szolgálati egységekkel tartott rádió-távbeszélő összeköttetés során használnak, és amely megfelel a légi-jármű repülési tervében szereplő azonosító jelnek.
3. Megjegyzés. – A „HIJACK” kifejezés használatát a körülmények nem mindig teszik lehetővé, illetve kívánatossá.

a) a polietilén nyomásnélküli ballonoknál legalább két módszert, rendszert, berendezést vagy ezek kombinációját alkalmaznak, amelyek egymástól függetlenül működnek a ballon burkolatok repülésének megszüntetésére.

Megjegyzés. – E berendezések használata a túlnyomásos ballonoknál nem szükséges, mivel azok a teher elengedése után gyorsan felemelkednek és a ballon burkolata így, a kilyukasztásra szolgáló berendezés vagy rendszer nélkül is széthasad. A túlnyomásos ballon itt olyan nem táguló burkolatú ballont jelent, amely ellenáll a belső túlnyomásnak. A ballont úgy töltik fel, hogy az éjszakai kisebb nyomású gáz teljesen kitöltse a ballon belsejét. Az ilyen túlnyomásos ballon gyakorlatilag egészen addig állandó szinten marad, amíg túl sok gáz nem távozik el belőle.

c) a ballon burkolata olyan radarjel visszaverő berendezéssel vagy radarjel visszaverő anyaggal van felszerelve, amely a 200 MHz és 2700 MHz frekvencia tartományok között működő földi radarberendezéseknek visszavert jelet ad, és/vagy a ballon olyan egyéb berendezéssel van felszerelve, amely a földi radarberendezés hatótávolságán túl a radar kezelőjének folyamatos célkövetésre ad lehetőséget.

3.4 A "nehéz" személyzet nélküli szabad ballont tilos olyan területen üzemeltetni, ahol

a) földi telepítésű, másodlagos radarberendezést használnak, hacsak a ballon olyan másodlagos radar válaszjel-adóval nincs felszerelve, amely képes a kijelölt másodlagos radar kódon a folyamatos nyomás-magasság sugárzására, vagy a megfigyelő állomásról - szükség szerint – bekapcsolható; vagy
b) földi telepítésű ADS-B berendezést használnak, hacsak a ballon olyan ADS-B adóval nincs felszerelve, amely képes a nyomás-magasság folyamatos sugárzására, vagy a megfigyelő állomásról - szükség szerint - bekapcsolható.

3.5 Azt a nehéz besorolású, személyzet nélküli szabad ballon, amely olyan függő antennával van felszerelve, amelynek bármely pontján történő letöréséhez 230 N-nál nagyobb erőre van szükség, csak abban az esetben üzemeltethető, ha az antennán legalább 15 méterenként színes jelzőzászló vagy jelzőcsík található.

3.6 A nehéz besorolású személyzet nélküli szabad ballon nem üzemeltethető 18000 méter (60000 láb) nyomásmagasság alatt napnyugta és napkelte között kivéve, ha a ballont, annak tartozékait és a terhet - függetlenül attól, hogy ezek a repülés során a ballonról leválnak-e vagy sem,- jelzőfénnyel látják el.

3.7 A nehéz besorolású, személyzet nélküli szabad ballon, amely 15 méternél hosszabb felfüggesztő szerkezettel (a nagyon feltűnő, színes, nyitott ejtőernyő kivételével) van ellátva, nem üzemeltethető napkelte és napnyugta között 18000 méter (60000 láb) nyomásmagasság alatt, kivéve, ha a függő szerkezetet nagyon feltűnő színes csíkokkal befestik, vagy azt színes jelzőzászlókkal látják el.

4. A repülés megszüntetése

4.1 A nehéz besorolású, személyzet nélküli szabad ballon üzemeltetője köteles működésbe hozni a fenti 3.3 *a)* és *b)* pontban előírt - továbbrepülést megakadályozó - berendezést, ha

a) ismeretessé válik, hogy az időjárási feltételek az üzemeltetésre előírt minimumoknál rosszabbak;
b) meghibásodás, vagy bármely egyéb ok miatt a további üzemeltetés veszélyes lehet a légiforgalomra, a földön lévő személyekre vagy vagyontárgyakra; vagy
c) mielőtt a ballon engedély nélkül berepül egy másik állam légterébe.

5. A repülésre vonatkozó tájékoztatás

5.1 Repülés előtti tájékoztatás

5.1.1 A közepes és a nehéz besorolású, személyzet nélküli szabad ballon tervezett repüléséről - a repülés megkezdése előtt legalább hét nappal - előzetes tájékoztatást kell küldeni az illetékes légiforgalmi szolgálati egységnek.

5.1.2 A tervezett repüléssel kapcsolatos tájékoztatásnak – az illetékes légiforgalmi szolgálati egység kívánságának megfelelően – az alábbi adatokat, vagy ezek bármelyikét kell tartalmaznia:

a) a ballonrepülés azonosító jele vagy projekt kódneve;
b) a ballon osztályba sorolása és leírása;
c) SSR kód vagy NDB frekvencia (amelyik alkalmazható);
d) az üzemeltető neve és telefonszáma;
e) a felbocsátás helye;
f) a felbocsátás tervezett ideje (vagy több felbocsátás esetén a felbocsátások kezdete és befejezése);
g) több ballon felbocsátása esetén a ballonok száma, valamint a felbocsátások közötti időtartam;
h) a felemelkedés várható iránya;
i) utazószint(ek) (nyomásmagasság);
j) az a várható időtartam, amely a 18000 méter (60000 láb) nyomásmagasság keresztezéséig, vagy ha az utazószint 18000 méter (60000 láb) vagy kevesebb, az utazószint eléréséig eltelik, valamint a keresztezés vagy az utazószint elérés számított helye;

Megjegyzés. – Ha az üzemeltetés folyamatosan történő ballon felbocsátásokból áll, a feltüntetendő idők azon várható időpontok, amikor az első és az utolsó ballon eléri a megfelelő repülési szintet (például 122136–130330 UTC).

k) a repülés befejezésének várható ideje (nap/óra/perc), valamint a tervezett földet-érési (megtalálási) terület. Azon ballonok esetében, melyek repülése hosszú ideig tart és ezért a repülés befejezésének idejét, valamint a tervezett földet-érési/megtalálási területet pontosan nem lehet előre meghatározni, a „hosszú időtartam” (long duration) kifejezést kell használni.

Megjegyzés. – Amennyiben egynél több földet-érési/megtalálási területet állapítanak meg, minden egyes helyszínt, a megfelelő várható földet-érési idővel együtt fel kell tüntetni. Amennyiben sorozatos földet érés várható, a feltüntetendő idők azon várható időpontok legyenek, amikor a sorozat első és utolsó ballonja földet ér (például 070330–072300 UTC).

5.1.3 Az 5.1.2 pont előírásaiban megadott, felbocsátás előtti tájékoztatások bármely változását legalább 6 órával, kritikus időpontú naprendszeri vagy kozmikus zavarok vizsgálata esetén legalább 30 perccel a tervezett felbocsátás előtt be kell jelenteni az érintett légiforgalmi szolgálati egységnek.

5.2 A felbocsátásról szóló tájékoztatás

5.2.1 A közepes vagy nehéz besorolású, személyzet nélküli szabad ballon felbocsátása után az üzemeltetőnek azonnal értesítenie kell az illetékes légiforgalmi szolgálati egységet a következőkről:

a) a ballonrepülés azonosító jele;
b) a felbocsátás helye;
c) a felbocsátás tényleges ideje;
d) a 18000 méter (60000 láb) nyomásmagasság keresztezésének, vagy ha az utazószint 18000 méter (60000 láb) vagy kevesebb, az utazószint elérésének várható ideje és helye; és
e) az 5.1.2 *g)* és *h)* pontban előírtak szerint az előzetes tájékoztatásban közöltektől való bármely eltérés.

5.3 Tájékoztatás a repülési feladat törléséről

5.3.1 Az üzemeltetőnek azonnal értesítenie kell az illetékes légiforgalmi szolgálati egységet, amint ismertté válik az 5.1 pontban előírtak alapján előzetesen bejelentett közepes vagy nehéz besorolású, személyzet nélküli szabad ballon repülésének törlése.

6. A repülési útvonal követése és helyzetjelentés

6.1 A 18000 méter (60000 láb) nyomásmagasságon, vagy ez alatt működő nehéz besorolású, személyzet nélküli szabad ballon üzemeltetőjének figyelemmel kell kísérnie a ballon repülési útját és a légiforgalmi szolgálatok kívánságának megfelelően, jelentenie kell a ballon helyzetét. Hacsak a légiforgalmi szolgálatok gyakoribb helyzetjelentést nem kérnek, az üzemeltetőnek minden két órában jelentenie kell a ballon helyzetét.

6.2 A 18000 méter (60000 láb) nyomásmagasság felett működő nehéz besorolású, személyzet nélküli szabad ballon üzemeltetőjének figyelemmel kell kísérnie a ballon repülési útját, és a légiforgalmi szolgálatok kívánságának megfelelően jelentenie kell a ballon helyzetét. Hacsak a légiforgalmi szolgálatok gyakoribb helyzetjelentéseket nem kérnek, az üzemeltetőnek 24 óránként kell jelenteni a ballon helyzetét.

6.3 Amennyiben a ballon helyzetét a 6.1 és a 6.2 pontokban előírtak szerint nem lehet megállapítani, az üzemeltetőnek erről azonnal értesítenie kell az illetékes légiforgalmi szolgálati egységet. Ennek az értesítésnek tartalmaznia kell a ballon utolsó megállapított helyzetét. Amikor a ballonrepülési útvonalának követését ismét végre tudják hajtani, az illetékes légiforgalmi szolgálati egységet azonnal értesíteni kell.

6.4 A nehéz besorolású, személyzet nélküli szabad ballon tervezett süllyedésének megkezdése előtt egy órával az üzemeltetőnek értesíteni kell az illetékes légiforgalmi szolgálati egységet a ballonnal kapcsolatos következő adatokról:

a) jelenlegei földrajzi helyzet;
b) jelenlegi szint (nyomás-magasság);
c) amennyiben lehetséges, a 18000 méter (60000 láb) nyomás-magasság keresztezésének előre-jelzéses időpontja;
d) a földet érés előre-jelzéses ideje és helye.

6.5 A nehéz vagy közepes besorolású, személyzet nélküli irányítatlan ballon üzemeltetőjének értesítenie kell az illetékes légiforgalmi szolgálati egységet arról, hogy az üzemelést befejezték.

„A" MELLÉKLET

POLGÁRI LÉGI-JÁRMŰ ELFOGÁSA

(Megjegyzés. – Lásd az Annex 3. fejezet 3.8 pontját és a hozzá tartozó megjegyzést.)

Megjegyzés: A teljesség érdekében az Annex 2. Függelékének előírásait a jelen Mellékletben összefoglaljuk.

1. Bevezető

A Nemzetközi Polgári Légi-közlekedési Egyezmény 3 (d) cikkelyének rendelkezése szerint az ICAO szerződő államok „állami légi-járműveikre vonatkozó előírásaik kiadásakor kellő figyelmet fordítanak a polgári légi-közlekedésben működő légi-járművek biztonságára". Mivel a polgári légi-járművek elfogása minden esetben gyakorlati veszélyt jelent, az ICAO Tanács kidolgozta az alábbi különleges ajánlásokat, és nyomatékosan kéri, hogy azokat a szerződő államok egységesen alkalmazzák, mert az összes érintett részéről történő egységes alkalmazás alapvető fontosságú a polgári légi-járművek és bennük tartózkodó személyek biztonsága érdekében. Ezért az ICAO Tanácsa felhívja a szerződő államok figyelmét, hogy a szerződő állam értesítse a Szervezetet bármely eltérésről, amely saját országos előírásai és gyakorlata, illetve az alábbiakban ismertetett különleges ajánlások között van.

2. Általános rész

2.1 A polgári légi-jármű elfogása elkerülendő, csak végső eszközként alkalmazható. Amennyiben az elfogást alkalmazzák, az a légi-jármű azonosságának megállapítására korlátozódjon, hacsak szükség nem támad a tervezett repülési útvonalra vagy az ország légtér határain belülre történő visszavezetésére, a tiltott, korlátozott vagy veszélyes légterekből történő kivezetésre, illetve a kijelölt repülőtérre történő leszállás végrehajtására. A polgári légi-jármű gyakorlás céljából történő elfogása tilos.

2.2 A polgári légi-jármű elfogásának elkerülése vagy az elfogás szükségességének csökkentése érdekében

a) az elfogást irányító egységek tegyenek meg minden lehetséges intézkedést a légi-jármű - amely polgári légi-jármű lehet-, azonosítására, és az illetékes légiforgalmi szolgálati egységek segítségével adják meg a szükséges utasításokat vagy tanácsokat az ilyen légi-jármű számára. Ennek érdekében alapvető fontosságú, hogy gyors és megbízható összeköttetést hozzanak létre az elfogást irányító és a légiforgalmi szolgálati egységek között, továbbá a 11. Annex előírásai szerint megfelelő egyezményeket dolgozzanak ki az egységek között a polgári légi-jármű mozgására vonatkozó tájékoztatás biztosítására;
b) az összes polgári repülés számára tiltott, valamint olyan területeket, amelyeken a polgári repülést külön állami engedély nélkül nem engedélyezik, a légiforgalmi tájékoztató kiadványban - a 15. Annex előírásai szerint - pontosan tegyék közzé, a szükséges módon jelezve az elfogás lehetőségét az ilyen területre történő belépés esetén. Amikor az ilyen területek a közzétett légiforgalmi szolgálati útvonalak vagy más, gyakran használt útirányok közelében helyezkednek el, az államok vegyék figyelembe a polgári légi-járművek által használt navigációs rendszerek jellemzőit és általános pontosságát, valamint a légi-járművek azon képességét, amellyel a kijelölt területet elkerülik;
c) tekintsék át további kiegészítő navigációs berendezések létesítésének lehetőségét, illetve szükségességét, hogy a polgári légi-jármű biztonságosan elkerülhesse a tiltott vagy - ha megkövetelt,- a korlátozott területeket.

2.3 A végső eszközként alkalmazott elfogásokból származó veszélyek kiküszöbölése vagy csökkentése érdekében minden lehetséges intézkedést tegyenek meg a repülőgép-vezető és az érintett földi egységek személyzete összehangolt tevékenységének elősegítésére. Ennek érdekében alapvető, hogy a szerződő államok biztosítsák az alábbiakat:

a) az összes polgári légi-jármű repülőgép-vezetője pontosan ismerje a végrehajtandó feladatait és az alkalmazott látási jeleket, amelyek a jelen Annex 3. fejezetében és az 1. Függelékben kerültek meghatározásra;
b) a polgári légi-jármű üzemeltetője vagy parancsnoka tegyen eleget a 6. Annex I, II. és III. rész előírásainak, amelyek a légi-jármű rádió összeköttetés tartási képességére vonatkoznak a 121.5 MHz vészhelyzeti frekvencián, valamint a légi-jármű fedélzetén helyezzék el az elfogás esetén alkalmazandó eljárások és látási jelek jegyzékét;
c) a légiforgalmi szolgálatok teljes személyzete pontosan ismerje a 11. Annex 2. fejezet és a PANS-ATM (Doc 4444) előírásai szerint végrehajtandó feladatait;
d) az elfogó légi-járművek összes parancsnoka ismerje a polgári légi-jármű általános teljesítmény korlátozásait, és számoljon azzal a lehetőséggel, hogy az elfogott légi-jármű műszaki nehézségek vagy jogtalan beavatkozás miatt vészhelyzetben lehet;
e) az elfogást irányító egységek valamint a lehetséges elfogó légi-járművek parancsnokai számára pontos és egyértelmű utasításokat adjanak az elfogási műveletekről, az elfogott légi-jármű vezetéséről, az elfogott légi-jármű által várható tevékenységekről és repülési műveletekről, a levegőben alkalmazott látási jelekről, az elfogott légi-járművel történő rádióleveleézésről, és a fegyverhasználattól történő tartózkodás szükségességéről

Megjegyzés: Lásd a 3 – 8. pontokat;

f) az elfogott légi-járművel való kapcsolatteremtés érdekében az elfogást irányító egységek és az elfogó légi-járművek legyenek ellátva az Annex 10 I. kötetében meghatározott műszaki követelményű rádió-távbeszélő berendezéssel, az elfogott légi-járművel a 121,5 MHz vészhelyzeti frekvencián történő közleményváltás céljából;
g) biztosítsanak másodlagos radar és/vagy ADS-B eszközöket olyan mértékben, hogy lehetővé tegyék az elfogást irányító egységeknek a polgári légi-járművek azonosítását azokon a területeken, ahol azok elfogására egyébiránt sor kerülhet. Az ilyen eszközök tegyék lehetővé a légi-jármű azonosító felismerését, továbbá a vészhelyzeti és sürgősségi feltételek azonnali felismerését.

3. Elfogási manőverek

3.1 Az elfogott légi-járművet érintő veszélyek elkerülése érdekében a polgári légi-járművet elfogó légi-jármű repülési tevékenységére szabványos manőverezési eljárást kell kidolgozni. Az eljárás kidolgozásakor kellő mértékben vegyék figyelembe a polgári légi-járművek teljesítmény korlátait, azon követelményt, hogy az elfogó légi-jármű ne kerüljön az elfogott légi-járművel összeütközés veszélyét előidéző közelségbe, valamint, hogy az elfogó légi-jármű ne keresztezze az elfogott légi-jármű útját, vagy, hogy bármilyen más manővert ne úgy hajtsanak végre, hogy a légi-jármű által keltett turbulencia veszélyt idézzen elő, különösen akkor, ha az elfogott légi-jármű "könnyű" kategóriájú.

1.2. Az összeütközést elkerülő rendszerrel (ACAS) felszerelt és elfogás alatt lévő légi-jármű összeütközési fenyegetésnek érzékelheti az elfogót, és ennek következtében az ACAS megoldási tanácsára válaszul kikerülési manőverbe kezd. Ez a manőver az elfogó számára félrevezethető lehet, barátságtalan szándék jelzéseként értékelheti. Ebből következően fontos, hogy a másodlagos felderítő radar (SSR) válaszjel-adóval felszerelt elfogó légi-jármű repülőgép-vezetői elnyomják a nyomás-magasság információ adását (C válaszmódban vagy az S válaszmód AC mezőjében) az elfogás alatt álló légi-járműtől legalább 37 km (20 tengeri mérföld) távolságon belül. Ez az elfogott légi-járműben lévő ACAS-t meggátolja abban, hogy az elfogó vonatkozásában jelentkező megoldási tanácsokat felhasználja, mialatt az ACAS forgalom- tanácsadási tájékoztatása továbbra is rendelkezésre áll.

3.3 Látással történő azonosítási manőverek

3.3.1 Az alábbi eljárást javasoljuk az elfogó légi-jármű számára a polgári légi-jármű látással történő azonosításának végrehajtására:

I. szakasz:

Az elfogó légi-jármű az elfogott légi-járművet a légi-jármű hátulja felől közelítse meg. Az elfogó kötelék, vagy ha csak egy elfogó légi-jármű tevékenykedik, az elfogó légi-jármű vezetője az elfogott légi-jármű baloldalára, kissé az elfogott légi-jármű felett és előtt helyezkedjen el úgy, hogy az elfogott légi-járműtől kezdetben legalább 300 m távolságra, az elfogott légi-jármű vezetőjének látóterén belül legyen. Bármely más - az elfogásban résztvevő - légi-jármű maradjon biztonságos távolságban, lehetőleg az elfogott légi-jármű felett és mögött. Amikor az elfogott légi-járműhöz viszonyított megfelelő sebességet és repülési helyzetet felvette, az elfogó légi-jármű szükségszerűen hajtsa végre a mások szakaszban előírtakat.

II. szakasz:

Az elfogó kötelék, vagy az elfogó légi-jármű vezetője azonos szinten repülve kezdje meg az elfogott légi-jármű óvatos megközelítését. Az elfogó légi-jármű ne repüljön az elfogott légi-járműhöz közelebb, mint ahogy az a szükséges adatok beszerzése céljából feltétlenül szükséges. Az elfogó kötelék, vagy az elfogó légi-jármű vezetője legyen óvatos, nehogy megijessze az elfogott légi-jármű személyzetét, vagy utasait. Az elfogó légi-jármű vezetője mindig vegye figyelembe azt a tényt, hogy azok a manőverek, melyek az elfogó légi-járművek számára természetesek, veszélyesek lehetnek a polgári légi-jármű személyzetei, vagy utasai számára. Az elfogásban résztvevő bármely más légi-jármű maradjon az elfogott légi-járműtől biztonságos távolságra. Az azonosítás befejezése után az elfogó légi-jármű a harmadik szakaszban körvonalazottak szerint távolodjon el az elfogott légi-jármű közeléből.

III. szakasz:

Az elfogó kötelék, vagy az elfogó légi-jármű vezetője óvatosan, enyhe ereszkedő fordulóval repüljön el az elfogott légi-járműtől. Az elfogásban résztvevő bármely más légi-jármű maradjon az elfogott légi-járműtől biztonságos távolságra, és csatlakozzon a kötelék vezetőjéhez.

3.4 Navigációs vezetési manőverek

3.4.1 Amennyiben a fenti I. és II. szakaszban leírt azonosítási műveletek végrehajtása után úgy ítélik meg, hogy az elfogott légi-jármű repülési útvonalának megváltoztatása szükséges, a kötelék vezetőjének, vagy az egyedül elfogó légi-járműnek rendszerint az elfogott légi-jármű bal oldalán, kissé felette és előtte kell elhelyezkednie, hogy annak parancsnoka láthassa a leadott látási jeleket.

3.4.2 Nélkülözhetetlenül szükséges, hogy az elfogó légi-jármű parancsnoka meggyőződjön arról, hogy az elfogott légi-jármű parancsnoka az elfogást észlelte és nyugtázza a jelzéseket. Ha az 1. függelék II. részében szereplő 1. sorozatú jelzések ismétlésével sem sikerül az elfogott légi-jármű parancsnokának figyelmét felhívni, más jelzési módszerek is használhatók e célra, beleértve utolsó eszközként az után-égető keltette fényhatást, feltéve, ha ennek használata az elfogott légi-járműre nem jelent veszélyt.

3.5 Ismeretes, hogy adódnak olyan esetek, amikor az időjárási körülmények, vagy a domborzati viszonyok szükségessé tehetik, hogy a kötelékvezető vagy az egyedüli elfogó légi-jármű az elfogott légi-jármű jobb oldalán, kissé felette és előtte helyezkedjen el. Ilyen esetben, az elfogó légi-jármű parancsnokának megkülönböztetett figyelmet kell fordítania arra, hogy légi-járművét az elfogott légi-jármű parancsnoka folyamatosan, tisztán láthassa.

4. Az elfogott légi-jármű útbaigazítása

4.1 Amikor az elfogott légi-járművel rádióösszeköttetés létesíthető, a navigációs útbaigazítást és a kapcsolódó információkat rádió-távbeszélőn kell biztosítani az elfogott légi-jármű számára.

4.2 Amikor navigációs útbaigazítást adnak egy elfogott légi-jármű számára, gondoskodni kell arról, hogy az elfogott légi-járművet ne vezessék olyan körülmények közé, ahol a látástávolság a repülés látás szerinti időjárási körülmények közötti tartásához szükséges minimum alá csökkenhet. Vigyázni kell arra is, hogy az elfogott légi-járművektől megkövetelt manőverek ne növeljék az elfogott légi-járműre háruló, már meglévő veszélyeket abban az esetben, ha a légi-jármű üzemeltetési hatékonysága korlátozott.

4.3 Abban a kivételes esetben, ha az elfogott légi-járművet az átrepült területen le kell szállítani, ügyelni kell arra is, hogy

a) a kijelölt repülőtér alkalmas legyen az érintett légi-jármű típus biztonságos leszállására, különösen akkor, ha a repülőteret rendes körülmények között polgári légi-forgalom céljaira nem használják;
b) a repülőteret körülvevő terep alkalmas legyen a körözés, megközelítés, valamint a megszakított megközelítés végrehajtására;
c) az elfogott légi-járműnek elegendő üzemanyaga legyen a repülőtér elérésére;
d) ha az elfogott légi-jármű polgári szállító légi-jármű, a kijelölt repülőtér olyan futópályával rendelkezzen, amely megfelel egy közepes tengerszinten lévő, legalább 2500 m hosszúságú futópályának, és teherbírása elegendő legyen a légi-jármű elbírására; és
e) amikor csak lehetséges, a kijelölt repülőtér olyan legyen, melynek részletes leírása a vonatkozó légiforgalmi tájékoztató kiadványban szerepel.

4.4 Amennyiben polgári légi-járművet ismeretlen repülőtéren való leszállásra utasítanak, elegendő időt kell adni arra, hogy a polgári légi-jármű vezetője előkészülhessen a leszállás végrehajtására, figyelembe véve azt a tényt, hogy egyedül a polgári légi-jármű parancsnoka tudja megítélni azt, hogy adott időben a futópálya hosszát és a légi-jármű tömegét figyelembe véve a leszállási manőver biztonságosan végrehajtható-e.

4.5 Különösen fontos, hogy rádió-távbeszélő segítségével adják meg az elfogott légi-járműnek a biztonságos megközelítés és leszállás végrehajtásához szükséges összes tájékoztatást.

5. Az elfogott légi-jármű ténykedése

A 2. Függelék II. részében szereplő szabványok az alábbiakat írják elő:

„2.1 Egy másik légi-jármű által elfogott légi-járműnek azonnal

a) követnie kell az elfogó légi-jármű utasításait, a látási jeleket az „1” függelékben megadott előírások szerint értelmezve és viszonozva.
b) ha lehetséges, értesítse az illetékes légiforgalmi szolgálati egységet;
c) kísérelje meg a rádióösszeköttetés felvételét az elfogó légi-járművel, vagy az illetékes, elfogást irányító egységgel, általános hívással a 121,5 MHz vészhelyzeti frekvencián, megadva az elfogott légi-jármű azonosító jelét és a repülés fajtáját; és ha nem jött létre az összeköttetés és gyakorlatilag lehetséges, ismételje meg ezt a hívást a 243 MHz vészfrekvencián is;
d) ha fel van szerelve SSR válaszjel-adóval, állítsa be az „A” mód 7700 kódot, hacsak más utasítást nem kapott az illetékes légiforgalmi szolgálati egységtől.
e) ha fel van szerelve ADS-B-vel vagy ADS-C-vel, válassza ki a megfelelő vészhelyzeti funkciót, amennyiben rendelkezésre áll, hacsak más utasítást nem kap az illetékes légiforgalmi szolgálati

egységtől.

2.2 Ha bármely rádión kapott utasítás ellentétes az elfogó légi-jármű által látási jelek útján adott utasítással, az elfogott légi-jármű kérjen azonnali tisztázást, mialatt továbbra is követi az elfogó légi-jármű látási jelekkel adott utasításait.

2.3 Ha bármely rádión vett utasítás ellentétes az elfogó légi-jármű által rádión adott utasítással, az elfogott légi-jármű kérjen azonnali tisztázást, mialatt továbbra is követi az elfogó légi-jármű rádión adott utasításait."

6. Levegőben alkalmazott látási jelek

6.1 Az elfogó és az elfogott légi-járművek által alkalmazandó látási jeleket jelen Annex 1. Függeléke tartalmazza. Elengedhetetlenül fontos, hogy az elfogó légi-jármű pontosan alkalmazza e látási jeleket, és helyesen értelmezze a másik légi-jármű által adott jelzéseket. Különösen fontos, hogy az elfogó légi-jármű nagyon figyeljen minden - az elfogott légi-jármű által adott olyan - jelzésre, amely azt jelzi, hogy az elfogott légi-jármű veszélyben van, vagy segítségre szorul.

7. Rádióösszeköttetés az elfogást irányító egység vagy az elfogó légi-jármű, és az elfogott légi-jármű között

7.1 Az elfogás végrehajtása során, az elfogást irányító egység és az elfogó légi-jármű

a) először kíséreljen meg közös nyelven kétoldalú rádióösszeköttetést létesíteni a 121,5 MHz vészhelyzeti frekvencián;

A rádióösszeköttetés során a következő hívónevek használandók:
„INTERCEPT CONTROL" (elfogást irányító egység),
„INTERCEPTOR (hívójel)" [elfogó légi-jármű (hívójel)],
„INTERCEPTED AIRCRAFT" (elfogott légi-jármű); és

b) ennek sikertelensége esetén kíséreljenek meg kétoldalú rádióösszeköttetést létesíteni az elfogott légi-járművel olyan más frekvencián vagy frekvenciákon, amelyeket az illetékes ATS hatóságok írhattak elő, vagy létesítsenek összeköttetést a megfelelő ATS egységeken keresztül.

7.2 Ha az elfogás során létrejön a rádióösszeköttetés, de az üzenetváltás közös nyelven nem lehetséges, meg kell kísérelni az utasítások adását, az utasítások nyugtázását és a leglényegesebb tájékoztatások továbbítását az A-1 táblázatban szereplő kifejezések és kiejtési útmutató használatával, az egyes kifejezéseket kétszer ismételve.

A-1 táblázat

Az ELFOGÓ légi-jármű által használandó kifejezések:			*Az ELFOGOTT légi-jármű által használandó kifejezések:*		
Kifejezés	*Kiejtés*[1]	*Jelentése*	*Kifejezés*	*Kiejtés*[1]	*Jelentése*
CALL SIGN	<u>KOL-</u>SZAIN	Mi a hívójele?	CALL SIGN[2] (hívójel)	<u>KOL-</u>SZAIN (hívójel)	Hívójelem…
FOLLOW	<u>FOL</u>-LO	Kövessen	WILCO	<u>VILL</u>-KO	Megértettem, végrehajtom
DESCEND	DI-<u>SZEND</u>	Süllyedjen leszálláshoz	CAN NOT	<u>KAN-</u>NOT	Nem tudom teljesíteni

YOU LAND	JU-LEEND	Szálljon le ezen a repülőtéren	REPEAT	RI-PIT	Ismételje meg utasítását
PROCEED	PRO-SZID	Tovább haladhat	AM LOST	AM-LOSZT	Eltévedtem
			MAYDAY	MÉJDÉJ	Vészhelyzetben vagyok
			HIJACK[3]	HÁJDZSEK	Eltérítettek
			LAND (…)	LEND (…)	Leszállást kérek … helyen
			DESCEND	DI-SZEND	Süllyedést kérek

1. Megjegyzés. – A második oszlopban a hangsúlyozandó szótag alá van húzva.
2. Megjegyzés. – A megadandó hívójel az legyen, melyet a légiforgalmi szolgálati egységekkel tartott rádió-távbeszélő összeköttetés során használnak, és amely megfelel a légi-jármű repülési tervében szereplő azonosító jelnek.
3. Megjegyzés. – A "HIJACK" kifejezés használatát a körülmények nem mindig teszik lehetővé, illetve kívánatossá.

8. Tartózkodás a fegyverhasználattól

Megjegyzés. – Az ICAO tagállamok közgyűlésének 1984. május 10-én tartott 25. (rendkívüli) ülésén egyöntetűen elfogadott Nemzetközi Polgári Repülési Egyezmény 3 (b) cikkelye értelmében a Szerződő Államok elfogadták, hogy „minden államnak tartózkodnia kell a fegyverhasználattól repülést folytató polgári légi-járművekkel szemben"
.
Nyomjelzős lövedékek használata a figyelem felkeltése céljából veszélyes, és elvárt, hogy intézkedéseket foganatosítsanak ezek használatának elkerülésére annak érdekében, hogy a légi-jármű biztonságát és a fedélzeten lévő utasok életét ne veszélyeztessék.

9. Együttműködés az elfogást irányító egységek és a légiforgalmi szolgálati egységek között

9.1 Alapvető, hogy egy tudottan vagy feltételezhetően polgári légi-jármű elfogásának minden szakaszában szoros együttműködést tartsanak fenn az elfogást irányító egység és az illetékes légiforgalmi szolgálati egység között abból a célból, hogy a légiforgalmi szolgálati egység folyamatosan tájékoztatva legyen a fejleményekről, valamint az elfogott légi-járműtől megkövetelt tevékenységről.

„B" MELLÉKLET

JOGTALAN BEAVATKOZÁS

1. Általános rész

A következő eljárások útmutatóként szolgálnak arra az esetre, amikor a légi-jármű jogtalan beavatkozás alatt áll, és erről a légiforgalmi szolgálati egységet nem tudja értesíteni.

2. Eljárások

2.1 Amennyiben a légi-jármű parancsnoka a 3. Fejezet 3.7.2. pontban foglalt szabályok szerint nem képes egy repülőtér felé haladni, kísérelje meg folytatni útját a kijelölt útirányon és utazószinten legalább addig, amíg értesíteni tud egy légiforgalmi szolgálati egységet, vagy amíg radar vagy ADS-B fedésterületen van.

2.2 Amikor a jogtalan beavatkozás alatt álló légi-jármű el kell térjen kijelölt útirányától vagy utazószintjétől, és nem képes rádióösszeköttetést létesíteni az ATS-sel, a légi-jármű parancsnoka, amennyiben lehetséges

a) kísérelje meg figyelmeztetést adni a használatos VHF csatornán vagy a VHF vészhelyzeti frekvencián, és más megfelelő csatornákon, hacsak a légi-jármű fedélzetén a körülmények mást nem követelnek. Ha előnyös így cselekedni és a körülmények lehetővé teszik, használjon más berendezéseket is, mint például a fedélzeti válaszjel-adót vagy az adatátviteli eszközöket;
b) amennyiben ilyen eljárásokat kidolgoztak és a Helyi Körzeti Egyezmények (Doc 7030) eljárásaiban közzétettek, repüljön tovább a repülés közben kialakult váratlan helyzetekre előírt különleges eljárások szerint; vagy
c) ha alkalmazható körzeti eljárásokat nem dolgoztak ki, repüljön olyan szinten, amely a IFR repüléshez használt normál utazószintektől a következőkben különbözik:

> *1)* 150 méter (500 ft) olyan területen, ahol az alkalmazott függőleges elkülönítési minimum 300 méter (1000 láb); vagy
> *2)* 300 méter (1000 ft) olyan területen, ahol az alkalmazott függőleges elkülönítési minimum 600 méter (2000 láb).

Megjegyzés: A jogtalan beavatkozás alatt álló elfogott légi-jármű tennivalóit a jelen Annex 3.8 szakasza írja elő.

- Vége -

üzemeltetőként tevékenykedni. Mielőtt a szakszolgálati engedélye jogosítványait gyakorolná, a szakszolgálati engedély birtokosának meg kell ismernie a légiforgalmi állomáson használatos berendezéstípusokra és üzemeltetési eljárásokra vonatkozó és érvényes összes információt.

4. 8. Repülés-meteorológiai személyzet

Megjegyzés.- A repülés-meteorológiai személyzet kiképzésére és minősítésére vonatkozó követelmények a Meteorológiai Világszervezet (WMO) felelőssége és alapja az a munka megállapodás, mely a Nemzetközi Polgári Repülési Szervezet (ICAO) és a Meteorológiai Világszervezet (WMO) között jött létre (DOC 7475). A követelményeket a WMO 258. okiratában - Irányelvek a meteorológiai és az üzemi hidrológiai személyzet oktatására és kiképzésére – lásd Meteorológia I. Kötet:

ANNEX 3.
Meteorológiai Szolgálat Nemzetközi Léginavigációhoz

Lektorálta: Füredi Tamás Alkalmazás esetén mindenkor az eredeti ICAO anyagban foglaltak a mérvadók!

16. kiadás – 2007. július

I. rész
Szabványok és Ajánlott Eljárások törzsanyaga

II. rész
Függelékek és Mellékletek

Ez a kiadás magában foglalja a Tanács által 2007. február 22. előtt elfogadott összes módosítást, és 2007. november 7-ével hatálytalanítja a 3. Annex minden ezt megelőző kiadását.
A Szabványok és Ajánlott Eljárások alkalmazhatóságára vonatkozó információkat illetően lásd az Előszót.
Nemzetközi Polgári Repülési Szervezet

KÍSÉRŐ MEGJEGYZÉS
A NEMZETKÖZI POLGÁRI REPÜLÉSI EGYEZMÉNY FÜGGELÉKÉNEK ÚJ KIADÁSAI
Tudomásunkra jutott, hogy egy Annex új kiadásának megjelenésekor az Annex előző kiadásával együtt az ahhoz tartozó **Kiegészítés** is kidobásra kerültek. Kérjük megjegyezni, hogy az előző kiadáshoz tartozó Kiegészítést meg kell tartani, amíg egy új Kiegészítés kiadásra nem kerül.

A 74. MÓDOSÍTÁSRA VONATKOZÓ FONTOS MEGJEGYZÉS.
Ez az új kiadás az összes, 1-től 74-ig terjedő összes módosítást magában foglalja, és **2007. november 7.-**i alkalmazhatósági dátummal rendelkezik. Azonban a WAFS előrejelzések használatára vonatkozó bizonyos utasítások, az repülőtéri előrejelzés érvényességi időtartamának kiterjesztése, és a repülésmeteorológiai kódokra vonatkozó más módosítások csak **2008. november 5.-én** válnak alkalmazhatóvá, és ezeket az új kiadás **nem** tartalmazza. A 2008-ban alkalmazható utasítások helyettesítési oldalainak megküldésére 2007 szeptemberében kerül sor.

MÓDOSÍTÁSOK

A módosítások kiadását rendszeresen közlik az *ICAO Journal*-ban és a havonta megjelenő *Supplement to the Catalogue of ICAO Publications and Audio-visual Training Aids*-ben (Kiegészítés az ICAO kiadványok és audio-vizuális képzési segédletek katalógusához), amelyeket jelen kiadvány birtokosainak célszerű áttanulmányozni. Az alábbi hely ezeknek a módosításoknak a bejegyzésére szolgál.

MÓDOSÍTÁSOK ÉS JAVÍTÁSOK BEJEGYZÉSE

MÓDOSÍTÁSOK				JAVÍTÁSOK			
Szám	Alkalmazhatóság dátuma	Beírás dátuma	Beírta:	Szám	Kiadás dátuma	Beírás dátuma	Beírta:
1-74	07/11/7	-	ICAO	1	07/12/1	-	ICAO
74	08/11/5	-	ICAO	2	08/5/12	-	ICAO

TARTALOMJEGYZÉK

II. RÉSZ. FÜGGELÉKEK ÉS MELLÉKLETEK

FÜGGELÉKEK

ELŐSZÓ

Történeti háttér

A meteorológiára vonatkozó Szabványokat és Ajánlott Eljárásokat a Tanács először 1948. Április 16-án fogadta el a Nemzetközi Polgári Repülési Egyezmény (Chicago, 1944) 37. Cikkelyében foglalt előírásoknak megfelelően, és 3. Annex-ként jelölte ki az Egyezményhez, *Szabványok és Ajánlott Eljárások - Meteorológiai Kódok* címen. A Szabványok és Ajánlott Eljárások a Meteorológiai Részleg 1947. szeptemberében tartott különleges ülésszakának ajánlásain alapultak.

Az *A* Táblázat mutatja az egymást követő módosítások eredetét, valamint egy jegyzéket az érintett lényegi kérdésekről és azokról a dátumokról, amelyeken az Annexet és a módosításokat a Tanács elfogadta, vagy jóváhagyta, amikor hatályba léptek, és amikor alkalmazhatóvá váltak.

A Szerződő Államok tevékenysége

Eltérések bejelentése. A Szerződő Államok figyelmét felhívjuk az Egyezmény 38. Cikkelyében szereplő kötelezettségükre, amely szerint a Szerződő Államok kötelesek tájékoztatni a Szervezetet bármely eltérésről, amely nemzeti szabályozásaik és eljárásaik, és a jelen Annexben és annak bármely módosításában tartalmazott Nemzetközi Szabvány között fennáll. Felhívjuk a Szerződő Államokat, hogy ezt a tájékoztatást terjesszék ki a jelen Annex és annak bármely módosítása által tartalmazott Ajánlott Eljárásoktól való eltérésekre, amennyiben ezek az eltérések a légiközlekedés biztonsága szempontjából fontosak. Továbbá felhívjuk a Szerződő Államokat, hogy folyamatosan tájékoztassák a Szervezetet a későbbiekben előforduló eltérésekről, illetve bármely, korábban bejelentett eltérés visszavonásáról. Az eltérések bejelentésére vonatkozó specifikus kérést a Szervezet minden, ezzel az Annexszel kapcsolatos módosítás elfogadása után azonnal elküldi a Szerződő Államoknak.

Felhívjuk a szerződő Államok figyelmét a 15. Annex azon előírásaira is, amelyek a nemzeti szabályozások és eljárások és a vonatkozó ICAO Szabványok és Ajánlott Eljárások között fennálló eltéréseknek a Repülési Információs Szolgálaton (AIS) keresztül való közzétételére vonatkoznak, amelyet az Államoknak az Egyezmény 38. Cikkelye szerinti kötelezettségén felül meg kell tenniük.

Információ közlés. A jelen Annexben részletezett Szabványoknak és Ajánlott Eljárásoknak megfelelően biztosított, a légijárművek üzemeltetését befolyásoló berendezések, szolgálatok és eljárások létrehozásáról, megszüntetéséről és változásáról tájékoztatást kell adni, és ezeket a 15. Annex rendelkezései szerint kell életbe léptetni.

Az Annex szövegének felhasználása a nemzeti szabályozásokban. A Tanács 1948. április 13-án elfogadott egy határozatot, amely felhívja a Szerződő Államok figyelmét arra, hogy kívánatos saját nemzeti szabályozásaikban, amennyiben lehetséges, azoknak az ICAO Szabványoknak pontos nyelvezetét használni, amelyek szabályozó jellegűek; továbbá, hogy kívánatos a Szabványoktól való eltérések közlése, beleértve bármely pótlólagos nemzeti szabályozásról adott tájékoztatást, amely fontos a légiközlekedés biztonsága és rendszeressége szempontjából. Ahol csak lehetséges volt, jelen Annex rendelkezései olyan módon íródtak, hogy megkönnyítsék a nemzeti rendelkezésekbe nagyobb szövegváltoztatás nélküli beillesztését.

Az Annex részeinek státusza

Egy Annex a következő alkotórészekből épül fel, amelyek közül azonban nem mindegyik található meg szükségszerűen minden egyes Annexben; ezeknek a következőkben meghatározott státuszuk van:

1. – *Az Annex sajátosságát tartalmazó anyag:*

a) *Szabványok és Ajánlott Eljárások,* amelyeket a Tanács elfogadott az Egyezmény előírásainak megfelelően. Ezek meghatározása a következő:

Szabvány: Fizikai jellemzőkre, elrendezésekre, anyagra, teljesítményre, személyekre vagy eljárásokra vonatkozó bármely előírás, amelynek egységes alkalmazását szükségesnek tartják a nemzetközi repülés biztonsága vagy rendszeressége szempontjából, és amelyhez a Szerződő Államok az Egyezményeknek megfelelően igazodnak; teljesítésének lehetetlensége esetén a 38. Cikkely értelmében a Tanácsot kötelező értesíteni.

Ajánlott Eljárás: Fizikai jellemzőkre, elrendezésekre, anyagra, teljesítményre, személyekre vagy eljárásokra vonatkozó bármely előírás, amelynek egységes alkalmazását kívánatosnak tartják a nemzetközi repülés biztonsága, rendszeressége vagy hatékonysága érdekében, és amelyhez a Szerződő Államok az Egyezménynek megfelelően igyekeznek alkalmazkodni.

b) *Függelékek* a kényelem kedvéért külön csoportosított anyag, de a Tanács által elfogadott Szabványok és Ajánlott Eljárások részét képezik.

c) *Meghatározások* a Szabványok és Ajánlott Eljárásokban használt azon kifejezések definíciói, amelyek nem maguktól értetődőek, mivel nincs elfogadott szótári jelentésük. A definíciónak nincs független státusza, de lényeges része minden Szabványnak és Ajánlott Eljárásnak, amelyben a kifejezés előfordul, mivel a kifejezés jelentésének megváltoztatása befolyásolná az előírást.

d) *Táblázatok és Ábrák,* amelyek kiegészítik, vagy illusztrálják a Szabványokat és Ajánlott Eljárásokat, amelyekben hivatkoznak azokra, részei a velük kapcsolatos Szabványoknak, illetve Ajánlott Eljárásoknak és ugyanazon státuszuk van.

2. – A Tanács által kiadásra jóváhagyott Szabványokkal és Ajánlott Eljárásokkal kapcsolatos anyag:

a) *Előszó:* Tartalmazza a történeti és magyarázó anyagot a Tanács tevékenységéről, és tartalmazza az Államoknak a Szabványok és Ajánlott Eljárások alkalmazására vonatkozó kötelezettségeinek kifejtését, amelyek az Egyezményből és az Elfogadási Határozatból következnek.

b) *Bevezetés* az Annex részeinek, fejezeteinek vagy alfejezeteinek az elején magyarázó anyagot tartalmaz, amely segít a szöveg alkalmazásának megértésében.

c) *Megjegyzések,* ahol szükségesek, a szövegben szerepelnek, tényszerű információkat és felvilágosításokat adnak az adott Szabványra és Ajánlott Eljárásra vonatkozóan, de nem alkotják a Szabványok és Ajánlott Eljárások részét.

d) *Mellékletek* olyan anyagokat tartalmaznak, amelyek kiegészítik a Szabványokat és Ajánlott Eljárásokat, vagy útmutatást adnak azok alkalmazásához.

Nyelv kiválasztása

Ezt az Annexet öt nyelven fogadták el - angolul, arabul, franciául, oroszul és spanyolul. Minden Szerződő Államot felkérnek, hogy válasszon ezek közül egyet a nemzeti alkalmazás céljaira és az Egyezményben előírt egyéb célokra, akár közvetlen felhasználással, akár saját nemzeti nyelvére lefordítva, és erről a Szervezetet megfelelően értesítse.

Szerkesztési eljárások

A következő szerkesztési gyakorlatot alkalmazták az előírások szövegezésében, hogy az egyes állítások státusza az első pillantásra jelezze: *Szabványok* antikva betűtípussal vannak nyomtatva, míg az *Ajánlott Eljárások* dőlt betűkkel, a státuszt az **Ajánlás** előtag jelzi; *Megjegyzés* antikva *betűtípussal* nyomtatva*,* a státuszt a *Megjegyzés* előtag jelzi.

Bármely hivatkozás ennek a dokumentumnak egy számmal azonosított részére, a rész valamennyi alrészét tartalmazza.

Alkalmazhatóság

Jelen dokumentumban szereplő Szabványok és Ajánlott Eljárások szabályozzák a *Regionális Kiegészítő Eljárások* (Doc. 7030) alkalmazását, amelyben a regionális választású megállapítások szerepelnek, amennyiben ilyen választást jelen Annex megenged.

Felelősség

A 6. Annex II. Rész Előszavának egy hasonló előírásában foglaltaknak megfelelően, a felelősség, amely az üzemeltetőre hárul, a 3. Annex előírásai szerint, a nemzetközi általános célú repülés esetén a légijármű parancsnokot terheli.

A megfelelő WMO kiadványokkal való kapcsolat

A 3. Annexben lévő szabályozó anyag, néhány kisebb szerkesztési eltéréstől eltekintve, azonos a Meteorológiai Világszervezet (WMO) Műszaki Szabályozások (C.3.1 Fejezet) anyagával.

A 3. Annexben hivatkozott repülésmeteorológiai kód formátumokat a Meteorológiai Világszervezet alakította ki az ebben az Annexben található repülési követelmények alapján, illetve a Tanács időről-időre megállapított követelményei alapján. A repülésmeteorológiai kód formátumokat a Meteorológiai Világszervezet No.306 kiadványban - *Kódkézikönyv,* I. kötet tette közzé.

A Táblázat A 3. Annex módosításai

Módosítás(ok)	Forrás(ok)	Tárgy(ak)	Elfogadva/ jóváhagyva Hatályba lép Alkalmazható
1. kiadás	A Meteorológiai Részleg 2. Ülésszaka	Meteorológiai kódok a meteorológiai információk repülési célokból való továbbítására	1948.04.16. 1948.09.01. 1949.01.01.
1 -21 (2. kiadás)	A Meteorológiai Részleg rendkívüli Ülésszaka	A meteorológiai kódok felülvizsgálata és javítása.	1948.09.17. 1948.12.23. 1949.01.01.
22 - 37	A Meteorológiai Részleg 3. Ülésszaka	Köznyelvű szöveg és egyszerűsített kódok alkalmazása a légijelentésekben a repülési körülményekre vonatkozóan	1951.05.28. 1951.10.01. 1952.01.01.
38 (3. kiadás)	Első Léginavigációs Konferencia	A légijelentések rádiótelefonos vagy rádiótávírós AIREP forma bevezetése.	1953.12.15. 1954.08.01. 1954.09.01.
39	Első Léginavigációs Konferencia	A POMAR-kód módosított rádiótávíró formája a légijelentések számára.	1954.05.18. 1954.09.01. 1954.09.01.

40	Meteorológiai Világ Szervezet	Új repülésmeteoro-lógiai számkódok egy mellékletben, amely felváltja a SARP-okban koráb-ban megjelenteket (a POMAR-kódok kivételével).	1954.09.28. 1955.01.01. 1955.01.01.
41	A Meteorológiai Részleg 4. Ülésszaka	Szabványok és Ajánlott Eljárások bevezetése, amelyek szabályozzák a Szerződő Államok kötelezettségeit a meteorológiai szer-vezet létrehozásában minden egyes Ál-lamban, megfelelően kielégítve az Egyezmény 28. és 37. Cikkelyében foglaltakat; a 3. Annex címének ebből adódó megvál-tozása a következők-re: „Nemzetközi Szabványok és Ajánlott Eljárások - Meteorológia”.	1955.04.01. 1955.08.01. 1956.01.01.
42 (4.kiadás)	Második Léginavigációs Konferencia	A légijelentés AIREP és POMAR formájában a helyzet meghatározás mód-szeréhez alkalmazott részletes leírás egy-szerűsítése	1956.05.08. 1956.09.01. 1956.12.01.
43	Harmadik Léginavigációs Konferencia	A „SIGMET tájé-koztatás” kifejezés bevezetése a „ta-nácsadói közle-mény” és a „figyel-meztető közlemény” helyett; a POMAR-kódban a „tenger állapota” (State of Sea) táblázat módo-sítása.	1957.06.13. 1957.10.01. 1957.12.01.

44	Repülési Szabályok és Légiforgalmi Szolgálatok/Kutatás és Mentés Részlegek	A légijelentések AIREP formájában az 1.rész (helyzetjelentés) alapelemeinek változása - a „Repülési Körülmények” elem törlése és az utolsó elem módosítása ebben a részben a következőkre: „Következő helyzet és eltelt idő”	1960.02.18. 1960.05.01. 1960.08.01.
45	Repülési Szabályok és Légiforgalmi Szolgálatok/Kutatás és Mentés Részlegek	Az AIREP és POMAR típusú légijelentés formanyomtatvány mintájának módosítása, a 44. Módosítás következményeként.	
46	Meteorológiai Világszervezet	Felfrissítés a WMO által 1960. Január 1-jén bevezetett repülés-meteorológiai számkódokkal.	1960.06.08 – 1960.06.08

47 (5. kiadás)	A Meteorológiai Részleg 5. Ülésszaka	Légijárművek időjárás észlelési és jelentési eljárásainak módosítása, megváltoztatva azokat a különleges észlelések tekintetében, és bevezetve az egyéb észlelésekre vonatkozó követelményeket; a légijelentés POMAR formátumának törlése; a repülésmeteorológiai figyelés törlése és az útvonal előrejelző szolgálat bevezetése a területi meteorológiai figyelés kiegészítésére; a kitérő repülőtérhez vezető útvonalon lévő meteorológiai körülményekre vonatkozó előírások módosítása	1960.12.02. 1961.04.01. 1961.07.01..
48	A Meteorológiai Részleg 5. Ülésszaka	A légijelentés AIREP formanyomtatvány mintájának módosítása, hogy tükrözze a légijármű általi meteorológiai észlelésekre és jelentésekre a PANS-RAC módosítása miatt bekövetkező változásokat.	1960.12.02. – 1961.07.01.
49	A Meteorológiai Részleg 5. Ülésszaka	A „D-érték” definíciójának bevezetése	1963.04.08. 1963.08.01. 1963.11.01
50.	Meteorológiai Világszervezet	Felfrissítés az 1964. Január 1-jén a Meteorológiai Világszervezet által bevezetett repülésmeteorológiai számkódokkal.	1964.03.18 – 1964.03.18.

51 (6. kiadás)	Meteorológiai és Üzemelési Részleg ülése	Megfigyelés végzése követelményének bevezetése olyan helyekre, ahol ezek arra a területre lesznek jellemzőek, amelyre elsősorban megköveteltek. Különleges légijelentések kritériumainak kiterjesztése olyan jelenségekre, amelyek befolyásolhatják a hatékonyságot és a biztonságot, és az „egyéb légijármű általi észlelések” követelményének törlése a regionálisan egyeztetett kritériumok szerint; a légijelentések AIREP formátumából a D-érték, az időjárás és felhőzet, mint állandó tételek törlése; az AIREP formátum módosított mintájának bevezetése; a meteorológiai közlemények formájára vonatkozó és az információk képi formában való cseréjére biztosított eljárások változása; „köznyelv” definíciójának bevezetése.	1965.05.31. 1965.10.01. 1965.03.10.
52	Meteorológiai Világszervezet	Felfrissítés a Meteorológiai Világszervezet által 1966. Március 10-én bevezetett repülésmeteorológiai számkódokkal	1966.12.12 –

53	Meteorológiai és Üzemeltetési Részleg ülése.	A regionális léginavigációs egyezmény jóváhagyása a közlemények képi formában való továbbításáról az előrejelzések szétosztásában; a „szimbolikus közleményforma” kifejezés helyettesítése a közlemény formájának specifikusabb leírásával, amelyre ez a kifejezés volt hivatva utalni.	1966.12.12. 1967.04.12. 1967.08.24.
54	Meteorológiai Világszervezet	Felfrissítés a Meteorológiai Világszervezet által 1968. Január 1-jén bevezetett repülésmeteorológiai számkódokkal.	1967.06.13. 1968.01.01.
55.	Franciaország	A légijelentések változtatásának engedélyezése a föld-föld terjesztésük előtt	1968.12.16. 1969.04. 16. 1969.09.18.

56 (7. kiadás)	Hatodik Léginavigációs Konferencia	A következők bevezetése: területi előrejelző központok részletes leírása; meteorológiai szolgálatok egyszerűsített előírásai, amelyek a növekvő centralizációt tükrözik; a légijelentések tartalmának kiterjesztése rossz időjárási körülményekre, amelyekbe a légijármű a kezdeti emelkedés és a végső megközelítés során kerül; a légijármű általi jelentés inkább egy „adott ponton” uralkodó szélről, mint az „átlag” szélről; a turbulencia erősségéről repülés közben adandó jelentés kritériumainak pontosítása; a „légiforgalmi szolgálatok jelentő irodája” új definíciója és változtatás a „légiforgalmi szolgálati egység” meghatározásában; felfrissítés a Meteorológiai Világszervezet által 1969. Szeptember 18-án bevezetett repülésmeteorológiai kódokkal.	1970.05.15. 1970.09.15. 1971.02.04.

57	A Szuperszónikus Légiközlekedés Repülés Üzemelési Munkacsoport Második Ülése	A „SIGMET információ” meghatározásának módosítása, hogy az SST légijárművek üzemeltetési követelményeit figyelembe vegye; különleges megfigyelések végzésére és rögzítésére vonatkozó előírások bevezetése olyan esetekre, amikor transzonikus vagy szuperszonikus sebességű repülés során mérsékelt turbulencia, jégeső vagy cumulonimbus felhő tapasztalható.	1971.03.19. 1971.09.06. 1972.01.01
58.	Meteorológiai Világszervezet	Felfrissítés a Meteorológiai Világszervezet által 1972. Január 1-jén bevezetett repülésmeteorológiai kódokkal.	1971.03.19. 1972.01.06.
59	Hatodik Léginavigációs Konferencia	A meteorológiai szolgálatok között váltott légijelentések 1. Részéről a „következő helyzet és az odaérkezés ideje” elhagyásának engedélyezése: a légijelentés formátum mintájában és a megszokott adatokban bekövetkező változások bevezetése annak érdekében, hogy azt alkalmassá tegyék a számítógépbe való közvetlen bevitelre.	1972.03.24. 1972.07.24. 1972.12.07.

60. (8.kiadás)	Hatodik Léginavigációs Konferecia. Nyolcadik Léginavigációs Konferencia. Meteorológiai Részleg Ülése (1974)	A 3. Annex teljes átdolgozása, a PANS-MET beépítése, amelynek előírásait alkalmasnak találták a 3. Annexbe Szabványként és Ajánlott Eljárásként való beillesztésre; az átdolgozás figyelembe vette az elfogadott üzemeltetési követelményeket és azok kielégítésének korszerű módszereit; az üzemeltetők és a hajózószemélyzet tagjai részére adott szolgáltatások, a légiforgalmi szolgálatoknak és a kutató-mentő szolgálatoknak adott meteorológiai információkra vonatkozó új Szabványok és Ajánlott Eljárások bevezetése, beleértve a kommunikációra és azok felhasználására vonatkozó követelményeket is; a 3. Annex címe ennek megfelelően *Meteorológiai Szolgálat a Nemzetközi Repülés számára.*	1975.11.26. 1976.03.26. 1976.08.12.

61.	Kilencedik Léginavigációs Konferencia. Meteorológiai Részleg Ülés (1974))	Új előírások és fennálló rendelkezések módosításai a meteorológiai hivatalok/állomások és a légiforgalmi szolgálati egységek között meglévő koordináció és az utóbbi számára adott meteorológiai információkkal való ellátottság javítása érdekében; a 14. Annexnek a berendezések és épületek üzemelési területén való olyan elhelyezésére és építésére vonatkozó előírásaira utaló megjegyzés bevezetése, amelynél a légijárművek veszélyeztetettsége minimumra csökken; a „szuperszonikus szállító légijármű” kifejezés helyettesítése a „szuperszónikus légijármű” kifejezéssel; a 2. Függelék 2. Részének pontosítása; a „nefanalizis” definíciójának módosítása és a „(29.92 inch)” törlése a „repülési magasságszint” definíciójából; a D Melléklet - Repülésmeteorológiai Kódok rész törlése.	1977.12.14. 1978.04.14. 1978.08.10

62	Nyolcadik Léginavigációs Konferencia és az ICAO Tanács	Az 1. Függelékbe a Meteorológiai Világszervezet által a 3. Annexben szereplő üzemeltetési követelmények alapján kifejlesztett minta térképek és formanyomtatványok beiktatása; az adatjelölések és földrajzi jelzések átvitele a 3. Annex 2. Függelékéből a *Repülésmeteorológiai Eljárások Kézikönyvébe* (Doc 8896).	1978.06.26. 1978.10.26. 1979.11.29
63.	MET Részleg Ülés (1974). ICAO Titkárság Üzemi Repüléstájékoztató Szolgálati Panel. Kilencedik Léginavigációs Konferencia (Doc 9328)	Definíció a „meteorológiai bulletin"-re; a légijelentések föld-föld terjesztése hiányosságainak kijavítása; az „aktív zivatar területtel" foglalkozás csökkentése SIGMET közleményekben; a „jelentő vonalakra" való hivatkozás törlése; utalás új RVR Megfigyelési és Jelentési Eljárásaink Kézikönyvére.	1981.03.23. 1981.07.23. 1981.11.26
64	ICAO Titkárság	Új előírások és a meglévő módosítása, hogy megfeleljenek az alacsony szinti szélnyírás megfigyelésére és jelentésére vonatkozó üzemeltetési követelményeknek, beleértve a szélnyírásra való figyelmeztetést is, a repülés kezdeti emelkedési és a megközelítés fázisaiban.	1982.12.06. 1983.04.06. 1983.11.24.

65. (9. kiadás)	Távközlési/Meteorológiai Részleg Együttes Ülése (1982). ADAPT panel harmadik ülése	Új előírások és a régiek módosítása, amelyek az új világméretű területi előrejelző rendszer bevezetésére vonatkoznak; az üzemelési meteorológiai adatok cseréjének módszerei; az RVR becslési pontosságának javítása és az RVR jelentése	1983.06.10. 1984.10.10. 1984.11.22
66. (10. kiadás)	Távközlési/Meteorológiai Részlet Együttes Ülés (1982). Második Asia/Pacific Regionális léginavágiációsÜlés. Ez Európai Léginavigációs Tervezési Csoport Huszonkettedik és huszonharmadik ülése. Meteorológiai Világszervezet. Az ANC referencia dátum/idő módszere és a mértékegységekre vonatkozó javaslatai ICAO Titkárság	A következők módosítása: a szélnyírás információ repülőtéren kívülre való továbbítására vonatkozó előírás; a kiválasztott különleges jelentések kiadásának kritériumai, a felhő információ belefoglalása a repülőtéri előrejelzésekbe, rövidtávú-repülésekhez biztosítandó repülési dokumentáció a SIGMET közlemény és a meteorológiai bulletin fejrészének formátuma: a „SIGMET információ” definíciójának bevezetése; a 3. Annex és az 5. Annex egyeztetése a mértékegység és a referencia idő tekintetében.	1986.03.24. 1986.07.27. 1986.11.f20.

67	Távközlési/Meteorológiai Részleg Együttes Ülése (1982). Az Európai Léginavigációs Tervező Csoport 22. És 23. Ülése. ICAO Titkárság. Meteorológiai Világszervezet	A következőkre vonatkozó előírások módosítása: RVR mérésnél használt fényintenzitás beállítás; a kiválasztott repülőterek azonosítása és a WAFS térképeken a hőmérsékleti körök követelmény törlése; előrejelzések továbbítási ideje a regionális körzeti előrejelző központokból a felhasználókhoz; a vulkáni hamu figyelmeztetés eredetére és terjesztésére vonatkozó előírások bevezetése; a szélsebesség mértékegységeinek a repülésmeteorológiai számkódok példáiba való beillesztése, a 3. Annex és a PANS-RAC egyeztetése a légijelentések elemeinek tekintetében; a SIGMET közlemény példák szerkesztői módosítása	1987.03.27. 1987.07.27. 1987.11.19.

68.	Távközlési/Meteorológiai Részlet Együttes Ülése (1982). ICAO Titkárság Meteorológiai Világszervezet	Az RVR jelentés helyének azonosítására vonatkozó előírások módosítása; az RVR változásának kiválasztott különleges jelentésekben való közzétételének kritériumai; a repülőtéren túl szétosztandó jelentésekbe foglalandó földetérési zóna RVR értékek, amikor valamennyi futópálya használható leszállásra; repülőtéri dokumentációhoz minta térképek és formátumok; a vulkáni hamuval kapcsolatos SIGMET közlemény kiadása és módosítása, pontos előírások, hogy mikor szükséges a légiforgalmi tájékoztató szolgálati egységeket MET tájékoztatással ellátni; a légiforgalmi állandóhelyű távközlési hálózat és a légiforgalmi mozgószolgálat definíciók 10. Annex szerinti egységesítése, a terminológiai PANS-OPS II. kötet III. rész 6.3.1. pont szerinti egységesítése; a 3.3.7 pont szerkesztői módosítása az egyenértékű nyomásszint törlése; példa a SPECI jelentésre; a 8. Melléklet 3. Rész 1.4.b/ pontjának Hivatkozása; és a „C” melléklet lábjegyzete az RVR és a látástávolság vonatkozásában.	1989.03.21. 1989.07.23. 1989.11.16.

69. (11. kiadás)	Távközlési/Meteorológia/Üzemelések (COM/MET/OPS) Részleg Együttes Ülés (1990). ICAO Titkárság	A WAFS végső fázisára történő átmenettel kapcsolatos előírások módosítása; légiforgalmi meteorológiai kódok, útmutató anyag repülőtéri külön jelentések kritériumairól; légiforgalmi klimatológiai tájékoztatás; SIGMET információk és útmutató anyag SIGMET-ek kiadásához; automatikus időjárás észlelő állomások; meteorológiai információk helikopterek számára; valamint a 6. Annex I. és II. kötetének megfelelően, a kitérő repülőtér definíciója	1992.03.23. 1992.07.27. 1992.11.12. 1993.07.01.

70. (12. kiadás)	Kommunikációs/Meteorológiai/Üzemeltetési Részlet Együttes Ülése (1990). Korlátozott Észak-Atlanti (COM/MET/RAC) Regionális Léginavigációs Ülés (1992). Harmadik Ázsia/Csendes Óceán Regionális Léginavigációs Ülés (1993). Az Európai Léginavigációs Tervezési Csoport harminckettedik ülése. ICAO Titkárság.	Az AIRMET információ definíciója, a kiterjesztett hatótávolságú üzemelés definíciója, a GAMET területi előrejelzés definíciója, az üzemelési irányítás definíciója és a trópusi ciklon definíciója; a vizszintes felbontással és a kód formával foglalkozó rendelkezések módosítása, amelyekben a magaslégköri szél és hőmérséklet rácspont előrejelzéseket a világ-területi előrejelző központoknak kell készíteni; különleges jelentések kiadása a repülőtéri hőmérséklet változásról; repülőtéri meteorológiai információk jelentésére és előrejelzésére vonatkozó rendelkezések, amelyeken az új repülésmeteorológiai kódok alapulnak, és ezek következményeként az A1, A2, TA1, TA2 és SN minták módosítására a felfrissített repülésmeteorológiai kódok figyelembevételéhez; automatizált légi jelentés; a kismagassági repülésre veszélyes időjárás jelenségre vonatkozó információkat érintő rendelkezés, a minimum küszöbérték bevezetése a maximális talajszél sebességre, amelynél trópusi ciklon SIGMET-et kell kiadn; szélnyírás megfigyelés és jelentés a földi szélnyírás megfigyelő	1995.03.17. 1995.07.24. 1996.01.01.

71 (13. kiadás) 24	Korlátozott Észak-Atlanti COM/MET/RAC) Regionális Léginavigációs Űlés (1992) Harmadik Ázsia/Csendes óceán Regionális Léginavigációs Tervezési Csoport harmincnyolcadik űlése (EANPG/38). Egyesült Államok. ICAO Titkárság	Automatikus függő légtérellenőrzés definíciója, az Emberi Tényező alapelvek definíciója, nemzetközi légiútvonali vulkánikus figyelés definíciója, szint definíciója, trópusi ciklon tanácsadó központ definíciója, vulkánikus hamu tanácsadó központ definíciója, és VOLMET adatkapcsolat szolgálat definíciója;az Államok AIP-jaiban kijelölt meteorológiai hatóság feltüntetéseire vonatkozó előírások módosítása; az Emberi Tényező alapelvek szerepének bevezetése; 6 óra és 36 óra érvényességű WAFS magas- Légköri szél/hőmérséklet előrejelzések beillesztése; vulkánikus hamu tanácsadásokra vonatkozó előírások és új modell bevezetése grafikus formában; vulkánikus hamu tanácsadások felfrissítési gyakoriságának és a VAAC-ok és TCAS-ok speciális szerepének specifikálása; szerkesztési módosítás a konzisztencia biztosítására az „RVR” és „RWY” szavak rendjében; az aktuális időjárásra vonatkozó rövidítések módosítása; a „VOLMET” adatkapcsolat szolgáltatásra vonatkozó előírások bevezetése: a légi Automati-	1998.03.11. 1998.07.20. 1998.11.5

72 (14. kiadás)	Korlátozott Közép-Kelet (COM/MET/RAC) RAN Ülés. ASIA/PAC Léginavigációs Tervező és Megvalósító Regionális Csoport kilencedik ülése. Európai Léginavigációs Tervező Csoport harminchatodi, harminckilencedik és negyvenedik ülése. Nemzetközi Légiközlekedési Egyesület. Titkárság.	A hajózó személyzet tagja, a rácspont adat numerikus formában, repülőgép parancsnok, a regionális területi előrejelző központ és világ területi előrejelző központ definíciójának megváltoztatása; a minimális szektor tengerszint feletti magasság, a minőségbiztosítás, a minőségellenőrzés a minőségirányítás, a minőségrendszer és a látás definíciójának bevezetése, OPMET információk globális cseréjére vonatkozó előírások bevezetése; vulkánikus hamu és trópus ciklon tanácsadási közlemények felfrissített formulája; radioaktív anyagok véletlen elszabadulásáról tudósító információk továbbítására, sugárzás szimbólumának WAFS SIGWX térképekre való felvitelére vonatkozó előírások bevezetése; WAFS magaslégköri szél/hőmérséklet adatok napi négyre növelt kiadási gyakoriságra vonatkozó világ területi előrejelző rendszer (WAFS) előírások; 140-es repülési magasságszint és nedvesség bevitele a GRIB globális adatokba, a BUFR kód bevezetése, „erős talajszelek” és „hegyi homály” szimbólumok beillesztése az alacsonyszinti SIGWX térképeken:	2001.03.07. 2001.07.16. 2001.11.01.

73 (15. kiadás)	Meteorológiai (MET) Részleg Ülése (2002). Titkárság	A 3. Annex átszerkesztése két részbe; új és módosított definíciók; egyes Ajánlott Eljárások előléptetése Szabvánnyá; WAFS T4 térkép előállítások kiadása szükségességének megszüntetése; WAFS előrejelzések integritása fenntartása követelményének bevezetése; ACC, MWO és VAAC Állami vulkán megfigyelő állomások általi értesítése a vulkanikus tevékenységről; Előírások bevezetése, melyek lehetővé teszik SIGMET közlemények kiadását grafikus formában vulkanikus hamu és trópusi vihar jelenségekről WMO BUFR kódforma használatával; sablonok bevezetése különleges légijelentések, (lefelé kapcsolati), vulkanikus hamu és trópusi ciklon tanácsadó közlemények és repülőtéri és szélnyírás figyelmeztetések vonatkozásában; követelmény bevezetése METAR és SPECI információk kiadására a repülőtér újbóli üzemelései előtt, előírások bevezetése, amelyek lehetővé teszik teljesen automatikus megfigyelő rendszerek használatát üzemen kívüli órák során; a dominens látás bevezetése; követelmény bevezetése azoknak a	2004. 02. 25. 2004.07. 12. 2004. 11. 25

		időszakára és a közepes szélsebesség változására; követelmény bevezetése maximális fényintenzitás az RVR értékelésére a METAR és SPECI részére; a TB Modell 2.Példa törlése;új 3. és 4. Példa bevitele az SWH model alatt, az A Melléklet törlése; új C Melléklet bevezetése a támogató eljárások leírására a WAFC-oknál; és szerkesztési változtatások.	
74 (16.kiadás)	Világ Területi Előrejelző Rendszer Operációs Csoport (WAFSOPSG). Nemzetközi Légiközlekedési Vulkán Figyelő Operációs Csoport (IAVWOPSG). Nemzetközi légiközlekedési Szövetség (IATA). ICAO Titkárság.	Módosítások az „üzemelés szempontjából jelentőséggel bíró felhő”és „domináns látás” definiciókban és a „szolgáltatási terület (világ területi előrejelző rendszer)”definició törlése; az összes SST követelmény törlése; követelmény bevezetése a vulkanikus hamu tájékoztató központ (VAAC) támogató eljárásaihoz; szignifikáns időjárás (SIGWX) előrejelzések módosítása szükségességének törlése; a standard WAFS repülési magasságszintek tengerszint feletti magassága előrejelzéseinek bevezetése; annak a követelménynek az eltörlése, amely szerint repülőtéri különleges meteorológiai jelentést (SPECI) kell kiadni, ha félóránkénti repülőtéri rendszeres meteorológiai jelentéseket (METAR) adnak ki; széllökések helyi rendszeres és különleges jelentések küldésének módosítása zajcsökkentő eljárások alkalmazása esetén; kritériumok kijelölése változás csoportok használatához TAF-ban SPECI kiadásánál; megengedő cikkelyek bevezetése bináris általános forma (BUFR) használatára meteorológiai kód formájú előállításához METAR/SPECI és TAF terjesztéséhez bilaterális bázison; másodlagos ellenőrző radar (SSR) S-üzemmódú adat-	2007. február 21. 2007. július 16. 2007. november 7. 2008. november 5.

		kapcsolat bevezetése automatikus meteorológiai jelentés küldésbe; SIGMET-ből vulkanikus hamura és trópusi ciklonokra vonatkozó kilátás eliminálása; standard WAFS térképek szolgáltatásának követelménye rögzített lefedési területekre; a WAFS előrejelzések meteorológiai tartalmának módosítását megakadályozó előírás bevezetése; előírások feljavítása a WAFS előrejelzések használatának előmozdítása érdekében; talajmenti frontok, konvergencia zónák és felhők, CB-k kivételével, eliminálása a magas- és középszintű SIGW előrejelzésekből; a vulkanikus hamu tájékoztatási formula és a trópusi ciklon tájékoztatási formula összehangolása; a trópusi ciklon tájékoztatás módosítások 6-órás előrejelzések bevezetéséhez; a „szomszédság” definíciójának változtatása; automatikus rendszerek használatának kiterjesztése üzemelési idő tartamára; turbulencia automatikus jelentésének módosításai; új minta bevezetése GAMET közlésekhez; a TAF érvényességi időtartamának kiterjesztése a nagyon nagy hatótávolságú repülések követelményeinek kielégítésére; előírások bevezetése grafikus SIGMET-nél az összes jelenségre, a SIGMET minta felfrissítésére, hogy rádioaktív felhőt tartalmazzon; ’cunami’ bevezetése a repülőtéri figyelmeztetésekbe; a 3.és 11. Annex légiforgalmi szolgálatoknak (ATS) szóló meteorológiai információkkal foglalkozó előírásainak kijelölése; kritériumok módosítása, hogy a VOLMET és a D-VOLMET SIGMET-et és TAF-ot tartalmazzon ; a megfigyelés és mérés elérhető pontosságának törlése az A Mellékletből; a megkívánt pontosság frissítése a B Mellékletben; és szerkesztési módosítások.	

NEMZETKÖZI SZABVÁNYOK ÉS AJÁNLOTT ELJÁRÁSOK

I. RÉSZ
SZABVÁNYOK ÉS AJÁNLOTT ELJÁRÁSOK TÖRZSANYAGA

1. FEJEZET. DEFINÍCIÓK

Megjegyzés. – Az (RR) jelölés ezekben a definíciókban olyan definíciót jelez, amelyet a Nemzetközi Távközlési Egyesület (ITU) Rádió Szabályzatokból vettünk (lásd Rádiófrekvencia Spektrum Előírások Kézikönyve Polgári Repülés részére, amely jóváhagyott ICAO álláspontokat tartalmaz *(Doc 9718)).*

1.1 Definíciók

Amikor a következő fogalmakat használják a Meteorológiai Szolgálat Nemzetközi Léginavigációhoz Szabványaiban és Ajánlott Eljárásaiban, ezek az alábbi jelentéssel bírnak:

Repülőtér (Aerodrome). Egy meghatározott terület földön vagy vízen (beleértve bármely épületet, építményt és berendezést), amely teljes egészében vagy részben a légijárművek érkezésére, indulására és földi mozgására szolgál.

Repülőtéri éghajlati összefoglaló (Aerodrome climatological summary). Meghatározott meteorológiai elemek tömör összefoglalása egy repülőtérre, statisztikai adatok alapján.

Repülőtéri éghajlati táblázat (Aerodrome climatological table). Olyan táblázat, amely statisztikai adatokat szolgáltat egy vagy több meteorológiai elem megfigyelt előfordulásáról egy adott repülőtéren.

Repülőtéri irányító torony (Aerodrome control tower). A repülőtéri forgalom számára légiforgalmi irányító szolgálat biztosítására létrehozott egység.

Repülőtér tengerszint feletti magassága (Aerodrome elevation). A leszálló terület legmagasabb pontjának tengerszint feletti magassága.

Repülőtéri meteorológiai iroda (Aerodrome meteorological office). A repülőtéren telepített, a nemzetközi repülés számára meteorológiai szolgálat nyújtására kijelölt hivatal.

Repülőtéri referencia pont (Aerodrome reference point). A repülőtér kijelölt földrajzi pontja.

Repülési állandóhelyű szolgálat (Aeronautical fixed service (AFS)). Meghatározott rögzített pontok közötti távközlési szolgálat, amely elsősorban a repülés biztonságát, valamint a légiszolgálatok rendszeres, hatékony és gazdaságos működését szolgálja.

Repülési állandóhelyű távközlési hálózat (Aeronautical fixed telecommunication network (AFTN)). A légiforgalmi állandóhelyű körök világméretű rendszere, amely a repülési állandóhelyű szolgálat részeként az ugyanolyan, vagy kompatíbilis távközlési jellemzőkkel rendelkező repülési állandóhelyű állomások közötti közlemények és/vagy digitális adatok cseréjére szolgál.

Repülésmeteorológiai állomás (Aeronautical meteorological station). A nemzetközi léginavigációban való felhasználásra szolgáló megfigyelések és meteorológiai jelentések készítésére kijelölt állomás.

Repülési mobil szolgáltatás (RR S1.32) (Aeronautical mobile service). Mobil szolgálat repülési állomások és légijármű állomások között, vagy légijármű állomások között, amelyben életmentő állomások is szerepelhetnek; vészhelyzeti helyzetjelző rádió jeladók is részt vehetnek ebben a szolgáltatásban, kijelölt katasztrófa- és vészhelyzeti frekvenciákon.

Repülési távközlési állomás (Aeronautical telecommunication station). A légiforgalmi távközlési szolgálat állomása.

Légijármű (Aircraft). Bármely gép, amely az atmoszférában képes támaszt leszármaztatni a levegő olyan reakcióiból, amelyeket a levegőből nem a földfelszín vált ki.

Légijárműves megfigyelés (Aircraft observation). Repülést végző légijárműtől származó, egy vagy több meteorológiai elem értékelése.

AIRMET információ (AIRMET information). Meteorológiai figyelő iroda által kiadott tájékoztatás, amely meghatározott útvonali időjárás jelenségek előfordulásával vagy várható előfordulásával foglalko-

zik, amely jelenségek befolyásolhatják a kismagasságú légijármű üzemelések biztonságát, és amely tájékoztatás már nem szerepelt a kismagasságú repülések részére kiadott előrejelzésben az illetékes repülési információs körzetben vagy ennek alkörzetében.
Légijelentés (Air-report). Légijárműről repülés közben adott jelentés, amelyet a helyzet, üzemeltetési és/vagy meteorológiai jelentésre vonatkozó előírásoknak megfelelően készítettek.
Megjegyzés. — Az AIREP formanyomtatványra vonatkozó részleteket a PANS-ATM (Doc 4444) tartalmaz.
Légiforgalmi szolgáltató egység (Air traffic service unit). Gyűjtőnévi kifejezés, amely váltakozva jelenthet légiforgalmi irányító egységet, repülésinformációs központot vagy légiforgalmi szolgálathoz tartozó jelentő irodát.
Kitérő repülőtér (Alternate aerodorome). Az a repülőtér, ahová a légijármű repülhet, ha a rendeltetési repülőtérre történő repülés, vagy az ott történő leszállás nem lehetséges, vagy nem tanácsos. A kitérő repülőterek fajtái az alábbiak:
Felszállási kitérő repülőtér (Departure alternate). Az a kitérő repülőtér, ahol egy légijármű leszállhat, ha ez a felszállást követő rövid időn belül szükségessé válik és az indulási repülőtér erre nem használható.
*Útvonali kitérő repülőtér (En-route alternate)***.** Az a kitérő repülőtér, ahol egy útvonalrepülés során rendellenes, vagy vészhelyzeti állapot észlelése után a légijármű leszállni képes.
ETOPS útvonali kitérő repülőtér (ETOPS en-route alternate). Alkalmas és megfelelő kitérő repülőtér, ahol ETOPS útvonal repülés során hajtóműleállás vagy egyéb rendellenes vagy vészhelyzeti állapot észlelése után a repülőgép leszállni képes.
Rendeltetési kitérő repülőtér (Destination alternate). Az a kitérő repülőtér, ahová egy légijármű repülhet, ha a szándékolt repülőtéren a leszállás lehetetlenné, vagy nem tanácsolttá válik.
Megjegyzés. — Az a repülőtér, amelyről a repülés elindult, e repülés számára útvonali vagy rendeltetési kitérő repülőtér is lehet.
Közepes tengerszint feletti magasság (Altitude). Egy szint, egy pont vagy egy pontnak tekintett tárgy közepes tengerszinttől (MSL) mért függőleges távolsága.
Bevezető irányítási egység (Approach control unit). Egy vagy több repülőtérre érkező vagy azokról induló irányított repülések részére légiforgalmi irányítás szolgáltatására létesített egység.
Illetékes ATS hatóság (Appropriate ATS authority). Egy állam által kijelölt illetékes hatóság, amely felelős az érintett légtérben a légiforgalmi szolgálatok ellátásáért.
Körzeti irányító központ (Area control centre). Az irányított repülések számára, az illetékessége alá tartozó irányítás körzetekben légiforgalmi irányító szolgálat ellátására létesített egység.
Automatikus függő légtérellenőrzés (ADS) (Automatic dependent surveillance(ADS))
Légtérellenőrzési eljárás, amelynél a légijárművek automatikusan, egy adatkapcsolaton keresztül fedélzeti navigációs és helyzetrögzítő rendszerekből származtatott adatokat, közöttük légijármű azonosítási, négydimenziós helyzet és szükség szerinti kiegészítő adatokat szolgáltatnak.
Eligazítás (Briefing). Szóbeli ismertetés fennálló és/vagy várható meteorológiai viszonyokról.
Üzemelési jelentőségű felhő (Cloud of operational significance). Felhő 1500 m (5000 láb) vagy a legmagasabb minimális szektormagasság, amelyik a nagyobb, alatti felhőalap magassággal, vagy comolonimbus felhő, vagy tornyosuló gomolyfelhő bármely magaságon.
Konzultáció (Consultation). A meteorológussal vagy más képesített személlyel a légi üzemeltetésre vonatkozó fennálló és/vagy várható meteorológiai viszonyokról folytatott megbeszélés; a kérdésekre adott válaszokat is magában foglalja.
Irányítási terület (Control area). A földfelszín felett meghatározott határtól felfelé terjedő ellenőrzött légtér.
Utazómagasság (Crusing level). A repülés jelentős szakaszán tartott repülési magasság.
Tengerszint feletti magasság (Elevation). Egy földfelszínen lévő, vagy ahhoz rögzített pontnak vagy szintnek a közepes tengerszinttől mért függőleges távolsága.
Kiterjesztett hatótávolságú üzemelés (Extended range operation). Két-gázturbinás-hajtóműves repülőgép olyan repülése, ahol a repülési idő az egyik hajtómű működőképtelensége esetéhez tartozó utazási repülési sebességnél (Nemzetközi Normál Atmoszféra és szélcsend körülményei között) az útvonal egy

pontjától egy alkalmas kitérő repülőtérig nagyobb, mint az Üzemeltető Állam által jóváhagyott küszöbidő.
Hajózószemélyzet tagja (Flight crew member). Szakszolgálati engedéllyel rendelkező személyzeti tag, aki olyan szolgálati feladatokkal van megbízva, amelyek a repülés ideje alatt fontosak a légijármű üzemeltetése szempontjából.
Repülési dokumentáció (Flight documentation). Kézírásos vagy nyomtatott okmányok, közöttük a repüléshez meteorológiai információkat tartalmazó térképek és nyomtatványok.
Repülési információs központ (Flight information centre). Repülési információs és riasztó szolgálat ellátására létesített egység.
Repülési információs régió (Flight information region). Meghatározott méretű légtér, amelyen belül repülési információs szolgálatot és riasztó szolgálatot biztosítanak.
Repülési magasságszint (Flight level). Egy állandó légköri nyomású felület, amely egy speciális 1013.2 hektopascal (hPa) nyomásértékhez tartozik, és amelyet más ilyen felületektől meghatározott nyomásintervallumok választanak el.
1. Megjegyzés Egy nyomás típusú , a Nemzetközi Normál Atmoszférával összhangban kalibrált magasságmérő:
a) amikor QNH magasságmérő beállításhoz állítják be, tengerszint feletti magasságot mutat;
b) amikor QFE magasságmérő beállításhoz állítják be, a QFE referencia érték feletti magasságot mutat; és
c) amikor 1013,2 hektopascal (hPa) nyomásra állítják be, akkor repülési magasságszintek jelzésére lehet használni.
2. Megjegyzés — A „height" (magasság) és „altitude" (tengerszint feletti magasság), amelyeket a fenti 1. Megjegyzésben használtunk, inkább altimetrikus, mint geometriai magasságokat és tengerszint feletti magasságokat jelölnek.
Előrejelzés (Forecast). Egy meghatározott időpontban vagy időszakban és a légtér egy meghatározott területén vagy részén várható meteorológiai viszonyokra vonatkozó közlés.
GAMET körzeti előrejelzés (GAMET area forecast) Körzeti előrejelzés rövidített köznyelven kismagasságú repüléseknél egy repülési információs körzet vagy alterület számára, amelyet az illetékes meteorológiai hatóság által kijelölt meteorológiai iroda készít, és amelyet a szomszédos repülési információs körzetekben működő meteorológiai irodával kicserélnek. az illetékes meteorológiai hatóságok közötti megállapodás szerint.
Rácspont adatok digitális formában (Grid point data in digital form). Egy térképen szabályos távolságokban elhelyezkedő pontok halmazára vonatkozó, számítógéppel feldolgozott meteorológiai adatok egy meteorológiai számítógépből másik számítógépbe való továbbítására, automatikus felhasználásra alkalmas kód formában.
Megjegyzés — Legtöbb esetben az ilyen adatokat közepes vagy nagysebességű távközlési csatornákon továbbítják.
Magasság - (Height) Egy szintnek, egy pontnak vagy egy pontnak tekintett tárgynak meghatározott vonatkozási alaptól mért függőleges távolsága.
Emberi Tényező alapelvek (Human Factors principles). Olyan alapelvek, amelyeket repülési tervezéshez, alkalmasság tanúsításhoz, képzéshez, üzemeltetéshez és karbantartáshoz alkalmaznak, és amelyek biztonságos kapcsolódást keresnek az emberi és más rendszer komponensek között az emberi teljesítőképesség helyes értékelésével.
Nemzetközi légiútvonali vulkán figyelés (International airways volcano watch) (IAVW) Nemzetközi egyezmények az atmoszférában lévő vulkánikus hamu figyeléséről és a légijárművek erre való figyelmeztetéséről.
Megjegyzés. – A IAVW repülési és nem-repülési operatív egységek együttműködésén alapszik, felhasználva az Államok által biztosított megfigyelő forrásokból és hálózatokból származtatott információkat. A figyelést az ICAO, más érdekelt nemzetközi szervezetekkel együttműködve, koordinálja.
Szint (Level) Repülést végző légijármű függőleges helyzetére vonatkozó gyűjtőnévi fogalom, amely váltakozva jelent magasságot, közepes tengerszint feletti magasságot vagy repülési magasságszintet.

Meteorológiai hatóság (Meteorological authority). A Szerződő Állam nevében a nemzetközi repülés részére meteorológiai szolgáltatást nyújtó vagy e szolgáltatás nyújtását elrendelő hatóság.
Meteorológiai bulletin (Meteorological bulletin). Meteorológiai információkat tartalmazó szöveg, amelyet egy megfelelő fejrész előz meg.
Meteorológiai információ (Meteorological information). Meteorológiai jelentés, analízis, előrejelzés és bármilyen egyéb, a fennálló vagy várható meteorológiai viszonyokra vonatkozó közlemény.
Meteorológiai iroda (Meteorological office). A nemzetközi léginavigáció számára meteorológiai szolgáltatásra kijelölt iroda.
Meteorológiai jelentés (Meteorological report). Egy meghatározott időre és helyre vonatkozó, megfigyelt meteorológiai viszonyok közlése.
Meteorológiai mesterséges hold (Meteorological satellite). Föld körül keringő mesterséges hold, amely meteorológiai megfigyeléseket végez és ezeket a földre továbbítja.
Minimális szektor tengerszint feletti magasság (Minimum sector altitude). Az alkalmazható legkisebb tengerszint feletti magasság, amely minimum 3OO m (1000 láb) akadálymentes magasságot szolgáltat egy navigációs rádióberendezés középpontú, 46 km (25 tengeri mérföld) sugarú kör szektoron belüli területen elhelyezkedő összes akadály felett.
Megfigyelés (meteorológiai) (Observation (meteorological)). Egy vagy több meteorológiai elem értékelése.
Üzemelés ellenőrzés (Operational control). Felügyelet gyakorlása egy repülés indítása, folytatása, elterelése vagy befejezése felett a légijármű biztonsága és a repülés rendszeressége és hatékonysága érdekében.
Üzemeltetési repülési terv (Operational flight plan). Az üzemeltető a repülés biztonságos végrehajtására vonatkozó terve a repülőgép teljesítménye, más üzemeltetési korlátok, valamint a lerepülendő légiútvonalon és a repülőtereken várható viszonyokra vonatkozó megfontolások alapján.
Üzemeltetési tervezés (Operational planning). A repülés üzemeltetés üzemeltető általi tervezése.
Üzemeltető (Operator). Személy, szervezet, vagy vállalat, amely légijárműveket üzemeltet, vagy arra ajánlatot tesz.
Légijármű parancsnok (Pilot-in-command). Az üzemeltető, vagy általános célú repülés esetén a tulajdonos, által parancsnokként a légijármű üzemeltetéséért és a repülés biztonságos végrehajtásáért felelősként kijelölt légijárművezető.
Dominens látás (Prevailing visibility). A körhorizontnak legalább a felén belül, vagy a repülőtéri felületnek legalább a felén belül a „látás" definíciójának megfelelően észlelt legnagyobb látási érték. Ezek a területek szomszédos és nem szomszédos szektorokat tartalmazhatnak.
Megjegyzés. – Ezt az értéket emberi megfigyeléssel és/vagy műszerezett rendszerekkel lehet meghatározni. Amikor műszereket szerelnek fel, azokat a dominens látás legjobb meghatározásának nyerésére használják.
Előrejelzési térkép ((Prognostic chart). Meghatározott meteorológiai elem(ek) előrejelzése egy meghatározott időpontra vagy időszakra, és egy meghatározott felületre vagy légtér részre, grafikusan ábrázolva egy térképen.
Minőségbiztosítás (Quality assurance**).** A minőségi rendszeren belül megvalósított, és szükség esetén demonstrált összes tervezett és rendszeres tevékenység, amely arra irányul, hogy bizonyosságot szolgáltasson arról, hogy egy entitás teljesíti a minőségi követelményeket (ISO 9000:2000[1]*)
Minőségellenőrzés (Quality control) Üzemelési eljárások és tevékenységek, amelyeket a minőségi követelmények kielégítésére használnak (ISO9000:2000[2]*)
Minőség menedzsment (Quality management**)** Az átfogó menedzsment funkcióhoz tartozó összes tevékenység, amely meghatározza a minőségpolitikát, a célokat és felelősségi köröket és azok megvalósítását olyan eszközökkel, mint például a minőség rendszeren belüli minőségtervezés, minőségellenőrzés, minőségbiztosítás és minőségjavítás (ISO9000:2000[3]*).
Minőség rendszer (Quality system**)** A minőség menedzsment megvalósításához szükséges szervezeti struktúra, eljárások, folyamatok és források (ISO 9000:2000[4]*)
Regionális léginavigációs egyezmény (Regional air navigation agreement). Az ICAO Tanács által jó-

váhagyott megegyezés, általában egy regionális léginavigációs értekezlet tanácsára.
körzetén belül lévő repülőterekről induló légijárművek számára és rácspont adatokat szolgáltasson digitális formában a világméretű fedéshez.
Jelentőpont (Reporting point). Egy meghatározott földrajzi hely, amelyhez viszonyítva egy légijármű helyzetét jelenteni lehet.
Mentés koordináló központ (Rescue coordinating centre). Egy kutató és mentő körzeten belül a kutatási és mentési szolgáltatás hatékony megszervezésének elősegítéséért és a kutatási és mentési műveletek végrehajtásának koordinálásáért felelős egység.
Futópálya (Runway). Szárazföldi repülőtéren a légijárművek le- és felszállására készített téglalap alakú terület.
Futópálya látástávolság (Runway visual range (RVR)). Az a távolság, amelyről a futópálya középvonalán lévő légijármű vezetője a futópálya felületi jelzéseit, vagy a futópálya szegélyfényeit, illetve a középvonalat jelző fényeket felismeri.
Kutató és mentő szolgálati egység (Search and rescue service unit). Gyűjtőnévi kifejezés, amely jelenthet mentést koordináló központot, mentő alközpontot, vagy riasztó őrhelyet.
Szolgálati terület (világterületi előrejelző rendszer). (Service area (world area forecast system)). Egy földrajzi terület, amelyen belül egy regionális területi előrejelző központ felelősséggel tartozik területi előrejelzések biztosításáért a meteorológiai hatóságok és más felhasználók részére.
SIGMET információ (SIGMET information). Meteorológiai figyelőiroda által kiadott, az útvonalon a légijárművek üzemeltetésének biztonságát befolyásolható, meghatározott időjárási jelenségek előfordulásáról, vagy várható előfordulásáról szóló információk.
Szabvány izobár felület (Standard isobaric surface). Izobár felület, amelyet világméretű alapon a légköri viszonyok reprezentálására és elemzésére használnak.
Küszöb (Threshold). A futópálya leszállásra használható részének kezdete.
Földetérési zóna (Touchdown zone). A futópálya küszöbén túli rész, ahol a leszállni szándékozó légijárművek először érintik a futópályát.
Trópusi ciklon (Tropical cyclone). Trópusi vagy szubtrópusi vizek felett keletkező, szervezett konvekcióval és határozott ciklonikus felületi szél cirkulációval rendelkező gyűjtőnévi fogalom.
Trópusi ciklon tájékoztató központ (Tropical cyclone advisory centre (TCAC)) Regionális léginavigációs egyezmény által meteorológiai figyelő irodák, világterületi előrejelző központok és nemzetközi OPMET adatbankok részére a trópusi ciklonok helyzetére, előrejelzett mozgásirányára és sebességére, központi nyomására és maximális talajszelére vonatkozó tanácsadó információk szolgáltatására kijelölt meteorológia központ.
Magaslégköri térkép (Upper-air-chart). Az atmoszféra meghatározott felső légköri szintjére vagy rétegére vonatkozó meteorológiai térkép.
Látás (Visibility) A repülési célokra szolgáló látás az alábbiak közül a nagyobbik:
a) az a legnagyobb távolság, amelynél megfelelő méretű, a föld közelében elhelyezett fekete tárgy látható és felismerhető, amikor fényes háttérrel szemben figyelik;
b) az a legnagyobb távolság, amelynél körülbelül 1000 gyertyás fények láthatóak és felismerhetőek kivilágítatlan háttérrel szemben.
Megjegyzés. – A két távolságnak, adott kioltási tényezőjű levegőben, különböző értékei vannak, és az utóbbi b) a háttér megvilágítással változik. Az előbbi a)-t a meteorológiai optikai távolság reprezentálja (MOR).
Vulkanikus hamu tájékoztató központ (Volcanic ash advisori centre (VAAC)). Regionális léginavigációs egyezmény által meteorológiai megfigyelő irodák, körzeti irányító központok, repülési információs központok, világterületi előrejelző központok és nemzetközi OPMET adatbankok részére a vulkánkitőrést követően a vulkanikus hamunak az atmoszférában való lateriális és függőleges kiterjedésére, előrejelzett mozgására tanácsadó információkat szolgáltató meteorológiai központ.
VOLMET. (VOLMET) Meteorológiai információ repülést végző légijármű részére.
Adatkapcsolati VOLMET (D-VOLMET) (Data link VOLMET (D-VOLMET)) Aktuális rendszeres repülőtéri időjárás jelentések, (METAR) és repülőtéri különleges meteorológiai jelentések (SPECI) repülőtéri

előrejelzések (TAF), SIGMET, SIGMET által nem lefedett különleges légijelentések és, ahol rendelkezésre áll, AIRMET közlemények szolgáltatása adatkapcsolaton keresztül.
VOLMET adás (VOLMET broadcast). Folytonos és ismétlődő rádióadások útján, ahogyan megfelelő, aktuális METAR, SPECI, TAF és SIGMET előrejelzések és SIGMET közlemények szolgáltatása.
Világterületi előrejelző központ (World area forecast centre(WAFC)). Egy meteorológiai központ, amelyet arra jelöltek ki, hogy szignifikáns időjárás előrejelzéseket és magaslégköri előrejelzéseket készítsen és biztosítson digitális és/vagy képi formában, az egész világra kiterjedően, a regionális területi előrejelző központok és közvetlenül az Államok részére, megfelelő eszközökkel, mint a repülési helyhez kötött szolgálat része.
Világterületi előrejelző rendszer) (World area forecast system (WAFS)). Egy világméretű rendszer, amelynek segítségével a világ- és regionális körzeti előrejelző központok légiforgalmi meteorológiai útvonal előrejelzéseket biztosítanak egységesített formában.

1.2 Korlátozott jelentéssel használt fogalmak

Ezen Annex céljára a következő kifejezések korlátozott jelentéssel rendelkeznek, az alábbiak szerint:

a) a „szolgálat" (service) szó körüli félreértések elkerülése érdekében a meteorológiai szolgálat, mint adminisztratív egység és az általa nyújtott szolgáltatás megkülönböztetésére „meteorológiai hatóságnak" nevezzük az előbbit és „szolgáltatásnak" az utóbbit;

b) „szolgáltatni" kizárólag szolgáltatással kapcsolatosan használatos;

c) „kiadni" kizárólag azokkal az esetekkel kapcsolatosan használatos, amikor a kötelezettség kifejezetten információknak egy felhasználóhoz való megküldésére terjed ki;

d) „hozzáférhetővé tesz" csak akkor használatos, ha a kötelezettség akkor fejeződik be, amikor az információt egy felhasználó számára hozzáférhetővé tették;

e) „rendelkezésre bocsát" kifejezés csak a c) vagy d) esetekkel kapcsolatban használatos.

2. FEJEZET – ÁLTALÁNOS ELŐÍRÁSOK

1. Bevezető Megjegyzés – Ismeretes, hogy ennek az Annex-nek a meteorológiai információkra vonatkozó rendelkezései annak megértésén alapulnak, hogy a Szerződő Állam kötelessége, az Egyezmény 28. Cikkelye alapján, meteorológiai információk szolgáltatása, és hogy az ilyen információk alkalmazásáért a felhasználó felelős.

2. Bevezető Megjegyzés.– Bár a Nemzetközi Polgári Repülési Egyezmény a lajstromozó államra bizonyos teendőket jelöl ki, amelyeket az állam jogosult vagy köteles végrehajtani, a közgyűlés elismerte az A23-13 sz. Határozatban, hogy a Lajstromozó Állam esetleg képtelen megfelelően teljesíteni kötelezettségeit olyan esetekben, ha a légijárművet egy másik Állam üzemeltetője haszonbérbe veszi, kibérli vagy elcseréli – különösen , ha személyzet nélküli – és, hogy az Egyezmény nem határozhatja meg pontosan az üzemeltető államának jogait és kötelezettségeit ilyen esetekben, amíg az Egyezmény 83. bis Cikkelye életbe nem lép. Ennek megfelelően a Tanács sürgette, hogy ha a fent említett esetben a Lajstromozó Állam képtelennek érezné magát az Egyezmény által ráosztott tevékenység megfelelő végrehajtására, akkor ruházza át azokat a feladatokat az üzemeltető államra, annak hozzájárulásával, amelyeket az jobban el tud látni. Nyilvánvaló, hogy amíg az Egyezmény 83. bis cikkelye életbe lép, az előbb említett intézkedés csupán gyakorlati megegyezés kérdése, és nem befolyásolja a Chicagói Egyezmény rendelkezéseit, amelyek a lajstromozó állam, illetve bármely harmadik állam kötelezettségeit előírja. Azonban, mivel az Egyezmény 83 bis cikkelye 1997. június 20-án életbelépett, ilyen átruházási egyezmények azokra a Szerződő Államokra bírnak érvénnyel, amelyek a vonatkozó Jegyzőkönyvet (Doc 9318) a 83 bis Cikkelyben megállapított feltételek kielégítéséről ratifikálták.

3. Bevezető Megjegyzés. – Nemzetközi üzemelés esetén, amelyet közösen olyan repülőgépekkel végeznek, amelyek nem mindegyike ugyanazon Szerződő Államban van lajstromozva, semmi nincs ebben az Annexben, ami megakadályozná az illető Államokat abban, hogy egyezményt kössenek azon funkciók közös gyakorlására, amelyeket ennek az Annexnek az előírásai a Lajstromozó Államra vonatkozóan lefektetnek.

2.1 A meteorológiai szolgálat célja, meghatározása és a rá vonatkozó előírás

2.1.1 A nemzetközi léginavigáció részére nyújtott meteorológiai szolgáltatás célja hozzájárulni a nemzetközi léginavigáció biztonságához, rendszerességéhez és hatékonyságához.
2.1.2 Ezt a célt úgy kell elérni, hogy az üzemeltetőnek, a hajózószemélyzet tagjainak, a légiforgalmi szolgálati egységeknek, kutató és mentőszolgálati egységeknek, repülőtéri igazgatóságoknak és más olyan szervezeteknek, amelyek a nemzetközi légiközlekedés fejlesztésében érdekeltek, biztosítják a saját feladataik ellátásához szükséges meteorológiai információkat.
2.1.3 Minden Szerződő Államnak meg kell határoznia azt a meteorológiai szolgáltatást, amelyet nyújtani fog a nemzetközi léginavigáció igényeinek kielégítésére. Ezt a jelen Annex rendelkezéseinek megfelelően kell végrehajtani, tekintettel a regionális léginavigációs egyezményekre is; ennek tartalmazni kell a nemzetközi vizek és az illető állam területén kívül fekvő területek fölötti léginavigáció számára nyújtott meteorológiai szolgáltatás meghatározását is.
2.1.4 Minden Szerződő Állam jelölje ki a hatóságát, a továbbiakban: meteorológiai hatóság, amely a Szerződő Állam képviseletében ellátja vagy megszervezi a nemzetközi légiközlekedés részére a meteorológiai szolgáltatást. Az így kijelölt meteorológiai hatóságra vonatkozó részleteket az Állam repülési információs kiadványnak kell tartalmaznia a 15. Annex, 1. Függelék, GEN 1.1.
2.1.5 Minden Szerződő Államnak biztosítania kell, hogy a kijelölt meteorológiai hatóság kielégítse a Meteorológiai Világszervezetnek a nemzetközi léginavigáció kiszolgálását végző meteorológiai személyzet képesítésére és szakképzésére vonatkozó követelményeit.
Megjegyzés. – A repülésmeteorológiában alkalmazott meteorológiai személyzet képesítésére és szakképzésére vonatkozó követelmények a WMO 49 sz. kiadványában, Technical Regulations, *Volume I –* General Meteorological Standards and Recommended Practises, *Chapter B.4 (*Műszaki Szabályozások, *I. Kötet –* Általános Meteorológiai Szabványok és Ajánlott Eljárások, *B.4 fejezet – Oktatás és képzés) találhatók*

2.2 Meteorológiai információk szolgáltatása, minőségbiztosítása és felhasználása

2.2.1 Szoros kapcsolatot kell tartani a nemzetközi léginavigáció meteorológiai szolgáltatásait érintő kérdésekre vonatkozó meteorológiai információk szolgáltatásában érdekeltek és a felhasználásában érdekeltek között.
2.2.2 **Ajánlás.** – *Hogy megvalósítsák a nemzetközi léginavigáció meteorológiai szolgálatának célját, a Szerződő Államoknak biztosítaniuk kell, hogy a 2.1.4 pontban hivatkozott kijelölt meteorológiai hatóság létrehozzon és megvalósítson egy jól szervezett minőségi rendszert, amely magában foglalja a 2.1.2 pontban felsorolt felhasználóknak szolgáltatott meteorológiai információk minőség menedzseléséhez szükséges eljárásokat, folyamatokat és forrásokat.*
2.2.3 **Ajánlás.** – *A 2.2.2 pontnak megfelelően létrehozott minőségi rendszer legyen konform a minőségbiztosítási szabványok Nemzetközi Szabványügyi Szervezet (ISO) 9000-es sorozatával, és erről egy megfelelő szervezet által kiadott igazolással rendelkezzen.*
Megjegyzés. – A minőségbiztosítási szabványok Nemzetközi Szabványügyi Szervezet (ISO) 9000-es sorozata alapkeretet szolgáltat egy minőségbiztosítási program kidolgozásához. Egy sikeres program részleteit minden Államnak meg kell fogalmaznia, és a legtöbb esetben ezek az Állam szervezeti sajátjai.
2.2.4 **Ajánlás.** – *A minőségi rendszernek biztosítékot kell nyújtania a felhasználóknak arra vonatkozóan, hogy a szolgáltatott információk kielégítik a megállapított követelményeket a földrajzi és térbeli lefedés, a forma és tartalom, a kiadás időpontja és gyakorisága és az érvényességi időszak, valamint a mérések, megfigyelések és előrejelzések pontossága tekintetében. Amennyiben a minőségi rendszer jelzi, hogy a felhasználók részére szolgáltatott információk nem felelnek meg a megállapított követelményeknek, és az automatikus hibakorrigáló eljárások nem alkalmazhatók, ezeket az információkat nem szabad a felhasználókhoz eljuttatni, hacsak az információ létrehozója ezeket nem érvényesíti.*
Megjegyzés. – A repülési felhasználók részére szolgáltatott meteorológiai információk földrajzi és térbeli lefedésre, tartalmára és formájára, a kiadás időpontjára és gyakoriságára és érvényességi időtartamára vonatkozó követelmények ennek az Annexnek a 3. 4., 6., 7., 8.,9. és 10. Fejezetében és a 2.,3.,5.,.6,.7.,8. és 9. Függelékeiben, és a megfelelő regionális léginavigációs tervekben vannak megadva. A mérési és megfigyelési pontossággal, és az előrejelzések pontosságával foglalkozó útmutató jelen Annex A és B Mellék-

letében található.

2.2.5 **Ajánlás.** *– Üzemelési célú meteorológiai információk cseréjére vonatkozóan a minőségi rendszer tartalmazzon igazolási és érvényesítési eljárásokat és forrásokat az egyedi üzenetek, és/vagy bulletinek, melyeknek cseréjét megkövetelik, előírt továbbítási üteme és a továbbítás időpontjai betartásának figyelésére. A minőségi rendszernek képesnek kell lenni a közlemények és bulletinek túlságosan hosszú továbbítási idejének észlelésére.*

Megjegyzés. – Üzemelési meteorológiai információk cseréjére vonatkozó előírások jelen Annex 11. Fejezetében és 10. Függelékében találhatók

2.2.6 **Ajánlás.** *– Az alkalmazott minőségi rendszer megfelelősségének demonstrálását ellenőrző vizsgálattal lehet végezni. Ha a rendszer konformitásának hiányát észlelik, az okot meg kell határozni, és meg kell szüntetni. Minden ellenőrző vizsgálatot tanúsítani és megfelelően dokumentálni kell.*

2.2.7 A 2.1.2 pontban felsorolt felhasználóknak szolgáltatott meteorológiai információknak konzisztenseknek kell lenniük az Emberi Tényező alapelvekkel, és olyan formájúaknak kell lenniük, hogy ezektől a felhasználóktól csak minimális értelmezési munkát igényeljenek, ahogyan az a következő fejezetekben le van írva.

Megjegyzés. – Útmutató anyag az Emberi Tényező alapelveiről az Emberi Tényező Oktatási Kézikönyvben (Human Factors Trainig Manual) *(Doc 9683) található.*

2.3 Az üzemeltetőktől megkövetelt értesítések

2.3.1 Az az üzemeltető, amely a meteorológiai szolgáltatást vagy a fennálló meteorológiai szolgáltatás megváltoztatását kívánja, elegendő idővel előre értesítse a meteorológiai hatóságot, vagy az illetékes meteorológiai irodát (irodákat). Az előzetes értesítés minimális terjedelme és minimális előretartási ideje a meteorológiai hatóság, vagy a meteorológiai iroda (irodák) és az üzemeltető közötti megállapodásnak megfelelő legyen.

2.3.2 A szolgáltatást kérő üzemeltetőnek értesítenie kell a meteorológiai hatóságot, ha:

a) új útvonalakat vagy új típusú üzemeltetést tervez;

b) tartós jellegű változtatásokat kíván végrehajtani a menetrendszerű járatokban;

c) egyéb olyan változtatásokat tervez, amelyek befolyásolják a meteorológiai szolgáltatás nyújtását.

Az ilyen információnak tartalmaznia kell az összes részletet, amelyek a meteorológiai hatóság részére szükségesek a megfelelő intézkedések tervezéséhez.

2.3.3 Az üzemeltető vagy a hajózószemélyzet tagja értesítse a repülőtéri vagy az illetékes meteorológiai irodát:

a) a repülési menetrendről;

b) amikor nem-menetrendszerű járatokat kívánnak üzemeltetni

c) ha a járatok késnek, korábban indulnak, vagy törölték őket.

2.3.4 **Ajánlás.** *– A repülőtéri, vagy az illetékes meteorológiai iroda számára az egyes járatokról adandó értesítésnek az alábbi információkat kell tartalmaznia, kivéve, ha a menetrendszerű járatok esetében ezeket az információkat, vagy azok egy részét a meteorológiai iroda és az üzemeltető közötti megállapodás alapján nem szükségesek:*

a) indulási repülőtér és a tervezett indulási idő;

b) rendeltetési hely és az érkezés tervezett időpontja;

c) repülendő útvonal és a közbenső repülőtérre (repülőterekre) való érkezés, illetve onnan való indulás becsült időpontja;

d) a repülés végrehajtási terv elkészítéséhez szükséges és a regionális léginavigációs tervezet megfelelő jegyzékében szereplők közül kiválasztott kitérő repülőterek;

e) utazómagasság;

f) a repülés típusa, hogy azt látás szerinti repülési-, vagy műszer szerinti repülési szabályok szerint hajtják végre;

g) a hajózószemélyzeti tag részére kért meteorológiai információ típusa: időjárási repülési dokumentáció és/vagy eligazítás vagy konzultáció; és *h) időpont(ok), amelyekre az eligazítás, konzultáció és/vagy repülési dokumentáció szükséges.*

3. FEJEZET – VILÁG TERÜLETI ELŐREJELZŐ RENDSZER ÉS METEOROLÓGIAI IRODÁK

Megjegyzés. – Erre a fejezetre vonatkozó műszaki specifikációkat és részletes kritériumokat a 2. Függelék tartalmazza.

3.1 A világ területi előrejelző rendszer feladata

A világ területi előrejelző rendszer feladata ellátni a meteorológiai hatóságokat és más felhasználókat digitális formában globális magassági szél, magaslégköri hőmérséklet és nedvesség; maximális szélirány, sebesség és magasság, tropopauza magasság és hőmérséklet előrejelzésekkel; valamint a szignifikáns időjárás jelenségek előrejelzéseivel. Ezt a feladatot átfogó, integrált, világméretű és, amennyire megvalósítható, egységes rendszerrel és költséghatékony módon, a fejlődő technológia összes előnyének kihasználásával kell megvalósítani.

3.2 Világ területi előrejelző központok

3.2.1 Egy Szerződő Állam, amely magára vállalta egy világ területi előrejelző központ (WAFC) felállításának felelősségét a világ területi előrejelző rendszer keretében, a következőket rendelje el az adott központ számára:

a) globális előrejelzések készítése rácspont adatokhoz az összes előírt, alább felsorolt globális előrejelzés szintre:

1) magassági szél;
2) magaslégköri hőmérséklet és nedvesség;
3) a repülési magasságszintek geopotenciális tengerszint feletti magassága;
4) a tropopauza repülési magasságszintje és hőmérséklete; és
5) a maximális szél iránya, sebessége és repülési magasságszintje;

b) szignifikáns időjárási (SIGWX) jelenségek globális előrejelzéseinek készítése;

c) az a) és b) alpontok szerinti előrejelzések kiadása digitális formában a meteorológiai hatóságok és más felhasználók részére, ahogyan a Szerződő Állam a meteorológiai hatóság tanácsára jóváhagyta;

d) radioaktív anyagok véletlen atmoszférába jutásáról szóló információk fogadása a hozzátartozó WMO regionális, a radiológiai környezeti vészhelyzeti reagáláshoz szolgáló közlekedés modell eredmények szolgáltatására specializált meteorológiai központtól (RSMC) annak érdekében, hogy ezeket az információkat beillesszék a szignifikáns időjárás előrejelzésekbe; és

f) kapcsolatot létesíteni és fenntartani a VAAC-al a vulkánikus tevékenységről szóló információk cseréjéhez, hogy koordinálják a vulkánkitörésekről szóló információk beillesztését a szignifikáns időjárás (SIGWX) előrejelzésekbe.

3.2.2 Egy WAFC működésének megszakadása esetén feladatait vegye át egy másik WAFC.

Megjegyzés. – Egy WAFC működésének megszakadása esetén alkalmazandó támogató eljárásokat a Világ Területi Előrejelző Rendszer Operációs Csoport szükség szerint állandóan frissíti; az utolsó revízió a WAFSOPSG weboldalán: www.icao.int/anb/wafsopsg található.

3.3 Meteorológiai irodák

3.3.1 Minden Szerződő Államnak egy vagy több repülőtéri és/vagy egyéb meteorológiai irodát kell létesítenie, amelyek alkalmasak a nemzetközi repülési navigáció igényeinek kielégítéséhez szükséges meteorológiai szolgáltatások biztosítására.

3.3.2 Egy repülőtéri meteorológiai irodának el kell látnia az alábbiakban felsorolt feladatok mindegyikét vagy egy részét, amelyek szükségesek a repülőtéri repülés-üzemelés szükségleteinek kielégítéséhez:

a) előrejelzések és egyéb fontos információk készítése és/vagy beszerzése azokhoz a járatokhoz, amelyekkel ezek kapcsolatosak; az előrejelzések készítésére vonatkozó kötelezettségeinek ki kell terjednie a más irodáktól kapott útvonal és repülőtéri előrejelzések anyagának helyi hozzáférhetőségére és felhasználására;

b) előrejelzések készítése és/vagy beszerzése a helyi meteorológiai viszonyokról;
c) a meteorológiai viszonyok folyamatos ellenőrzése azokon a repülőtereken, amelyekre előrejelzéseket kell készítenie;
d) eligazítást, konzultációt és repülési dokumentációt kell biztosítania hajózószemélyzeti tagok és/vagy egyéb légi üzemeltetést végző személyek számára;
e) egyéb meteorológiai információk adása repülési felhasználóknak;
f) a rendelkezésre álló meteorológiai információk bemutatása;
g) meteorológiai információk cseréje más meteorológiai irodákkal;és
h) kitörés előtti vulkánikus aktivitással, vulkánkitöréssel vagy vulkánikus hamu felhővel kapcsolatban kapott információk szolgáltatása a légiforgalmi szolgálati egységnek, légiforgalmi tájékoztató szolgálati egységnek és meteorológiai figyelő irodának, ahogy ebben az érintett meteorológiai, légiforgalmi tájékoztató szolgálat és ATS hatóságok megegyeztek.
3.3.3 Azokat a repülőtéri meteorológiai irodákat, amelyektől repülési dokumentációt igényelnek, valamint a lefedendő területeket regionális léginavigációs egyezményben, kell meghatározni.
3.3.4 Azokat a repülőtereket, amelyekre leszállási előrejelzés szükséges, a regionális léginavigációs egyezményben kell meghatározni.
3.3.5 A meteorológiai irodával nem rendelkező repülőterek számára:
a) az illetékes meteorológiai hatóság jelöljön ki egy vagy több meteorológiai irodát a kívánt meteorológiai információk biztosítására; és
b) az illetékes hatóságok hozzák létre azokat az eszközöket, amelyek segítségével ezek az információk az érintett repülőterek számára eljuttathatók.

3.4 Meteorológiai megfigyelő irodák

3.4.1 Az a Szerződő Állam, amely elfogadta azt a kötelezettséget, hogy egy repüléstájékoztató körzeten vagy irányítási területen belül légiforgalmi szolgálatokat biztosít, egy vagy több megfigyelő irodát tartozik létesíteni, vagy el kell intéznie, hogy ezt egy másik Szerződő Állam megtegye.
3.4.2 A meteorológiai megfigyelő iroda tartozik:
a) figyelemmel kísérni azokat a meteorológiai viszonyokat, amelyek a felelősségi területének határain belül lévő légijárművek üzemeltetését befolyásolhatják;
b) SIGMET és egyéb információkat készíteni a felelősségi területére vonatkozóan;
c) SIGMET információkat és szükség esetén egyéb meteorológiai információkat szolgáltatni a kapcsolódó légiforgalmi szolgálati egységeknek;
d) szétosztani a SIGMET tájékoztatást;
e) amikor a regionális léginavigációs egyezmény megköveteli, a 7.2.1-el összhangban;
1) AIRMET információt készíteni a felelősségi területére vonatkozóan;
2) AIRMET információval ellátni a kapcsolódó légiforgalmi szolgálati egységeket; és
3) szétosztani az AIRMET információt;
f) kitörés előtti vulkanikus aktivitással, vulkánkitöréssel vagy vulkanikus hamu felhővel kapcsolatban kapott információkat továbbítani, amelyre vonatkozóan SIGMET-et még nem adtak ki, a hozzá kapcsolódó ACC/FIC számára, ahogy abban az érintett meteorológiai és ATS hatóságok megegyeztek, és a hozzá kapcsolódó VAAC számára, hogyan azt a regionális léginavigációs egyezmény meghatározta; és
g) a radioaktív anyagoknak azon a területen, amelyen figyelést végez, és a szomszédos területeken, véletlen atmoszférába jutásáról szóló, vett információk továbbítása a hozzá tartozó ACC/FIC-hez, az illetékes meteorológiai és ATS hatóságok közötti megállapodás szerint, és a repülési információs szolgálati egységeknek, az illetékes meteorológiai és megfelelő polgári repülési hatóságok közötti megállapodásnak megfelelően. Az információnak tartalmaznia kell a baleset helyét, dátumát és időpontját, és a radioaktív anyagok előrejelzett trajektóriáit.
Megjegyzés. – Az információt a radiológiai környezeti vészhelyzeti reagáláshoz szolgáló transzport modell eredmények szolgáltatására specializált WMO regionális meteorológiai központok (RSMC) által egy Államba delegált hatóság kérésére szolgáltatják. Az információkat az RSMC mindegyik Államban az országos meteorológiai szolgálatának egyetlen kapcsolódási pontjára küldi el. Ennek a kapcsolódási pont-

nak a felelőssége az RSMC produktumok újraelosztása az érintett Államon belül.
3.4.3 **Ajánlás** – *Azon terület határainak, amelyre a meteorológiai irodának figyelést kell fenntartania, lehetőség szerint egybe kell esnie egy repülésinformációs körzet, vagy repülésinformációs körzetek és/vagy összevont irányítási területek egy kombinációjának határaival.*
3.4.4 **Ajánlás** – *A meteorológiai figyelést folyamatosan fenn kell tartani, olyan területeken azonban, ahol a forgalom sűrűsége kicsi, a figyelést korlátozni lehet a várható repülésüzemelési időszakra.*

3.5 Vulkanikus hamu tájékoztató központok

3.5.1 Egy Szerződő Államnak, miután egy regionális léginavigációs egyezmény által elfogadta egy VAAC ellátásának kötelezettségét a nemzetközi légiútvonali vulkánikus figyelés keretében, meg kell szerveznie, hogy ez a központ válaszoljon egy vulkánkitöréséről vagy várható kitöréséről szóló értesítésre, vagy ha vulkanikus hamut jelentenek a felelősségébe tartozó területén, elrendezve, hogy ez a központ
a) figyelje a releváns geostacionárius és poláris keringési pályájú műhold adatokat, hogy észlelje vulkanikus hamu meglétét és kiterjedését az atmoszférában a szóbanforgó területen;
b) aktivizálja a vulkanikus hamu numerikus trajektória/szétoszlás modellt annak érdekében, hogy bármely észlelt vagy jelentett hamu „felhő" mozgását előrejelezzék.
Megjegyzés. – A numerikus modell lehet saját, vagy megegyezésalapján, egy másik VAAC modellje.
c) adjon ki vulkanikus hamu „felhő" kiterjedésére és előrejelzett mozgására vonatkozó tájékoztatási információkat a következő szervezetek részére:
1) meteorológiai megfigyelő irodák, körzeti irányító központok és repülési információs központok, amelyek azokat a felelősségi területén lévő repülési információs körzeteket szolgálják ki, amelyek érintettek lehetnek;
2) más VAAC-ok, amelyek felelősségi területei érintettek lehetnek;
3) világ területi előrejelző központok, releváns regionális területi előrejelző központok, nemzetközi OPMET adatbankok, nemzetközi NOTAM irodák, és a regionális léginavigációs egyezmény által repülési helyhezkötött szolgálati műholdas elosztó rendszerek működtetésére kijelölt központok; és
4) légitársaságok, amelyek a speciálisan erre a célra biztosított AFTN címen keresztül igénylik a tájékoztató információkat;
Megjegyzés. – A VAAC-ok által használt AFTN cím a Kézikönyv a Nemzetközi Légiútvonali Vulkán Figyelésről (IAVW) – *(Doc 9766) kiadványban, és a http:// www.icao.int/icao/ en/anb/met/index.htmlweb oldalon található.*
d) adjon ki felfrissített információkat a meteorológiai figyelő irodáknak, körzeti irányító központoknak és VAAC-oknak, amelyek a c)-ben vannak felsorolva, szükség szerint, de legalább minden hat órában, amíg a vulkánikus hamu „felhő" már nem azonosítható a műholdas adatokból, már nem érkezik több vulkánikus hamu jelentés a területről, és nem jelentenek már vulkánkitörést.
3.5.2 A vulkanikus hamu tájékoztató központoknak 24-órás figyelést kell fenntartaniuk.

3.6 Állami vulkánmegfigyelő állomások

Azoknak a Szerződő Államoknak, amelyek aktív vulkánok monitorozását végző vulkán megfigyelő állomásokat működtetnek, el kell rendezniük, hogy kiválasztott Állam vulkán megfigyelő állomásai, amelyek regionális léginavigációs szerződésnek megfelelően, megfigyelve

a) szignifikáns kitörés előtti vulkanikus tevékenységet, vagy annak megszűnését;
b) vulkánkitörést vagy annak megszűnését; és/vagy
c) az atmoszférában vulkanikus hamut,

ezeket az információkat amilyen gyorsan csak lehet, küldjék meg a hozzájuk tartozó AAC, MWO és VAAC intézményeknek.
Megjegyzés. – Kitörés előtti vulkanikus tevékenység ebben a vonatkozásban szokatlan és/vagy növekvő vulkanikus tevékenységet jelent, amely vulkánkitörés előjele lehet.

3.7 Trópusi ciklon tájékoztató központok

Egy Szerződő Államnak, miután egy regionális léginavigációs egyezmény által elfogadta egy TCAC ellátásának kötelezettségét, meg kell szerveznie, hogy ez a központ:
a) geostacionárius és poláris keringési pályán lévő műholdak adatainak, radar adatok és egyéb meteorológiai információk felhasználásával figyelje trópusi ciklonok kialakulását a felelősségi területén;
b) adjon ki rövidített köznyelven a ciklon központ helyzetére, mozgásának irányára és sebességére, a középpont nyomására és a középpont közelében a talajszélre vonatkozó tájékoztató információkat a következő szervezetek részére:
1) a felelősségi területén lévő meteorológiai figyelő irodák;
2) más TCAC-ok, amelyek felelősségi területei érintettek lehetnek;és
3) világ területi előrejelző központok, releváns regionális területi előrejelző központok, nemzetközi OPMET adatbankok és regionális léginavigációs egyezmény által repülési helyhezkötött szolgálati műholdas elosztó rendszerek működtetésére kijelölt központok;
c) adjon ki felfrissített tájékoztató információkat a meteorológiai figyelő irodák részére minden trópusi ciklonra, szükség szerint, de legalább minden hat órában.

4. FEJEZET – METEOROLÓGIAI MEGFIGYELÉSEK ÉS JELENTÉSEK

Megjegyzés. – Erre a fejezetre vonatkozó műszaki specifikációkat és részletes kritériumokat a 3. Függelék tartalmazza.

4.1 Repülésmeteorológiai állomások és megfigyelések

4.1.1 Minden Szerződő Állam tartozik a területén elhelyezkedő repülőtereken olyan repülésmeteorológiai állomásokat létesíteni, amelyeket szükségesnek ítél. Egy repülésmeteorológiai állomás lehet különálló, vagy egy szinoptikus állomással kombinált.

Megjegyzés. – Repülésmeteorológiai állomások tartalmazhatnak a repülőtéren kívül felszerelt érzékelőket, ahol a meteorológiai hatóság által igazolt szükségessége a nemzetközi léginavigáció részére jelen Annexben előírt meteorológiai szolgáltatások biztosításához.

4.1.2 **Ajánlás** – *Minden Szerződő Állam létesítsen meteorológiai állomásokat, vagy gondoskodjon repülésmeteorológiai állomások létesítéséről tengeri építményeken vagy egyéb, a tengeri építményekre irányuló helikopter üzemelések szempontjából fontos helyeken, ha regionális léginavigációs egyezmény ezt megköveteli.*

4.1.3 A repülésmeteorológiai állomásoknak meghatározott időközönként rendszeres megfigyeléseket kell végezniük. Repülőtereken a rendszeres megfigyeléseket ki kell egészíteni különleges megfigyelésekkel, amikor meghatározott változások fordulnak elő a talajszél, a látás, futópálya látástávolság, aktuális időjárás, felhőzet és/vagy levegő hőmérséklet vonatkozásában.

4.1.4 **Ajánlás** – *Minden Szerződő Állam kellő gyakorisággal ellenőrizze a repülésmeteorológiai állomásait annak biztosítására, hogy a megfigyelések magas színvonalát fenntartsa, a műszerek és az összes jelzőberendezések kifogástalanul működjenek, és ellenőrizze, hogy a műszerek elhelyezése nem változott-e meg jelentősen.*

4.1.5 II. és III. kategóriájú műszeres megközelítési és leszállási műveletek végrehajtására szolgáló futópályákkal rendelkező repülőtereken a talajszél, a futópálya látástávolság és felhőalap magasság, levegő- és harmatpont hőmérséklet és atmoszférikus nyomás mérésére vagy megbecslésére, amelyik megfelelő, és figyelésére és távkijelzésére szolgáló automatizált berendezéseket kell felszerelni. Ezeknek a berendezéseknek integrált automatikus rendszereknek kell lenniük, amelyek a fel- és leszállási műveleteket befolyásoló meteorológiai paraméterek begyűjtését, feldolgozását, szétosztását és valósidejű kijelzését végzik. Az integrált automatikus rendszerek tervezésénél figyelembe kell venni az Emberi Tényezők alapelveket, és támasztó eljárásokat kell tartalmazniuk.

1. Megjegyzés. – A precíziós megközelítési és leszállási műveletek kategóriái a 6. Annex I. Részben vannak definiálva.

2. Megjegyzés. – Az Emberi Tényező alapelvek alkalmazására vonatkozó útmutató anyag az Emberi Tényező Oktatási Kézikönyvben *(Doc. 9683) található.*

4.1.6 **Ajánlás.** – *I. kategóriájú műszeres megközelítési és leszállási műveletek végrehajtására szolgáló* *futópályákkal rendelkező repülőtereken a talajszél, a látás, a futópálya látástávolság, a felhőalap magasság, levegő és harmatpont hőmérséklet és atmoszférikus nyomás mérésére vagy megbecslésére, amelyik megfelelő, és figyelésére és távkijelzésére szolgáló automatizált berendezéseket kell felszerelni a megközelítési és leszállási és felszállási műveletek támogatására. Ezeknek a berendezéseknek integrált automatikus rendszereknek kell lenniük, amelyek a fel- és leszállási műveleteket befolyásoló meteorológiai paraméterek begyűjtését, feldolgozását, szétosztását és valósidejű kijelzését végzik. Az integrált automatikus rendszerek tervezésénél figyelembe kell venni az Emberi Tényezők alapelveket, és támasztó eljárásokat kell tartalmazniuk.*

4.1.7 **Ajánlás.** – *Ahol integrált fél-automatikus rendszert használnak a meteorológiai információk szétküldésére/kijelzésére, ez legyen alkalmas azon meteorológiai elemek adatai manuális bevitelének fogadására, amelyek automatikus eszközökkel nem figyelhetők meg.*

4.1.8 A megfigyelések egyaránt alapját képezik azon jelentések elkészítésének, amelyeket a megfigyelést végző repülőtéren terjesztenek, valamint azoknak, amelyeket e repülőtéren kívül terjesztenek.

4.1.9 A meteorológiai elemek térbeli és időbeli változékonysága, az észlelési technika és bizonyos elemek definíciója által okozott bizonytalanságok miatt, egy jelentésben bármely elemre megadott jellemző értéket a fogadónak úgy kell értelmeznie, hogy az a tényleges viszonyok legjobb megközelítése a megfigyelés idején.

Megjegyzés – A mérések, illetve megfigyelések üzemeltetési szempontból kívánatos és jelenleg elérhető pontosságára vonatkozó tájékoztató anyagot az A Melléklet tartalmaz.

4.2 Légiforgalmi szolgáltató hatóságok és meteorológiai hatóságok közötti egyezmény

Ajánlás. – *A meteorológiai hatóság és az illetékes ATS hatóság között megállapodást kell létrehozni többek között a következőkre kiterjedően:*

a) a légiforgalmi szolgálati egységek ellátása integrált automatikus rendszerekre vonatkozó kijelzőkkel;

b) ezen kijelzők/műszerek hitelesítése és karbantartása;

c) ezeknek a kijelzőknek/műszereknek a légiforgalmi szolgálatok személyzete általi használata;

d) amennyiben és ahol szükséges, pótlólagos vizuális megfigyelések (pl. az emelkedési és megközelítési területeken üzemeltetési jelentőséggel bíró meteorológiai jelenségekről), amennyiben és amikor azt légiforgalmi szolgálatok személyzete végezte, annak érdekében, hogy a meteorológiai állomás által szolgáltatott információkat aktuálissá tegyék, vagy kiegészítsék;

e) a fel- és leszálló légijárművektől kapott meteorológiai információk (pl. a szélnyírásról);

f) ha rendelkezésre áll, földi időjárás radartól származó meteorológiai információk.

Megjegyzés. — Útmutatót az ATS és repülésmeteorológiai szolgálat közötti koordináció tárgyában a Manual on Coordination between Air Traffic Services, Aeronautical Information Services and Aeronautical Meteorology Services (Kézikönyv Légiforgalmi Szolgálat, Repülés Információs Szolgálat és Repülésmeteorológiai Szolgálat közötti koordinációról) *(Doc 9377).*

4.3 Rendszeres megfigyelések és jelentések

4.3.1 A repülőtereken minden nap 24 órán keresztül kell rendszeres megfigyeléseket végezni, kivéve, ha a meteorológiai hatóság, az illetékes légiforgalmi szolgálati hatóság és az érintett üzemeltető között másfajta megállapodás született. Az ilyen megfigyeléseket óránként, vagy ha regionális léginavigációs egyezményben úgy határozzák meg, félóránként kell végezni. Más repülésmeteorológiai állomásokon az ilyen megfigyeléseket a meteorológiai hatóság által a légiforgalmi szolgálati egységek és a légijárművek üzemeltetési követelményeinek figyelembevételével meghatározottak szerint kell végezni.

4.3.2 Rendszeres megfigyelések jelentéseit a következők szerint kell kiadni:

a) helyi rendszeres jelentésekként, csak azon a repülőtéren terjesztve, ahol ezeket kiadták (érkező és induló légijárművek számára); és

b) METAR formában, a származási helyhez tartozó repülőtéren kívül, a többi repülőtereken való terjesztésre (főleg repülés tervezésre, VOLMET rádióadásra és D-VOLMET-re szánva).

Megjegyzés. – ATIS-ban (beszéd-ATIS-ban és D-ATIS-ban) használt meteorológiai információkat a helyi rendszeres jelentésből kell kivenni, a 11. Annex 4.3.6.1 g) pontjával összhangban.

4.3.3 Azoknál a repülőtereknél, amelyek nem 24 órán keresztül üzemelnek, a 4.3.1 ponttal összhangban METAR-t kell kiadni a repülőtér újraüzemelései előtt, a regionális léginavigációs egyezménynek megfelelően.

4.4 Különleges megfigyelések és jelentések

4.4.1 A különleges megfigyelések kritériumainak listáját a meteorológiai hatóságnak a megfelelő ATS hatósággal, az üzemeltetőkkel és más érdekeltekkel konzultálva kell elkészítenie.
4.4.2 Különleges megfigyelések jelentéseit a következők szerint kell kiadni:
a) helyi különleges jelentések, csak azon a repülőtéren terjesztve, ahol ezeket kiadták (érkező és induló légijárművek számára); és
b) SPECI, a származási helyhez tartozó repülőtéren kívüli repülőtereken való terjesztésre (főleg repüléstervezésre, VOLMET rádióadásra és D-VOLMET-re szánva).
Megjegyzés. – ATIS-ban (beszéd-ATIS-ban és D-ATIS-ban) használt meteorológiai információkat a helyi különleges jelentésből kell kivenni, a 11. Annex 4.3.6.1 g) pontjával összhangban.
4.4.3 Azoknál a repülőtereknél, amelyek nem 24 órán keresztül üzemelnek, a 4.3.1 ponttal összhangban, METAR ismételt kiadása előtt, ha szükséges, SPECI-t kell kiadni.

4.5 A jelentések tartalma

4.5.1 A helyi rendszeres és különleges és a METAR/SPEC kódformájú rendszeres és különleges jelentéseknek az alábbi információkat kell tartalmazniuk, a megadott sorrendben:
a) a jelentés fajtájának azonosítása;
b) elhelyezkedési jelző;
c) a megfigyelés ideje;
d) automatizált vagy hiányzó jelentés azonosítása, ha alkalmazható;
e) talajszél iránya és sebessége;
f) látás;
g) futópálya látástávolság, ahol alkalmazható;
h) aktuális időjárás;
i) felhő mennyisége, fajtája (csak cumulonimbus és tornyosuló cumulus felhő esetén) és a felhőalap magassága, vagy, ahol mérik, függőleges látás;
j) levegőhőmérséklet és harmatpont hőmérséklet; és
k) QNH és ahol alkalmazható, QFE értéke (a QFE-t csak a helyi rendszeres és különleges, jelentések tartalmazzák).
Megjegyzés. – A fenti b) pontban említett helységjelzők és jelentésük az ICAO Doc 7910 –Location – Indicators (Hely jelölések) *kiadványban találhatók.*
4.5.2 **Ajánlás. –** *A 4.5.1 a) – k) pontok alatt felsorolt elemeken kívül a helyi rendszeres és különleges jelentések és a METAR és SPECI tartalmazhatnak kiegészítő információkat is, amelyeket a k pont után lehet elhelyezni.*
4.5.3 Kiegészítő információk alatt tartalmazott választható elemeket a METAR-nak és SPECI-nek a regionális léginavigációs egyezménynek megfelelően kell tartalmazni

4.6 Meteorológiai elemek megfigyelése és jelentése

4.6.1 Talajszél

4.6.1.1 A talajszél közepes irányát és közepes sebességét mérni kell, ugyanígy a szél irányában és sebességében beálló változásokat, és földrajzi fokokban és kilométer per órában (vagy csomóban) kell jelenteni.
4.6.1.2 **Ajánlás.–** *Amikor helyi rendszeres és különleges jelentéseket induló légijárművekhez használják, az ezekhez a jelentésekhez végzett talajszél megfigyeléseknek a futópálya mentére kell kiterjedniük; amikor helyi rendszeres és különleges jelentéseket érkező légijárművekhez használják, az ezekhez a jelentésekhez végzett talajszél megfigyeléseknek a földetérési zónára kell kiterjedniük.*

4.6.1.3 **Ajánlás.** – *METAR és SPECI esetén a talajszél megfigyeléseknek az egész futópályára kell kiterjednie, ha csak egy futópálya van, és a teljes futópálya komplexumra, ahol egynél több futópálya van.*

4.6.2 Látás

4.6.2.1 Az 1. Fejezetben definiált látást méterben vagy kilométerben kell mérni vagy megfigyelni és jelenteni.
Megjegyzés. – A műszeren leolvasott értékek látásra való átszámítására vonatkozó útmutató anyag a D Mellékletben található.
4.6.2.2 **Ajánlás.**– *Amikor helyi rendszeres és különleges jelentéseket induló légijárművekhez használják, az ezekhez a jelentésekhez végzett látás megfigyeléseknek a futópálya menti állapotokat kell tükrözniük; amikor helyi rendszeres és különleges jelentéseket érkező légijárművekhez használják, az ezekhez a jelentésekhez végzett látás megfigyeléseknek a földetérési zónára kell kiterjedniük.*
4.6.2.3 **Ajánlás.** – *METAR és SPECI esetén a talajszél megfigyeléseknek a repülőtérre kell kiterjedniük.*

4.6.3 Futópálya látástávolság

Megjegyzés. – A futópálya látástávolság témakörére vonatkozó útmutató anyag a Futópálya látástávolság észlelési és jelentési gyakorlatának kézikönyvében (Manual of Runway Visual Range Observing and Reporting Practices) *található (Doc.9328).*
4.6.3.1 Az 1. Fejezetben szereplő definíció szerinti futópálya látástávolságot az összes II. és III kategóriájú műszeres megközelítési és leszállási műveletekre szánt futópályára meg kell határozni.
4.6.3.2 **Ajánlás** – *Az 1. Fejezetben szereplő definíció szerinti futópálya látástávolságot az összes olyan futópályára meg kell határozni, amelyet csökkent látási időszakokban is használni kívánnak, közöttük a:*
a) az I. kategóriájú műszeres megközelítési és leszállási üzemelésre szolgáló precíziós megközelítési futópályákra; és
b) felszállásra használt és nagyintenzitású szegélyfényekkel és/vagy középvonalfényekkel rendelkező futópályákra.
Megjegyzés. – A precíziós megközelítési futópályák meghatározása a 14. Annex 1. Kötet, 1. Fejezetében, a „Műszeres futópályák" cím alatt található.
4.6.3.3 A futópálya látástávolságot, a 4.6.3.1 és 4.6.3.2 pontoknak megfelelően megállapítva, méterekben kell jelenteni azokban az időszakokban, amikor vagy a látás, vagy a futópálya látástávolság kisebb, mint 1500 m.
4.6.3.4 A futópálya látástávolság megállapításokat a futópálya alábbi részére kiterjedően kell végezni:
a) nem-precíziós vagy I. kategóriájú műszeres megközelítési és leszállási műveletekre szánt futópálya földetérési zónája;
b) II. kategóriájú műszeres megközelítési és leszállási műveletekre szánt futópálya földetérési zónája és felezőpontja;
c) III. kategóriájú műszeres megközelítési és leszállási műveletekre szánt futópálya földetérési zónája; felezőpontja és megállási végszakasza.
4.6.3.5 Egy repülőtér részére légiforgalmi szolgáltatást és repülési információszolgáltatást nyújtó egységeknek késedelem nélkül tudomást kell szerezniük a futópálya látástávolság megállapítására használt automatizált berendezések működőképességi állapotában beállt változásokról.

4.6.4 Aktuális időjárás

4.6.4.1 A repülőtéren és/vagy annak környékén uralkodó aktuális időjárást figyelni és szükség esetén jelenteni kell. Minimálisan a következő aktuális időjárás jelenségeket kell azonosítani: csapadék és fagyott csapadék (azok intenzitását is közölve), köd, fagyott köd és zivatarok (a szomszédos környezetben előforduló zivatarokkal együtt).
4.6.4.2 **Ajánlás**. – *Helyi rendszeres és különleges jelentéseknél az aktuális időjárás információknak a repülőtéri időjárási viszonyokra kell vonatkozniuk.*

4.6.4.3 **Ajánlás.** – *METAR és SPECI esetén az aktuális időjárás információknak a repülőtéri időjárási viszonyokra, és bizonyos meghatározott aktuális időjárási jelenségek esetében, a repülőtér környékére kell kiterjedniük.*

4.6.5 Felhők

4.6.5.1 A felhőmennyiséget, felhőtípust és felhőalap magasságát figyelni és jelenteni kell, szükség esetén ismertetve az üzemeltetés szempontjából jelentőséggel bíró felhőket. Ha az égbolt borult, a felhő mennyiség; felhő típus és felhőalap magasság helyett, ahol mérik, a függőleges látást kell figyelni és jelenteni. A felhőalap magasságát és a függőleges látást méterben (vagy lábban) kell jelenteni.
4.6.5.2 **Ajánlás**. – *Helyi rendszeres és különleges jelentésekhez végzett felhő megfigyeléseknek a megközelítési területre kell kiterjedniük.*
4.6.5.3 **Ajánlás.** – *METAR és SPECI részére végzett felhő megfigyeléseknek a repülőtérre és környékére kell kiterjedniük.*

4.6.6 Levegő hőmérséklet és harmatpont hőmérséklet

4.6.6.1 A levegő hőmérsékleteket és a harmatpont hőmérsékletet Celsius fokban kell mérni és jelenteni.
4.6.6.2 **Ajánlás**. – *Helyi rendszeres és különleges jelentések és METAR és SPECI részére végzett levegő hőmérséklet és harmatpont hőmérséklet megfigyeléseknek a teljes futópálya komplexumra kell kiterjedniük.*

4.6.7 Atmoszférikus nyomás

Az atmoszférikus nyomást mérni kell, és a QNH és QFE értékeket hektopascalban kell számolni és jelenteni.

4.6.8 Kiegészítő információk

Ajánlás. – *A repülőtereken végzett megfigyeléseknek magukban kell foglalniuk a szignifikáns meteorológiai viszonyokra vonatkozó kiegészítő információkat, különös tekintettel azokra, amelyek a megközelítési és emelkedési területekre vonatkoznak. Ahol megvalósítható, az információnak azonosítani kell a meteorológiai körülmények helyét.*

4.7 Automatikus megfigyelő rendszertől érkező meteorológiai információk jelentése

4.7.1 **Ajánlás.** – *Automatikus megfigyelő rendszerektől származó METAR és SPECI csak azok az Államok használhatják, amelyek abban a helyzetben vannak, hogy ezt megtehetik a repülőtér üzemidején kívüli órákban és a repülőtér üzemelési ideje alatt, a meteorológiai hatóság meghatározása szerint, a felhasználókkal konzultálva, a személyzet rendelkezésre állása és hatékony alkalmazása alapján.*
Megjegyzés. – Automatikus meteorológiai megfigyelő rendszerek használatára vonatkozó útmutató anyag A repülőtereken lévő automatikus meteorológiai megfigyelő rendszerek kézikönyve (Doc 9837) (Manual on Automatic Meteorological Observing Systems at Aerodromes)
4.7.2 Automatikus megfigyelő rendszerektől származó METAR és SPECI az „AUTO" szóval azonosítandó.

4.8 Vulkanikus tevékenység megfigyelése és jelentése

Ajánlás. – *A kitörés előtti vulkáni tevékenység, vulkánkitörés és vulkanikus hamu felhő előfordulását késedelem nélkül jelenteni kell a légiforgalmi szolgálati egységnek és a meteorológiai megfigyelő irodának. A jelentést vulkánikus tevékenység jelentés formájában kell elkészíteni, amely az alább felsorolt információkat tartalmazza a megadott sorrendben:*
a) közlemény típusa, VULKANIKUS TEVÉKENYSÉG JELENTÉS (VOLCANIC ACTIVITY REPORT);
b) állomás azonosítója, az állomás elhelyezkedés jelzője vagy neve;

c) a közlemény dátuma/időpontja;
d) a vulkán helye és neve, ha ismert;
e) az esemény tömör leírása, ideértve, rendelkezésre állás szerint, a vulkánikus tevékenység intenzitásának szintjét, kitörése előfordulását és annak dátumát és időpontját, valamint vulkánikus hamu felhő előfordulását az adott térségben, a hamu felhő mozgásának irányát és magasságát.
Megjegyzés: -- A kitörés előtti vulkanikus tevékenység ebben a szöveg-összefüggésben szokatlan és/vagy erősödő vulkanikus tevékenységet jelent, amely előre jelezheti egy vulkán kitörését.

5. FEJEZET – LÉGIJÁRMŰVES MEGFIGYELÉSEK ÉS JELENTÉSEK

Megjegyzés. – Erre a fejezetre vonatkozó műszaki specifikációkat és részletes kritériumokat a 4. Függelék tartalmazza.

5.1 Az államok kötelezettségei

Minden Szerződő Állam köteles ennek a fejezetnek az előírásaival megegyezően intézkedni a felségjelével lajstromozott, nemzetközi légiútvonalakon üzemeltetett légijárművek által végzendő megfigyelésekről és a megfigyelések rögzítéséről, illetve azok jelentéséről.

5.2 Légijárműves megfigyelések fajtái

A következő légijárműves megfigyeléseket kell végrehajtani:

a) rendszeres légijárműves megfigyelések útvonalrepülés és emelkedés repülési fázisok során; és

b) speciális és más nem rendszeres légijárműves megfigyelések a repülés bármely fázisában.

5.3 Rendszeres légijárműves megfigyelések – kijelölés

5.3.1 **Ajánlás**. -- *Amikor levegő-föld adatösszeköttetést használnak, és automatikus függő ellenőrzést (ADS), vagy másodlagos ellenőrző radart (SSR) S-üzemmódban alkalmaznak, az útvonalrepülés fázisában minden 15 percben, míg az emelkedés fázisának első 10 perce során 30 másodpercenként automatizált rendszeres megfigyeléseket kell végezni.*
5.3.2 Amikor beszédkommunikációt használnak, rendszeres megfigyeléseket kell végezni az útvonalrepülés fázisban a következő légiforgalmi szolgálati jelentő pontokra vagy intervallumokra vonatkozóan:
a) amelyeken az alkalmazandó légiforgalmi szolgálati eljárások rendszeres helyzetjelentést követelnek meg; és
b) amelyek olyan távolságokkal vannak elválasztva, amelyek az egyórás repülési időnek megfelelő intervallumokhoz a legközelebb esnek.
5.3.3 **Ajánlás**. -- *Tengeren épült szerkezeteken lévő repülőterekre és repülőterekről történő helikopter üzemeléseknél a helikopterekről az érintett meteorológiai hatóságok és az illetékes helikopter üzemeltetők közötti megegyezés szerinti pontokon és időpontokban kell rendszeres észleléseket végezni.*
5.3.4 Nagysűrűségű légiforgalommal rendelkező légiútvonalak (pl. szervezett útvonalak) esetében egyes repülési magasságokon repülő légijárművek közül egyet ki kell jelölni, közelítőleg órás intervallumokban, rendszeres megfigyelések végzésére az 5.3.1 vagy 5.3.2 pontnak megfelelően, amelyik alkalmazható. A kijelölési eljárások regionális léginavigációs egyezmény tárgyai.
5.3.5 Emelkedési fázisban jelentés leadás iránti követelmény esetén egy légijárművet kell kijelölni, közelítőleg órás intervallumokban, egyes repülőtereknél rendszeres megfigyelés végzésére az 5.3.1 pontnak megfelelően.

5.4 Rendszeres légijárműves megfigyelések – mentesítések

5.4.1 Amikor beszédkommunikációt használnak, egy légijármű akkor mentesül az 5.4.2 pontban leírt rendszeres megfigyelések végzése alól, ha:
a) a légijármű nincs felszerelve RNAV berendezéssel, vagy
b) a repülés időtartama 2 óra vagy kevesebb; vagy
c) a légijármű egy repülési órának megfelelő távolságnál közelebb van a következő tervezett leszállási ponthoz; vagy

d) a repülési magassága 1500 m (5000 láb) alatt van.
5.4.2 **Ajánlás**. -- *Amikor beszédkommunikációt használnak, további felmentéseket írhat elő a regionális léginavigációs egyezmény a nagy légiforgalmú és/vagy megfelelő szinoptikus hálózattal rendelkező területeken és útvonalakon repülő járatok részére. Az ilyen eljárásoknak mentesítési vagy kijelölési eljárás formáját kell ölteni, és*

a) tegyék lehetővé valamennyi érdekelt meteorológiai hivatal minimális követelményeinek kielégítését a légijárművek által végzett észlelésekkel kapcsolatban;

b) végrehajtásuk a lehető legegyszerűbb legyen, és lehetőleg ne tartalmazzanak egyedi esetekre vonatkozó megfontolásokat.

5.5 Különleges légijárműves megfigyelések

Különleges megfigyeléseket kell végezni minden légijárműnek, ha az alábbi körülményekkel találkozik, vagy ilyent észlel:
a) erős turbulencia; vagy
b) erős jegesedés; vagy
c) erős hegyi hullám; vagy
d) zivatar jégeső nélkül, amely takart, beágyazott, széles kiterjedésű vagy széllökés vonalban lévő; vagy
e) zivatar jégesővel, amely takart, beágyazott, széles kiterjedésű vagy széllökés vonalban lévő;
f) heves porvihar vagy heves homokvihar; vagy
g) vulkanikus hamu felhő; vagy
h) kitörés előtti vulkanikus tevékenység vagy vulkánkitörés.
Megjegyzés. -- A kitörés előtti vulkanikus tevékenység ebben a szöveg-összefüggésben szokatlan és/vagy erősödő vulkánikus tevékenységet jelent, amely előre jelezhet egy vulkánkitörést.

5.6 Egyéb nem-rendszeres légijárműves megfigyelések

Amikor az 5.5 alatt nem-felsorolt meteorológiai viszonyok, pl. szélnyírás, lépnek fel, és olyanok, amelyek a légijármű parancsnok véleménye szerint más légijárművek biztonságára kihatnak, vagy üzemelési hatékonyságukat jelentősen befolyásolják, a légijármű parancsnok a lehető legrövidebb időn belül tájékoztassa erről a megfelelő légiforgalmi szolgálati egységet.
Megjegyzés. – A jegesedés, turbulencia és főleg a szélnyírás olyan elemek, amelyeket ma még nem lehet kielégítően észlelni a földről, és amelyek jelenlétére vonatkozóan a legtöbb esetben a légijárműves megfigyelések képezik az egyetlen bizonyítékot.

5.7 Légijárműves megfigyelések jelentése repülés során

5.7.1 A légijárműves megfigyeléseket a levegő-föld adatkapcsolaton keresztül kell jelenteni. Ahol levegő-föld adatösszeköttetés nincs, vagy nem megfelelő, a légijárműves megfigyeléseket beszédkommunikáció útján kell jelenteni.
5.7.2 A légijárműves megfigyeléseket a repülés során a megfigyelés végzésével egyidőben, vagy azután, a lehető legrövidebb időn belül, kell jelenteni.
5.7.3 Légijárműves megfigyeléseket légijelentésként kell jelenteni.

5.8 Légijelentések ATS egységek általi továbbítása

Az illetékes meteorológiai hatóságnak meg kell állapodnia a megfelelő légiforgalmi szolgálati hatósággal, hogy miután a légiforgalmi szolgálati egységek vették az alábbiakat, biztosítsák:

a) rendszeres és különleges légijelentések beszédkommunikációval, az ATS egységek ezeket késedelem nélkül továbbítsák a hozzájuk tartozó meteorológiai megfigyelő irodáknak;

b) rendszeres légijelentések adatkapcsolati kommunikációval, az ATS egységek ezeket késedelem nélkül továbbítsák a WAFC-oknak és;

c) különleges légijelentések adatkapcsolati kommunikációval, az ATS egységek ezeket késedelem nélkül továbbítsák a hozzájuk tartozó meteorológiai megfigyelő irodának, és a WAFC-oknak.

5.9 Vulkanikus tevékenység légijárműves megfigyeléseinek rögzítése és repülés utáni jelentése

A kitörés előtti vulkanikus tevékenység, vulkanikus kitörés vagy vulkanikus hamu felhő speciális légijármű megfigyeléseket a vulkanikus tevékenység különleges légijelentés formátumra kell rögzíteni. A formátum egy példányát tartalmaznia kell a repülési dokumentumnak, amelyet olyan útvonalakon üzemelő járatok részére adnak át, amely útvonalakat az illetékes meteorológiai hatóság véleménye szerint vulkanikus hamu felhők befolyásolhatnak.

6. FEJEZET – ELŐREJELZÉSEK

Megjegyzés. – Erre a fejezetre vonatkozó műszaki specifikációkat és részletes kritériumokat az 5. Függelék tartalmazza.

6.1 Az előrejelzések értelmezése és felhasználása

6.1.1 A meteorológiai elemek térbeli és időbeli változása, az előrejelzési módszerek korlátjai, és néhány elem meghatározásában előforduló korlátozások miatt, egy előrejelzésben megadott bármely elemre vonatkozó értéket a fogadó félnek úgy kell értelmeznie, mint azt a legvalószínűbb értéket, amelyet az előrejelzési periódus folyamán az elem felvehet. Hasonlóképpen, ha valamely elem előfordulásának vagy megváltozásának idejét adják meg egy előrejelzésben, ezt az időt a legvalószínűbb időpontnak kell felfogni.

Megjegyzés. – Az előrejelzések üzemeltetés szempontjából kívánatos pontosságára vonatkozó útmutatást a B Melléklet tartalmaz.

6.1.2 Egy meteorológiai iroda által kiadott új előrejelzést, mint például egy rendszeres repülőtéri előrejelzést, úgy kell értelmezni, hogy az automatikusan törli bármely ugyanarra az érvényességi időszakra, vagy annak egy részére, ugyanarra a helyre vonatkozó, ugyanolyan típusú, korábban kiadott előrejelzést.

6.2 Repülőtéri előrejelzések

6.2.1 Repülőtéri előrejelzést az illetékes meteorológiai hatóság által kijelölt meteorológiai irodának kell készítenie.

6.2.2 A repülőtéri előrejelzést meghatározott időpontban kell kiadni, és a repülőtéren egy meghatározott időszak alatt várható meteorológiai viszonyokra vonatkozó tömör megállapításból kell állnia.

6.2.3 Repülőtéri előrejelzéseket és ezek módosításait TAF-ként kell kiadni, és a következő információkat kell, a jelzett sorrendben, tartalmazniuk:

a) az előrejelzés fajtájának azonosítása;
b) hely jelző;
c) előrejelzés kiadásának időpontja;
d) hiányzó előrejelzés azonosítása, amikor alkalmazható;
e) az előrejelzés érvényességi dátuma és időszaka;
f) törölt előrejelzés azonosítása, amikor alkalmazható;
g) talajszél;
h) látás;
i) időjárás;
j) felhő; és
k) ezen elemek közül egynek vagy többnek az érvényességi időszak alatt várható lényeges változásai.

A TAF-nak választható elemeket a regionális léginavigációs egyezménnyel összhangban kell tartalmazni

Megjegyzés. – A TAF-ban szereplő látás az előrejelzési domináns látásra vonatkozik.

6.2.4 A repülőtéri előrejelzéseket készítő meteorológiai irodáknak az előrejelzéseket folyamatosan ellenőrizniük kell, és ha szükséges, azonnal módosításokat kell kiadni. Az előrejelzési közlemények hosszát és az előrejelzésekben megjelölt változások számát minimálisra kell korlátozni.

Megjegyzés. – A TAF folyamatos ellenőrzés alatt tartásának módszerére vonatkozó útmutatás a Repülésmeteorológiai eljárások kézikönyve (DOC 8896) (Manual of Aeronautical Meteorological Practice)

6.2.5 Azt a TAF-t, amely nem tartható folytonos ellenőrzés alatt, törölni kell.

6.2.6 **Ajánlás.–** *Egy rendszeres TAF érvényességi időszaka nem lehet kevesebb, mint 6 óra, és nem lehet* *több mint 30 óra; az érvényességi időszakot a regionális léginavigációs egyezményben kell meghatározni. 12 óránál rövidebb időszakra érvényes rendszeres TAF-ot minden 3 órában ki kell adni, és azokat, amelyek 12-30 óráig érvényesek, minden 6 órában kell kiadni.*

6.2.7 TAF kiadása esetén a meteorológiai irodáknak biztosítaniuk kell, hogy egy repülőtéren egyidőben csak egy TAF legyen érvényben.

6.3 Leszállási előrejelzések

6.3.1 Leszállási előrejelzést a regionális léginavigációs egyezmény szerint illetékes meteorológiai hatóság által kijelölt meteorológiai irodának kell készítenie; az ilyen előrejelzéseknek ki kell elégíteniük a helyi felhasználók és a repülőtértől körülbelül egy órás repülési időre lévő légijárművek igényeit.

6.3.2 A leszállási előrejelzéseket trend típusú előrejelzés formájában kell elkészíteni.

6.3.3 Egy trend előrejelzés a repülőtéri időjárási viszonyokban várható jelentős változások tömör ismertetéséből áll, amelyet egy helyi rendszeres, vagy helyi különleges jelentéshez, vagy egy METAR-hoz, vagy SPECI-hez csatolnak. A trend előrejelzés érvényessége 2 óra annak a jelentésnek az időpontjától számítva, amely a leszállási előrejelzés részét képezi.

6.4 Előrejelzések felszálláshoz

6.4.1 Felszállási előrejelzést az illetékes meteorológiai hatóság által kijelölt meteorológiai irodának kell készítenie.

6.4.2 **Ajánlás**. – *A felszállási előrejelzésnek egy meghatározott időszakra kell vonatkoznia, és információkat kell tartalmaznia a futópálya rendszer felett várható viszonyokról, a talajszél irányáról és sebességéről, valamint annak bármilyen megváltozásáról, hőmérsékletről, a nyomásról (QNH), valamint helyi megállapodás szerinti, bármely más elemről.*

6.4.3 **Ajánlás**. – *A felszállási előrejelzést az üzemeltetők és a hajózószemélyzet tagjainak kérésére, 3 órával az indulás várható időpontja előtt rendelkezésükre kell bocsátani.*

6.4.4 **Ajánlás**. – *A felszálláshoz előrejelzéseket készítő meteorológiai irodáknak az előrejelzéseket állandóan felül kell vizsgálniuk, és ha szükséges, azonnal módosításokat kell kiadni.*

6.5 Körzeti előrejelzések kismagasságú repülések részére

6.5.1 Ha a 100-as repülési magasságszint alatt (maximálisan 150-es repülési magasságszintig hegyes területen, vagy ennél nagyobb magasságig, ha szükséges) üzemelő forgalom sűrűsége szükségessé teszi az ilyen repülések számára területi előrejelzések rendszeres kiadását és elosztását, akkor az ilyen előrejelzések kiadásának gyakoriságát, formáját és érvényességének rögzített időtartamát vagy időszakát, és ezek módosítási kritériumait a meteorológiai hatóságnak a felhasználókkal folytatott konzultáció alapján kell meghatároznia.

6.5.2 Amikor a 100-as repülési magasságszint alatt üzemelő járatok sűrűsége megkívánja AIRMET információk kiadását a 7.2.1 ponttal összhangban, az ilyen repüléseknek szóló területi előrejelzéseket az illetékes meteorológiai hatóságok közötti megállapodás szerinti formátumban kell elkészíteni. Ha rövidített köznyelvet használnak, az előrejelzést GAMET területi előrejelzésként kell elkészíteni, jóváhagyott ICAO rövidítéseket és számszerű értékeket alkalmazva; amikor térkép formátumot használnak, az előrejelzést a magassági szélre és magaslégköri hőmérsékletre és a SIGWX jelenségekre vonatkozó előrejelzések kombinációjaként kell elkészíteni. A területi előrejelzéseket úgy kell kiadni, hogy lefedjék a talajszint és a 100-as repülési magasságszint (vagy hegyes területen 150-es repülési magasságszint, vagy ha szükséges, magasabb szint) közötti réteget, és tartalmaznia kell a kismagasságú repülésekre veszélyes útvonali időjárás-jelenségekről szóló információkat az AIRMET információ kiadásának alátámasztására, és a kismagasságú repülések számára szükséges további információkat.

6.5.3 Kismagasságú repülések részére szóló területi előrejelzéseket, amelyeket az AIRMET információk kiadásának elősegítésére a meteorológiai irodák egymás között cserélnek, minden 6 órában ki kell adni egy 6 órás érvényességi időtartamra, és az illetékes meteorológiai irodák részére nem később, mint érvényességi időszakának kezdete előtt egy órával, továbbítani kell.

7. FEJEZET – SIGMET ÉS AIRMET TÁJÉKOZTATÁSOK, REPÜLŐTÉRI FIGYELMEZTETÉSEK ÉS SZÉLNYÍRÁS FIGYELMEZTETÉSEK ÉS RIASZTÁSOK

Megjegyzés. – Erre a fejezetre vonatkozó műszaki specifikációkat és részletes kritériumokat a 6. Függelék tartalmazza.

7.1 SIGMET tájékoztatás

7.1.1 A SIGMET tájékoztatást meteorológiai figyelő irodának kell kiadnia, amelynek rövidített köznyelven, azoknak a meghatározott útvonali időjárási jelenségeknek tényleges vagy várható előfordulását kell tömören megadnia, melyek befolyásolhatják a légi üzemelés biztonságát, valamint meg kell adnia ezeknek a jelenségeknek időbeli és térbeli alakulását.
7.1.2 A SIGMET tájékoztatást törölni kell, ha a jelenség már nem fordul elő, vagy előfordulása az adott területen a továbbiakban nem várható.
7.1.3 A SIGMET közlemény érvényességi időtartama nem lehet több 4 óránál. A vulkanikus hamu felhőre és trópikus ciklonokra vonatkozó SIGMET közlemények speciális esetében az érvényességi időtartamot maximum 6 órára ki kell terjeszteni.
7.1.4 **Ajánlás**. – *Vulkanikus hamu felhőre illetve trópusi ciklonokra vonatkozó SIGMET közleményeknek a regionális léginavigációs egyezményben kijelölt VAAC-ok illetve TCAC-ok által kiadott tájékoztató infomációkon kell alapulni.*
7.1.5 Szoros együttműködést kell fenntartani a meteorológiai figyelő iroda és a hozzátartozó körzeti irányító központ/repülési információs központ között annak biztosítása érdekében, hogy a SIGMET és a NOTAM közleményekben lévő információk a vulkanikus hamuról, konzisztensek legyenek.
7.1.6 SIGMET üzeneteket az érvényességi időtartam kezdete előtt nem több, mint 4 órával kell kiadni. A vulkanikus hamu felhőre és trópusi ciklonokra vonatkozó SIGMET közlemények speciális esetében ezeket a közleményeket amint lehetséges, de az érvényességi időszak kezdete előtt nem több, mint 12 órával kell kiadni. A vulkanikus hamu felhőre és trópusi ciklonokra vonatkozó SIGMET közleményeket legalább minden 6 órában frissíteni kell.

7.2 AIRMET tájékoztatás

7.2.1 AIRMET tájékoztatást a meteorológiai megfigyelő iroda ad ki a regionális légi-navigációs egyezménynek megfelelően, figyelembe véve a 100-as repülési magasságszint alatti légiforgalmi sűrűséget. AIRMET tájékoztatásnak rövidített köznyelven rövid leírást kell adni meghatározott útvonali időjárás jelenségek előfordulásáról és/vagy várható előfordulásáról, amelyeket nem tartalmaz a kismagasságú repülések részére a 6. Fejezet 6.5 szakaszban leírtakkal összhangban kiadott területi előrejelzés I. szakasza, és amelyek kihatással lehetnek a kismagasságú repülések biztonságára, valamint a szóbanforgó jelenségek időbeli és térbeli alakulásáról.
7.2.2 AIRMET tájékoztatást törölni lehet, ha a jelenségek már nem állnak fenn, vagy megjelenésük már nem várható a területen.
7.2.3 Az AIRMET közlemény érvényességi időszaka nem lehet több 4 óránál.

7.3 Repülőtéri figyelmeztetések

7.3.1 A repülőtéri figyelmeztetéseket az illetékes meteorológiai hatóság által kijelölt meteorológiai irodának kell kiadnia, és ezeknek tömör információt kell adniuk olyan meteorológiai körülményekről, amelyek károsan befolyásolhatják a földön lévő légijárműveket, beleértve a parkoló légijárműveket is, valamint a repülőtéri létesítményeket és szolgálatokat.
7.3.2 **Ajánlás**- – *Repülőtéri figyelmeztetéseket törölni kell, amikor a repülőtéren a körülmények már nem állnak fenn és/vagy bekövetkezésük már nem várható.*

7.4 Szélnyírás figyelmeztetések és riasztások

Megjegyzés. – Útmutatást a szélnyírás tárgyában a Szélnyírás kézikönyv (Doc 9817). (Manual on Wind Shear) *tartalmaz. Szélnyírás riasztások elvárhatóan kiegészítik a szélnyírás figyelmeztetéseket, és együtt a* *szélnyírási szituáció tudatának erősítését szolgálják.*

7.4.1 A szélnyírás figyelmeztetéseket a meteorológiai hatóság, mely azoknál a repülőtereknél illetékes, amelyeknél a szélnyírás tényezőként szerepel, által kijelölt meteorológiai hivatalnak kell elkészítenie, a megfelelő ATS egységgel és az illetékes üzemeltetőkkel kötött megállapodásnak megfelelően. A szélnyírás figyelmeztetéseknek tömör információt kell adnia a megfigyelt vagy várhatóan megjelenő szélnyírásról, amely hátrányosan befolyásolhatja a légijárművet a megközelítési pályán, vagy a felszálló pályán, vagy körös megközelítés alatt a futópálya szint és e szint feletti 500 m-es (1600 láb) szint között, és a futópályán leszállási kigurulás vagy felszállási nekifutás végzése közben. Ahol a helyi terepviszonyok jelentős szélnyírás létesítését mutatják 500 m-t (1600 láb) a futópálya szint felett meghaladó magasságokon, ott az 500 m (1600 láb) nem tekinthető korlátozó értéknek.

7.4.2 **Ajánlás**. – *Az érkező és/vagy induló légijárművek számára szóló szélnyírási figyelmeztetést törölni kell, ha légijármű jelentések jelzik, hogy szélnyírás a továbbiakban nem áll fenn, vagy alternatívaként, egy megállapodás szerinti idő eltelte után. A szélnyírásról szóló figyelmeztetés megszüntetésének kritériumait minden repülőtérre helyileg kell megállapitani a meteorológiai hatóság, az illetékes ATS hatóság és az érintett üzemeltetők megállapodásának megfelelően.*

7.4.3 Azokon a repülőtereken, ahol a szélnyírást automatikus, földi telepítésű, szélnyírás távérzékelő vagy észlelő berendezéssel észlelik, ezekkel a rendszerekkel generált szélnyírás riasztásokat kell kiadni. A szélnyírás riasztásoknak tömör, frissített információt kell adni a szélnyírás megfigyelt létezéséről, amely 30 km/óra (15 csomó) vagy ennél nagyobb szembeszél/hátszél változásokat produkál, ami károsan befolyásolhatja a végső megközelítési pályán, vagy kezdeti felszálló pályán lévő légijárműveket, és a futópályán a leszállási kigurulást vagy felszállási nekifutást végző légijárműveket.

7.4.4 **Ajánlás. –** *A szélnyírás riasztást legalább minden percben frissíteni kell. A szélnyírás riasztást törölni kell, mihelyt a szembeszél/hátszél változás 30 km/óra (15 csomó) alá esik.*

8. FEJEZET. – REPÜLÉSKLIMATOLÓGIAI INFORMÁCIÓK

Megjegyzés. – Erre a fejezetre vonatkozó műszaki specifikációkat és részletes kritériumokat a 7. Függelék tartalmazza.

8.1 Általános előírások

Megjegyzés. – Olyan esetekben, amikor a repülésklimatológiai információs követelményeket nemzeti alapon nem lehetséges kielégíteni, a megfigyelési adatok gyűjtését, feldolgozását és tárolását nemzetközi használatra rendelkezésre álló számítógépes eszközökkel is végre lehet hajtani, valamint a megkívánt repülésklimatológiai információ készítésének felelősségét az érintett meteorológiai hatóságok közötti megegyezés alapján át lehet ruházni.

8.1.1 A légi üzemeltetés tervezéséhez igényelt repülésklimatológiai információkat repülőtéri klimatológiai táblázatok és repülőtéri klimatológiai összefoglalók formájában kell elkészíteni. Az ilyen információkat repülési felhasználók részére a meteorológiai hatóság és az érintett felhasználók közötti megállapodás szerint kell szolgáltatni.

Megjegyzés. – Repülőtér-tervezési célokra szükséges klimatológiai adatok a 14. Annex I. Kötet, 3.1.4. pontjában és az A Mellékletben találhatók.

8.1.2 **Ajánlás**. – *A repülésklimatológiai információknak általában legalább 5 éven keresztül végzett megfigyeléseken kell alapulniuk, és ezt az időszakot meg kell jelölni a szolgáltatott információban.*

8.1.3 **Ajánlás**. – *Új repülőterek létesítésének helyére, valamint meglévő repülőtereken kialakítandó további futópályákra vonatkozó klimatológiai adatok gyűjtését a repülőterek, illetve futópályák üzembe helyezését megelőzően, a lehető legkorábban kell elkezdeni.*

8.2 Repülőtéri klimatológiai táblázatok

Ajánlás – *Minden Szerződő Állam intézkedjen a szükséges megfigyelési adatok gyűjtéséről és megőrzéséről, továbbá legyen képes:*

a) repülőtéri klimatológiai táblázatok készítésére a területén belül lévő valamennyi, a nemzetközi légiforgalom által rendszeresen és kitérőként használt repülőtérre; és *b) ezeknek a klimatológiai táblázatoknak elérhetővé tételére valamely légiforgalmi felhasználó számára egy olyan időszakon belül, amelyet a meteorológiai hatóság és a felhasználó közötti megállapodás tartalmaz.*

8.3 Repülőtéri klimatológiai összefoglalók

Ajánlás. – *A repülőtéri klimatológiai összefoglalókat a Meteorológiai Világszervezet által előírt eljárásoknak megfelelően kell készíteni. Amennyiben az információk tárolására, feldolgozására és visszakeresésére számítógépes eszközök állnak rendelkezésre, az összefoglalókat publikálni kell, vagy kérésükre egyéb módon a repülési felhasználók rendelkezésére kell bocsátani. Ahol ilyen számítógépes eszközök nincsenek, az összefoglalókat a Meteorológiai Világszervezet által meghatározott minták felhasználásával kell elkészíteni, ezeket ki kell adni és szükség szerint naprakészen kell tartani.*

8.4 A meteorológiai megfigyelési adatok példányai

Minden meteorológiai hatóság, kívánságra és a lehetőségekhez mérten, tegye hozzáférhetővé bármely más meteorológiai hatóság, üzemeltető és egyéb, a meteorológiának a nemzetközi légiközlekedésben való alkalmazásában érdekelt fél részére az eredeti meteorológiai észlelési adatok másolatait, amelyek kutatáshoz, kivizsgáláshoz vagy üzemeltetési analízishez szükségesek.

9. FEJEZET – ÜZEMELTETŐK ÉS REPÜLŐSZEMÉLYZETI TAGOK RÉSZÉRE NYÚJTOTT SZOLGÁLTATÁSOK

Megjegyzés. – Erre a fejezetre vonatkozó műszaki specifikációkat és részletes kritériumokat a 8. Függelék tartalmaz.

9.1 Általános előírások

9.1.1 Meteorológiai információkat kell szolgáltatni az üzemeltetők és a hajózószemélyzet részére a következőkhöz:

a) az üzemeltetők által végzett repülés-előtti tervezéshez

b) üzemeltetők által, repülésüzemeltetés központosított üzemelés-irányításának felhasználásával végrehajtott, repülés közbeni áttervezéshez;

c) a hajózószemélyzet tagjai általi felhasználásra indulás előtt; és

d) repülést végző légijárművek számára.

9.1.2 Az üzemeltető és a hajózószemélyzeti tagok részére szolgáltatott információknak le kell fedniük a repülést idő, magasság és földrajzi kiterjedés szempontjából. Ennek megfelelően, az információnak a megfelelő rögzített időpontokra vagy időszakokra kell vonatkoznia, és a célrepülőtérig kell terjednie, és tartalmaznia kell a célrepülőtér és az üzemeltető által kijelölt kitérő repülőtér között várható meteorológiai viszonyait.

9.1 3 Az üzemeltetők és a hajózószemélyzeti tagok részére szolgáltatott meteorológiai információknak frissítettnek kell lenniük, és a következő információkat kell tartalmazniuk, ahogyan azt a meteorológiai hatóság az érintett üzemeltetőkkel megbeszélve megállapította:

a) az alábbiakra vonatkozó előrejelzések:

1) magassági szél és magaslégköri hőmérséklet;
2) magaslégköri nedvesség;
3) repülési magasságszintek geopotenciális magassága;
4) a tropopauza repülési magasságszintje és hőmérséklete;
5) maximális szél iránya, sebessége és repülési magasságszintje; és
6) SIGWX jelenségek.

Megjegyzés. – A magaslégköri nedvességre és a repülési magasságszintekre vonatkozó előrejelzéseket csak automatikus repüléstervezésben használják, és nem kell kijelezni.

b) METAR vagy SPECI (magában foglalva a trend előrejelzéseket, ahogyan a regionális léginavigációs egyezménynek megfelelően kiadták) az indulási- és célrepülőtérre, és felszállási, útvonali és rendeltetési kitérő repülőtérre;

c) TAF vagy módosított TAF az indulási- és célrepülőtérre, és felszállási, útvonali és rendeltetési kitérő repülőtérre;
d) felszállási előrejelzés;
e) SIGMET tájékoztatás és a teljes útvonalra érvényes megfelelő különleges légijelentések

Megjegyzés. – Megfelelő különleges légijelentések azok lesznek, amelyek nem kerültek már felhasználásra a SIGMET elkészítésénél.

f) regionális léginavigációs egyezmény szerint, GAMET területi előrejelzés és/vagy területi előrejelzések kismagasságú repülések számára térkép formában, amelyek AIRMET tájékoztatás kiadásának támogatására készülnek, és a teljes útvonalra érvényes AIRMET tájékoztatás kismagasságú repülések részére;
g) repülőtéri figyelmeztetések a helyi repülőtér számára;
h) meteorológiai műhold felvételek; és
i) földi telepítésű időjárás radar információk.

9.1.4 A 9.1.3a) pont alatt felsorolt előrejelzéseket a WAFC-ok által szolgáltatott digitális előrejelzésekből kell generálni, amikor ezek az előrejelzések időben, tengerszint feletti magasságban és földrajzi kiterjedésben lefedik a tervezett repülési pályát, hacsak a meteorológiai hatóság és az érintett üzemeltető között nem született más megállapodás.

9.1.5 Amikor előrejelzéseket a WAFC-októl származóként azonosítanak, ezek meteorológiai tartalmát nem lehet módosítani.

9.1.6 A WAFC-ok által szolgáltatott digitális előrejelzésekből generált térképeket az üzemeltetők kívánságára rendelkezésre kell bocsátani rögzített lefedési területekre, ahogyan azt a 8. Függelék A8-1, A8-2 és A8-3 ábrái mutatják.

9.1.7 Amikor a 9.1.3a) pont alatt felsorolt magassági szélre és magaslégköri hőmérsékletre vonatkozó előrejelzéseket térkép formájában szolgáltatják, ezeknek a repülési magasságszintekre vonatkozó, rögzített idejű prognosztikai térképeknek kell lenniük, ahogyan az a 2. Függelék 1.2.2a) pontjában elő van írva. Amikor a 9.1.3a) 6 pont alatt felsorolt SIGWX jelenségekre vonatkozó előrejelzéseket térkép formájában szolgáltatják, ezeknek rögzített idejű prognosztikai térképeknek kell lenniük az atmoszféra repülési magasságszintek által korlátozott részére, a 2. Függelék 1.3.2 pontjában és az 5. Függelék 4.3.2 pontjában előírtaknak megfelelően.

9.1.8 Az üzemeltető által a repülés előtti tervezéshez és a repülés alatti áttervezéshez kért, a 100-as repülési magasságszint feletti magassági szélre és a magaslégköri hőmérsékletre vonatkozó előrejelzéseket mihelyt rendelkezésre állnak, de az indulás előtt 3 óránál nem később, szolgáltatni kell. A repülés előtti tervezéshez és a repülés alatti áttervezéshez az üzemeltető által kért egyéb meteorológiai információkat a lehető leghamarabb szolgáltatni kell.

9.1.9 Amikor szükséges, az üzemeltetők és a hajózószemélyzeti tagok számára szolgáltatást nyújtó Állam meteorológiai hatósága koordinációt köteles kezdeményezni más Államok meteorológiai hatóságaival, annak érdekében, hogy beszerezze tőlük a szükséges jelentéseket és/vagy előrejelzéseket.

9.1.10 A meteorológiai információkat az üzemeltető és a hajózószemélyzet tagjai számára a meteorológiai hatóság által az üzemeltetőkkel folytatott konzultációk után, meghatározott helyen, a meteorológiai iroda és az érintett üzemeltető közötti megállapodásnak megfelelő időben kell szolgáltatni. A szolgáltatásnak rendes körülmények között az érintett Állam területéről induló járatokra kell korlátozódnia, hacsak nem születik más megállapodás a meteorológiai hatóság és az érintett üzemeltető között. Meteorológiai irodával nem rendelkező repülőtéren a meteorológiai információk nyújtására vonatkozó intézkedések a meteorológiai hatóság és az érdekelt üzemeltető között létrejött megállapodás szerintiek.

9.2 Eligazítás, konzultáció és kijelzés

Megjegyzés – Automatizált repülés előtti információs rendszerek eligazítás, konzultáció és kijelzés szolgáltatására való felhasználására vonatkozó követelmények a 9.4 szakaszban találhatók.

9.2.1 Kívánságra eligazítást és/vagy konzultációt kell biztosítani a hajózószemélyzet tagjainak és/vagy egyéb légiüzemeltetési személyzetnek. Ennek célja az, hogy megadja a legutóbbi rendelkezésre álló információkat a repülendő légiútvonalon fennálló és várható meteorológiai viszonyokról, valamint a tervezett rendeltetési repülőtérre, kitérő repülőtérre és egyéb érintett repülőterekre vonatkozóan, akár az, hogy

magyarázatot és megerősítést adjon a repülési dokumentációban található információkra, akár a meteorológiai hatóság és az üzemeltető megállapodása alapján repülési dokumentáció helyett szerepeljen.
9.2.2 Az eligazításhoz, konzultációhoz és kijelzésre szolgáló meteorológiai információknak magukban kell foglalniuk a 9.1.3 pontban felsoroltak közül az egyiket vagy mindegyiket.
9.2.3 Ha a meteorológiai iroda olyan véleményt nyilvánít, hogy valamely repülőtéren a meteorológiai viszonyok alakulása jelentősen eltér a repülési dokumentációban lévő repülőtéri előrejelzéstől, akkor a hajózószemélyzet tagjainak figyelmét fel kell hívni erre az eltérésre. Az eligazításnak az eltéréssel foglalkozó részét az eligazítás idején rögzíteni kell, és hozzáférhetővé kell tenni az üzemeltető számára.
9.2.4 Az igényelt eligazítást, konzultációt, kijelzést és/vagy repülési dokumentációt általában az indulási repülőteret kiszolgáló meteorológiai irodának kell biztosítania. Olyan repülőtéren, ahol ezek a szolgáltatások nem biztosíthatók, a hajózószemélyzet kívánságainak teljesítésére irányuló intézkedéseknek a meteorológiai hatóság és az érdekelt üzemeltető közötti megállapodásnak megfelelőknek kell lenniük. Kivételes körülmények között, mint pl. nagyobb késés, a repülőtérhez tartozó meteorológiai irodának új eligazítást, konzultációt és/vagy repülési dokumentációt kell, szolgáltatni, vagy ha ez nem megvalósítható, akkor intézkednie kell új eligazításról, konzultációról és/vagy repülési dokumentációról, ahogyan szükséges.
9.2.5 **Ajánlás** – *A hajózószemélyzet tagjának vagy más légiüzemeltetési személynek, akinek a részére az eligazítást, konzultációt és/vagy repülési dokumentációt igényelték, fel kell keresnie a meteorológiai irodát, a meteorológiai iroda és az érintett üzemeltető közötti megállapodásban előírt időben. Ha egy repülőtéren a helyi körülmények a személyes eligazítást vagy konzultációt nem teszik lehetővé, a meteorológiai irodának ezeket a szolgáltatásokat telefonon vagy egyéb megfelelő távközlési eszközök segítségével kell biztosítania.*

9.3 Repülési dokumentáció

Megjegyzés. – Automatikus repülés előtti információs rendszerek repülési dokumentációban való felhasználására vonatkozó előírások a 9.4 szakaszban találhatók.
9.3.1 Repülésdokumentációnak a 9.1.3 a) 1) és 6), b), c), e) és, amennyiben alkalmas, f) alatt felsorolt információkat kell tartalmaznia. Azonban, ha a meteorológiai hatóság és az érdekelt üzemeltető megegyezett, két óra vagy ennél kisebb időtartamú repülések repülési dokumentációját rövid megállás vagy fordulás után az üzemeléshez szükséges információkra kell korlátozni, de a dokumentációnak minden esetben tartalmaznia kell legalább a 9.1.3 b), c), e) és ha megfelelő, f) pontot.
9.4.3 Amikor nyilvánvalóvá válik, hogy a meteorológiai információk, amelyek a repülési dokumentációba kerülnek, lényegesen különbözni fognak, amelyet a repülés előtti tervezéshez és a repülés közbeni újratervezéshez rendelkezésre bocsátottak, az üzemeltetőt haladéktalanul értesíteni kell, és ha megvalósítható, revidiált információval el kell látni, ahogyan az üzemeltető és az illetékes meteorológiai iroda megállapodott.
9.3.2 Amikor nyilvánvalóvá válik, hogy a repülési dokumentáció által tartalmazott meteorológiai információ el fog térni a repülés előtti tervezéshez és a repülés alatti áttervezéshez rendelkezésre bocsátott re4pülési dokumentációtól, az üzemeltetőt haladéktalanul értesíteni kell, és ha megvalósítható, el kell látni a javított információval, az illetékes meteorológiai hatóság és üzemeltető közötti megállapodás szerint.
9.3.3 **Ajánlás** – *Abban az esetben, amikor a módosítás szükségessége a repülési dokumentáció kiadása után és a légijármű felszállása előtt merül fel, a meteorológiai irodának, a helyi megállapodásnak megfelelően, ki kell adni a szükséges módosítást vagy a felfrissített információt az üzemeltető számára, vagy a helyi légiforgalmi szolgálati egység részére, a légijárműhöz való továbbítás céljából.*
9.3 4 A meteorológiai hatóság őrizze meg a hajózószemélyzet tagjainak szolgáltatott információkat vagy nyomtatott példány, vagy számítógépes fájlok formájában, a kiadás keltétől legalább 30 napig. Az információkat kérésre hozzáférhetővé kell tenni érdeklődés vagy kivizsgálás céljára és ezek befejezéséig azokat meg kell őrizni.

9.4 Automatizált repülés előtti információs rendszerek eligazításhoz, konzultációhoz, repülésterve-

zéshez és repülési dokumentációhoz

9.4.1 Ahol a meteorológiai hatóság automatizált repülés előtti információs rendszereket használ az üzemeltetők és a repülő személyzeti tagok meteorológiai információkkal való ellátására és ezek kijelzésére eligazítás, repülés tervezés és repülés dokumentáció céljaira, a szolgáltatott és kijelzett információknak eleget kell tenniük a 9.1 - 9.3 szakaszok releváns előírásainak.

9.4.2 **Ajánlás.** *–Az üzemeltetők, repülőszemélyzeti tagok és más repülésben érdekelt személyek részére meteorológiai információkhoz és repülési információs szolgáltatási információkhoz összehangolt, közös pontú hozzáférést biztosító automatikus repülés előtti információs rendszereket kell létrehozni a meteorológiai hatóság és az illetékes polgári repülési hatóság, vagy azon hivatal közötti szerződés segítségével, amelybe a szolgáltatást végző hatóság delegálva van, a 15. Annex 3.1.1 c) pontjával összhangban.*

Megjegyzés – A szóbanforgó meteorológiai illetve a repülési információs szolgáltatási információkat a 9.1 – 9.3 szakaszok és a 8. Függelék és a 15.Annex 8.1 és 8.2 szakaszai ismertetik.

9.4 3 Ahol üzemeltetők, repülőszemélyzeti tagok és más repülésben érdekelt személyek részére meteorológiai információkhoz és repülési információs szolgáltatási információkhoz összehangolt, közös pontú hozzáférést biztosító automatikus repülés előtti információs rendszert használnak, az ilyen rendszerek által szolgáltatott meteorológiai információk minőségi ellenőrzésének és minőségmenedzselésének az érintett meteorológiai hatóság kötelezettségében kell maradnia, a 2. Fejezet 2.2.2 ponttal összhangban.

Megjegyzés. – A repülési információs szolgálati információkra és az információk minőségbiztosítására vonatkozó kötelezettségeket a 15. Annex 3. Fejezet tartalmazza.

9.5 Információk repülést végző légijárművek részére

9.5.1 A repülést végző légijárművek részére felhasználás céljára adott meteorológiai információkat a meteorológiai irodának a vele kapcsolatban álló légiforgalmi szolgálati egységnek kell továbbítania és D-VOLMET vagy VOLMET adásban sugároznia, ahogyan azt regionális léginavigációs egyezmény meghatározza. A repülést végző légijármű számára az üzemeltető által végzett tervezéshez szolgáló meteorológiai információkat kívánságra meg kell adni, a meteorológiai hatóság vagy hatóságok és az érintett üzemeltető közötti megállapodásnak megfelelően.

9.5.2 A repülést végző légijármű általi felhasználásra szolgáló meteorológiai információkat a 10. Fejezet előírásainak megfelelően kell eljuttatni a légiforgalmi szolgálati egységhez.

9.5.3 A meteorológiai információkat D-VOLMET vagy VOLMET adás segítségével kell szolgáltatni, a regionális léginavigációs egyezmény rendelkezéseinek és a 11. Fejezet előírásainak megfelelően.

10. FEJEZET – INFORMÁCIÓK A LÉGIFORGALMI SZOLGÁLATOK, A KUTATÓ ÉS MENTŐ SZOLGÁLATOK ÉS REPÜLÉSI TÁJÉKOZTATÓ SZOLGÁLATOK RÉSZÉRE

Megjegyzés. – Erre a fejezetre vonatkozó műszaki specifikációkat és részletes kritériumokat a 9. Függelék tartalmazza.

10.1 Információk légiforgalmi szolgálati egységek részére

10.1.1 A meteorológiai hatóság jelöljön ki egy meteorológiai irodát, amely az egyes légiforgalmi szolgálati egységekkel kapcsolódik. A kapcsolódó meteorológiai irodának a légiforgalmi szolgálati egységgel való koordináció után, szolgáltatnia kell a legfrissebb meteorológiai információkat az egység részére, vagy intézkednie kell a friss információk biztosításáról, ahogyan az feladatainak ellátásához szükséges.

10.1.2 **Ajánlás** *– Repülőtéri irányító toronyhoz, vagy körzeti irányító egységhez kapcsolódó meteorológiai iroda repülőtéri meteorológiai iroda legyen.*

10.1.3 Repülési központhoz, vagy területi irányító központhoz rendelt meteorológiai iroda meteorológiai megfigyelő iroda legyen.

10.1.4 **Ajánlás** *– Ahol helyi körülmények miatt, célszerű valamely hozzárendelt meteorológiai iroda feladatait két vagy több meteorológiai iroda között megosztani, a felelősség megosztását a meteorológiai hatóságnak kell meghatároznia, az érintett ATS hatósággal folytatott konzultáció alapján.*

10.1.5 Bármely, a légiforgalmi szolgálati egység által kért meteorológiai információt, amely a légijárművek vészhelyzetével kapcsolatos, olyan gyorsan kell megadni, amennyire az lehetséges.

10.2 Információk a kutató és mentő szolgálati egységek részére

A regionális léginavigációs megállapodásnak megfelelően, a meteorológiai hatóság által kijelölt meteorológiai irodáknak a kutató-mentő szolgálati egységeket el kell látniuk az általuk kért információkkal, a kölcsönös megegyezés alapján létrehozott formában. E célból a kijelölt meteorológiai állomásnak kapcsolatot kell tartani a kutató-mentő szolgálati egységgel a kutató-mentő művelet során.

10.3 Információk a repülési információs szolgálati egységek részére

A meteorológiai hatóságnak, az illetékes polgári repülési hatósággal koordinálva, biztosítania kell a releváns repülési információs szolgálati egységek ellátását aktuális meteorológiai információkkal, feladataik ellátása érdekében.

11. FEJEZET – A KOMMUNIKÁCIÓVAL ÉS HASZNÁLATÁVAL SZEMBEN TÁMASZTOTT KÖVETELMÉNYEK

1. Megjegyzés. – Erre a fejezetre vonatkozó műszaki specifikációkat és részletes kritériumokat a 10. Függelék tartalmazza.

2. Megjegyzés – Elismert, hogy minden szerződő állam maga dönt a jelen fejezetben szereplő kommunikációs eszközök megvalósítását illető saját belső szervezeti és kötelezettségi kérdésekben.

11.1 Kommunikációval szembeni követelmények

11.1.1 Megfelelő távközlési eszközöket kell biztosítani annak érdekében, hogy a repülőtéri meteorológiai irodák és szükség szerint a repülésmeteorológiai állomások továbbíthassák a megkívánt meteorológiai információkat az azokon a repülőtereken lévő légiforgalmi szolgálati egységeknek, melyekért ezek a hivatalok, illetve állomások felelősek, különös tekintettel az ezeket a repülőtereket kiszolgáló repülőtéri irányító tornyokra, bevezető irányító egységekre és repülési távközlési állomásokra.

Megjegyzés. – Repülési helyhezkötött szolgálat áramköreit üzemelési meteorológiai információk gyűjtésére és regionális és interregionális cseréjére, valamint a nemzetközi üzemelési meteorológiai adatbankokhoz való hozzáféréshez használják. Három, globális lefedést szolgáltató repülési helyhezkötött szolgálati műholdas elosztó rendszert használnak az üzemelési meteorológiai információk regionális és interregionális cseréjének támogatására. A műholdas elosztó rendszerekre vonatkozó előírásokat a 10. Annex, III. Kötet, I. Rész 10.1 és 10.2 pontja tartalmaz.

11.1.2 Megfelelő távközlési eszközöket kell rendelkezésre bocsátani annak érdekében, hogy a meteorológiai figyelő irodák továbbíthassák a megkívánt meteorológiai információkat a légiforgalmi és mentő szolgálati egységek számára azon repülési információs régiókra, irányítói területekre, valamint kutatási és mentési régiókra vonatkozóan, melyekért ezek az irodák felelősek, különös tekintettel a repülési információs központokra, valamint a mentést koordináló központokra, és az ezekhez tartozó repülési távközlési állomásokra.

11.1.3 Megfelelő távközlési eszközöket kell rendelkezésre bocsátani annak érdekében, hogy a világ és a regionális területi előrejelző központok továbbíthassák a kívánt világterületi előrejelző rendszer anyagait a meteorológiai irodák, meteorológiai hatóságok és egyéb felhasználók számára.

11.1.4 A meteorológiai irodák, illetve szükség esetén a repülésmeteorológiai állomások és a repülőtéri irányítótornyok, vagy bevezető irányító egységek közötti távközlési eszközöknek lehetővé kell tenniük a közvetlen beszéd kommunikációt, a sebesség, amellyel a kommunikáció létrehozható, olyan legyen, hogy a kívánt pontok között a kapcsolat, rendes körülmények között, közelítőleg 15 másodpercen belül létrehozható legyen.

11.1.5 **Ajánlás** – *A meteorológiai irodák és a repülési információs központok, területi irányító központok, mentést koordináló központok és repülési távközlési állomások közötti távközlési eszközök tegyék lehetővé a következőket:*

a) a közvetlen beszéd kommunikációt, a sebesség, amellyel a kommunikációt létrehozzák, olyan legyen, hogy a kívánt ponttal való kapcsolat rendes körülmények között, közelítőleg 15 másodpercen belül megte-

remthető legyen; és
b) nyomtatott formájú kommunikációt, ha a fogadó felek a rögzítést megkívánják; a közlemény továbbítási ideje ne haladja meg az 5 percet.
Megjegyzés – A 11.1.4 és a 11.1.5 pontokban szereplő „közelítőleg 15 másodperc" a távbeszélő központon keresztüli telefon kommunikációra, az „5 perc" pedig a továbbküldést is magában foglaló, nyomtatott kommunikáció küldésre vonatkozik.
11.1.6 **Ajánlás** – *A 11.1.4 és a 11.1.5 pontoknak megfelelő távközlési eszközöket, ahol és amikor szükséges, ki kell egészíteni vizuális vagy audio kommunikáció egyéb formáival, például zártláncú televízióval vagy külön információ feldolgozó rendszerekkel.*
11.1.7 **Ajánlás** – *A meteorológiai hatóság és az üzemeltetők közötti megállapodás szerint rendelkezni kell arról, hogy lehetővé tegyék az üzemeltetők számára megfelelő távközlési eszközök létesítését, a repülőtéri meteorológiai irodáktól, illetve más megfelelő forrásoktól történő meteorológiai információk beszerzéséhez.*
11.1.8 Megfelelő távközlési eszközöknek kell rendelkezésre állni ahhoz, hogy a meteorológiai irodák kicserélhessék az üzemeltetési meteorológiai információkat más meteorológiai irodákkal.
11.1.9 **Ajánlás** – *Üzemeltetési meteorológiai információk cseréjére használt távközlési eszköz a repülési állandóhelyű szolgálat legyen.*

11.2 Repülési állandó helyű szolgálati kommunikáció felhasználása – alfanumerikus formátumú meteorológiai bulletinek

A légiforgalmi állandó helyű szolgálaton keresztül továbbított üzemeltetési meteorológiai információkat tartalmazó bulletineket a megfelelő meteorológiai irodának vagy meteorológiai állomásnak kell eredeztetnie.
Megjegyzés. – A légiforgalmi állandó helyű szolgálaton keresztüli továbbításra engedélyezett, üzemeltetési meteorológiai infomációkat tartalmazó meteorológiai bulletinek felsorolása a 10. Annex , II. Kötet 4. Fejezetében található, a megfelelő prioritással és prioritás jelölővel együtt.

11.3 A repülési helyhezkötött szolgálati kommunikáció felhasználása – a világ területi előrejelző rendszer anyagai

Ajánlás – *A világterületi előrejelző rendszer adatait digitális formában bináris adatkommunikációs technika alkalmazásával kell továbbítani. Az anyagok szétosztásának módszere és az erre használt kommunikációs csatornák feleljenek meg a regionális léginavigációs egyezményben meghatározottaknak.*

11.4 A repülési mozgószolgálati kommunikáció felhasználása

A légijárműveknek és a légijárművek által továbbított meteorológiai információk tartalma és formája legyen konzisztens a jelen Annex előírásaival.

11.5 Repülési adatkapcsolat szolgáltatás felhasználása – D-VOLMET tartalma

A D-VOLMET tartalmazzon aktuális METAR-t és SPECI-t trend előrejelzésekkel együtt, ahol rendelkezésre áll, TAF és SIGMET közleményeket, különleges légi-jelentéseket, amelyeket SIGMET nem fed le, és ahol rendelkezésre áll, AIRMET közleményeket.
Megjegyzés – METAR és SPECI kód formájú jelentések szolgáltatásának követelményei kielégíthetők az adatkapcsolati repülési információ szolgáltatás (D-FIS) alkalmazásával, amely az „Adatkapcsolat-repülési rendszeres időjárás jelentés (D-METAR) szolgáltatás" címet viseli; a TAF szolgáltatásának követelménye kielégíthető a D-FIS alkalmazásával, amely az „Adatkapcsolati-repülőtéri előrejelzés (D-TAF) szolgáltatás" címet viseli, és a SIGMET és AIRMET közlemények szolgáltatásának követelménye kielégíthető a D-FIS alkalmazásával, amely az „Adatkapcsolati SIGMET (D-SIGMET)szolgáltatás" címet viseli. Ezekről az adatkapcsolatokról részletes leírás a Manual of Air Traffic Services Data Link Applications (Légiforgalmi szolgálat adatkapcsolat alkalmazási kézikönyv) *(Doc. 9694) kiadványban található.*

11.6 A repülési rádióadási szolgáltatás felhasználása – VOLMET rádióadások tartalma

11.6.1 Az általában nagyon nagy frekvenciás (VHF), folyamatos VOLMET rádióadásoknak aktuális METAR-t és SPECI-t kell tartalmazniuk, trend előrejelzésekkel együtt, ahol rendelkezésre áll.
11.6.2 Az általában nagyfrekvenciás (HF) sugárzott rendszeres VOLMET adásoknak aktuális METAR-t és SPECI-t kell tartalmazniuk, trend előrejelzésekkel együtt, ahol rendelkezésre áll, valamint ha a regionális léginavigációs egyezmény előírja, TAF-t és SIGMET-et.

II. RÉSZ

FÜGGELÉKEK ÉS MELLÉKLETEK

1. FÜGGELÉK. REPÜLÉSI DOKUMENTÁCIÓ – TÉRKÉPMINTÁK ÉS FORMAMINTÁK

(lásd jelen Annex 9.Fejezet)

A MINTA – OPMET információ
IS MINTA – Magassági szél és magaslégköri hőmérséklet térkép standard izobár felületre
1. Példa – Nyilak, tollak és zászlók (Merkator vetület)
2. Példa – Nyilak, tollak és zászlók (Poláris sztereografikus vetület)
SWH MINTA – Szignifikáns időjárás térkép (magas szint)
Példa – Polár sztereografikus vetület (jet stream-et függőleges kiterjedést mutat)
SWM MINTA – Szignifikáns időjárás térkép (közepes szint)
SWL MINTA – Szignifikáns időjárás térkép (alacsony szint)
1. Példa
2. Példa
VAG MINTA – Vulkanikus hamu tájékoztató információ grafikus formátumban
SVA MINTA – SIGMET vulkanikus hamu grafikus formátumban
SGE MINTA – SIGMET trópikus ciklontól és vulkanikus hamutól eltérő jelenségekre grafikus formátumban
SN MINTA – Repülési dokumentációban használt jelölések lapja

OPMET infomáció A MINTA

KIADTA……………………..METEOROLÓGIAI IRODA (DÁTUM,IDŐ UTC)………………………..

INTENZITÁS

’’-’’(enyhe); jelzés nélkül (mérsékelt); ’’+”(heves vagy jól kifejlett por/homok forgatagok (por ördögök) és tölcsér felhők esetében jeleket használják bizonyos jelenségek előrejelzett intenzitásának jelzésére

DESZKRIPTOROK

MI – sekély	PR – részleges	BL – fújó	TS – zivatar
BC – foltok	DR – talajmenti fúvás	SH – zápor(ok)	FZ – fagyott (túlhűlt)

IDŐJÁRÁS ELÖREJELZÉSI RÖVIDÍTÉSEK

DZ – szitálás	GS – kis jégeső és/vagy hólabdacs	SA – homok
RA – eső		HZ – párásság
SN – hó	BR – ködfátyol	PO – por/homok forgatag (por ördög)
SG – hódara	FG – köd	SQ – széllökés
IC – jégkristályok (gyémánt por)	FU – füst	FC – tölcsérfelhők (tornádó vagy víztölcsér)
PL – jéglabdacsok	VA – vulkánikus hamu	SS – homokvihar
GR – jégeső	DU nagykiterjedésű füst	DS – porvihar

PÉLDÁK

+SHRA – heves záporeső	TSSN – zivatar mérsékelt havazással
FZDZ – mérsékelt fagyott szitálás	SNRA – mérsékelt havazás és eső
+TSSNGR – zivatar heves havazással és jégesővel	

KIVÁLASZTOTT ICAO LOKÁCIÓS JELZŐK

CYUL Montreal Pierre Eliot Trudeau/Intl	HECA Cairo/Intl	OBBI Bahrain Intl
	HKJK Nairobi/Jomo Kenyatta	RJTT Tokyo Intl
EDDF Frankfurt/Main	New York/John F. Kennedy Intl	SBGL Rio de Janeiro/Galeä Intl
EGLL London/Heathrow	LFPG Paris/Charles de Gaulle	YSSY Sydney/Kingtsford Smith Intl
GMMC Casablanca/Anfa	NZAA Auckland Intl	ZBAA Beijing/Capital

METAR CYUL 240700Z 27018G30KT 9999 SN FEW020 BKN045 M02/M07 Q0995=
METAR EDDF 240950Z 05015KT 999 FE025 04/M05 Q1018 NOSIG=
METAR LFPG 241000Z 07010KT 5000 SCT010 BKN040 02/M01 Q1014 NOSIG=
SPECI GMMC 220530Z 24006KT 5000-TSGR BKN016TCU FEW020CB SCT026 08/07 Q1013=
TAF AMD NZAA 240855Z 2409/2506 24010KT 9999 FEW030 BECMG 2411/2413 VRB02KT 2000 HZ FM 242224010KT CAVOK=
TAF ZBAA 240440Z 2406/2506 13015KMH 6000 NSC BECMG 2415/2416 2000 SN OVC040 TEMPO 2418/24211000 SN BECMG 2500/2501 32015KMH 3500 BR NSC BECMG 2503/2504 32030G60KMH CAVOK=
TAF YSSY 240443Z 2406/2506 05015KT 3000 BR SCT030 BECMG 2414/2416 33008KT FM 2422 0402KT CAVOK=
HECC SIGMET 2 VALID 240900/1200 HECA-
HECC CAIRO FIR SEV TURB OBS N OF N27 FL 390/440 MOV E25KMH NC.

IS modell. Magassági szél és hőmérséklet térkép izobár felületre.

1. példa - Nyilak, tollak és zászlócskák (Merkátor vetület)

Ábra szövegek
1 Kiadta a…………………..WAFC
2 Szél/hőmérséklet
3 Rögzített időpontú előrejelzési térkép, érvényes ………………………
4 Alapozva………………
5 Használt mértékegységek: csomó; fok Celsius
6 Hőmérsékletek negatívok, hacsak nincs előttük + előjel.

IS modell. Magassági szél és hőmérséklet térkép standard izobár felületre. 2. példa - Nyilak, tollak és zászlócskák (Poláris sztereografikus vetület)

Ábra szövegek
1 Kiadta a ……………………WAFC
2 Szél/hőmérséklet
3 Rögzített időpontú előrejelzési térkép, érvényes …………..
4 Alapozva ………………..
5 Használt mértékegységek: csomó, fok Celsius
6 Hőmérsékletek negatívok, hacsak nincs előttük + előjel.

SWH modell. Szignifikáns időjárás térkép (magas szint) Példa - Poláris sztereografikus vetület (mutatja a jet stream függőleges kiter-jedését)

Ábra szövegek
1 Kiadta …………………WAFC
2 Rögzített időpontú előrejelzési térkép. Érvényes …………………….
3 ICAO terület G SIGWX
4 250-630 repülési magasságszintek
5 Érvényes …………
6 CB tartalmaz:TS, mod or sev turb és jég
7 Használt mértékegységek: magasság repülési magasságszintben
8 Check SIGMET, ADVISORIES, ASHTAM és NOTAM vulkanikus hamuhoz

SWM modell. Szignifikáns időjárás térkép (közép szint)

Ábra szövegek
1 Kiadta………………..WAFC
2 Rögzített időpontú előrejelzési térkép
3. ICAO terület NAT SIGWX
4 100-250 repülési magasságszintek
5 Érvényes ……………….
6 CB tartalmaz: TS, GR, mod vagy sev turb és jég
7 Használt mértékegységek: magasság repülési magasságszintbeben
8 CHECK SIGMET, ADVISORIES, ASHTAM és NOTAM vulkanikus hamuhoz

SWL modell. Szignifikáns időjárási térkép (alacsony szint). 1. példa

Ábra szövegek
1 Kiadta …………………WAFC
2 Rögzített időpontú előrejelzési térkép.
3 SIGWX SFC – 10000 láb
4 Érvényes …………….
5. CB tartalmaz:zivatart, mérsékelt vagy erős turbulenciát, jeget és jégesőt
6 Használt mértékegységek: csomó; látás méterben vagy kilométerben; magasság hektolábban a közepes tengerszint felett.

SWL modell. Szignifikáns időjárás térkép (alacsony szint) 2. példa

Rögzített időpontú előrejelzési térkép Érvényes ……UTC ……20… Alapszik ….UTC dátum …….

VÁLTOZÓ	LÁTÁS	SZIGNIFIKÁNS IDŐJÁRÁS	FELHŐ, TURBULENCIA JEGESEDÉS	0°C
A TERÜLET			SCT CU 025/080	50
ISOL			BKN CU 015/XXX 050/XXX	
B TERÜLET			OVC LYR ST NS 015/XXX 050/XXX	50
OCNL	4000	HEVES ESŐ	EMBD CB 008/XXX 008/XXX	
ISOL	1000	ZIVATAR		
C TERÜLET			BKN OVC ST 010/040	100
LOC DÉL COT DOMBOK	2000	SZEMERKÉLÉS	OVC ST SC 003/050	
D TERÜLET			OVC LYR SC NS 010/XXX	90
LOC NORTH	4500	ESŐ	OVC LYR ST NS 005/XXX 090/XXX	
E TERÜLET			SCT SC 020/030	40
LOC FÖLD	0500	KÖD		
F TERÜLET	2000	KÖDFÁTYOL	BKN OVC ST 002/010-ig	30
LOC COT DOMBOK	0200	KÖD	OVC ST 002/010	
G TERÜLET	4500	ESŐ	OVC CU SC NS 010/XXX 030/050	30
LOC ÉSZAK	0500	KÖD	OVC ST SFC/010	
J TERÜLET			SCT CU SC 030/050	40
LOC DOMBOK ÉSZAK			BLV 070	

Megjegyzések:
ÉK Gales Shetlandtól keletre a Hebridákig – Erős hegyi hullámok ÉNy Skócia – Ködfoltok Észak Anglia – Széles kiterjedésű köd Észak Franciaország, Belgium és Hollandia felett

Ábra szövegek
1 SIGWX SFC – 10000 láb
2 Kiadta: ……………………UTC-kor

3. **Megjegyzések:**

1. Nyomás hPa-ban és a sebességek csomóban.
2. Látás méterben, ha kisebb mint 5000 m …ha a látás 200 m vagy ennél kisebb.
3. Magasság hektolábban a közepes tengerszint felett XXX=10000 láb felett.
4. CB tartalmaz MOD/SEV jegesedést, turbulenciát és zivatart.
5. Csak szignifikáns időjárást és/vagy időjárás jelenséget, amely a látás 5000 m alá csökkenését okozza, tartalmaz.

VAG modell. Vulkanikus hamu tájékoztató információ grafikus formában

Ábra szövegek

1 Vulkanikus hamu tájékoztatás
2 Dátum, idő: 20050711/0728Z
3 VAAC: Tokió
4 Vulkán: Pinatubo 0703-083
5 Terület: Luzon Fülöp szigetek
6 Csúcs magassága:1486m
7 Tájékoztató száma:2005/1
8 Információforrás:MTSAT-1R, AIREP
9 Repülési színkód: piros
10 Kitörésre vonatkozó részletek: kitört 20050711/0532Z
11 Megjegyzés: nincs
12 Következő tájékoztatás: nem később, mint 20050711/1311Z

SVA modell SIGMET vulkanikus hamuhoz grafikus formában

Ábra szövegek

1 WIIZ SIGMET A3
2 Érvényes 130628/131228 WIII
3 Megfigyelés 0509Z SFC/ 400 repülési magasságszint
4 + 6óra előrejelzés

SGE modell SIGMET trópikus ciklontól és vulkanikus hamutól különböző jelenségekhez

Ábra szövegek

1 YMMM SIGMET 1
2 Érvényes 022030/030030 YMMC

SN modell. Repülési dokumentációban használatos jelölések lapja

1. Szignifikáns időjárás szimbólumok

A táblázat szövegei
1 Trópusi ciklon
2 Erős széllökés vonal*
3 Mérsékelt turbulencia

4 Erős turbulencia
5 Hegyi hullám
6 Mérsékelt légijármű jegesedés
7 Erős légijármű jegesedés
8 Nagykiterjedésű köd
9 Radioaktív anyagok az atmoszférában**
10 Vulkánkitörés***
11 Hegyi takarás
12 Szitálás
13 Eső
14 Hó
15 Zápor
16 Jégeső
17 Nagykiterjedésű hófúvás
18 Erős homok vagy por miatti homály
19 Nagykiterjedésű homokvihar vagy porvihar
20 Nagykiterjedésű homály
21 Nagykiterjedésű párásság
22 Nagykiterjedésű füst
23 Ónos csapadék*****

24 *A 100-as repülési magasságszintig a repülés közbeni dokumentációban. Ez a szimbólum "széllökés vonal"-ra utal.
25 **A következő információkat a térkép oldalán kell elhelyezni: radioaktív anyagok szimbóluma; a baleset helyszínének földrajzi szélessége/hosszúsága; a baleset dátuma és időpontja; ellenőrzési NOTAM a következő információnál.
26 ***A következő információk azokra a szimbólumokra vonatkoznak, amelyek a térkép oldalán vannak feltüntetve: vulkánkitörés; a vulkán neve (ha ismert); földrajzi hosszúság/szélesség; az első kitörés dátuma és időpontja (ha ismert); vulkánikus hamura vonatkozó SIGMET-ek és NOTAM vagy ASHTAM ellenőrzése
27 ****Ez a szimbólum nem vonatkozik nagyon alacsony hőmérsékleten repülő légijárművel érintkezésbe kerülő csapadék miatti jegesedésre..
28 MEGJEGYZÉS: - Magasságjelzések, amely magasságok között a jelenségek várhatók, tető az alap felett, a térkép jelmagyarázata szerint.

2. Frontok és konvergencia zónák és más használt szimbólumok

A táblázat szövegei
1 Hideg front a felszínnél
2 Meleg front a felszínnél
3 Okkludált front a felszínnél
4 Kvázi-stacionárius front a felszínnél
5 Tropopauza magas
6 Tropopauza alacsony
7 Tropopauza szint
8 Maximális szél helye, sebessége és szintje
9 Konvergencia vonal
10 Fagyás szint
11 Intertrópusi konvergencia zóna
12 Tenger állapota
13 Tengerfelszín hőmérséklet

14 Kiterjedt erős talajszél*
15 A szélnyilak a maximális szelet jelzik a jetben és a repülési magasságszintet, ahol előfordulhat. Ha a maximális szél sebesség 240 km/h (120 csómó), a repülési magasságszintek, amelyek között a szelek nagyobbak, mint 160 km/h (80 csomó), a maximális szél szint alatt helyezkednek el. A példában a szelek nagyobbak, mint 160 km/h (80 csomó) 220-as repülési magasságszint és 400-as repülési magasságszint között.
16 A vastag vonal a jet tengely elejét/végét jelöli annál a pontnál, ahol szélsebesség az előrejelzés szerint 160 km/h (80 csomó).
17 *Ez a szimbólum a 60 km/h-t (30 csomó) meghaladó széles kiterjedésű talajszél sebességet jelöl.

3. Felhők jellemzésére használt rövidítések

3.1 Felhőfajta
CI = Cirrus
CC = Cirrocumulus
CS = Cirrostratus
AC = Altocumulus
AS = Altostratus
NS = Nimbostratus
SC = Stratocumulus
ST = Stratus
CU = Cumulus
CB = Cumulonimbus

3.2 Mennyiség
Felhők a CB kivételével
FEW = kevés (1/8-2/8)
SCT = elszórt (3/8-4/8)
BKN = (szakadozott (5/8-7/8)
OVC = borult (8/8)

Csak CB esetén
ISOL = egyedi CB-k (izolált)
OCNL = jól elkülönült CB-k (esetenkénti)
FRQ = CB-k kis elkülönüléssel vagy elkülönülés nélkül
EMBD = más felhőrétegekbe beágyazódott vagy homály által takart
CB-k (beágyazódott)

3.3 Magasságok
Az SWH és SWM térképeken a magasságokat repülési magasságszintekkel jelölik, (FL) tető az alap felett. Amikor a XXX-et használnak, a tetők vagy alapok kívül esnek azon az atmoszféra rétegen, amelyre a térképet alkalmazzák.
SWL térképeken:
i) a magasságokat közepes tengerszint feletti magasságként jelölik,
ii) az SFC rövidítést a talajszint jelölésére használják.

4. Vonalak és rendszerek ábrázolása specifikus térképeken

4.1 SWH és SWM modellek – Szignifikáns időjárás térképek (nagy és közepes magasság)
Cakkozott vonal = Szignifikáns időjárási területek elválasztása

Vastag szaggatott vonal	=	CAT terület körvonala
Vastag folytonos vonal szél-nyíllal és repülési magasságszinttel megszakítva	=	Jet-stream tengely helye, a szélirány, szélsebesség csomóban, vagy km/h-ban és magasság repülési magasságszintben megjelölésével
Számok a nyilakon	=	Frontrendszer mozgási sebessége csomóban vagy km/h-ban
Repülési magasságszintek kis négyszögeken belül	=	A tropopauza magassága repülés magasságszint-ben kifejezve adott helyeken, pl. 340. A tropopauza topográfia Alacsony és Magas pont-jait L és H betűkkel jelölik egy ötszögbe írt, re-pülési magasságszintben kifejezett magassággal együtt. Explicit repülési magasságszint kijelzés a JET mélységekre és a tropopauza magasságra még ha az előrejelzési határokon kívül is esik.

4.2 SWL modell – Szignifikáns időjárás térkép (kismagasság)

X	=	Nyomás középpontok helye hektopascalban meg-adva
L	=	Kisnyomás középpontja
H	=	Nagynyomás középpontja
Cakkozott vonal	=	Szignifikáns időjárási terület elválasztó körvonala
Szaggatott vonal	=	0°C izoterma magassága lábban (hektolábban) vagy méterben MEGJEGYZÉS: a 0°C szintet 0°:060 módon is le-het jelölni, azaz 0°C szint 6000 láb magasságban van
Számok nyilakon	=	Front rendszerek, depressziók vagy anticiklonok mozgási sebessége csomóban vagy km/h-ban
Szám a tenger állapota szimbólumon belül	=	Teljes hullám magasság lábban vagy méterben
Szám a tenger felszín hőmérséklet szimbólumon belül	=	Tenger felszín hőmérséklete C°-ban
Szám az erős talajszél szimbólumon belül	=	szél csomóban vagy km/h-ban

4.3 Nyilak, tollak és zászlócskák

A nyilak az irányt jelzik. A zászlócskák és/vagy tollak száma a sebességnek felel meg.
Példa:
270°/115 csomó (ekvivalens 213 km/h-val)
A zászlócskák 50 csomó vagyis 92 km/h sebességnek felelnek meg.
Tollak 10 csomónak vagy 18 km/h-nak felelnek meg.
Féltollak 5 csomónak vagy 9 km/h-nak felelnek meg.
*A használt átszámítási tényező 1 a 2-höz

Csomó átszámítása kilométer per órára

2. FÜGGELÉK A VILÁG TERÜLETI ELŐREJELZŐ RENDSZERRE ÉS METEOROLÓGIAI IRODÁKRA VONATKOZÓ MŰSZAKI ELŐÍRÁSOK

(Lásd jelen Annex 3. Fejezet)

1. VILÁG TERÜLETI ELŐREJELZŐ RENDSZER

1.1 Formátumok és kódok

A WAFC-oknak egységes formátumokat és kódokat kell alkalmazniuk előrejelzések és módosítások szolgáltatásánál.

1.2 Magaslégköri előrejelzések

1.2.1 A magassági szél, magaslégköri hőmérséklet és nedvesség, a maximális szélirány, sebesség és magasság és a tropopauza repülési magasságszint és hőmérséklet és a repülési magasságszintek előrejelzések, amelyeket a WAFC naponta négyszer készít, 6, 12, 18, 24, 30 36 óra hosszáig érvényesek az előrejelzések alapját képező szinoptikus adatok időpontja (0000, 0600, 1200 és1800 UTC) után. Az egyes előrejelzések kiosztását a fenti sorrendben kell végezni, és amint ez technikailag lehetséges, de nem később, mint a megfigyelési standard idő után 6 órával be kell fejezni.

1.2.2 A WAFC által készített rácspont előrejelzéseknek a következőkből kell állniuk:

a) szél és hőmérséklet adatok a következő repülési magasságszintekre: 50 (850 hPa), 100 (700 hPa), 140 (600 hPa), 180 (500 hPa), 240 (400 hPa), 300 (300 hPa), 340 (250 hPa), 390 (200 hPa), 450 (150 hPa)és 530(100 hPa);

b) tropopauza repülési magasságszintje és hőmérséklete;

c) a maximális szél iránya, sebessége és repülési magasságszintje;

d) nedvesség adatok a következő repülési magasságszinteken: 50 (850 hPa), 100 (700 hPa), 140 (600 hPa) és 180 (500 hPa);

e) geopotenciális magassági adatok az 50 (850 hPa), 100 (700 hPa), (700 hPa), 140 (600 hPa), 180 (500 hPa), 240 (400 hPa), 300 (300 hPa), 340 (250 hPa), 390 (200 hPa) és 450 (150 hPa) repülési magasságszintekre.

1.2.3 Az előző rácspont előrejelzéseket a WAFC-oknak bináris kód formában kell kiadniuk, a WMO által előírt GRIB kódformát használva.

Megjegyzés. – A GRIB kódformát a WMO 306 számú kiadványa, Kód kézikönyv (Manual on Codes) *1.2 kötet, B Rész – Bináris kódok tartalmazza.*

1.2.4 Az előző rácspont előrejelzéseket a WAFC-nak 140 km-es vízszintes felbontású rögzített rácsban kell készítenie.

Megjegyzés. – 140 km egy körülbelül 1,25°-os távolságot jelent hosszúsági körben.

1.3 Szignifikáns időjárás (SIGWX) előrejelzések

1.3.1 Általános előírások

1.3.1.1 A WAFC-oknak naponta négyszer SIGWX előrejelzést kell készíteniük, és ezek érvényesek rögzített érvényességi időn keresztül 24 óráig az előrejelzések alapját képező szinoptikus adatok ideje (0000, 0600, 1200 és 1800 UTC) után Az egyes előrejelzések kiosztását amint ez technikailag lehetséges, de nem később, mint a megfigyelési standard idő után 6 órával be kell fejezni.

1.3.1.2 A SIGWX előrejelzéseket bináris kód formában, a WMO által előírt BUFR kódforma használatával kell kiadni.

Megjegyzés – A BUFR kódformát a WMO 306 sz. kiadványa, Kód kézikönyv (Manual on Codes) *1.2 kötet, B rész – Bináris kódok tartalmazza.*

1.3.2 SIGWX előrejelzések fajtái

SIGWX előrejelzéseket a következők szerint kell kiadni:
a) magas szint SIGWX előrejelzések 250 és 630 közötti repülési magasságszintekre; és
b) közepes szint SIGWX előrejelzések 100 és 250 közötti repülési magasságszintekre korlátozott földrajzi területekre, regionális léginavigációs egyezményben meghatározottak szerint.

1.3.3 SIGWX előrejelzések által tartalmazott tételek

Magasszint és középszint SIGWX előrejelzéseknek a következő tételeket kell tartalmazniuk:

a) trópusi ciklon, feltéve, hogy a 10 perces közepes talajszél sebesség maximuma várhatóan eléri vagy meghaladja a 63 km/h-t (34 csomó);
b) erős széllökés vonal;
c) mérsékelt vagy erős turbulencia (felhőben vagy tiszta levegőben);
d) mérsékelt vagy erős jegesedés;
e) kiterjedt homokvihar/porvihar;
f) cumulonimbus felhők zivatarokkal és a)-tól e)-ig jelenségekkel összekötve;
Megjegyzés – Felhőbeni mérsékelt vagy erős turbulenciával és/vagy mérsékelt vagy erős jegesedéssel kapcsolódó nem konvektív felhő területeket a SIGWX előrejelzéseknek tartalmazniuk kell.
g) a tropopauza repülési magasságszintje;
h) jet streamek;
i) információ a légijármű üzemeltetésre jelentős hatást gyakorló hamu felhőket létrehozó vulkánkitörések helyéről, amely a következőkből áll: vulkánkitörés szimbóluma a vulkán helyén, és a térkép oldalán a vulkánkitörés szimbóluma, a vulkán neve, földrajzi szélesség/hosszúság, az első kitörés dátuma, időpontja, ha ismert, és hivatkozás az érintett területre kiadott SIGMET-re és NOTAM-ra vagy ASHTAM-ra; és
j) információ radioaktív anyagok véletlen kijutásáról az atmoszférába, amely jelentős hatást gyakorol a légijármű üzemeltetésre, amely a következőkből áll: radioaktivitás szimbóluma a baleset helyén, és a térkép oldalán radioaktivitás szimbóluma, a baleset helyének földrajzi szélessége/hosszúsága, a baleset dátuma és időpontja és emlékeztető a felhasználók részére az érintett területre vonatkozó NOTAM ellenőrzésére.
Megjegyzés – Az alacsony szintű (azaz a 100-as repülési magasságszint alatti) SIGWX előrejelzések által tartalmazott tételeket az 5. Függelék tartalmazza.

1.3.4 SIGWX előrejelzések által tartalmazott tételek kritériumai

A magas szint és közepes szint SIGWX előrejelzéseknél a következő kritériumokat kell alkalmazni:

a) az a) – f) tételeket csak akkor kell tartalmazniuk, ha a SIGWX előrejelzés alsó és felső szintje között előfordulásuk várható;

b) a „CB” rövidítést csak akkor tartalmazhatja, ha cumulonimbus felhők előfordulására vagy várható előfordulására hivatkozás történik, ahol ezek:

1) az érintett terület 50 százalékát vagy ennél nagyobb maximális térbeli lefedésű területre vannak kihatással;

2) egy vonal mentén helyezkednek el, ahol az egyes felhők között kis térköz van, vagy ilyen egyáltalán nincs; és

3) felhő rétegekbe vannak beágyazva, vagy pára rejti őket.

c) a „CB”-be tartozás alatt azt kell érteni, hogy ez tartalmaz minden olyan időjárás jelenséget, amely normál körülmények között cumulonimbus felhőkhöz kapcsolódnak, azaz zivatar, mérsékelt vagy erős turbulencia és jégeső;

d) ahol vulkánkitörés, vagy radioaktív anyagok véletlen atmoszférába jutása indokolja a vulkanikus tevékenység vagy a radioaktivitás szimbólumának megjelenését a SIGWX előrejelzésekben, a szimbólumoknak benne kell lenniük a magas szint vagy közepes szint SIGWX előrejelzésekben, tekintet nélkül a magasságra, amelyre a hamu oszlopot vagy radioaktív anyagot jelentették, vagy amelynek elérése várhatóan bekövetkezik.

e) az 1.3.3 a), i) és j) együttes fellépésének, vagy részleges átfedésének esetében, a legmagasabb prioritást az i) tételnek kell adni, ezt követi a j) és az a) tétel. A legmagasabb prioritású tételt az esemény helyénél kell elhelyezni, és nyilat kell alkalmazni a többi tétel helyének összekötéséhez a hozzátartozó szimbólummal, vagy keretezett szövegével.

2. METEOROLÓGIAI IRODÁK

2.1 WAFS produktumok használata

2.1.1 A repülőtéri meteorológiai irodáknak a repülési dokumentum elkészítésénél a WAFC-ok által kiadott előrejelzéseket kell felhasználniuk, amennyiben ezek az előrejelzések a szándékolt repülési pályát idő, tengerszint feletti magasság és földrajzi kiterjedés vonatkozásában lefedik, hacsak a meteorológiai hatóság és az érintett üzemeltető nem állapodott meg másképpen.
2.1.2 A repülési dokumentáció egységességének és szabványosításának érdekében a kapott WAFS GRIB és BUFR adatokat dekódolni kell szabványos WAFS térképekbe ebben az Annexben szereplő előírásokkal összhangban, és a WAFS előrejelzések eredetijének tartalmát és azonosítását nem szabad módosítani.

2.2 WAFC értesítése szignifikáns diszkrepenciákról

WAFS GRIB és/vagy BUFR adatokat használó meteorológiai irodáknak azonnal értesíteniük kell az illetékes WAFC-t, ha a következő kritériumoknak megfelelően, a WAFS SIGWX előrejelzésekre vonatkozóan szignifikáns diszkrepenciákat észleltek vagy jelentettek:
a) jegesedés, turbulencia, zivatarok, amelyek rejtettek, gyakoriak, beágyazottak vagy széllökés vonalon fordulnak elő, és homokviharok/porviharok:
– újra várható előfordulás vagy nem-előfordulás; vagy
b) vulkánkitörések vagy radioaktív anyagok véletlen atmoszférába jutása, amelyek a légijármű üzemeltetés szempontjából jelentőséggel bírnak:
– vulkanikus tevékenység szimbólum, vagy sugárzás szimbólum bevitele vagy eltávolítása.
Az üzenetet átvevő WAFC-nak tudatni kell az üzenet átvételét a létrehozóval egy a jelentésről és bármilyen intézkedésről szóló rövid kommentárral együtt, ugyanazokat a kommunikációs eszközöket használva, mint amelyeket a létrehozó alkalmazott.
Megjegyzés. – Szignifikáns diszkrepenciák jelentésére vonatkozó útmutatást a Repülésmeteorológiai gyakorlati kézikönyv (Manual of Aeronautical Meteorological Practice) *(Doc 8896) tartalmaz.*

3. VULKANIKUS HAMU TÁJÉKOZTATÓ KÖZPONTOK (VAAC)

3.1 Vulkanikus hamu tájékoztató információk

3.1.1 **Ajánlás.** – *A jóváhagyott ICAO rövidítéseket és magától értetődő jellegű numerikus értékeket használva, rövidített köznyelven kiadott vulkanikus hamu tájékoztató információknak összhangban kell lenniük az A2-1 táblázatban bemutatott mintával. Ahol jóváhagyott ICAO rövidítések nem állnak rendelkezésre, angol köznyelvű szöveget kell használni, minimumra törekedve.*
4.1.2 **Ajánlás.** – *Az A2-1 táblázatban felsorolt vulkanikus hamu információknak, amennyiben grafikus formátumban adták ki őket, az 1. Függelékben megadottakkal egyezőnek kell lenniük. Ha bináris formátumban adták ki őket, BUFR kódformát kell használni.*
Megjegyzés. – A BUFR kódformát a WMO 306 számú kiadványa, Kód kézikönyv (Manual on Codes) *1.2 kötet, B Rész – Bináris kódok tartalmazza.*

4. ÁLLAMI VULKÁN MEGFIGYELŐ ÁLLOMÁSOK

4.1 Információk az állami vulkán megfigyelő állomásoktól

Ajánlás. – *Az információknak, amelyeket az állami vulkán megfigyelő állomásoknak a hozzájuk tartozó ACC-k, MWO és VAAC részére meg kell küldeniük, a következőkből kell állniuk:*
a) szignifikáns, kitörés előtti vulkanikus tevékenységre vonatkozóan: a jelentés dátuma/időpontja (UTC); a vulkán neve és, ha ismert, száma; földrajzi hely (szélesség/hosszúság); és a vulkanikus tevékenység leírása; és
b) vulkánkitörésre vonatkozóan: a jelentés dátuma/időpontja (UTC) és a kitörés időpontja (UTC), ha a jelentés időpontjától különbözik; a vulkán neve és, ha ismert, száma; földrajzi hely (szélesség/hosszúság); és a vulkánkitörés leírása, benne, hogy hamuoszlop kilövellés történt-e, és ha igen, a hamuoszlop becsült magassága, és bármely látható vulkanikus hamufelhő kiterjedése a kitörés alatt, és azt követően.
Megjegyzés. – Kitörés előtti vulkanikus tevékenység ebben a vonatkozásban szokatlan és/vagy növekvő vulkanikus tevékenységet jelent, amely vulkánkitörés előjele lehet.

5. TRÓPUSI CIKLON TÁJÉKOZTATÓ KÖZPONTOK (TCAC)

5.1 Trópusi ciklon tájékoztató információk

5.1.1 Trópusi ciklonokra vonatkozó tájékoztató információkat akkor kell trópusi ciklonokra kiadni, amikor a talajszél 10 perces közepes sebesség maximum várhatóan eléri vagy meghaladja a 63 km/h (34 csomó) értéket a tájékoztatás által lefedett időszak során.
5.1.2 A trópusi ciklonra vonatkozó tájékoztató információknak összhangban kell lenniük az A2-2 táblázatban bemutatott mintával.
5.1.3 **Ajánlás. –** *Ha trópusi ciklon tanácsadást bináris formátumban adnak ki, BUFR kódformát kell használni.*
Megjegyzés. – A BUFR kódformát a WMO 306 számú kiadványa, Kód kézikönyv (Manual on Codes) *1.2 kötet, B Rész – Bináris kódok tartalmazza.*

A2-1 táblázat. Minta vulkanikus hamu tájékoztató közleményhez
Kulcs: M = kötelező bevitel, minden közlemény kötelező része
O = fakultatív bevitel
= = kettős párhuzamos vonal azt jelzi, hogy az ezt követő szöveget a következő sorban kell elhelyezni
1. Megjegyzés. – A vulkanikus hamu tájékoztató közleményekben szereplő numerikus elemek nagyságrendje és felbontása a 6. Függelék A6-4 táblázatban látható
2. Megjegyzés. – A rövidítések magyarázata a Procedures for Air Navigation Services – ICAO Abbreviations and Codes (Léginavigációs szolgálati eljárások – ICAO rövidítések és kódok) *(PANS-ABC, Doc 8400) kiadványban található*
3. Megjegyzés. – „Kettőspont" beírása minden elem címe után kötelező.
4. Megjegyzés. – Az 1-től 18-ig számok csak az anyag világossá tétele céljából szerepelnek, ezek nem részei a tájékoztató közleménynek, ahogyan az a példában látszik.

Elem		Részletes tartalom	Minta(k)	Példák
1	A közlemény fajtájának azonosítása	A közlemény fajtája	VA ADVISORY	VA ADVISORY
2	A keletkezés ideje (M)	Év, hónap, nap, időpont UTC	DTG: nnnnnnn/nnnnZ	DTG: 20000402/0700Z
3	A VAAC neve (M)	A VAAC neve (M)	VAAC nnnnnnnnnnnn	VAAC: TOKYO
4	A vulkán neve (M)	A vulkán neve és IAVCEI[1] száma	VOLCANO nnnnnnnnnnnnnnnnnnnnn [nnnnnn] *vagy* UNKNOWN *vagy* UNNAMED	VOLCANÓ: USUZÁN VOLCANO: UNNAMED
5	A vulkán földrajzi helye (M)	A vulkán földrajzi helye fokokban és percekben	PSN: Nnnnn *vagy* Snnnnn Wnnnnn *vagy* Ennnnn *vagy* UNKNOWN *vagy* UNNAMED	PSN: N4230 E14048 PSN: UNKNOWN
6	Állam *vagy* régió (M	Állam, *vagy* régió, ha az Állam felett hamut nem jelentettek	AREA: nnnnnnnnnnnnnn	AREA JAPÁN
7	A csúcs közepes tengerszint feletti magassága (M)	A csúcs közepes tengerszint feletti magassága m-ben (vagy lábban)	SUMMIT ELEV: nnnnM (*vagy* nnnnnFT)	SUMMIT ELEV: 732M
8	Tájékoztatásszáma	Tájékoztatás szám: évszám teljesen kiírva és közlemény szám (külön sorozat az egyes vulkánokra	ADVISORY NR: nnnn/nnnn	ADVISORY NR: 2000/432
9	Információ forrás (M)	Információ forrás szabad szöveggel leírva	INFO SOURCE: *szabad szöveg maximum 32 karakter*	INFO SOURCE: MGMS-JA AIREP
10	Színkód	Repülési színkód	AVIATION COLOUR CODE: RED *vagy* ORANGE *vagy* YELLOW *vagy* GREEN*vagy* UNKNOWN *vagy* NOT GIVEN *vagy* NIL	AVIATION COLOUR: RED
11	Kitörés részletek (M)	Kitörés részletek (beleértve a kitörés(ek) dátuma/időpontja)	ERUPTION DETAILS: *szabad szöveg maximum 64 karakter vagy* UNKNOWN	ERUPTION DETAILS: ERUPTED: 20000402/064Z ERUPTION OBS VA TO ABV FL300
12	Hamu észlelésének	Vulkanikus hamu észlelésének napja	OBS VA DTG nn/nnnnZ	OBS VA DTG: 020645Z

	időpontja (M)	és időpontja (UTC)		
13	Észlelt *vagy* becsült hamufelhő (M)	Az észlelt *vagy* becsült hamufelhő vízszintes kiterjedése (fokokban és percekben) és függőleges kiterjedése a megfigyelés időpontjában, *vagy*, ha az alap ismeretlen, az észlelt *vagy* becsült hamufelhő teteje; az észlelt *vagy* becsült hamufelhő mozgása	OBS VA CLD *vagy* EST VA CLD TOP FLnnn *vagy* SFC/FLnnn *vagy* FLnnn/nnn [nnKM WID LINE[2] BTN (nnNM WID LINE BTN) Nnn[nn] *vagy* Snn[nn] Wnn[nn] *vagy* Ennn[nn] Nnn[nn] *vagy* Snn[nn] Wnn[nn] *vagy* Ennn[nn] Nnn[nn] *vagy* Snn[nn] Wnn[nn] *vagy* Ennn[nn] Nnn[nn] *vagy* Snn[nn] Wnn[nn] *vagy* Ennn[nn] Nnn[nn] *vagy* Snn[nn] Wnn[nn] *vagy* Ennn[nn] *vagy* TOP FLnnn *vagy* SFC/FLnnn *vagy* FLnnn/nnn MOV N nnKMH (*vagy* KT) *vagy* MOV NE nnKMH (*vagy* KT) *vagy* MOV E nnKMH (*vagy* KT) *vagy* MOV SE nnKMH (*vagy* KT) *vagy* MOV S nnKMH (*vagy* KT) *vagy* MOV SW nnKMH (*vagy* KT) *vagy* MOV W nnKMH (*vagy* KT) *vagy* MOV NW nnKMH (*vagy* KT) VA NOT IDENTIFIABLE FROM SATELLITE DATA WINDS FLnn/nnn nnn/nn[n] KMH (KT)	OBS VA CLD FL 150/350 N4230 E14048 N4300 E14130 N4246 E14230 N4232 E14048 SFC/FL150 MOV NE 25kt FL150/350 MOV E 30KT TOP FL240 MOV W 40KMH
14	A hamufelhők előrejelzési magassága és pozíciója (+6óra) (M)	Nap és időpont (UTC szerint) (6 óra a 12 tételben megadott „Hamu észlelésének időpontjá”-tól); Előrejelzési magasság és pozíció (fokokban és percekben) minden egyes felhőtömegre erre a rögzített érvényességi időre	FCST VA CLD+6HR nn/nnnnZ SFC *vagy* FLnnn/[FL]nnn [nnKM WID LINE[2]BTN (nnNM WID LINE BTN) Nnn[nn]*vagy* Snn[nn] Wnn[nn] *vagy* Ennn[nn] Nnn[nn] *vagy* Snn[nn] Wnn[nn] *vagy* Ennn[nn]- Nnn[nn] *vagy* Snn[nn] Wnn[nn] *vagy* Ennn[nn] Nnn[nn] *vagy* Snn[nn] Wnn[nn] *vagy* Ennn[nn][3] *vagy* NO VA EXP	FCST VA CLD 02/1245Z +6HR SFC/FL200 N4230 E14048 N4232 E14150 N4238 E1430 N4246 E14230 FL200/350 N4230 E14048 N4232 E14150 N4238 E1430 N4246 E14230 FL350/600 NO VA EXP

15	A hamufelhők előrejelzési magassága és pozíciója (+12óra) (M)	Nap és időpont (UTC szerint) (6 óra a 12 tételben megadott „Hamu észlelésének időpontjá”-tól); Előrejelzési magasság és pozíció (fokokban és percekben) minden egyes felhőtömegre erre a rögzített érvényességi időre	FCST VA CLD+12HR nn/nnnnZ SFC *vagy* FLnnn/[FL]nnn [nnKM WID LINE[2]BTN (nnNM WID LINE BTN) Nnn[nn]*vagy* Snn[nn] Wnn[nn] *vagy* Ennn[nn] Nnn[nn] *vagy* Snn[nn] Wnn[nn] *vagy* Ennn[nn]- Nnn[nn] *vagy* Snn[nn] Wnn[nn] *vagy* Ennn[nn] Nnn[nn] *vagy* Snn[nn] Wnn[nn] *vagy* Ennn[nn][3] *vagy* NO VA EXP	FCST VA CLD: +12HR 02/1245Z SFC/FL300 N4230 E14048 N4232 E14150 N4230 E14048 N4246 E14230 N4238 E1430 N4246 E14230 FL300/600 NO VA EXP
16	A hamufelhők előrejelzési magassága és pozíciója (+18óra) (M)	Nap és időpont (UTC szerint) (6 óra a 12 tételben megadott „Hamu észlelésének időpontjá”-tól); Előrejelzési magasság és pozíció (fokokban és percekben) minden egyes felhőtömegre erre a rögzített érvényességi időre	FCST VA CLD+18HR nn/nnnnZ SFC *vagy* FLnnn/[FL]nnn [nnKM WID LINE[2]BTN (nnNM WID LINE BTN) Nnn[nn]*vagy* Snn[nn] Wnn[nn] *vagy* Ennn[nn] Nnn[nn] *vagy* Snn[nn] Wnn[nn] *vagy* Ennn[nn]- Nnn[nn] *vagy* Snn[nn] Wnn[nn] *vagy* Ennn[nn] Nnn[nn] *vagy* Snn[nn] Wnn[nn] *vagy* Ennn[nn][3] *vagy* NO VA EXP	FCST VA CLD: 03/0045Z +18HR SFC/FL600 NO VA EXP
17	Megjegyzések (M)	Megjegyzések, szükség szerint	RMK: *Szabad szöveg, maximum 256 karakter* *vagy* NIL	RMK: ASH CLD CAN NO LONGER BE DETECTED ON SATELLITE IMAGE
18	Következő tájékoztatás (M)	Év, hónap, nap és időpont UTC	NEXT ADVISORY: nnnnnnnn/nnnnZ *vagy* NO LATER THEN nnnnnnnn/nnnnZ *vagy* NO FURTHER ADVISORIES *vagy* WILL BE ISSUED BY nnnnnnnn/nnnnZ-ig	NEXT ADVISORY 20000402/1300Z

Megjegyzés .–
1. International Association of Volcanology and Chemistry of the Earth’s Interior (IAVCEI) (A Föld belsejének vulkanológiai és kémiai nemzetközi szövetsége).
2. Két pont között egyenes vonal húzva a térképen a Mercator vetületen, vagy két pont között egyenes vonal, amely állandó szögnél hosszúsági vonalakat keresztez.
3. Maximum 4 kiválasztott réteg.
4. Ha hamut jelentenek (pl. AIREP), de nem azonosítható műholdas adatokból.

A2-1 példa Tanácsadási közlemény vulkanikus hamuról

	20000402/0700Z
VA ADVISORY	TOKYO
DTG	USUZAN 805-03
VAAC:	N4230E14048
VOLCANO:	JAPAN
PSN:	732M
AREA:	2000/432
SUMMIT ELEV:	GMS JMA
ADVISORY NR:	RED
INFO SOURCE:	ERUPTED 20000402/0614Z ERUPTION OBS ASH TO ABV FL300
AVIATION COLOUR CODE:	02/0645Z
ERUPTION DETAILS:	FL150/350 N4230E14048-N4300E14030-N4246E14230-N4232E14150-
OBS VA DTG:	N4230E14048 SFC/FL150 MOV NE 25KT FL150/350 MOV E 30KT
OBS VA CLD:	02/1245Z SFC/FL200 N4230E14048-N4232 E14150-N4238E14300-
	N4246 E14230 FL200/350 N4230 E14048-N4232E14150N4238
FCST VA CLD + 6 HR:	E14300-N4246E14230 FL350/600 NO ASH EXP
	02/1845Z SFC/FL300 N4230 E14048-N4232E14150-N4232 E14300-
FCST VA CLD + 12 HR:	N4246 E14230 FL300/600 NO ASH EXP
FCST VA CLD + 18 HR:	03/0045Z SFC/FL600 NO ASH EXP
RMK:	HAMUFELHŐ MÁR NEM ÉSZLELHETŐ A MŰHOLD KÉPEN
NXT ADVISORY: :	20000402/1300Z

A2-2. táblázat. Minta trópusi ciklon tanácsadó közleményhez

Key = = kettős párhuzamos vonal azt jelzi, hogy az ezt követő szöveget a következő sorban kell elhelyezni

1. Megjegyzés. – A trópusi ciklon tájékoztató közleményekben szereplő numerikus elemek nagyságrendje és felbontása a 6. Függelék A6-4 táblázatban látható.

2. Megjegyzés. – A rövidítések magyarázata a Procedures for Air Navigation Services – ICAO Abbreviations and Codes (Léginavigációs szolgálati eljárások – ICAO rövidítések és kódok) *(PANS-ABC, Doc 8400).*

3. Megjegyzés. – Az összes elem kötelező.

4. Megjegyzés. – „Kettőspont" beírása minden elem címe után kötelező.

5. Megjegyzés. – Az 1-től 16-ig számok csak az anyag világossá tétele céljából szerepelnek, ezek nem részei a tanácsadó közleménynek, ahogyan az a példában látszik.

Elem		*Részletezett tartalom*	*Minta (Minták)*	*Példák*
1	A közlemény fajtájának azonosítása	A közlemény fajtája	TC ADVISORY	TC ADVISORY
2	A keletkezés ideje	A kiadás éve, hónapja, napja, időpontja UTC	DTG: nnnnnnn/nnnnZ	DTG:: 20040925/1600Z
3	A TCAC neve	A TCAC neve (földrajzi hely jelölése vagy teljes név)	TCAC: nnnnnnn/nnnnZ	TCAC: YUFO[1] TCAC MIAMI
4	A trópusi ciklon neve	A trópusi ciklon neve *vagy* „NIL" névtelen trópusi ciklonnál	TC: nnnnnnnnnnn *vagy* NIL	TC? GLORIA
5	Tájékoztatás szám	Tájékoztatás szám („01"-től kezdve mindegyik ciklonra)	NR: nn	NR: 01

6	A központ helyzete	A trópusi ciklon központjának helyzete (fokokban és percekben)	PSN Wnnn[nn]	Nnn[nn] vagy Snn[nn] vagy vagy Ennn[nn]	PSN: N2706 W07306
7	A mozgás iránya és sebessége	A mozgás iránya és sebessége legalább nyolc iránytű pontban, km/h, *vagy* lassú (<6km/h(3csomó)) *vagy* stacionárius (<2km/h (1csomó))	MOV: *vagy*	N nnKMH (*vagy* KT) *vagy* NNE nnKMH (*vagy* KT) *vagy* NE nnKMH (*vagy* KT) *vagy* ENE nnKMH (*vagy* KT) *vagy* E nnKMH (*vagy* KT)*vagy* ESE nnKMH (*vagy* KT) *vagy* SE nnKMH (*vagy* KT) *vagy* SSE nnKMH (*vagy* KT *vagy* S nnKMH (*vagy* KT) SSW nnKMH (*vagy* KT) *vagy* SW nnKMH (*vagy* KT) *vagy* WSW nnKMH (*vagy* KT) *vagy* W nnKMH (*vagy* KT) *vagy* WNW nnKMH (*vagy* KT) *vagy* NW nnKMH (*vagy* KT) *vagy* NNW nnKMH (*vagy* KT) *vagy* SLW *vagy* STNR	MOV: NW 20KMH
8	Központi nyomás	Központi nyomás (hPa-ban)	C:	nnnHPA	C: 965HPA
9	Maximális talajszél	Maximális talajszél a központ közelében (10 percre vonatkozó átlag km/h-ban (vagy csomóban)	MAX WIND:	nn[n]KMH (*vagy* nn[n]KT)	MAX WIND: 90KMH
10	Központ helyzet előrejelzés (+6 óra)	Nap és időpont (UTC szerint) (6 órával a 2-es tételben adott „DTG"-től) Trópusi ciklon központ helyzetének előrejelzése (fokokban és percekben	FCST PSN+6 HR:	nn/nnnnZ Nnn[nn] *vagy* Snn[nn] *vagy* Wnnn[nn] *vagy* Ennn[nn]	FCST PSN+6 HR: 25/2200Z N2748 W07350
11	Maximális talajszél előrejelzés (+6 óra)	Maximális talajszél előrejelzés (6 órával a 2-es tételben adott „DTG"-től)	FCST MAX WIND +6 HR:	nn[n]KMH (vagy nn[n]KT)	FCST MAX WIND: +6 HR 90KMH
12	Központ helyzet előrejelzés (+12 óra)	Nap és időpont (UTC szerint) (12 órával a 2-es tételben adott „DTG"-től) Trópusi ciklon központ helyzetének előrejelzése (fokokban és percekben	FCST PSN +12 HR Wnnn[nn] *vagy*	nn/nnnnZ Nnn[nn] *vagy* Snn[nn] *vagy* Ennn[nn]	FCST PSN +12 HR: 26/0400Z N2830 W07430
13	Maximális talajszél előrejelzés (+12 óra)	Maximális talajszél előrejelzés (12 órával a 2-es tételben adott „DTG"-től)	FCST MAX WIND +12 HR:	nn[n]KMH (*vagy* nn[n]KT)	FCST MAX WIND +12 HR:…… 90KMH
14	Központ helyzet előrejelzés (+18 óra)	Nap és időpont (UTC szerint) (18 órával a 2-es tételben adott „DTG"-től) Trópusi ciklon központ helyzetének előrejelzése (fokokban és percekben	FCST PSN +18 HR:	nn/nnnnZ Nnn[nn] *vagy*nn[nn] *vagy* Wnnn[nn] *vagy* Ennn[nn]	FCST PSN +18 HR:… 26/1000Z N2852 W07500
15	Maximális talajszél előrejelzés (18 órával a 2-es tételben adott „DTG"-től)	Maximális talajszél előrejelzés (18 órával a 2-es tételben adott „DTG"-től)	FCST MAX WIND +18 HR:	nn[n]KMH (*vagy* nn[n]KT)	FCST MAX WIND +18 HR: 85KMH
16	Központ helyzet előrejelzés (+24óra)	Nap és időpont (UTC szerint) (24 órával a 2-es tételben adott „DTG"-től) Trópusi ciklon központ helyzetének előrejelzése (fokokban	FCST PSN +24 HR:	nn/nnnnZ Nnn[nn] *vagy*nn[nn] *vagy* Wnnn[nn] *vagy* Ennn[nn]	FCST PSN +24 HR: 26/1600Z N2912W07530

		és percekben		
17	Maximális talajszél előrejelzés (24 órával a 2-es tételben adott „DTG”-től)	Maximális talajszél előrejelzés (18 órával a 2-es tételben adott „DTG”-től)	FCST MAX WIND +24 HR: nn[n]KMH (*vagy* nn[n]KT)	FCST MAX WIND +24 HR: 80KMH
18	Megjegyzések	Megjegyzések szükség szerint	RMK: *Szabad szöveg maximálisan 256 karakter*	RMK: NIL
19	A következő tájékoztatás kiadásának várható időpontja	A következő tájékoztatás kiadásának várható éve, hónapja, napja és időpontja (UTC szerint)	NXT MSG: [BFR] nnnnnnn/nnnnZ *vagy* NO MSG EXP	NXT MSG: 20040925/2000Z

Megjegyzés
1.Fiktív hely.

A2-2 példa. Tanácsadási közlemény trópusi ciklonokról

TC ADVISORY	
DTG:	19970925/1600Z
TCAC:	YUFO
TC:	GLORIA
NR:	01
PSN:	N2706 W07306
MOV:	NW 20kMH
C:	965HPA
MAX WIND:	90KMH
FCST PSN + 6HR	25/2200Z N2748 W07350
FCST MAX WIND +6HR	90KMH
FCST PSN + 12 HR:	260400 N2830 W07500
FCST MAX WIND + 12 HR:	90KMH
FCST PSN + 18 HR:	261000 N2852 W07500
FCST MAX WIND + 18 HR:	85KMH
FCST PSN + 24 HR:	261600 N2912 W07530
FCST MAX WIND + 24 HR:	80KMH
NXT MSG:	19970925/2000 Z

3. FÜGGELÉK. METEOROLÓGIAI MEGFIGYELÉSEKRE ÉS JELENTÉSEKRE VONATKOZÓ MŰSZAKI ELŐÍRÁSOK

(Lásd jelen Annex 4. Fejezete)

1. METEOROLÓGIAI MEGFIGYELÉSEKRE VONATKOZÓ ÁLTALÁNOS ELŐÍRÁSOK

1.1 **Ajánlás** – *A repülőtéren használt meteorológiai műszereket úgy kell elhelyezni, hogy arra a területre jellemző adatokat szolgáltassanak, amelyekre a méréseket igénylik.*

Megjegyzés. – Az üzemelési területeken telepített berendezések és felszerelések elhelyezésére és konstrukciójára vonatkozó előírások, amelyek a légijárművek veszélyeztetésének a minimumra csökkentését célozzák, a 14. Annex 1. Kötet 8. Fejezetében találhatók.

1.2 **Ajánlás. –** *A repülésmeteorológiai állomásokon lévő meteorológiai műszereket a Meteorológiai Világszervezet által közzétett eljárások és előírások szerint kell telepíteni, üzemeltetni és karbantartani.*

1.3 **Ajánlás.** – *A repülőtéren a megfigyelő eszközöket, amennyire lehetséges, úgy kell elhelyezni, hogy az általuk szolgáltatott adatok arra a területre vonatkozzanak, amelyre a megfigyeléseket igénylik*

1.4 **Ajánlás.** –*Ahol az automatikus berendezés részét képezi egy integrált fél-automatikus megfigyelő rendszernek, a helyi légiforgalmi szolgálati egységek számára rendelkezésre álló adatkijelzők a helyi meteorológiai szolgálati egység berendezéseinek kiegészítő egységei legyenek, és azokkal párhuzamosan működjenek. Ezeken a kijelzőkön az egyes időjárási elemeknél, ahogyan megfelelő, jelezni kell, hogy az elem melyik észlelési helyre vonatkozik.*

2. METEOROLÓGIAI JELENTÉSEKRE VONATKOZÓ ÁLTALÁNOS KRITÉRIUMOK

2.1 Meteorológiai jelentések formátuma

2.1.1 Helyi rendszeres és különleges jelentéseket rövidített köznyelven kell kiadni, az A3-1 táblázatban bemutatott mintának megfelelően.
2.1.2 METAR-t és SPECI-t az A3-2 táblázatban bemutatott mintával összhangban kell kiadni, és a Világ Meteorológiai Szervezet által előírt METAR és SPECI kód formában kell terjeszteni.
Megjegyzés. – A METAR és SPECI kódformákat a WMO 306 számú kiadványában, Kód kézikönyv (Manual on Codes), *1.1 kötet, A Rész – Alfanumerikus kódok.*
2.1.3 **Ajánlás. –** *A METAR-t és SPECI-t az Államok közötti kétoldalú megállapodások szerint, ha ezekben így szerepel, WMO BUFR kódformában kell terjeszteni, a METAR és SPECI 2.1.2 pontban előírtak mellett.*
Megjegyzés. – A BUFR kódformát a WMO 306 számú kiadványa, Kód kézikönyv (Manual on Codes) *1.2 kötet, B Rész – Bináris kódok tartalmazza.*

2.2 CAVOK használata

Amikor a megfigyelés idején a következő feltételek szimultán fordulnak elő:
a) látás, 10 km vagy nagyobb;
Megjegyzés. –.Helyi rendszeres és különleges jelentésekben a látás azokra az érték(ek)re vonatkozik, amelyeket 4.2.4.2 és 4.2.4.3 pontoknak megfelelően kell jelenteni; METAR-ban és SPECI-ben azokra az értékekre vonatkozik, amelyeket a 4.2.4.4 pontnak megfelelően kell jelenteni.
b) nincs a repülésüzemeltetés szempontjából jelentőséggel bíró felhő;
c) nincs olyan időjárás, amely a repülés számára, a 4.4.2.3 és 4.4.2.4 pontoknak megfelelően jelentőséggel bír;
akkor a látásra, a futópálya látástávolságra, az aktuális időjárásra és felhőmennyiségre, felhő fajtára és felhőalap magasságra vonatkozó információkat minden meteorológiai jelentésben a „CAVOK” terminussal kell helyettesíteni.

2.3 Helyi különleges jelentések és SPECI kiadásának kritériumai

2.3.1 A helyi különleges jelentések kritériumainak listájában a következőknek kell szerepelniük:
a) azok az értékek, amelyek a legszorosabban kapcsolódnak a repülőteret használó üzemeltetők minimumaihoz;
b) azok az értékek, amelyek kielégítik a légiforgalmi szolgálati egységek és az üzemeltetők más helyi követelményeit;
c) 2 C°-os vagy ennél nagyobb levegő hőmérséklet növekedés a legutolsó jelentésben megadotthoz képest, vagy egy alternatív küszöbérték, a meteorológiai hatóság, a megfelelő légiforgalmi szolgáltatási hatóság és az érintett üzemeltetők közötti megállapodásnak megfelelően;
d) a megközelítési és emelkedési területeken szignifikáns meteorológiai körülmények előfordulásával foglalkozó, rendelkezésre álló kiegészítő információk, az A3-1 táblázatban megadottaknak megfelelően; és
e) azok az értékek, amelyek a SPECI kritériumait alkotják.
2.3.2 **Ajánlás** – *SPECI- kell kiadni, valahányszor a következő kritériumoknak megfelelő változások lép-*

nek fel:
a) ha a talajszél közepes iránya 60 fokkal, vagy többel megváltozott a legutóbbi jelentésben közölthöz képest, amennyiben az átlagos sebessége a változás előtt és/vagy után 20 km/h (10 csomó), vagy több volt;
b) ha a talajszél közepes sebessége 20 km/h-val (10 csomóval), vagy többel megváltozott a legutóbbi jelentésben közölthöz képest;
c) ha a talajszél közepes sebességtől való eltérés (széllökések) 20 km/h-val (10 csomó), vagy többel nagyobb a legutóbbi jelentésben közölt értéknél, amennyiben a közepes szélsebesség a megváltozás előtt és/vagy után 30 km/h (15 csomó), vagy több volt
d) ha a szélváltozások üzemelési szempontból lényeges értékeket lépnek át. A küszöbértékeket a meteorológiai hatóságnak kell megállapítania az illetékes légiforgalmi szolgálatihatósággal és az érintett üzemeltetőkkel konzultálva, figyelembe véve azokat a szélváltozásokat, melyek:
1) használatos futópálya (futópályák) változtatást tesznek szükségessé;
2) jelzik, hogy a futópálya hátszél és oldalszél összetevői a repülőtéren üzemelő tipikus légijárművek számára a főbb üzemelési határértékeket meghaladják.
e) ha a látás javul, és a változások során az alábbi értékek közül egyet vagy többet elér, vagy túllép, vagy amikor a látás romlik, és az alábbi értékek közül egyet vagy többet átlép:
1) 800, 1500, 3000 méter; és
2) 5000 métert, ahol jelentős számú járatot üzemeltetnek látás szerinti repülési szabályok szerint.
Megjegyzés. – Helyi különleges jelentésekben a látás arra (azokra) az érték(ek)re vonatkozik, amelye(ke)t a 4.2.4.2 és 4.2.4.3 pontoknak megfelelően kell jelenteni, SPECI-ben a látás arra (azokra) az érték(ek)re vonatkozik, amelye(ke)t a 4.24.4 pontnak megfelelően kell jelenteni.
f) ha a futópálya látástávolság javul, és az alábbi értékek közül egyet vagy többet a változás során elér, vagy átlép, vagy ha a futópálya látástávolság romlik, és az alábbi értékek közül egyet vagy többet átlép: 150, 350, 600 vagy 800 m;
g) ha a következő meteorológiai jelenségek valamelyike, vagy ezek valamilyen kombinációja létrejön, megszűnik, vagy intenzitása megváltozik:
– ónos csapadék
– mérsékelt vagy heves csapadék (beleértve a záporokat is)
– zivatar (csapadékkal)
– porvihar
–homokvihar;
h) ha a következő meteorológiai jelenségek valamelyike, vagy ezek valamilyen kombinációja létrejön vagy megszűnik:
– jégkristályok
– fagyott köd
– talajközeli por-, homok- vagy hófúvás
– por, homok vagy hófúvás (beleértve a hóvihart)
– zivatar (csapadék nélkül))
– szélroham
– tölcsérfelhő (tornádó vagy víztölcsér);
i) amikor a BKN vagy OVC felhőtakarás legalacsonyabb felhőrétege alapjának magassága növekszik, és az alábbi értékek közül egyet vagy többet a változás során elér, vagy túllép, vagy amikor a BKN vagy OVC felhőtakarás legalacsonyabb felhőrétege alapjának magasságcsökkenése az alábbi értékek közül egyet vagy többet elér vagy átlép, vagy amikor a BKN vagy OVC felhőtakarás legalacsonyabb felhőrétege alapjának magasságcsökkenése az alábbi értékek közül egyet vagy többet elér vagy átlép:
1) 30, 60, 150, vagy 300 méter (100, 200, 500 vagy 1000 láb); és
2) 450 méter (1500 láb), olyan esetekben, amikor jelentős számú járatot üzemeltetnek látás szerinti repülési szabályok szerint;
j) amikor a 450 méter (1500 láb) alatti felhőréteg mennyisége az alábbiak szerint megváltozik:
1) SKC-ről, FEW-ről vagy SCT-ről BKN-re vagy OVC-re; vagy

2) BKN-ről vagy OVC-ről SKC-re, FEW-re vagy SCT-re vagy kisebbre;
k) amikor az égbolt borult és a függőleges látás javul, és az alábbi értékek közül egyet vagy többet elér vagy túlhalad, vagy amikor a függőleges látás romlik és az alábbi értékek közül egyen vagy többen áthalad: 30, 60, 150 vagy 300 m (100, 200, 500 vagy1000 láb); és
l)minden egyéb helyi üzemelési minimumokon alapuló kritérium, a meteorológiai hatóság és az üzemeltetők közötti megállapodás szerint.
Megjegyzés – A helyi repülőtér üzemelési minimumain alapuló egyéb kritériumokat a hasonló kritériumokkal párhuzamosan kell megfontolni a változás csoportokba való belefoglaláshoz és a TAF módosításhoz, mely minimumokat az 5. Függelék1.3.1 k) pontjának eleget téve alakítottak ki.
2.3.3 Ha egy időjárási elem romlását egy másik javulása kíséri, akkor egyetlen SPECI-t kell kiadni; ezt romlási jelentésként kell kezelni.

3. METEOROLÓGIAI JELENTÉSEK SZÉTKÜLDÉSE

3.1 METAR és SPECI

3.1.1 A METAR-t és SPECI-t el kell juttatni a nemzetközi OPMET adatbázisokhoz és a regionális léginavigációs egyezmények által repülési állandó helyű műholdas elosztó rendszer működtetésére kijelölt központokhoz, a regionális léginavigációs egyezménynek megfelelően.
3.1.2 METAR-t és SPECI-t a regionális léginavigációs egyezményeknek megfelelően más repülőterekhez is el kell juttatni.
3.1.3 **Ajánlás**. – *A körülmények leromlásáról szóló SPECI-t közvetlenül az észlelés után kell szétküldeni. A körülmények javulásáról szóló SPECI-t a javulás után 10 perc visszatartás után kell szétküldeni, szükség esetén a SPECI-t szétküldés előtt módosítani kell, és jelezni kell az ennek a 10 perces periódusnak a végén uralkodó körülményeket. Egy SPECI-t, amely az egyik időjárás elem leromlását és egy másik elem javulását tartalmazza, az észlelés után azonnal szét kell küldeni.*

3.2 Helyi rendszeres és különleges jelentések

3.2.1 A helyi rendszeres jelentéseket továbbítani kell a helyi légiforgalmi szolgálati egységeknek, és az üzemeltetők, és a repülőtéren más felhasználók részére rendelkezésre kell bocsátani.
3.2.2 A helyi különleges jelentéseket továbbítani kell a helyi légiforgalmi szolgálati egységeknek, mihelyt a specifikált körülmények megjelennek. Azonban a meteorológiai hatóság és a megfelelő légiforgalmi szolgáltatási hatóság közötti egyezmény szerint ezeket nem kell kiadni a következőkre vonatkozóan:
a) bármely elem, amelyre vonatkozóan a helyi légiforgalmi szolgáltató egységnél egy kijelző van, amely megegyezik a meteorológiai állomáson lévővel, és intézkedések vannak érvényben ennek a kijelzőnek a használatát illetően a helyi rendszeres és különleges jelentések által tartalmazott információk felfrissítésére; és
b) futópálya látástávolság, amikor a használt jelentési mérték szerinti egy vagy több lépcsőnyi összes változást a helyi légiforgalmi szolgálati egységnek egy repülőtéren lévő megfigyelő jelent.
Helyi különleges jelentéseket az üzemeltetők, és a repülőtéren lévő más felhasználók részére ugyancsak rendelkezésre kell bocsátani.

4. METEOROLÓGIAI ELEMEK MEGFIGYELÉSE ÉS JELENTÉSE
Bevezető Megjegyzés. – A 4.1-től – 4.8-ig szakaszokban hivatkozott meteorológiai információkhoz repülőtéri jelentésekbe bekerülő alkalmazható kiválasztott kritériumokat a C Melléklet táblázatos formában tartalmazza.

4.1 Talajszél

4.1.1 Elhelyezés
4.1.1.1 **Ajánlás**. – *A talajszelet közelítőleg a futópálya(k) felett 10 m (30 láb) magasságban kell megfi-*

gyelni.

4.1.1.2 **Ajánlás**. – *Reprezentatív talajszél megfigyeléseket alkalmasan elhelyezett érzékelők felhasználásával kell nyerni. A helyi rendszeres és különleges jelentésekhez végzett talajszél megfigyeléseket kiszolgáló érzékelőket úgy kell elhelyezni, hogy a futópálya menti és a földetérési zónákban uralkodó viszonyoknak a lehető legjobb jelzését adja. Azokon a repülőtereken, ahol a terepviszonyok vagy az uralkodó időjárási viszonyok a talajszélben jelentős különbségeket okoznak a futópálya különböző szakaszain, további érzékelőket kell alkalmazni.*

Megjegyzés. – Mivel a gyakorlatban a talajszelet nem lehet közvetlenül a futópályán mérni, a felszálláshoz és leszálláshoz végzett talajszél megfigyelések várhatóan a legjobb nyerhető mutatója a szeleknek, amellyel egy légijármű felszállás és leszállás közben találkozik.

4.1.2 Kijelzők

4.1.2.1 Az egyes érzékelőkhöz kapcsolódó kijelzőket a megfelelő légiforgalmi szolgálati egységnél lévő kijelzőkkel kapcsolódó meteorológiai állomáson kell elhelyezni. A meteorológiai állomáson és a légiforgalmi szolgálati egységeknél lévő kijelzőknek ugyanahhoz az érzékelőhöz kell tartozniuk, és ahol külön érzékelők szükségesek, ahogyan a 4.1.1.2 pontban van leírva, a kijelzőket világosan meg kell jelölni az egyes érzékelők által figyelt futópálya és futópálya szakasz azonosításához.

4.1.2.2 **Ajánlás**. – *A talajszél irány és sebesség közepes értékeit és jelentős változásait automatizált berendezésekkel kell leszármaztatni és kijelezni.*

4.1.3 Átlagolás

4.1.3.1 A talajszél megfigyelések átlagolási időszakainak a következőknek kell lenniük:

a) 2 perc helyi rendszeres és különleges jelentéseknél és szél kijelzőknél légiforgalmi szolgáltató egységeknél; és

b) 10 perc METAR és SPECI esetén, kivéve, ha a 10-perces időszak markáns diszkontinuitást tartalmaz a szélirányban és/vagy sebességben, amikor csak a diszkontinuitás utáni adatokat használják fel a középértékek nyeréséhez, ennek következtében az időintervallumokat ilyen körülmények között megfelelően csökkenteni kell.

Megjegyzés – Markáns diszkontinuitás akkor fordul elő, amikor egy szakadáslép fel, és a szélirányban 30 fokos vagy ennél nagyobb változás tartósan fennmarad, a változás előtt vagy után 20 km/h (10 csomó) szélsebesség mellett, vagy 20 km/h (10 csomó) vagy nagyobb szélsebesség változás esetén, amely legalább 2 percig tart.

4.1.3.2 **Ajánlás. –** *Az átlagolási időszak a közepes szélsebességtől való eltérések (széllökések), amelyeket a 4.1.4.2 c) pontnak megfelelően jelentettek, mérésénél 3 másodperc legyen helyi rendszeres és különleges jelentéseknél és METAR és SPECI esetén és a közepes szélsebességtől való eltérések (széllökések) leképezéséhez használt kijelzőknél, a légiforgalmi szolgálati egységeknél.*

4.1.4 A mérés pontossága

Ajánlás. – *A jelentett közepes talajszéliránynak és sebességnek, valamint a közepes talajszéltől való eltéréseknek ki kell elégíteniük az üzemelés szempontjából kívánatos mérési pontosságot, ahogyan az A Mellékletben meg van adva.*

4.1.5 Jelentés

4.1.5.1 Helyi rendszeres és különleges jelentésekben és METAR-ban és SPECI-ben a talajszél irányt, illetve sebességet 10 földrajzi fokos, illetve 1 km per óra (vagy 1 csomó) lépcsőkben kell jelenteni. Az olyan észlelt értéket, amelyik nem illeszkedik a használt jelentés skálához, a skála legközelebbi lépcsőjének értékére kell kerekíteni.

4.1.5.2 Helyi rendszeres és különleges jelentésekben és METAR-ban és SPECI-ben:

a) a szélsebesség mérésére használt mértékegységeket jelölni kell;

b) a közepes széliránytól az utolsó 10 perc során való eltéréseket a következők szerint kell jelenteni, ha a teljes változás 60^{o} vagy több:

1) ha a teljes változás 60^{o} vagy több és kisebb mint 180^{o}, és a szélsebesség 6 km/h (3 csomó) vagy ennél nagyobb; az ilyen irányváltozásokat a két szélső irány, amelyek között a talajszél változott, megadásával kell jelenteni;

2) ha a teljes változás 60° és kisebb mint 180°, és a szélsebesség kisebb, mint 6 km/h (3 csomó), a szélirányt, mint nem a közepes szélirránnyal változót kell jelenteni; vagy

3) ha a teljes változás 180° vagy nagyobb, a szélirányt, mint nem közepes szélirránnyal változót kell jelenteni;

c) az utolsó 10 perc során a közepes szélsebességtől való eltéréseket (széllökések) jelenteni kell, ha a maximális szélsebesség a közepes szélsebességet a következő értékekkel haladja meg:

1) 10 km/h (5csomó) vagy nagyobb értékkel helyi rendszeres és különleges jelentésekben, amikor zajcsökkentő eljárásokat alkalmaznak a PANS-ATM (Doc 4444) 7.2.3 pontjának megfelelően; vagy

2) 20km/h (10 csomó) vagy nagyobb más esetben;

d) ha 2 km/h-nál (1 csomó) kisebb szélsebességet jelentenek, ezt nyugalomként kell jelezni;

e) ha 200 km(h (100 csomó) vagy ennél nagyobb szélsebességet jelentenek, ezt több, mint 199 km/h-ként (99 csomó) kell jelölni; és

f) ha a 10 perces időperiódus a szélirány és/vagy szélsebesség markáns diszkontinuitását tartalmazza, csak ezen diszkontinuitás után fellépő, a közepes széliránytól és közepes szélsebességtől való eltéréseket kell jelenteni.

Megjegyzés. – Lásd a 4.1.3.1 pont alatti megjegyzést

4.1.5.3 A helyi rendszeres és különleges jelentésekben:

a) ha a talajszelet a futópálya mentén több helyen észlelik, azokat a helyeket, amelyeket ezek az értékek reprezentálnak, meg kell jelölni;

b) amikor több futópálya van használatban, és a talajszelet ezekre a futópályákra vonatkozóan figyelik, a rendelkezésre álló értékeket az egyes futópályákra kell megadni, és a futópályákat, amelyekre az érték vonatkozik, jelenteni kell;

c) ha a közepes széliránytól való eltéréseket a 4.1.5.2 b) 2) pontnak megfelelően jelentik, a két szélső értéket, amelyek között a talajszél változott, kell jelenteni; és

d) ha a közepes szélsebességtől való eltéréseket (széllökések) a 4.1.5.2c) pontnak megfelelően jelentik, a szélsebesség által elért maximális és minimális értéket kell jelenteni;

4.1.5.4 METAR-ban és SPECI-ben, amikor a közepes szélsebességtől való eltéréseket (széllökések) a 4.1.5.2 c) pontnak megfelelően jelentik, az elért maximális szélsebesség értéket kell jelenteni.

4.2 Látás

4.2.1 Elhelyezés

4.2.1.1 **Ajánlás –** *Ha a látás mérésére műszerezett rendszereket használnak, a látást a futópálya felett megközelítően 2,5 m (7,5 láb) magasságban kell mérni.*

4.2.1.2 **Ajánlás** – *Ha a látás mérésére műszerezett rendszereket használnak, reprezentatív észleléseket megfelelő helyeken elhelyezett érzékelők használatával kell nyerni. A helyi rendszeres és különleges jelentésekhez szükséges látás megfigyelésekre szolgáló érzékelőket úgy kell elhelyezni, hogy a futópálya menti és a földetérési zóna menti látás lehető legjobb jelzését adja.*

4.2.2 Kijelzők

Ajánlás – *Ha látás mérésére műszerezett rendszereket használnak, az egyes érzékelőkhöz tartozó látás kijelzőket a megfelelő légiforgalmi egységeknél lévő kijelzőkkel kapcsolódó meteorológiai állomáson kell elhelyezni. A meteorológiai állomáson és a légiforgalmi szolgálati egységeknél lévő kijelzőknek ugyanazon érzékelőkhöz kell tartozniuk, és ahol külön érzékelők szükségesek, ahogyan a 4.2.1 szakaszban le van írva, a kijelzőket világosan meg kell jelölni az egyes érzékelők által figyelt terület, például futópálya és futópálya szakasz azonosítása érdekében.*

4.2.3 Átlagolás

Ajánlás – *Ha látás mérésére műszerezett rendszereket használnak, ezek inputjait legalább minden 60 másodpercben fel kell frissíteni, hogy lehetővé tegyék az aktuális reprezentatív értékek szolgáltatását. Az átlagolási időszaknak a következők szerintinek kell lenni:*

a) 1 perc helyi rendszeres és különleges jelentéseknél és légiforgalmi szolgáltató egységeknél lévő látáskijelzőknél; és

b) 10 perc METAR és SPECI esetén, kivéve, ha a megfigyelést közvetlen megelőző 10-perces időszak markáns diszkontinuitást tartalmaz a látásban, amikor csak a diszkontinuitás utáni adatokat használják fel a középértékek nyeréséhez.
Megjegyzés – Markáns diszkontinuitás akkor fordul elő, amikor a látásban egy megszakítás és egy legalább 2 percig tartó változás fennmarad, amely eléri vagy meghaladja a 2.3 pontban megadott, SPECI jelentések kiadására vonatkozó kritériumokat.
4.2.4 Jelentés
4.2.4.1 Helyi rendszeres és különleges jelentésekben és METAR-ban és SPECI-ben, ha a látás 800 m alatt van, azt 50 m-es lépcsőkben kell jelenteni, ha a látás 800 m, vagy több, de kevesebb, mint 5 km, akkor 100 m-es lépcsőket kell használni¸ 5 km felett, de 10 km alatt pedig kilométeres lépcsőkben; és ha 10 km, vagy több, akkor 10 km-ekben kell megadni, kivéve, ha fennállnak a CAVOK használatára vonatkozó feltételek. Ha valamely észlelt érték nem illeszkedik a használt jelentő skálához, akkor a skálán lévő legközelebbi kisebb lépcsőre kell lekerekíteni.
Megjegyzés. – A CAVOK használatára vonatkozó előírásokat a 2.2 szakasz tartalmazza.
4.2.4.2 Helyi rendszeres és különleges jelentésekben a futópálya (futópályák) menti látást a mérésnél használt mértékegységekkel együtt kell jelenteni.
4.2.4.3 **Ajánlás.** – *Helyi rendszeres és különleges jelentésekben, amikor műszerezett rendszert használnak a látás mérésére:*
a) ha a látást a futópálya mentén több helyen figyelik, ahogyan a 4. Fejezet 4.6.2.2 pontjában le van írva, a földetérési zónát reprezentáló értékeket kell először jelenteni, amelyet, ha szükséges, a futópálya középponthoz és megállás véghez tartozó értékek követnek, és az ezeket az értékeket reprezentáló helyeket jelezni kell; és
b) ha egynél több futópálya van használatban, és a látást ezekre a futópályákra vonatkozóan figyelik, az egyes futópályákat reprezentáló látás értékeket jelenteni kell, és a futópályákat, amelyekre ezek az értékek vonatkoznak, jelezni kell
4.2.4.4 **Ajánlás.** – *METAR-ban és SPECI-ben a látást domináns látásként kell jelenteni, ahogyan az 1. Fejezetben definiálva van. Ha a látás nem ugyanaz minden irányban és*
a) ha a legkisebb látás különbözik a domináns látástól és1) kisebb, mint 1500 m vagy 2) kisebb, mint a domináns látás 50 százaléka és kisebb, mint 5000m; a megfigyelt legkisebb látást is jelenteni kell és ennek a repülőtérhez viszonyított általános irányát az iránytű nyolc pontjának egyikéhez viszonyítva kell jelezni. Ha a legkisebb látást egynél több irányban észlelik, akkor az üzemeltetés szempontjából legszignifikánsabb irányt kell jelenteni; és
b) ha a látás gyakran és gyorsan ingadozik, és a domináns látás nem határozható meg, csak a legkisebb látást kell jelenteni az irány megjelölése nélkül.
4.2.4.5 **Ajánlás.** – *Automatizált METAR-ban és SPECI-ben, amikor a látásérzékelők olyan módon vannak elhelyezve, hogy iránybeli változtatásokat nem lehet megadni, a jelentett látás értéket az „NDV" rövidítésnek kell követni.*

4.3 Futópálya látástávolság

4.3.1 Elhelyezés
4.3.1.1 **Ajánlás. –** *Futópálya látástávolságot a futópálya felett közelítőleg 2,5 m (7,5 láb) magasságban kell meghatározni.*
4.3.1.2 **Ajánlás. –***A futópálya látástávolság megállapítását a futópálya középvonalától nem több, mint 120 m oldalirányú távolságban kell végezni. A földetérési zónát reprezentáló megfigyelések helyének kb. 300 m-re kell lennie a futópálya mentén a küszöbtől számítva. A futópálya középső pontját és megállási végpontját reprezentáló megfigyelések helyét a futópálya mentén a küszöbtől számítva 1000 és 1500 méter közötti távolságra kell telepíteni, illetve kb. 300 m-re a futópálya ellentétes végétől. E helyek, és ha szükséges, további helyek, pontos pozíciójának pontos meghatározásához olyan repülési, meteorológiai és klimatológiai tényezőket kell figyelembe venni, mint pl. hosszú futópályák, ingoványok és más ködösödésre hajlamos területek.*

4.3.2 Műszerezett rendszerek

Megjegyzés. – Mivel a pontosság egyik műszerkivitelezésről a másikra változhat, a teljesítményjellemzőket a futópálya látástávolság megállapítására szolgáló műszereknél kiválasztás előtt ellenőrizni kell. Az előre-szórás mérő kalibrálásának követhetőnek, és a transzmisszométer szabványhoz verifikálhatónak kell lenni, amelynek pontosságát az előirányzott üzemelési tartomány felett verifikálták. Műszerezett futópálya látástávolság rendszerekben lévő transzmisszométerek és előreszórás mérők használatára vonatkozó útmutató anyag a Futópálya látástávolság megfigyelési és jelentési eljárások kézikönyve (Manual of Runway Visual Range Observing and Reporting Practices) *(Doc 9328) kiadványban található.*

4.3.2.1 II. és III. kategóriájú műszeres megközelítési és leszállási műveletekre szánt futópályákon való futópálya látástávolság meghatározására transzmisszométereken vagy előre-szórás mérőkön alapuló műszerezett rendszereket kell használni.

4.3.2.2 **Ajánlás.** –*I. kategóriájú műszeres megközelítési és leszállási műveletekre szánt futópályákon való futópálya látástávolság meghatározására Transzmisszométereken vagy előre-szórás mérőkön alapuló műszerezett rendszereketkell használni.*

4.3.3 Kijelző

4.3.3.1 Ha a futópálya látástávolság megállapítására műszerezett rendszereket használnak, egy, vagy igény esetén több kijelzőt, a megfelelő légiforgalmi egységeknél lévő kijelzőkkel kapcsolódó meteorológiai állomáson kell elhelyezni. A meteorológiai állomáson és a légiforgalmi szolgálati egységeknél lévő kijelzőknek ugyanazon érzékelőkhöz kell tartozniuk, és ahol külön érzékelők szükségesek, ahogyan a 4.3.1.2 pontban le van írva, a kijelzőket világosan meg kell jelölni az egyes érzékelők által figyelt futópálya és futópálya szakasz azonosítása érdekében.

4.3.3.2 **Ajánlás.** – *Ahol a futópálya látástávolságot emberi megfigyelők állapítják meg, a futópálya látástávolságot jelenteni kell a megfelelő helyi légiforgalmi szolgáltató egységeknek, ha a jelentő skálának megfelelően jelentett értékben változás áll be (kivéve, ha a 3.2.2 a) vagy b) pont előírásai érvényesek). Az ilyen jelentések továbbítását normál esetben a megfigyelés befejezése után 15 másodpercen belül be kell fejezni.*

4.3.4 Átlagolás

Ahol a futópálya látástávolság meghatározására műszerezett rendszereket használnak, ezek inputjait legalább minden 60 másodpercben fel kell frissíteni, hogy lehetővé tegyék aktuális reprezentatív értékek szolgáltatását. A futópálya látástávolság értékeknél az átlagolási időszaknak a következőknek kell lenni:

a) 1 perc helyi rendszeres és különleges jelentéseknél és légiforgalmi szolgáltató egységeknél elhelyezett futópálya látástávolság kijelzőknél; és

b) 10 perc METAR és SPECI esetén, kivéve, ha a megfigyelést közvetlen megelőző 10-perces időszak markáns diszkontinuitást tartalmaz a futópálya látástávolság értékekben, amikor csak a diszkontinuitás utáni adatokat használják fel a középértékek nyeréséhez.

Megjegyzés – Markáns diszkontinuitás akkor fordul elő, amikor a látásban egy megszakítás, és egy legalább 2 percig tartó változás fennmarad, amely eléri vagy meghaladja a 2.3.2 f) pontban megadott, SPECI jelentések kiadására vonatkozó kritériumokat.

4.3.5 Futópálya megvilágítás intenzitása

Ajánlás – *Ha műszerezett rendszereket használnak a futópálya látástávolság megállapítására, számításokat kell végezni külön mindegyik rendelkezésre álló futópályára. A futópálya látástávolságot nem lehet a futópályán rendelkezésre álló maximális fényintenzitás 3%-ára vagy ennél kevesebbre számítani. Helyi rendszeres és különleges jelentések részére a számításhoz használt fényintenzitásnak a következőnek kell lenni:*

a) bekapcsolt fényekkel rendelkező futópályáknál a fényintenzitás aktuálisan az ezen a futópályán használt lesz; és

b) a kikapcsolt (vagy az újraüzemelés során a legkisebbre állított) világítású futópályánál az optimális fényintenzitás, amely megfelelne az uralkodó körülményekben üzemelési célra használtnak.

METAR-ban és SPECI-ben a futópálya látástávolságnak a futópályán rendelkezésre álló maximális fényintenzitáson kell alapulnia.

Megjegyzés. – A műszeren leolvasott értékek futópálya látástávolság értékekre való átszámítására vonat-

kozó útmutató anyag az E Mellékletben található.
4.3.6 Jelentés
4.3.6.1 Helyi rendszeres és különleges jelentésekben és METAR-ban és SPECI-ben, ha a futópálya látástávolság 400 m alatt van, azt 25 m-es lépcsőkben kell jelenteni, 400 m és 800 m között 50 m-es lépcsőket kell használni, és 100 m-es lépcsőket, ha a futópálya látástávolság nagyobb, mint 800 m. Ha valamely észlelt érték nem illeszkedik a használt jelentő skálához, akkor a skálán lévő legközelebbi kisebb lépcsőre kell lekerekíteni.
4.3.6.2 **Ajánlás** – *A futópálya látástávolság alsó határának 50 métert, a felső határának 2000 métert kell tekinteni. Ezeken a határértékeken kívül eső értékeknél a helyi rendszeres és különleges jelentéseknek és a METAR-nak és SPECI-nek csupán azt kell jelezni, hogy a futópálya látástávolság kisebb, mint 50 méter, vagy nagyobb, mint 2000 méter.*
4.3.6.3 Helyi rendszeres és speciális jelentésekben és METAR-ban és SPECI-ben:
a) Ha a futópálya látástávolság a használt rendszerrel meghatározható maximális érték fölött van, ezt a „ABV" rövidítés használatával kell jelenteni a helyi rendszeres és különleges jelentésekben, és a „P" rövidítés használatával METAR-ban és SPECI-ben, amelyet a rendszerrel megállapítható maximális érték követ; és
b) ha a futópálya látástávolság a használt rendszerrel meghatározható minimális érték alatt van, azt „BLW" rövidítés használatával kell jelenteni a helyi rendszeres és különleges jelentésekben, és „M" rövidítés használatával METAR-ban és SPECI-ben, amelyet a rendszerrel meghatározó minimális érték követ.
4.3.6.4 Helyi rendszeres és különleges jelentésekben:
a) a használt mértékegységeknek szerepelniük kell;
b) ha futópálya látástávolságot a futópálya mentén csak egy helyen figyelik, azaz a földetérési zónában, annak a hely jelzése nélkül kell szerepelni;
c) ha a futópálya látástávolságot a futópálya mentén egynél több helyen figyelik, a földetérési zónát képviselő értéket kell először jelenteni, amelyet a középpontot és a megállási véget képviselő értékek követnek, és jelölni kell azokat a helyeket, amelyeket ezek az értékek reprezentálnak; és
d) ha egynél több futópálya van használatban, a rendelkezésre álló futópálya látástávolság értékeket mindegyik futópályára jelenteni kell, és a futópályákat, amelyekre az értékek vonatkoznak, jelölni kell.
4.3.6.5 **Ajánlás** – *METAR-ban és SPECI-ben:*
a) csak a földetérési zónát reprezentáló értéket kell jelenteni, és nem kell a futópályán lévő hely jelzését megadni; és
b) ahol egynél több futópálya áll leszálláshoz rendelkezésre, a földetérési zóna futópálya látástávolság értékeket minden ilyen futópályára, maximálisan négyre, meg kell adni és a futópályákat, amelyekre az értékek vonatkoznak, jelölni kell.
4.3.6.6 **Ajánlás**. – *Ha a futópálya látástávolság megállapításához műszeres rendszereket használnak, a megfigyelést megelőző 10 perc futópálya látástávolság értékek változásait a METAR-nak és a SPECI-nek tartalmazniuk kell a következők szerint:*
a) ha a futópálya látástávolság értékek a 10 perces időszak alatt eltérő tendenciát mutatnak, pl. az első 5 perc átlaga 100 m-el, vagy többel eltér a második 5 perc átlagától, ezt jelezni kell. Ha a látástávolság értékek változása növekvő, illetve csökkenő tendenciát mutatnak, ezt az „U", illetve a „D" rövidítésekkel kell jelezni. Olyan esetekben, amikor a 10 perces időszak alatti ingadozások eltérő tendenciát nem mutatnak, ezt a „N" rövidítéssel kell jelezni. Ha tendencia jelzések nem állnak rendelkezésre, a fenti rövidítések nem szerepelnek; és
b) ha a 10 perces időszak egy perces futópálya látástávolság értékei az átlagértéktől több mint 50 m-el, vagy több mint 20 százalékkal, attól függően, melyik a nagyobb, eltérnek, az 1 perces átlag minimumot és az 1 perces átlag maximumot kell megadni a 10 perces átlagérték helyett. Ha megfigyelést közvetlenül megelőző 10 perces időszak alatt jelentős diszkontinuitás mutatkozik a futópálya látástávolság értékekben, csak a diszkontinuitás utáni értékeket kell használni a változások meghatározásához.
Megjegyzés. – Markáns diszkontinuitásnak a futópálya látástávolság olyan hirtelen bekövetkező és folyamatos – legalább 2 percig tartó – változása minősül, amely eléri vagy meghaladja a SPECI kiadásá-

nak 2.3.2 f) pontban megadott kritériumait.

4.4. Aktuális időjárás

4.4.1 Elhelyezés

Ajánlás – *Ha a 4.4.2.3 és 4.4.2.4 pontok alatt felsorolt aktuális időjárás jelenségek megfigyelésére műszerezett rendszereket használnak, reprezentatív információkat megfelelően elhelyezett érzékelők használatával kell nyerni*

4.4.2 Jelentés

4.4.2.1 A helyi rendszeres és különleges jelentésekben az észlelt aktuális időjárási jelenségeket fajta és jelleg és minősített intenzitás fogalmakban kell megadni, amelyik a megfelelő.

4.4.2.2 METAR-ban és SPECI-ben az észlelt aktuális időjárási jelenségeket fajta és jelleg, , valamint minősített intenzitás vagy a repülőtérhez való közelség fogalmakban kell megadni, amelyik a megfelelő.

4.4.2.3 **Ajánlás. –** *Helyi rendszeres és különleges jelentésekben és METAR-ban és SPECI-ben az aktuális időjárás jelenségek következő fajtáit kell jelenteni, a megfelelő rövidítéseket és releváns kritériumokat, amelyik a megfelelő, használva:*

a) Csapadék

Szitálás	*DZ*
Eső	*RA*
Hó	*SN*
Hódara	*SG*
Jéglabdacsok	*PL*
Jégkristályok (nagyon apró jégkristályok lebegésben, gyémántporként is ismert)	*IC*
– Csak akkor kell jelenteni, ha a hozzá kapcsolódó látás 5000 m vagy kevesebb.	
Jégeső	*GR*
– Akkor jelentendő, ha a legnagyobb jégszemek átmérője 5 mm, vagy ennél nagyobb.	
Kisméretű jég és/vagy hódara	*GS*
– Akkor jelentendő, ha a legnagyobb szemek átmérője 5 mm-nél kisebb.	

b) Homályosságok (hidrometeorok)

Köd	*FG*
– Akkor jelentendő, ha a látástávolság 1000 m alatt van, kivéve azokat az eseteket, amikor „MI”, „BC”, „PR”, vagy „VC”-nek van minősítve (lásd 4.4.2.5 és 44.2.6. pontokat).	
Párásság	*BR*
– Akkor jelölendő, ha a látástávolság legalább 1000 m, de nem több, mint 5000 m.	

c) Homályosság (litometeorok)

A következők csak akkor használandók, ha a homályosság túlnyomórészt litometeorokból áll és a látástávolság 5000 m, vagy annál kisebb, kivéve az „SA”-t, ha azt „DR”(lásd 4.4.2.5)és vulkanikus hamu kvalifikálja

Homok	*SA*
Por (nagy kiterjedésű)	*DU*
Homály	*HZ*
Füst	*FU*
Vulkanikus hamu	*VA*

d) Egyéb jelenségek

Por/homok forgatag (dust devils)	*PO*
Szélroham	*SQ*
Tölcsérfelhő (tornádó vagy víztölcsér)	*FC*
Porvihar	*DS*
Homokvihar	*SS*

4.4.2.4 **Ajánlás** – *Automatizált METAR-ban és SPECI-ben,a 4.4.2.3 a) pont alatt felsorolt csapadék fajták mellett z UP rövidítést kell használni nem-azonosított csapadéknál, amikor a csapadék fajtája automatikus megfigyelő rendszerrel nem lehet azonosítani.*
4.4.2.5 **Ajánlás.** – *Helyi rendszeres és különleges jelentésekben és METAR-ban és SPECI-ben az aktuális időjárás jelenségek következő jellemzőit, ahogyan szükséges, kell jelenteni, a megfelelő rövidítéseiket és releváns kritériumaikat, amelyik alkalmas, használva:*

Zivatar	*TS*
–Csapadékkal kísért zivatar jelentésére használják, az A3-1 és A3-2 táblázatokban bemutatott mintáknak megfelelően. Ha mennydörgést hallani, vagy villámlást látnia repülőtéren a megfigyelést megelőző 10 perces időszakon belül, a „TS” rövidítést kell használni, minősítés nélkül.	
Zápor	*SH*
– Használatos záporesők jelentésére az A3-1 és az A3-2 táblázatokban bemutatott mintáknak megfelelően. A repülőtér környezetében észlelt záport (lásd 4.4.2.6. pont) „VCSH”-ként kell jelenteni, a csapadék típusának vagy intenzitásának minősítése nélkül;	
Ónos eső	*FZ*
Túlhűlt vízcseppek, vagy csapadék, az aktuális időjárás jelenségek fajtájánál használják az A3-1 és az A3-2 táblázatokban bemutatott mintáknak megfelelően	
Fúvás	*BL*
–Használatos az A3-1 és az A3-2 táblázatokban bemutatott mintáknak megfelelően a föld felett 2 m-ren, (6 láb) vagy annál magasabban fúvó szél által előidézett aktuális időjárás jelenség fajtáinál.	
Talajközeli fúvás	*DR*
--Használatos az A3-1 és az A3-2 táblázatokban bemutatott mintáknak megfelelően szél által a föld feletti 2 m-t (6 láb) el nem érő magasságban fúvó szél által előidézett aktuális időjárás jelenség fajtáinál	
Sekély	*MI*
--A földfelszínhez képest 2 m-nél (6 láb) alacsonyabb	
Foltok	*BC*
–Ködfoltok, amelyek a repülőteret véletlenszerűen elszórva borítják.	
Részleges	*PR*
–A repülőtér számottevő részét köd borítja, míg a többi rész tiszta.	

4.4.2.6 **Ajánlás.** – *Helyi rendszeres és különleges jelentésekben és METAR-ban és SPECI-ben jelentett aktuális időjárási jelenség intenzitásának, illetve a repülőtérhez való közelségének, ahogy alkalmas, jelölésére az alábbiak szolgálnak:*

	(helyi rendszeres és különleges jelentések)	*(METAR és SPECI)*
Gyenge	*FBL*	*–*
Közepes	*MOD*	*(nincs jelölés)*
Erős	*HVY*	*+*

az aktuális időjárás jelenségekkel használatos az A3-1és az A3-2 táblázatokban bemutatott mintáknak megfelelően. A gyenge intenzitást csak csapadékként kell jelölni.

Környék *VC*

– Közelitőleg a repülőtér referencia pontjának 8 és 16 km-e közötl, és csak METAR-ban és SPECI-benaktuális időjárásnál az A3-2 táblázatban bemutatótt mintának megfelelően használatos, amikor 4.4.2.5. pont alatt nem jelentették.

4.4.2.7 **Ajánlás**. – *Helyi rendszeres és különleges jelentésekbenés METAR-ban vagy SPECI-ben:*

a) egy vagy több, maximum három, a 4.4.2.3 és 4.4.2.4 pontban megadott rövidítést kell szükség szerint használni, ahol alkalmas, a jelenség jellegének és intenzitásának vagy repülőtéri közelségének jelzésével együtt, úgy, hogy a repülési műveletek számára jelentőséggel bíró aktuális időjárásról komplett leírást adjon;
b) az intenzitás vagy a repülőtéri közelség jelölése kerüljön az első helyre, ahogy megfelelő, ezt kövesse az időjárási jelenség jellege és fajtája; és
c) ha két különböző fajtájú időjárást észlelnek, ezt két különálló csoportban kell jelenteni, ahol az intenzitás vagy repülőtér közelség jelölés arra az időjárási jelenségre utal, amelyik a jelölést követi. Az észlelés időpontjában előforduló többféle csapadék fajtát viszont egyetlen csoportban kell jelenteni, a domináns csapadékfajta jelentésével az első helyen, ezt csak egy intenzitásjelző előzi meg, amely a teljes csapadék-intenzitást jelöli.

4.5 Felhők

4.5.1 Elhelyezés
Ajánlás – *Ha a felhő mennyiség és felhőalap magasság mérésére műszerezett rendszert használnak, reprezentatív észleléseket kell nyerni megfelelően elhelyezett érzékelők használatával. Helyi rendszeres és különleges jelentéseknél precíziós megközelítéses futópályákkal rendelkező repülőterek esetén, a felhő mennyiség és felhőalap magasság érzékelőket úgy kell elhelyezni, hogy a felhőalap magasság és felhő mennyiség lehető legjobb jelzését adja a műszeres leszállító rendszer középső rádió jeladójánál, vagy olyan repülőtereknél, ahol középső rádió jeladót nem használnak, 900-1200 m (3000-4000 láb) távolságra a leszállási küszöbtől a futópálya megközelítési végénél.*
Megjegyzés. – Műszeres leszállító rendszer középső jeladó helyének specifikációi a 10. Annex 1. Kötet 3. fejezetben és a C Melléklet C-5 táblázatában vannak meg adva.
4.5.2 Kijelző
Ajánlás. – *Ha a felhőalap mérésére automatizált berendezést használnak, a felhőalap magasság kijelző(ke)t a megfelelő légiforgalmi szolgálati egységeknél lévő kijelző(k)höz kapcsolódó meteorológiai állomáson kell elhelyezni. A meteorológiai állomáson és a légiforgalmi szolgálati egységeknél lévő kijelzőknek ugyanahhoz az érzékelőhöz kell tartozniuk, és ahol különálló érzékelők szükségesek, ahogyan a 4.5.1 pontban le van írva, a kijelzőknek világosan azonosítani kell az egyes érzékelők által figyelt területet.*
4.5.3 Referencia szint
Ajánlás – *A felhőalap magasságot általában a repülőtér közepes tengerszint feletti magassága felettiként kell jelenteni. Ha olyan precíziós megközelítéses futópálya van használatban, amelynek 15 m-el (50 láb) vagy többel a repülőtér közepes tengerszint feletti magassága alatti küszöbmagassága van, helyi megállapodást kell kötni arról, hogy az érkező légijárműveknek jelentett felhőalap a küszöbmagasságra vonatkozzon. Tengeren lévő partközeli szerkezetekről kiadott jelentések esetében a felhőalap magasságot a közepes tengerszint felettiként kell megadni.*
4.5.4 Jelentés
4.5.4.1 Helyi rendszeres és különleges jelentésekben és METAR-ban és SPECI-ben a felhőalap magasságát 30 m-es lépcsőkben kell megadni 3000 m-ig (10000 láb). Bármely észlelt értéket, amelyik nem illeszkedik a használt jelentési skálához, a skála legközelebbi alacsonyabb lépcsőjére kell lekerekíteni.
4.5.4.2 **Ajánlás** – *Helyi rendszeres és különleges jelentésekben és METAR-ban és SPECI-ben:*
a) felhőmennyiséget a „FEW" (1-től 2 oktáig), „SCT" (3-tól 4 oktáig), „BKN" (5-től 7 oktáig) vagy „OVC" (8 okta) rövidítéseket használva kell jelenteni;
b) cumulonimbus felhőket és tornyosuló cumulus felhőket „CB" és „TCU" rövidítésekkel kell jelenteni;
c) a függőleges látást 30 m-es (100 láb) lépcsőkben kell jelenteni 600 m-ig (2000 láb);
d) ha nincs az üzemeltetés szempontjából jelentőséggel bíró felhő, és nincs korlát a függőleges látásban, és a „CAVOK" rövidítés nem megfelelő, az „NSC" rövidítést kell használni;

e) ha több, üzemeltetés szempontjából szignifikáns felhőréteget vagy felhőtömeget észleltek, mennyiségüket és felhőalap magasságukat a felhőalap magasság növekvő sorrendjében, és a következő kritériumoknak megfelelően kell jelenteni:
1) mennyiségre való tekintet nélkül, a legalacsonyabb réteg vagy tömeg, melyet megfelelően FEW, SCT, BKN, vagy OVC-ként kell jelenteni, amelyik megfelelő;
2) a következő réteg vagy tömeg, amely az égboltnak több mint 2/8 részét borítja, melyet megfelelően SCT, BKN, vagy OVC-ként kell jelenteni;
3) a következő magasabb réteg vagy tömeg, amely az égboltnak több, mint 4/8 részét borítja, melyet megfelelően BKN, vagy OVC-ként kell jelteni; és
4) cumulonimbus és/vagy tornyos cumulus felhők, ha észleltek ilyet és nem jelentették azokat a fenti 1)-3) pontokban.
f) ha a felhőalap kusza vagy egyenetlen, vagy gyorsan ingadozik, a felhőalap minimális magasságát, vagy felhőfoszlányokat kell jelenteni; és
g) ha egy egyedi felhőréteg (felhőtömeg) cumulonimbusszal és tornyosuló cumulus felhőkkel együtt van, a felhőfajtát csak mint cumulonimbust kell jelenteni.
Megjegyzés. – Tornyosuló cumulus nagy függőleges kiterjedésű cumulus congestust jelöl.
4.5.4.3 Helyi rendszeres és különleges jelentésekben:
a) a felhőalap magasság és a függőleges látás vonatkozó mértékegységeit jelölni kell; és
b) ha egynél több futópálya van használatban, és a felhőalap magasságokat ezekre a futópályákra műszerekkel figyelik, a rendelkezésre álló felhőalap magasságokat az egyes futópályákra vonatkozóan kell jelenteni, és a futópályát, amelyre az értékek vonatkoznak, meg kell jelölni.
4.5.4.4 **Ajánlás. –** *A automatizált METAR-ban és SPECI-ben:*
a) amikor a felhőfajtát nem lehet automatikus megfigyelő rendszerrel figyelni, a felhőtípust minden felhőcsoportban „///” jellel kell helyettesíteni;
b) ha nincs automatikus megfigyelő rendszerrel észlelt fefelhő, ezt az „NCD” rövidítés felhasználásával kell jelezni; és
c) ha cumulonimbus felhőket, vagytornyos cumulus felhőket automatikus megfigyelő rendszerrel észlelnek, és a felhő mennyiséget ésa felhőalap magasságot nem lehet észlelni, a felhő mennyiséget és a felhőalap magasságot „//////” jellel kell helyettesíteni.

4.6 Levegő hőmérséklet és harmatpont hőmérséklet

4.6.1 Kijelző
Ajánlás. – *Ha a levegő hőmérséklet és harmatpont hőmérséklet mérésére automatizált berendezést használnak, a levegő hőmérséklet és harmatpont hőmérséklet kijelzőket a megfelelő légiforgalmi szolgálati egységeknél lévő kijelző(k)höz kapcsolódó meteorológiai állomáson kell elhelyezni. A meteorológiai állomáson és a légiforgalmi szolgálati egységeknél lévő kijelzőknek ugyanahhoz az érzékelőkhöz kell tartozniuk.*
4.6.2 Jelentés
4.6.2.1 Helyi rendszeres és különleges jelentésekben és METAR-ban és SPECI-ben a levegő hőmérsékletet és a harmatpont hőmérsékletet egész Celsius fok lépcsőkben kell jelenteni. Azokat az észlelt értékeket, amelyek nem illeszkednek a használt jelentő skálához, a legközelebbi egész Celsius fokra kell kerekíteni, ha az észlelt érték 0,5° végződésű, akkor a legközelebbi nagyobb egész Celsius fokra kell kerekíteni.
4.6.2.2 Helyi rendszeres és különleges jelentésekben és METAR-ban és SPECI-ben 0°C alatti hőmérsékletet azonosítani kell.

4.7 Atmoszférikus nyomás

4.7.1 Kijelző
Amikor nyomásmérésre automatizált berendezéseket használnak, a barométerrel kapcsolódó QNH és a 4.7.3.2 b) ponttal összhangban szükséges QFE kijelzőket a meteorológiai állomáson kell elhelyezni, összekötve a megfelelő légiforgalmi szolgáltató egységekben lévő kijelzőkkel. Ha a QFE értékek kijelzése

egynél több futópályára vonatkozóan történik, ahogyan az a 4.7.3.2 d) pontban le van írva, a kijelzőket világosan meg kell jelölni, hogy a futópálya, amelyre a kijelzett QFE érték vonatkozik, azonosítható legyen.

4.7.2 Referencia szint

Ajánlás. – *A QFE kiszámításához a vonatkozási szint a repülőtér tengerszint feletti magassága legyen. Nem-precíziós megközelítésű futópályáknál, amelyek küszöbje 2 méterrel (7 lábbal) vagy többel a repülőtér tengerszint feletti magassága alatt van, és a precíziós megközelítésű futópályáknál, a QFE-t, ha szükséges, a megfelelő küszöb tengerszint feletti magasságra vonatkoztatva kell megadni.*

4.7.3 Jelentés

4.7.3.1 Helyi rendszeres és különleges jelentéseknél és METAR-ban és SPECI-ben QNH-t és QFE-t tized hektopascalban kell számolni, és egész hektopascalos lépcsőkben kell jelenteni, négy számjegyet használva. Azokat az észlelt értékeket, amelyek nem illeszkednek a használt jelentő skálához, a legközelebbi kisebb egész hektopascalra kell kerekíteni.

4.7.3.2 Helyi rendszeres és különleges jelentésekben:

a) QNH-nak szerepelni kell;

b) QFE-nek szerepelni kell, ha az üzemeltetők igénylik, vagy ha a légiforgalmi szolgáltatási hatóságok és az érdekelt üzemeltetők között helyileg ilyen megállapodás van, reguláris alapon;

c) a QNH és QFE értékek mérésénél használt mértékegységeknek szerepelni kell; és

d) ha a QFE értékeket egynél több futópályára igénylik, az igényelt QFE értékeket az egyes futópályákra jelenteni kell, és a futópályákat, amelyekre az értékek vonatkoznak, meg kell jelölni.

4.7.3.3 METAR-ban és SPECI-ben csak a QNH értékeket kell szerepeltetni.

4.8 Kiegészítő információk

4.8.1 Jelentés

4.8.1.1 **Ajánlás**. – *Helyi rendszeres és különleges jelentésekben és METAR-ban és SPECI-ben az alább felsorolt legutóbbi időjárás jelenségeket, azaz azokat, amelyeket a repülőtéren az utolsó kiadott rendszeres jelentés óta eltelt időszak során, vagy az utolsó egy órában, amelyik a rövidebb, de nem a megfigyelés időpontjában észleltek, maximálisan három csoportot, az A3-1 és A3-2 táblázaban közölt mintának megfelelően a kiegészítő információban jelenteni kell:*

– ónos csapadék

– mérsékelt vagy heves csapadék (beleértve a záporokat)

– hófúvás

– porvihar, homokvihar

– zivatar

– tölcsér felhő (tornádó vagy víztölcsér)

– vulkanikus hamu

4.8.1.2 **Ajánlás. –** *Helyi rendszeres és különleges jelentésekben a következő szignifikáns meteorológiai viszonyokat, vagy ezek kombinációit kell kiegészítő információként jelenteni:*

– cumulonimbus felhők	*CB*
– zivatar	*TS*
– mérsékelt vagy heves turbulencia	*MOD TURB, SEV TURB*
– szélnyírás	*WS*
– jégeső	*GR*
– heves szélvihar vonal	*SEV SQL*
– mérsékelt vagy erős jegesedés	*MOD ICE, SEV ICE*
– ónos csapadék	*FZDZ, FZRA*
– erős hegyi hullám	*SEV MTW*
– porvihar, homokvihar	*DS, SS*

– hófúvás *BLSN*
– tölcsérfelhő (tornádó vagy víztölcsér) *FC.*
A meteorológiai körülmény helyét jelölni kell. Ahol szükséges, kiegészítő információkat kell bevinni, rövidített köznyelvet használva.
4.8.1.3 **Ajánlás. –** *Automatizált METAR-ban és SPECI-ben a 4.8.1.1 pontban felsorolt legutolsó időjárás jelenségek mellett, a legutolsó ismeretlen csapadékot jelenteni kell, az A3-2 táblázatban bemutatott mintának megfelelően, amikor a csapadék fajtát az automatikus megfigyelő rendszer nem tudja azonosítani.*
4.8.1.4 **Ajánlás. –** *METAR-ban és SPECI-ben, ahol a helyi körülmények így indokolják, szélnyírás információkat kell adni.*

Megjegyzés. – A 4.8.1.4 pontban hivatkozott helyi körülmények, bár nem korlátozódnak szükségszerűen egy nem átmeneti jellegű szélnyírásra, például kapcsolódhatnak alacsonyszinti hőmérséklet inverzióhoz vagy helyi terepviszonyokhoz.
4.8.1.5 **Ajánlás. –** *METAR-ban és SPECI-ben a következő információknak kell szerepelni a kiegészítő információk között, a regionális léginavigációs egyezménynek megfelelően:*
a) tengeren partközelben emelt építményeken létesített, repülésmeteorológiai állomásoktól származó, a tengerszinti hőmérsékletre és a tenger állapotára vonatkozó információk a helikopteres üzemelések támogatására; és
b) a megfelelő repülőtéri hatóság által szolgáltatott, a futópálya állapotára vonatkozó információk.
1. Megjegyzés. – A tenger állapota a WMO 306 számú kiadványában, Kód kézikönyv (Manual on Codes), *1.1 kötet, A Rész – Alfanumerikus kódok, 3700-es kód táblázat van specifikálva.*
2. Megjegyzés. –A tenger állapota a WMO 306 számú kiadványában, Kód kézikönyv (Manual on Codes), *1.1 kötet, A Rész – Alfanumerikus kódok, 0366, 0519, 0919 és 1079 kód táblázatok van specifikálva.*

A3-1 táblázat. Minta helyi rendszeres (MET REPORT) és helyi különleges (SPECIAL) jelentésekhez

Kulcs: M = kötelező bevitel, minden közlemény része
C = feltételes bevitel, meteorológiai körülményektől függ
O = fakultatív bevitel
1. Megjegyzés. –A helyi rendszeres és különleges jelentésekben szereplő számszerű elemek nagyságrendje és felbontása jelen Függelék A3-4 táblázatban látható
2. Megjegyzés. – A rövidítések magyarázata a Procedures for Air Navigation Services – ICAO Abbreviations and Codes (Léginavigációs szolgálati eljárások – ICAO rövidítések és kódok) *(PANS-ABC, Doc 8400) kiadványban található.*

<table>
<tr><th>A 4. Fejezetben meghatározottak szerinti elem</th><th>Részletes tartalom</th><th colspan="3">Minta (Minták)</th><th>Példák</th></tr>
<tr><td>A jelentés típusának azonosítása (M)</td><td>A jelentés típusa</td><td colspan="3">MET REPORT vagy SPECIAL</td><td>MET REPORT</td></tr>
<tr><td>Hely jelzése (M)</td><td>ICAO hely jelzés (M)</td><td colspan="3">nnnn</td><td>YUDO[1]</td></tr>
<tr><td>A megfigyelés időpontja (M)</td><td>A megfigyelés dátuma és aktuális időpontja UTC</td><td colspan="3">nnnnnnZ</td><td>221630Z</td></tr>
<tr><td>Talajszél (M)</td><td>Az elem neve (M)</td><td colspan="3">WIND</td><td rowspan="4">WIND 240/15KMH
(WIND 240/8KT)
WIND RWY 18
TDZ 190/22KMH
(WIND RWY 18
TDZ 19*0/11KT)</td></tr>
<tr><td rowspan="3"></td><td>Futópálya (O)[2]</td><td colspan="3">RWY nn[L] vagy RWY nn[C] vagy RWYnn[R]</td></tr>
<tr><td>Futópálya szakasz (O[3])</td><td colspan="3">TDZ</td></tr>
<tr><td>Szélirány (M)</td><td>nnn/</td><td>VRB BTN nnn/ AND nnn/
vagy
VRB</td><td>C
A
L</td></tr>
</table>

	Szélsebesség(M)	[ABV] n[n][n]KMH (*vagy* [ABV] n[n]KT)		M	WIND VRB4KMH WIND CALM (WIND VRB2KT) WIND VRB BTN 350/ AND 050/4KMH (WIND VRB BTN 350/AND 050/2KT) WIND 270/ABV 199KMH (WIND 270/ABV 99KT) WIND 120/12KMH MAX35 MNM8 (WIND 120/6KT MAX18 MNM4) WIND 020/20KMH VRB BTN 350/AND 070/ (WIND 020/10KT VRB BTN 350/AND 070/) WIND RWY 14R MID 140/22KMH WIND RWY 14R MID 140/11KT)
	Szignifikáns sebességváltozások (C)[4]	MAX [ABV] nn [n] MNM n [n]			
	Szignifikáns irányváltozások (C)[5]	VRB BTN nnn/ AND nnn/	–		
	Futópálya szakasz (O[3])	MID			
	Szélirány (O)[3]	nnn/	VRB BTN nnn/ AND nnn/ *vagy* VRB	C A L M	
	Szélsebesség (O)[3]	[ABV] n[n][n]KMH (*vagy* [ABV]n[n]KT)			
	Szignifikáns sebességváltozások (C)[4]	MAX [ABV] nn[n] MNM n [n]KT			
	Szignifikáns irányváltozások (C)[5]	VRB BTN nnn/ AND nnn/	–		
	Futópálya szakasz (O[3])	END			WIND RWY 27 TDZ 240/32KMH MAX54 MNM20 END 250/28KMH (WIND RWY 27 TDZ 240/16KT MAX54 MNM20 END 250/14KT)
	Szélirány (O)[3]	nnn/	VRB BTN nnn/ AND nnn/ *vagy* VRB	C A L M	
	Szélsebesség (O)[3]	[ABV] n[n][n]KMH (*vagy* [ABV]n[n]KT)			
	Szignifikáns sebességváltozások (C)[4]	MAX [VRB BTN nnn/ AND nnn/ABV] nn[n] MNM n [n]			
	Szignifikáns irányváltozások (C)[5]	VRB BTN nnn/ AND nnn/	–		
Látás (M)	Az elem neve (M)	VIS		C A V O K	VIS 350M CAVOK VIS 7KM VIS 10KM VIS RWY 09 TDZ 800M END 1200M VIS RWY 18 TDZ 6KM RWY 27 TDZ 4000M
	Futópálya(O)[2]	RWY nn[L] *vagy* RWY nn[C] *vagy* RWYnn[R]			
	Futópálya szakasz(O)[3]	TDZ			
	Látás(M)	nn[n][n]M *vagy* n[n]KM			
	Futópálya szakasz (O)[3]	MID			
	Látás(O)[3]	nn[n][n]M *vagy* n[n]KM			
	Futópálya szakasz(O)[3]	END			
	Látás(O)[3]	nn[n][n]M *vagy* n[n]KM			
RVR (C)[6]	Elem neve (M)	RVR			RVR RWY 32 400M RVR RWY 20
	Futópálya (C)[7]	RWY nn[L] *vagy* RWY nn[C] *vagy* RWYnn[R]			

	Futópálya szakasz (C)[8]	TDZ				1600M
	RVR (M)	[ABV *vagy* BLW] nn[n][n]M				RVR RWY 10L BLW 50M RVR RWY 14 ABW 2000M RVR RWY 10BLW 150M RVR RWY 12 ABW1200M RVR RWY 12 TDZ 1100M MID ABV 1400M
	Futópálya szekció (C)[8]	MID				
	RVR (C)[8]	[ABV *vagy* BLW] nn[n][n]M				
	Futópálya szakasz (C)[8]	MID				RVR RWY 16 TDZ 1100M MID ABV 1400M
	RVR (C)[8]	[ABV *vagy* BLW] nn[n][n]M				
	Futópálya szakasz (C)[8]	END				
	RVR (C)[8]	[ABV *vagy* BLW] nn[n][n]M				RVR RWY 16 TDZ 600M MID 500M END 400M RVR RWY 26 500M RWY 20 800M
Aktuális időjárás (C)[9,10]	Aktuális időjárás intenzitása (C)[9]	FBL *vagy* MOD *vagy* HVY	–			
	Aktuális időjárás jellemzői és fajtája (C)[9,11]	DZ *vagy* RA *vagy* SN *vagy* SG *vagy* PL *vagy* DS *vagy* SS *vagy* FZDZ *vagy* FZRA *vagy* SHGR *vagy* SHGS *vagy* SHRA *vagy* SHSN *vagy* TSGR *vagy* TSGS *vagy* TSPL *vagy* TSRA *vagy* TSSN *vagy*	IC *vagy* FG*vagy* BR *vagy* SA *vagy* DU *vagy* HZ *vagy* FU *vagy* VA *vagy* SQ *vagy* PO *vagy* FC *vagy* TS *vagy* BCFG *vagy* BLDU *vagy* BLSA *vagy* BLSN *vagy* DRDU *vagy* DRSA *vagy* DRSN *vagy* FZFG *vagy* MIFG *vagy* PRFG			MOD RA HZ HVY TSRA FG HVY DZ VA FBL SN MIFG HVY TSRASN FBL SNRA FBL DZ FG HVY SHSN BLSN
Felhő (M)[12]	Az elem neve (M)	CLD				
	Futópálya (O)[2]	RWY nn[L] *vagy* RWY nn[C] *vagy* RWYnn[R]				CLD NSC
	Felhőmennyiség (M) *vagy* függőleges látás (O)[9]		OBSC	NSC		CLD SCT 300M OVC 600M (CLD SCT 1000FT OVC 2000 FT)
	Felhőfajta (C)[9]	CB *vagy* TCU	–			

	Felhőalap magas-sága vagy afüggőleges látás értéke (C)[9]	nn[n][n]M (*vagy*.nnn[n]FT)	[VERVIS nnn[n]M *vagy* VER VIS nnn[n]FT)]			CLD OBSC VER VIS 150M (CLD OBSC VER VIS 500M) CLD BKN TCU 270M (CLD BKN TCU 900FT) CLD RWY 08 BKN 60M RWY 26 BKN 90M (CLD RWY 08 BKN 200FT RWY 26 BKN 300FT)
Levegőhőmérséklet (M)	Az elem neve	T				T17 TMS08
	Levegőhőmérséklet (M)	[MS]nn				
Harmatpont hő-mérséklet (M)	Az elem neve	DP				DP15 DPMS18
	Harmatpont hő-mérséklet (M)	[MS]nn				
Nyomásértékek (M)	Az elem neve(M)	QNH				QNH 0995HPA QNH 1009HPA QNH 1022HPA QFE 1001HPA QNH 0987HPA QFE RWY 18 0956HPA RWY 24 0955HPA
	QNH (M)	nnnnHPA				
	Az elem neve (O)	QFE				
	QFE (O)	[RWY nn[L] *vagy* RWY nn[C] *vagy* RWY nn[R]] nnnnHPA [RWY nn[L] *vagy* RWY nn[C] *vagy* RWY nn[R] nnnnHPA]				
Kiegészítő infor-mációk (C)[9]	Signifikáns meteo-rológiai jelenségek (C)[9]	CB *vagy* TS *vagy* MOD TURB *vagy* SEV TURB *vagy* WS *vagy* GR *vagy* SEV SOL *vagy* MOD ICE *vagy* SEV ICE *vagy* FZDZ *vagy* FZRA*vagy* SEV MTW *vagy* SS *vagy* DS *vagy* BLSN *vagy* FC[13]				FC IN APCH WS IN APCH 60M-WIND: 360/50KMH WS RWY 12
	A jelenség helye (C)[9]	IN APCH [nnnM-WIND nnn/nnKMH] *vagy* IN CLIMB_OUT [nnnM-WIND nnn/nnKMH] (IN APCH [nnnFT-WIND nnn/nnKT] *vagy* IN CLIMB-OUT [nnnFT-Wind nnn/nnKT] *vagy* RWY nn[n]				
	Legutóbbi idő-járás (C)[9,10]	REFZDZ *vagy* REFZRA *vagy* REDZ *vagy* RE[SH]RA *vagy* RERASN *vagy* RE[SH]SN *vagy* RESG *vagy* RESHGR *vagy* RESHGS *vagy* REBLSN *vagy* RESS *vagy* REDS *vagy* RETSRA *vagy* RETSSN *vagy* RETSGR *vagy* RETSGS *vagy* REFC *vagy* REPL *vagy* REVA *vagy* RETS				REFZRA CB IN CLIMB OUT RETSRA
Trend előrejelzés O)[14]	Az elem neve (M)	TREND				TREND NOSIG TREND BECMG FEW 600M (TREND BECMG FEW 2000FT)
	Változás jelző (M)[15]	NOSIG	BECMG *vagy* TEMPO			
	A változás periodusa (C)[9]		FMnnnn *és/vagy* TLnnnn *vagy* ATnnnn			

<table>
<tr><td rowspan="3"></td><td>Szél (C)[9]</td><td rowspan="3"></td><td colspan="4">nnn/ [ABV] n[n][n]KMH [MAX[ABV] nn [n]]
(vagy nnn/ [ABV] n[n]KT [MAX[ABV] nn])</td><td rowspan="3">TREND TEMPO
250/750KMH MAX
100
(TREND TEMPO
250/35KT MAX 50)
TREND BECMG
AT1800 VIS 10
NSW
TREND BECMG
TL1700 VÍS 800M
FG
TREND BECMG
FM1030 TL1130
CAVOK
TREND TEMPO
TL1200 VIS 600M
BECMG
AT 1230 VIS 8KM
NSW NSC

TREND TEMPO
FM 0300 TL0430
MOD FZRA
TREND BECMG
FM1900 VIS 500M
HVY SNRA
TREND BECMG
FM1100 MOD SN
TEMPO FM1130
BLSN</td></tr>
<tr><td>Látás (C)[9]</td><td colspan="3">VIS nn[n][n]M vagyVISn[n]KM</td><td rowspan="2">CAVOK</td></tr>
<tr><td>Időjárás jelenség:
intenzitás (C)[9]</td><td>FBL vagy
MOD
vagy
HVY</td><td>–</td><td>NSW</td></tr>
</table>

	Időjárás jelenség: jellemzők és fajta (C)[9,10,12]		DZ *vagy* RA *vagy* SN *vagy* SG *vagy* PL *vagy* DS *vagy* SS *vagy* FZDZ *vagy* FZRA *vagy* SHGR *vagy* SHGS *vagy* SHRA *vagy* SHSN *vagy* TSGR *vagy* TSGS *vagy* TSPL *vagy* TSRA *vagy* TSSN	IC *vagy* FG*vagy* BR *vagy* SA *vagy* DU *vagy* HZ *vagy* FU *vagy* VA *vagy* SQ *vagy* PO *vagy* FC *vagy* TS *vagy* BCFG *vagy* BLDU *vagy* BLSA *vagy* BLSN *vagy* DRDU *vagy* DRSA *vagy* DRSN *vagy* FZFG *vagy* MIFG *vagy* PRFG			TREND BECMG AT1130 CLD OVC 300M (TREND BECMG AT1130 OVC 1000FT) TREND TEMPO TL1530 HVY SHRA CLD BKN CB 360M (TREND TEMPO TL1530 HVY SHRA CLD BKN CB 1200FT)
	Az elem neve (C)[9]		CLD				
	Felhő mennyiség és függőleges látás (C)[9]		FEW *vagy* SCT *vagy* BKN *vagy* OVC	OBSC	NSC		
	Felhőfajta (C)[9]		CB *vagy* TCU	–			
	A felhőalap magassága vagy a függőleges látás értéke (C)[9]		nn[n][n]M (*vagy* nnn[n]FT)	[VERVIS nn[n]M (*vagy*) VERVIS nnn[n]FT)]			

Megjegyzések.–

1. Fiktív hely.
2. Fakultatív értékek egy vagy több futópályára.C)
3. Fakultatív értékek a futópálya egy vagy két szektorára.
4. Tartalmazni kell a 4.1.5.2 c) pontnak megfelelően.
5. Tartalmazni kell a 4.1.5.2 b) 1) pontnak megfelelően.
6. Tartalmazni kell, ha a látás vagy futópálya látástávolság < 1500 m.
7. Tartalmazni kell a 4.3.6.4 d) pontnak megfelelően
8. Tartalmazni kell a 4.3.6.4 c) pontnak megfelelően.
9. Tartalmazni kell, ha odavonatkozik.
10. Egy vagy több, maximum három csoport 4.4.2.7 a), 4.8.1.1és az 5. Függelék 2.2.4.3 pontjának megfelelően
11. A 4.4.2.3 a) pont alatt felsorolt csapadék fajták kombinálhatók a 4.4.2.7 és az 5. Függelék 2.2.4.2 pontjának megfelelően. Csak mérsékelt vagy heves csapadékot kell jelezni trend előrejelzésekben az 5. Függelék 2.2 4.2 pontjának megfelelően.
12. Maximálisan négy felhőréteg a 4.5.4.2e) pontnak megfelelően.

13. Rövidített köznyelv használható a 4.8.1.2 pontnak megfelelően
14. Tartalmazni kell a 6. Fejezet 6.3.2 pontnak megfelelően
15. A változás jelzők számát minimumon kell tartani az 5. Függelék 2.2.1 szakaszának megfelelően, általában három csoportot nem halad meg.

A3-2 táblázat. Minta METAR-ra és SPECI-re
Kulcs: M = kötelező bevitel, minden közlemény része
C = feltételes bevitel meteorológiai körülményektől függ
O = fakultatív bevitel
1. Megjegyzés. – 1. Megjegyzés. – A METAR-ban és SPECI-ben szereplő numerikus elemek nagyságrendje és felbontása jelen Függelék A3-5 táblázatban látható
2. Megjegyzés. – A rövidítések magyarázata a Procedures for Air Navigation Services – ICAO Abbreviations and Codes (Léginavigációs szolgálati eljárások – ICAO rövidítések és kódok) *(PANS-ABC, Doc 8400).*

A 4. fejezetben meghatározottak szerinti elem	*Részletes tartalom*	*Minta (Minták*			*Példák*
A jelentés típusának azonosítása	A jelentés típusa (M)	METAR, METAR COR, SPECI *vagy* SPECI COR			METAR METAR COR SPECI
Hely jelzés (M)	ICAO hely jelzés (M)	nnnn			YUDO[1]
A megfigyelés időpontja (M)	A megfigyelés dátuma és időpontja UTC	nnnnnnZ			221630Z
Automatizált vagy hiányzó jelentés azonosítása (C)[2]	Automatizált vagy hiányzó jelentés azonosító (C)	AUTO *vagy* NIL			AUTO NIL
A METAR VÉGE HA JELENTÉS HIÁNYZIK					
Talajszél (M)	Szélirány (M)	nnn	VRB		24015KMH VRB04KMH (24008KT) (VRB02KT) 19000KMH (19011KT) 00000KMH (00000KT) 140P199KMH (140P99KT)
	Szélsebesség (M)	[P]nn[n]			
	Jelentős sebesség változások (C)[3]	G[P]nn[n]			12012G35KMH (12006G18KT) 24032G54KMH (24016G27KT)
	Mértékegységek (M)	KMH (or KT)			
	Jelentős irányváltozások (C)[4]	nnnVnnn	–		02020KMH 350V070 (02010KT 350V070
Látás (M)	Domináns vagy minimális látás (M)[5]	nnnn		C A V O K	0350 7000NDV 9999
	Egyirányú látás (C)[6]	NDV			0800
	Minimális látás (C)[7]	nnnn			2000 1200NW 6000 2800E
	Minimális látás iránya (C)[7]	N *vagy* NE *vagy* SE *vagy*S *vagy*SW *vagy*W *vagy*NW			

RVR (C)[8]	Az elem neve (M)	R				R32/0400 R12R/1700 R10/M0050 R14L/P2000 R16L0650 R16C/0500 R16R0450 R17L/0450 R20/0700V1200 R19/0350VP1200 R12/1100U R26/0550N R20/0800D R09/0375V0600U R10/M0150V0500D
	Futópálya (M)	Nn[L]/ *vagy* nn[C]/ *vagy* nn[R]/				
	RVR (M)	[P *vagy* M]nnn				
	RVR változások (C)[9]	V [P *vagy* M]nnn				
	RVR múlt tendenciái (C)[10]	U, D, *vagy* N				
Aktuális időjárás (C)[2,11]	Aktuális időjárás intenzitása vagy közelsége (C)[12]	– *vagy* +	–	VC		
	Aktuális időjárás jellemzői és fajtája (M)[13]	DZ *vagy* RA *vagy* SN *vagy* SG *vagy* PL *vagy* DS *vagy* SS *vagy* FZDZ *vagy* FZRA *vagy* FZUP[5] *vagy* SHGR *vagy* SHGS *vagy* SHRA *vagy* SHSN *vagy* SHUP *vagy* TSGR *vagy* TSGS *vagy* TSRA *vagy* TSSN *vagy* TSUP	IC *vagy* FG *vagy* BR *vagy* SA *vagy* DU *vagy* HZ *vagy* FU *vagy* VA *vagy* SQ *vagy* PO *vagy* FC *vagy* TS *vagy* BCFG *vagy* BLDU *vagy* BLSA *vagy* BLSN *vagy* DRDU *vagy* DRSA *vagy* DRSN *vagy* FZFG *vagy* MIFG *vagy* PRFG	FG *vagy* PO *vagy* FC *vagy* DS *vagy* SS *vagy* TS *vagy* SH *vagy* BLSN *vagy* BLSA *vagy* BLDU *vagy* VA		RA HZ VCFG +TSRA FG VCSH +DZ VA VCTS -SN MIFG VCBLSA +TSRASN -SNRA DZ FG +SHSN BLSN UP FZUP TSUP FZUP
Felhő (M)[14]	Felhő mennyiség és felhőalap magassága vagy függőleges látás (M)	FEWnnn *vagy* SCTnnn *vagy* BKNnnn*vagy* OVCnnn*vagy* //////[6]	VVnnn *vagy* VV///	NSC *vagy* NCD[6]		FEW015 VV005 OVC030 VV/// NSC SCT010 OVC020 BKN025/// BKN009TCUNCD SCT008 BKN025CB
	Felhőfajta (C)[2]	CB *vagy* TCU *vagy* ///[6]	–			
Levegő és harmatpont hőmérséklet (M)	Levegő és harmatpont hőmérsékletek (M)	[M]nn/[M]nn				17/10 02/M08 M01/M10
Nyomás értékek (M)	Az elem neve (M)	Q				Q0995 Q1009

	QNH (M)	nnn		Q1022 Q0987
Kiegészítő információk (C)	Legutóbbi időjárás (C) [2,11]	REFZDZ *vagy*REFZRA *vagy* RE[SH]RA *vagy* RERASN *vagy* RE[SH]SN *vagy* RESHGR *vagy* RESHGS *vagy* REBLSN *vagy* RESS*vagy* REDS *vagy* RETSRA *vagy* RETSSN *vagy* RETSGR *vagy* RETSGS *vagy* RETS *vagy* REFC *vagy* REVA *vagy* REPL *vagy* REUP[6] *vagy* REFZUP6 *vagy* RETSUP[6] *vagy*RESHUP[6]		REFZRA RETSRA
	Szélnyírás (C)[2]	WS Rnn[L] *vagy* WS Rnn[C] *vagy* WS Rnn[R] *vagy* WS ALL RWY		WS RWY03 WS ALL RWY
	Tengerfelszín hőmérséklet és a tenger állapota (C)[15]	W[M]nn/Sn		W15/S2
	Futópálya állapota (C)[16] – Futópálya jelölés (M)	Rnn[L]/*vagy* Rnn[C]/ *vagy* Rnn[R]/	R/SNOCLO	R99/421594 R/SNOCOLO R14L/CLRD//
	Futópálya állapota – Futópálya lerakódások (M)	n *vagy* /	CLRD//	
	Futópálya állapota – Futópálya szennyezés kiterjedése (M)	n *vagy* /		
	Futópálya állapota – A lerakódás mélysége (M)	nn *vagy* //		
	Futópálya állapota – Súrlódási együttható vagy fékezési művelet (M)	nn *vagy* //		
Trend előrejelzés (O)[17]	Változás indikátor (M)[18]	NOSIG	BECMG *vagy* TEMPO	NOSIG BECMG FEW020
	A változás időszaka (C)[2]		FMnnnn *és/vagy* TLnnnn *vagy* ATnnnn	
	Szél (C)[2]		nnn[P]nn[n][G[P]nn[n]]KMH (*vagy* nnn[P]nn[G[P]nn]KT)	TEMPO 25070G100KMH (TEMPO 25035G50KT)
	Domináns látás (C)[2]		nnnn; CAVO	BECMG FM1030 TL1130 CAVOK BECMG TL1700 0800 FG BECMG AT1800 9000 NSW BECMG FM1900 0500 +SNRA
	Időjárási jelenség: intenzitás (C)[12]		- *vagy* + ; – ; NS	

	Időjárási jelenség: jellemzők és fajta (C)[2,11,13]		DZ *vagy* RA *vagy* SN *vagy* SG *vagy* PL *vagy* DS *vagy* SS *vagy* FZDZ *vagy* FZRA *vagy* SHGR *vagy* SHGS *vagy* SHRA *vagy* SHSN *vagy* TSGR *vagy* TSGS *vagy* TSRA *vagy* TSSN	IC *vagy* FG *vagy* BR *vagy* SA *vagy* DU *vagy* HZ *vagy* FU *vagy* VA *vagy* SQ *vagy* PO *vagy* FC *vagy* TS *vagy* BCFG *vagy* BLDU *vagy* BLSA *vagy* BLSN *vagy* DRDU *vagy* DRSA *vagy* DRSN *vagy* FZFG *vagy* MIFG *vagy* PRFG	W	K	BECMG FM1100 SN TEMPO FM1130 BLSN TEMPO FM0330 TL 0430 FZRA
	Felhő mennyiség és felhőalap magassága vagy függőleges látás (C)[2]		FEWnnn *vagy* SCTnnn *vagy* BKNnnn*va* *vagyy* OVCnnn	VVnn *vagy* VV///	N S C		TEMPO TL1200 0600 BECMG AT1200 8000NSW NSC BECMG AT1130 OVC010 TEMPO TL1530 +SHRA BKN012CB
	Felhő fajta (C)[2]		CB *vagy* TCU	–			

Megjegyzések. –
1.Fiktív hely.
2. Tartalmazni kell, amikor alkalmazható.
3. Tartalmazni kell a 4.1.5.2 c) pontnak megfelelően.
4. Tartalmazni kell a 4.1.5.2 b) 1) pontnak megfelelően.
5. Tartalmazni kell a 4.2.4.4 b) pontnak megfelelően.
6. Csak automatizált jelentéseknél.
7. Tartalmazni kell a 4.2.4.4 a) pontnak megfelelően.
8 Tartalmazni kell, ha a látás vagy a futópálya látástávolság<1500 m maximálisan négy futópályára a 4.3.6.5 b)pontnak megfelelően.
9 Tartalmazni kell a 4.3.6.6 b) pontnak megfelelően.
10 Tartalmazni kell a 4.3.6.6 a) pontnak megfelelően
11 Egy vagy több, maximum három csoport a 4.4.2.7 a), 4.8.1.1 és az 5. Függelék 2.2.4.2 pontjának megfelelően.
12 Tartalmazni kell, amikor alkalmazható; nem minősítő *mérsékelt* intenzitás esetén a 4.4.2.6 pontnak

megfelelően.
13 A 4.4.2.3 a) pont alatt felsorolt csapadék fajták kombinálhatók a 4.4.2.7 c) és az 5. Függelék 2.2.4.2 pontjának megfelelően. Csak. mérsékelt vagy heves csapadékot kell jelezni trend előrejelzésekben az 5. Függelék 2.2 4.2 pontjának megfelelően.
14. Maximálisan négy felhőréteg a 4.5.4.2 e) pontnak megfelelően.
15. Tartalmazni kell a 4.8.1.5 a) pontnak megfelelően.
16. Tartalmazni kell a 4.8.1.5 b) pontnak megfelelően
17. Tartalmazni kell a 6. Fejezet 6.3.2 pontnak megfelelően
18. A csere indikátorok számát minimumon kell tartani az 5. Függelék 2.2.1 pontnak megfelelően; általában nem haladja meg a három csoportot.

A3-3 táblázat. Változás jelzők használata trend előrejelzésekben

Változás jelző	*Idő jelző és időszak*	*Jelentés*	
NOSIG	–	nincsenek szignifikáns változások előrejelezve	
BECMG	$FMn_1n_1n_1n_1$ $TLn_2n_2n_2n_2$	A változás az előrejelzés szerint	kezdődik $n_1n_1n_1n_1$-kor UTC és befejeződik $n_2n_2n_2n_2$-kor UTC
	TLnnnn		kezdődik a trend előrejelzési időszak kezdetén és befejeződik nnnn UTC-ig
	FMnnnn		kezdődik nnnn UTC-kor és befejeződik a trend előrejelzési időszak végén
	ATnnnn		megjelenik nnnn UTC-kor (megadott időpont)
	–		a) kezdődik a trend előrejelzési időszak kezdetén és befejeződik a trend előrejelzési időszak alatt b) az időpont bizonytalan
TEMPO	$FMn_1n_1n_1n_1$ $TLn_2n_2n_2n_2$	átmeneti ingadozás van előrejelezve	kezdődik $n_1n_1n_1n_1$ UTC -kor és megszünik $n_2n_2n_2n_2$ UTC-kor
	TLnnnn		kezdődik a trend előrejelzési időszak kezdetén és megszakad nnnn UTC-ig
	FMnnnn		kezdődik nnnn UTC-kor és megszakad a trend előrejelzési időszak végén
	–		kezdődik trend előrejelzési időszak kezdetén és megszakad a trend előrejelzési időszak alatt

A3-4 táblázat Tartományok és felbontások a helyi jelentések által tartalmazott numerikus elemeknél

A 4. Fejezet szerint specifikált elem		*Intervallum*	*Felbontás*
Futópálya:	nincs mértékegység	01–36	1
Szélirány földrajzi fok:°	true	010–360	10
Szélsebesség:	KMH	1–399*	1
	KT	1–199*	1
Látás:	M	0–800	50
	M	800–5000	100
	KM	5–10	1

Futópálya látástávolság:	M M M	0–400 400–800 800–2000	25 50 100
Függőleges látás:	M FT	0–600 0–2000	30 100
Felhő: alap magassága:	M FT	0–1500 0–5000	30 100
Levegő hőmérséklet: Harmatpont hőmérséklet:	°C	-80–+60	1
QNH; QFE	hPa	0500–1100	1
*Nincs repülési követelmény arra, hogy 200km/h (100 csomó) vagy nagyobb sebességű talajszelet jelentsenek, azonban rendeletet hoztak nem-repülési célokra szolgáló jelentések készítésére 399 km/h (199 csomó) szélsebességig, szükség szerint.			

A3-5 táblázat. Tartományok és felbontások a METAR/SPECI által tartalmazott numerikus elemeknél

A 4. Fejezet szerint specifikált elem			*Intervallum*	*Felbontás*
Futópálya		Nincsenek egységek	01–36	1
Szélirány földrajzi fok		°true	000–360	10
Szélsebesség		KMH KT	00–399* 00–199*	1 1
Látás		M M M M	0000–0800 0800–5000 5000–9000 9000–9999	50 100 1000 999
Futópálya látástávolság		M M M	0000–0400 0400–0800 0800–2000	25 50 100
Függőleges látás		30's M (100's FT)	000–020	1
Felhő: alap magassága		30's M (100's FT)	000–050	1
Levegő hőmérséklet Harmatpont hőmérséklet		°C	-80–+60	1
QNH		hPa	0850–1100	1
Tengerfelület hőmérséklete		°C	-10–+40	1
A tenger állapota		nincs mértékegység	0–9	1
A futópálya állapota	Futópálya jelölő:	nincs mértékegység	01–36; 88; 89	1
	Lerakódások a futópályán	nincs mértékegység	0–9	1
	A futópálya szennyezés mértéke	nincs mértékegység	1; 2; 5; 9	
	A lerakódás mélysége	nincs mértékegység	00–90; 92–99	1
	Súrlódási tényező/fékezés	nincs mértékegység	00–95; 99	1
*Nincs repülési követelmény arra, hogy 200km/h (100 csomó) vagy nagyobb sebességű talajszelet, azonban rendeletet hoztak 399 km/h (199 csomó) szélsebességig jelentésre nem-repülési célokra, szükség szerint.				

A3-1. példa Rendszeres jelentés

a) Helyi rendszeres jelentés (ugyanaz a hely és időjárási körülmények, mint a METAR-nál):

MET REPORT YUDO 22163Z WIND 24015KMH VIS 600M RVR RWY 12 TDZ 1000M MOD DZ FG CLD SCT 300M OVC 600M T17 DP16 QNH 1018 TREND BECMG TL1700 VIS 800M FG BECMG AT1800 VIS 10KM NSW

b) METAR YUDO-ra (Donlon Nemzetközi Repülőtér):*

METAR YUDO 221630Z 24015KMH 0600 R12/1000U FG DZ SCT010 OVC020 17/16 Q1018 BECMG TL1700 0800 FG BECMG AT1800 9999 NSW

A két jelentés értelmi jelentése:

Rendszeres jelentés Donlon Nemzetközi Repülőtérről*, amelyet a hónap 22-én 1630 UTC-kor adtak ki; talajszél irány 240 fok; szélsebesség 15 kilométer per óra; látás 600 méter; a 12-es futópálya földetérési zónáját reprezentáló futópálya látástávolság 1000 méter és a futópálya látástávolság értékei az előző 10 perc során felfelé irányuló tendenciát mutattak (az EVR tendenciát csak a METAR tartalmazza); köd és mérsékelt szitálás; szétszórt felhőzet 300 méteren; teljes borultság 600 méteren; levegő hőmérséklet 17 fok Celsius; harmatpont hőmérséklet 16 fok Celsius; QNH 1018 hektopascal; trend a következő két óra alatt: a látás 800 méterré válik ködben 1700 UTC-ig; 1800 UTC-kor a látás 10 kilométerre vagy nagyobbra változik és nincs szignifikáns időjárás.

*Fiktív hely

Megjegyzés. – Ebben a példában az elsődleges mértékegységeket, a „kilométer per órát" illetve a „métert" használtuk a szélsebesség illetve a felhőalap magasságára vonatkozóan. Az 5. Annex előírásainak megfelelően, helyettük a vonatkozó, nem SI szerinti alternatív mértékegységek, a „csomó" illetve a „láb" használható.

A3-2. példa – Különleges jelentés

a) Helyi különleges jelentés (ugyanaz a hely és időjárási körülmények, mint a SPECI-nél):

SPECIAL YUDO 151115Z WIND 050/25KT MAX37 MNM10 VIS 1200M HVZ TSRA CLD BKN CB 500FT T25 DP22 QNH 1008 HPA TREND TEMPO TL1200 VIS 600M BECMG AT1200 VIS 8KM NSW NSC

b) SPECI YUDO-ra (Donlon Nemzetközi Repülőtér):*

SPECI YUDO 15115Z 05025G37KT 3000 1200NE + TSRA BKN005CB 25/22 Q1008 TEMPO TL1200 0600 BECMG AT1200 8000 NSW NSC

A két jelentés értelmi jelentése:

Különleges jelentés Donlon Nemzetközi Repülőtérről*, amelyet a hónap 15-én 1115 UTC-kor adtak ki; talajszél iránya 050 fok; szélsebesség 25 csomó, széllökések 10 és 37 csomó között (a minimális szélsebességet a SPECI-nek nem kell tartalmaznia); a látás 1200 méter (a futópálya (futópályák) mentén a helyi különleges jelentésben); domináns látás 3000 méter (SPECI-ben) 1200 méteres minimális látással észak-kelet felé (az irányváltozásokat csak a SPECI tartalmazza); zivatar heves esővel; szakadozott cumulonimbus felhő 500 lábon; lvegő hőmérséklet 25 fok Celsius; harmatpont hőmérséklet 22 fok Celsius; QNH 1008 hektopascal; a trend a következő két órában: látás (a futópálya (futópályák) mentén a helyi különleges jelentésben; domináns látás SPECI-ben) átmenetileg 600 méter 1115-től 1200-ig, 1200 UTC-kor, látás (a futópálya (futópályák) mentén a helyi különleges jelentésben; domináns látás SPECI-ben) 8 km lesz, a zivatar megszűnik és nincs szignifikáns időjárás és nincs szignifikáns felhő.

*Fiktív hely

Megjegyzés. – Ebben a példában a "csomó" és "láb"nem-SI alternatív mértékegységeket használtuk a sebességre és a felhőalap magasságra. Azonban az 5. Annex előírásainak megfelelően, helyettük a vonatkozó elsődleges mértékegységek, a „kilométer per óra” illetve a „méter” használható..

A3-3. példa – Vulkánikus tevékenység jelentés

VOLCANIC ACTIVITY REPORT YUSB* 231500 MT TROJEEN* VOLCANO N5605 W12652 ERUPTED 231445 LARGE ASH CLOUD EXTENDING TO APPROX 30000 FEET MOVING SW

Jelentése:

Vulkánikus tevékenység jelentés, amelyet a Siby/Bistock meteorológiai állomás adott ki 1500 UTC-kor a hónap 23-án. Az Mt Trojeen vulkán, amelynek helye 56 fok 5 perc északi szélesség és 126 fok 52 perc nyugati hosszúság a hónap 23. napján 1445 UTC-kor kitört; egy nagy hamufelhőt észleltek, amely közelítőleg 30000 lábig terjed, és délnyugati irányban mozog.

*Fiktív hely

4. FÜGGELÉK. LÉGIJÁRMŰVES MEGFIGYELÉSEKRE ÉS JELENTÉSEKRE VONATKOZÓ MŰSZAKI ELŐÍRÁSOK

(Lásd jelen Annex 5. Fejezet)

1. LÉGIJELENTÉSEK TARTALMA

1.1 Rendszeres légijelentések levegő-föld adatkapcsolattal

1.1.1 Amikor levegő-föld adatkapcsolatot használnak, és automatikus függő légtérellenőrzést (ADS) alkalmaznak, a rendszeres légijelentések által tartalmazott elemeknek a következőknek kell lenni:
Közlemény típus jelölő
Légijármű azonosítás

1. adatblokk
Földrajzi szélesség
Földrajzi hosszúság
Magasságszint
Idő

2. adatblokk
Szélirány
Szélsebesség
Szélminőség zászló
Hőmérséklet
Turbulencia (ha rendelkezésre áll)
Nedvesség (ha rendelkezésre áll)
Megjegyzés. – Amikor ADS vagy SSRS üzemmódban kerül alkalmazásra, a rendszeres légijelentés köve-

telményei kielégíthetők az alap ADS/SSR S üzemmód adatblokk (1. adatblokk) és a meteorológiai információs adatblokk (2. adatblokk) kombinációjával, amely az ADS vagy SSR S üzemmód jelentésekből áll rendelkezésre. Az ADS közlemény formátum ismertetése a PANS-ATM (Doc 4444) 4.11.4 pontban és a 13. fejezetben, és az SSR S üzemmód közlemény formátum a 10. Annex, III. Kötet I. Rész 5. fejezetben – Digitális adatkommunikációs rendszerek (Digital Data Communication Systems) *– került ismertetésre.*

1.1.2 Ha levegő-föld adatkapcsolatot használnak, amikor ADS nincs használatban, a rendszeres jelentések által tartalmazott elemeknek az 1.3 szakasszal kell összhangban lenniük.

Megjegyzés. – Amikor levegő-föld adatkapcsolatot használnak, miközben ADS és SSR S üzemmód nincs alkalmazásban, a rendszeres légi-jelentések követelményei kielégíthetők az irányító - légijárművezető adatkapcsolati kommunikáció (CPDLC) alkalmazásával, a „Helyzet jelentés" címzéssel. Ezen adatkapcsolat alkalmazásáról részletes leírás a Légiforgalmi szolgálatok adatkapcsolat alkalmazások kézikönyvben (Manual of Air Trafic Services Data Link Applications) *(Doc4444) és a 10. Annex, III. Kötet, I. Részben található.*

1.2 Különleges légi-jelentések levegő-föld adatkapcsolattal

Amikor levegő-föld adatkapcsolatot használnak, a rendszeres légi-jelentések által tartalmazott elemeknek a következőknek kell lenni:

Közlemény típus jelölő
Légijármű azonosító
1. adatblokk
Földrajzi szélesség
Földrajzi hosszúság
Magasságszint
Idő
2. adatblokk
Szélirány
Szélsebesség
Szélminőség zászló
Hőmérséklet
Turbulencia (ha rendelkezésre áll)
Nedvesség (ha rendelkezésre áll)
3. adatblokk
Különleges légijelentés kiadását indokolttá tevő körülmény (egy körülményt az A4-2 táblázatban közölt listáról kell kiválasztani).

1. Megjegyzés. – A különleges légijelentések követelményei kielégíthetők az adatkapcsolati repülés információ szolgáltatás (D-FIS) alkalmazásával, amely „Különleges légijelentés szolgáltatás" címet viseli. Ennek az adatkapcsolatnak az alkalmazásáról részletes specifikáció a Doc 9694 kiadványban található.

2. Megjegyzés. – Kitörés előtti vulkanikus tevékenység, vulkánkitörés vagy vulkanikus hamufelhő különleges légijelentése továbbításának esetében további követelmények a 4.2 szakaszban vannak feltüntetve.

1.3 Rendszeres légijelentések beszédkommunikációval

Amikor beszédkommunikációt használnak, a rendszeres és különleges légi jelentések által tartalmazott elemeknek a következőknek kell lenniük:

Közlemény típus jelölő
1. szekció (Helyzet információ)
Légijármű azonosítás
Helyzet vagy földrajzi szélesség és hosszúság
Időpont
Repülési magasságszint vagy tengerszint feletti magasság
Következő helyzet és az eltelt idő

Következő szignifikáns pont
2. szekció (Üzemelési információk)
Megérkezés becsült időpontja
Repülési időtartam
3. szekció (Meteorológiai információk)
Levegő hőmérséklet
Szélirány
Szélsebesség
Turbulencia
Légijármű jegesedés
Nedvesség (ha rendelkezésre áll)

1.4 Különleges légi jelentések beszédkommunikációval

Amikor beszédkommunikációt használnak, a különleges légi jelentéseknek a következő elemeket kell tartalmazniuk:
Közlemény típus jelölő
1. szekció (Helyzet információ)
Légijármű azonosítás
Helyzet vagy földrajzi szélesség és hosszúság
Időpont
Repülési magasságszint vagy tengerszint feletti magasság
3. szekció (Meteorológiai információk)
Különleges légi jelentés kiadását indokolttá tevő körülményeket az A4-2 táblázatban közölt listából kell kiválasztani.
1. Megjegyzés. – A légi-jelentés alapértelmezés szerint rendszeres jelentés. A közlemény típus jelző különleges légi jelentés esetére a PANS-ATM (Doc. 4444), I. Függelékben van leírva.
2 Megjegyzés. – Kitörés előtti vulkanikus tevékenység, vulkánkitörés vagy vulkanikus hamufelhő különleges légi jelentése esetében a további követelmények az 4.2 szakaszban vannak feltüntetve.

2. JELENTÉSI KRITÉRIUMOK

2.1 Általánosságok

Amikor levegő-föld adatkapcsolatot használnak, a légi-jelentésekben tartalmazott szélirányt, szélsebességet, szélminőség zászlót, hőmérsékletet, turbulenciát és nedvességet kell jelenteni a következő kritériumokkal összhangban.

2.2 Szélirány

A szélirányt földrajzi fokokban kell jelenteni, a legközelebbi egész fokra kerekítve.

2.3 Szélsebesség

A szélsebességet kilométer per órában vagy csomóban kell jelenteni, a legközelebbi 2 km/h-ra (1csomó) kerekítve. A használt mértékegységeket jelölni kell.

2.4 Szélminőség zászló

A szélminőség zászlót 0-nak kell jelenteni, ha a görgés szög kisebb, mint 5 fok, és 1-nek, ha a görgés szög 5 fok vagy ennél nagyobb.

2.5 Hőmérséklet

A hőmérsékletet tized Celsius fokokban kell jelenteni.

2.6 Turbulencia

A turbulenciát örvény disszipáció ráta (EDR) köbgyöke kifejezésben kell jelenteni..
2.6.1 Rendszeres légi-jelentések
A turbulenciát a repülés útvonal fázisa alatt kell jelenteni, és a megfigyelést közvetlenül megelőző 15 perces időszakra kell vonatkoznia. A turbulenciának mind az átlagos, mind a csúcsértékét, a csúcsérték megjelenési idejével együtt, a legközelebbi perc pontossággal, figyelni kell. Az átlagos és a csúcsértékeket az EDR köbgyökében kifejezve kell jelenteni. A csúcsérték megjelenési idejét az A4-1 táblázatban feltüntetett módon kell jelenteni. A turbulenciát az elemelkedés fázisban a repülés első 10 percére kell jelenteni, és a megfigyelést közvetlenül megelőző 30 másodpercre kell vonatkoznia. A turbulencia csúcsértékét figyelni kell.
2.6.2 A turbulencia jelentés értelmezése
A turbulencia erősségének értelmezése a következők szerinti:
a) heves, amikor az EDR köbgyökének csúcsértéke meghaladja a 0,7-et;
b) mérsékelt, ha az EDR köbgyökének csúcsértéke 0,4 felett van és kisebb vagy egyenlő 0,7-el;
c) enyhe, ha az EDR köbgyökének csúcsértéke 0,1 felett van és kisebb vagy egyenlő 0,4;
d) nincs, ha az EDR köbgyökének csúcsértéke kisebb vagy egyenlő 0,1-el.
Megjegyzés. – Az EDR a turbulencia légijárműtől független mértéke. Azonban az EDR értéke és a turbulencia csapadéka függvénye a légijármű típusának és tömegének, a közepes tengerszint feletti magasságának, konfigurációjának a légijármű levegőhöz viszonyított sebességének. Az EDR fent megadott értékei az erösségi szintet egy közepes méretű szállító repülőgépre, tipikus útvonali körülményekre (azaz tengerszint feletti magasságra,levegőhöz képesti sebességre és súlyra) vannak megadva.

2.6.3 Különleges légijelentések
Különleges légi-jelentéseket kell készíteni turbulenciáról a repülés bármely fázisában, amikor az EDR köbgyökének csúcsértéke meghaladja a 0,7 értéket. A különleges jelentést a megfigyelést közvetlen megelőző 1 perces időszakra vonatkozóan kell készíteni. A turbulenciának mind az átlagos, mind a csúcs értékét figyelni kell. A turbulencia átlagos és csúcs értékét az EDR köbgyökének terminusaiban kell jelenteni, ahogyan az. Különleges légijelentést minden percben ki kell adni addig az időpontig, amíg az EDR köbgyökének csúcsértékei 0,7 érték alá nem esnek.

2.7 Nedvesség

A nedvességet relatív nedvességként kell jelenteni, a legközelebbi egész százalékértékre kerekítve.
Megjegyzés. – A légijelentésekben szereplő meteorológiai elemek intervallumai és felbontásai az A4-3 táblázatban láthatók.

3. LÉGIJELENTÉSEK CSERÉJE

3.1 Meteorológiai figyelő irodák kötelezettségei

3.1.1 A meteorológiai figyelő irodáknak össze kell gyűjteniük a rendszeres légi jelentéseket, amelyek beszédkommunikáció útján érkeztek, és a regionális léginavigációs egyezménnyel összhangban továbbítaniuk kell azokat a WAFC-oknak és más meteorológiai irodáknak.
Megjegyzés. – Egyórás bázisú gyűjtemények cseréje lehet kívánatos, ha nagyon sok a jelentés.
3.1.2 A meteorológiai figyelő irodának késedelem nélkül továbbítania kell a beszédkommunikáció útján a vett különleges légijelentéseket a WAFC-okhoz
3.1.3 A meteorológiai figyelő irodának késedelem nélkül továbbítania kell a kitörés előtti vulkánikus tevékenységről, vulkánkitörésről, vagy vulkánikus hamufelhőről szóló, általa vett különleges légi jelentéseket a hozzátartozó VAAC-okhoz.

3.1.4 Ha különleges légijelentés érkezik a meteorológiai figyelő irodához, de az előrejelző úgy gondolja, hogy a jelenség, amely miatt a jelentés íródott, várhatóan nem marad fenn, és így SIGMET kiadására nincs ok, a különleges légijelentést kell ugyanolyan módon, mint egy SIGMET közleményt szétküldeni a 6. Függelék 1.2.1 pontjának megfelelően, azaz a meteorológiai figyelő irodáknak és más meteorológiai irodáknak, a regionális léginavigációs egyezménynek megfelelően.

3.2 Világ előrejelző központok kötelezettségei

A WAFC-oknál és RAFC-oknál vett légijelentéseket meteorológiai alapadatként kell tovább terjeszteni.
Megjegyzés. – A meteorológiai alapadatok terjesztését általában a WMO globális távközlési rendszerén végzik.

3.3 Légijelentések kiegészítő terjesztése

Ajánlás. – *Ahol a légijelentések kiegészítő szétosztására van szükség speciális repülési vagy meteorológiai igények kielégítésére, az ilyen terjesztést az illetékes meteorológiai hatóságok között kell lerendezni.*

3.4 Légijelentések formátuma

Légijelentéseket olyan formátumban kell cserélni, amilyenben azok érkeztek, kivéve azt, amikor beszéd kommunikációt használnak, ha helyzetet egy légiforgalmi szolgálat jelentő pontjára hivatkozva adnak meg, azt a meteorológiai megfigyelő irodának a megfelelő földrajzi szélességre és hosszúságra kell átalakítania.

4. SZÉLNYÍRÁS ÉS VULKANIKUS HAMU JELENTÉSÉRE VONATKOZÓ SPECIFIKUS ELŐÍRÁSOK

4.1 Szélnyírás jelentése

4.1.1 **Ajánlás**. -- *Elemelkedési és megközelítési repülési fázis során előfordult szélnyírás légijárműves megfigyeléseiről szóló jelentéseknek tartalmazniuk kell a légijármű típusát.*
4.1.2 **Ajánlás**. -- *Ha az elemelkedés vagy megközelítés fázisaiban szélnyírást jelentettek vagy előrejeleztek, de nem tapasztaltak, a légijármű parancsnokának ezt, mihelyt lehetséges, jelentenie kell az illetékes légiforgalmi szolgálati egységnek, kivéve, ha tudomása van arról, hogy a megfelelő légiforgalmi szolgálati egységet már tájékoztatta egy korábbi légijármű.*

4.2 Vulkanikus tevékenység repülés utáni jelentése

Megjegyzés. – A vulkánikus tevékenység megfigyelések rögzítésére és jelentésére vonatkozón részletes instrukciók a PANS-ATM (Doc.4444) 1. Függelékben találhatók.
4.2.1 Egy járat megérkezésekor egy repülőtérre, a vulkánikus tevékenységről szóló elkészített jelentést az üzemeltetőnek vagy a repülő személyzet egy tagjának késedelem nélkül el kell juttatnia a repülőtéri meteorológiai irodához, vagy ha ilyen iroda az érkező járat személyzete számára nem könnyen elérhető, a kész formátumot a meteorológiai hatóság és az üzemeltető közötti helyi megállapodásokkal összhangban kell kezelni.
4.2.2 A meteorológiai iroda által megkapott, vulkánikus tevékenységről szóló kész jelentést késedelem nélkül továbbítani kell azon meteorológiai figyelő iroda részére, amelynek kötelessége meteorológia megfigyelést biztosítani a repülési információhoz abban a régióban, ahol a vulkánikus tevékenységet megfigyelték.

A4-1 Táblázat A jelentendő csúcsérték megjelenésének időpontja

A megfigyelést …....perccel megelőző egy-perces időszak alatt előforduló turbulencia csúcsérték	*A jelentendő érték*
0–1	0

1–2	1
2–3	2
…	…
13–14	13
14–15	14
Időzítési információ nem áll rendelkezésre	15

A4-2 táblázat. Minta a különleges légijelentéshez (lefelé kapcsolat)

Kulcs: M = kötelező, minden közlemény része

C = feltételes tartalmazás, ahol rendelkezésre áll

Megjegyzés. – Pilóta-parancsnok által kezdeményezett közlemény. Jelenleg csak a „SEV TURB” körülmény lehet automatizált (lásd 2.6.3 pont).

Az 5. Fejezet szerint specifikált elem	*Részletes tartalom*	*Minta (Minták)*	*Példák*
Közlemény típusú jelölés (M)	Légijelentés fajtája (M)	ARS	ARS
Légijármű azonosítás (M)	Légijármű rádiótelefon hívójel	nnnn	VA812
1. ADATBLOKK			
Földrajzi szélesség (M)	Földrajzi szélesség fokokban és percekben (M)	Nnnnn *vagy* Snnnn	S4506
Földrajzi hosszúság (M)	Földrajzi hosszúság fokokban és percekben (M)	Wnnnn *vagy* Ennnn	E01056
Magassági szint (M)	Repülési magassági szint (M)	FLnnn	FL330
Időpont (M)	A megjelenés időpontja órákban és percekben (M)	OBS AT nnnnZ	OBS AT 1216Z
2. ADATBLOKK			
Szélirány (M)	Szélirány földrajzi fokokban(M)	nnn/	262/
Szélsebesség (M)	Szélsebesség kilométer per órában (vagy csomóban) (M)	nnnKMH (*or* nnnKT)	158KMH (079KT)
Szélminőség zászló (M)	Szélminőség zászló (M)	n	1
Hőmérséklet (M)	Levegőhőmérséklet tized Celsius fokokban (M)	T[M]nnn	T127 TM455
Turbulencia (C)	Turbulencia század $m^{2/3}s^{-1}$ –ben és a csúcsérték megjelenésének időpontja (C)[1]	EDRnn/nn	EDR16/08
Nedvesség (C)	Relatív nedvesség százalékban (C)	RHnnn	RH054
3. ADATBLOKK			
Különleges légijelentés kiadását szükségessé tevő feltétel (M)		SEV TURB [EDRnn][2] *vagy* SEV ICE *vagy* SEV MTW *vagy* TS GR[3] *vagy* TS[3] *vagy* HVY SS[4] *vagy* VA CLD [FL nnn/nnn] *vagy* VA[5] [MT nnnnnnnnnnnnnnnnn]	SEV TURB EDR16; VA CLD FL050/100

Megjegyzés

1. A megjelenés időpontját jelenteni kell az A4-1 táblázatnak megfelelően.
2. A turbulenciát a 2.6.3 pontnak megfelelően jelenteni kell.
3. Borult, beágyazott vagy kiterjedt zivatarok vagy zivatarok széllökésvonalakban.
4. Porvihar vagy homokvihar.

5 Kitörés előtti vulkanikus tevékenység vagy vulkánkitörés.

A4-3. Légijelentésekben lévő meteorológiai elemek intervallumai és felbontásai

Az 5. Fejezet szerint specifikált elem		*Intervallum*	*Felbontás*
Szélirány:		000–360	1
Szélsebesség:		00–500 00–250	2 1
Szélminőség zászló:	(index)*	0–1	1
Hőmérséklet:		-80–+60	0,1
Turbulencia: rendszeres légijelentés	$m^{2/3}s^{-1}$ (a megjelenés időpontja)	0–2 0–15	0,01 1
Turbulencia: különleges légijelentés	$m^{2/3}s^{-1}$	0-2	0,01
Nedvesség		0–1001	1
*Dimenzió nélküli			

5. FÜGGELÉK ELŐREJELZÉSEKRE VONATKOZÓ MŰSZAKI ELŐÍRÁSOK

(Lásd jelen Annex 6. Fejezet)

1. TAF-RA VONATKOZÓ KRITÉRIUMOK

1.1 TAF formátum

A TAF-t az A5-1 táblázatban bemutatott mintának megfelelően kell kiadni, és a Meteorológiai Világ Szervezet által előírt TAF kódformában kell terjeszteni.
Megjegyzés. – A TAF kódforma ismertetését a WMO 306 számú kiadványa Kód kézikönyv (Manual on Codes) *1.1 Kötet, A Rész – Alfanumerikus kódok (Alphanumeric Codes) tartalmazza.*
1.1.2 **Ajánlás.** – *A TAF-t az ehhez megfelelő pozícióban lévő Államok közötti kétoldalú egyezmények szerint, WMO BUFR kódformában kell szétosztani, a TAF 1.1.1 pontnak megfelelő terjesztése mellett.*
Megjegyzés. – A BUFR kódforma ismertetését a WMO 306 számú kiadványa Kód kézikönyv (Manual on Codes) *1.2 Kötet, B Rész – Bináris kódok (Binary Codes) tartalmazza.*

1.2 Meteorológiai elemek bevitele TAF-ba

Megjegyzés. – Előrejelzések üzemelés szempontjából megkívánt pontosságáról útmutatást a B Melléklet tartalmaz.
1.2.1 Talajszél
Ajánlás. – *Szél előrejelzésben a várható domináns irányt kell megadni. Ha a domináns talajszél irányt a várható változása miatt nem lehet előrejelezni, például enyhe szél (kevesebb, mint 6 km/h (1csomó)), vagy zivatarok alatt, a szélirányt „VRB" alkalmazásával változóként kell jelölni. Ha a szelet 2 km/h-nál (1 csomó) kisebbre előrejelzik, a szélsebességet nyugalomként kell jelezni.. Ha az előrejelzett maximális sebesség (széllökés) 20 km/h-val (10 csomó) vagy többel meghaladja az előrejelzett közepes szélsebességet, az előrejelzett maximális szélsebességet kell jelezni. Ha az előrejelzés szerint 200 km/h (100 csomó) vagy ennél nagyobb szélsebesség várható, ezt nagyobb, mint 199 km/h (99 csomó)sebességként kell jelezni.*
1.2.2 Látás
Ajánlás. – *Ha a látást 800 m-nél kisebbre előrejelzik, ezt 50 m-es lépcsőkben kell kifejezni; ha az előrejelzett látás 800 m vagy nagyobb, de kisebb, mint 5 km, 100 m-es lépcsőkben; ha 5 km vagy nagyobb, de kisebb, mint 10 km, akkor kilométeres lépcsőkben; ha 10 km vagy ennél nagyobb, akkor 10 km-ként kell előrejelezni, kivéve ha CAVOK körülmények előrejelzése történt. Ha az előrejelzett látás különböző irányokban változó, és a domináns látás nem előrejelezhető, a legkisebb előrejelzett látást kell meg-*

adni.

1.2.3 Időjárás jelenségek

Ajánlás. – *Az alábbi időjárási jelenségek vagy azok kombinációi közül egynek vagy többnek, de maximum háromnak, jellemzőivel és, ahol lehet, intenzitásával együtt előrejelzését kell megadni, ha azok várhatóan a repülőtéren megjelennek:*

- ónos csapadék
- ónos köd
- mérsékelt vagy heves csapadék (beleértve a záport)
- talajközeli por, homok- vagy hófúvás
- por-, homok- vagy hófúvás
- porvihar
- homokvihar
- zivatar (csapadékkal vagy anélkül)
- szélroham
- tölcsérfelhő (tornádó vagy víztölcsér).
- egyéb, a 3. Függelék 4.4.2.3 pontjában megadott időjárás jelenségek csak akkor, ha azok várhatóan a látás lényeges megváltozását okozzák.

A fenti jelenségek várható megszűnését a „NSW" rövidítéssel kell jelezni.

1.2.4 Felhő

Ajánlás. – *A felhőzet mennyiségét szükség szerint a „FEW, „SCT", „BKN" vagy az „OVC" rövidítések használatával kell előrejelezni, ahogyan szükséges. Ha az ég várhatóan borult marad vagy borussá válik,és felhőzet előfordulás nem előrejelezhető, és a függőleges látásra vonatkozó információ a repülőtéren rendelkezésre áll, a függőleges látást kell előre jelezni "VV"formában, melyet a függőleges látás előrejelzett értéke követ. Ha több felhőréteg vagy felhőtömeg várható, mennyiségüket és alapjuk magasságát az alábbi sorrendben kell előrejelezni:*

a) mennyiségtől függetlenül, a legalacsonyabb réteget vagy tömeget FEW, SCT, BKN, illetőleg OVC , ahogy megfelelő, jelzésekkel kell előrejelezni;

b) a következő réteget vagy tömeget, amely az égboltnak több mint 2/8 részét borítja, SCT, BKN, illetőleg OVC jelzésekkel kell előrejelezni, ahogy megfelelő;

c) a következő magasabb réteget vagy tömeget, amely az égboltnak több mint 4/8 részét borítja, BKN illetőleg OVC jelzésekkel kell előrejelezni, ahogyan megfelelő; és

d) cumulonimbus felhők, ha várhatók, és a fenti a)-c) pontokban még nem szerepeltek.

A felhő információkat az üzemeltetés szempontjából jelentőséggel bíró felhőzetre kell korlátozni;ha üzemeltetés szempontjából jelentőséggel bíró felhőzet nincs előrejelezve, és „CAVOK" nem megfelelő,az „NSC" rövidítést kell használni.

1.2.5 Hőmérséklet

Ajánlás. – *Amikor regionális léginavigációs egyezménnyel összhangban, előrejelzett hőmérsékleteket visznek be, a TAF érvényességi időszaka alatt várhatóan fellépő maximális és minimális hőmérsékleteket, a megjelenésük időpontjával együtt, meg kell adni.*

1.3 Változás csoportok használata

Megjegyzés. – Változás és idő jelzők TAF-ban való használatára útmutatás az A5-2 Táblázatban található

1.3.1 **Ajánlás.** – *A változás csoportok TAF-ba bevitele vagy a TAF módosítása kritériumainak a következőkön kell alapulnia:*

a) ha a közepes talajszél változása az előrejelzés szerint 60° vagy nagyobb,a közepes sebesség a változás előtt és/vagy után 20 km/h (10csomó) vagy nagyobb;

b) ha a talajszél sebesség változásának előrejelzésében 20 km/h (10 csomó) szerepel;

c) ha a közepes talajszél sebességtől től való eltérések (széllökések) előrejelzése 20 km/h vagy ennél na-

gyobb értékre való növekedést tartalmaz, a közepes sebesség a változás előtt és/vagy után 30 km/h (15 csomó) vagy nagyobb;
d) Ha a talajszél az előrejelzés szerint az üzemeltetés szempontjából jelentőséggel bíró értékeket lép át. A küszöbértékeket a meteorológiai hatóság a megfelelő légiforgalmi szolgálati hatósággal és az érintett üzemeltetőkkel konzultálva állapítja meg, figyelembe véve az olyan szélváltozásokat, amelyek:
1) a használt futópálya (futópályák) cseréjét teszik szükségessé; és
2) jelzik, hogy a futópálya hátszél és oldalszél komponensei a repülőteret használó tipikus légijárművek főbb üzemelési kokorlátjait jelentő értékeket átlépve fognak változni.
e) ha a látás az előrejelzés szerint javul és az alábbi értékek közül egyet vagy többet elér vagy meghalad, vagy amikor az előrejelzés szerint a látás romlik és az alábbi értékek közül egyet vagy többet átlép:
1) 150, 350, 600, 800, 1500, vagy 3000 m; vagy
2) 5000 m azokban az esetekben, ha jelentős számú repülést végeznek látvarepülési szabályok szerint;
f) ha az alábbiakban felsorolt időjárási jelenségek közül bármelyik, vagy ezek valamilyen kombinációjának beindulása vagy megszűnése,vagy intenzitásának változása előrejelzés szerint bekövetkezik:
– ónos csapadék
– mérsékelt vagy heves csapadék (beleértve a záporokat is)
– zivatar (csapadékkal)
– porvihar
– homokvihar;
g) ha az alábbiakban felsorolt időjárási jelenségek közül bármelyik, vagy ezek valamilyen kombinációja előrejelzés szerint elkezdődik, vagy befejeződik,:
– jégkristályok
– zúzmarás köd
– talajközeli por-, homok- vagy hófúvás;
– por-, homok- vagy hófúvás
– zivatar (csapadék nélkül);
– szélroham;
– tölcsérfelhő (tornádó vagy víztölcsér);
h) ha a legalacsonyabb BKN vagy OVC felhőréteg, vagy felhőtömeg alapjának magassága az előrejelzés szerint emelkedik, és az alábbi értékek közül egyet vagy többet elér, vagy meghalad, vagy amikor a legalacsonyabb BKN vagy OVC felhőréteg vagy felhőtömeg alapjának magassága az előrejelzés szerint csökken és az alábbi értékek közül egyet vagy többet átlép:
1) 30, 60, 150, vagy 300 m (100, 200, 500 vagy 1000 láb), vagy
2) 450 m (1500 láb) azokban az esetekben, ha jelentős számú repülést végeznek látás szerinti repülési szabályok szerint;
i)) ha 450 m (1500 láb) alatti felhőréteg vagy felhőtömeg mennyisége előrejelzés szerint az alábbiaknak megfelelően változik;
1) NSC-ról, FEW-ról vagy SCT-ról BKN-re vagy OVC-re; vagy
2) BKN-ről vagy OVC-ről NSC-re, FEW-re vagy SCT-re;
j) ha a függőleges látás az előrejelzés szerint javul, és az alábbi értékek közül egyet, vagy többet elér, vagy meghalad, vagy amikor a függőleges látás az előrejelzés szerint romlik, és az alábbi értékek közül egyet vagy többet átlép: 30, 60, 150 vagy 300 m (100, 200, 500 vagy 1000 láb); és
k) bármely egyéb, a meteorológiai hatóság és az üzemeltetők által közösen megállapított, helyi repülőtéri üzemelési minimumokon alapuló kritérium.
Megjegyzés.– Más helyi repülőtéri üzemelési minimumokon alapuló kritériumokat a SPECI kiadásához a 3. Függelék 2.3.2.l) pontja szerint kialakított hasonló kritériumokhoz hasonlóan kell számításba venni.
1.3.2 **Ajánlás**. *– Ha a 6. Fejezet 6.2.3 pontjában megadott elemek valamelyikében beálló változást az 1.3.1 pontban szereplő kritériumoknak megfelelően jelezni kell, a „BECMG" vagy „TEMPO" változás jelzőket kell használni, és ezt követően meg kell adni azt az időszakot, amely alatt a változás várhatóan végbemegy. Az időszakot, annak kerek UTC órában kifejezett kezdeti és befejezési időpontjával kell jelölni. A változásjelzést követően csak azokat az elemeket kell megadni, melyek várhatóan szignifikánsan*

megváltoznak. Felhőzetre vonatkozó szignifikáns változások esetében azonban valamennyi felhőcsoportot, beleértve azokat a felhőrétegeket és tömegeket, amelyeknek változása nem várható, jelezni kell.

1.3.3 **Ajánlás. –** *A „BECMG” változás jelzőt és a hozzátartozó időcsoportot olyan változások leírására kell használni, ahol a meteorológiai körülmények egy megadott küszöbértéket szabályos vagy szabálytalan mértékben, és az időperiódus alatt egy nem meghatározott időpontban, várhatóan elérnek vagy meghaladnak. Az időperiodus normál körülmények között nem haladhatja meg a két órát, de semmi esetre sem haladhatja meg a 4 órát.*

1.3.4 **Ajánlás** *– A „TEMPO” változásjelzőt és az ehhez kapcsolódó időcsoportot olyan, várhatóan gyakori vagy nem gyakori átmeneti meteorológiai körülmény-ingadozások leírására kell használni, melyek meghatározott küszöbértékeket elérnek, vagy meghaladnak, és minden esetben egy óránál rövidebb időszakon keresztül tartanak, és az ingadozások együttesen előreláthatólag az előrejelzési időszak felénél rövidebb időtartam alatt fognak fennállni. Ha az átmeneti ingadozás várhatóan egy órán keresztül, vagy hosszabb ideig marad fenn, az 1.3.3 pont szerinti „BECMG” változás jelző csoportot kell használni, vagy az érvényességi időszakot az 1.3.5 pontnak megfelelően fel kell osztani.*

1.3.5 **Ajánlás. –** *Ahol az uralkodó időjárási feltételek egy együttesének jelentős változása, többé-kevésbé teljes mértékben egy eltérő feltétel együttesbe való átmenete várható, az érvényességi időszakot különálló időszakokra kell osztani az „FM” rövidítést használva, amelyet közvetlenül követ egy négyszámjegyű időcsoport UTC szerinti egész órákban és percekben, amelya azt a várható időpontot jelzi, amikor a változás várhatóan fellép. Az „FM” rövidítést követő felosztott időszaknak különállónak kell lennie, és a rövidítést követő előrejelzett körülmények a rövidítés előtt adott minden előrejelzett körülményt hatálytalanítanak.*

1.4 Valószínűségi csoportok használata

Ajánlás. – *Valamely előrejelzett időjárási elem, vagy elemek alternatív értékének előfordulási valószínűségét szükség szerint a „PROB” rövidítés használatával kell jelezni, melyet a 10 százalékos egységekben kifejezett valószinűségi érték, és annak az időperiódusnak a jelölése követ, amely alatt az alternatív érték(ek) várhatóan érvényesek. A valószínűség információt az előrejelzett elemet vagy elemeket követően kell elhelyezni, és ezt követően kell megadni az elem, vagy elemek alternatív értékét. A meteorológiai viszonyok várható időnkénti változásainak valószínűségét szükség szerint, a „PROB” rövidítés használatával kell jelezni, melyet a valószínűség 10 százalékos egységekben kifejezett értékének jelölése követ, amelyet a „TEMPO” változásjelző és a hozzá kapcsolódó időcsoport elé kell elhelyezni. Valamely alternatív érték vagy változás 30 százaléknál kisebb valószínűsége nem tekintendő elegendő jelentőségűnek ahhoz, hogy fel kelljen tüntetni. Valamely alternatív érték vagy változás 50 százalékos, vagy azt meghaladó valószínűségét repülési célokra nem valószínűségnek kell tekinteni, hanem szükség szerint a „BECMG” vagy „TEMPO” változásjelzők használatával, vagy az érvényességi időszak felosztásával, FM” rövidítés használatával kell jelezni. A valószínűségi csoportot nem használják sem a „BECMG” változásjelző, sem az „FM” időjelző minősítésére.*

1.5 Változási és valószínűségi csoportok száma

Ajánlás. – *A változási és valószínűségi csoportok számát minimumon kell tartani, és ez általában nem haladhatja meg az öt csoportot.*

1.6 TAF terjesztése

A TAF-t és módosításait el kell juttatni a nemzetközi OPMET adatbázisokhoz, és a regionális léginavigációs egyezmény által, a repülési állandó helyű szolgálati műhold elosztó rendszerek működtetéséhez kijelölt központokhoz, a regionális léginavigációs egyezménnyel összhangban.

2. TREND ELŐREJELZÉSEKRE VONATKOZÓ KRITÉRIUMOK

2.1 Trend előrejelzések formátuma

Trend előrejelzéseket a 3. Függelék A3-1 és A3-2 táblázatban bemutatott mintának megfelelően kell kiadni. A trend előrejelzésben használt egységeknek és méretarányoknak ugyanazoknak kell lenni, mint amiket a jelentés használ, amelyhez az előrejelzés tartozik.
Megjegyzés. – Trend előrejelzésekre példákat a 3. Függelék tartalmaz.

2.2 Meteorológiai elemek bevitele trend előrejelzésekbe

2.2.1 Általános előírások
A trend előrejelzéseknek jelezniük kell egy vagy több elem: talajszél, látás, időjárás és felhők vonatkozásában végbemenő jelentős változásokat. Csak azokat az elemeket kell tartalmazniuk, amelyeknek jelentős változása várható. Azonban felhőre vonatkozó jelentős változás esetén, minden felhőcsoportra, beleértve azokat a felhőrétegeket és tömegeket is, amelyeknél változás nem várható, meg kell jelölni. A látás jelentős változása esetén a látás csökkenését okozó jelenséget is meg kell jelölni. Ha változás bekövetkezése nem várható, ezt a „NOSIG" terminussal kell jelölni.
2.2.2 Talajszél
A trend előrejelzésnek jeleznie kell a talajszélben bekövetkező alábbi változásokat:
a) a közepes szélirány 60 fokos vagy nagyobb változása, amikor a közepes szélsebesség a változás előtt és/vagy után 2O km/h (10 csomó) vagy
b) a közepes szélsebesség 20 km/h (10 csomó) értékű vagy ennél nagyobb változása;
c) üzemelési szempontból lényeges értékeket meghaladó szélváltozások. A küszöbértékeket a meteorológiai hatóságnak kell megállapítania, az illetékes ATS hatósággal és az érintett üzemeltetőkkel konzultálva, figyelembe véve azokat a szélváltozásokat, melyek:
1) használatos futópálya (futópályák) megváltoztatását teszik szükségessé; és
2) jelzik, hogy a futópálya hátszél és oldalszél összetevői a repülőtéren üzemelő tipikus légijármű számára megállapított főbb üzemelési határértéket meghaladják.
2.2.3 Látás
Ha a látás várhatóan javul és a 150, 350, 600, 800, 1500 vagy 3000 m értékek közül egyet vagy többet elér, vagy túllép, vagy ha a látás várhatóan romlik és ezen értékek közül egyet vagy többet átlép, a trend előrejelzésekben jelezni kell a változást. Ha jelentős számú járat a látás szerinti repülési szabályok szerint repül, akkor az előrejelzésnek ezen felül jelezni kell az 5000 m-es értékre való változást vagy ennek átlépését.
Megjegyzés. – Helyi rendszeres és különleges jelentésekhez tartozó trend előrejelzésekben a látás a futópálya (futópályák) menti látás előrejelzésre vonatkozik; METAR-hoz és SPECI-hez tartozó trend előrejelzésekben az előrejelzett domináns látásra vonatkozik.
2.2.4 Időjárás jelenségek
2.2.4.1 A trend előrejelzésnek az alábbi időjárási jelenségek vagy azok kombinációi közül egynek vagy többnek, a várható kialakulását, megszűnését vagy intenzitásváltozását kell jeleznie:
– ónos csapadék
– mérsékelt vagy heves csapadék (beleértve a záporokat is)
– zivatar (csapadékkal)
– porvihar
– homokvihar
– a 3. Függelék 4.4.2.3 pontjában felsorolt egyéb időjárási jelenségek, csak akkor, ha várhatóan jelentős változást okoznak a látásban.
2.2.4.2 A trend előrejelzésnek az alábbi időjárási jelenségek vagy azok kombinációi közül egynek vagy többnek a várható kialakulását, vagy megszűnését kell jeleznie:
– jégkristályok
– ónos köd
–talajközeli por-, homok- vagy hófúvás

– por-, homok- vagy hófúvás
– zivatar (csapadék nélkül)
– széllökés
– tölcsérfelhő (tornádó vagy víztölcsér)
2.2.4.3 a 2.2.4.1 és 2.2.4.2 pontokban jelentett jelenségek teljes száma nem haladhatja meg a hármat.
2.2.4.4 A fenti jelenségek várható végét az „NSW" rövidítéssel kell jelezni
2.2.5 Felhők
Ha egy BKN vagy OVC felhőréteg alapjának magassága várhatóan növekszik, és az alábbi értékek közül egyet vagy többet elér, vagy túllép, vagy egy BKN vagy OVC felhőréteg alapjának magassága várhatóan csökken, és a következő értékek közül: 30, 60, 150, 300 és 450 m (100, 200, 500, 1000 és 1500 láb).egyet vagy többet átlép, a trend típusú leszállási előrejelzés trend részében a változást jelezni kell: Ha egy felhőréteg alapjának magassága 450 m (1500 láb) alatt van,vagy várhatóan az alá süllyed, vagy a fölé emelkedik, akkor a trend előrejelzésnek jelezni kell a felhőzet mennyiségének változásait, FEW-ról vagy SCT-ről BKN-re, vagy OVC-re növekedését, illetve BKN vagy OVC-ről SKC, FEW-ra vagy SCT-re csökkenését. Ha nincsenek üzemelés szempontjából jelentőséggel bíró felhők előrejelezve és a „CAVOK" nem megfelelelő, az „NSC" rövidítést kell alkalmazni.
2.2.6 Függőleges látás
Ha várható, hogy az égbolt takart marad, vagy azzá változik, és a repülőtéren a függőleges látás megfigyelések rendelkezésre állnak, és előrejelezték a függőleges látás javulását, és a változás eléri vagy meghaladja a 0, 60, 150 vagy 300 m (100, 200, 500 vagy 1000 láb) értékek egyikét, vagy közülük többet, vagy ha a függőleges látás romlása van előrejelezve, és ez a fenti értékek közül egyet vagy többet átlép, a trend előrejelzésnek jeleznie kell a változást
2.2.7 Kiegészítő kritériumok
A 2.2.2 - 2.2.6 pontokban megadottakon kívül, helyi repülőtéri üzemelési minimumokon alapuló változás jelzési kritériumokat a meteorológiai hatóság és az érintett üzemeltető(k) megállapodásának megfelelően kell alkalmazni.

2.3 Változás jelzők használata

Megjegyzés. – Változás jelzők trend előrejelzésekben való használatára útmutatás az A3-3 Táblázatban található.
2.3.1 Ha változás bekövetkezése várható, a trend előrejelzésnek a „BECMG" vagy „TEMPO" jelzések egyikével kell kezdődnie.
2.3.2 A „BECMG" változásjelzőt kell használni olyan változások előrejelzésének leírásához, ahol az időjárási körülmények szabályos vagy szabálytalan ütemben várhatóan elérnek, vagy átlépnek meghatározott értékeket. Azt az időszakot, vagy azt az időpontot, ami alatt, vagy amikor a változás bekövetkezését előrejelzik, az „FM", „TL" vagy AT" rövidítések, amelyik megfelelő, használatával, valamint ezeket követően egy órákból és percekből álló időcsoporttal jelezni kell. Ha a változás az előrejelzés szerint a trend előrejelzés kezdete és vége közötti időszakban teljes mértékben végbemegy, a változás kezdetét illetve végét az „FM", illetőleg „TL" rövidítésekkel és a hozzájuk tartozó időcsoportokkal kell jelezni. Ha a változás az előrejelzés szerint a trend előrejelzés kezdeti időpontjában kezdődik el, de még annak vége előtt befejeződik, az „FM" rövidítést és a hozzá kapcsolódó időcsoportot ki kell hagyni és csak a „TL"-t és a hozzá kapcsolódó időcsoportot kell használni. Ha a változás az előrejelzés szerint a trend előrejelzés érvényességi időszakában kezdődik meg és ezen időszak végének időpontjában fejeződik be, a „TL" rövidítést és a hozzá kapcsolódó időcsoportot ki kell hagyni és csak az „FM"-t és a hozzá kapcsolódó időcsoportot kell használni. Ha a változás az előrejelzés szerint a trend előrejelzés érvényességi időszaka alatti valamely időpontban történik, az „AT" rövidítést és ezt követően a hozzá kapcsolódó időcsoportot kell használni, Ha a változás az előrejelzés szerint a trend előrejelzés időszakának kezdetekor kezdődik és az időszak végéig befejeződik, vagy ha a változás az előrejelzés szerint a trend előrejelzés időtartama alatt megtörténik, de az időpont bizonytalan, az „FM", „TL" vagy „AT" rövidítéseket és az ezekhez kapcsolódó időcsoportokat el kell hagyni, és egyedül a „BECMG" változásjelzőt kell használni.

2.3.3 A „TEMPO” változásjelzőt kell használni olyan átmeneti időjárás ingadozások előrejelzésének leírásához, melyeknél az egyes változások meghatározott értékeket egy óránál rövidebb időtartamon keresztül érnek el, vagy lépnek át és az ingadozások összességükben az előrejelzés szerint az előrejelzési időszak felénél rövidebb időszakot fednek le. Azt az időszakot, amely alatt az átmeneti ingadozások az előrejelzés szerint fennállnak, az „FM” és/vagy „TL” rövidítések megfelelő használatával, valamint ezeket követően egy órákból és percekből álló időcsoporttal kell jelezni. Ha az átmeneti időjárás változások az előrejelzés szerint a trend előrejelzés kezdete és vége közötti időpontok között teljes mértékben végbemegy, az átmeneti ingadozások kezdetét illetve végét az „FM”, illetőleg a „TL” rövidítésekkel és a hozzájuk tartozó időcsoportokkal kell jelezni. Ha az átmeneti ingadozások időszaka az előrejelzés szerint a trend előrejelzés kezdeti időpontjában kezdődik el, de még annak vége előtt befejeződik, az „FM” rövidítést és a hozzá kapcsolódó időcsoportot ki kell hagyni és csak a „TL”-t és a hozzá kapcsolódó időcsoportot kell használni. Ha az átmeneti ingadozások időszaka az előrejelzés szerint a trend előrejelzés érvényességi időszakában kezdődik és ezen időszak végének időpontjában befejeződik, a „TL” rövidítést és a hozzá kapcsolódó időcsoportot ki kell hagyni és csak az FM-t és a hozzá kapcsolódó időcsoportot kell használni. Ha az átmeneti ingadozások időszaka az előrejelzés szerint a trend előrejelzés időszakának kezdetekor kezdődik és az időszak végéig befejeződik, az „FM” és „TL” rövidítéseket és a hozzájuk kapcsolódó időcsoportokat ki kell hagyni és egyedül a „TEMPO” változásjelzőt kell használni.

2.4 Valószínűségi jelző használata

A „PROB” jelző nem alkalmazható trend előrejelzésekben.

3. FELSZÁLLÁSI ELŐREJELZÉSEKRE VONATKOZÓ KRITÉRIUMOK

3.1 Felszállási előrejelzések formátuma

Ajánlás. – *Az előrejelzés formátumának a meteorológiai hatóság és az érintett üzemeltető közötti megállapodás szerintinek kell lennie. A felszállási előrejelzésekben használt időjárási elemek sorrendje, a terminológia, a mértékegységek és a skálák legyenek azonosak az ugyanazon repülőtérről készült jelentésekben használtakkal.*

3.2 Felszállási előrejelzések módosításai

Ajánlás. –. *A felszálláshoz a talajszél irányról és sebességről, a hőmérsékletről és nyomásról és más helyileg megállapított elemekről szóló előrejelzések módosításának kiadási kritériumairól a meteorológiai hatóság és az érintett üzemeltetők között kell megállapodni. A kritériumoknak konzisztensnek kell lenniük a hozzájuk tartozó repülőtéri különleges jelentésekre megállapított kritériumokkal, a 3. Függelék 2.3.1 pontjával összhangban.*

4. KISMAGASSÁGÚ REPÜLÉSEK RÉSZÉRE KIADOTT KÖRZETI ELŐREJELZÉSEKRE VONATKOZÓ KRITÉRIUMOK

4.1 GAMET körzeti előrejelzések formátuma és tartalma

Ha GAMET formátumban készülnek, a körzeti előrejelzéseknek két szakaszt kell tartalmazniuk: az I. Szakasz a kismagasságú repülésekre veszélyes útvonali időjárás jelenségekről szóló információkra vonatkozik, amelyek AIRMET információk kiadásának alátámasztására készülnek, és a II. Szakasz, amely a kismagasságú repülések által igényelt kiegészítő információkra vonatkozik. A GAMET területi előrelzés által tartalmazott elemeknek és sorrendjüknek, amikor készülnek, meg kell felelniük az A5-4 Táblázatban bemutatott mintának. A II. Szakasz által tartalmazott kiegészítő elemeknek a regionális léginavigációs egyezménnyel összhangban kell lenniük. Azokat az elemeket, amelyeket egy SIGMET előrejelzés már érintett, a GAMET körzeti előrejelzésekből ki kell hagyni.

4.2 GAMET körzeti előrejelzések módosításai

Ha a kismagasságú repülésekre veszélyes jelenség szerepelt a GAMET területi előrejelzésben, és az előre jelzett jelenség nem fordul elő, vagy már nincs előrejelezve, egy GAMET AMD-t kell kiadni, amely csak a szóbanforgó időjárás elemet módosítja.
Megjegyzés. – A kismagasságú repülésekre veszélyes időjárás jelenségekre vonatkozó körzeti előrejelzést módosító AIRMET információ kiadását érintő előírások a 6. Függelékben találhatók.

4.3 Kismagasságú repülésekre vonatkozó, térkép formájú körzeti előrejelzések tartalma

4.3.1 Amikor kismagasságú repüléseket érintő körzeti előrejelzésekhez térkép formát használnak, a magassági szél és magaslégköri hőmérséklet előrejelzéseket egymástól nem több, mint 500 km (300 tengeri mérföld) távolságra lévő pontokra és legalább a következő tengerszint feletti magasságokra: 600, 1500 és 3000 m (2000, 5000 és 10000 láb, és 4500 m(15000 láb) hegyes területeken.
4.3.2 Amikor kismagasságú repüléseket érintő körzeti előrejelzésekhez térkép formát használnak, a SIGWX jelenségekre vonatkozó előrejelzést alacsonyszintű SIGWX előrejelzésként kell kiadni a 100-as repülési magasságszint (vagy 150-es magasságszint hegyes területeken, vagy ahol szükséges, ennél magasabb) alatti repülési szintekre. Alacsonyszintű SIGWX előrejelzéseknek a következő tételeket kell tartalmazniuk:
a) SIGMET kiadását indokoló jelenségek, a 6. Függelékben megadottak szerint, és amelyek várhatóan hatással vannak a kismagaságú repülésekre; és
b) a kismagasságú repülésekre vonatkozó körzeti előrejelzésekben szereplő elemek az A5-4 Táblázat szerint, kivéve azalábbi elemekre vonatkozókat:
1) magassági szelek és magaslégköri hőmérséklet; és
2) QNH előrejelzés.
Megjegyzés. – Az „ISOL", „OCNL" és „FRQ"cumulonimbus és tornyosuló cumulus felhőkre vonatkozó terminusokra a 6. Függelék tartalmaz útmutatást.

4.4 Kismagasságú repülések részére készített körzeti előrejelzések cseréje

Kismagasságú repülések részére szóló körzeti előrejelzéseket, amelyeket az AIRMET információk kiadásának alátámasztására készítenek, az illetékes repülési információs körzetekben végzett kismagasságú repülések részére történő kiadásáért felelős meteorológiai irodáknak egymás között cserélniük kell.

A5-1 táblázat Minta TAF-ra
Kulcs: M = kötelező bevitel, minden közlemény része;
C = feltételes bevitel, meteorológiai körülményektől függ;
O = fakultatív bevitel.
1. Megjegyzés. – A TAF-ban szereplő numerikus elemek tartományait és felbontásait ennek a függeléknek az A5-3 táblázata mutatja be.
2. Megjegyzés. – A rövidítések magyarázata a Procedures for Air Navigation Services – ICAO Abbreviations and Codes (Léginavigációs szolgálati eljárások – ICAO rövidítések és kódok) *(PANS-ABC, Doc 8400)kiadványban található.*
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A 6. Fejezetben meghatározottak szerinti elem	*Részletes tartalom*	*Minta (Minták)*	*Példák*
Az előrejelzés típusának azonosítása (M)	Az előrejelzés típusa(M)	TAF *vagy* TAF AMD *or* TAF COR	TAF TAF AMD
Hely jelzés (M)	ICAO hely jelzés (M)	nnnn	YUDO[1]
Az előrejelzés	Az előrejelzés kiadá-	nnnnnnZ	160000Z

kiadásának időpontja (M)	sának dátuma és időpontja UTC (M)				
Hiányzó előrejelzés azonosítása (C)	Hiányzó előrejelzés azonosító (C)	NIL			NIL
A TAF vége, ha az előrejelzés törölve					
Az előrejelzés érvényességének napja és időszaka (M)	Az előrejelzés érvényességének napja és időszaka UTC (M)	nnnn/nnnn			1606/1624 0812/0918
Törölt előrejelzés azonosítása (C)	Törölt előrejelzés azonosító (C)	CNL			CNL
A TAF vége, ha az előrejelzést törölték					
Talajszél (M)	Szélirány (M)	nnn *vagy* VRB[2]			24015KMH; VRB04KMH (24008KT); (VRB02KT) 19022KMH (19011KT) 00000KMH (00000KT) 140P199KMH (140P99KT) 12012 G35KMH (12006G18KT) 24032G54KMH (24016G27KT)
	Szélsebesség (M)	[P]nn[n]			
	Jelentős sebesség változások (C)[3]	G[P]nn[n]			
	Mértékegységek(M)	KMH (*vagy* KT)			
Látás (M)	Domináns látás (M)	nnnn		C A V O K	0350 CAVOK 7000 9000 9999
Időjárás (C)[4, 5]	Az időjárás jelenség intenzitása (C)[6]	- *vagy* +	–		

	Az időjárás jelenségek jellemzői és típusa (C)[7]	DZ *vagy* RA *vagy* SN *vagy* SG *vagy* PL *vagy* DS *vagy* SS *vagy* FZDZ *vagy* FZRA *vagy* SHGR *vagy* SHGS *vagy* SHRA *vagy* SHSN *vagy* TSGR *vagy* TSGS *vagy* TSRA *vagy* TSSN		IC *vagy* FG *vagy* BR *vagy* SA *vagy* DU *vagy* HZ *vagy* FU *vagy* VA *vagy* SQ *vagy* PO *vagy* FC *vagy* TS *vagy* BCFG *vagy* BLDU *vagy* BLSA *vagy* BLSN *vagy* DRDU *vagy* DRSA *vagy* DRSN *vagy* FZFG *vagy* MIFG *vagy* PRFG		RA HZ +TSRA FG -FZDZ PRFG +TSRASN SNRA FG
Felhő (M)[8]	Felhőmennyiség és az alap magasága vagy függőleges látás (M)	FEWnnn *vagy* SCTnnn *vagy* BKNnnn *vagy* OVCnnn	VVnnn *vagy* VV ///	NSC		FEW010 VV005 OVC020 VV/// NSC SCT005 BKN012 SCT008 BKN025CB
	Felhő fajta (C)[4]	CB	–			
Hőmérséklet (O)[9]	Az elem neve (M)	TX				TX25/1013Z TN09/1005Z TX05/2112Z TNM02/2103Z
	Maximális hőmérséklet (M)	[M]nn/				
	A maximális hőmérséklet fellépésének napja és időpontja(M)	nnnnZ				
	Az elem neve (M)	TN				
	Minimális hőmérséklet (M)	[M]nn/				
	A minimális hőmérséklet fellépésének napja és időpontja(M)	nnnnZ				
A fenti elemek közül egynek vagy többnek az érvényességi időszak alatti várható lényeges változásai (C)[4, 10]	Változási vagy valószínűség jelző (M)	PROB30 [TEMPO] *vagy* PROB40 [TEMPO] *vagy* BECMG *vagy* TEMPO *vagy* FM				
	A változás vagy megjelenés időszaka (M)	nnnn/nnnn				TEMPO 0815/0818

	Szél (C)[4]	nn[P]nn[n][G[P]nn[n]]KMH *vagy* VRBnnKMH (*vagy* nnn[P]nn[G[P]nn]KT *vagy* VRBnnKT)				25070G100KMH (TEMPO 0815/0818 25035G50KT) TEMPO 2212/2214 17025G50KMH 1000 TSRA SCT010CB BKN020 (TEMPO-2212/2214 17012G25KT 1000 TSRA SCT010CB BKN020) BECMG 3010/3011 00000KMH 2400 OVC010 (BECMG 3010/3011 00000KT 2400 OVC010) PROB30 1412/1414 0800 FG BECMG 1412/1414 RA TEMPO 2503/2504 FZRA TEMPO 0612/0615 BLSN PROB40 TEMPO 2923/3001 0500 FG
	Domináns látás (C)[4]	nnnn			C A V O K	
	Időjárás jelenség: intenzitás (C)[6]	-vagy+	–	NSW		
	Időjárás jelenség: jellemzők és típus (C)[4, 7]	DZ *vagy* RA *vagy* SN *vagy* SG *vagy* PL *vagy* DS *vagy* SS *vagy* FZDZ *vagy* FZRA *vagy* SHGR *vagy* SHGS *vagy* SHPL *vagy* SHSN *vagy* TSGR *vagy* TSGS *vagy* TSRA *vagy* TSSN	IC *vagy* FG *vagy* BR *vagy* SA *vagy* DU *vagy* HZ *vagy* FU *vagy* VA *vagy* SQ *vagy* PO *vagy* FC *vagy* TS *vagy* BCFG *vagy* BLDU *vagy* BLSA *vagy* BLSN *vagy* DRDU *vagy* DRSA *vagy* DRSN *vagy* FZFG *vagy* MIFG *vagy* PRFG			
	Felhő mennyiség és felhőalap magasság vagy függőleges látás (C)[4]	FEWnnn *vagy* SCTnnn *vagy* BKNnnn *vagy* OVCnnn	VVnnn *vagy* VV///	NSC		FM051230 15015KMH 9999 BKN020 (FM051230 15008KT 9999 BKN020) BECMG 1618/1620 8000 NSW NSC BECMG 2306/2308 SCT015CB BKN020

Megjegyzések:

1. Fiktív hely.
2. Az 1.2.1 pontnak megfelelően kell használni.
3. Az 1.2.1 pontnak megfelelően kell tartalmazni.
4. Akkor kell tartalmazni, ha alkalmazható.
5. Egy vagy több, maximum három csoport, 1.2.3 pontnak megfelelően.

6. Akkor kell tartalmazni, ha odavonatkozik, az 1.2.3 pontnak megfelelően. Nincs minősítő *mérsékelt* intenzitásnál.
7. 1.2.3 pontnak megfelelő időjárás jelenségeket kell szerepeltetni.
8 Maximálisan négy felhőréteg, az 1.2.4 pontnak megfelelően.
9. Az 1.2.5 pontnak megfelelően kell tartalmazni.
10. Az 1.3, 1.4 és 1.5 pontoknak megfelelően kell tartalmazni.

A5-2 táblázat Változás- és idő jelzők használata TAF-ban

Változás vagy idő jelző		*Időszak*	*Jelentés*	
FM		$n_dn_dn_hn_hn_mn_m$	több időjárás elemben, n_hn_h óra n_mn_m perckor (UTC) fellépő jelentős változás jelölésére használják; az összes „FM” előtt megadott elemet tartalmaznia kell az „FM” után következőknek (azaz ezeket a rövidítést követők hatálytalanítják	
BECMG			a változás kezdetének előrejelzése nap és óra(UTC), és befejeződésének előrejelzése nap és óra (UTC); csak azokat az elemeket kell a „BECMG” után megadni, amelyek változását előrejelzik; az időszakasznak általában kisebbnek kell lenni, mint 2 óra és semmi esetre sem haladhatja meg a 4 órát	
TEMPO			átmeneti ingadozások elkezdődésének előrejelzése napra és órára (UTC), megszűnésének előrejelzése órára (UTC); csak azokat az elemeket kell a „TEMPO” után megadni, amelyek ingadozását előrejelzik; az átmeneti ingadozások nem tarthatnak tovább egy óránál az egyes esetekben, és összességében az időszakasznak kevesebb, mint a felét fedhetik le.	
PROBnn	–		az előrejelzett elem vagy elemek egy alternatív értékének előfordulási valószínűsége (%-ban); csak nn=30 vagy nn=40; a megfelelő elem(ek) után elhelyezve	–
	TEMPO			átmeneti ingadozások fellépésének valószínűsége

A5-3 Táblázat. Tartományok és felbontások TAF által tartalmazott numerikus elemekhez

A 6. Fejezetben meghatározottak szerinti elem		*Tartomány*	*Felbontás*
Szélirány	földrajzi fok	000–360	10
Szélsebesség	KMH KT	00–399* 00–199*	1 1
Látás	M M M M	0000–0800 0800–5000 5000–9000 9000–9999	50 100 1000 999
Függőleges látás	30's M (100's FT)	000–020	1
Felhőalap magassága	30's M (100's FT)	000–100	1
Levegő hőmérséklet (maximum és minimum)	°C	-80–+60	1
*Nincs repülési követelmény arra, hogy 200km/h (100 csomó) vagy nagyobb sebességű talajszelet jelentsenek, azonban rendeletet hoztak nem-repülési célokra szolgáló jelentések készítésére 399 km/h (199 csomó) szélsebességig, szükség szerint.			

A5-4 Táblázat. Minta GAMET-hez

Kulcs: M = kötelező bevitel, minden közlemény része;
C = feltételes bevitel, meteorológiai körülményektől függ;
O = fakultatív bevitel;
= = kettős vonal azt jelöli, hogy az ezt követő szöveget a következő sorba kell elhelyezni.

Elem	*Részletes tartalom*	*Minta*	*Példák*
FIR/CTAjelzőjének helye (M)	A FIR-t vagy CTA-t, amelyre a GAMET vonatkozik, kiszolgálóATS egység ICAO hely jelzője (M)	nnnn	YUCC[1]
Azonosítás (M)	Közlemény azonosítás (M)	GAMET	GAMET
Érvényességi időszak (M)	Az érvényességi időszakot jelző nap/időpont csoportok UTC	VALID nnnnnn/nnnnnn	VALID 220600/221200
A meteorológiai iroda hely jelzője (M)	Meteorológiai iroda, amelytől a közlemény származik, hely jelzője eloválasztó kötőjellel (M)	Nnnn-	YUDO[1]
FIR/CTA vagy részének neve (M)	FIR/CTA vagy részének, amelyre a GAMET-et kiadták, hely jelölője és neve (M)		YUCC AMSWELL FIR/2 BLW FL 120 YUCC AMSWELL FIR

Elem	*Részletes tartalom*	*Minta*			*Példák*
		Azonosító és időpont	*Tartalom*	*Hely*	
Szakasz kezdetének jelölője (M)	Jelölő a Szakasz kezdetének azonosítására	SECN 1			SECN 1
Talajszél (C)	60 km/h-t (30 csomó) meghaladó kiterjedt talajszél	SFC WSPD: [nn/nn]	[n]nn KMH (*vagy* [n]nn KT)	[N of Nnn *vagy*Snn] *vagy*[S of NN *vagy* Snn] *vagy* W of Wnnn *vagy* Ennn] *vagy* [E of Wnnn *vagy* Ennn] *vagy* [nnnnnnnnnn][2]	SFC WSPD: 10/12 65 KMH SFC WSPD: 40 KT E OF W110
Talajmenti látás (C)	Kiterjedt talajmenti látás 5000 m-nél kisebb, benne a látás csökkenését okozó időjárás jelenségek	SFC VIS: [nn/nn]	nnnn M FG *vagy* BR *vagy* SA *vagy* DU *vagy* HZ *vagy* FU *vagy* VA *vagy* PO *vagy* DS *vagy* SS *vagy* DZ *vagy* RA *vagy* SN *vagy* SG *vagy* IC *vagy* FC *vagy* GR *vagy* GS *vagy* PL *vagy* SQ		SFC VIS: 06/08 3000 M BR N of N51

Szignifikáns időjárás (C)	Zivatarokat és heves homokvihart és porvihart magában foglaló szignifikáns időjárási időjárási körülmények	SIGWX: [nn/nn]	ISOL TS *vagy* OCNL TS *vagy* FRQ TS *vagy* OBSC TS *vagy* EMBD TS *vagy* HVY DS *vagy* HVY SS *vagy* SQL TS *vagy* ISOL TSGR *vagy* OCNL TSGR *vagy* FRQ TSGR *vagy* OBSC TSGR *vagy* EMBD TSGR *vagy* SQL TSGR *vagy* VA		SIGWX: 11/12 ISOL TS SIGWX: 12/14 SS S OF N35
Hegyi takarás (C)	Hegyi takarás	MT OBSC: [nn/nn]	nnnnnnnnnn[2]		MT OBSC: MT PASSES S OF N48
Felhő (C)	Kisebb, mint 300m (1000 láb) földfeletti (AGL) vagy közepes tengerszint feletti AMSL) felhőalap magasságú szakadozott *vagy* összefüggő felhő kiterjedt területei, *és/vagy*cumulonimbus (CB) *vagy* tornyos cumulus (TCU) felhők bármilyen előfordulása.	SIG CLD: [nn/nn]	BKN *vagy* OVC nnn[n]/nnn[n] M (*vagy* nnn[n]/nnn[n] FT) AGL *vagy* AMSL ISOL *vagy* OCNL *vagy* FRQ *vagy* OBSC *vagy* EMBD CB[3] *vagy* TCU[3] nnn[n]/nnn[n] M (*vagy* nnn[n]/nnn[n] FT) AGL *vagy* AMSL		SIG CLD: 06/09 OVC 800/1100 FT AGL N OF N51 10/12 ISOL TCU 1200/8000 FT AGL
Jegesedés (C)	Jegesedés (kivéve, amikor konvektív felhőkben fordul elő, és erős jegesedést, amelyre már SIGMET tájékoztatást kiadtak)	ICE: [nn/nn]	MOD FLnnn/nnn *vagy* MOD ABV FLnnn *vagy* SEV FLnnn/nnn *vagy* SEV ABV FLnnn		ICE: MOD FL050/080
Turbulencia (C)	Turbulencia (kivéve, amikor konvektív felhőkben fordul elő, és erős turbulenciát, amelyre már SIGMET tájékoztatást kiadtak)	TURB: [nn/nn]	MOD FLnnn/nnn *vagy* MOD ABV FLnnn *vagy* SEV FLnnn/nnn *vagy* SEV ABV FLnnn		TURB: MOD ABV FL090

Hegyi hullám (C)	Hegyí hullám (kivéve az erős hegyi hullámot, amelyre már SIGMET tájékoztatást kiadtak)	MTW: [nn/nn]	MOD FLnnn/nnn *vagy* MOD ABV FLnnn *vagy* SEV FLnnn/nnn *vagy* SEV ABV FLnnn		MTW: MOD ABW FL080 N OF N63
SIGMET (C)	Az illetékes FIR/CTA-ra, vagy annak egy alkörzetére, amelyre a körzeti előrejelzés érvényes. alkalmazható SIGMET üzenetek	SIGMET APPLICABLE:	n [,n] [,n]		SIGMET APPLICABLE: 3,5
vagy HAZARDOUS WX NIL ©[4]		HAZARDOUS WX NIL			HAZARDOUS WX NIL
II. Szakasz kezdetének jelzője (M)	II. Szakasz kezdetének azonosítási jelzője (M)	SECN II			SECN II
Nyomásközéppontok és frontok (M)	Nyomásközéppontok és frontok és várható mozgásaik és alakulásaik	PSYS: [nn]	L [n]nnn HPA *vagy* H [n]nnn HPA *vagy* FRONT *vagy* NIL	Nnnn *vagy* Snnn Wnnnnn *vagy* Ennn *vagy* Nnnn *vagy* Snnnn Wnnnnn *vagy* Ennnnn TO Nnnnn *vagy* Snnnn Wnnnnn *vagy* Ennnnn	PSYS: 06 L 1004 HPA N5130 E01000 MOV NE 25KT WKN
			MOV N *vagy* NE *vagy* E *vagy* SE *vagy* S *vagy* SW *vagy* W *vagy* NW nnKMH (nnKT) WKN *vagy* NC *vagy* INTSF	-	
Magassági szelek és magaslégköri hőmérsékletek (M)	Magassági szelek és magaslégköri hőmérsékletek a következő tengerszint feletti magasságokra: 600, 1500 és 3000 m (2000, 5000 és10000 láb)	WIND/T:	[n]nnn M (*vagy*[n]nnn FT) nnn/[n]nn KMH (*vagy* nnn/[n]nn KT) PSnn *vagy* MSnn	Nnnnn *vagy* Snnnn Wnnnnn *vagy* Ennnnn *vagy* [N of Nnn *vagy* Snn] *vagy* [W of Wnnn *vagy* Ennn] *vagy* [E of Wnnn *vagy* Ennn] *vagy* [nnnnnnnnnn][2]	WIND/T:2000 T 270/70 KMH PS03 5000 FT 250/280 KMH MS02 FT 240/85 KMH MS11
Felhő (M)	Az I. Szakasz által nem tartalmazott felhő információk, amelyek a felhőalap és felhő tető föld feletti (AGL), vagy közepes tengerszit feletti (AMSL) magasságát adják meg	CLD: [nn/nn]			CLD: BKN SC 2500/8000 FT AGL
Fagyás szint (M)	A 0°C szint(ek) földfeletti (AGL) vagy közepes tengerszint feletti (AMSL) magasság jelző, ha alacsonyabb, mint a légtér, amelyre az előrejelzés vonatkozik, teteje	FZLVL:	[ABV] nnnn FT AGL *vagy* AMSL		FZLVL: 3000 FT AGL

QNH előrejelzés (M)	Az érvényességi időszak alatti legalacsonyabb QNH előrejelzés	MNM QNH:	[n]nnn HPA		MNM QNH: 1004 HPA
Tengerszint hőmérséklet és a tenger állapota (O)	Tengerszint hőmérséklet és a tenger állapota, ha a regionális léginavigációs egyezmény megköveteli	SEA:	Tnn HGT [n]n M		SEA: T15 HGT 5 M
Vulkánkitörések (M)	Vulkán neve	VA:	nnnnnnnnnn *vagy* NIL		VA: ETNA

Megjegyzések.–

1. Fiktív hely.
2. Jólismert földrajzi helyek szabadszöveges leírását minimumon kell tartani.
3. CB és/vagy TCU helyét meg kell adni szakadozott vagy összefüggő felhő bármely kiterjedt területe mellett, ahogyan a példában meg van adva.
4. Amikor az I. Szakaszban nincsenek elemek.

A5-1 példa. TAF

*TAF YUDO-ra (Donlo/International)**

TAF YUDO 160000Z 1606/1624 13018KMH 9000 BKN020 BECMG 1606/1608 SCT015CB BKN020 TEMPO 1608/1612 17025G45KMH 1000 TSRA SCT010CB BKN020 FM161230 15015KMH 9999 BKN020

Az előrejelzés értelmi jelentése:

Repülőtéri előrejelzés Donlon Nemzetközi Repülőtérre*, amelyet a hónap 16-án 0000 UTC-kor adtak ki, érvényes a hónap 16-án 0600 UTC-től 2400 UTC-ig; talajszél iránya 130 fok; szélsebesség 18 km/óra; látás 9 kilométer, szakadozott felhő 600 méteren; 0600 UTC és 0800 UTC között, szétszórt cumulonimbus.felhővé válva 450 méteren és szakadozott felhővé 600 méteren; a hó 16-án 0800 UTC és 1200 UTC között időnként a talajszél iránya 170 fok; szélsebesség 25 km/óra 45 km/órás, lökésekkel; látás 1000 méter mérséklelt esővel kísért zivatarban; szétszórt cumulonimbus felhő 300 méteren és szakadozott felhő 600 méteren; a hó 16. 1230 UTC-től talajszél iránya 150 fok; szélsebesség 15 km/óra; látás 10 kilométer vagy több; szakadozott felhő 600 méteren.

*Fiktív hely

Megjegyzés. – Ebben a példában az elsődleges mértékegységeket, a „kilométer per órát” illetve a „métert” használtuk a szélsebesség illetve a felhöalap magasságára vonatkozóan. Az 5. Annex előírásainak megfelelően, helyettük a vonatkozó, nem-SI szerinti alternatív mértékegységek, a „csomó” illetve a „láb” használható.

A5-2 példa. TAF törlése

*TAF törlése Zudo-ra (Donlon/International)**

TAF AMD YUDO 161500Z 160624 CNL

Az előrejelzés jelentése:

Módosított TAF Donlon/Internationalra* a hó 16.-án 1500 UTC-kor kiadva, amely törli az előzőleg kiadott, a hó 16.-án 0600 UTC-től 2400 UTC-ig érvényes TAF-t

*Fiktív hely

A5-3 példa. GAMET területi előrejelzésre

YUCC GAMET VALID 220600/221200 YUDO
YUCC AMSWELL FIR/2 BLW FL100
SECN 1
SFC WSPD: 10/12 65 KMH
SFC VIS: 06/08 3000 M BR N OF N51
SIGWX: 11/12 ISOL TS
SIG CLD: 06/09 OVC 800/1100 FT AGL N OF N51 10/12 ISOL TCU 1200/8000 FT AGL
ICE: MOD FL050/080
TURB: MOD ABV FL090
SIGMETS APPLICABLE: 3,5
SECN II
PSYS: 06 L 1004 HPA N51.5 E10.0 MOV NE 25 KT WKN
WIND/T: 2000 FT 270/70 KMH PS03 5000 FT 250/80 KMH MS02 10000 FT 240/85 KMH MS11
CLD: BKN SC 2500/8000 FT AGL
FZLVL:3000 FT AGL
MNM QNH: 1004 HPA
SEA: T15 HGT 5M
VA: NIL

Jelentése: körzeti előrejelzés kismagasságú repülések részére (GAMET), a Donlon/International* meteorológiai iroda (YUDO) adott ki az Amswell* repülési információs régió 2. sz. alterülete (YUCC Amswell területi irányító központ által azonosított) számára a 100-as repülési magasságszit alatti légtérre;a közlemény érvényes a hó 22.-én 0600 UTC-től 1200 UTC-ig.

I. Szakasz:
talajszél sebesség: 1000 UTC és 200 UTC között 65 kilométer per óra;
talajmenti látás: 0600 UTC és 0800 UTC között 3000 méter az 51-es északi szélességi körtől északra; (párásság miatt);
szignifikáns időjárás jelenségek:: 1100 UTC és 1200 UTC között izolált zivatarok jégeső nélkül;
szignifikáns felhők: 0600 UTC és 0900 UTC között összefüggő felhő alap 800, tető 1100 láb föld feletti magasságon az 51-es északi szélességi körtől északra; 1000 UTC és 1200 között izolált tornyosuló cumulus felhőalap 1200, felhőtető 8000 láb föld feletti magasság szinten;
jegesedés: mérsékelt 050 és 080 repülési magasságszint között;
turbulencia: mérsékelt a 090-es repülési magasságszint felett (legalább a 100-as repülési magaságszintig);
SIGMET közlemények: 3 és 5 alkalmazható az érvényességi időszakra és az érintett al-területre;

II. Szakasz:
nyomás rendszerek: 0600 UTC-kor 1004 hektopascal alacsony nyomás északi 51,5 foknál, keleti 10,0 foknál, várható mozgás észak-kelet felé 25 csomó sebességgel és gyengül;
szelek és hőmérsékletek: 2000 láb föld feletti magasság szinten a szélirány 270 fok; szélsebesség 70 kilométer per óra, hőmérséklet plusz 3 fok Celsius; 5000 láb föld feletti magasság szinten a szélirány 250 fok; szélsebesség 80 kilométer per óra, hőmérséklet mínusz 2 fok Celsius; 10000 láb föld feletti magasságon a szélirány 240 fok; szélsebesség 85 kilométer per óra, hőmérséklet mínusz 11 fok Celsius;
felhők: szakadozott stratocumulus, felhőalap 2500 láb, felhőtető 800 láb föld feletti magasságon ;
fagyás szint: 3000 láb föld feletti magasság szinten;
minimum QNH: 1004 hektopascal;

tenger: felület hőmérséklete:	15 fok Celsius; és tenger állapot 5 méter;
vulkanikus hamu:	nincs.
*Fiktív helyek	

6. FÜGGELÉK. SIGMET ÉS AIRMET TÁJÉKOZTATÁSRA, REPÜLŐTÉRI FIGYELMEZTETÉSEKRE ÉS SZÉLNYÍRÁSRA VONATKOZÓ MŰSZAKI ELŐÍRÁSOK

(Lásd jelen Annex 7. Fejezet)

Megjegyzés. – A SIGMET, AIRMET, trópusi ciklon és vulkánikus hamu tájékoztató közlemények rövidített címeiben használt adattípus jelölések a WMO 386 számú kiadványában, Globális távközlési rendszer kézikönyv (Manual on Global Telecommunication System) *vannak megadva.*

1. SIGMET TÁJÉKOZTATÁSRA VONATKOZÓ ELŐÍRÁSOK

1.1 SIGMET közlemények formátuma

1.1.1 A SIGMET közlemény tartalmának és elemei sorrendjének az A6-1. táblázatban bemutatott mintával kell összhangban lennie.
1.1.2 A szubszonikus légijárművek számára adott SIGMET információkat tartalmazó közleményeket „SIGMET” jelöléssel kell azonosítani.
1.1.3 Az A6-1 táblázatban lévő mintában hivatkozott sorszámnak meg kell egyeznie azoknak a SIGMET közleményeknek a számával, amelyet az adott napon 0001 UTC óta a repülési információs régió számára kiadtak. A „SIGMET" és „SIGMET SST” közleményeket külön kell sorszámozni. A meteorológiai megfigyelő irodáknak, amelyeknek felelősségi területébe egynél több FIR és/vagy CTA tartozik, a felelősségi területébe tartozó mindegyik FIR és/vagy CTA részére külön SIGMET közleményt kell kiadni.
1.1.4 Az A6-1 táblázatban lévő mintának megfelelően, a SIGMET közleménynek a következő jelenségeknek csak egyikét kell tartalmaznia, az alább bemutatott rövidítéseket használva:
a) szubszonikus utazó magasságokon:

zivatar	
– takart	OBSC TS
– beágyazott	EMBD TS
– gyakori	FRQ TS
– széllökés vonali	SQL TS
– takart, jégesővel	OBSC TSGR
– beágyazott, jégesővel	EMBD TSGR
– gyakori, jégesővel	FRQ TSGR
– széllökésvonali, jégesővel	SQL TSGR
trópusi ciklon	
– trópusi ciklon	TC (+ciklon neve)
– 10 perces 63 km/h	
– (34 csomó) vagy nagyobb közepes talajszél-sebességű	
turbulencia	
– erős turbulencia	SEV TURB
jegesedés	
– erős jegesedés	SEV ICE

– erős jegesedés ónos eső miatt	SEV ICE (FZRA)
hegyi hullám	
– erős hegyi hullám	SEV MTW
porvihar	
– erős porvihar	HVY DS
homokvihar	
– erős homokvihar	HVY SS
vulkanikus hamu	
– vulkanikus hamu	VA (+ vulkán neve, ha ismert)
radioaktív felhő	RDOACT CLD

1.1.5 A SIGMET tájékoztatás nem tartalmazhat szükségtelen leíró részeket. A SIGMET kiadását előidéző időjárási jelenség leírása a 1.1.4 pontban megadottakon túlmenő leíró anyagot nem tartalmazhat. Zivatarokra és trópusi ciklonokra vonatkozó SIGMET tájékoztatások nem tartalmazhatnak hivatkozást velük társult turbulenciára és jegesedésre.
1.1.6 **Ajánlás.** – *Az erre alkalmas pozícióban lévő meteorológiai megfigyelő irodáknak SIGMET tájékoztatást kell kiadniuk vulkánikus hamu felhőről és trópusi ciklonokról grafikus formában, a WMO BUFR kódformát használva, még ugyanezen SIGMET tájékoztatásnak a 1.1.1 pontnak megfelelő rövidített köznyelven való kiadásán felül.*
Megjegyzés. – A BUFR kód formát a WMO 306 sz. kiadványa, Kód kézikönyv (Manual on Codes) *1.2. Kötet B Rész – Bináris kódok, tartalmazza.*
1.1.7 **Ajánlás. –** *A SIGMET-nek, ha grafikus formátumban adják ki, az 1. Függelékben előírtaknak megfelelőnek kell lennie.*

1.2 SIGMET közlemények terjesztése

1.2.1 A SIGMET közleményeket a meteorológiai figyelő irodák, WAFC-k és más meteorológiai irodák részére a regionális léginavigációs egyezményeknek megfelelően kell szétküldeni. A vulkanikus hamura vonatkozó SIGMET közleményeket a VAAC-oknak is el kell küldeni.
1.2.2 A SIGMET közleményeket továbbítani kell a nemzetközi OPMET adatbankokba, és a regionális léginavigációs egyezmény által repülési helyhezkötött szolgálati műholdas elosztó rendszerek működtetésére kijelölt központokhoz, a regionális léginavigációs egyezményekkel összhangban.

2. AIRMET INFORMÁCIÓKRA VONATKOZÓ ELŐÍRÁSOK

2.1 AIRMET közlemények formátuma

2.1.1 Az AIRMET közlemény tartalmának és elemei sorrendjének az A6-1 táblázatban bemutatott mintával kell összhangban lennie.
2.1.2 Az A6-1 táblázatban lévő mintában hivatkozott sorszámnak meg kell egyeznie azoknak az AIRMET közleményeknek a számával, amelyet az adott napon 0001 UTC óta a repülési információs régió számára kiadtak. A meteorológiai megfigyelő irodáknak, amelyeknek felelősségi területébe egynél több FIR és/vagy CTA tartozik, a felelősségi területébe tartozó mindegyik FIR és/vagy CTA részére külön AIRMET közleményt kell kiadni.
2.1.3 A repülési információs régiót, ha szükséges, alterületekre lehet osztani.
2.1.4 Az A6-1 táblázatban lévő mintának megfelelően, az AIRMET közleménynek a következő jelenségeknek csak egyikét kell tartalmaznia, az alább bemutatott rövidítéseket használva:

A 100-as repülési magasságszint alatti (vagy hegyes területen a 150-es repülési magasságszint alatti vagy ha szükséges, ennél is magasabb szint alatti) utazó magasságokon:

talajszél sebesség	
– nagykiterjedésű közepes talajszél sebesség 60 km/h (30 csomó) felett	SFC WSPD (+szélsebesség és egységei)
felszíni látás	
– a látásnak 5000 m-nél kisebbre csökkenése által befolyásolt nagykiterjedésű területek, amelyek magukbafoglalják a látás csökkenését okozó időjárás jelenséget	SFC VIS (+látás) (+a következő időjárási jelenségek illetve ezek kombinációinak valamelyike BR, DS, DU, DZ, FC FG, FU, GR, GS, HZ IC, PL PQ, RA, SA, SG SN, SQ SS, vagy VA)
zivatarok	
– izolált zivatarok jégeső nélkül	ISOL TS
– esetenkénti zivatarok jégeső nélkül	OCNL TS
– izolált zivatarok jégesővel	ISOL TSGR
– esetenkénti zivatarok jégesővel	OCNL TSGR
– hegytakarás	
–eltakart hegyek	MT OBSC
felhő	
–kisebb, mint 300 m (1000 láb) föld feletti felhőalap magassággal rendelkező szakadozott vagy összefüggő felhőzet kiterjedt területei	
–szakadozott és	BKN CLD (+felhőalap és tetőmagasság egységek)
–összefüggő felhőtakaró	OVC CLD (+felhőalapés tetőmagasság és egységek)
– cumulonimbus felhők, amelyek:	
– izolált	ISOL CB
– esetenkénti	OCNL CB
– gyakori	FRQ CB
– tornyos cumulus felhők, amelyek:	
– izolált	ISOL TCU
– esetenként	OCNL TCU
– gyakori	FRQ TCU
– jegesedés	
– mérsékelt jegesedés (kivéve a jegesedést konvektív felhőkben)	MOD ICE
– turbulencia	
– mérsékelt turbulencia (kivéve a turbulenciát konvektív felhőkben)	MOD TURB
– hegyi hullám	
– mérsékelt hegyi hullám	MOD MTW

2.1.5 AIRMET információ szükségtelen leíró anyagot nem tartalmazhat. Az időjárás jelenségek, amelyre az AIRMET-et kiadják, leírása nem tartalmazhat a 2.1.4-ben megadottakhoz képest további leíró anyagot. Zivatarokkal, vagy cumulonimbus felhőkkel foglalkozó AIRMET információ nem tartalmazhat kísérő turbulenciára és jegesedésre vonatkozó utalást.

Megjegyzés. –Kismagasságú repülésekhez is használható SIGMET tájékoztatásokra vonatkozó előírásokat az 1.1.4 pont tartalmaz.

2.2 SIGMET közlemények terjesztése

2.2.1 **Ajánlás** – *Az AIRMET közleményeket a szomszédos repülési információs régiókban lévő meteorológiai irodák és más meteorológiai irodák részére kell szétosztani, ahogyan az illetékes meteorológiai hatóságok megállapodtak.*
2.2.2 **Ajánlás. –** *Az AIRMET közleményeket továbbítani kell a nemzetközi üzemelési meteorológiai adatbankokba, és a regionális léginavigációs egyezmény által a repülési helyhezkötött szolgálati műholdas elosztó rendszerek működtetésére kijelölt központokhoz, a regionális léginavigációs egyezményekkel összhangban.*

3. KÜLÖNLEGES LÉGIJELENTÉSEKRE VONATKOZÓ ELŐÍRÁSOK

Megjegyzés. – Ez a függelék különleges légijelentések felfelé kapcsolatával foglalkozik. A különleges légijelentésekre vonatkozó általános leírások a 4. Függelékben találhatók.
3.1 **Ajánlás. –** *Különleges légijelentéseket kiadásuk utáni 60 perc során kell felküldeni.*
3.2 **Ajánlás. –** *Az automatizált különleges légijelentésekben lévő szél és hőmérséklet információkat nem kell felküldeni más, repülést végző légijárműveknek.*

4. SIGMET ÉS AIRMET KÖZLEMÉNYEKRE ÉS KÜLÖNLEGES LÉGIJELENTÉSEKRE (FELFELÉ KAPCSOLAT) VONATKOZÓ RÉSZLETES KRITÉRIUMOK

4.1 Repülési információs régió azonosítása

Ajánlás. – *Azokban az esetekben, amikor a légtér repülési információs régióra (FIR) és magassági repülési információs régióra (UIR) van felosztva, a SIGMET-et a FIR-t kiszolgáló légiforgalmi irányítási szolgálati egység hely jelzőjével kell azonosítani.*
Megjegyzés. – A SIGMET közlemény a FIR laterális határain belül a teljes légtérre érvényes, azaz a FIR-re és az UIR-re. A SIGMET kiadását szükségessé tevő időjárási jelenségek által befolyásolt részterületek és/vagy repülési magasságszintek a közlemény szövegében meg vannak adva.

4.2 A SIGMET és AIRMET közleményekben és különleges légijelentésekben tartalmazott jelenségekre vonatkozó kritériumok

4.2.1 **Ajánlás –** *Zivatarok és cumulonimbus felhők területei lehetnek:*
a) takart (OBSC), ha homály vagy füst borítja, vagy sötétség miatt nem látszik felismerhetően;
b) beágyazott (EMBD), ha felhőrétegek közé van beágyazódva és nem ismerhető fel;
c) izolált (ISOL), ha egyedekből áll, amelyek ténylegesen hatással vannak, vagy előrejelzés szerint hatással lesznek egy területre, amelynek térbeli beborítottsága kisebb, mint az érintett terület 50 százaléka (egy rögzített időpontban vagy egy érvényességi időszak alatt); és
d) eseti (OCNL), ha jól elkülönült egyedekből áll, amelyek ténylegesen hatással vannak, vagy előrejelzés szerint hatással lesznek egy területre, amelynek maximális térbeli beborítottsága az érintett terület 50 és 75 százaléka között van (egy rögzített időpontban vagy egy érvényességi időszak alatt).
4.2.2 **Ajánlás. –** *Zivatarok egy területét gyakorinak (FRQ) tekintik, ha ezen a területen belül a szomszédos zivatartól kis elválasztódások vannak, vagy ilyenek egyáltalán nincsenek, amelynek maximális térbeli beborítottsága az érintett, vagy az előrejelzés szerint érintetté váló terület 75 százalékánál nagyobb (egy rögzített időpontban vagy egy érvényességi időszak alatt).*
4.2.3 **Ajánlás. –** *Szélroham vonal (SQL) zivatart jelöl, amely egy vonal mentén egyedi felhők között kis közökkel rendelkezik, vagy ilyenközök egyáltalán nincsenek.*
4.2.4 **Ajánlás. –** *Jégesőt (GR) a zivatar további leírásaként kell használni, ha szükséges.*
4.2.5 **Ajánlás. –** *Heves és mérsékelt turbulencia (TURB) csak a következőkre vonatkozhat: alacsonyszinti turbulencia, amely erős talajszéllel kapcsolódik; rotor áramlás; turbulencia akár felhővel, akár felhő nélkül (CAT). Konvektív felhőkkel kapcsolatosan turbulenciát nem használnak.*
4.2.6 Turbulencia lehet:
a) erős, amikor az EDR köbgyökének csúcsértéke meghaladja a 0,7-et; és

b) mérsékelt, amikor EDR köbgyökének csúcsértéke 0,4 felett van és kisebb vagy egyenlő 0,7-el.
4.2.7 **Ajánlás.** – *Erős és mérsékelt jegesedés (ICE) nem-konvektív felhőben való jegesedésre vonatkozhat. Ónos eső (FZRA) ónos eső által okozott erős jegesedési körülményekre vonatkozhat.*
4.2.8 **Ajánlás.** – *Hegyi hullám (MTW) lehet:*
a) erős, amikor 3,0 m/s (600 láb/perc) vagy ennél nagyobb kísérő leáramlást és/vagy erős turbulencát észlelnek vagy előrejeleznek; és
b) mérsékelt, , amikor 1,75 – 3,0 m/s (350-600 láb/perc) kísérő leáramlást és/vagy mérsékelt turbulenciát észlelnek, vagy előrejeleznek.

5. REPÜLŐTÉRI FIGYELMEZTETÉSEKRE VONATKOZÓ ELŐÍRÁSOK

5.1 Repülőtéri figyelmeztetések formátuma és terjesztése

5.1.1 A repülőtéri figyelmeztetéseket az A6-2 táblázatban közölt mintának megfelelően kell kiadni, ahol az üzemeltetők vagy repülőtéri szolgáltatók igénylik, és az azokra vonatkozó helyi megállapodásnak megfelelően kell szétosztani.
5.1.2 Az A6-2 táblázatban lévő mintában a vonatkozó sorszámnak meg kell felelnie a repülőtérre a szóbanforgó napon 0001 UTC-től kiadott repülőtéri figyelmeztetések számának
5.1.3 **Ajánlás** – *Az A6-2 táblázatban közölt mintának megfelelően, repülőtéri figyelmeztetéseket az alábbi jelenségek közül valamelyiknek vagy többnek a megjelenésével, vagy várható megjelenésével kapcsolatban kell kiadni.*
– trópusi ciklon (akkor, ha a repülőtéren a 10 perces közepes talajszél sebesség 63 km/h-ra vagy ennél nagyobbra várható)
– zivatar
– jégeső
– hó (beleértve a várható vagy észlelt hó felgyülemlést)
– ónos csapadék
– dér vagy zúzmara
– homokvihar
– porvihar
– felkavart homok vagy por
– erős talajszél és széllökések
– szélroham
– fagy
– vulkanikus hamu
– cunami
– egyéb jelenségek helyi megállapodás szerint.

5.1.4 **Ajánlás.** – *Az A6-2 táblázatban lévő mintában felsorolt rövidítéseket kiegészítő szöveg használatát minimálisra kell korlátozni. A kiegészítő szöveget rövidített köznyelven kell kiadni, ICAO által jóváhagyott rövidítéseket, valamint numerikus értékeket használva. Ha ICAO által jóváhagyott rövidítések nem állnak rendelkezésre, angol köznyelvű szöveget kell használni.*

5.2 Mennyiségi kritériumok repülőtéri figyelmeztetésekhez

Ajánlás – *Ha mennyiségi kritériumok szükségesek repülőtéri figyelmeztetések kibocsátásához, például a várható maximális szélsebesség vagy a várható lehulló teljes hómennyiség, a kritériumokat a meteorológiai iroda és a figyelmeztetések felhasználói közötti megállapodásban kell rögzíteni.*

6. SZÉLNYÍRÁS FIGYELMEZTETÉSEKRE VONATKOZÓ ELŐÍRÁSOK

6.1 Szélnyírás észlelése

Ajánlás. – *Szélnyírás létezésének bizonyítékát a következőkből kell származtatni:*
a) földi szélnyírás távérzékelő berendezés, például Doppler radar;
b) földi szélnyírás észlelő berendezések, például talajszél és/vagy nyomásérzékelők, amelyek úgy vannak elhelyezve, hogy adott futópályát vagy futópályákat és a hozzájuk tartozó megközelítési és indulási pályákat figyelnek;
c) légijármű megfigyelések elemelkedési vagy megközelítési repülési fázisban, amelyeket az 5. Fejezetnek megfelelően kell végezni; vagy
d) más meteorológiai információk, például a repülőtér szomszédságában vagy magasföldek közelében lévő póznákon vagy tornyokon elhelyezett megfelelő érzékelőktől származó információk.
Megjegyzés. – A szélnyírási körülmények rendszerint a következő jelenségekkel járnak együtt:
– zivatarok, mikroburstök, tölcsérfelhő (tornádó vagy víztölcsér), és széllökés frontok;
– front felületek;
– helyi terepviszonyokkal kapcsolatos erős talajszél;
– tengeri szélfrontok;
– hegyi hullámok; (beleértve az alacsonyszinti rotorokat a terminál területen)
– alacsonyszinti hőmérséklet inverziók.

6.2 Szélnyírás figyelmeztetések formátuma és terjesztése

Megjegyzés. – A helyi rendszeres és különleges jelentéseknek és METAR-nak és SPECI-nek kiegészítő információként a szélnyírás információkat is tartalmazniuk kell az A3-1 és A3-2 táblázatokban lévő mintáknak megfelelően.
6.2.1 A szélnyírás figyelmeztetéseket az A6-3 Táblázatban lévő mintának megfelelően kell kiadni, és az idevonatkozó helyi elrendezésnek megfelelően kell terjeszteni.
6.2.2 Az A6-3 táblázatban lévő mintában a vonatkozó sorszámnak meg kell felelnie a repülőtérre a szóbanforgó napon 0001 UTC-től kiadott repülőtéri figyelmeztetések számának.
6.2.3 **Ajánlás.** – *Az A6-3 táblázatban lévő mintában felsorolt rövidítéseket kiegészítő szöveg használatát minimálisra kell korlátozni. A kiegészítő szöveget rövidített köznyelven kell kiadni, ICAO által jóváhagyott rövidítéseket, valamint numerikus értékeket használva. Ha ICAO által jóváhagyott rövidítések nem állnak rendelkezésre, angol köznyelvű szöveget kell használni.*
6.2.4 **Ajánlás**. – *Ha egy légijármű jelentést használnak fel készítenek szélnyírásról szóló figyelmeztetés készítéséhez, vagy megerősítik az előzőleg kiadott figyelmeztetést, akkor a légijármű jelentését, a légijármű típusával együtt, változatlan formában kell szétosztan, avonatkozó helyi elrendezéseknek megfelelően.*
1. *Megjegyzés. – Ha egy érkező és egy induló légijármű is jelentett szélnyírást, akkor két szélnyírásról szóló figyelmeztetés is létezhet, egy az induló, egy az érkező légijárművek számára.*
2. Megjegyzés. – A szélnyírás intenzitásának jelentésére vonatkozó részletek kidolgozása folyamatban van. Elfogadott azonban, hogy a pilóták a szélnyírás jelentésekor használhatják a „mérsékelt” (moderate), „erős” (strong) és „heves” (severe) minőségjelző kifejezéseket, az észlelt szélnyírás intenzitásának megítélését nagymértékben a pilóták szubjektív becslésére alapozva.
6.2.5 A szélnyírás figyelmeztetéseket automatizált, földi telepítésű szélnyírás távérzékelőtől vagy észlelő berendezésektől kell szétküldeni a vonatkozó helyi elrendezéseknek megfelelően.
6.2.6 **Ajánlás.** – *Ahol mikroburstöt észlenek, vagy pilóták jelentenek, vagy földi telepítésű szélnyírás észlelő vagy távérzékelő berendezéssel észlelnek, a szélnyírás figyelmeztetésnek, vagy szélnyírás riasztásnak a mikroburstre való különleges hivatkozást kell tartalmaznia.*
6.2.7 Ahol földi szélnyírás észlelő vagy távérzékelő berendezésektől nyerik a szélnyírás figyelmeztetés készítéséhez használt információkat, a szélnyírás figyelmeztetés vagy riasztás, amennyiben megvalósítható, a futópálya egy bizonyos szakaszára, és a megközelítési pálya vagy felszállási pálya mentén bizonyos távolságra vonatkozzon, a meteorológiai hatóság, a megfelelő ATS hatóság és az érdekelt üzemeltetők közötti megállapodásnak megfelelően.

6.1 Táblázat. Minta SIGMET és AIRMET közleményekre és különleges légi-jelentésekre

Kulcs: M = kötelező beszúrás, minden közlemény része
C = feltételes beszúrás meteorológiai körülményektől függ
= = kettős vonal azt jelzi, hogy az ezt követő szöveget a következő sorban kell elhelyezni.

Megjegyzés. – A SIGMET/AIRMET közleményekben és különleges légijelentésekben szereplő numerikus elemek tartományait és felbontásait ennek a függeléknek az A6-4 táblázata mutatja be.

Az 5. Fejezetben és a 6. Függelékben meghatározottak szerinti elem	*Részletes tartalom*	*Minta (Minták)*			*Példák*
		SIGMET	*AIRMET*	*KÜLÖNLEGES LÉGIJELENTÉS*[1]	
FIR/CTA hely jelző (M)[2]	A FIR-t vagy CTA-t, amelyre a SIGMET/AIRMET vonatkozik, kiszolgáló ATS egység ICAO hely jelzője,	nnnn		–	YUCC[3] YUDD[3]
Azonosítás (M)	Közlemény azonosítás és sorozatszám[4] (M)	SIGMET [nn]n	AIRMET [nn]n	ARS	SIGMET 5 SIGMET A3 AIRMET 2 ARS
Érvényességi időtartam (M)	Az érvényességi időtartamot jelölő dátum-időpont UTC csoport (M)	VALID nnnnnn/nnnnnn		–[5]	VALID 221215/221600 VALID 101520/101800 VALID 251600/252200
Az MWO hely jele (M)	MWO, ahonnan a közlemény származik, hely jele elválasztó kötőjellel (M)	nnnn–			YUDO–[3] YUSO–[3]
A FIR/CTA neve, *vagy* légijármű azonosítás (M)	A FIR/CTA[6] neve, amelynek részére a SIGMET/ARMET-et kiadják, vagy a légijármű rádiótelefon hívójele (M)	nnnn nnnnnnnnnn FIR[/UIR] *vagy* nnnn nnnnnnnnnn CTA	nnnn nnnnnnnnnn FIR[/n]	nnnnnn	YUCC AMSWELL FIR[3] YUDD SHANLON FIR/UIR[3] YUCC AMSWELL FIR/2[3] YUDD SHANLON FIR[3] VA812
HA A SIGMETET TÖRÖLNI KELL, A RÉSZLETEKET LÁSD A MINTA VÉGÉN.					
Jelenség (M)[7]	SIGMET/AIRMET kiadását kiváltó jelenség leírása (C)	OBSC[8] TS[GR[9]] EMBD[10] TS[GR] FRQ[11] TS[GR] SQL[12] TS[GR] TC nnnnnnnnnn	SFC WSPD nn[n]KMH (*vagy* SFC WSPD nn[n]KT) SFC VIS nnnnM (nn)[16]	TS TSGR SEV TURB SEV ICE	SEV TURB FRQ TS OBSC TSGR EMBD TSGR TC GLORIA VA ERUPTION

		SEV TURB[13] SEV ICE[14] SEV ICE (FZRA)[14] SEV MTW[15] HVY DS HVY SS [VA ERUPTION] [MT nnnnnnnnnn] [LOC Nnn[nn] *vagy* Snn[nn] Ennn[nn] *vagy* Wnnn[nn]] VA CLD RDOACT CLD	ISOL[17] TS[GR][9] OCNL[18] TS[GR] MT OBSC BKN CLD nnn/[ABV]nnnnM (*vagy* BKN CLD nnn/[ABV]nnnnFT) OVC CLD nnn/[ABV]nnnnM (*vagy* OVC CLD nnn/[ABV]nnnnFT) ISOL[17] CB[19] OCNL[18] CB FRQ[11] CB ISOL[17] TCU[19] OCNL[18] TCU[19] FRQ[11] TCU MOD TURB[13] MOD ICE[14] MOD MTW[15]	SEV MTW HVY SS VA CLD [FL nnn/nnn] VA [MT nnnnnnnnnn]	MT ASHVAL LOC S15 E073 VA CLD MOD TURB MOD MTW ISOL CB BKN CLD 120/900M (BKN CLD 400/3000FT) OVC CLD 270/ABV3000M (OVC CLD 900/ABV10000FT) SEV ICE RDOACT CLD
Megfigyelt vagy előrejelzett jelenség (M)	Annak jelölése, hogy az információ megfigyelt és folytatódása várható, vagy pedig előrejelzett (M)	OBS [AT nnnnZ] FCST		OBS AT nnnnZ	OBS AT 1210Z OBS
Hely (C)	Hely (földrajzi szélességben és hosszúságban (fokokban és percekben) megadva, vagy nemzetközileg jól ismert helyek vagy földrajzi jellegzetességek)	Nnn[nn] Wnnn[nn] *vagy* Nnn[nn] Ennn[nn] *vagy* Snn[nn] Wnnn[nn] *vagy* Snn[nn] Ennn[nn] *vagy* N OF Nnn[nn] *vagy* S OF Nnn[nn] *vagy* N OF Snn[nn] *vagy* S OF Snn[nn] *vagy* [AND] W OF Wnnn[nn] *vagy* E OF Wnnn[nn] *vagy* W OF Ennn[nn] *vagy* E OF Ennn[nn] *vagy* [N OF, NE OF, E OF, SE OF, S OF, SW OF, W OF, NW OF] [LINE] Nnn[nn] *vagy* Snn[nn] Wnnn[nn] *vagy* Ennn[nn]- Nnn[nn] *vagy* Snn[nn] Wnnn[nn] *vagy* Ennn[nn] *vagy* [N OF, NE OF, E OF, SE OF, S OF, SW OF, W OF, NW OF, AT] nnnnnnnnnnn *vagy* WI Nnn[nn] *vagy* Snn[nn] Wnnn[nn] *vagy* Ennn[nn] – Nnn[nn] *vagy* Snn[nn] Wnnn[nn] *vagy*		NnnnnWnnnnn *vagy* NnnnnWnnnnn *vagy* SnnnnWnnnnn *vagy* SnnnnEnnnnn	S OF N54 N OF N50 N2020 W07005 YUSB[3] N2706 W07306 N48 E010 N OF N1515 AND W OF E13530 W OF E1554 N OF LINE S2520 W11510-S2520 W12010 WI N6030 E02550 - N6055 E02500 - N6050 E02630

		Ennn[nn] – Nnn[nn] *vagy* Snn[nn] Wnnn[nn] *vagy* Ennn[nn] – [Nnn[nn] *vagy* Snn[nn] Wnnn[nn] *vagy* Ennn[nn] – Nnn[nn] *vagy* Snn[nn] Wnnn[nn] *vagy* Ennn[nn]]		
Szint (C)	Repülési magas-ságszint és kiterje-dés[20] (C)	FLnnn *vagy* FLnnn/nnn *vagy* TOP FLnnn *vagy* [TOP] ABV FLnnn *vagy* [TOP] BLW FLnnn *vagy* BLW nnnnM (*vagy* BLW nnnnFT) *vagy*[21] CB TOP [ABV] FLnnn WI nnnKM OF CENTRE (*vagy* CB TOP [ABV] FLnnn WI nnnNM OF CENTRE) *vagy* CB TOP [BLW] FLnnn WI nnnKM OF CENTRE (*vagy* CB TOP [BLW] FLnnn WI nnnNM OF CENTRE) *vagy*[22] FLnnn/nnn [APRX nnnKM BY nnnKM] [nnKM WID LINE[23]BTN (nnNM WID LINE BTN)] [Nnn[nn] *vagy* Snn[nn] Wnnn[nn] *vagy* Ennn[nn] – Nnn[nn] *vagy* Snn[nn] Wnnn[nn] *vagy* Ennn[nn] [– Nnn[nn] *vagy* Snn[nn] Wnnn[nn] *vagy* Ennn[nn]] [– Nnn[nn] *vagy* Snn[nn] Wnnn[nn] *vagy* Ennn[nn]]] (*vagy* FLnnn/nnn [APRX nnnNM BY nnnNM] [Nnn[nn] *vagy* Snn[nn] Wnnn[nn] *vagy* Ennn[nn] – Nnn[nn] *vagy* Snn[nn] Wnnn[nn] *vagy* Ennn[nn] [– Nnn[nn] *vagy* Snn[nn] Wnnn[nn] *vagy* Ennn[nn]] [– Nnn[nn] *vagy* Snn[nn] Wnnn[nn] *vagy* Ennn[nn]]])	FLnnn	FL180 FL050/080 TOP FL390 BLW FL200 TOP ABV FL100 FL310/450 CB TOP FL500 WI 270KM OF CENTRE (CB TOP FL500 WI 150NM OF CENTRE) FL310/350 APRX 220KM BY 35KM FL390
Mozgás vagy várható mozgás (C)	Mozgás vagy várható mozgás (irány és sebesség) az iránytű nyolc pontjának egyikére hivatkozással, vagy mozdulatlanság (C)	MOV N [nnKMH] *vagy* MOV NE [nnKMH] *vagy* MOV E [nnKMH] *vagy* MOV SE [nnKMH] *vagy* MOV S [nnKMH] *vagy* MOV SW [nnKMH] *vagy* MOV W [nnKMH] *vagy* MOV NW [nnKMH] (*vagy* MOV N [nnKT] *vagy* MOV NE [nnKT] *vagy* MOV E [nnKT] *vagy* MOV SE [nnKT] *vagy* MOV S[nnKT] *vagy* MOV SW [nnKT] *vagy* MOV W [nnKT] *vagy* MOV NW [nnKT]) *vagy* STNR	–	MOV E 40KMH (MOV E 20KT) MOV SE STNR
Intenzitás válto-	Az intenzitás	INTSF *vagy* WKN *vagy* NC	–	WKN

zások (C)	várható változásai (C)				
Előrejelzett helyzet (C)[20]	Vulkánikus hamu felhő vagy a TC központjának előrejelzett helyzete a SIGMET közlemény érvényességi időszakának végén (C)	FCST nnnnZ TC CENTRE Nnn[nn] *vagy* Snn[nn] Wnnn[nn] *vagy* Ennn[nn] *vagy* FCST nnnnZ VA CLD APRX [nnKM WID LINE[23] BTN (nnNM WID LINE BTN)] Nnn[nn] *vagy* Snn[nn] Wnnn[nn] *vagy* Ennn[nn] – Nnn[nn] *vagy* Snn[nn] Wnnn[nn] *vagy* Ennn[nn] [– Nnn[nn] *vagy* Snn[nn] Wnnn[nn] *vagy* Ennn[nn]] [– Nnn[nn] *vagy* Snn[nn] Wnnn[nn] *vagy* Ennn[nn]]	–	–	FCST 2200Z TC CENTRE N2740 W07345 FCST 1700Z VA CLD APRX S15 E075 – S15 E081 – S17 E083 – S18 E079 – S15 E075

VAGY

SIGMET/AIRMET törlése[24] (C)	SIGMET/AIRMET törlése azonosítására hivatkozva	CNL SIGMET [nn]n nnnnnn/nnnnnn *vagy* CNL SIGMET [nn]n nnnnnn/nnnnnn [VA MOV TO nnnn FIR][22]	CNL AIRMET [nn]n nnnnnn/nnnnnn	–	CNL SIGMET 2 101200/101600[24] CNL SIGMET 3 251030/251430 VA MOV TO YUDO FIR[24] CNL AIRMET 151520/151800[24]

Megjegyzések.–

1. a szél és hőmérséklet adatot nem szükséges feljuttatni a repülést végző többi légijárműhöz 3.2 szakiasznak megfelelően.
2. Lásd 4.1 pont.
3 Fiktív hely.
4. 1.1.3 és 2.1.2 pontnak megfelelően.
5. Lásd 3.1 szakasz.
6. Lásd 2.1.3 pont.
7. 1.1.4 és 2.1.4 pontnak megfelelően.
8. 4.2.1 a) pontnak megfelelően.
9. 4.2.4 pontnak megfelelően

10. 4.2.1 b) pontnak megfelelően
11. 4.2.2 pontnak megfelelően.
12. 4.2.3 pontnak megfelelően.
13. 4.2.5 és 4.2.6 pontnak megfelelően.
14. 4.2.7 pontnak megfelelően.
15. 4.2.8 pontnak megfelelően.
16. 2.1.4 pontnak megfelelően
17. 4.2.1 c) pontnak megfelelően
18. 4.2.1 d) pontnak megfelelően
19. Cumulonimbus, CB és tornyosuló cumulus, TCU használata AIRMET-ekre korlátozódik a 2.1.4 ponttal összhangban.
20. Csak vulkánikus hamu felhőre és trópusi ciklonokra vonatkozó SIGMET közleményeknél.
21. Csak trópusi ciklonokra vonatkozó SIGMET közleményeknél
22. Csak vulkánikus hamu felhőre vonatkozó SIGMET közleményeknél.
23. Két pont között húzott egyenes vonal egy térképen a Markátor vetületben, vagy két pont közötti egyenes vonal, amely hosszúsági vonalakat keresztez állandó szögnél.
24. A közlemény vége (mivel a SIGMET/AIRMET közleményt törölték).

Megjegyzés. – Zivatarokkal, cumulonimbus felhőkkel vagy trópusi ciklonokkal kapcsolódó erős vagy mérsékelt jegesedést, és erős vagy mérsékelt turbulenciát (SEV ICE, MOD ICE, SEV TURB, MOD TURB) az 1.1.5 és a 2.1.5 pontoknak megfelelően, nem tartalmazhat.

A6-2 táblázat. Minta repülőtéri figyelmeztetésekre

Kulcs: M = kötelező bevitel, minden közlemény része
C = feltételes bevitel, mindenütt, ahol alkalmazható

1. Megjegyzés. –A helyi rendszeres és különleges jelentésekben szereplő numerikus elemek nagyságrendje és felbontása jelen függelék A6-4 táblázatban látható
2. Megjegyzés. – A rövidítések magyarázata a Procedures for Air Navigation Services – ICAO Abbreviations and Codes (Léginavigációs szolgálati eljárások – ICAO rövidítések és kódok) *(PANS-ABC, Doc 8400) kiadványban található.*

Elem	*Részletes tartalom*	*Minta*	*Példa*
A repülőtér hely jelzője(M)	A repülőtér hely jelzője	nnnn	YUCC[1]
A közlemény fajtájának azonosítása (M)	A közlemény fajtája és sorszáma	AD WRNG [n]n	AD WRNG 2
Érvényességi időszak (M)	Az érvényességi időszak napja és időpontja UTC	VALID nnnnnn/nnnnnn	VALID 211230/211530
HA A REPÜLŐTÉRI FIGYELMEZTETÉST TÖRÖLNI KELL, RÉSZLETEKET LÁSD A MINTA VÉGÉN.			

Jelenség (M)[2]	A repülőtéri figyelmeztetés kiadását szükségessé tevő jelenség leírása	TC[3] nnnnnnnnnn *vagy* [HVY] TS *vagy* GR *vagy* [HVY] SN [nnCM][3] *vagy* [HVY] FZRA *vagy* [HVY] FZDZ *vagy* RIME[4] *vagy* [HVY] SS *vagy* [HVY] DS *vagy* SA *vagy* DU *vagy* SFC WSPD nn[n]KMH MAX nn[n] (SFC WSPD nn[n]KT MAX nn[n]) *vagy* SQ *vagy* FROST *vagy* TSUNAMI *vagy* VA *vagy* *szabad szöveg 32 karakterig*[5]	TC ANDREW HVY SN 25CM SFC WSPD 80KMH MAX 120 VA TSUNAMI
Észlelt vagy előrejelzett jelenség (M)	Jelzés, hogy az információt észlelték-e és folytatódása várható-e, vagy előrejelezték	OBS [AT nnnnZ] *vagy* FCST	OBS AT 1200Z OBS
Intenzitás változások (C)	Várható intenzitás változások	INTSF *vagy* WKN *vagy* NC	WKN

VAGY

Repülőtéri figyelmeztetés törlése[6]	Repülőtéri figyelmeztetés törlése, azonosítására hivatkozva	CNL AD WRNG [n]n nnnnnn/nnnnnn	CNL AD WRNG 2 211230/211530[6]

Megjegyzés. –
1. Fiktív hely.
2. Egyik jelenség, vagy ezeknek egy kombinációja, az 5.1.3 pontnak megfelelően
3. 5.1.3 pontnak megfelelően
4. Zúzmarás fagy *vagy* zúzmara, 5.1.3 pontnak megfelelően.
5. 5.1.4 pontnak megfelelően
6. Közlemény vége (mivel a repülőtéri figyelmeztetést törlik).

A6-3 táblázat. Minta szélnyírás figyelmeztetésre

Kulcs: M = kötelező bevitel, minden közlemény részemindenütt. Ahol alkalmazható körülményektől függ

1. Megjegyzés. –A helyi rendszeres és különleges jelentésekben szereplő numerikus elemek nagyságrendje és felbontása jelen függelék A6-4 táblázatban látható

2. Megjegyzés. – A rövidítések magyarázata a Procedures for Air Navigation Services – ICAO Abbreviations and Codes (Léginavigációs szolgálati eljárások – ICAO rövidítések és kódok) *(PANS-ABC, Doc 8400) kiadványban található.*

Elem	*Részletes tartalom*	*Minta*	*Példa*
A repülőtér hely indikátora (M)	A repülőtér hely jelzője	nnnn	YUCC[1]
A közlemény fajtájának azonosítása (M)	A közlemény fajtája és sorszáma	WS WRNG [n]n	WS WRNG 1
A kiadás ideje és érvényességi időszak (M)	A kiadás napja és időpontja és ahol alkalmazható, érvényességi időszak UTC	nnnnnn [VALID TL nnnnnn] *vagy* [VALID nnnnnn/nnnnnn]	211230 VALID TL 211330 221200 VALID 221215/221315
HA A SZÉLNYÍRÁST TÖRÖLNI KELL, LÁSD A RÉSZLETEKET A MINTA VÉGÉN.			

Jelenség (M)	A jelenség és helyének azonosítása	[MOD] *vagy* [SEV] WS IN APCH *vagy* [MOD] *vagy* [SEV] WS [APCH] RWYnnn *vagy* [MOD] *vagy* [SEV] WS IN CLIMB-OUT *vagy* [MOD] *vagy* [SEV] WS CLIMB-OUT RWYnnn *vagy* MBST IN APCH *vagy* MBST [APCH] RWYnnn *vagy* MBST IN CLIMB-OUT *vagy* MBST CLIMB-OUT RWYnnn	WS APCH RWY12 MOD WS RWY34 WS IN CLIMB-OUT MBST APCH RWY26 MBST IN CLIMB-OUT
Észlelt, jelentett, vagy előrejelzett jelenség (M)	Azonosítás, hogy az információt észlelték-e és folytatódása várható-e, vagy előrejelezték	REP AT nnnn nnnnnnnn *vagy* OBS [AT nnnn] *vagy* FCST	REP AT 1510 B747 OBS AT 1205 FCST
A jelenség részletei (C)[2]	A szélnyírás figyelmeztetés kiadását szükségessé tevő jelenség leírása	SFC WIND: nnn/nnKMH (*vagy* nnn/nnKT) nnnM (nnnFT)-WIND: nnn/nnKMH (*vagy* nnn/nnKT) *vagy* nnKMH (*vagy* nnKT) ASPEEDL nnKM (*vagy* nnNM) FNA RWYnn *vagy* nnKMH (*vagy* nnKT) ASPEEDG nnKM (*vagy* nnNM) FNA RWYnn	SFC WIND: 320/20KMH 60M-WIND: 360/50KMH (SFC WIND: 320/10KT 200FT-WIND: 360/25KT) 60KMH ASPEEDL 4KM FNA RWY13 (30KT ASPEEDL 2NM FNA RWY13)
VAGY			
Szélnyírás figyelmeztetés törlése[3]	Szélnyírás figyelmeztetés törlése, azonosítására hivatkozva	CNL WS WRNG [n]n nnnnnn/nnnnnn	CNL WS WRNG 1211230/211330[3]

Megjegyzés. –

1. Fiktív hely.
2. További előírások a 6.2.3 pontban.
3. Közlemény vége (mivel a repülőtéri figyelmeztetést törlik).

A6-4 táblázat. Vulkanikus hamu és trópusi ciklon tájékoztató közleményekben, SIGMET/AIRMET közleményekben és repülőtéri és szélnyírás figyelmeztetésekben tartalmazott numerikus elemek tartományai és felbontásai

A 2. és 6. Függelékben ismertetett elem		*Tartomány*	*Felbontás*
Csúcsmagasság:	M	000–8100	1
	FT	000–27000	1
Tájékoztatási szám:	for VA (index)*	000–2000	1
	for TC (index)*	00–99	1
Maximális talajszél:	KMH	00–399	1
	KT	00–199	1
Központi nyomás:	hPa	850–1050	1
Talajszél sebesség:	KMH	60–199	1
	KT	30–99	1

Talajmenti látás:	M M	0000–0800 0800–5000	50 100
Felhőalap magassága:	M FT	000–300 000–1000	30 100
Felhőtető magasság:	M M FT FT	000–3000 3000–20000 000–10000 10000–60000	30 300 100 1000
Földrajzi szélesség:	°(fokok) ’(percek)	00–90 00–60	1 1
Földrajzi hosszúság:	°(fokok) ’(percek)	000–180 00–60	1 1
Repülési magasságszintek:		000–650	10
Mozgás:	KMH KT	0–300 0–150	10 5
*Dimenzió nélküli			

A6-1 példa SIGMET és AIRMET közlemény és törlésük

SIGMET YUDD SIGMET 2 VALID 101200/101600 YUSO– YOUD SHANLON FIR/UIR OBSC TS FCST S OF N54 TOP FL390 MOV E WKN	**SIGMET törlése** YUDD SIGMET 3 VALID101345/101600 YUSO– YUDD SHANLON FIR/UIR CNL SIGMET 2 101200/101600
AIRMET YUDD AIRMET 1 VALID 151520/151800 YUSO– YUDD SHANLON FIR ISOL TS OBS N OF S50 TOP ABV FL100 STNR WKN	**AIRMET törlése** YUDD AIRMET 2 VALID 151650/151800 YUSO– YUDD SHANLON FIR CNL AIRMET 1 151520/151800

A6-2 példa. SIGMET közlemények trópusi ciklonnál

YUCC SIGMET 3 VALID 251600/252200 YUDO–
YUCC AMSWELL FIR TC GLORIA OBS AT 1600Z N2706 W07306 CB TOP FL500 WI 150NM OF CENTRE MOV NW 10KT NC FCST 22007 TC CENTRE N2740 W07345
OTLK TC CENTRE 260400N1830 W07430 261000 N2912 W07530

Jelentése:

Az AMSWELL* repülési információs régió részére a Donlon/International* meteorológiai megfigyelő iroda (YUDO) által 0001 UTC óta kiadott (a YUCC Amswell területi ellenőrző központ által azonosított) harmadik SIGMET közlemény; a közlemény e hó 25-e 1600 UTC-től 2200 UTC-ig érvényes; a Glória trópusi ciklont 27 fok 06 perc észak és 73 fok 6 perc nyugat helyen észlelték 1600 UTC-kor, cumulonimbus tetővel az 500-as repülési magasságszinten a központtól 150 tengeri mérföldön belül; a trópusi ciklon várhatóan észak-nyugati irányban fog mozogni 10 csomós sebességgel és intenzitása nem változik; a trópusi ciklon központjának előrejelzett helyzete 2200 UTC-kor várhatóan 27 fok 40 perc észak és 73 fok 45 perc nyugat.

*Fiktív helyek

A6-3. Példa. SIGMET közlemény vulkanikus hamunál

YUDD SIGMET 2 VALID 211100/211700 YUSO–
YUDD SHANLON FIR/UIR VA ERUPTION MT ASHVAL LOC S1500 E07348 VA CLD OBS AT 1100Z FL310/450 APRX 220KM BY 35 KM S1500 E07348 - S1530 E07642 MOV SE 65KMH FCST 1700Z VA CLD APRX S1506 E07500 - S1518 E08112 - S1712 E08330 - S1824 E07836

Jelentése:

A Shanlon/International* meteorológiai megfigyelő iroda (YUSO) által 0001 UTC óta az SHANLON* repülés információs régió részére kiadott (a YUDD Shanlon körzeti ellenőrző központ által azonosított) második SIGMET közlemény; a közlemény e hó 21-e 1100 UTC-től 1700 UTC-ig érvényes; a Mount Ashval* vulkanikus hamu kitörése, amely 15 fok dél és 73 fok 48 perc kelet elhelyezkedésű; vulkanikus hamufelhőt észleltek 1100 UTC-kor a 310-es és 450-es repülési magasságszint között egy közelítőleg 220 km x 35 km nagyságú területen 15 fok dél és 73 fok 48 perc kelet, és 15 fok 30 perc dél és 76 fok 42 perc kelet között; a vulkanikus hamufelhő várhatóan kelet-délkelet irányban fog mozogni 65 km per óra sebességgel;1700 UTC-kor a vulkanikus hamufelhő előrejelzés szerint közelítőleg a következő pontok által határolt területen lesz: 15 fok 6 perc dél és 75 fok kelet, 15 fok 18 perc dél és 81 fok 12 perc dél, 17 fok 12 perc dél és 83 fok 30 perc kelet, és 18 fok 24 perc dél és 78 fok 36 perc kelet.

*Fiktív helyek

A6-4 példa SIGMET közlemény erős turbulenciánál

YUCC SIGMET 5 VALID 221215/221600 YUDO–
YUCC AMSWELL FIR SEV TURB OBS AT 1210Z YUSB FL250 MOV E 40KMH WKN

Jelentése:

A Donlon/International* meteorológiai megfigyelő iroda (YUDO) által 0001 UTC óta az AMSWELL* repülés információs régió részére kiadott (a YUCC Amswell területi ellenőrző központ által azonosított) ötödik SIGMET közlemény; a közlemény e hó 22-e 1215 UTC-től 1600 UTC-ig érvényes; erős turbulenciát észleltek 1210 UTC-kor a Siby/Bistock* repülőtér (YUSB) felett a 250-es repülési magasságszinten; a turbulencia várhatóan kelet felé mozog 40 km per óra sebességgel és intenzitása gyengülni fog.

*Fiktív helyek

A6-5 példa AIRMET közlemény mérsékelt hegyi hullámnál

YUCC AIRMET 2 VALID 221215/221600 YUDO–
YUCC AMSWELL FIR MOD MTW OBS AT 12057 AND FCST N48 E10 FL080 STNR NC

Jelentése:

A Donlon/International* meteorológiai megfigyelő iroda (YUDO) által 0001 UTC óta az AMSWELL* repülés információs régió részére kiadott (a YUCC Amswell területi ellenőrző központ által azonosított) második AIRMET közlemény; a közlemény e hó 22-e 1215 UTC-től 1600 UTC-ig érvényes; mérsékelt hegyi hullámot észleltek 1205 UTC-kor 48 fok észak és 10 fok kelet pontban a 080-as repülési magasságszinten; a hegyi hullám várhatóan stacionárus marad és intenzitásában nem változik.

*Fiktív helyek

7. FÜGGELÉK. REPÜLÉSI KLIMATOLÓGIAI INFORMÁCIÓKRA VONATKOZÓ MŰSZAKI ELŐÍRÁSOK

*(Lásd jelen Annex 8. Fejezezet***)**

1. REPÜLÉS-KLIMATOLÓGIAI INFORMÁCIÓK FELDOLGOZÁSA

Ajánlás. – *A reguláris és kitérő repülőtéri megfigyeléseket a repülőtéri klimatológiai információk készítéséhez illeszkedő formában kell összegyűjteni, feldolgozni és tárolni.*

2. REPÜLÉS-KLIMATOLÓGIAI INFORMÁCIÓK CSERÉJE

Ajánlás. – *Repülés-klimatológiai információkat kérésre a meteorológiai hatóságok között cserélni kell. Üzemeltetőknek és más repülési felhasználóknak, akik ilyen információkat igényelnek, általában ezek készítéséért felelős meteorológiai hatóságokhoz kell folyamodniuk.*

3. REPÜLÉS-KLIMATOLÓGIAI INFORMÁCIÓK TARTALMA

3.1 Repülőtéri klimatológiai táblázatok

3.1 1 **Ajánlás. –** *A repülőtéri klimatológia táblázatnak alkalmazhatóként az alábbiakat kell megadni:*
a) meteorológiai elemek középértékeit és az attól való eltéréseket, tartalmazva a maximum és minimum értékeket (például levegőhőmérséklet); és/vagy
b) a repülőtéren a repülésüzemeltetésre ható aktuális időjárás jelenségek (például homokvihar) előfordulási gyakoriságát; és/vagy
c) egy, vagy két, vagy több elem kombinációja (például alacsony látás és alacsony felhő kombinációja) megadott értékének megjelenési gyakoriságát.
3.1.2 **Ajánlás –** *A repülőtéri klimatológiai táblázatoknak tartalmazniuk kell azokat az információkat, amelyek repülőtéri klimatológiai összegezések 3.2 pontnak megfelelő elkészítéséhez szükségesek.*

3.2 Repülőtéri klimatológiai összegezések

Ajánlás – *Repülőtéri klimatológiai összegezéseknek le kell fedniük az alábbiakat:*
a) futópálya látástávolság/látás és/vagy meghatározott időpontokban meghatározott értékek alá nyúló BKN vagy OVC legalsó felhő réteg felhőalap magasság előfordulási gyakorisága;
b) meghatározott időpontokban meghatározott értékek alatti látás gyakorisága;
c) meghatározott időpontokban meghatározott értékek alá nyúló BKN vagy OVC legalsó felhőréteg felhőalap magasságának gyakorisága;
d) egyazon szél irány és sebesség előfordulás gyakorisága meghatározott intervallumokon belül;
e) talajmenti hőmérséklet gyakorisága az 5°C meghatározott intervallumaiban, meghatározott időpontokban;
f) üzemelés tervezési célokból, beleértve a felszállási teljesítményszámításokat is, szükséges meteorológiai elemek középértékei, és az ettől való eltérések, a maximális és minimális értékek.

Megjegyzés. – Az a)-tól e)-ig pontokra vonatkozó klimatológiai összegezési modelleket a WMO Publication No.49, Technical Regulations (Műszaki szabályozások), *II. kötet C.3.2 fejezet tartalmazza.*

8. FÜGGELÉK. ÜZEMELTETŐK ÉS REPÜLŐ SZEMÉLYZET KISZOLGÁLÁSÁRA VONATKOZÓ MŰSZAKI ELŐÍRÁSOK

(Lásd jelen Annex 9. Fejezet)

Megjegyzés. – A repülés dokumentációra (beleértve a minta térképeket és formátumokat) vonatkozó előírásokat az 1. Függelék tartalmazza.

1. METEOROLÓGIAI INFORMÁCIÓK SZOLGÁLTATÁSI ESZKÖZEI ÉS FORMÁTUMA

1.1 Üzemeltetőket és repülőszemélyzeti tagokat az alábbiak közül az egyik vagy többféle módon kell meteorológiai információkkal ellátni, a meteorológiai hatóság és az illetékes üzemeltető közötti megállapodás szerint, és az alábbiak szerinti sorrendben, amely nem alkalmaz prioritásokat:

a) írt vagy nyomtatott anyag, közötte specifikált térképek, és formanyomtatványok;

b) adatok digitális formában;

c) eligazítás;

d) konzultáció;

e) kijelzés; vagy

f) a)-tól e)-ig pontok helyett öneligazítást szolgáltató automatizált repülés előtti információs rendszer és repülésdokumentációs eszközök, fenntartva az üzemeltetők és repülőszemélyzet konzultálási lehetőségét, szükség esetén, a meteorológia irodával, az 5.1 pontnak megfelelően.

1.2 A meteorológiai hatóságnak az üzemeltetővel való konzultációjánál az alábbiakat kell meghatároznia:

a) a szolgáltatásra kerülő meteorológiai információk fajtáját és formátumát; és

b) ezen információk szolgáltatásának módszereit és eszközeit.

1.3 **Ajánlás**. – *Az üzemeltető kérésére a repülési tervhez szolgáltatott információknak adatokat kell tartalmazniuk a legalsó használható repülési magasságszint meghatározásához.*

2. REPÜLÉS ELŐTTI TERVEZÉSHEZ ÉS REPÜLÉS KÖZBENI ÁTTERVEZÉSHEZ SZOLGÁLÓ INFORMÁCIÓKRA VONATKOZÓ ELŐÍRÁSOK

2.1 Magaslégköri információ formátuma

A WAPC-ok által repülés előtti tervezéshez és repülés közbeni áttervezéshez szolgáltatott magaslégköri információknak GRIB kód formájúaknak kell lenniük.

Megjegyzés. – A GRIB kód formát a WMO 306 számú kiadványa (Kód kézikönyv (Manual on Codes) *1.2 Kötet B Rész – Bináris kódok (Binary Codes), tartalmazza.*

2.2 Szignifikáns időjárási információk formátuma

A WAFC-ok által repülés előtti tervezéshez és repülés közbeni áttervezéshez szolgáltatott információknak BUFR kódformát kell ölteniük.

Megjegyzés. – A BUFR kódformát a WMD 306 számú kiadványa (Kód kézikönyv (Manual on Codes), *1.2 Kötet B Rész – Bináris kódok (Binary Codes) tartalmazza.*

2.3 Helikopter üzemeltetés speciális igényei

Ajánlás – T*engeri partközeli szerkezetekre repülő helikoptereket üzemeltetők által végzett, repülés előtti tervezéshez és repülés közbeni áttervezéshez szolgáló meteorológiai információknak a tengerszinttől a 100-as repülési magassági szintig terjedő magasságokra vonatkozó adatokat kell tartalmazniuk. Különös figyelmet kell fordítani a várható felszíni látásra, a 100-as repülési magasságszint alatti felhő mennyiségére, fajtájára (ahol rendelkezésre áll), alapjára és tetejére, a tenger állapotára és tenger felszín hőmér-*

sékletére, a közepes tengerszinti nyomásra, és turbulencia és jegesedés előfordulására és várható megjelenésére, ahogyan a regionális léginavigációs egyezmény meghatározza.

3. ELIGAZÍTÁSRA ÉS KONZULTÁCIÓRA VONATKOZÓ ELŐÍRÁSOK

Ajánlás – *A kijelzett anyagnak olvashatóan hozzáférhetőnek kell lennie a repülőszemélyzet tagjai és más érdekelt repülésüzemeltető személyzet számára.*

4. REPÜLÉSI DOKUMENTÁCIÓRA VONATKOZÓ ELŐÍRÁSOK

4.1 Az infomáció prezentálása

4.1.1 A magassági szél és magaslégköri hőmérséklet és SIGWX jelenségek előrejelzésére vonatkozó repülési dokumentációkat térképek formájában kell prezentálni. Kismagassságú repülésekhez, alternatívaként GAMET körzeti előrejelzéseket kell használni.
Megjegyzés. – Repülési dokumentáció készítésében használt térképek és formátumok modelljei az 1. Függelékben vannak megadva. Ezeket a modelleket és módszereketa Világ Meteorológiai Szervezet a Nemzetközi Polgári Repülési Szervezet által felállított idevonatkozó üzemeltetési követelmények alapján fejlesztette ki.
4.1.2 METAR és SPECI (beleértve a regionális léginavigációs egyezménnyel összhangban kiadott trend előrejelzéseket), TAF, GAMET, SIGMET és AIRMET információkat a 3., 5. és 6. Függelékben található mintákkal összhangban kell prezentálni. Más meteorológiai irodáktól kapott METAR, SPECI, TAF, GAMET, SIGMET és AIRMET közleményeket a repülési dokumentációba változtatás nélkül kell beletenni.
Megjegyzés. METAR/SPECI és TAF prezentációjának formulájára példát az 1. Függelék tartalmaz.
4.1.3 **Ajánlás.** – *A használt hely jelzőket és rövidítéseket a repülési dokumentációban el kell magyarázni.*
4.1.4 **Ajánlás.** – *A repülési dokumentáció által tartalmazott térképek formuláit és jelmagyarázatát angolul, franciául, oroszul és spanyolul ki kell nyomtatni. Ahol lehetséges, jóváhagyott rövidítéseket kell használni. Az egyes elemekhez alkalmazott mértékegységeket jelölni kell; ezeknek összhangban kell lenniük az 5. Annexszel.*

4.2 Térképek repülési dokumentációban

4.2.1 Térképek jellemzői
4.2.1.1 **Ajánlás.** *A repülési dokumentáció által tartalmazott térképeknek világosnak és jól olvashatónak kell lenniük és a következő fizikai jellemzőkkel kell rendelkezniük:*
a) a kényelem kedvéért a térképek legnagyobb méretének körülbelül 42 x 30 cm-nek (szabványos A3 méret), és a legkisebb méretnek 21 x 30 cm-nek (szabványos A4 méret) kell lennie. E méretek közötti választás az útvonal hossztól függ, a térképeken megadni szükséges részletek mennyisége a meteorológiai hatóságok és a felhasználók közötti megállapodás tárgya.;
b) nagyobb földrajzi egységeket, mint például tengerpartokat, nagyobb folyókat és tavakat olyan módon kell ábrázolni, hogy azok könnyen felismerhetők legyenek;
c) számítógéppel készített térképeknél a meteorológiai adatok preferenciát élveznek az alap térkép információkkal szemben, az előbbi törli az utóbbit, ahol ezek fedik egymást;
d) nagyobb repülőtereket pontként kell ábrázolni, és annak a városnak az első betűjével azonosítani, amelyet a repülőtér kiszolgál, ahogyan arereleváns regionális léginavigációs terv AOP táblázatában meg van adva;
e) a földrajzi hálózatot minden 10º szélességnél és hosszúságnál pontozott vonalakkal húzott meridiánok és párhuzamosak képviselik; a pontokat egymástól egy fok távolságra kell elhelyezni;
f) a szélességi és hosszúsági értékeket a térképeken több különböző ponton kell jelölni (azaz nemcsak a széleken);
g) a címkéknek a repülési dokumentációs térképeken világosnak és egyszerűnek kell lenniük, és egyértelmű módon fel kell tüntetni rajtuk a világ területi előrejelző központ nevét, vagy nem-WAFS előállítások esetén az eredeti központ nevét, a térkép fajtáját, a dátumot és az érvényesség idejét, és szükség esetén a

használt egységek fajtáit egyértelmű módon..
4.2.1.2 A repülési dokumentációban szereplő meteorológiai információkat a következők reprezentálják:
a) a szeleket a térképeken tollakkal és árnyékolt zászlócskákkal ellátott nyilakkal kell ábrázolni, elegendően sűrű rácson;
b) a hőmérsékleteket számokkal kell ábrázolni, elegendően sűrű rácson;
c) egy világ területi előrejelző központtól kapott adatkészletből kiválasztott szél és hőmérséklet adatokat elegendően sűrű szélesség/hosszúság rácsban kell ábrázolni; és
d) szélnyilaknak előtérbe kell kerülniük a hőmérsékletekkel szemben és mindkettőnek előtérbe kell kerülniük a térkép háttérrel szemben.
4.2.1.3 **Ajánlás** – *Rövid hatótávolságú repülésekhez korlátozott területeket lefedő térképeket kell készíteni, 1:15x10*^{6} *méretarányban, ahogy megkövetelik.*

4.2.2 A szolgáltatandó térkép készlet
4.2.2.1 A 250-es repülési magasságszint és a 630-as repülési magasságszint közötti repülésekhez szolgáltatandó minimális számú térképek között kell lenni egy nagymagassági SIGWX térképnek (250-es repülési magasságszinttől 630-as repülési magasságszintig) és egy előrejelzési 250 hPa-os szél és hőmérséklet térképnek. A repülés előtti és repülés közbeni tervezéshez és a repülési dokumentációhoz szolgáló aktuális térképek együttesének összetételét a meteorológiai hatóságok és a szolgálati területen belüli más felhasználók közötti megállapodás határozza meg.
4.2.2.2 A szolgáltatandó térképeket a WAFC-ok által szolgáltatott digitális előrejelzésekből kell generálni, amikor ezek az előrejelzések idő, tengerszint feletti magasság és földrajzi kiterjedés szempontjából lefedik a szándékolt repülési pályát, hacsak a meteorológiai és az érintett üzemeltető közötti megállapodás másképp nem rendelkezik.
4.2.3 Magasság jelölések
Repülési dokumentációban a magasság jelöléseket a következőképpen kell megadni:
a) az útvonali meteorológiai viszonyokra való minden hivatkozást, mint például magassági szelek, turbulencia, vagy felhőalap és felhőtető magasságjelölések, lehetőség szerint repülési magasságszintekben kell kifejezni; ezek kifejezhetők még nyomásban, közepes tengerszint feletti magasságban, vagy, kismagasságú repüléseknél, föld feletti magassággal; és
b) a repülőtéri meteorológiai viszonyokra való minden hivatkozást, mint például a felhőalap magasság jelölések, a repülőtér közepes tengerszint feletti magassága feletti magassággal kell kifejezni.

4.3 Kismagasságú repülésekre vonatkozó előírások

4.3.1 Térkép formában
Ajánlás – *Ahol az előrejelzéseket térkép formájában szolgáltatják, a repülési dokumentációnak kismagasságú repülésekhez, beleértve azokat is, amelyek a látás szerinti repülés szabályai szerint folynak, amely repüléseket maximum a 100-as szinten hajtják végre (vagy hegyes területen maximum a 150-es repülési magasságszinten, vagy nagyobb magasságokban, ahol szükséges) a következőket kell tartalmazniuk, ahogyan a repülésnek megfelel:*
a) információk a releváns SIGMET és AIRMET közleményekből;
b magassági szél és magaslégköri hőmérséklet térképek, ahogyan a 5.4.3.1 pontban meg van adva; és
c) szignifikáns időjárás térképek, ahogy az 5. Függelék 4 3.2 pontban meg van adva.
4.3.2 Rövidített köznyelven
Ajánlás – *Ahol az előrejelzéseket nem térkép formájában szolgáltatják, a repülési dokumentációnak kismagasságú repülésekhez, beleértve azokat is, amelyek a látás szerinti repülés szabályai szerint folynak, amely repüléseket maximum a 100-as szinten hajtják végre (vagy hegyes területen maximum a 150-es repülési magasságszinten, vagy nagyobb magasságokban, ahol szükséges) a következőket kell tartalmazniuk, ahogyan a repülésnek megfelel:*
a) SIGMET és AIRMET tájékoztatások; és

b) GAMET körzeti előrejelzések.
Megjegyzés – a GAMET körzrti előrejelzésre példát az 5. Függelék tartalmaz.

5. ELIGAZÍTÁSHOZ, KONZULTÁCIÓHOZ, REPÜLÉSTERVEZÉSHEZ ÉS REPÜLÉSI DOKUMENTÁCIÓHOZ SZOLGÁLÓ, AUTOMATIZÁLT REPÜLÉS ELŐTTI INFORMÁCIÓS RENDSZEREKRE VONATKOZÓ ELŐÍRÁSOK

5.1 Hozzáférés a rendszerekhez

Öneligazítási eszközöket szolgáltató automatizált repülés előtti információs rendszereknek hozzáférést kell biztosítani az üzemeltetőknek és a repülőszemélyzet tagjainak, szükség esetén a meteorológiai irodával telefonon vagy más megfelelő kommunikációs eszközzel történő konzultációhoz.

5.2 A rendszerekre vonatkozó részletes előírások

Ajánlás. – *Öneligazításhoz, repülés előtti tervezéshez és repülési dokumentációhoz szolgáló meteorológiai információk szolgáltatását végző automatizált repülés előtti információs rendszereknek a következő feladatokat kell ellátni:*
a) gondoskodni a rendszer adatbázisának folyamatos és időben történő frissítéséről és tárolt meteorológiai információk érvényességének és integritásának figyeléséről;
b) lehetővé tenni az üzemeltetők és a repülőszemélyzet tagjai, valamint más illetékes használók részére is a hozzáférést a rendszerhez alkalmas távkölési eszközök segítségével;
c) rövidített köznyelven és, amennyiben megfelelő, ICAO hely jelölőkön és a WMO által előírt repülésmeteorológiai kód adat-típusú jelölőkön alapuló, vagy menü rendszerű felhasználói interfészen, vagy más alkalmas mechanizmusokon alapuló hozzáférési és lekérdezési eljárásokat használni a meteorológiai hatóság és az érintett üzemeltető közötti megegyezés szerint; és
d) gyors választ adni a felhasználó információ iránti kérésére.
Megjegyzés. –AZ ICAO rövidítések és kódok és hely jelölők a Léginavigációs szolgáltatási eljárások – ICAO rövidítések és kódok (Procedeures for Air Navigation Services – ICAO Abbreviations and Codes)*(PANS-ABC, Doc 8400)és* Hely jelölők (Location Indicators) *(DOC 7910) kiadványokban találhatók. Repülésmeteorológiai kód adat-típusú jelölők a WMO 386 számú kiadványában* Globális távközlési rendszer kézikönyv (Manual on Telecommunication System) *kiadványban vannak megadva*.

6. REPÜLÉST VÉGZŐ LÉGIJÁRMŰVEKNEK SZÓLÓ INFORMÁCIÓKRA VONATKOZÓ ELŐÍRÁSOK

6.1 Repülést végző légijármű által igényelt információk szolgáltatása

Ajánlás. *Ha repülést végző légijármű meteorológiai információt kér, a kérést vevő meteorológiai irodának intézkedni kell, ha szükséges másik meteorológiai iroda segítségével, az információ szolgáltatásának biztosítására.*

6.2 Információk az üzemeltető repülés közbeni tervezéséhez

Ajánlás. *Meteorológiai információt repülést végző légijármű üzemeltető általi repülési tervezéséhez a repülési periódus alatt kell szolgáltatni, és ezeknek a a következők valamelyikéből, vagy mindegyikéből kell állni:*
a) METAR és SPECI (beleértve trend előrejelzéseket is, mint regionális léginavigációs egyezmény szerint kiadottakat);
b) TAF és módosított TAF;
c) SIGMET és AIRMET tájékoztatás és erre a repülésre vonatkozó különleges légijelentések, hacsak az utóbbi nem volt egy SIGMET közlemény tárgya; és
d) magassági szél és magaslégköri levegő hőmérséklet információk.

A8-1 ábra. Térkép formátumú WAFS előrejelzések rögzített lefedési területei – Mercator vetület
Ábra szövegek
1 Ázsia dél
2 térkép
3 szélesség
4 hosszúság

A8-2 ábra. Térkép formátumú WAFS előrejelzések rögzített lefedési területei – Polar sztereografikus vetület (északi félteke)
Ábra szövegek
1 térkép
2 szélesség
3 hosszúság

A8-3 ábra. Térkép formátumú WAFS előrejelzések rögzített lefedési területei – Polar sztereografikus vetület (déli félteke)
Ábra szövegek
1 térkép
2 szélesség
3 hosszúság

9. FÜGGELÉK. LÉGIFORGALMI SZOLGÁLATOK, KUTATÓ ÉS MENTŐ SZOLGÁLATOK ÉS REPÜLÉSI INFORMÁCIÓS SZOLGÁLATOK RÉSZÉRE NYÚJTOTT INFORMÁCIÓKRA VONATKOZÓ MŰSZAKI ELŐÍRÁSOK

(Lásd jelen Annex 10. Fejezete)

1 LÉGIFORGALMI SZOLGÁLATI EGYSÉGEK SZÁMÁRA SZOGÁLTATANDÓ INFORMÁCIÓK

1.1 Repülőtéri irányító tornyoknak szóló információk jegyzéke

A következő meteorológiai információkat kell szükség esetén a repülőtéri irányító torony részére a hozzárendelt repülőtéri meteorológiai irodának biztosítani:
a) rendszeres és különleges jelentések, METAR és SPECI, TAF és trend előrejelzések és ezek módosításai az érintett repülőtérre vonatkozóan;
b) SIGMET és AIRMET tájékoztatások, szélnyírás figyelmeztetések és repülőtéri figyelmeztetések;
c) helyileg egyeztetett, bármely pótlólagos meteorológiai információ, mint például talajszélre vonatkozó előrejelzések a lehetséges futópálya változtatás meghatározásához;
d) vulkanikus hamu felhőről kapott tájékoztatás, amelyre vonatkozóan még nem adtak ki SIGMET-et, ahogy abban az érintett meteorológiai és ATS hatóságok megegyeztek; és
e) kitörés előtti vulkanikus tevékenységről és/vagy vulkánkitörésről kapott információ, ahogy abban az érintett meteorológiai és ATS hatóságok megegyeztek.

1.2 Bevezetés irányító egységnek szóló információk jegyzéke

A bevezető irányító egység részére a hozzárendelt repülőtéri meteorológiai irodának szükség esetén a következő meteorológiai információkat kell biztosítania:
a) helyi rendszeres és különleges jelentések, rendszeres jelentések METAR, és SPECI és trend előrejelzések és ezek módosításai arra (azokra) a repülőtérre (repülőterekre) vonatkozóan, amelye(ke)n a bevezető irányító egység illetékes.
b) arra a légtérre vonatkozó SIGMET és AIRMET tájékoztatások, szélnyírás figyelmeztetések és riasztások és megfelelő különleges légijelentések, amelyben a bevezető irányító egység illetékes, és repülőtéri figyelmeztetések;
c) bármely további meteorológiai információ, amelyben helyileg megegyeztek;
d) vulkanikus hamu felhőről kapott információ, amelyre vonatkozóan még nem adtak ki SIGMET-et, az érintett meteorológiai és ATS hatóságok megegyezésének megfelelően; és
e) kitörés előtti vulkanikus tevékenységről és/vagy vulkánkitörésről kapott információ, ahogy abban az érintett meteorológiai és ATS hatóságok megegyeztek.

1.3 Repülés információs központnak szóló információk jegyzéke

A repülési információs központ vagy a körzeti irányító központ részére, szükség szerint, a hozzárendelt meteorológiai megfigyelő irodának a következő meteorológiai információkat kell biztosítania :
a) METAR és SPECI, amelyek tartalmazzák a repülőterek és egyéb helyek aktuális légnyomás adatait, TAF és trend előrejelzéseket, és ezek módosításait, amelyek a repülési információs régiót vagy az irányító körzetet érintik, és ha a repülési információs központ vagy a körzeti irányító központ kívánja, a szomszédos repülési információs régióban lévő repülőterekre vonatkozókat is, a regionális léginavigációs egyezményben meghatározottaknak megfelelően;
b) a magassági szelekre és magaslégköri levegő hőmérsékletre, szignifikáns útvonal időjárási jelenségekre vonatkozó előrejelzések és ezek módosításai, különös tekintettel azokra, melyek lehetetlenné teszik a látás szerinti repülési szabályok szerinti üzemelést, SIGMET és AIRMET tájékoztatások és megfelelő különleges légijelentések, amelyek a repülési információs régióra, vagy irányítói körzetre vonatkoznak, valamint, ha a regionális léginavigációs egyezmény úgy határozza meg, és a körzeti irányító központ úgy kívánja, a szomszédos repülési információs régiókra vonatkozókat is;
c) bármely egyéb, a repülési információs központ, illetve a körzeti irányító központ által a repülést végző légijárművek kéréseinek kielégítéséhez igényelt meteorológiai információk; ha az igényelt információ nem áll rendelkezésre a hozzárendelt meteorológiai figyelő irodánál, akkor ennek más meteorológiai iroda segítségét kell kérnie ezen információk biztosításához;
d) vulkanikus hamu felhőről kapott információ, amelyre vonatkozóan még nem adtak ki SIGMET közleményt, ahogy abban az érintett meteorológiai és ATS hatóságok megegyeztek; és
e) radioaktív anyagok véletlen atmoszférába jutásáról szóló vett információ, az érintett meteorológiai és ATS hatóság közötti megállapodás szerint;
f) a területért felelős TCAC által kiadott trópikus ciklon tájékoztató információ;
g) a területért felelős VAAC által kiadott vulkanikus hamu tájékoztató információ; és
h) kitörés előtti vulkanikus tevékenységről és/vagy vulkánkitörésről kapott információ, ahogy abban az érintett meteorológiai és ATS hatóságok megegyeztek.

1.4 Repülési távközlési központok információ ellátása

Ahol repülési információs célokra szükséges, az aktuális meteorológiai jelentéseket és előrejelzéseket biztosítani kell kijelölt repülési távközlési állomások részére. Ha szükséges, az információk egy példányát továbbítani kell a repülési információs központnak vagy a körzeti irányító központnak.

1.5 Információ formátum

1.5.1 **Ajánlás** – *A légiforgalmi szolgálati egységeket helyi rendszeres és különleges jelentésekkel, METAR-ral, SPECI-vel, repülőtéri és leszállási előrejelzéssel, SIGMET és AIRMET tájékoztatással, magassági szél és magaslégköri hőmérséklet előrejelzésekkel és ezek módosításaival kell ellátni, abban a formában, amelyben ezek készültek, a többi meteorológiai irodákrészére szétosztásra kerültek, vagy más meteorológiai irodáktól érkeztek, hacsak helyileg nem állapodtak meg másképpen.*
1.5.2 **Ajánlás** – *Ha rácspontokra vonatkozó, számítógép által feldolgozott magaslégköri adatokat digitális formában továbbítják a légiforgalmi szolgálati egységnek a légiforgalmi szolgálatok számítógépein történő felhasználásra, a formátum és a továbbítás módja a meteorológiai hatóság és az illetékes ATS hatóság közötti megállapodás szerinti legyen. Az adatokat normál körülmények között, az előrejelzések feldolgozásának befejezése után, a lehető leggyorsabban szolgáltatni kell.*

2. KUTATÁS ÉS MENTÉS SZOLGÁLATI EGYSÉGEK RÉSZÉRE SZOLGÁLTATANDÓ INFORMÁCIÓK

2.1 Információk jegyzéke

A mentési koordinációs központoknak juttatott információknak tartalmazniuk kell a meteorológiai körülményeket, amelyek a keresett repülőgép utolsó ismert helyzeténél és ennek a légijárműnek a szándékolt útvonala mentén fennálltak, különös tekintettel a következőkre:
a) szignifikáns útvonali időjárás jelenségek;
b) felhő mennyiség és fajta, különösen a cumulonimbus, a felhőalap- és tető magasság jelzések;
c) látás és a látást csökkentő jelenségek;
d) talajszél és magassági szél;
e) a talaj állapota, különösen hótakaró vagy vízelöntés;
f) tengerfelület hőmérséklet, a tenger állapota, jégborítás, ha van, és óceáni áramlatok, ha relevánsak a kutatás területén;
g) tengerszinti nyomás adatok.

2.2 Kérésre szolgáltatandó információk

2.2.1 **Ajánlás** – *A mentést koordináló központ kérésére a kijelölt meteorológiai irodának intézkednie kell azon repülési dokumentáció részleteinek beszerzéséről, amelyet az eltűnt légijárműnek adtak, bármely előrejelzésre vonatkozó módosítással együtt, melyet a repülést végző légijárműnek továbbítottak.*
2.2.2 **Ajánlás** – *A kutatási és mentési munkálatok elősegítése érdekében a kijelölt meteorológiai iroda kérésre biztosítson:*
a) teljes és részletes információkat a jelenlegi és várható meteorológiai viszonyokról a kutatási területre vonatkozóan; és
b) az aktuális és előrejelzett körülményeket azokon az útvonalakon, amelyeken a kutató légijárművek a kutatás végrehajtási repülőterétől és az oda való visszatérésük alatt repülnek.
2.2.3 **Ajánlás** – *A mentést koordináló központ kérésére a kijelölt meteorológiai iroda szolgáltassa a kutató és mentő tevékenységet végző hajók által igényelt meteorológiai információkat vagy intézkedjen annak biztosítására.*

3. REPÜLÉSI INFORMÁCIÓS SZOLGÁLTATÓ EGYSÉGEK RÉSZÉRE BIZTOSÍTANDÓ INFORMÁCIÓK

3.1 Információk jegyzéke

Egy légiforgalmi információs szolgálati egység részére szükség szerint az alábbi információkat kell biztosítani:
a) információ a nemzetközi léginavigáció meteorológiai szolgálatáról, amelyet repülési információs kiad-

vány(ok)ban szándékoznak közzétenni.
Megjegyzés: – Ezeknek az információknak a részleteit lásd a 15. Annex, 1. Függelék 1. Rész GEN 3.5 és a 3. Rész AD 2.2, 2.11, 3.2 és 3.11 pontjai alatt.
b) NOTAM vagy ASHTAM elkészítéséhez szükséges információk, amelyek különösen az alábbiakra vonatkozó információkat tartalmazzák:
1) repülésmeteorológiai szolgálatok létesítése, megszüntetése és működésükben beálló jelentős változások. Ezt a tájékoztatást a repülési információs szolgálati egység részére a hatályba lépés időpontja előtt megfelelő idővel biztosítani kell, hogy lehetőség legyen NOTAM kiadására a 15. Annex 5.1.1 és 5.1.1.1 pontjának megfelelően.
2) vulkanikus tevékenység előfordulása; és
Megjegyzés – A kívánt speciális információkat 3. Fejezet 3.3.2 és a 4. Fejezet 4.8 pontjai tartalmazzák.
3) radioaktív anyagok véletlen atmoszférába kerülése, ahogyan az érintett meteorológiai és a megfelelő polgári repülési hatóság megállapodott; és
Megjegyzés. – A megkövetelt különleges információk a 3. Fejezet 3.4.2 g) pontban vannak megadva.
c) a repülési információs körlevelek elkészítéséhez szükséges információk, különösen az alábbi információk:
1) a repülésmeteorológiai eljárások, szolgálatok és eszközök várható jelentős változása; és
2) bizonyos időjárási jelenségek hatása a légijárművek üzemelésére.

10. FÜGGELÉK. KOMMUNIKÁCIÓVAL ÉS HASZNÁLATÁVAL SZEMBENI KÖVETELMÉNYEKRE VONATKOZÓ MŰSZAKI ELŐÍRÁSOK

(Lásd jelen Annex 11. Fejezet)

1. KOMMUNIKÁCIÓVAL SZEMBENI SPECIÁLIS KÖVETELMÉNYEK

1.1 Meteorológiai információk megkövetelt átviteli idői

Ajánlás – *Hacsak a regionális léginavigációs egyezményben máshogy nem rendelkeztek, az üzemeltetési meteorológiai információkat tartalmazó AFTN közlemények és bulletinek továbbítási idejének a következőkben megadottaknál rövidebbnek kell lenni:*

SIGMET és AIRMET közlemények, vulkánikus hamu és trópusi ciklon tájékoztató információk és különleges légijelentések		*5 perc*
Szignifikáns időjárásra és magaslégköri előrejelzésekre vonatkozó rövidített köznyelvű módosítások		*5 perc*
Módosított TAF és TAF korrekciók		*5 perc*
METAR Trend előrejelzések TAF SPECI	*0-900 km (500 NM)*	*5 perc*
	több mint 900 km (500NM)	*10 perc*

1.2 Rácspont adatok ATS és üzemeltetők részére

1.2.1 **Ajánlás. –***Amikor a légiforgalmi szolgálatok számítógépein való felhasználásra a rácspontokra vonatkozó magaslégköri adatokat digitális formában bocsátják rendelkezésre, a továbbításra vonatkozó elrendezések feleljenek meg a meteorológiai hatóság és az illetékes ATS hatóság közötti megállapodásnak.*

1.2.2 **Ajánlás. –** *Amikor számítógépes repüléstervezés céljából az üzemeltetők részére a rácspontokra vonatkozó magaslégköri adatokat digitális formában bocsátják rendelkezésre, a továbbításra vonatkozó rendelkezések feleljenek meg az érintett világterületi vagy regionális területi előrejelző központ, a meteorológiai hatóság és az üzemeltetők közötti megállapodásnak.*

2. REPÜLÉSI ÁLLANDÓHELYŰ SZOLGÁLATI KOMMUNIKÁCIÓ HASZNÁLATA

2.1 Meteorológiai bulletinek alfanumerikus formátumban

2.1.1 Bulletinek összeállítása

Ajánlás – *Mindenütt ahol lehetséges, az üzemeltetési meteorológiai információk cseréjét a meteorológiai tájékoztatások ugyanazon típusainak összevonásával, bulletinek formájában kell végezni*

2.1.2 Bulletinek létrehozási időpontjai

Ajánlás – *Ütemezetten továbbítandó meteorológiai bulletineket rendszeresen, előírt időpontban kell összeállítani. A METAR kód formájában készült jelentéseket továbbítás céljából nem később, mint 5 perccel a megfigyelés tényleges ideje után össze kell állítani. A repülőtéri előrejelzéseket továbbítás céljából legalább 1 órával az érvényességi időtartamuk kezdete előtt össze kell állítani, hacsak a regionális léginavigációs egyezmény másképp nem határozza meg.*

2.1.3 Bulletinek fejrészei

A repülési állandóhelyű szolgálatok eszközein keresztül való továbbításra szánt üzemeltetési meteorológiai információkat tartalmazó meteorológiai bulletinek az alábbiakból álló fejrésszel rendelkeznek:

a) négy betűből és két számjegyből álló azonosító;

b) a meteorológiai bulletint kibocsátó vagy összeállító meteorológiai iroda földrajzi helyére vonatkozó négybetűs ICAO hely-jelölés;

c) dátum-idő csoport; és

d) szükség esetén egy hárombetűs jelölés.

1. *Megjegyzés – A fejrész formájára és tartalmára vonatkozó részletes előírások a WMO* Globális Távközlési Rendszer Kézikönyv (Manual on the Telecommunication System*) I. kötetében találhatók és a* Repülésmeteorológiai Eljárások Kézikönyvben (Manual of Aeronautical Meteorological Practice) *(Doc. 8896) reprodukálva vannak.*

2. *Megjegyzés – Az ICAO hely-jelölések* Hely-jelölések (Location Indicators) *(Doc 7910) című kiadványban vannak felsorolva.*

2.1.4 Bulletinek szerkezete

Az AFTN-en keresztül továbbítandó üzemeltetési meteorológiai információkat tartalmazó meteorológiai bulletineket az AFTN közlemény formátum szöveg részébe kell belefoglalni.

2.2. Világ területi előrejelző rendszer produktumai

2.2.1 Távközlés WAFS produktumok szolgáltatásának részére

Ajánlás. – *A világ területi előrejelzési rendszer produktumainak szolgáltatására szolgáló eszközként a repülési állandó helyű szolgálatot kell használni*

2.2.2 Térképek minőségi követelményei

Ajánlás – *Ahol a világterületi előrejelző rendszer produktumait térkép formátumban osztják szét, a kapott térképek minősége olyan legyen, amely megfelelően olvasható másolatok készítését teszi lehetővé repüléstervezési és dokumentációs célokra. A kapott térképek az ábrázolt területnek több mint 95 százalékában legyenek olvashatók.*

2.2.3 Átvitelek minőségi követelményei
Ajánlás – *Az átvitelek olyanok legyenek, melyek biztosítják, hogy bármely 6 órás időtartam alatt a megszakadásuk nem haladja meg a 10 percet.*
2.2.4 WAFS produktumokat tartalmazó bulletinek fejrésze
A repülési állandó helyű szolgálat eszközein digitális formában továbbítandó, WAFS produktumokat tartalmazó meteorológiai bulletineket a 2.1.3 pontban megadott fejrésszel kell ellátni.

3. REPÜLÉSI MOZGÓ SZOLGÁLATI KOMMUNIKÁCIÓ HASZNÁLATA

3.1 Meteorológiai közlemények tartalma és formátuma

3.1.1 A légijárműveknek továbbított jelentések, előrejelzések és SIGMET tájékoztatások tartalma és formája legyen összhangban a jelen Annex 4., 6. és 7. Fejezeteiben előírtakkal.
3.1.2 A légijárművek által továbbított légijelentések tartalma és formája egyezzen meg a jelen Annex 5. Fejezetének, és a *Léginavigációs szolgáltatási eljárások – égiforgalmi menedzsment (Procedures for Air Navigation Services – Air Traffic Management)* (PANS-ATM, Doc. 4444) 1. Függelékének *előírásaival.*

3.2 Meteorológiai bulletinek tartalma és formátuma

A légiforgalmi mobil szolgálaton keresztül továbbított meteorológiai bulletin lényege maradjon változatlan ahhoz képest, amelyet a bulletin a kibocsátásakor tartalmazott.

4. REPÜLÉSI ADATKAPCSOLATI SZOLGÁLAT HASZNÁLATA – D-VOLMET

4.1 D-VOLMET részére rendelkezésre álló meteorológiai információk részletes tartalma

4.1.1 Azokat a repülőtereket, amelyekre jelentéseknek, előrejelzéseknek kell rendelkezésre állni felfelé kapcsolat részére a repülést végző légijárműhöz, regionális léginavigációs egyezménnyel kell meghatározni.
4.1.2 Azokat a repülési információs régiókat, amelyekre SIGMET és AIRMET közleményeknek kell rendelkezésre állni felfelé kapcsolat részére a repülést végző légijárműhöz, regionális léginavigációs egyezménnyel kell meghatározni.

4.2 A D-VOLMET részére rendelkezésre álló meteorológiai információkra vonatkozó kritériumok

4.2.1 **Ajánlás –** *A legfrissebb rendelkezésre álló METAR és SPECI és TAF, és érvényes SIGMET és AIRMET közleményeket kell a repülést végző légijárműhöz való felfelé kapcsolathoz használni.*
4.2.2 **Ajánlás** – *A D-VOLMET által tartalmazott TAF-t szükség esetén módosítani kell, annak érdekében, hogy egy előrejelzés, amikor a repülést végző légijárműhöz való felfelé kapcsolathoz rendelkezésre bocsátják, az illetékes meteorológiai iroda legfrissebb véleményét tükrözze.*
4.2.3 **Ajánlás** – *Ha nincs érvényes SIGMET közlemény egy repülési információs régióra, a D-VOLMET-ben „NIL SIGMET" jelzésnek kell benne lenni.*

4.3 A D-VOLMET részére rendelkezésre álló meteorológiai információk formátuma

A D-VOLMET-ben lévő jelentések, előrejelzések és SIGMET és AIRMET tájékoztatások tartalma és formája feleljen meg jelen Annex 4., 6. és 7. Fejezeteiben szereplő előírásoknak.

5. REPÜLÉSI RÁDIÓADÁS SZOLGÁLAT HASZNÁLATA — VOLMET RÁDIÓADÁSOK

5.1 VOLMET rádióadásokban tartalmazott meteorológiai információk részletes tartalma

5.1.1 Azokat a repülőtereket, amelyekre vonatkozó METAR-t, SPECI-t és TAF-t a VOLMET adásoknak tartalmazniuk kell, ezek továbbítási sorrendjét és az adás idejét regionális léginavigációs egyezménynek

kell meghatároznia.
5.1.2 Azokat a repülési információs régiókat, amelyek részére az időütemezett VOLMET rádióadásoknak SIGMET közleményeket kell tartalmazniuk, regionális léginavigációs egyezménnyel kell meghatározni. Ahol ez történik, a SIGMET közleményt, az adás elején, vagy egy ötperces idő-blokk elején kell továbbítani.

5.2 VOLMET rádióadásokban tartalmazott információkra vonatkozó kritériumok

5.2.1 **Ajánlás** – *Ha egy jelentés valamely repülőtérről nem érkezett meg időben az adáshoz, a legutóbbi rendelkezésre álló jelentést kell felvenni az adásba, az észlelés idejének megjelölésével.*
5.2.2 **Ajánlás** – *Rendszeres időközökben sugárzott VOLMET adásokban szereplő TAF-t szükség esetén módosítani kell annak érdekében, hogy az előrejelzés a továbbítás idején az érintett meteorológiai iroda legutolsó véleményét tükrözze.*
5.2.3 **Ajánlás.** – *Ahol időütemezett VOLMET rádióadások SIGMET közleményeket tartalmaznak, „NIL SIGMET"jelzést kell továbbítan, ha az érintett repülés információs régiókra nincs érvényes SIGMET közlemény.*

5.3 VOLMET rádióadásokban tartalmazott meteorológiai információk formátuma

5.3.1 A VOLMET adásokban szereplő jelentések, előrejelzések és SIGMET tájékoztatás tartalma és formátuma feleljen meg jelen Annex 4., 6. és 7. Fejezeteiben szereplő előírásoknak.
5.3.2 **Ajánlás.** – *VOLMET rádióadásoknak szabványos rádiótelefon frazeológiákat kell használni.*
Megjegyzés. – VOLMET rádióadásokban használt szabványos rádiótelefon frazeológiákról útmutatást a Kézikönyv a Légiforgalmi Szolgálatok, a Repülési Információs Szolgálatok és a Repülésmeteorológiai Szolgálatok közötti koordinációról (Manual on Coordination between Air Traffic Services, Aeronautical Meteorological Services) *(Doc 9377), 1. Függelék ad.*

A MELLÉKLET. MÉRÉSEK VAGY MEGFIGYELÉSEK ÜZEMELÉSI SZEMPONTBÓL KÍVÁNATOS PONTOSSÁGA

Megjegyzés – A jelen táblázatba foglalt útmutatás a 4. Fejezetre – Meteorológiai megfigyelések és jelentések – különösen a 4.1.9 pontra vonatkozik.

Észlelendő elem	*A mérések vagy megfigyelések üzemelés szempontjából kívánatos pontossága**
Átlagos talaj-szél	Irány: ±10 fok Sebesség: ±2 km/h (1 csomó) 19 km/h-ig (10 csomó) ±10% 19 km/h (10 csomó) felett
Eltérések az átlagos talajszéltől	±4km/h (2 csomó), hosszanti ésoldalirányú komponensekben kifejezve
Látás	±50 m 600 m-ig ±10% 600 és 1500 m között ±20% 1500 m felett
Futópálya látás-távolság	±10 m 400 m-ig ±25 m 400 és 800 m között ±10% 800m felett
Felhőmennyiség	±1 okta

Felhőmagasság	±10 m -től (33 láb) 100 m-ig (330 láb) ±10% 100 m (330 láb) felett
Levegő hőmérséklet és harmatpont hőmérséklet	±1ºC
Nyomásérték (QNH, QFE)	±0,5 hPa

* Az üzemelés szempontjából kívánatos pontosságot nem üzemelési előírásnak szánják; ezt az üzemeltetők által kifejezett célként kell tekinteni.

Megjegyzés. – A mérési vagy megfigyelési bizonytalanságra vonatkozó útmutatás a WMO 8. számú kiadványában – Útmutató meteorológiai műszerekhez és megfigyelési módszerekhez (Guide to Meteorological Instruments and Methods of Observation) *található.*

B MELLÉKLET. ELŐREJELZÉSEK ÜZEMELÉSI SZEMPONTBÓL KÍVÁNATOS PONTOSSÁGA

1. Megjegyzés. – Az ebben a táblázatban lévő útmutató a 6. Fejezet – Előrejelzések-re, különösen a 6.1.1 pontra vonatkozik

2. Megjegyzés. – Ha az előrejelzések pontossága a második oszlopban bemutatott, üzemelési szempontból kívánatos tartományon belül marad az eseteknek a harmadik oszlopban jelölt százalékánál, akkor az előrejelzés hibáinak hatása nem tekinthető lényegesnek a navigációs hibák és más üzemelési bizonytalanságok hatásaihoz képest.

Előrejelzendő elemek	*Előrejelzések üzemeltetési szempontból kívánatos pontossága*	*A tartományon belüli esetek minimális százaléka*
	TAF	
Szélirány	±20	az esetek 80%-a
Szélsebesség	±9 km/h (5csomó)	az esetek 80%-a
Látás	±200 m 800 m-ig ±30% 700 m és 10 km között	az esetek 80%-a
Csapadék	Előfordulás vagy nem-előfordulás	az esetek 80%-a
Felhő mennyiség	Egy kategória 450 m (1500 láb) alatt BKN vagy OVC előfordulása vagy nem-előfordulása 450 m (1500 láb) és 3000 m (10000 láb) között	az esetek 70%-a
Felhő magasság	±30 m (100 láb) 300 m-ig (1000 láb) ±30% 300 m (1000 láb) és 3000 m (10000 láb) között	az esetek 70%-a
Levegő hőmérséklet	±1ºC	az esetek 70%-a
	TREND ELŐREJELZÉS	
Szélirány	±20º	az esetek 90%-a

Szélsebesség	10km/h	az esetek 90%-a
Látás	±200 m 800 m-ig ±30% 800 m és 10 km között	az esetek 90%-a
Csapadék	Előfordulás vagy nem-előfordulás	az esetek 90%-a
Felhő mennyiség	Egy kategória 450 m (1500 láb) alatt BKN vagy OVC előfordulása vagy nem-előfordulása 450 m (1500 láb) és 3000 m (10000 láb) között	az esetek 90%-a
Felhő magasság	±30 m (100 láb) 300 m-ig (1000 láb) ±30% 300 m (1000 láb) és 3000 m (10000 láb) között	az esetek 90%-a

FELSZÁLLÁSI ELŐREJELZÉS

Szélirány	±20	az esetek 90%-a
Szélsebesség	±10 km/h (5 csomó) 50 km/h-ig (25 csomó) ±20% 46 km/h (25 csomó) felett	az esetek 90%-a
Levegő hőmérséklet	±1ºC	az esetek 90%-a
Nyomásérték (QNH)	±1 hPa	az esetek 90%-a

KÖRZETI, LÉGI ÉS ÚTVONALI ELŐREJELZÉSEK

Magaslégköri levegő hőmérséklet	±2 (Közepes 900 km (500tengeri mérföldnél))	az esetek 90%-a
Relatív nedvesség	±20%	az esetek 90%-a
Magassági szél	20 km/h (10 csomó) (Vektor különbség modulusa 900 km (500 tengeri mérföld)	az esetek 90%-a
Szignifikáns útvonali időjárás jelenségek és felhő	Előfordulás vagy nem-előfordulás	az esetek 80%-a
	Hely: ±100 km (60 tengeri mérföld)	az esetek 70%-a
	Függőleges kiterjedés: ±300 m 1000 láb)	az esetek 70%-a
	Tropopauza repülési magasságszintje:±300 m (1000 láb)	az esetek 80%-a
	Maximális szél szintje:±300 m (1000 láb)	az esetek 80%-a

C MELLÉKLET. REPÜLŐTÉRI JELENTÉSEKHEZ ALKALMAZHATÓ VÁLOGATOTT KRITÉRIUMOK

(Ebben a táblázatban lévő útmutatás a 47. Fejezetre és a 3.Függelékre vonatkozik.)

	Talajszél				*Látás*			*RVR* A B C (OBS TIME) (Idő, MN)			*Aktuá időjár*
Előírások	Irányváltozások[3]			Sebes-ségváltozások[3]	Irányváltozások[4]			Múlt tendencia[5]		Változá-sok[5]	Álta krité nem rende a WX ség (spe kritér lás Füg 4.4.:
	≥60°és < 180°		≥180°		Általános szabály	Speciális esetek Minimum VIS≠domináns VIS		$\lvert \bar{R}_{5(AB)} - \bar{R}_{5(BC)} \rvert$		$\lvert \bar{R}_{1} - \bar{R}_{10} \rvert$>MAX [50 m vagy 20% R_{10}]	
	Közepes sebesség			Közepessebesség kiterjedése ≥ 20 km/h		Minimál VIS<1500 m vagy 0,5 domi-náns VIS	VIS ingadozás domináns VIS nem határozható meg	<100m	≥100m		
	<6km/h	≥6km/h									
Helyi rendsze-res és különle-ges jelentés	2perc VRB+2 szélső irányok[11]	2perc közepes+2 szélső irányok[11]	2 perc VRB (nincse-nek szélsősé-gek)[11]	2 perc Minimális és maximális sebesség	1perc VIS a futópálya(k) mentén	NA	NA	1 perc NA[8]			
METAR/SPECI	10perc VRB (nincs szélsőség)	10perc közepes+2 szélső irányok	10perc VRB (nincse-nek szélsősé-gek)	10perc Maximális sebesség[11]	10perc Domináns VIS	Domináns VIS és minimum VIS + irány	Minimális VIS	10perc Nincs észlelt tendencia („N”) Tendencia nem áll redelkezésre, a tendencia elhagyva	Felfelé („U”) vagy lefelé („U”)	1perc Minimum és maxi-mum (10perc közép helyett)	
Releváns jelentő skála az összes közle-ménynél	Három számjegyű irány, a legköze-lebbi 10 fokra kerekítve (1–4 fok lefelé, 5–9 fok felfelé)			Sebesség 1 km/h vagy 1 csomó Sebesség<2km/h (1 csomó: CALM	// Alkalmaz ható lépés VIS<800m :50m 800m≤VIS< 5000m :100m 5000m≤VIS< 10km :1km VIS>10km :Semmi, 10 km-ként megad-va, vagy CAVOK			// Alkalmaz ható lépés RVR<400m :25m 400≤RVR≤800m:50m 800<RVR< 2000m :100m[13]			N/A

Megjegyzések:

1. Az elmúlt 10 percet figyelembe véve (kivéve: ha a 10 perces időtartam alatt jelentős változás áll be (pl. az RVR eléri vagy meghaladja a 150, 350, 600 vagy 800 métert, és ez ≥2 perc, időn keresztül fennáll), ez esetben a változás utáni adatokat kell használni). Egyszerű diagram mutatja az RVR kritériumokra vonatkozó megfigyelés előtti 10 perces időtartamot, pl. AB, BC és AC.
2. CB és TCU-ból álló azonos felhőalapú réteg esetén, a felhőt „CB"-vel kell jelölni.
3. Az elmúlt 10 percet figyelembe véve (kivéve ha a 10 perces időtartam alatt jelentős diszkontinuitás áll be (pl. az irány ≥30 fokkal és a szélsebesség ≥20 km/h; vagy a szélsebesség változásai ≥20 km/h mértékben megváltozik és ez ≥2 percig tart), ez esetben a változás utáni adatokat kell használni.
4. Különböző irányok esetén az üzemeltetési szempontból legfontosabb irány használandó.
5. $\bar{R}_1$ = az AC időtartam alatt bármely 1 perc átlag RVR értéke;
$\bar{R}_{10}$ = az AC időtartam alatti átlag RVR érték;
$\bar{R}_{5(AB)}$= az AB időtartam alatti RVR érték 5 perces átlaga; és
$\bar{R}_{5(BC)}$ = a BC időtartam alatti RVR érték 5 perces átlaga
6. CB (cumulonimbus) és TCU (tornyosuló cumulus = nagy függőleges kiterjedésű cumulus congestus), ha a többi rétegben még nem szerepel.
7. Időátlagolás, ha alkalmazható, a bal felső sarokban jelezve.
8. N/A = nem alkalmazható.
9. Külön kérésre a QFE-t bele kell foglalni. A QFE referencia magassága a repülőtér közepes tengerszint feletti magassága, kivéve a precíziós megközelítéses futópályákat, és azokat a nem-precíziós megközelítéses futópályákat, melyeknek küszöbe ≥2 m-el (7 láb) a repülőtér tengerszint feletti magassága alatt vagy felett van, amikor a referencia szint a releváns küszöb közepes tengerszint feletti magassága.
10. Ahogyan a 3. Függelék 4.8 pontban fel van sorolva.
11. A WMO Kódok Kézikönyve (WMO – No.306) 15.4.5 pontja szerint „ajánlatos, hogy a szélmérő rendszerek olyanok legyenek, hogy a csúcs széllökések 3 másodperces átlag értékeket jelezzenek".
12. Beleértve a tenger felszíni hőmérsékletet és tengerállapotot, tengeren emelt építményen történő megfigyelés esetén. a regionális léginavigációs egyezménynek megfelelően.
13. Akkor jelezze, ha az RVR és/vagy a VIS ≤1500 méter, értékhatárok 50 és 2000 méter.
14. Azokon a repülőtereken, ahol a küszöbmagasság ≥15 m-el, a repülőtér tengerszint feletti magassága alatt van, és a leszállópálya precíziós megközelítésű, a *küszöb magasságot* kell referenciaként használni.
15. 0,1 hPa pontossággal mérve.

D MELLÉKLET – A MŰSZER LEOLVASÁSI ÉRTÉKEINEK ÁTALAKÍTÁSA FUTÓPÁLYA LÁTÁSTÁVOLSÁG ÉRTÉKEKRE

(Lásd jelen Annex 3. Függelék 4.3.5 pontját)

1. A műszer leolvasási értékeinek futópálya látástávolság értékekre történő átalakítása a Koschmieder-törvényen vagy az Allard-törvényen alapul, attól függően, hogy a pilóta a vizuális irányítás túlnyomó részét a futópályától és annak jelöléseitől, vagy pedig a futópálya-fényektől várhatja. A futópálya látástávolság becslésének szabványosítása érdekében ez a melléklet útmutatást ad a fő átszámítási tényezők használatára és alkalmazására vonatkozóan.
2. A Koschmieder-törvényben az egyik számításba veendő tényező a pilóta szemének kontrasztérzékenységi küszöbe. Megállapodás szerint ehhez a 0,05 állandót használják (dimenzió nélküli).
3. Az Allard-törvényben a megfelelő tényező a megvilágítási küszöb. Ez nem egy állandó, hanem a

háttérmegvilágítás folytonos függvénye. A megállapított összefüggést, amelyet olyan műszerezett rendszerben kell használni, melyben a megvilágítási küszöböt a háttér megvilágítás érzékelője folyamatosan állítja, a D1. ábra görbéje mutatja. Egy folytonos függvény használata, amely a lépcsős függvényt közelíti, ahogyan a D-1 ábra mutatja, a 4. paragrafusban leírt lépcsős összefüggéshez képesti nagyobb pontossága miatt előnyben részesül.

4. Olyan műszerezett rendszerekben, amelyek nem rendelkeznek folyamatos megvilágítási küszöb be állítással, négy egyenlő térközű megvilágítási küszöbérték használata megállapított megfelelő háttér megvilágítási tartományokkal, kényelmes, de a pontosságot csökkenti. A négy értéket a D-1 ábra lépcsőzetesen ábrázolja, valamint a D-1 táblázat is tartalmazza, a könnyebb érthetőség kedvéért.

1. Megjegyzés. – A futópálya látástávolság pályafényeken alapuló becsléséhez információ és útmutató anyag a Futópálya látástávolság észlelési és jelentési eljárásainak kézikönyve (Manual of Runway Visual Range Observing and Reporting Practices) *(Doc 9328) kiadványban található.*

2. Megjegyzés. – A látás repülési célokra alkotott definíciójával összhangban, a látás becsléséhez használt megvilágítás intenzitás 1000 cd környékén van.

D-1 táblázat. Megvilágítási küszöb lépcsők

Feltétel	*Megvilágítási küszöb (lx)*	*Háttér megvilágítás (cd/m2)*
Éjszaka	$8x10^{-7}$	≤50
Közbenső	10^{-5}	51-999
Normál nappal	10^{-4}	1000-12000
Fényes nappal (napfényes köd)	10^{-3}	>12000

D-1 ábra. Összefüggés az E_T(lx) megvilágítás küszöb és a B (cd/m^2) háttér fényerősség között

Ábra szövegek
1 Napsütéses nappal
2 Normál nappal
3 Közepes
4 Éjszaka
5 Megvilágítási küszöb – lux
6 Háttér megvilágítás – Candela per négyzetméter

ANNEX 4.
Légiforgalmi térképek

10. kiadás – 2001. július
54. módosítással
Ez a kiadás magában foglal a Tanács által 2001. március 8. előtt elfogadott minden módosítást és 2001. november 9-től a 4. Annex minden korábbi kiadásának helyébe lép.
A szabványok és az ajánlott gyakorlatok alkalmazási eljárásaira vonatkozó tájékoztatás az 1. Fejezetben és az Előszóban olvasható.
Nemzetközi Polgári Repülési Szervezet

MÓDOSÍTÁSOK

A módosítások kiadását az *ICAO Journal* és *az ICAO Kiadványok és Audio-vizuális Kiképzési segédletek Katalógusá*nak havi kiegészítései rendszeresen közlik, a jelen Kiadvány tulajdonosai kísérjék ezeket figyelemmel. Az alábbi táblázat a módosítások nyilvántartására szolgál.

MÓDOSÍTÁSOK ÉS JAVÍTÁSOK JEGYZÉKE

MÓDOSÍTÁSOK				JAVÍTÁSOK			
Sorszám	Alkalmazás dátuma	Beépítés dátuma	Beépítette	Sor szám	Kiadás dátuma	Beépítés dátuma	Beépítette
1-52	E kiadásba bedolgozva						
53	2004 nov. 25	-	ICAO				
54	2007 nov. 22	2008 aug. 09	MJ				

ELŐSZÓ

Történeti háttér

A légiforgalmi térképekre vonatkozó szabványokat és ajánlott gyakorlatokat legelőször 1948. április 16-án fogadott el az ICAO Tanácsa a Nemzetközi Polgári Repülésről szóló Egyezmény (Chicago 1944) 37. cikkelye rendelkezésének folyományaként, és ezeket az Egyezmény 4. Annexének nevezték el. Ezek 1949. március 1-től váltak alkalmazandóvá.

Az "A" táblázatban található a soron következő módosítások felsorolása, a módosítások eredete az érintett főbb témakörökkel, és azokkal a dátumokkal együtt, amikor az Annex-et és módosításait a Tanács elfogadta, amikor azok hatályba léptek, és amikor alkalmazandóvá váltak.

A Szerződő Államok Ténykedése

Az eltérések bejelentése. Felhívjuk a Szerződő Államok figyelmét az Egyezmény 38. cikkelyéből fakadó kötelezettségükre, mely értelmében a Szerződő Államtól megkövetelt, hogy a szervezet számára bejelentsenek minden olyan eltérést, amelyek nemzeti előírásai és gyakorlatai, valamint a jelen Annex-ben és annak bármely módosításában található nemzetközi szabványok között fennáll. Felkérjük a Szerződő Államot, hogy ezt a bejelentést a jelen Annex-ben és annak bármely módosításában található ajánlott gyakorlatoktól történő eltérésekre is terjessze ki, ha az ilyen eltérések bejelentése a repülés biztonságra nézve fontos. Felkérjük továbbá a Szerződő Államot, hogy folyamatosan tájékoztassa a szervezetet az esetleg később keletkező eltérésekről, illetve a korábban bejelentett eltérés visszavonásáról is. A jelen Annex minden egyes módosításának elfogadása után azonnal külön felkérést küldünk a Szerződő Államnak az eltérések bejelentése céljából.
Felhívjuk az államok figyelmét a 15. Annex rendelkezéseire is, amely az államoknak az Egyezmény 38.

cikkelyéből fakadó kötelezettségén kívül előírja, hogy a nemzeti előírások és gyakorlatok, valamint a vonatkozó ICAO szabványok és ajánlott gyakorlatok közötti eltéréseket a légiforgalmi tájékoztató szolgálat útján közzé kell tenni.

A tájékoztatás közzététele. A légi-jármű üzemeltetést érintő és az ebben az Annexben előírt szabványoknak és ajánlott gyakorlatoknak, továbbá eljárásoknak megfelelően biztosított légi-forgalmi térképek rendelkezésre állásáról és módosításáról szóló tájékoztatást a 15. Annex előírásainak megfelelően kell közzétenni és érvénybe léptetni.

Az Annex alkotóelemeinek jogállása

Egy Annex az alábbi alkotóelemekből áll, habár nem minden elem található meg szükségképpen minden Annex-ben. Az egyes alkotóelemek az alábbiakban feltüntetett jogállással rendelkeznek:

1. - A szoros értelemben vett Annex-et alkotó anyag:

a) Szabványok és ajánlott gyakorlatok, amelyeket a Tanács az Egyezmény rendelkezései értelmében elfogadott. Ezek meghatározása a következő:

Szabvány: fizikai jellemzőre, kialakításra, anyagra, teljesítményre, személyzetre, vagy eljárásra vonatkozó minden olyan kikötés, amelynek egységes alkalmazását a nemzetközi repülés biztonsága és rendszeressége szempontjából szükségesnek ismerték el és, amelyhez a Szerződő Államok az Egyezmény szerint alkalmazkodni fognak, illetőleg amelyek teljesítésének lehetetlensége esetén a Tanács értesítése a 38. cikkely értelmében kötelező

Ajánlott gyakorlat: fizikai jellemzőre, kialakításra, anyagra, teljesítményre, személyzetre, vagy eljárásra vonatkozó minden olyan kikötés, amelynek egységes alkalmazását a nemzetközi repülés biztonsága, rendszeressége és hatékony lebonyolítása szempontjából kívánatosnak ismerték el és, amelyhez alkalmazkodni a Szerződő Államok az Egyezmény értelmében törekedni fognak.

b) *Függelékek:* ezek kényelmi szempontból külön csoportosított anyagot tartalmaznak, de a Tanács által elfogadott szabványok és ajánlott gyakorlatok részét képezik.

c) *Meghatározások:* A szabványokban és ajánlott gyakorlatokban használt olyan kifejezések meghatározásai, amelyek nem maguktól értetődők abban az értelemben, hogy elfogadott szótári jelentéssel nem rendelkeznek. A meghatározás független jogállással nem rendelkezik, de minden olyan szabványnak és ajánlott gyakorlatnak, amelyben a kifejezést használják, lényeges részei, mivel a kifejezés értelmének megváltoztatása hatással volna az előírásra is.

d) *Táblázatok* és *ábrák:* amelyek kiegészítik, vagy szemléltetik az adott szabványt, vagy ajánlott gyakorlatot és amelyekre a szabványban, vagy ajánlott gyakorlatban hivatkozás történik, azok a kapcsolatos szabvány, vagy ajánlott gyakorlat részét képezik és ugyanolyan jogállással rendelkeznek.

2. - A Tanács által a szabványokkal és ajánlott gyakorlatokkal együttes közzétételre jóváhagyott anyag:

a) *Előszó:* a Tanács tevékenységén alapuló történeti áttekintést és magyarázó jellegű anyagot tartalmaz, valamint a szabványok és ajánlott gyakorlatok alkalmazására vonatkozóan az államok részére magyarázattal szolgál az Egyezményből és az elfogadási határozatból eredő kötelezettségeikhez.

b) *Bevezető rész:* magyarázó jellegű anyagot tartalmaz, amely azért szerepel az Annex részeinek, fejezeteinek, vagy szakaszainak elején, hogy elősegítse a szöveg alkalmazásának megértését.

c) *Megjegyzések:* ahol szükséges, a szövegbe beépített anyag, amely az érintett szabvánnyal és ajánlott gyakorlattal kapcsolatban tárgyi felvilágosítással, vagy hivatkozással szolgál, de a szabvány és az ajánlott gyakorlat részét nem képezi.

d) *Mellékletek:* a szabványokat és az ajánlott gyakorlatokat kiegészítő anyag, vagy ezek alkalmazásához útmutatóul szolgáló anyag.

A nyelv kiválasztása

Ezt az Annex-et hat nyelven, angolul, arabul, kínaiul, franciául, spanyolul és oroszul fogadták el. Minden Szerződő Államra vonatkozó felkérés, hogy a hazai bevezetés céljára, illetve az Egyezményben meghatározott egyéb célokra az említett hat szöveg közül egyet válasszon ki és közvetlenül, vagy saját nyelvre lefordítva használja azt, és az ICAO-t erről tájékoztassa.

Szerkesztési gyakorlat

Annak érdekében, hogy minden alkotórész jogállása első pillantásra szembetűnjön, az alábbi gyakorlatot alkalmaztuk: a szabványokat vékony álló betűkkel nyomtattuk, az ajánlott gyakorlatokat vékony dőlt betűkkel nyomtattuk. Az ajánlás esetében a jogállást vastag álló betűvel szedett **Ajánlás** szó jelzi. A megjegyzéseket vékony dőlt betűvel szedtük, jogállásukat a dőlt betűvel szedett Megjegyzés címszó jelzi.

Az angol nyelvű rendelkezések szövegében az alábbi szerkesztési gyakorlatot követték: a szabványok szövegében a "kell", "köteles" szó (az angol nyelvű eredetiben "shall"), az ajánlott gyakorlatok szövegében a szükséges (az angol nyelvű eredeti szövegben "should") kifejezést alkalmazták.

E dokumentumban a mértékegységek metrikus rendszerben szerepelnek, amelyeket a láb-font rendszerben közölt mértékegységek zárójelben követnek.

A jelen dokumentum bármely számmal és/vagy címmel azonosított részére történő utalás magában foglalja az adott rész alpontjait is.

"A" Táblázat - a 4. Annex módosításai

Módosítás	*Forrás(ok)*	*Tárgy*	*Elfogadva Hatályba lépés Alkalmazandó*
1. kiadás	Légiforgalmi térképek szekció 1. ülés (1945 nov), 2. ülés (1946 ápr.), 3. ülés (1947jan.)	ICAO (WAC) 1:1000000 Légiforgalmi világtérkép; műszeres megközelítési és leszálló térképek; 1:500000 Légiforgalmi térképek; 1: 250000 Légiforgalmi térképek; Légiforgalmi tartózkodási hely követő térképek; Légiforgalmi útvonal térképek; Légiforgalmi tervező térképek	1948. ápr. 16 1948. nov. 1. 1949. márc.1
Az 1. Kiadásba beépített 1. módosítás	Légiforgalmi térképek szekció, 4.ülés (1948.március)	Az ICAO WAC 1:1000000 vetülete	1948. dec. 6 1949. márc. 15 1949. márc. 15
A 2. - 22. Módosításokat magába foglaló 2. kiadás	Légiforgalmi térképek szekció, 4. ülés (1948.március)	Meghatározások; ICAO WAC 1:1000000; ICAO 1:500000 Légiforgalmi térképek; 1: 250000 Légiforgalmi térképek; ICAO műszeres megközelítési térképek; ICAO Műszeres leszálló térképek; Rádió-navigációs berendezések térképei.	1949. nov. 15. 1950. jún. 1 1950. szept. 1
23. -28.	A Tanács egyéb tevékenysége	Rövidítések; Térképjelek; Meghatározások.	1951. jún. 25 1951. nov. 1 1952. jan. 1

29.	Légiforgalmi térképek szekció 5. ülés (1951. október)	Meghatározások; ICAO WAC 1:1000000; ICAO 1:500000 Légiforgalmi térképek; ICAO 1: 250000 Légiforgalmi térképek; ICAO Megközelítési térképek; ICAO Leszálló térképek; ICAO Légiforgalmi tartózkodási hely követő térképek; Rádió navigációs berendezések térképei; ICAO Térképjelölések; ICAO Repülőtéri akadályok felülnézeti és metszeti rajza.	1952. jún. 19 1952. dec. 1 1953. ápr. 1
30.	A Légi-navigációs Bizottság tevékenysége az államokkal folytatott konzultációt követően.	A 4. és a 15. Annex között fennálló ellentmondások megszüntetése.	1956. feb. 22 1956. júl. 1 1956. dec. 1
31., 32.	Harmadik Légi-navigációs Konferencia (1956 október) A Légi-navigációs Bizottság ajánlása	Repülőtéri akadály térképek; Szerkesztői módosítások; ICAO térkép jelölések.	1957. jún. 13 1957. okt. 1 1957. dec. 1
33.	A Légi-navigációs Bizottság tevékenysége az államokkal folytatott konzultációt követően.	A Veszélyes légtér, a korlátozott légtér és a tiltott légtér meghatározások alkalmazása (Útmutató anyag).	1958. nov. 14 - -

34.	A Légiforgalmi Tájékoztató Szolgálatok Szekció és a Légiforgalmi Térképek Szekció (AIS/MAP Szekció) ülés (1959 április - május)	Meghatározások; Általános előírások; ICAO A és B típusú Repülőtéri akadály térkép; ICAO Tartózkodási hely követő térképek; ICAO Rádió-navigációs Térképek; ICAO Közel körzeti térkép; ICAO Műszeres megközelítési térkép; ICAO (WAC) 1:1000000 Légiforgalmi világtérkép; ICAO 1:500000 Légiforgalmi térkép; ICAO Látás szerinti megközelítési térkép; ICAO Leszálló térkép; ICAO Repülőtér térkép; ICAO 1 : 2 000 000 Légiforgalmi navigációs térkép; Lap elrendezés az ICAO WAC 1 : 1 000000 szelvényekhez; ICAO térkép jelölések; Szín útmutató; Magasság szerinti színárnyalási útmutató; Az ICAO WAC 1:1000000 formátuma; A legkisebb szektor magasság meghatározására vonatkozó előírások; Mellékletek.	1960. jún. 20 1960. okt. 1 1961. júl. 1
35.	AIS/MAP szekció ülés (1959 április-május)	ICAO 'A' típusú Repülőtéri Akadály térkép	1961. dec. 8 1962. ápr. 1 1962. júl. 1
36.	AIS/MAP szekció ülés (1959 április-május); nem hivatalos EUM/MAP ülés (1961 május).	Legkisebb szektor magasságok; Az ICAO WAC 1:1000000 szelvény határai.	1962. dec. 14 1963. ápr. 1 1963. nov. 1
37.	Kanada; Svájc; ENSZ műszaki konferencia a Nemzetközi világtérképről.	Térképjelek.	1963. dec. 11 1964. jún. 1 1964. nov. 1
38.	Az AGA Szekció 7. ülése; PANS-ICAO rövidítések és Kódok (Doc 8400)	Meghatározások; Általános előírások; ICAO A és B típusú repülőtéri akadály térkép minták .	1964. márc. 25 1964. aug. 1 1964. nov. 1
39.	RAC/OPS ülés (1963)	Meghatározások; Magyarázó jegyzetek a veszélyes légtér, tiltott légtér és a korlátozott légtér meghatározások alkalmazására.	1965. dec. 10 1966. ápr. 10 1966. aug. 25

40.	AIS/MAP Szekció ülés	Szintvonalak és a domborzat ábrázolása, magasság szerinti színárnyalás, térképjelek, ICAO WAC 1:1000000; ICAO kisméretarányú Légiforgalmi térkép; az akadályok magasságának vonatkoztatási alapja; meghatározások; mellékletek.	1967. jún. 13 1967. okt. 8 1968. feb. 8
41.	5. Légi-navigációs Konferencia; Akadálymentességi Szakcsoport (első ülés). Különféle időjárási feltételek közötti üzemelési szakcsoport (harmadik ülés)	Meghatározások; ICAO 'A' típusú Repülőtéri Akadály Térkép; ICAO Leszálló térkép; ICAO Repülőtér térkép; ICAO térképjelek.	1969. jan. 23 1969. máj 23 1969. szept. 18
42	Hatodik Légi-navigációs Konferencia (1969)	ICAO Rádió-navigációs Térkép; ICAO Közel körzeti Térkép	1970. máj. 15 1970. szept.15 1971. febr. 04
43	5. Észak-Atlanti Körzeti Légi-navigációs Értekezlet (1970), 17/5 a) ajánlás	ICAO Repülőtér Térkép	1971. nov. 29 1972. márc. 29 1972. dec. 07
44	Különféle időjárási körülmények közötti üzemelési szakcsoport harmadik ülése, 8/1 ajánlás	ICAO Precíziós Megközelítés domborzati Térkép	1972. nov. 27 1973. márc. 27 1973. aug. 16
45	A RAN ülés világméretben alkalmazható ajánlásairól hozott Légi-navigációs Bizottsági döntés. Hatodik EUM RAN értekezlet (16/24 számú ajánlás). Kilencedik Légi-navigációs Konferencia.	Meghatározások; ICAO A és B típusú Repülőtéri Akadály Térkép; ICAO Rádió-navigációs Térkép; ICAO Közel körzeti Térkép; ICAO Műszeres Megközelítési Térkép; ICAO 1 : 1 000 000 Légiforgalmi Világ Térkép; ICAO 1 : 500 000 Légiforgalmi Világ Térkép; Látás szerinti Megközelítési Térkép; ICAO Leszálló térkép; ICAO Repülőtér Térkép; ICAO kis méretarányú Légiforgalmi Navigációs Térkép; ICAO Precíziós Megközelítési domborzati Térkép; ICAO térképjelölések	1977. dec. 9 1978. ápr. 9 1978. aug. 10
46	Tanulmány a pilótakabinban használt térképekről; Az akadálymentességi szakcsoport hatodik ülésének 4/2 számú ajánlása és az AGA szekció ülés (1981) 10/1számú ajánlása	Meghatározások; Általános Előírások; ICAO Műszeres Megközelítési Térkép	1984. febr. 27 1984. júl. 30 1984. nov. 22

47	Tanulmány a pilótakabinban használt térképekről. Az akadálymentességi szakcsoport hetedik ülésének 3/1 számú ajánlása és az AGA szekció ülés (1981) 8/2 számú ajánlása	Meghatározások; Általános előírások; ICAO A és B típusú Repülőtéri Akadály Térkép; ICAO Tartózkodási hely követő Térkép; ICAO Útvonal Térkép; ICAO Körzeti Térkép; ICAO Műszeres megközelítési térkép; ICAO 1:1000000 Légiforgalmi Világ Térkép; ICAO 1:500000 Légiforgalmi Térkép; ICAO Látás szerinti Megközelítési Térkép; ICAO Repülőtér Térkép; ICAO kis méretarányú Légiforgalmi Navigációs Térkép; ICAO Precíziós Megközelítés domborzati Térkép; ICAO térképjelölések; Színezési útmutató; A következő térképek bevezetése: ICAO Repülőtéri Földi Mozgások Térképe; ICAO Légi-jármű állóhely/beállító Térkép; ICAO Műszeres Szabvány Kirepülési Eljárás Térkép (SID); ICAO Műszeres Szabvány Érkezési Eljárás Térkép (STAR); ICAO C Típusú Repülőtéri Akadály Térkép.	1985. márc. 18 1985. júl. 29 1985. nov. 21

48	A 6. Annex 18. módosítása; a 14. Annex 33. módosítása; a Látási Segédeszközök Testület (11 értekezletének) 2/2 számú ajánlása és Titkársági észrevételek	ICAO A, B és C típusú Repülőtéri Akadály Térkép; ICAO Precíziós Megközelítés domborzati Térkép; ICAO Műszeres Szabvány Indulási Eljárás Térkép (SID); ICAO Műszeres Szabvány Érkezési Eljárás Térkép (STAR); ICAO Műszeres Megközelítési Térkép; ICAO Látás szerinti Megközelítési Térkép; ICAO Repülőtér Térkép; ICAO Repülőtéri Földi Mozgások Térképe; ICAO Légi-jármű állóhely/beállító Térkép; ICAO 1:1000000 Légiforgalmi Világtérkép; ICAO 1:500000 Légi-forgalmi Térkép; ICAO kis méretarányú Légiforgalmi Navigációs Térkép; ICAO Tartózkodási hely követő térkép; ICAO térképjelek;	1989. febr. 24 1989. júl. 31 1989. nov. 16
49	A 11. Annex 33. módosítása; A 14. Annex 39. módosítása; A 14. Annex II. Kötetének bevezetése; A Doc 8168 PANS-OPS I. és II. Kötetének 5., illetve 6. Módosítása	Meghatározások; Általános előírások; ICAO Útvonal Térkép; ICAO Körzeti Térkép; ICAO Műszeres Megközelítési Térkép; ICAO Látás szerinti Megközelítési Térkép; ICAO Repülőtéri Térkép; ICAO 1:1000000 Légiforgalmi Világ Térkép; ICAO 1 : 500 000 Légiforgalmi Térkép; ICAO térképjelek;	1992. febr. 28 1992. júl. 27 1992. nov. 12

50	A WGS-84 Tanács általi elfogadása, mint a nemzetközi légi-közlekedés szabvány geodéziai vonatkoztatási rendszere; WAFS tervezés és bevezetés; PANS-OPS bevezetési problémák; az All Weather Operation kézikönyv felülvizsgálata; a helikopter forgalom és a hagyományos repülőgép forgalom integrálása; az RGCSP/8 és a Titkárság javaslata	Meghatározások; új rendelkezések bevezetése a WGS84 koordináták 1998. január 1-el történő közzétételével kapcsolatban; a vízszintes gyorsítási magasság közzétételére vonatkozó rendelkezés megszüntetése; az RNP típus bevezetése; a közeli akadályokról szóló megjegyzések SID térképeken történő feltüntetése; új térkép szimbólum bevezetése az aktív tűzhányó jelzésére.	1995. márc. 1 1995. július 24. 1995. nov. 9 1998. január 1.
51	Az Akadály mentességi panel és a Légi-navigációs Bizottság 10. és 11. Találkozója	Meghatározások; repülési adatbázisok; a geodéziai világrendszer (WGS-84) függőleges eleme; emberi tényező; az RNAV eljárások azonosítása; a befejező megközelítés gradiensének biztosítása; meredek siklópályájú megközelítések; és térképjelek az átrepülési útvonal pont és a rátartásos útvonal pont céljára.	1998. márc. 20 1998. július 20. 1998. nov. 5

52	Az optikai berendezések panel (VAP); az akadály mentességi panel (OCP); a kormányzott földnek ütközés (CFIT) közös ICAO - iparági munkacsoport; a légiforgalmi tájékoztató szolgálatok/légiforgalmi térképek (AIS/MAP) divízió találkozójának (1998), és a titkárság ajánlásai	Meghatározások; futópálya várópontok; légvédelmi azonosító körzet (ADIZ); a domborzat és a legkisebb repülési magasságok ábrázolása; futópálya menti látástávolság (RVR) mérő helyek; légtér osztályozás; területi navigációs (RNAV) berendezésekre alapuló repülési eljárások és akadály mentességi kritériumok; térkép jelek a futópálya váró-pont, az ADIZ, az elektronikus légiforgalmi térképek, a légtér kategória, az atomerőmű és útvonalpont céljára, valamint 2002 november 28-tól új rendelkezések bevezetése az ICAO Elektronikus Légiforgalmi Térkép Megjelenítő - céljára.	2001. márc. 7 2001. júl. 16 2001. nov. 1 2002. nov. 28
53	Az Akadály Mentességi Panel tizenkettedik és tizenharmadik találkozója; a Légi-Navigációs Bizottság; és a Titkárság	A meghatározásokkal kapcsolatos új rendelkezések; függőleges és időpont vonatkoztatási rendszerek; közel-forgalmi érkezési magasság; ICAO Legkisebb Radar Magasság Térkép; és térképjelek a magasságok/repülési szintek és a befejező megközelítés kezdőpontja céljára. A geodéziai világrendszer - 1984 (WGS-84) érvényben lévő rendelkezéseinek naprakésszé tétele; akadályok; az ICAO Műszeres Megközelítési Térkép azonosítása, a rajta lévő repülőtér üzemeltetési minimum és kiegészítő információk; valamint légi-forgalmi adat minőségi követelmények.	2004. febr. 23 2004. júl. 12 2004. nov. 25

54	Különféle források, benne az AIS/MAP Divizió Találkozó (1998) 2.3/2 ajánlása és az OCP/14 és OPLINKP/1 találkozók, a Futópálya Biztonsági Oktató és Tudatosító Program, valamint a Titkárság ajánlásai	Meghatározások és új rendelkezések 2010 november 18-i bevezetése az ICAO (Elektronikus) Repülőtéri terep és akadály térképpel kapcsolatban; Legkisebb útvonal menti magasság, legkisebb akadály mentességi magasság, bejelentkezési cím, ATS felderítő rendszer kifejezések, légiforgalmi adatbázis követelmények, megközelítési fix-ek és pontok, gradiensekre és szögekre vonatkozó légiforgalmi adat minőségi követelmények, meredek megközelítési szög figyelmeztető megjegyzés, forró pont és közbenső várópont új térképjelekkel egyetemben.	2007. márc. 02 2007. júl. 16 2007. nov. 22

NEMZETKÖZI SZABVÁNYOK ÉS AJÁNLOTT ELJÁRÁSOK

1. FEJEZET MEGHATÁROZÁSOK, ALKALMAZÁSI ELŐÍRÁSOK ÉS HOZZÁFÉRHETŐSÉG

1.1 Meghatározások

Ha a légiforgalmi térképekre vonatkozó Szabványokban és Ajánlott Eljárásokban a következő fogalmakat alkalmazzák, akkor azok a következő jelentéssel rendelkeznek:

Repülőtér (Aerodrome) – Szárazföldön, vagy vízen kijelölt terület (beleértve minden épületét, felszerelését és berendezését is), mely egészében, vagy részben a légi-járművek érkezésére, indulására és földfelszíni mozgására szolgál.

Repülőtér Tengerszint feletti magassága (Aerodrome elevation) - A leszállási terület legmagasabb pontjának tengerszinthez viszonyított magassága.

Repülőtér üzemeltetési minimum (Aerodrome operating minima) - Egy repülőtér használhatóságának határértéke a következőkre:

a) felszállásra, látástávolság és/vagy futópálya látástávolság és, ha szükséges, felhőviszonyok fogalmával kifejezve;

b) leszálláshoz precíziós megközelítéssel és leszállási üzemre, látástávolság és/vagy futópálya látástávolság és elhatározási QNH/QFE magasság (DA/H) fogalmakkal kifejezve, az üzemelési kategóriának megfelelően;

c) leszálláshoz megközelítési és leszállási üzemhez függőleges menti vezetés biztosítása mellett, látástávolság és/vagy futópálya látástávolság és elhatározási QNH/QFE magasság (DA/H) fogalmakkal kifejezve; és

d) leszálláshoz nem-precíziós megközelítési és leszállási üzemhez, látástávolság és/vagy futópálya látástávolság, minimum süllyedési magasság (MDA/H) és, ha szükséges, felhőviszonyok fogalmával kifejezve;

Repülőtér vonatkoztatási pont (Aerodrome reference point) - A repülőtér kijelölt földrajzi helyzete (helyzetpontja)

Légiforgalmi térkép (Aeronautical chart) - A földfelszín egy részének ábrázolása az adott kultúr környezetet és domborzatot kifejezetten a légi-navigációs követelményeknek megfelelően feltüntetve.

Légi-jármű állóhely (Aircraft stand) - Az előtér légi-jármű parkolásra szánt kijelölt része.

Légvédelmi azonosító körzet (Air defense identification zone) - Meghatározott kiterjedésű különleges céllal kijelölt légtér rész, amelyen belül a légi-járműtől elvárt, hogy a légiforgalmi szolgálatok (ATS) biztosításához kapcsolódó eljárások mellett eleget tegyen a különleges azonosítási és/vagy jelentési eljárásoknak

Légi gurulóút (Air taxiway) - Helikopterek lebegésben végzett gurulása céljából a talaj felszínen kijelölt pálya.

Légiforgalmi szolgálat (Air traffic service) - Gyűjtőfogalom, mely jelenthet repüléstájékoztató szolgálatot, riasztó szolgálatot, légiforgalmi tanácsadó szolgálatot, légiforgalmi irányító szolgálatot, (körzeti irányító szolgálatot, bevezető irányító szolgálatot, vagy repülőtéri irányító szolgálatot).

Légi tranzitút (Air transit route) - Helikopterek légi áthaladásához a talajfelszínen kijelölt pálya.

Légifolyosó (Airway) - folyosó formájában kialakított irányítói körzet, vagy annak egy része.

Tengerszint feletti magasság (Altitude) - Adott szintnek, pontnak, vagy pontként értelmezett tárgynak a közepes tengerszinthez (MSL) viszonyított függőleges távolsága.

Alkalmazás (Application) – Adatok felhasználói követelmények szerinti alakítása és feldolgozása (ISO 19104*)

Előtér (Apron) - Szárazföldi repülőtéren a légi-járművek kiszolgálására, utasok ki- és beszállítására, posta, vagy áru ki- és berakására, üzemanyag felvételre, parkolásra, vagy karbantartásra kijelölt terület.

Legkisebb területi magasság (Area minimum altitude AMA) - Műszeres meteorológiai körülmények (IMC) között alkalmazandó legkisebb magasság, amely - rendszerint földrajzi szélességgel és hosszúsággal - kijelölt területen belül biztosít minimum akadály mentességet.

Érkezési útvonal (Arrival routes) - A műszeres megközelítési eljárásban az a kijelölt útvonal, amelyet követve a légi-jármű a repülés utazószakaszáról a kezdeti megközelítés pontjára érkezik.

ATS útvonal (ATS route) - A légiforgalmi szolgálatok biztosításához szükség szerint, a légi-forgalom irányított áramlására kijelölt útvonal.

1. Megjegyzés: Az ATS útvonal kifejezés légifolyosó, tanácsadói útvonal, ellenőrzött, vagy nem-ellenőrzött útvonal, érkezési, vagy indulási útvonal, stb., jelentéssel használatos.

2. Megjegyzés: az ATS útvonalat útvonal jellemzőkkel azonosítják, e jellemzők közé tartozik egy ATS útvonal elnevezés, a jellemző pontokhoz (útvonal pontokhoz), vagy azoktól elvezető irány, a jellemző pontok közötti távolság, a jelentési előírások és, a megfelelő ATS hatóság által kijelölt legalacsonyabb biztonságos magasság.

ATS légtérellenőrző rendszer (ATS surveillance system) – Gyűjtő fogalom, jelenthet ADS-B, PSR, SSR, vagy légi-jármű azonosítást lehetővé tévő egyenértékű egyéb földi telepítésű rendszert.

Megjegyzés: Egyenértékű földi telepítésű rendszer az, amely biztonsága és teljesítménye összehasonlító elemzéssel, vagy egyéb módszerrel a monopulse SSR-ével egyezőnek, vagy jobbnak bizonyult.

Puszta Föld (Bare Earth) - A Föld felszíne, beleértve a vízfelületeket, az állandó jég és hó mezőket, de kizárva minden vegetációt és ember alkotta tárgyat.

Naptár (Calendar) - Egyértelmű időpont vonatkoztatási rendszer, amely az időpont egy napnyi nagyságrendű meghatározásához szolgáltat alapot (ISO 19108[1]*).

Burok (Canopy) - A puszta Föld felszín kiegészítve a vegetáció magasságával.

Átkapcsolási pont (Change-over point) - VHF körsugárzó rádió irányszög-adó (VOR) berendezésektől vett rádió-navigációs jelekkel kijelölt ATS útvonalon az a pont, amelynél a légi-jármű navigációs helymeghatározásának elsődleges viszonyítási alapjaként a mögötte lévő navigációs berendezésről az előtte lévő következő berendezésre várhatóan átkapcsol.

Megjegyzés: Átkapcsolási pontokat azért jelölnek ki, hogy a navigációs berendezések között kiegyenlített jel erősséget és minőséget biztosítsanak az összes használt repülési szinten, továbbá, hogy az azonos útvonal szakaszon repülő légi-járművek mindegyike számára ugyanattól a berendezéstől származó irányszög vezetést biztosítsanak.

Akadálymentes sáv (Clearway) **-** Az illetékes hatóság ellenőrzése alatt álló, alkalmasként kijelölt, vagy alkalmassá tett téglalap alakú szárazföldi, vagy vízi terület, amely felett a légi-jármű kezdeti emelkedésének egy részét az előírt magasság elérése érdekében végrehajthatja.

Szintvonal (Contour line) - térképen lévő, az azonos magasságokat összekötő vonal.

Kultúr környezet (Culture) - A föld felszínén található, ember által létrehozott minden olyan terepjellegzetesség, mint például a városok, vasútvonalak, csatornák, stb.

Ciklikus redundancia ellenőrzés (Cyclic Redundancy Check) - az adat vesztéssel, vagy módosulással szemben egy adott szinten biztosítékot nyújtó, az adat digitális kifejezéséhez alkalmazott matematikai algoritmus.

Veszélyes légtér (Danger area) - Meghatározott méretű légtér, amelyben meghatározott időben a légi-járművek repülésére veszélyes tevékenység folyhat.

Adat termék-előírás (Data product specification) **–** Adat készlet, vagy adat készlet csoportok részletes leírása a létrehozást, más felekhez juttatást és használatot lehetővé tévő egyéb információval együtt (ISO 19131*).

Megjegyzés.-Az adat termék-előírás biztosít leírást az adat készlet számszerűsített entitás tartományáról és előírást a számszerűsített entitás tartomány adat készlet szerinti leképezéséhez. Ez használható gyártási-, eladási-, vég-használói és egyéb célokra.

Adat készlet (Data set) **-** Adatok beazonosítható gyűjteménye (ISO 19101*).

Adat készlet sorozat (Data set series) **-** Azonos gyártási előírásokat követő adatkészlet gyűjtemények (ISO 19115*).

Digitális magasság model (Digital Elevation Model - DEM) **–**,

A domborzat felszín -közös vonatkoztatási alapadathoz viszonyított- magasság értékeinek folytonos ábrázolása adott rács minden metszéspontjában.

Megjegyzés.- A Digitális domborzati modellre (Digital Terrain Model - DTM) néha DEM-ként utalnak.

Adat minőség (Data Quality) - Megbízhatósági szint, vagy fok (mérték), miszerint a szolgáltatott adat teljesíti az adat-felhasználó pontosság, felbontás és egységesség tekintetében kifejezett követelményeit.

Alapadat (Datum) - Bármely mennyiség, vagy mennyiségek együttese, amely (amelyek) kiindulási, vagy viszonyítási alapul szolgálhatnak más mennyiségek kiszámításához (ISO 19104[2]*).

Beljebb helyezett küszöb (Displaced threshold) - Nem a futópálya végénél kijelölt küszöb.

Elektronikus légiforgalmi térkép megjelenítő (Electronic aeronautical chart display) - Elektronikus készülék, amely a repülő személyzetnek az előírt információ megjelenítésével kényelmes és időbeni útvonaltervezés, útvonal ellenőrzés és navigálás elvégzését teszi lehetővé.

Tengerszint feletti magasság (Elevation) - A föld felszínén lévő, vagy ahhoz rögzített pontnak, vagy szintnek a közepes tengerszinttől mért függőleges távolsága.

Elliptikus magasság (Geodéziai magasság) (Ellipsoid height) (Geodetic height) **-** Az ellipszoid kérdéses ponton keresztül haladó külső merőlegese mentén mért és a viszonyítási alapul vett ellipszishez vonatkoztatott magasság.

Jellegzetesség (Feature) **-** A valós világ absztrakt jellemzői (ISO 19101[3]*).

Jellegzetesség jegy (Feature attribute) **–** A jellegzetesség jellemzője (ISO 19101*).

Megjegyzés.- A jellegzetesség jegy névvel, adattípussal és magával kapcsolatos érték tartománnyal bír.

Befejező megközelítés (Final Approach) - A műszeres megközelítési eljárásnak egy meghatározott befejező megközelítési navigációs berendezésnél, vagy pontnál kezdődő része, vagy ahol ilyen berendezés, vagy pont nincs kijelölve,

a) az utolsó eljárási forduló, alapforduló, vagy lóversenypálya alakú eljárás rárepülési fordulója, ha azt kijelölték; vagy

b) a megközelítési eljárásban meghatározott utolsó útirányra való ráállás pontjánál: és a repülőtér közelében lévő azon pontig tartó szakasz, ahonnan:

1) a leszállás végrehajtható; vagy

2) megszakított megközelítési eljárást kell kezdeni.

Befejező megközelítési és felszállási légtér (Final approach and take-off area) (FATO). Meghatározott légtér, amely felett a megközelítési manőver befejező szakasza a függeszkedéshez, vagy leszálláshoz befejeződik és, amelyről a felszállás manőverét megkezdik. Abban az esetben, ha a FATO-t az 1. teljesítmény osztályba tartozó helikopterek használják, ez a légtér magába foglalja a megszakított felszálláshoz rendelkezésre álló légteret is.

A befejező megközelítés navigációs berendezése, vagy pontja (Final approach fix or point) - A műszeres megközelítési eljárásban az a navigációs berendezés vagy pont, amelynél a befejező megközelítési szakasz kezdődik.

Befejező megközelítési szakasz (Final approach segment) - A műszeres megközelítési eljárásnak az a szakasza, amelyen a befejező egyenesre való ráállást és a leszálláshoz való süllyedést végrehajtják.

Repüléstájékoztató körzet (Flight information region) - Meghatározott kiterjedésű légtér, amelyben repüléstájékoztató és riasztó szolgálat biztosított.

Repülési szint (Flight level) - Meghatározott alaphoz, az 1013 hektopaszkálhoz (hPa) viszonyított, állandó légnyomású felület, amelyet a többi ugyanilyen felületektől meghatározott nagyságú légnyomáskülönbség értékek választanak el.

1. Megjegyzés. - A Nemzetközi Műlégkörnek megfelelően kalibrált barometrikus magasságmérő az, amelyik:

a) ha QNH nyomásértékre van beállítva, a tengerszint feletti magasságot mutatja;

b) ha QFE nyomásértékre van beállítva, a QFE vonatkoztatási alap feletti magasságot mutatja;

c) ha az 1013,2 hPa nyomásértékre van beállítva, a repülési szintek jelzésére használható.

2. Megjegyzés. - A fenti 1. Megjegyzésben használt magasság és tengerszint feletti magasság kifejezések barometrikus magasságot, nem pedig geometrikus magasságot és geometrikus tengerszint feletti magasságot jelentenek.

Geodéziai távolság (Geodetic distance) - Matematikailag meghatározott ellipsziod felületen bármely két pont közötti legrövidebb távolság.

Geodéziai alapadat (Geodetic datum) - a viszonyítási világrendszerhez képest a helyi viszonyítási rendszer helyének és tájolásának meghatározásához szükséges minimum mennyiségű adat együttes.

Geoid (Geoid) – egyenlő gravitációs potenciájú felület a Föld gravitációs mezőjében, amely egybe esik a kontinenseken át folyamatosan kiterjesztett és zavarmentes közepes tengerszinttel (MSL).

Megjegyzés.- A helyi gravitációs zavarok eredményeképp (szél által keltett ár, sótartalom, áramlat stb.) a Geoid szabálytalan alakú és a gravitáció iránya minden ponton a geoidra merőleges.

Geoid egyenetlenség (Geoid undulation) - A geoid távolsága a matematikai viszonyítási ellipszoid alatt (negatív), vagy felett (pozitív).

Megjegyzés. - A Geodéziai Világrendszer - 1984 (WGS-84) által meghatározott ellipszoid tekintetében a WGS-84 ellipszoid magasság és az orthometrikus magasság közötti különbség adja a WGS-84 geoid egyenetlenségét.

Siklópálya (Glide path) - A befejező megközelítés közbeni függőleges menti vezetéshez kijelölt süllyedési pálya.

Gergely naptár (Gregorian calendar) - Általánosan használt naptár; először 1582-ben vezették be az év meghatározásához, amely a György (Julian) naptárnál sokkal pontosabban követi a tropikus évet (ISO 19108[4]*).

Megjegyzés. - A Gergely naptárban az egymást követő tizenkét hónapra osztott szokványos évek 365 *napból állnak, míg a szökőév 366 napból áll.*

Magasság (Height) - Egy szintnek, egy pontnak, vagy egy pontként értelmezett tárgynak meghatározott vonatkozási alaptól mért függőleges távolsága.

Helikopter állóhely (Helicopter stand) - Helikopter parkolását biztosító légi-jármű állóhely és, ahol légi gurulás végezhető ott lehetőséget biztosít a helikopter földet éréséhez, illetve elemelkedéséhez.

Helikopter repülőtér (Heliport) - Helikopterek érkezésére, indulására és felszíni mozgására részben, vagy teljes egészében használatos repülőtér vagy építményen kijelölt terület.

Várakozási eljárás (Holding Procedure) - Előre kijelölt manőver, amely a további engedélyre várakozó légi-járművet a kijelölt légtéren belül tartja.

Forró pont (Hot spot) – A repülőtér mozgási területének tapasztaltan, vagy lehetséges ütközés-, illetve futópályára tévedés veszélyes és fokozott pilóta/járművezető figyelmet igénylő része.

Emberi tényező alapelvek (Human Factors principles) - A repülés terén a tervezésben/kialakításban, jogosításban, kiképzésben, üzemeltetésben és karbantartásban alkalmazandó elvek, melyek az emberi teljesítőképességet figyelembe véve keresnek biztonságos összekapcsolódási megoldásokat az ember és a rendszer más alkotó elemei között.

Magassági szín árnyékolás (Hypsometric tints) - Tengerszinthez viszonyított magassági szintközök ábrázolására használt árnyékolási vagy színárnyalási fokozatok.

Kezdeti megközelítési szakasz (Initial approach segment) - A műszeres megközelítési eljárásnak a kezdeti megközelítési navigációs berendezés/pont és a közbenső megközelítési navigációs berendezés/pont, vagy ahol alkalmazható, a befejező megközelítési berendezés, vagy pont közötti szakasza.

Műszeres megközelítési eljárás (Instrument approach procedure) - Repülés műszerek alapján végrehajtott, előre meghatározott manőverek sorozata, az akadályoktól való meghatározott védettséggel, a kezdeti megközelítés navigációs berendezésétől/pontjától, vagy ahol alkalmazható, a meghatározott érkezési útvonal kezdetétől egy olyan pontig, ahonnan a leszállás végrehajtható és azt követően, ha a leszállás nem történt meg, egy olyan helyzetig, ahol a várakozásra, vagy az útvonal szakaszra előírt akadálymentességi követelményeket alkalmazzák.

Közbenső megközelítési szakasz (Intermediate approach segment) - A műszeres megközelítési eljárásnak az a szakasza, amely, vagy a közbeeső megközelítési navigációs berendezéstől/ponttól a befejező megközelítés navigációs berendezéséig/pontjáig tart, vagy az irányváltásos, a lóversenypálya alakú, vagy a számított helyzet navigációs eljárás vége és a befejező megközelítés navigációs berendezése, vagy pontja között helyezkedik el, amelyik alkalmazható.

Közbenső várópont (Intermediate holding position) – Forgalomirányítási célból kijelölt pont, amelynél a repülőtéri irányító torony utasítására a guruló légi-jármű és jármű köteles megállni és várni a továbbhaladás engedélyezéséig.

Izogon (Isogonal) - Térképen, vagy egy térképlapon feltüntetett vonal, melynek minden pontjában azonos értékű a mágneses elhajlás egy meghatározott időszakon belül.

Izogriv (Isogriv) - Egy térképen, vagy térképlapon feltüntetett azon vonal, amely a navigációs hálózati észak és a mágneses észak közötti azonos fokeltérésű pontokat köti össze.

Leszállási terület (Landing area) - A mozgási terület légi-járművek leszállására, vagy felszállására használatos része.

Leszállási irányjelző (Landing direction indicator) - A le- és felszállásra kijelölt aktuális irány lát jelzésére szolgáló eszköz.

Szint (Level) - A levegőben lévő légi-jármű függőleges helyzetére vonatkozó általános kifejezés, mely jelenthet magasságot, tengerszint feletti magasságot, vagy repülési szintet.

Bejelentkezési cím (Logon address) – ATS egységhez adatlánc bejelentkezésre használt kijelölt kód.

Mágneses eltérés (Magnetic variation) - A földrajzi Észak és a mágneses Észak közötti különbség, fokokban kifejezve.

Megjegyzés: A megadott érték megjelöli azt is, hogy a fokbeli eltérés keleti, vagy nyugati a földrajzi

Északhoz viszonyítva.

Munkaterület (Manoeuvring area) - Az előtér kivételével, a repülőtérnek légi-járművek fel- és leszállására valamint gurulására használatos része.

Jelölés (Marking) - A mozgásterület felületén, légiforgalmi tájékoztatás közlése céljából elhelyezett jel, vagy jelek csoportja.

Meta adat (Metadata) - Adat az adatról (ISO 19115[5]*).

Megjegyzés. - Az adatot leíró és dokumentáló adat.

Útvonal menti legkisebb magasság (Minimum en-route altitude - MEA) – Az utazó szakasz légtérszerkezetének megfelelő, a vonatkozó navigációs berendezések és az ATS adás kellő vételét és az előírt akadálymentességet biztosító magassága.

Legkisebb akadálymentes magasság (Minimum obstacle clearance altitude - MOCA) – A repülés adott szakaszának az előírt akadálymentességet még biztosító legkisebb magassága.

Legkisebb szektor magasság (Minimum sector altitude) - Az a használható legalacsonyabb tengerszint feletti magasság, amely a rádió-navigációs berendezés körüli 46 km (25 NM) sugarú kör egy adott szektora által határolt területen belül található összes akadály felett legkevesebb 300 m (1000 láb) akadálymentességet biztosít.

A megszakított megközelítés pontja (Missed approach point) (MAPt) - A műszeres megközelítési eljárás azon pontja, amelynél vagy, amely előtt az előírt megszakított megközelítési eljárást annak biztosítása érdekében meg kell kezdeni, hogy a légi-jármű az akadálymentességi minimumot ne sértse meg.

Megszakított megközelítési eljárás (Missed approach procedure) - Abban az esetben követendő eljárás, ha a megközelítés nem folytatható tovább.

Mozgási terület (Movement area) - A repülőtérnek az a része, amely a légi-járművek le- és felszállására, valamint gurulására használatos és, amely magába foglalja a munkaterületet és az előter(ek)et.

Akadály (Obstacle) - A repülésben lévő légi-jármű védelmét szolgáló meghatározott felület fölé nyúló, vagy a légi-jármű földi mozgására szánt területen belül található minden rögzített (akár időleges, akár állandó), vagy mozgó tárgy, vagy annak része.

Megjegyzés. - Jelen Annexben az "akadály" kifejezés kizárólag a térképre viendő olyan tárgyakra vonatkozik, amely tárgyak valós veszélyt jelentenek azon üzemelési fajta szerint működő légi-jármű biztonságos áthaladására, amely üzemeltetési fajtára az illető térképlapot kialakították.

Akadálymentes QNH magasság, vagy Akadálymentes QFE magasság - Obstacle clearance altitude (OCA) or Obstacle clearance height (OCH) - A vonatkozó futópálya küszöb szintje, vagy alternatívaképp a repülőtér szintje feletti - amelyik alkalmazandó- az a legkisebb tengerszinthez viszonyított QNH magasság (OCA), vagy QFE magaság (OCH), amelyet a vonatkozó akadálymentességi követelmények teljesítésének megállapításához használnak.

1. Megjegyzés. - Az akadálymentes magasságot (altitude) a közepes tengerszinthez viszonyítják, míg az akadálymentes magasságot (height) a küszöb magasságához, illetve nem-precíziós megközelítések esetében a repülőtér szintmagasságához, avagy a küszöb magasságához, ha ez több mint 2 m-el (7 ft) alacsonyabb a repülőtér szintmagasságánál. A körözésből végzett megközelítés akadálymentes magasságát a repülőtér szintmagasságához viszonyítják.

2. Megjegyzés. - Kényelmi okok miatt, amikor mindkét kifejezést alkalmazzák, ezt a következő formában is írhatják: akadálymentes magasság/tengerszint feletti magasság (altitude/height), rövidítése OCA/H.

3. Megjegyzés. - E meghatározás jellemző alkalmazásáról lásd a Légi-navigációs Szolgálatok Eljárásai – Légi-jármű üzemeltetés (Procedures for Air Navigation Services - Aircraft Operations) (Doc 8168) I. Kötet, I. Rész, 4. Szakasz, 1. Fejezet 1.5 és és II. Kötet, I. Rész, 4. Szakasz, 5. Fejezet 5.4 pontját.

Akadálymentes terület (Obstacle free zone) (OFZ) - A belső megközelítési, a belső átmeneti és az elvétett leszállási felületek feletti, valamint az ezen felületek által határolt földsáv azon része feletti légtér, amelybe kizárólag a légi-navigáció számára szükséges kistömegű és törhetően épített rögzített akadály nyúlik bele.

Ortometrikus magasság (Orthometric Height) - Egy adott pont általában MSL magasságban kifejezett geoidhoz vonatkoztatott magassága.

Pontfény (Point light) - Érzékelhető hosszúság nélkülinek látszó világító jel.

Ábrázolás (Portrayal) – Az információ megjelenítése az ember számára (ISO 19117*).

Helyzet (földrajzi) (Position - Geographical) - A matematikai ellipszoidhoz viszonyított és a föld felszínén lévő adott pont helyzetét meghatározó koordináta együttes (szélesség, hosszúság).

Preciziós megközelítési eljárás (Precision approach procedure) - ILS, vagy PAR berendezés révén biztosított iránysáv és siklópálya információkat alkalmazó műszeres megközelítési eljárás.

Eljárási QNH/QFE magasság (Procedure altitude/height) - A minimum QNH/QFE magasságon, vagy felette kijelölt és üzemszerűen alkalmazott QNH/QFE magasság, amely célja a közbeeső/befejező megközelítési szakaszon előírt süllyedési mértékű/szögű stabilizált süllyedések számára teret biztosítani.

Eljárási forduló (Procedure turn) - Manőver, amely során először a kijelölt repülési útirány elhagyására kell fordulót végezni, ezt egy ellentétes irányú forduló követi, amely a légi-járműnek lehetővé teszi a kijelölt repülési útiránnyal ellentétes irány felvételét és az azon való továbbrepülést.

1. Megjegyzés. - Az eljárási fordulót "bal", vagy "jobb" fordulós néven nevezik meg, az első forduló irányának megfelelően.

2. Megjegyzés. - Az eljárási forduló kijelölhető akár szinttartással, akár süllyedésben történő végrehajtásra, az egyes műszeres megközelítési eljárások által támasztott követelmények függvényében.

Tiltott légtér (Prohibited area) - Az állam területe, vagy felségvize felett kijelölt meghatározott kiterjedésű légtér, amelyen belül légi-járművek repülése tiltott.

Domborzat (Relief) - A föld felszínének a tengerszinthez viszonyított magasságaiban lévő egyenetlenségek, melyeket a légiforgalmi térképeken szintvonalakkal, színárnyalással, árnyékolással, vagy a pontok tengerszinthez viszonyított magasságainak megadásával jelölnek.

Jelentőpont (Reporting point) - Meghatározott földrajzi hely, amelyhez viszonyítva a légi-jármű helyzetét jelenteni lehet.

Teljesítendő Navigációs Pontosság (Required Navigation Performance - RNP) - Kijelölt légtérben történő üzemeléshez a navigációs képesség pontosságára vonatkozó közlemény.

Megjegyzés. - A navigációs teljesítőképességet és követelményeket adott RNP típusra és/vagy alkalmazásra határoznak meg.

Felbontás (Resolution) - Mérési egységek, vagy számjegyek szám értéke, amelyben adott mért, vagy számított értéket kifejeznek, illetve használnak.

Korlátozott légtér (Restricted area) - Az állam területe, vagy felségvize felett kijelölt, meghatározott kiterjedésű légtér, amelyen belül a légi-járművek repülése bizonyos előírt feltételeknek megfelelően korlátozott.

Irányváltásos eljárás (Reversal procedure) - A műszeres megközelítési eljárás kezdeti megközelítési szakasza folyamán a légi-járművek számára az ellentétes irányba fordulás lehetővé tételéhez kijelölt eljárás. A szakasz magába foglalhat eljárási fordulókat, vagy alapfordulókat.

RNP típus (RNP type) - Tengeri mérföld hosszmértékben kifejezett és a szándék szerinti tartózkodási helytől számított "belül tartózkodás" értéke, amelyen a repülőgép a teljes repülési idő legalább 95 %-ában belül marad.

Például. - Az RNP 4, plusz, vagy mínusz 7,4 km (4 tengeri mérföld) navigációs pontosságot jelent 95 százalékos "belül tartózkodási" alapon.

Futópálya (Runway) - A szárazföldi repülőtéren kijelölt derékszögű, a légi-járművek leszállására és felszállására előkészített terület.

Futópálya várópont (Runway-HoldingPosition) - A futópálya, az akadály korlátozó felület, vagy az ILS/MLS kritikus/érzékeny területek védelmére kijelölt földi helyzetpont, amelynél a földi mozgást végző légi-járműnek, vagy járműveknek meg kell állni és várakozni kell, amíg a repülőtéri torony irányító eltérő engedélyt nem ad.

Megjegyzés.- A rádiótelefon szóhasználatban a „várópont” kifejezés a futópálya várópont megjelölésére szolgál.

Futópálya sáv (Runway strip) - A futópályát, és ha ilyet létesítettek-a végbiztonsági sávot is magába foglaló, az alábbiak céljára szolgáló kijelölt terület:

a) a futópályáról lefutó légi-járművek sérülési kockázatának csökkentése; és

b) a felszállás, vagy leszállás művelete közben a felette átrepülő légi-járművek védelme.

Futópálya látástávolság (Runway visual range) (RVR) - Az a távolság, amely távolságig a futópálya középvonalán lévő légi-jármű vezetője látja a futópálya felületének jelzéseit, illetve a futópályát szegélyező, vagy annak középvonalát azonosító fényeket.

Padka (Shoulder) - Egy, a szilárd burkolatú felület széléhez csatlakozó és olymódon kiképzett terület, hogy az átmenetet biztosítson a szilárd burkolat és a szomszédos talajfelület között.

Fontos/mérvadó pont (Significant point) - Meghatározott földrajzi hely, melyet valamely ATS útvonal, vagy egy légi-jármű repülési útvonalának meghatározásához, valamint egyéb navigációs és ATS célokra használnak.

Végbiztonsági sáv (Stopway) - A rendelkezésre álló nekifutási úthossz végénél kezdődő kijelölt derékszögű terület, amelyet megfelelően előkészítettek arra a célra, hogy rajta, megszakított felszállás esetén, a légi-jármű megállítható legyen.

Gurulás (Taxiing) - A fel- és leszállások kivételével a légi-jármű saját erőből történő mozgása a repülőtér talaján.

Gurulóút (Taxiway) - A szárazföldi repülőtéren a légi-járművek gurulásra kijelölt és kialakított út, amelyet arra a célra terveztek, hogy a repülőtér egy meghatározott részét egy másik részével összekösse, beleértve az alábbiakat:

a) *Légi-jármű állóhely guruló útvonal (Aircraft stand taxilane)* - Az előtérnek gurulósávként kijelölt azon része, amely kizárólagos célja a légi-jármű állóhely elérésének lehetővé tétele.

b) *Előtéri gurulóút (Apron taxiway)* - A gurulóút rendszer előtéren elhelyezkedő része, amelynek rendeltetése, hogy az előtéren keresztül történő átguruláshoz útvonalat biztosítson.

c) *Gyors leguruló út (Rapid exit taxiway)* - A futópályához hegyesszögben csatlakozó gurulóút, amelynek célja a leszálló légi-járműnek biztosítani, hogy a futópályát attól nagyobb sebességgel lefordulva hagyhassa el, mint amekkora sebességet más gurulóút típusok tesznek lehetővé, ezáltal csökkentve a futópálya foglaltsági idejét.

Közel-forgalmi érkezési magasság (Terminal arrival altitude - TAA) - Az a használható legalacsonyabb tengerszint feletti magasság, amely a megközelítés kezdőpontja (IAF), vagy ha nincs IAF kijelölve, akkor a közbenső megközelítés pontja (IF) körüli 46 km (25 NM) sugarú kör egy adott íve által határolt területen belül található összes akadály felett legkevesebb 300 m (1000 láb) akadálymentességet biztosít, amely ív széleit az IF-el összekötő egyenesek határolják. Egy adott megközelítési eljáráshoz tartozó TAA-k együttese az IF körül 360 fok-os fedettséget biztosítsanak.

Domborzat (Terrain) - A Föld felszíne, amely az akadályok kivételével magában foglal minden olyan természetes jellegzetességet, mint például a hegyek, dombok, szakadékok, völgyek, vízfelületek, állandó jég- és hómezők.

Megjegyzés. - Gyakorlatilag - az adatgyűjtés módjától függően - a domborzat felöleli a puszta föld folytonos felületét, a (vegetációs) burok tetejét, vagy ami közöttük esetleg van - ez "első visszaverő felület" néven is ismert.

Küszöb (Threshold) - A futópálya leszállásra használható részének kezdete.

Földet érési és elemelkedési terület (Touchdown and lift-off area) (TLOF) - Teherviselésre képes terület, amelyről, illetve amelyre a helikopter elemelkedhet, illetve földet érhet.

Földet érési zóna (Touchdown zone) - A futópályának a küszöbön belül lévő azon része, amelyben a leszállni szándékozó légi-jármű a futópályát először érinti.

Útirány (Track) - A légi-jármű útvonalának földfelszíni vetülete, amelynek irányát annak minden pontjában általában (földrajzi, mágneses, vagy hálózati) Északtól mért fokokban fejezik ki.

Átváltási magasság (Transition altitude) - Az a tengerszint feletti magasság, amelyen, vagy amely alatt a légi-jármű függőleges helyzetét a közepes tengerszint feletti magassághoz viszonyítva vezérlik.

Irányvezetés (Vectoring) – ATS ellenőrző rendszer használatára alapozott, navigációs irányvezetés biztosítása légi-járművek számára meghatározott irányok formájában.

Látás szerinti megközelítési eljárás (Visual approach procedure) - Látási támpontokra alapozott előre meghatározott manőverek sorozata a megközelítés kezdőpontjától, vagy ahol alkalmazható, a meghatározott érkezési útvonal kezdetétől egy olyan pontig, ahonnan a leszállás végrehajtható, és azt követően, ha a leszállás nem történt meg, egy olyan helyzetig, ahonnan az ismételt megközelítés kezdőpontjához vezető eljárás végrehajtható.

Útvonal pont (Waypoint) - Adott területi navigációs út vonalvezetésének, vagy egy területi navigációt alkalmazó légi-jármű repülési útvonalának kijelöléséhez használt meghatározott földrajzi hely. Az útvonal pont elnevezése lehet:

Rátartásos útvonal pont (Fly-by way-point) - Útvonal pont, mely esetében a fordulót a forduló ívének beszámításával a pont elérése előtt kell kezdeményezni, hogy az adott útvonal következő szakaszára fel-, vagy egy eljárásba becsatlakozás a forduló ív érintője mentén történjen meg.

Átrepülendő útvonal pont (Flyover way-point) - Útvonal pont, melynél fordulót annak érdekében kezdeményeznek, hogy valamely útvonal következő szakaszára fel-, vagy egy eljárásba becsatlakozzanak.

1.2 Alkalmazási előírások

1.2.1 Ezen Annex előírásait 2001. november 1-ével kezdődően kell alkalmazni.

Megjegyzés: a 20. Fejezet - ICAO Elektronikus Légiforgalmi térkép megjelenítő, 2002. November 28-án és azután alkalmazandó.

1.2.2 Az ezen Annex hatáskörébe tartozó és 2001. november 1-i, vagy azt követő légiforgalmi információ érvényességi dátumú összes térképnek teljesítenie kell az adott térképre vonatkozó Szabványokat.

1.2.2.1 **Ajánlás**. - *Továbbá, minden ilyen térképnek teljesítenie kell a rá vonatkozó Ajánlott Gyakorlatokat is.*

1.3. Hozzáférhetőség

1.3.1 *Tájékoztatás*. A másik szerződő állam kérésére és részére a szerződő állam bocsássa rendelkezésre a saját területére vonatkozó és a jelen Annex szabványainak teljesítését lehetővé tévő minden tájékoztatást.

1.3.2 *Térképek*. Ha az előírt, a térkép, vagy térképsorozat egyedi térképlapjára vonatkozó megfelelő alábbi módok valamelyike révén a szerződő állam köteles biztosítani a térképeihez való hozzáférést.

Megjegyzés.- A térképhez férés vonatkozik meghatározott elektronikus térképekre is.

1.3.2.1 A szerződő állam a teljes egészében azon területén belülre vonatkozó bármely térkép, vagy térképsorozat egyedi lapja esetében, amely terület fölött a szerződő állam hatáskörrel rendelkezik, köteles:

1) vagy maga elkészíteni a térképet, illetve térkép lapot; vagy

2) intézkedni azoknak egy másik szerződő állam, illetve ügynökség általi elkészítéséről; vagy

3) a térkép elkészítéséhez szükséges adatokat egy olyan szerződő állam rendelkezésére bocsátani, amely hajlandó kötelezettséget vállalni a térkép, vagy térképlap elkészítésére.

1.3.2.2. Két, vagy több szerződő állam területét magába foglaló térképekre, vagy térképsorozat egyedi térképlapjára vonatkozóan, azon államoknak kell meghatározniuk a módot, amelynek megfelelően a térkép, vagy térképlap hozzáférhetőségét biztosítják, amelyek fennhatósági területét a térkép magába foglalja. A döntést úgy kell meghozni, hogy az megfelelően figyelembe vegye a körzeti légi-navigációs egyezményeket és az ICAO Tanács által kialakított minden térkép-szelvényezési programot.

Megjegyzés. - A "körzeti légi-navigációs egyezmények" kifejezés az ICAO Tanácsa által, általában a körzeti légi-navigációs értekezletek javaslatai alapján, jóváhagyott egyezményeket jelenti.

1.3.3 A szerződő állam köteles minden ésszerű intézkedést megtenni annak érdekében, hogy az általa szolgáltatott tájékoztatások és az általa biztosított térképek a szükséges kívánalmaknak megfelelőek és pontosak legyenek és, hogy azokat megfelelő helyesbítő szolgálattal naprakész állapotban tartsa.

1.3.4 **Ajánlás.** - *Hogy az új térképészeti technikáról és az előállítási eljárásokról a tájékoztatások világméretű terjesztése javuljon, a szerződő államok által készített megfelelő térképeket, kérésre és* *kölcsönösségi alapon, a többi szerződő államnak ingyenesen kell rendelkezésre bocsátani.*

Megjegyzés. - A légiforgalmi térképek elkészítéséről, beleértve azok mintáit is, a Légiforgalmi Térképek Kézikönyve (Doc 8697) tartalmaz útmutató segédanyagot.

3. FEJEZET - ICAO A TÍPUSÚ REPÜLŐTÉRI AKADÁLY TÉRKÉP - (ÜZEMELTETÉSI KORLÁTOZÁSOK)

3.1 Rendeltetése

3.1.1 Ez a térkép az AIP-ben közzétett információval együtt biztosítsa az üzemeltető számára a 6. Annex, I. Rész, 5. Fejezetében és a III. Rész, II. Szakaszának 3. Fejezetében leírt üzemeltetési korlátozások teljesítéséhez szükséges adatokat.

3.2 Alkalmazási előírások

Az ICAO A típusú Repülőtéri Akadály Térképet (Üzemeltetési Korlátozások) a nemzetközi polgári repülés által rendszeresen használt minden repülőtérről az 1.3.2 pontban előírt módon rendelkezésre kell bocsátani, kivéve azokat a repülőtereket, ahol a felszállás pályája mentén nincsenek akadályok, vagy ahol az ICAO (Elektronikus) Repülőtéri terep és akadály térkép biztosított az 5. Fejezetben előírtak szerint.

3.2.2 Ha ez a térkép nem szükséges, mert a felszállás pályája mentén nincsenek akadályok, akkor az AIP-ben ilyen értelmű tájékoztatást kell közzétenni.

3.3 Mértékegységek

3.3.1 A tengerszinthez viszonyított magasságokat a legközelebbi fél méter, vagy legközelebbi egész láb értéknek megfelelő pontossággal kell feltüntetni.

3.3.2 A hossz-méreteket a legközelebbi fél méter értéknek megfelelő pontossággal kell feltüntetni.

3.4 Fedésterület és méretarány

3.4.1 Mindegyik felülnézeti térképrajz méretének elegendő nagyságúnak kell lennie ahhoz, hogy az összes lényeges akadályt magába foglalja.

Megjegyzés. - Az olyan egyedül álló távoli mérvadó akadályokat, amelyek a térkép méretét szükségtelenül növelnék, jelezhetők mindössze a megfelelő térképjellel és egy nyíllal is, azzal a feltétellel, hogy az akadálynak legtávolabbi futópálya végétől mért távolságát és irányát eltávolítják, az akadály tengerszinthez viszonyított magasságát közlik.

3.4.2 A vízszintes méretarány 1:10 000-től 1:15 000-ig terjedő tartományba essen.

3.4.3 **Ajánlás**. - A vízszintes méretarány 1:10 000 legyen.

Megjegyzés. - Ha a térkép előállítása ezzel megkönnyíthető az 1:20 000 méretarány is alkalmazható.

3.4.4 A függőleges méretarány a vízszintes méretarány tízszerese legyen.

3.4.5 Hossz-mértékvonalak. A térképeken fel kell tüntetni a méter és láb beosztású vízszintes- és függőleges mértékvonalat.

3.5 Formátum

3.5.1 A térképeken felülnézeti és metszetrajzban ábrázolni kell minden futópályát és a hozzájuk tartozó minden végbiztonsági és akadálymentes sávot, a felszállás pályájának területét és az akadályokat.

3.5.2 A metszetrajzon - a megegyező felülnézeti rajz felett - fel kell tüntetni az egyes futópályákat, végbiztonsági és akadálymentes sávokat, valamint a felszállás pályájának területén lévő akadályokat. Az alternatív felszállási pálya terület oldalnézeti metszete foglalja magába a teljes felszálló pályát és olymódon kell a megfelelő felülnézeti rajza fölé helyezni, amely a tájékoztatás azonnali megértését a legmegfelelőbben szolgálja.

3.5.3 A futópálya kivételével a teljes metszetre, metszet méret hálót kell fektetni. A függőleges vonalháló kiindulási pontja a közepes tengerszint legyen. A vízszintes vonalháló kiindulási pontja a vonatkozó felszállás pályája alatti terület kezdetétől távolabb lévő futópályavég legyen. A beosztási térközöket jelző osztóvonalakat a méretarány alap vonalán és a függőleges határvonalakon végig (azok teljes hosszában) fel kell tüntetni.

3.5.3.1 **Ajánlás**.- *A függőleges méret hálót 30 m-es (100 láb), a vízszintes méret hálót 300 m-es (1000 láb) térközökkel kell ábrázolni.*

3.5.4 A térkép tartalmazzon:

a) A 3.8.3 pontban megadott üzemi adatok rögzítésére szolgáló ablakot;

b) A módosítások és azok dátumainak bejegyzésére szolgáló ablakot.

3.6 Azonosítás

A térképet a következő nevekkel kell azonosítani: az ország neve, amelyben a repülőtér elhelyezkedik, annak a városnak, vagy körzetnek a neve, amelyet a repülőtér kiszolgál, továbbá a repülőtér neve és a futópálya(ák) azonosítói.

3.7 Mágneses eltérés

A térképen a legközelebbi fokra kerekített mágneses eltérést, valamint az adatok felmérési dátumát fel kell tüntetni.

3.8 Légiforgalmi adatok

3.8.1 Akadályok

3.8.1.1 Akadálynak kell tekinteni és fel kell tüntetni a felszállás pályája alatti területen lévő, a felszállás pályájának kezdőpontjától induló, 1,2%-os lejtésű síkon túlnyúló akadályokat, kivéve azokat az akadályokat, amelyek a 3.8.1.2 pontban meghatározottak szerint teljes egészében más akadályok árnyékában fekszenek. Az olyan mozgó akadályokat, mint például hajók, vonatok, teherautók, stb., amelyek az 1,2%-os síkon túlnyúlnak, akadályoknak kell tekinteni, de ezeket nem lehet úgy venni, hogy azok képesek az árnyékhatás létrehozására.

3.8.1.2 Egy akadály árnyékát olyan sík felületként kell kezelni, amely az akadály tetején keresztül és a felszállási pálya területére merőlegesen húzott vízszintes vonalnál kezdődik. Ez a sík a felszállás nyomvonalának teljes szélességét fedi és vagy a 3.8.1.1 pontban meghatározott síkig, vagy a legközelebbi magasabb akadályig tart, amelyik előbb helyezkedik el. A felszállás nyomvonalának első 300 m-én (1000 láb) az árnyék síkok vízszintesek, ezen a ponton túl a síkok felfelé 1,2%-os meredekséggel emelkednek.

3.8.1.3 Ha az árnyékhatást létrehozó akadályt várhatóan eltávolítják, akkor a térképen fel kell tüntetni azokat a tárgyakat, amelyek az előző akadály eltávolítása után akadályokká válnak.

3.8.2 A felszállási pálya nyomvonal területe

3.8.2.1 A felszállás pályája alatti terület a föld felszínén közvetlenül a felszállás pályája alatt kijelölt, annak két oldalán szimmetrikusan elhelyezkedő, négy oldallal rendelkező terület. Ez a terület a következő jellemzőkel rendelkezik:

a) a felszállásra alkalmasként közzétett terület végénél kezdődik (azaz, a futópálya, vagy az akadálymentes sáv végénél - amelyik alkalmazandó);

b) szélessége a kiinduló pontnál 180 m (600 láb) és ez 0,25D értékkel növekszik 1800 m (6000 láb) legnagyobb szélességig, ahol is "D" egyenlő a kiindulási ponttól mért távolsággal;

c) addig a pontig terjed, amelyen túl nincsenek akadályok, vagy 10 km (5,4 tengeri mérföld) távolságig, amelyik a kisebb.

3.8.2.2 Az olyan légi-járműveket kiszolgáló futópályák esetében, amely légi-járművek üzemelési korlátjai miatt 1,2 %-nál kisebb meredekségű emelkedési gradiens alkalmazása nincs kizárva, a felszállás pályája alatti terület 3.8.2.1 c) pontban meghatározott hosszát legalább 12 km-re (6,5 tengeri mérföld) meg kell növelni és a síknak a 3.8.1.1 pontban, illetve a 3.8.1.2 pontban meghatározott emelkedését 1 %-ra, vagy ennél kisebbre kell csökkenteni.

Megjegyzés. - Ha az 1,0 százalékos felmérő sík akadályt nem érint, akkor hajlásszöge addig csökkenthető, amíg a sík valamely akadállyal érintkezik.

3.8.3 Közzétett úthosszak

3.8.3.1 Minden futópálya mindkét irányára a következő tájékoztatást kell feltüntetni az e célra biztosított helyen:

a) rendelkezésre álló nekifutási úthossz;

b) rendelkezésre álló gyorsítás-fékezési úthossz

c) rendelkezésre álló felszálló úthossz;

d) rendelkezésre álló leszálló úthossz;

Megjegyzés. - - A 14. Annex I. Kötet, A Mellékletének 3. szakaszában útmutatás található a közzétett úthosszakról.

3.8.3.2 **Ajánlás. -** *Ha valamelyik úthosszat nem teszik közzé, mert a futópálya csak egy irányból használható, akkor a futópályát "felszállásra, leszállásra, vagy egyikre sem használható"-ként kell azonosítani.*

3.8.4 Felülnézeti és oldalnézeti ábrázolások

3.8.4.1 A felülnézeti ábrán:

a) a futópályák körvonalát folyamatos vonallal kell ábrázolni, beleértve hosszukat és szélességüket, a legközelebbi fokra kerekített mágneses irányukat és a futópálya számát; b) az akadálymentes területet

b) szaggatott vonallal kell jelölni, beleértve a hosszát és ilyen területként való azonosítását;

c) a felszállást követő repülés nyomvonalának területeit szaggatott vonallal és középvonalát hosszú/rövid vonalakból álló vékony szaggatott vonallal kell jelölni;

d) a felszállást követő repülés alternatív nyomvonal területeket. Ha a futópálya meghosszabbított középvonalára nem központos felszállást követő repülési alternatív nyomvonal területeket ábrázolnak, akkor egy, az ilyen területek jelentőségét magyarázó megjegyzést kell biztosítani.

e) az akadályokat, beleértve:

1) az egyes akadályok pontos helyét, az akadály fajtáját mutató jel feltüntetésével együtt;

2) az egyes akadályok tengerszinthez viszonyított magasságát és azonosítását;

3) a nagy kiterjedésű akadályok túlnyúlásának határértékeit megkülönböztető módon kell feltüntetni és a jelmagyarázatban azonosítani.

Megjegyzés. - Ez nem zárja ki a felszállást követő repülési nyomvonal területén belül lévő kritikus magassági pontok jelzésének szükségességét.

3.8.4.1.1 **Ajánlás.** - *A futópálya és végbiztonsági sáv felületek fajtáját fel kell tüntetni.*

3.8.4.1.2 **Ajánlás.** - *A végbiztonsági területeket, mint olyanokat azonosítani kell és szaggatott vonallal kell jelezni.*

3.8.4.1.3 Ha a végbiztonsági területeket ábrázolják, akkor az egyes végbiztonsági területek hosszát meg kell adni.

3.8.4.2 Az oldalnézeti rajzokon fel kell tüntetni:

a) a futópálya középvonalának metszetrajzát folyamatos vonallal és az egyes kapcsolódó végbiztonsági sávok és akadálymentes területek középvonalának metszetrajzát szaggatott vonallal;

b) a futópálya középvonalának tengerszinthez viszonyított magasságát, a futópálya mindkét végénél, a végbiztonsági sávoknál, az egyes felszállási repülési nyomvonal területek kezdeténél valamint a futópálya és a végbiztonsági sáv lejtésének minden jelentős változásánál;

c) az akadályokat, beleértve:

1) az egyes akadályokat olyan folyamatos vonallal, amely egy tetszés szerinti megfelelő hálózati vonaltól legalább még egy hálózati vonalon keresztül az akadály tetejének tengerszinthez viszonyított magasságáig terjed;

2) az egyes akadályok azonosítását;

3) a nagy kiterjedésű akadályok túlnyúlási határait megkülönböztető módon és a jelmagyarázatban azonosítva.

Megjegyzés. - Az akadály profil is feltüntethető, amely az egyes mérvadó akadályok tetejét összekötő vonal és, amely az egymás után következő mérvadó akadályok általi árnyékhatást képviseli.

3.9 Pontosság

3.9.1 Az elért pontosság mértékét a térképen fel kell tüntetni.

3.9.2 **Ajánlás.** - *A futópálya, a végbiztonsági sáv és az akadálymentes terület térképén feltüntetendő vízszintes kiterjedését és tengerszinthez viszonyított magasságát a legközelebbi 0,5 m-re (1 láb) kell meghatározni.*

3.9.3 **Ajánlás.** - *A terepen végzett felmérő munka és a térkép elkészítésének pontossági fokának olyannak kell lennie, hogy a térképen végezhető mérések pontossága a felszállást követő repülési nyomvonal területén a következő legnagyobb eltérésen belül legyen.*

1) *vízszintes távolságokra: 5 m (15 láb) a kezdőpontnál és azt követően 1/500-as nagyságrenddel növekvő eltéréssel;*

2) *függőleges méretekre: 0,5 m (1,5 láb) az első 300 méteren (1000 láb) és azt követően 1/1000-es nagyságrenddel növekvő eltéréssel;*

3.9.4 Magasság viszonyítási alap. Ha nincs pontos magasság viszonyítási alap, akkor az alkalmazott magasság viszonyítási alap pontjának tengerszinthez viszonyított magasságát kell megállapítani és, 'feltételezett érték' megjelöléssel kell ellátni.

4. FEJEZET
ICAO B TÍPUSÚ REPÜLŐTÉRI AKADÁLY TÉRKÉP

4.1 Rendeltetése

A térképnek az alábbi feladatok teljesítéséhez kell információt biztosítania:

a) a minimális biztonságos tengerszinthez viszonyított magasságok megállapításához, beleértve a körözési eljárásokra vonatkozókat is.

b) a felszállás, vagy a leszállás során bekövetkező kényszerhelyzet esetén alkalmazandó eljárások megállapításához;

c) az akadály elkerülési és jelölési követelmények alkalmazásához;

d) forrás adatanyag biztosítására légiforgalmi térképekhez.

4.2 Alkalmazási rendelkezések

4.2.1 **Ajánlás.** - Az ICAO B Típusú Repülőtéri Akadály Térképet a nemzetközi polgári repülés által rendszeresen használt minden repülőtérről az 1.3.2 pontban előírt módon rendelkezésre kell bocsátani, kivéve azokat a repülőtereket, ahol az ICAO (Elektronikus) Repülőtéri terep és akadály térkép biztosított az 5. Fejezetben előírtak szerint.

4.2.2 Ha a 3. és a 4. Fejezet előírásait egyesítő térképet tesznek közzé, akkor azt "ICAO (összevont) Repülőtéri Akadály Térkép" névvel kell ellátni.

4.3 Mértékegységek

4.3.1 A tengerszinthez viszonyított magasságokat a legközelebbi fél méter, vagy legközelebbi egész láb értéknek megfelelő pontossággal kell feltüntetni.

4.3.2 A hossz-méreteket a legközelebbi fél méter értéknek megfelelő pontossággal kell feltüntetni.

4.4 Fedésterület és méretarány

4.4.1 Minden egyes felülnézeti térképrajz méretének elegendő nagyságúnak kell lennie ahhoz, hogy az összes akadályt magába foglalja.

Megjegyzés. - Az olyan egyedül álló távoli akadályok, amelyek a térkép méretét szükségtelenül növelnék, jelezhetők mindössze a megfelelő térképjellel és egy nyíllal is, azzal a feltétellel, hogy az akadálynak a repülőtér vonatkoztatási pontjától mért távolságát és irányát, továbbá az akadály tengerszinthez viszonyított magasságát is közlik.

4.4.2 A vízszintes méretarány 1:10 000-től 1:20 000-ig terjedő tartományba essen.

4.4.3 A térképeken fel kell tüntetni egy vízszintes mérővonal skálát, amely a méter és láb értékeket egyaránt tartalmazza. Ha szükséges, a hossz értékeket kilométerben is és tengeri mérföldben is mutató mérővonalat is fel kell tüntetni.

4.5 Formátum

A térképeken ábrázolni kell:

a) az alkalmazott vetület minden szükséges magyarázatát;

b) az alkalmazott hálózat minden szükséges magyarázatát;

c) annak jelölését, hogy a feltüntetett akadályok azok az akadályok, amelyek a 14. Annex, I. Kötet, 4. Fejezetében meghatározott felületeken túlnyúlnak;

d) egy, a módosítások és azok időpontjainak bejegyzésére alkalmas rovatot;

e) a térkép határoló vonalán kívül, a földrajzi szélesség és hosszúság minden egyes fokának és fokpercének jelölését.

Megjegyzés. - A szélességi és hosszúsági körök vonalait a térképen végighúzva is fel lehet tüntetni.

4.6 Azonosítás

A térképet a következő nevekkel kell azonosítani: az ország neve, amelyben a repülőtér elhelyezkedik, annak a városnak, vagy körzetnek a neve, amelyet a repülőtér kiszolgál, továbbá a repülőtér neve.

4.7 Kultúr környezet és tereprajz

4.7.1 A vízelvezetési és vízrajzi részleteket a minimumra kell szorítani.

4.7.2 A repülőtérhez kapcsolódó épületeket és egyéb jellemző jellegzetességeket fel kell tüntetni. Ahol lehetséges, ezeket mérethelyesen kell ábrázolni.

4.7.3 A térképen fel kell tüntetni minden olyan mesterséges és természetes akadályt, amely a 4.9 pontban meghatározott felszállási és megközelítési felületeken, vagy a 14. Annex, I. Kötet, 4. Fejezetében meghatározott akadály elkülönítési és akadály jelölő felületeken túlnyúlik.

4.7.4 A térképen ábrázolni kell azokat az utakat és vasutakat, amelyek a felszállási és a megközelítési területen belül, a futópályától vagy a futópálya meghosszabbítástól kevesebb, mint 600 méter (2000 láb) távolságban fekszenek.

Megjegyzés. - A terepjellegzetességek neve, ha ezek jelentőséggel bírnak, feltüntethetők.

4.8 Mágneses eltérés

A térképen el kell helyezni egy, a földrajzi Északra tájolt iránytűrózsát, vagy egy Észak pontot és fel kell tüntetni a legközelebbi fokra kerekített mágneses eltérést az adat felmérési dátumával és az évenkénti változással egyetemben.

4.9 Légiforgalmi adatok

4.9.1 A térképen fel kell tüntetni:

a) a repülőtér vonatkoztatási pontját és annak földrajzi koordinátáit fokban, fokpercben és fokmásodpercben;

b) a futópályák körvonalát folyamatos vonallal;

c) a futópályák hosszát és szélességét;

d) a futópályák legközelebbi fokra kerekített mágneses irányát és a futópálya számát;

e) a futópálya középvonalának tengerszinthez viszonyított magasságát a futópálya mindkét végénél, a végbiztonsági sávoknál, az egyes felszállást követő repülési nyomvonal és megközelítési repülés nyomvonal területek kezdeténél, valamint a futópálya és a végbiztonsági sáv lejtésének minden jelentős változásánál;

f) a guruló utakat, az előtereket és az állóhely területeket ilyenként azonosítva, körvonalaikat folyamatos vonallal ábrázolva;

g) a végbiztonsági területet szaggatott vonallal és ilyen területként való azonosítását;

h) az egyes végbiztonsági sávok hosszát;

i) az akadálymentes területeket szaggatott vonallal és ilyen területként való azonosításukat;

j) az egyes akadálymentes területek hosszát;

k) a felszállási és megközelítési felületeket ilyenekként azonosítva és szaggatott vonallal ábrázolva;

l) a felszállási és megközelítési területeket;

Megjegyzés. - A felszállási terület leírását a 3.8.2.1 pont tartalmazza. A megközelítési terület a 14. Annex, I. Kötet, 4. Fejezetében meghatározottak szerinti közvetlenül a megközelítési felület alatt fekvő földfelszíni terület.

m) az akadályokat pontos helyükön, beleértve:

1) az akadály fajtájára utaló jelölést;

2) a tengerszinthez viszonyított magasságot

3) azonosítását;

4) a nagymérvű túlnyúlások határértékeit a jelmagyarázatban azonosított megkülönböztető módon és;

Megjegyzés. - Ez nem zárja ki a felszállást követő repülési nyomvonal területén belül lévő kritikus magassági pontok jelzésének szükségességét.

n) minden olyan további, a 3.8.1.1 pont szerint meghatározott akadályt, beleértve az akadályok árnyékában lévő akadályokat is, amelyeket egyébként nem kellene feltüntetni.

Megjegyzés. - A 14. Annex, I. Kötet, 4. Fejezetében meghatározott követelmények minimum követelmények. Ha az illetékes hatóság alacsonyabb felületeket alakított ki, ott ezek alkalmazhatók az akadályok kijelölésére.

4.9.1.1 **Ajánlás.** - *A futópálya és végbiztonsági sáv felületek fajtáját meg kell nevezni.*

4.9.1.2 **Ajánlás.** - *Ha megvalósítható, a térképen szembeötlően kell feltüntetni a repülőtér vonatkoztatási pontjától mért 5000 m-es (15 000 láb) sugarú körön belül lévő, a szomszédos megközelítési területek közötti legmagasabb tárgyat, vagy akadályt.*

4.9.1.3 **Ajánlás**. - *A részben akadályt képező fás területek és domborzati jellemzők kiterjedését ábrázolni kell.*

4.10 Pontosság

4.10.1 Az elért pontosság mértékét a térképen fel kell tüntetni.

4.10.2 Ajánlás. - A térképen feltüntetett mozgási területek, végbiztonsági sávok és akadálymentes területek vízszintes kiterjedtségét és a tengerszinthez viszonyított magasságát a legközelebbi 0,5 m-re (1 láb) kerekítve kell ábrázolni.

4.10.3 **Ajánlás.** - *A terepen végzett felmérő munka pontossági fokának és a térkép elkészítési pontosságának olyannak kell lennie, hogy a térképen végezhető mérések pontossága a következő legnagyobb eltérésen belül legyen:*

a) felszállási és megközelítési területek:

1) vízszintes távolságokra: 5 m (15 láb) a kezdőpontnál és azt követően 1/500-as nagyságrenddel növekvő eltéréssel;

2) függőleges méretekre: 0,5 m (1,5 láb) az első 300 méteren (1000 láb) és azt követően 1/1000-es nagyságrenddel növekvő eltéréssel;

b) egyéb területek:

1) vízszintes távolságokra: 5 m (15 láb) a repülőtér vonatkoztatási pontjától mért 5000 m-en (15 000 láb)

belül és 12 m (40 láb) e területen kívül;

2) függőleges méretekre: 1 m (3 láb) a repülőtér vonatkoztatási pontjától mért 1500 m-en (5 000 láb) távolságon belül és azt követően 1/1000-es nagyságrenddel növekvő eltéréssel;

4.10.4 Magasság viszonyítási alap. Ha nincs pontos magasság viszonyítási alap, akkor az alkalmazott magasság viszonyítási alap pontjának tengerszinthez viszonyított magasságáról kell nyilatkozni és, mint feltételezett értéket kell jelölni.

5. FEJEZET ICAO (ELEKTRONIKUS) REPÜLŐTÉRI TEREP ÉS AKADÁLY TÉRKÉP

5.1 Rendeltetése

Ez az elektronikus térkép a domborzati- és az akadály adatokat a légiforgalmi adatokkal együtt (a közülük megfelelőt) az alább felsorolt igényeket teljesítő módon ábrázolja:

a) az üzemeltetőnek tegye lehetővé a 6. Annex, I. Része 5. Fejezetében és a III. Rész, II. Szakaszának 3. Fejezetében leírt üzemeltetési korlátozások teljesítését megszakított leszállás, vagy felszállás közbeni vészhelyzet során alkalmazandó szükség eljárás kidolgozása révén és légi-jármű üzemeltetési korlát elemzések elvégzésével; és

b) támogassa az alábbi célú légi-navigációs alkalmazásokat:

  1) műszeres eljárások tervezése (beleértve a körözési eljárást);
  2) repülőtéri akadályok korlátozása és eltávolítása; és
  3) forrás adat biztosítása egyéb légiforgalmi térképek előállításához.

Megjegyzés. - E térkép szándék szerinti céljáról és használatáról a Légiforgalmi Térkép Kézikönyv (Doc 8697) tartalmaz magyarázatot.

5.2 Alkalmazási rendelkezések

5.2.1 Az ICAO (Elektronikus) Repülőtéri terep és akadály térképet 2010 november 18-tól az 1.3.2-ben előírt módon kell biztosítani a nemzetközi polgári repülésben használt minden repülőtérre.

1. Megjegyzés.- Ha az ICAO (Elektronikus) Repülőtéri terep és akadály térkép biztosított, akkor az ICAO A Típusú Repülőtéri Akadálytérkép – (Üzemeltetési Korlátozások) és az ICAO B Típusú Repülőtéri Akadálytérkép nem szükséges (lásd 3.2.1 és 4.2.1).

2. Megjegyzés.- Az ICAO Precíziós Domborzati Térképre előírt információ biztosítható az ICAO (Elektronikus) Repülőtéri terep és akadály térképen. Ahol ez történik, ott nincs szükség az ICAO Precíziós Domborzati Térképre (lásd 6.2.1).

5.2.2 **Ajánlás.—** Az ICAO (Elektronikus) Repülőtéri terep és akadály térképet az 1.3.2-ben előírt módon szükséges biztosítani a nemzetközi polgári repülésben használt minden repülőtérre.

5.2.3 Az ICAO (Elektronikus) Repülőtéri terep és akadály térképet –kérésre- nyomtatott formában is biztosítani kell.

Megjegyzés.- A nyomtatott másolatra vonatkozó előírásokat lásd az 5.7.7 alatt.

5.2.4 Általános adatmodellezési keretként az ISO földrajzi információra vonatkozó 19100 sorozatú szabványait kell alkalmazni

Megjegyzés.- Az ISO földrajzi információra vonatkozó 19100 sorozatú szabványok használata elősegíti az ICAO (Elektronikus) Repülőtéri terep és akadály térkép különféle felhasználók közötti cseréjét és használatát.

5.3 Azonosítás

Az elektronikus térképeket a következőkkel kell azonosítani: az ország neve, amelyben a repülőtér elhelyezkedik, a repülőtér által kiszolgált város, vagy helység, továbbá repülőtér neve.

5.4 Térkép fedésterület

A térkép mérete legyen elegendő a 15. Annex 10.2 pontjában leírt „Area 2" lefedéséhez

5.5 Térkép tartalom

5.5.1 Általános rész

5.5.1.1 A térkép jellemzők ábrázolásához alkalmazandó számítógép grafikai alkalmazás tervezésekor alkalmazási sablonnal meg kell határozni a jellegzetesség, a jellegzetesség jegyek összefüggéseit és a háttéri térgeometria és a kapcsolódó topológiai összefüggéseket. Az ábrázolt információt a kötött ábrázolási szabályoknak megfelelően alkalmazott ábrázolási előírások szerint kell biztosítani. Az ábrázolási szabályok és az ábrázolási előírások nem lehetnek az adatkészlet részei. Az ábrázolási szabályokat ábrázolási katalógusban kell tárolni, amelyeknek a külön tárolt ábrázolási előírásokra kell hivatkozniuk.

Megjegyzés.— A 19117-es ISO szabvány tartalmazza a jellegzetesség-alapú földrajzi információ ábrázoló mechanizmust leíró sablon meghatározását, míg a 19109-es ISO szabvány az alkalmazási sablonra vonatkozó szabályokat tartalmaz. A térgeometria és a kapcsolódó topológiai összefüggéseket a 19107-es ISO szabvány határozza meg.

5.5.1.2 A jellegzetesség ábrázolására használt jel legyen összhangban a 2.4-el és a 2. Függelék – ICAO térkép jelek-el.

5.5.2 Domborzati jellegzetesség

5.5.2.1 Az ábrázolandó terep jellegzetességnek és a kapcsolódó jegyeknek, illetve a térképhez kapcsolt adatbázisnak a 15. Annex, 10. Fejezetének és 8. Függelékének követelményeit teljesítő elektronikus terep adat készletre kell alapozódnia.

5.5.2.2 A terep jellegzetességet a terep hatásos összbenyomását keltő módon kell ábrázolni. Ez legyen a terep felületi leképzése, folyamatosan feltüntetve a Digitális Magasság Modellként (DEM) is ismert meghatározott rácsháló összes metszéspontjánál a magasság értékeket.

Megjegyzés.- A 15. Annex, 10. Fejezetével és 8. Függelékével összhangban, az „Area 2" DEM pozíció térköz (rács) 1 ívmásodpercben (megközelítőleg 30 m) lett megállapítva.

5.5.2.3 **Ajánlás.-** A terep felületi leképzését -a DEM mellett- választható szintvonal rétegekként szükséges biztosítani.

5.5.2.4 **Ajánlás.-** A DEM javításához a DEM-en lévő jellegzetességekkel passzoló, az átlapoló látványon jellegzetességekkel bíró geometriailag korrigált látványt kell használni. A látványt külön választható rétegként szükséges biztosítani.

5.5.2.5 Az ábrázolt területi jellegzetesség az adatbázis(ok)ban tárolt következő társított jellegzetesség jegyekkel legyen összekapcsolva:

a) a rácspontok vízszintes pozíciója földrajzi koordinátákkal és a pontok magassága;

b) felület típus;

c) szintvonal értékek, ha adottak; és

d) város-, helységnevek és egyéb kiemelkedő tereprajzi jellegzetességek.

5.5.2.6 **Ajánlás.-** A 15. Annex 8. Függelékének A8-3 Táblázatában előírt és adatbázis(ok)ban tárolt egyéb terep jegyek az ábrázolt terep-jellegzetességekhez legyenek csatolva.

5.5.3 Akadály jellegzetességek

5.5.3.1 Az ábrázolt, vagy adatbázis szinten a térképhez csatolt akadály jellegzetességeknek és a társított jegyeknek a 15. Annex 10. Fejezetének és 8. Függelékének követelményeit teljesítő elektronikus akadály adatkészletre kell alapulniuk.

5.5.3.2 Minden akadályt megfelelő jellel és akadály azonosítóval kell ábrázolni.

5.5.3.3 Az ábrázolt akadály jellegzetessége az adatbázis(ok)ban lévő alábbi társított jegyekkel legyen

összekapcsolva:
a) vízszintes pozíció földrajzi koordinátákkal és a társított magasság;
b) akadály típus; és
c) akadály terjedelem, ha alkalmazható.

5.5.3.4 **Ajánlás.-** A 15. Annex 8. Függelékének A8-4-es Táblázatában előírt és adatbázis(ok)ban tárolt egyéb akadály jegyek legyenek az ábrázolt akadály jellegzetességéhez csatolva.

5.5.4 Repülőtér jellegzetességek

5.5.4.1 Az ábrázolt, vagy adatbázis szinten a térképhez csatolt repülőtér jellegzetességeknek és a társított jegyeknek a 14. Annex 10. I. Kötet, 5. Függelékének és a 15. Annex 7. Függelékének követelményeit teljesítő repülőtér adatokra kell alapulniuk.

5.5.4.2 Az alábbi repülőtér jellegzetességeket a megfelelő jellel kell ábrázolni:
a) repülőtér vonatkoztatási pont;
b) futópálya(k) és azonosító száma(uk), és, ha van, végbiztonsági sáv(ok) és akadály mentes sáv(ok); valamint
c) gurulóut(ak), előter(ek), nagy épület(ek) és egyéb kiemelkedő repülőtéri jellegzetességek.

5.5.4.3 Az ábrázolt repülőtér jellegzetessége az adatbázis(ok)ban lévő alábbi társított jegyekkel legyen összekapcsolva:
a) a repülőtér vonatkoztatási pontjának földrajzi koordinátája;
b) mágneses elhajlás a repülőtéren, az adatfelmérés éve és az éves változás;
Megjegyzés.- A mágneses elhajlás adatbázis szinten lehet a repülőtéri vonatkoztatási ponthoz csatolt.
c) futópálya(k), végbiztonsági sáv(ok) és akadálymentességi sáv(ok) hossz(a) és szélesség(e);
d) futópálya(k) és végbiztonsági sáv(ok) felület típus(ai);
e) a futópálya(k) legközelebbi fokra kerekített mágneses iránya(i);
f) szintmagasság minden futópálya, végbiztonsági sáv, akadálymentes sáv végénél, és a futópálya(k), végbiztonsági sáv(ok) minden jelentős lejtési szög változásá(i)nál;
g) Közzétett úthosszak minden futópálya irányra, vagy „NU” rövidítés, ha valamely futópálya irány nem használható fel-, vagy leszállásra, vagy egyikre sem.
Megjegyzés.- A közzétett úthosszakról útmutató a 14. Annex 14, I. Kötet, A Mellékletében található.

5.5.5 Rádiónavigációs berendezés jellemzők

A térkép fedésterületén belül lévő minden rádiónavigációs berendezés jellegzetességét a megfelelő jellel kell ábrázolni.

Megjegyzés.- A navigációs berendezés jellegzetesség jegyek az adatbázis(ok)ban lévő ábrázolt navigációs berendezés jellegzetességekhez csatolhatók.

5.6 Pontosság és felbontás

5.6.1 A légiforgalmi adat pontossági nagyságrendje a következőkben előírtaknak feleljen meg: 11. Annex 5. Függelék és 14. Annex I. Kötet 5. Függelék, illetve II. Kötet, 1. Függelék. A domborzati és akadály adat pontossági nagyságrendje a 15. Annex 8. Függelékében előírtak szerinti legyen.

5.6.2 A légiforgalmi adat felbontása a 15. Annex 7. Függelékében előírtak szerinti, míg a domborzat és az akadály adat felbontása a 15. Annex 8. Függelékében előírtak szerinti legyen.

5.7 Elektronikus funkciók

5.7.1 A térkép változtatható méretarányú megtekintése legyen biztosított. Az áttekinthetőség javításához a jel és a betűméret a térkép mérete szerint változzon.

5.7.2 A térkép információ föld-tájolású legyen és a kurzor pozíció legalább a legközelebbi fokmásodpercnél legyen meghatározható.

5.7.3 A térkép férjen össze a széles körben kapható asztali számítógép eszközökkel, programokkal és médiákkal.

5.7.4 **Ajánlás.-** A térkép tartalmazza saját „olvasó" programját.

5.7.5 Az engedélyezett frissítés kivételével, ne legyen lehetőség a térképről információt eltávolítani.

5.7.6 Az információ felhasználói testre szabását lehetővé tévő információ-réteg választékot kell biztosítani, ha információ zsúfoltság miatt a térkép szerepének ellátásához szükséges részletek megfelelő láthatósággal nem mutathatók egyetlen összesítő térkép nézeten.

Megjegyzés.- A repülőtér jellemzők többségének ajánlott megjelenítési módja a felhasználó által választható információ-réteggel bíró elektronikus térkép változat.

5.7.7 Legyen lehetőség a térkép felhasználó által választott tartalmi és méretarány igény szerinti másolatát kinyomtatni.

1. Megjegyzés.- Felhasználói igény szerint, a nyomtatott termék ábrázolhat szelvény-sorozatokat, vagy egy választott területet.

2. Megjegyzés.- A kapcsolt adatbázis révén rendelkezésre álló jellegzetesség-jegy információ biztosítható egy megfelelő hivatkozással ellátott különálló lapon.

5.8 Térkép-adat termék-előírás

5.8.1 A térképet képező adat készletről átfogó nyilatkozatot kell biztosítani adat termék előírások formájában, amely alapján a légi-navigációs felhasználó képes a térkép-adat terméket elemezni és meghatározni, hogy az teljesíti-e a felhasználási céljára (alkalmazására) vonatkozó követelményeket

5.8.2 A térkép-adat termék-előírás tartalmazza a következőket: egy áttekintőt, egy előírás tárgykört, egy adat termék-azonosítót, adat tartalmi információt, az alkalmazott vonatkoztatási rendszert, az adat minőségi követelményeket, és tájékoztatót az adat nyerésről, adat karbantartásról, adat ábrázolásról, valamint bármely rendelkezésre álló további információt, és a meta adatot.

Megjegyzés.- A földrajzi információra vonatkozó követelményeket és az adat termék-előírás vázlatát az ISO 19131 szabványa írja le.

5.8.3 A térkép-adat termék-előírás áttekintője biztosítson egy kötetlen leírást a termékről és tartalmazzon általános tájékoztatást az adat termékről.

A térkép-adat termék-előírás előírás tárgyköre tartalmazza a térkép fedés térbeli (vízszintes) terjedelmét. A térkép-adat termék-azonosító tartalmazza a termék megnevezését, egy rövid összefoglaló leírást a térkép tartalmáról és rendeltetéséről, valamint egy leírást a térkép által fedett földrajzi területről.

5.8.4 A térkép-adat termék-előírás adat tartalma egyértelműen azonosítsa a fedés és/vagy a látvány típusát, valamint adjon róluk rövid leírást.

Megjegyzés.- A fedés geometria és funkciók sablonját az ISO 19123 szabványa tartalmazza.

5.8.5 A térkép-adat termék-előírás tartalmazzon az alkalmazott vonatkoztatási rendszert meghatározó információt. Ez tartalmazza a térbeli (vízszintes és függőleges) vonatkoztatási rendszert, és, ha alkalmazható, az időviszonyítási rendszert. A térkép-adat termék-előírás nevesítse az adat minőségi követelményeit. Ez foglaljon magába egy nyilatkozatot az egyezés elfogadható minőségi szintjeiről és a megfelelő adat minőségi intézkedésekről. E nyilatkozat öleljen fel minden adat minőségi elemet és adat minőségi rész-elemet, még akkor is, ha csak annyi a megállapítás, hogy az illető adat minőségi elem, vagy adat minőségi rész-elem nem alkalmazható.

Megjegyzés.- Az ISO 19113 szabvány földrajzi információra vonatkozó minőségi elveket fogalmaz meg, míg az ISO 19114 szabvány minőség értékelő eljárásokat tárgyal.

5.8.6 A térkép-adat termék-előírás tartalmazzon nyilatkozatot az adat nyerésről, amely legyen egy általános leírás a térkép adat forrásairól és a térkép adat kinyeréshez alkalmazott folyamatokról. A térkép-adat termék-előírásban rendelkezni kell a térkép karbantartáshoz alkalmazott elvekről és kritériumokról is, ide értve a térkép termék frissítésének ütemezését. Kiemelt fontosságú legyen a térképre vitt akadály adat készlet karbantartásáról szóló információ és az akadály adat karbantartásban alkalmazott elvek, módszerek és kritériumok jelzése.

5.8.7 A térkép-adat termék-előírás tartalmazzon tájékoztatást az adat térképi ábrázolásának mikéntjéről, az 5.5.1.1. részletezésének megfelelően. A térkép-adat termék-előírás tartalmazzon információt az adat termék továbbításról is, szólva a továbbítási formátumról és az adat hordozójáról.

5.8.8 A térkép-adat termék-előírásba fel kell venni az alap térkép meta adat elemeit. A termék-előírásban nyilatkozni kell bármely egyéb biztosítandó meta adat tételről és azok formátumáról és kódolásáról.

1. Megjegyzés.- Az ISO 19115 szabvány a földrajzi információ meta adatára vonatkozó követelményeket határozza meg.

2. Megjegyzés.- A térkép-adat termék-előírás dokumentálja a térkép adat terméket, amelyet adat készletként telepítenek. Ezen adat készleteket meta adat írja le.

6. FEJEZET - ICAO PRECIZIÓS MEGKÖZELÍTÉSI TEREP TÉRKÉP

6.1 Rendeltetése

A térkép rendeltetése, hogy a befejező megközelítés egy meghatározott részéről részletes terepmetszeti tájékoztatást nyújtson a légi-jármű üzemeltetők részére a rádió-magasságmérő használat céljaira megállapítandó elhatározási magasságra a terepviszonyok által gyakorolt hatás felméréséhez.

6.2 Alkalmazási rendelkezések

6.2.1 Az "ICAO Precíziós Megközelítési terep térkép"-et a nemzetközi polgári légi-közlekedés által használt minden repülőtér minden II. és III. kategóriájú precíziós megközelítéssel rendelkező futópályájára el kell készíteni, kivéve, ha az előírt adatokat az ICAO (Elektronikus) Repülőtéri terep és akadály térképen biztosítják az 5. Fejezetnek megfelelően..

6.2.2 Az "ICAO Precíziós Megközelítési terep térkép"-et bármiféle jelentősebb változás bekövetkezésekor módosítani kell.

6.3 Méretarányok

6.3.1 **Ajánlás.** - *A vízszintes méretarány 1:2 500, a függőleges 1:500 méretarány legyen.*

6.3.2 **Ajánlás.** - *Ha a térkép a futópálya küszöbtől 900 m-nél (3000 láb) távolabb lévő terület terep metszetrajzát tartalmazza, akkor a vízszintes méretarány 1:5 000 legyen.*

6.4 Azonosítás

A térképet a következő nevekkel kell azonosítani: az ország neve, amelyben a repülőtér elhelyezkedik, annak a körzetnek, vagy városnak a neve, amelyet a repülőtér kiszolgál, a repülőtér neve és a futópálya azonosítója.

6.5 Felülnézeti és metszet információk

6.5.1 A térképnek tartalmaznia kell:

1) felülnézeti ábrázolást a metszetrajzon szereplőkkel egyező távolságig, a szintvonalakat a futópálya meghosszabbított középvonala mentén és annak mindkét oldalán 60-60 méteren (200 láb) belüli területen 1 m (3 láb) térközönként tüntetve fel, a szintvonalakat a küszöbhöz kell viszonyítani;

2) annak jelzését, hogy a terep vagy a terepen lévő bármilyen akadály a fenti 1) pontban meghatározott felülnézeti rajzon (3 méterrel (10 láb) eltér a középvonal metszésvonalának magasságától és valószínű, hogy a rádió-magasságmérőt befolyásolja;

3) a terep metszetrajzát a futópálya meghosszabbított középvonala mentén a futópálya küszöbtől 900 m (3000 láb) távolságig.

6.5.2 **Ajánlás**. - *Ha a futópálya küszöbétől mért 900 m (3000 láb) távolságon túl lévő terep hegyekkel tűzdelt, vagy a térkép használója számára egyéb szempontból lényeges, akkor a terepmetszetet a futópálya* *küszöbtől mért 2000 métert (6500 láb) meg nem haladó távolságig szükséges ábrázolni.*

6.5.3 **Ajánlás.** - *Az ILS vonatkoztatási pont magasságát a térképen a legközelebbi fél méter, vagy láb pontossággal tüntessék fel.*

7. FEJEZET - ICAO ÚTVONAL TÉRKÉP

7.1 Rendeltetése

E térképen kell közölni a légi-jármű személyzet részére az ATS útvonalakon a légiforgalmi szolgálati eljárások betartásához megfelelő navigációs tevékenységet megkönnyítő információkat.

Megjegyzés. - E térképek egyszerűsített változatai alkalmasak arra, hogy a rádióösszeköttetési és rádió-navigációs táblázatok kiegészítéseként a Légiforgalmi Tájékoztató Kiadványba bekerüljenek.

7.2 Alkalmazási eljárások

7.2.1 Az ICAO Útvonal Térkép-et az 1.3.2 pontban előírt módon el kell készíteni minden olyan területről, ahol repüléstájékoztató körzetet létrehoztak.

Megjegyzés. - Bizonyos körülmények között szükségessé válhat az ICAO Körzeti Térkép elkészítése (lásd a 8. Fejezetet).

7.2.2 Különálló térképet kell biztosítani, ha a légiforgalmi szolgálati útvonalak, a helyzetjelentési követelmények, a repüléstájékoztató körzetek, vagy irányítói körzet területi határvonalak kijelölése a légtérben különféle magassági rétegződés szerint történt és kielégítő átláthatósággal ezek egyetlen térképen nem ábrázolhatók.

7.3 Fedésterület és méretarány

1. Megjegyzés. - Az ilyen típusú térképekre egységes méretarány, a különféle területek változó mértékű adatsűrűsége miatt nem határozható meg.

2. Megjegyzés. - A térkép átlagos méretarányán alapuló vízszintes mérővonal feltüntethető

7.3.1 **Ajánlás.** - *A térképlapok fedésterületének határvonalait az ATS útvonal szerkezet sűrűsége és szerkezeti felépítése alapján szükséges meghatározni.*

7.3.2 A folyamatos útvonal rendszert ábrázoló egymással szomszédos térképek között kerülni kell a nagy méretaránybeli különbségeket.

7.3.3 A navigáció folyamatosságának biztosítása érdekében a térképlapokon megfelelő nagyságú átfedést kell kialakítani.

7.4 Vetület

7.4.1 **Ajánlás.** - *Szögtartó vetületet kell alkalmazni, amelyen az egyenes vonal hozzávetőleg a nagykörrel azonos.*

7.4.2 A szélességi és hosszúsági köröket megfelelő térközönként kell feltüntetni.

7.4.3 A fokbeosztás jelzéseit azonos térközönként kell kiválasztott szélességi és hosszúsági körök vonala mentén elhelyezni.

7.5 Azonosítás

Az egyes térképlapokat a térképsorozat megnevezésével és számmal kell azonosítani.

7.6 Kultúr környezet és terepszint

7.6.1 Az összes nyílt vízfelületet, a nagy tavak és folyók elnagyolt partvonalát fel kell tüntetni kivéve akkor, ha az a térkép rendeltetésével szorosabban összefüggő adatokkal ütközne.

7.6.2 A 7.6.3 pontban előírtak kivételével, az egyes szélességi és hosszúsági körök által alkotott négyzetekben fel kell tüntetni a Terület legkisebb magasságát.

7.6.3 **Ajánlás.** - *A magasabb földrajzi szélességeken fekvő olyan területek esetében, amelyekről az* *illetékes hatóság úgy határozott, hogy a térkép földrajzi északhoz tájolása nem használható, ott a terület tengerszinthez viszonyított legkisebb biztonságos magasságát a használatos hálózati vonalak által alkotott négyzetekbe kell beírni.*

7.6.4 Ha a térkép nem a földrajzi északhoz tájolt, akkor ezt a tényt és az alkalmazott tájolást egyértelműen kötelező jelezni.

7.7 Mágneses eltérés

Ajánlás. - *Az azonos mértékű mágneses eltérések pontjait összekötő vonalakat (isogon) valamint az információ beszerzésének időpontját fel kell tüntetni.*

7.8 Irányok, útirányok és radiálok

7.8.1 A 7.8.2 pontban előírtak kivételével, az irányoknak, útirányoknak és radiáloknak mágneses irányoknak kell lenniük.

7.8.2 **Ajánlás.** - *Ha a magasabb földrajzi szélességű területek esetében az illetékes hatóság úgy határoz, hogy a mágneses Északra való iránymeghatározás nem megfelelő, akkor más alkalmas vonatkozatási alapot, például földrajzi Északot, vagy hálózati Északot kell alkalmazni.*

7.8.3 Ha az irányokat, útirányokat és radiálokat földrajzi Északhoz vagy hálózati Északhoz viszonyítják, ott ezt világosan jelezni kell. Ahol hálózati Északot alkalmaznak, ott ennek a hálózati vonatkoztatási hosszúsági körét azonosítani kell.

7.9 Légiforgalmi adatok

7.9.1 Repülőterek

A nemzetközi polgári repülés által használt minden olyan repülőteret fel kell tüntetni, amelyre műszeres megközelítés végrehajtható.

Megjegyzés. - Az egyéb repülőterek is ábrázolhatók.

7.9.2 Tiltott, korlátozott és veszélyes légterek

Az adott légtérréteget érintő tiltott, korlátozott és veszélyes légtereket, azonosító jelükkel és függőleges határértékeikkel együtt fel kell tüntetni.

7.9.3 Légiforgalmi szolgálatok rendszere

7.9.3.1 Ahol alkalmazható, ott fel kell tüntetni az adott területen kialakított légiforgalmi szolgálati rendszer összetevő elemeit.

7.9.3.1.1 Az alkotóelemek a következőket foglalják magukba:

1) a légiforgalmi szolgálati rendszerhez kapcsolódó rádió-navigációs berendezéseket, neveikkel, azonosítójukkal, frekvenciájukkal és fokokban, fokpercekben, fokmásodpercekben megadott földrajzi koordinátáikkal együtt;

2) DME berendezések vonatkozásában, kiegészítőleg, a DME adó antenna legközelebbi 30 méterre (100 láb) kerekített tengerszinthez viszonyított magasságát;

3) az összes kijelölt légtér feltüntetése, beleértve oldal és magassági határait és a megfelelő légtér-osztály azonosítókat;

4) útvonal repülés céljára biztosított minden ATS útvonalat és útvonal elnevezést, az előírt navigációs teljesítőképesség fajtáját (RNP), az útvonal minden egyes szakaszán mindkét irányban a legközelebbi fokra kerekített útirányt és, ahol alkalmazható, a forgalom áramlási irányát;

5) az ATS útvonalat meghatározó, rádió berendezés nélkül kijelölt minden mérvadó pontot és névkódjaikat, fokokban, fokpercekben, fokmásodpercekben megadott földrajzi koordinátáikkal együtt;

6) a VOR/DME berendezésekkel meghatározott területi navigációs útvonalakat kijelölő útvonal pontok esetében kiegészítésképp:

a) az útvonalat kijelölő VOR/DME berendezés azonosító jelét és rádió frekvenciáját;

b) a legközelebbi tized fokra kerekített irányt és a legközelebbi kéttized kilométerre (egytized tengeri mérföldre) kerekített távolságot az útvonalat kijelölő VOR/DME berendezéstől, ha az útvonal pont nem esik egybe a berendezés telepítési helyével;

7) az összes kötelező és nem-kötelező jelentőpont és az ATS-MET jelentőpont jelölését;

8) a fordulópontként, vagy jelentőpontként szolgáló mérvadó pontok közötti távolságot a legközelebbi tized kilométerre, vagy tengeri mérföldre kerekítve;

Megjegyzés. - A rádió berendezések közötti össz távolság is feltüntethető.

9) VOR berendezésekkel kijelölt útvonalszakaszokon az átkapcsolási pontokat, a navigációs berendezéstől mért és a legközelebbi kilométerre, vagy tengeri mérföldre kerekített távolságot is feltüntetve;

Megjegyzés. - Két rádió-navigációs berendezés között félúton, vagy két radiál metszésénél kialakított minden átkapcsolási pontot minden olyan útvonal szakasz esetében felesleges feltüntetni, amely útvonal iránya a két berendezés között változik, abban az esetben, ha ezen átkapcsolási pontok létezéséről általános nyilatkozatot tesznek közzé.

10) az ATS útvonalak igénybe vehető legalacsonyabb repülési magasságait és a legkisebb akadálymentes magasságait a legközelebbi magasabb 50 méterre, vagy 100 lábra felkerekítve (Lásd 11. Annex 2.22);

11) a kommunikációs létesítmények felsorolását a csatornáikkal és, ha alkalmazható, bejelentkezési címeikkel együtt;

12) a légvédelmi azonosító körzeteket (ADIZ) megfelelően azonosítva.

Megjegyzés: Az ADIZ eljárás a térkép jelmagyarázatában leírható.

7.9.4 Kiegészítő tájékoztatások

7.9.4.1 A közel körzeten belüli érkezési és kirepülési eljárások útvonalát és a kapcsolódó várakozási eljárásokat fel kell tüntetni kivéve, ha ezeket az ICAO Körzeti Térképen, az ICAO Műszeres Szabvány Kirepülési Eljárás Térképen (SID), vagy az ICAO Műszeres Szabvány Érkezési Eljárás Térképen (STAR) megadják.

1. Megjegyzés. - Lásd a 8., 9. és 10. Fejezetet az ezen térképekre vonatkozó előírásokat illetően.

2. Megjegyzés. - A kirepülési útvonalak rendszerint a futópálya végénél kezdődnek, míg az érkezési útvonalak rendszerint annál a pontnál végződnek, ahol a műszeres megközelítési eljárás kezdődik.

7.9.4.2 A magasságmérő beállítási körzeteket –ha van- fel kell tüntetni és azokat azonosítani kell.

8. FEJEZET - ICAO KÖRZETI TÉRKÉP

8.1 Rendeltetése

E térképen kell közölni a légjármű személyzetek részére a műszeres repülés következő szakaszainak végrehajtását megkönnyítő információkat:

a) az utazó repülési szakasz és a repülőtér megközelítési szakasz közötti átmenet;

b) a felszállás/megszakított megközelítés és az utazó repülési szakasz közötti átmenet; és

c) a bonyolult ATS útvonalakkal, vagy légtérszerkezettel rendelkező területeken áthaladó repülési szakasz.

Megjegyzés. - A 8.1 c) pontban leírt rendeltetési cél kielégíthető különálló térképpel, vagy egy, az ICAO Útvonal Térképen beszúrt betét térképpel is.

8.2 Alkalmazási előírások

8.2.1 Az ICAO Körzeti Térkép-et az 1.3.2 pontban előírt módon kell elkészíteni ott, ahol a légiforgalmi szolgálati útvonalak, vagy a helyzetjelentési követelmények bonyolultak és ez az ICAO Útvonal Térkép-en kielégítő módon nem ábrázolható.

8.2.2 Ha a légiforgalmi szolgálati útvonalak, vagy a helyzetjelentési követelmények az érkezésekre és a kirepülésekre eltérőek és az kielégítő láthatósággal egyetlen térképen nem ábrázolható, ott különálló térképet kell biztosítani.

Megjegyzés. - Bizonyos körülmények között szükségessé válhat ICAO Műszeres Szabvány Indulási Eljárási Térképet (SID) és ICAO Műszeres Szabvány Érkezési Térképet (STAR) biztosítani (lásd 9. és 10. Fejezetet).

8.3 Fedésterület és méretarány

8.3.1 Az egyes térképek fedésterülete legyen olyan, hogy a térkép ténylegesen ábrázolja az érkezési és indulási útvonalakat.

8.3.2 A térképet méretarányosan kell rajzolni, feltüntetve a mérő vonalat is.

8.4 Vetület

8.4.1 **Ajánlás.** - *Szögtartó vetületet kell alkalmazni, amelyen az egyenes vonal hozzávetőleg a nagykörrel azonos.*

8.4.2 A szélességi és hosszúsági köröket megfelelő térközönként fel kell tüntetni.

8.4.3 A fokbeosztás jelzéseit azonos térközönként kell a térkép határvonalán elhelyezni.

8.5 Azonosítás

Minden egyes térképlapot az ábrázolt légtérhez kapcsolódó értelmező névvel kell azonosítani.

Megjegyzés. - Ez a név lehet a légiforgalmi szolgálati központ neve, egy, a térkép fedésterületén belül elhelyezkedő város, vagy nagyváros neve, vagy annak a városnak a neve, amelyet a repülőtér kiszolgál. Ha a várost több repülőtér szolgálja ki, akkor annak a repülőtérnek a nevét is hozzá kell tenni, amelyre az eljárások felépülnek.

8.6 Kultúr környezet és terepszint

8.6.1 Az összes nyílt vízfelületet, a nagy tavak és folyók elnagyolt partvonalát fel kell tüntetni kivéve akkor, ha az a térkép rendeltetésével szorosabban összefüggő adatokkal ütközne.

8.6.2 **Ajánlás. -** *A jelentős terep sajátossággal rendelkező területeken a tartózkodási hely tudat fokozása céljából az elsődleges repülőtér szintjétől 300 m-el (1000 láb) magasabb domborzatot halvány szintvonallal, szintvonal értékekkel és a szintkülönbségeket barna színárnyalattal kell feltüntetni. A megfelelő magassági pontokat, beleértve az egyes szintvonal csoportokon belüli legmagasabb pont magasságát fekete színnel nyomtatva kell feltüntetni. A mérvadó akadályokat ugyancsak fel kell tüntetni.*

1. Megjegyzés - A színárnyalás kezdődhet az alap topográfiai térképen az elsődleges repülőtér szintjétől számított 300 m-t (1000 láb) meghaladó következő magasabb alkalmas szintvonal színárnyalásával.

2. Megjegyzés - A szintvonalak és domborzati jellemzők céljára 3. Függelék - Szín Útmutató-ban szerepel az előírt barna szín, amelyet a féltónusú szint árnyaláshoz alapul kell venni.

3. Megjegyzés - A megfelelő magasság pontok és mérvadó akadályok azok, amelyeket az eljárás specialisták biztosítanak.

8.7 Mágneses eltérés

A térkép fedésterületére vonatkozó átlagos mágneses eltéréseket a legközelebbi fokra kerekítve meg kell adni.

8.8 Irányok, útirányok és radiálok

8.8.1 A 8.8.2 pontban előírtakat kivételével, az irányoknak, útirányoknak és radiáloknak mágneses irányoknak kell lenniük.

8.8.2 **Ajánlás. -** *Ha a magasabb földrajzi szélességű területek esetében az illetékes hatóság úgy határoz, hogy a mágneses Északra való iránymeghatározás nem megfelelő, akkor más alkalmas vonatkozatási alapot, például földrajzi Északot, vagy hálózati Északot kell alkalmazni.*

8.8.3 Ha az irányokat, útirányokat és radiálokat földrajzi Északhoz vagy hálózati Északhoz viszonyítják, ott ezt világosan jelezni kell. Ahol hálózati Északot alkalmaznak, ott ennek a hálózati vonatkoztatási hosszúsági körét azonosítani kell.

8.9 Légiforgalmi adatok

8.9.1 Repülőterek

A közel körzeti útvonal vezetést befolyásoló összes repülőteret fel kell tüntetni. Ha szükséges, akkor fel kell tüntetni a futópályák elhelyezkedési rajzát is.

8.9.2 Tiltott, korlátozott és veszélyes légterek

A tiltott, korlátozott és veszélyes légtereket fel kell tüntetni, azonosító jelükkel és függőleges kiterjedtségi határaikkal együtt.

8.9.3 Területi legkisebb repülési magasságok

A szélességi és hosszúsági körök által alkotott négyzetekben fel kell tüntetni a terület tengerszinthez viszonyított legalacsonyabb repülési magasságát.

Megjegyzés. - A térkép választott méretarányának függvényében, a szélességi és hosszúsági körök által alkotott négyzetek rendszerint egész hosszúsági, illetve szélességi fokoknak feleljenek meg.

8.9.4 Légiforgalmi szolgálatok rendszere

8.9.4.1 Az adott területet érintő kialakított légiforgalmi szolgálati rendszer összetevő elemeit fel kell tüntetni.

8.9.4.1.1 Az alkotóelemek a következőket foglalják magukba

1) a légiforgalmi szolgálati rendszerhez kapcsolódó rádió-navigációs berendezéseket, neveikkel, azonosítójukkal, frekvenciájukkal és fokokban, fokpercekben és fok másodpercekben kifejezett földrajzi koordinátáikkal együtt;

2) DME berendezések vonatkozásában, kiegészítésképp, a DME adó antenna tengerszint feletti magasságát a legközelebbi 30 méterre (100 láb) kerekítve;

3) azokat a közel körzeti rádió-navigációs berendezéseket, amelyek az induló és az érkező forgalom számára és a várakozási eljárásokhoz szükségesek;

4) az összes kijelölt légtér oldal és magassági határait és a megfelelő légtér-osztály azonosítókat;

5) a várakozási eljárásokat és a közel körzeti útvonal rendszert az útvonal elnevezésekkel együtt, valamint az előírt légifolyosók és közel körzeti útvonalak egyes szakaszainak legközelebbi fokra kerekített útirányát;

6) a közel körzeti útvonalakat kijelölő rádió-navigációs berendezéssel nem jelölt összes mérvadó pontot névkódjukkal és fokokban, fokpercekben és fokmásodpercekben kifejezett földrajzi koordinátáikkal együtt;

7) a VOR/DME berendezésekkel meghatározott területi navigációs útvonalakat kijelölő útvonal pontok esetében kiegészítésképp:

a) a viszonyítás alapját adó VOR/DME berendezés azonosító jelét és rádió frekvenciáját;

b) a legközelebbi tized fokra kerekített irányt és a legközelebbi kéttized kilométerre (egytized tengeri mérföldre) kerekített távolságot a viszonyítási alapul szolgáló VOR/DME berendezéstől, ha az útvonal pont nem esik egybe a berendezés telepítési helyével;

8) az összes kötelező és nem-kötelező jelentőpontot;

9) a fordulópontként, vagy jelentőpontként szolgáló mérvadó pontok közötti, legközelebbi kilométerre, vagy tengeri mérföldre kerekített távolságot;

Megjegyzés. - A rádió berendezések közötti össz távolság is feltüntethető

10) VOR berendezésekkel kijelölt útvonalszakaszokon az átkapcsolási pontokat, a navigációs berendezésektől mért legközelebbi kilométerre, vagy tengeri mérföldre kerekített távolsággal együtt;

Megjegyzés. - Két rádió-navigációs berendezés között félúton, vagy két radiál metszésénél kialakított minden átkapcsolási pontot minden olyan útvonal szakasz esetében felesleges feltüntetni, amely útvonal *iránya a két berendezés között változik, abban az esetben, ha ezen átkapcsolási pontok létezéséről általános nyilatkozatot tesznek közzé.*

11) az ATS útvonalak legalacsonyabb repülési magasságait és a legkisebb akadálymentes magasságait a legközelebbi magasabb 50 méterre, vagy 100 lábra kerekítve (lásd a 11. Annex 2.22 pontját).

12) a megállapított legkisebb vektorálási magasságokat a legközelebbi magasabb 50 méterre, vagy 100 lábra kerekítve és egyértelműen azonosítva;

1. Megjegyzés. - Ha a közzétett szabvány érkezési, vagy indulási útvonalakon a légi-járművek mérvadó pontokra/ról való rá-, illetve elvezetésére, avagy megközelítés folyamán a legkisebb szektormagasság alá süllyedéshez az engedély kiadásra ATS ellenőrző rendszert alkalmaznak, akkor a vonatkozó eljárás az ICAO Körzeti Térkép-re rajzolhatók feltéve, hogy ez túlzott zsúfoltságot nem okoz.

2. Megjegyzés. - Ha túlzott zsúfoltság keletkezne, akkor ICAO- ATC Ellenőrző Legkisebb Magasság Térkép adható ki (lásd a 21. Fejezetben), amely esetben a 8.9.4.1.1, 12) pontban említett elemeket nem kell az ICAO Körzeti Térkép-en megismételni.

13) a területen alkalmazandó sebesség és repülési szint/tengerszint feletti magasság korlátozásokat, ahol ilyent meghatároztak;

14) a kommunikációs létesítményeket csatornáik és, ha alkalmazható, bejelentkezési címeik felsorolásával együtt.

9. FEJEZET - ICAO MŰSZERES SZABVÁNY INDULÁSI ELJÁRÁS TÉRKÉP (SID)

9.1 Rendeltetése

E térképen kell közölni a légjármű személyzet részére azokat az információkat, amelyek alapján követni tudják a szabvány műszeres indulási útvonalakat a felszállás szakaszától az utazó repülési szakaszig.

1. Megjegyzés. - A szabvány indulási útvonalak azonosítására vonatkozó előírásokat a 11. Annex 3. Függeléke; az ilyen útvonalak kialakítására vonatkozó útmutató anyagot a Légiforgalmi Szolgálatok Tervezési Kézikönyve (Doc 9426) tartalmazza.

2. Megjegyzés. - Az akadálymentességi követelményeket és a közzéteendő legszükségesebb információkkal kapcsolatos részleteket meghatározó előírásokat a PANS-OPS II. Kötet II. Rész (Doc 8168) tartalmazza.

9.2 Alkalmazás

Az ICAO Műszeres Szabvány Indulási Eljárás Térképet (SID) ki kell adni, ha van kialakított szabvány műszeres indulási eljárás és az kielégítő láthatósággal az ICAO Körzeti Térkép-en nem ábrázolható.

9.3 Fedésterület és méretarány

9.3.1 Az egyes térképek fedésterülete legyen olyan, hogy a térkép ténylegesen ábrázolja azt a pontot, ahol az indulási útvonal kezdődik és azt a kijelölt pontot is, ahol egy kijelölt légiforgalmi szolgálati útvonalon az utazó repülés szakasza megkezdhető.

Megjegyzés. - Az indulási útvonal rendszerint a futópálya végénél kezdődik.

9.3.2 **Ajánlás. -** *A térkép legyen méretarányos.*

9.3.3 Ha a térkép méretarányosan készül, akkor a lépték vonalat is fel kell tüntetni.

9.3.4 Ha a térkép nem méretarányosan készül, rajta "NEM MÉRETARÁNYOS" feliratot kell elhelyezni és a méretarány váltási jelzést kell alkalmazni az útvonalakon és a térkép egyéb olyan részletein, amelyek túl nagyok ahhoz, hogy méretarányosan legyenek ábrázolhatók.

9.4 Vetület

9.4.1 **Ajánlás. -** Szögtartó vetületet kell alkalmazni, amelyen az egyenes vonal hozzávetőleg a nagykörrel azonos.

9.4.2 **Ajánlás.**- *Ha a térkép méretarányosan készül, akkor a szélességi és hosszúsági köröket megfelelő* *térközönként fel kell tüntetni.*

9.4.3 A fokbeosztás jelzéseit azonos térközönként kell a térkép szélvonalai mentén elhelyezni.

9.5 Azonosítás

A térkép azonosítása a következőkből álljon: a repülőtér által kiszolgált városnak, vagy körzetnek a neve, a repülőtér nevével egyetemben és a Légi-navigációs Szolgálatok Eljárásai - Légi-jármű Üzemelés (PANS-OPS, Doc 8168) II. Kötet I. Rész, 3. Szakasz 5. Fejezetével egyezésben kialakított műszeres szabvány indulási útvonal(ak) megnevezése.

Megjegyzés. - A műszeres szabvány indulási útvonal(ak) nevét az eljárás specialisták adják.

9.6 Kultúr környezet és domborzat

9.6.1 A méretarányosan rajzolt térkép esetében az összes nyílt vízfelületet, a nagy tavak és folyók elnagyolt partvonalát fel kell tüntetni kivéve akkor, ha az a térkép rendeltetésével szorosabban összefüggő adattal ütközne.

9.6.2 **Ajánlás.** - *A jelentős domborzati sajátossággal rendelkező területeken a tartózkodási hely tudat fokozása céljából a térképet méretarányosan kell készíteni és a repülőtér szintjétől 300 m-el (1000 láb) magasabb domborzatot halvány szintvonallal, szintvonal értékekkel és a szintkülönbségeket barna színárnyalattal kell feltüntetni. A megfelelő magassági pontokat, beleértve az egyes szintvonal csoportokon belüli legmagasabb pont magasságát fekete színnel nyomtatva kell feltüntetni. Az akadályokat ugyancsak fel kell tüntetni.*

1. Megjegyzés - Az alap topográfiai térképen a színárnyalás kezdhető a repülőtér szintjétől számított 300 m-t (1000 láb) meghaladó következő magasabb alkalmas szintvonal színárnyalásával.

2. Megjegyzés - A szintvonalak és domborzati jellemzők céljára 3. Függelék - Szín Útmutató-ban szerepel az az előírt barna szín, amelyet a féltónusú szint árnyaláshoz alapul kell venni.

3. Melléklet - A megfelelő magasság pontok és mérvadó akadályok azok, amelyeket az eljárás specialisták biztosítanak.

9.7 Mágneses eltérés

A mágneses irányok, útirányok és radiálok meghatározásához alkalmazandó legközelebbi fokra kerekített mágneses eltérést fel kell tüntetni.

9.8 Irányok, útirányok és radiálok

9.8.1 Az irányoknak, útirányoknak és radiáloknak mágneses irányoknak kell lenniük, kivéve a 9.8.2 pontban előírtakat.

Megjegyzés. - A térképen feltüntethető egy erre utaló megjegyzés.

9.8.2 **Ajánlás.** - *Ha a magasabb földrajzi szélességű területek esetében az illetékes hatóság döntése szerint a mágneses Északhoz viszonyított iránymeghatározás nem megfelelő, más alkalmas vonatkozatási alapot, például földrajzi Északot, vagy hálózati Északot kell alkalmazni.*

9.8.3 Ha az irányokat, útirányokat és radiálokat földrajzi Északhoz, vagy hálózati Északhoz viszonyítva teszik közzé, ott ezt világosan jelezni kell. Ahol hálózati Északot alkalmaznak, ott ennek a hálózati vonatkoztatási hosszúsági körét azonosítani kell.

9.9 Légiforgalmi adatok

9.9.1 Repülőterek

9.9.1.1 Az indulási repülőteret futópályáinak elhelyezkedését szemléltető jelzésekkel kell ábrázolni.

9.9.1.2 Minden egyes olyan repülőteret fel kell tüntetni és azonosítani kell, amelyek a kijelölt szabvány műszeres indulási eljárások útvonalait befolyásolják. Ahol alkalmazható, ott a futópályák elhelyezkedését szemléltető jelzéseket kell alkalmazni.

9.9.2 Tiltott, korlátozott és veszélyes légterek

Az összes olyan tiltott, korlátozott és veszélyes légteret, amely befolyásolhatja az eljárások végrehajtását, fel kell tüntetni, azonosítójukkal és magassági határaikkal együtt.

9.9.3 Legkisebb szektor magasság

9.9.3.1 Fel kell tüntetni az eljárással kapcsolatos navigációs berendezésre alapozott, legalacsonyabb megállapított szektor magasságot, világosan jelezve, hogy az melyik szektorra vonatkozik.

9.9.3.2 Ha a legkisebb szektor magasságot nem határozták meg, akkor a térképet méretarányosan kell megrajzolni és a hosszúsági és szélességi körök által határolt négyzetekben fel kell tüntetni a területi legkisebb magasságokat. A területi legkisebb magasságokat a térkép azon részein ugyancsak fel kell tüntetni, amely területeket a legkisebb szektor magasságok nem fednek le.

Megjegyzés. - A térkép választott méretarányának függvényében, a szélességi és hosszúsági körök által alkotott négyzetek rendszerint fél hosszúsági, illetve szélességi fokoknak feleljenek meg.

9.9.4 Légiforgalmi szolgálatok rendszere

9.9.4.1 A vonatkozó légiforgalmi szolgálati rendszer összetevő elemeit fel kell tüntetni.

9.9.4.1.1 Ezek az összetevő elemek foglalják magukba a következőket:

1) minden szabvány műszeres indulási útvonal grafikus ábrázolása, beleértve a:

a) az útvonal elnevezését;

b) az útvonalat kijelölő fontos pontokat;

c) az útvonalak egyes szakaszain a legközelebbi fokra kerekített útirányokat, vagy radiálokat;

d) a fontos pontok közötti legközelebbi egész kilométer, vagy tengeri mérföld értékre kerekített távolságokat;

e) az útvonalak, vagy az útvonal szakaszok a legközelebbi magasabb 50 méterre, vagy 100 lábra kerekített tengerszint feletti legkisebb repülési magasságait, az eljárás által előírt magasságokat, illetve a repülési szint korlátozásokat, ahol ilyen létezik;

f) ha a térkép méretarányos és az indulás során irányvezetés biztosított, a legközelebbi magasabb 50 méterre, vagy 100 lábra kerekített, egyértelműen azonosított, közzétett legkisebb vektorálási magasságot;

1. Megjegyzés. - Ha a közzétett szabvány indulási útvonalon a légi-járművek mérvadó pontokra/ról való rá-, illetve elvezetésére ATS ellenőrző rendszert alkalmaznak, akkor a vonatkozó eljárás az ICAO Szabvány Műszeres Indulási Eljárás Térkép (SID)-re rajzolható, feltéve, hogy ez túlzott zsúfoltságot nem okoz.

2. Megjegyzés. - Ha túlzott zsúfoltság keletkezne, akkor ICAO – ATC Ellenőrző Legkisebb Magasság Térkép adható ki (lásd a 21. Fejezetben), amely esetben a 9.9.4.1.1, 1) f) pontban említett elemeket nem kell az ICAO Szabvány Műszeres Indulási Eljárás Térkép (SID)-en megismételni.

2) az útvonalakhoz kapcsolódó rádió-navigációs berendezéseket, beleértve:

a) nyílt nyelvű nevüket;

b) azonosító jeleiket;

c) frekvenciájukat;

d) fokokban, fokpercekben és fokmásodpercekben kifejezett földrajzi koordinátáikat;

e) DME berendezésnél a csatorna számot és a DME berendezés adó antennájának tengerszinthez viszonyított magasságát a legközelebbi 30 méterre (100 láb) kerekítve;

3) rádió berendezés telepítési helyével ki-nem-jelölt minden mérvadó pontot névkódjával és fokokban, fokpercekben és fok másodpercekben kifejezett földrajzi koordinátáival egyetemben, továbbá a legközelebbi tized fokra kerekített irányát és a legközelebbi kéttized kilométerre (egytized tengeri mérföldre) kerekített távolságát a viszonyítási alapul szolgáló rádió berendezéstől;

4) az alkalmazható várakozási eljárásokat;

5) a legközelebbi magasabb 300 méterre, vagy 1000 lábra kerekített átváltási magasságot/tengerszint feletti magasságot;

6) az akadály felmérő síkon (OIS) túlnyúló közeli akadályok helyzetét és magasságát. Minden esetben egy kiegészítő megjegyzést kell közzétenni, ha a közeli akadályok túlnyúlnak az akadály felmérő síkon (OIS), amelyeket azonban a közzétett eljárás tervezési gradiensénél nem vettek figyelembe;

Megjegyzés. A PANS-OPS II. Kötetével egyezésben, a közeli akadályokra vonatkozó adatokat az eljárás specialisták adják meg.

7) a területi sebesség korlátozásokat, ahol ilyent meghatároztak;

8) az összes kötelező és kérésre alkalmazandó jelentőpontot;

9) a rádióösszeköttetési eljárásokat, beleértve:

a) az ATS egységek hívójeleit;

b) frekvenciáját;

c) a válasz jeladó kód beállítást, ahol szükséges.

9.9.4.2 **Ajánlás.** - *A műszeres szabvány indulási útvonal (SID) szöveges leírását és a vonatkozó rádióösszeköttetés megszakadása esetén alkalmazandó eljárások leírását meg kell adni és amikor csak lehetséges, ezeket a térképen, vagy a térképet magába foglaló oldalon kell feltüntetni.*

9.9.4.3 Légiforgalmi adatbázis követelmények

A navigációs adatbázis kódolást támogató megfelelő adatokat a Légi-navigációs Szolgálatok Eljárásai – Légi-jármű Üzemeltetés (PANS-OPS, DOC 8168), II. Kötet, III. Rész, 5. Szakasz, 2. Fejezet, 2.1 pontja szerint kell közzétenni, vagy a térkép hátoldalán, vagy egy megfelelő hivatkozásokkal ellátott különálló lapon.

Megjegyzés.- A megfelelő adatok azok, amelyeket az eljárás specialisták biztosítanak.

10. FEJEZET - ICAO MŰSZERES SZABVÁNY ÉRKEZÉSI ELJÁRÁS TÉRKÉP (STAR)

10.1 Rendeltetése

E térképen kell közölni a légjármű személyzet részére azokat az információkat, amelyek alapján követni tudja a szabvány műszeres érkezési útvonalakat az útvonal repülési szakasztól a megközelítési szakaszig.

1. Megjegyzés. - A "szabvány műszeres érkezési útvonal" fogalom értelme magában foglalja a "süllyedés profil" és a "folyamatos süllyedéssel végzett megközelítés" valamint egyéb, nem szabványos eljárás leírásokat is. Szabvány süllyedési profil esetében az oldalnézeti ábrázolás nem szükséges.

2. Megjegyzés. - A szabvány érkezési útvonalak azonosítására vonatkozó előírásokat a 11. Annex 3. Függeléke; míg az ilyen útvonalak kialakítására vonatkozó útmutató anyagot a Légiforgalmi Szolgálatok Tervezési Kézikönyve (Doc 9426) tartalmazza

10.2 Alkalmazási rendelkezések

Az ICAO Műszeres Szabvány Érkezési Eljárás Térkép-et (STAR) mindig ki kell adni, ha van kialakított szabvány műszeres megközelítési eljárás és az kielégítő láthatósággal az ICAO Körzeti Térkép-en nem ábrázolható.

10.3 Fedésterület és méretarány

10.3.1 Az egyes térképek fedésterülete legyen olyan, hogy a térkép tartalmazza azokat a pontokat, amelyeknél az utazó szakasz végződik és azokat, amelyeknél a megközelítés szakasza kezdődik.

10.3.2 **Ajánlás**. - *A térkép legyen méretarányos.*

10.3.3 Ha a térkép méretarányosan készül, akkor a lépték vonalat is fel kell tüntetni.

10.3.4 Ha a térkép nem méretarányosan készül, rajta "NEM MÉRETARÁNYOS" feliratot kell elhelyezni és a méretarány váltási jelzést kell alkalmazni az útvonalakon és a térkép egyéb olyan részletein, amelyek túl nagyok ahhoz, hogy méretarányosan legyenek ábrázolhatók.

10.4 Vetület

10.4.1 **Ajánlás. -** Szögtartó vetületet kell alkalmazni, amelyen az egyenes vonal hozzávetőleg a nagykörrel azonos.

10.4.2 **Ajánlás. -** Ha a térkép méretarányosan készül, akkor a szélességi és hosszúsági köröket megfelelő térközönként fel kell tüntetni.

10.4.3 A fokbeosztás jelzéseit azonos térközönként kell a térkép oldalvonalán elhelyezni.

10.5 Azonosítás

A térkép azonosítása a következőkből álljon: a repülőtér által kiszolgált városnak, vagy körzetnek a neve, a repülőtér nevével egyetemben és a Légi-navigációs Szolgálatok Eljárásai - Légi-jármű Üzemelés (PANS-OPS, Doc 8168) II. Kötet I. Rész, 4. Szakasz, 2. Fejezetével egyezésben kialakított műszeres szabvány érkezési útvonal(ak) megnevezése.

Megjegyzés. - A műszeres szabvány érkezési útvonal(ak) nevét az eljárás specialisták adják.

10.6 Kultúr környezet és tereprajz

10.6.1 Ha a térképet méretarányosan rajzolták, akkor az összes nyílt vízfelületet, a nagy tavak és folyók elnagyolt partvonalát fel kell tüntetni kivéve akkor, ha az a térkép rendeltetésével szorosabban összefüggő adattal ütközne.

10.6.2 **Ajánlás**. - *A jelentős szin különbséggel bíró területeken a tartózkodási hely tudat fokozása céljából a térképet méretarányosan kell készíteni és a repülőtér szintjétől 300 m-el (1000 láb) magasabb domborzatot halvány szintvonallal, szintvonal értékekkel és a szintkülönbségeket barna színárnyalattal kell feltüntetni. A megfelelő magassági pontokat, beleértve az egyes szintvonal csoportokon belüli legmagasabb pont magasságát fekete színnel nyomtatva kell feltüntetni. Az akadályokat ugyancsak fel kell tüntetni.*

1. Megjegyzés - - Az alap topográfiai térképen a színárnyalás kezdődhet a repülőtér szintjétől számított 300 m-t (1000 láb) meghaladó következő magasabb alkalmas szintvonal színárnyalásával.

2. Megjegyzés - A szintvonalak és domborzati jellemzők céljára 3. Függelék - Szín Útmutató-ban szerepel az az előírt barna szín, amelyet a féltónusú szint árnyaláshoz alapul kell venni.

3. Melléklet - A megfelelő magasság pontok és mérvadó akadályok azok, amelyeket az eljárás specialisták biztosítanak

10.7 Mágneses eltérés

A mágneses irányok, útirányok és radiálok meghatározásához alkalmazandó legközelebbi fokra kerekített mágneses eltérést fel kell tüntetni.

10.8 Irányok, útirányok és radiálok

10.8.1 Az irányoknak, útirányoknak és radiáloknak mágneses irányoknak kell lenniük, kivéve a 10.8.2 pontban előírtakat.

Megjegyzés. - A térképen feltüntethető egy erre utaló megjegyzés.

10.8.2 **Ajánlás. -** *Ha a magasabb földrajzi szélességű területek esetében az illetékes hatóság döntése szerint a mágneses Északhoz viszonyított iránymeghatározás nem megfelelő, más alkalmas vonatkozatási alapot, például földrajzi Északot, vagy hálózati Északot kell alkalmazni.*

10.8.3 Ha az irányokat, útirányokat és radiálokat földrajzi Északhoz, vagy hálózati Északhoz viszonyítva teszik közzé, ott ezt világosan jelezni kell. Ahol hálózati Északot alkalmaznak, ott ennek a hálózati vonatkoztatási hosszúsági körét azonosítani kell.

10.9 Légiforgalmi adatok

10.9.1 Repülőterek

10.9.1.1 A leszállás repülőterét futópályáinak elhelyezkedését szemléltető jelzésekkel kell ábrázolni.

10.9.1.2 A kijelölt szabvány műszeres érkezési eljárások útvonalait befolyásoló minden egyes repülőteret fel kell tüntetni és azonosítani kell. Ahol alkalmazható, ott a futópályák elhelyezkedését szemléltető jelzéseket kell alkalmazni.

10.9.2 Tiltott, korlátozott és veszélyes légterek

Az eljárások végrehajtását esetleg befolyásoló minden tiltott, korlátozott és veszélyes légteret fel kell tüntetni, azonosítójukkal és magassági határaikkal együtt.

10.9.3 Legkisebb szektor magasság

10.9.3.1 A szektor megállapított legkisebb magasságot -ha meghatározták-, fel kell tüntetni, világosan jelezve, hogy melyik szektorra vonatkozik.

10.9.3.2 Ha a legkisebb szektor magasságot nem határozták meg, akkor a térképet méretarányosan kell megrajzolni és a hosszúsági és szélességi körök által határolt négyzetekben fel kell tüntetni a területi legkisebb magasságokat. A területi legkisebb repülési magasságokat a térkép azon részein ugyancsak fel kell tüntetni, amelyeket a legkisebb szektorok magasságok nem fednek le.

Megjegyzés. - A térkép választott méretarányának függvényében, a szélességi és hosszúsági körök által alkotott négyzetek rendszerint fél hosszúsági, illetve szélességi fokoknak feleljenek meg.

10.9.4 Légiforgalmi szolgálatok rendszere

10.9.4.1 A vonatkozó légiforgalmi szolgálati rendszer összetevő elemeit fel kell tüntetni.

10.9.4.1.1 Ezek az összetevő elemek foglalják magukba a következőket:

1) minden szabvány műszeres érkezési útvonal grafikus ábrázolása, beleértve:

a) az útvonal elnevezését;

b) az útvonalat kijelölő fontos pontokat;

c) az útvonal szakaszainak legközelebbi egész fokértékre kerekített útirányait, vagy radiáljait;

d) a fontos pontok közötti legközelebbi egész kilométer érékre, vagy tengeri mérföldre kerekített távolságokat;

e) az útvonalak, vagy az útvonal szakaszok legközelebbi magasabb 50 méterre, vagy 100 lábra kerekített legkisebb akadálymentes magasságait és az eljárás által előírt magasságokat, illetve a repülési szintkorlátozásokat, ahol ilyen létezik;

f) ha a térkép méretarányos és az érkezés során irányvezetés biztosított, a legközelebbi magasabb 50 méterre, vagy 100 lábra kerekített, egyértelműen azonosított, közzétett legkisebb vektorálási magasságot;

1. Megjegyzés. - Ha a közzétett szabvány érkezési útvonalon a légi-járművek mérvadó pontokra/ról való rá-, illetve elvezetésére, vagy az érkezés során a legkisebb szektor magasság alá süllyedés engedélyének kiadásához ATS ellenőrző rendszert alkalmaznak, akkor a vonatkozó eljárás az ICAO Szabvány Műszeres Érkezési Eljárás Térkép (STAR)-ra rajzolható, feltéve, hogy ez túlzott zsúfoltságot nem okoz.

2. Megjegyzés. - Ha túlzott zsúfoltság keletkezne, akkor ICAO – ATS Ellenőrző Legkisebb Magasság Térkép adható ki (lásd a 21. Fejezetben), amely esetben a 10.9.4.1.1, 1) f) pontban említett elemeket nem kell az ICAO Szabvány Műszeres Érkezési Eljárás Térkép (STAR)-on megismételni.

2) az útvonalakhoz kapcsolódó rádió-navigációs berendezéseket, beleértve:

a) nyílt nyelvű elnevezéseiket;

b) azonosító jeleiket;

c) frekvenciájukat;

d) földrajzi fokokban, fokpercekben és fokmásodpercben kifejezett koordinátáikat;

e) DME berendezésnél a csatorna számot és a DME berendezés adó antennájának tengerszinthez viszonyított magasságát a legközelebbi 30 méterre (100 láb) kerekítve;

3) rádió berendezés telepítési helyével ki-nem-jelölt minden mérvadó pontot névkódjával és fokokban, fokpercekben és fok másodpercekben kifejezett földrajzi koordinátáival egyetemben, továbbá a legközelebbi tized fokra kerekített irányát és a legközelebbi kéttized kilométerre (egytized tengeri mérföldre) kerekített távolságát a viszonyítási alapul szolgáló rádió berendezéstől;

4) az alkalmazható várakozási eljárásokat;
5) a legközelebbi magasabb 300 méterre, vagy 1000 lábra kerekített átváltási magasságot/tengerszint feletti magasságot;
6) a területi sebesség korlátozásokat, ahol ilyent meghatároztak;
7) az összes kötelező és a kérésre alkalmazandó jelentőpontot;
8) a rádióösszeköttetési eljárásokat, beleértve:
a) az ATS egységek hívójeleit;
b) frekvenciáját;
c) a válasz jeladó kód beállítást, ahol szükséges.
10.9.4.2 **Ajánlás.** - *A műszeres szabvány érkezési útvonal (STAR) szöveges leírását és a vonatkozó rádióösszeköttetés megszakadása esetén alkalmazandó eljárások leírását meg kell adni, és amikor csak lehetséges, ezeket a térképen, vagy a térképet magába foglaló oldalon kell feltüntetni.*
10.9.4.3 Légiforgalmi adatbázis követelmények
A navigációs adatbázis kódolást támogató megfelelő adatokat a Légi-navigációs Szolgálatok Eljárásai – Légi-jármű Üzemeltetés (PANS-OPS, DOC 8168), II. Kötet, III. Rész, 5. Szakasz, 2. Fejezet, 2.2 pontja szerint kell közzétenni, vagy a térkép hátoldalán, vagy egy megfelelő hivatkozásokkal ellátott különálló lapon.
Megjegyzés.- A megfelelő adatok azok, amelyeket az eljárás specialisták biztosítanak.

11. FEJEZET - ICAO MŰSZERES MEGKÖZELÍTÉSI TÉRKÉP

11.1 Rendeltetése
E térképen kell közölni a légjármű személyzet részére azt az információt, amely lehetővé teszi számukra a jóváhagyott műszeres megközelítési eljárás végrehajtását arra a futópályára, amelyre a leszállást végre kívánják hajtani, beleértve a megszakított megközelítési eljárás végrehajtását és, ahol alkalmazható, a kapcsolódó várakozási eljárásokat is.
Megjegyzés. - A műszeres megközelítési eljárások kialakítására és a kapcsolódó tengerszint/terep szint feletti magasságok felbontási nagyságrendjére vonatkozó részletes előírásokat a Légi-navigációs Szolgálatok Eljárásai - Légi-jármű üzemeltetés (PANS-OPS, Doc 8168) tartalmazza.

11.2 Alkalmazási rendelkezések
11.2.1 Az ICAO Műszeres Megközelítési Térképet, a nemzetközi polgári repülés által használt minden olyan repülőtérről ki kell adni, amelyre az illető állam műszeres megközelítési eljárásokat alakított ki.
11.2.2 Az állam által kialakított minden precíziós műszeres megközelítési eljárásra általában különálló műszeres megközelítési térképet kell biztosítani.
11.2.3 Általában külön műszeres megközelítési térképet kell biztosítani az állam által kialakított minden nem-precíziós műszeres megközelítési eljárásra.
Megjegyzés. - Egyetlen lapra nyomtatott precíziós, vagy nem-precíziós megközelítési térkép is kiadható, amikor több olyan megközelítési eljárást tüntetnek fel, amelyek közbeeső megközelítési, befejező megközelítési és a megszakított megközelítési eljárási szakaszaik azonosak.
11.2.4 Több térképlapot kell készíteni akkor, ha a műszeres megközelítési eljárás befejező szakaszán kívül, a különféle légi-jármű kategóriákra vonatkozó útirányok, az idő, vagy a tengerszint feletti magasság értékek eltérőek és ezek egyetlen térképlapon való felsorolása zavart, vagy tévesztést idézhet elő.
Megjegyzés. - A légi-jármű kategóriákat illetően lásd a Légi-navigációs Szolgálatok Eljárásai – Légi-jármű üzemeltetés (PANS-OPS, Doc 8168), II. Kötet, I. Rész, 4. Szakasz, 9. Fejezetét.
11.2.5 Az "ICAO Műszeres Megközelítési Térkép"-et kötelező helyesbíteni, amikor a biztonságos üzemeltetéshez szükséges nélkülözhetetlen adatok elavulttá válnak.

11.3 Fedésterület és méretarány

11.3.1 Az egyes térképek fedésterülete kellően nagy legyen, hogy a műszeres megközelítési eljárás minden szakasza és az olyan kiegészítő területek ábrázolhatók legyenek, amelyek a tervezett megközelítési fajta esetében szükségesek lehetnek.

11.3.2 A választott méretarány optimális olvashatóságot biztosítson:

1) a térképen ábrázolt eljárás; és

2) a lapméret

figyelembevételével.

11.3.3 Méretarány jelzést biztosítani kell.

11.3.3.1 Ha megvalósítható, a térképen egy 20 km (10 tengeri mérföld) sugarú kört kell ábrázolni, amelynek középpontja vagy a repülőtéren, vagy annak szomszédságában telepített DME berendezés, vagy -ha alkalmas DME berendezés nincs- a repülőtér vonatkoztatási pontja; a sugár méretét a köríven ki kell írni.

11.3.3.2 **Ajánlás. -** *Közvetlenül a metszeti ábrázolás alatt, távolság mérővonal feltüntetése szükséges.*

11.4 Formátum

Ajánlás. *- A lapméret 210 × 148 mm (8,27 × 5,82 hüvelyk) legyen.*

11.5 Vetület

11.5.1 Szögtartó vetületet kell alkalmazni, amelyen az egyenes vonal hozzávetőleg a nagykörrel azonos.

11.5.2 **Ajánlás. -** *A fokbeosztás jelzéseit azonos térközönként kell a térkép oldalvonalán elhelyezni.*

11.6 Azonosítás

11.6.1 A térkép azonosítása a következőkből álljon: a repülőtér által kiszolgált városnak, vagy körzetnek a neve, a repülőtér neve és a Légi-navigációs Szolgálatok Eljárásai – Légi-jármű Üzemelés (PANS-OPS, Doc 8168) II. Kötet I. Rész, 4. Szakasz, 1. Fejezetével egyezésben kialakított műszeres megközelítési eljárás megnevezése.

Megjegyzés. – A műszeres megközelítési eljárás nevét az eljárás specialisták adják.

11.7 Kultúr környezet és domborzat

11.7.1 A szabvány műszeres megközelítési eljárás biztonságos végrehajtásához tartozó nélkülözhetetlen összes topográfiai információt fel kell tüntetni, ideértve a megszakított megközelítési eljárásokat, a kapcsolódó várakozási eljárásokat és a látással végzett manőverezést (körözést) is, ahol ilyent kialakítottak. Az ilyen terepjellegzetességeket csak akkor kell elnevezésükkel megjelölni, ha az eljárások érthetőségének növeléséhez ez szükséges. Legalább a nagyobb földterületeket valamint lényegesebb folyók és tavak körvonalát kell jelezni.

11.7.2 A domborzatot a terület sajátos magassági jellegzetességeinek legjobban megfelelő módon kell ábrázolni. Olyan térségekben, ahol a térkép fedésterületén belül a repülőtér szintjétől számított domborzat magassága 1200 m-nél (4000 láb) magasabb, vagy a repülőtér vonatkozási pontjától mért 11 km-en (6 tengeri mérföld) belül 600 m-nél (2000 láb) magasabb, avagy ha a befejező megközelítés, vagy a megszakított megközelítés gradiense az optimumnál meredekebb a domborzatnak betudhatóan, akkor a repülőtér szintjétől 150 m-el (500 láb) magasabb minden domborzatot halvány szintvonallal, szintvonal értékekkel és a szintkülönbségeket barna színárnyalattal kell feltüntetni. A megfelelő magassági pontokat, beleértve az egyes szintvonal csoportokon belüli legmagasabb pont magasságát fekete színnel nyomtatva kell feltüntetni.

1. Megjegyzés - A színárnyalás kezdődhet az alap topográfiai térképen feltüntetett és a repülőtér szintjétől számított 150 m-t (500 láb) meghaladó következő magasabb alkalmas szintvonal színárnyalásával.

2. Megjegyzés - A szintvonalak és domborzati jellemzők céljára a 3. Függelék - Szín Útmutató-ban szerepel az az előírt barna szín, amelyet a féltónusú szint árnyaláshoz alapul kell venni.

3. Megjegyzés - A megfelelő magasság pontok és mérvadó akadályok azok, amelyeket az eljárás specialisták biztosítanak.
11.7.3 **Ajánlás. -** *Az olyan területeken, ahol a domborzat alacsonyabb a 11.7.2-ben meghatározottaktól, ott a repülőtér szintjétől 150 m-el (500 láb) magasabb minden domborzatot halvány szintvonallal, szintvonal értékekkel és a szintkülönbségeket barna színárnyalattal kell feltüntetni. A megfelelő magassági pontokat, beleértve az egyes szintvonal csoportokon belüli legmagasabb pont magasságát fekete színnel nyomtatva kell feltüntetni.*
1. Megjegyzés - A színárnyalás kezdődhet az alap topográfiai térképen feltüntetett és a repülőtér szintjétől számított 150 m-t (500 láb) meghaladó következő magasabb alkalmas szintvonal színárnyalásával.
2. Megjegyzés - A szintvonalak és domborzati jellemzők céljára 3. Függelék - Szín Útmutató-ban szerepel az az előírt barna szín, amelyet a féltónusú szint árnyaláshoz alapul kell venni.
3. Megjegyzés - A megfelelő magasság pontok és mérvadó akadályok azok, amelyeket az eljárás specialisták biztosítanak.

11.8 Mágneses eltérés

11.8.1 **Ajánlás. -** *A mágneses eltérést fel kell tüntetni.*
11.8.2 Ha a legközelebbi egész fokra kerekített mágneses eltérést feltüntetik, akkor annak értéke egyezzen meg a mágneses irányok, útirányok és radiálok meghatározásához alkalmazott értékével.

11.9 Irányok, útirányok és radiálok

11.9.1 Az irányoknak, útirányoknak és radiáloknak mágneses irányoknak kell lenniük, kivéve a 11.9.2 pontban előírtakat.
Megjegyzés. - A térképen feltüntethető egy erre utaló megjegyzés.
11.9.2 **Ajánlás.** - *Ha a magasabb földrajzi szélességű területek esetében az illetékes hatóság döntése szerint a mágneses Északhoz viszonyított iránymeghatározás nem megfelelő más alkalmas vonatkozatási alapot, például földrajzi Északot, vagy hálózati Északot kell alkalmazni.*
11.9.3 Ha az irányokat, útirányokat és radiálokat földrajzi Északhoz, vagy hálózati Északhoz viszonyítva teszik közzé, ott ezt világosan jelezni kell. Ahol hálózati Északot alkalmaznak, ott ennek a hálózati vonatkoztatási hosszúsági körét azonosítani kell.

11.10 Légiforgalmi adatok

11.10.1 Repülőterek

11.10.1.1 A levegőből jellegzetes rajzolatot mutató minden repülőteret megfelelő jelöléssel kell feltüntetni a térképen. Az üzemen kívül helyezett repülőtereket "üzemen kívül"- ként kell megjelölni.
11.10.1.2 A futópályák elhelyezkedését a repülőtér egyértelmű szemléltetéséhez elégséges nagyságú méretben kell feltüntetni:
1) arra a repülőtérre, amelyre az eljárás alapszik;
2) az olyan repülőterekre, amelyek érintik a forgalmi kört, vagy úgy helyezkednek el, hogy kedvezőtlen időjárási körülmények esetén összetéveszthetők a tervezett leszállás repülőterével.
11.10.1.3 A repülőtér legközelebbi méterre, vagy lábra kerekített tengerszint feletti magasságát a térképen szembeötlő helyen kell feltüntetni.
11.10.1.4 A térképen fel kell tüntetni a küszöb tengerszinthez viszonyított legközelebbi méterre, vagy lábra kerekített magasságát, vagy ahol alkalmazható, a földet érési zóna legmagasabb pontjának legközelebbi méterre, vagy lábra kerekített tengerszint feletti magasságát.

11.10.2 Akadályok

11.10.2.1 Az akadályokat a repülőtér felülnézeti ábrázolásán fel kell tüntetni.
Megjegyzés. - A megfelelő akadályok azok, amelyeket az eljárás specialisták adnak meg.
11.10.2.2 **Ajánlás.** - *Ha valamely akadálymentességi/tengerszint feletti magasság meghatározó tényezője egy, vagy több akadály, akkor ezeket az akadályokat azonosítani kell.*

11.10.2.3 Az akadályok tetejének tengerszinthez viszonyított magasságát a legközelebbi (magasabb) méterre, vagy lábra kerekítve kell közzétenni.
11.10.2.4 **Ajánlás.** - *Az akadályok magasságát a közepes tengerszinttől eltérő alapszinttől mérten is fel kell tüntetni (lásd 11.10.2.3). Ha ilyen magasságokat is feltüntetnek, akkor ezeket zárójelbe téve kell a térképen ábrázolni.*
11.10.2.5 Ha az akadályok magasságát a közepes tengerszinttől eltérő egyéb vonatkoztatási alaphoz viszonyítva tüntetik fel, akkor e vonatkoztatás alapja a repülőtér tengerszinthez viszonyított magassága legyen, kivéve az olyan repülőterek esetében, amelyek műszeres futópályája (vagy pályái) küszöbének tengerszinthez viszonyított magassága több, mint 2 méterrel (7 láb) alacsonyabb, mint a repülőtér tengerszinthez viszonyított magassága, mert ilyen esetben a térkép vonatkoztatási alapja annak a küszöbnek a tengerszinthez viszonyított magassága legyen, amelyre a műszeres megközelítés vonatkozik.
11.10.2.6 Ha nem a közepes tengerszintet használják vonatkoztatási alapul, akkor ezt a térképen szembetűnő helyen közzé kell tenni.
11.10.2.7 Ha az I. kategóriás precíziós megközelítési futópályára akadály mentes zónát nem hoztak létre, ott ezt jelezni kell.

11.10.3 Tiltott, korlátozott és veszélyes légterek

Az eljárások végrehajtását befolyásoló tiltott, korlátozott és veszélyes légtereket azonosítójukkal és magassági határaikkal együtt fel kell tüntetni.

11.10.4 Rádióösszeköttetési berendezések és navigációs eszközök

11.10.4.1 Az eljárásokhoz szükséges rádió-navigációs eszközöket frekvenciával, azonosító jellel és útirány meghatározó jellemzőikkel - ha vannak - kell feltüntetni. A befejező megközelítés pályáján egynél több berendezést tartalmazó eljárás esetében a befejező megközelítésben iránykövetéshez alkalmazott berendezést egyértelműen kell azonosítani. Továbbá, fontolóra kell venni, hogy a megközelítési térképen lehetőleg ne tüntessék fel az eljárás folyamán nem alkalmazott berendezéseket.
11.10.4.2 A kezdeti megközelítési fixét (IAF), a közbenső megközelítési fixet (IF), a befejező megközelítési fixet (FAF) (vagy ILS eljárás esetén a befejező megközelítési pontot (FAP)), a megszakított megközelítési pontot (MAPt), ha létrehozták, és az eljárásban foglalt és ahhoz nélkülözhetetlen minden egyéb fixet és pontot fel kell tüntetni és azonosítani kell azokat.
11.10.4.3 **Ajánlás.** - *A befejező megközelítés fixét (vagy ILS eljárás esetén a befejező megközelítési pontot) fokokban, fokpercekben és fokmásodpercekben megadott földrajzi koordinátáival kell azonosítani.*
11.10.4.4 Az alternatív eljárásoknál használható rádió-navigációs berendezéseket, azok útirány meghatározó jellemzőikkel, ha van ilyen, fel kell tüntetni, vagy jelezni kell a térképen.
11.10.4.5 Az eljárás végrehajtásához szükségesek rádióösszeköttetési frekvenciákat, beleértve a hívójeleket is, fel kell tüntetni.
11.10.4.6 A befejező megközelítési szakasz által érintett minden rádió-navigációs berendezés repülőtértől mért, legközelebbi egész kilométerre, vagy tengeri mérföldre kerekített távolságát kötelező feltüntetni, ha az az eljáráshoz szükséges. Ha nincs berendezés a repülőtérre vezető útirány meghatározásához, akkor az irányt a legközelebbi egész fokra kerekítve kell feltüntetni.

11.10.5 Legkisebb szektor magasság, vagy közel-forgalmi érkezési magasság

Az illetékes hatóság által megállapított legalacsonyabb szektormagasságot, vagy közel-forgalmi érkezési magasságot a vonatkozó szektor egyértelmű jelölésével együtt kell feltüntetni.

11.10.6 Az eljárások útirányainak ábrázolása

11.10.6.1 A felülnézeti rajz -az alább megadott módon- a következő információt ábrázolja,:
a) a megközelítési eljárás útirányát nyilazott folyamatos vonallal, ahol a nyilak a repülés irányát jelzik;
b) a megszakított megközelítés útirányát nyilazott szaggatott vonallal;
c) nyilazott pontozott vonallal minden egyéb, az a), vagy a b) pontban megadottaktól eltérő kiegészítő

eljárás útirányát;
d) az eljáráshoz szükséges legközelebbi egész fokra kerekített irányokat, útirányokat, radiálokat és a legközelebbi kéttized kilométerre, vagy tized tengeri mérföldre kerekített távolságokat, vagy az eljáráshoz előírt időtartamokat;
e) ha az útirány meghatározására nincs navigációs berendezés, a befejező megközelítési szakasz által érintett navigációs berendezéstől a repülőtérre vezető, legközelebbi egész fokra kerekített mágneses irányt;
f) minden olyan szektor határvonalát, amelyben a látásos manőverezés (körözés) tiltott;
g) ahol kijelölték, ott a megközelítéshez és a megszakított megközelítéshez kapcsolódó várakozási eljárást és a várakozás legalacsonyabb tengerszint feletti magasságát/magasságait;
h) ahol szükséges, a térkép előlapján szembetűnő helyen feltüntetett figyelmeztető megjegyzéseket.
11.10.6.2 **Ajánlás.** - *A felülnézeti rajzon fel kell tüntetni a befejező megközelítési szakasz által érintett minden navigációs berendezésnek a repülőtértől mért távolságát.*
11.10.6.3 Rendszerint a felülnézeti rajz alatt, a következő adatokat feltüntető metszetrajzot kell biztosítani:
a) a repülőteret tömör négyszöggel ábrázolva, a repülőtér tengerszinthez viszonyított magasságánál;
b) a megközelítési eljárás oldalnézeti nyomvonalát nyilazott folyamatos vonallal, ahol a nyíl a repülés irányát jelzi.
c) a megszakított megközelítés oldalnézeti nyomvonalát nyilazott szaggatott vonallal és az eljárás leírásával;
d) nyilazott pontozott vonallal minden egyéb kiegészítő, a b) és c) pontban leírtaktól eltérő eljárás oldalnézeti nyomvonalát;
e) az eljáráshoz szükséges legközelebbi egész fokra kerekített irányokat, útirányokat, radiálokat és a legközelebbi kéttized kilométerre, vagy tized tengeri mérföldre kerekített távolságokat, vagy az eljáráshoz előírt időtartamokat;
f) az eljáráshoz szükséges tengerszint/terepszint feletti magasságokat, beleértve az átváltási magasságot is és az eljárásban előírt magasságokat, ahol ilyet kijelöltek;
g) az eljárási forduló legközelebbi egész kilométerre, vagy tengeri mérföldre kerekített határoló távolságát, ha ilyet meghatároztak;
h) a közbenső megközelítés fixét, vagy pontját az olyan eljárásokban, ahol irányváltás nincs engedélyezve;
i) a térkép széléig kiterjesztett, a repülőtér magasságát, vagy a küszöb magasságát - amelyik megfelelő- jelképező vonalat a futópálya küszöbnél kezdődő távolság léptékkel együtt.
11.10.6.4 **Ajánlás.** - *Az eljáráshoz szükséges magasságokat (height) zárójelben kell feltüntetni, a 11.10.2.5 pontban előírt magassági viszonyítási alapot használva.*
11.10.6.5. **Ajánlás.** – *Az oldalnézet tartalmazza a talaj metszetvonalát, vagy a minimum QNH/QFE magasság ábrázolását a következők szerint:*
a) a talaj metszetvonalát folyamatos vonallal tüntetve fel, amely ábrázolja a befejező megközelítés elsődleges területén belül előforduló legmagasabb domborzat legmagasabb pontjainak tengerszint feletti magasságát. A befejező megközelítés másodlagos területén belül előforduló legmagasabb terep alakulatok legmagasabb pontjainak tengerszint feletti magasságait a metszet rajzon szaggatott vonallal tüntetve fel; vagy
b) a közbenső és a befejező megközelítési szakaszra vonatkozó minimum QNH/QFE magasságokat körülhatárolt árnyékolt keretekben.
1. Megjegyzés. - A talaj oldalnézeti ábrázolásához a befejező megközelítési szakasz elsődleges és másodlagos területeinek aktuális mintáit a kartográfusok részére az eljárás specialisták biztosítják
2. Megjegyzés. - A minimum QNH/QFE magasság ábrázolás célja, hogy azt a nem-precíziós megközelítéseket befejező megközelítési fix-el ábrázoló térképeken használják.

11.10.7 Repülőtér üzemeltetési minimumok

11.10.7.1 Ha az állam repülőtér üzemeltetési minimumokat meghatározott, akkor azokat fel kell tüntetni.
11.10.7.2 Az akadálymentességi tengerszint feletti magasságot/terep feletti magasságot azon légi-jármű kategóriákra fel kell tüntetni, amely kategóriákra az eljárást kialakították; precíziós megközelítési

eljárásokhoz, a Cat D_L légi-járművek (szárny fesztávolság 65 m és 80 méter között és/vagy a kerekek, illetve a siklópálya vevő antenna repülési pályája közötti függőleges távolság 7 m és 8 m között van) számára kiegészítő OCA/H-t kell közzétenni, ha az szükséges.

11.10.8 Kiegészítő tájékoztatások

11.10.8.1 Ha a megszakított megközelítési pont az alábbiak révén kijelölt:
- a befejező megközelítési ponttól mért távolsággal, vagy
- navigációs berendezéssel, vagy ponttal és a befejező megközelítés pontjától mért vonatkozó távolsággal,

akkor meg kell adni a befejező megközelítés pontjától a megszakított megközelítés pontjáig adott és a legközelebbi kéttized kilométerre, vagy tized tengeri mérföldre kerekített távolságot, illetve a vonatkozó földfeletti sebességet és időtartamokat tartalmazó táblázatot.

11.10.8.2 Ha a befejező megközelítési szakaszon DME berendezés használata szükséges, akkor fel kell tüntetni egy olyan táblázatot, amely a tengerszint feletti magasságokat/terep feletti magasságokat, vagy 2 km-enként, vagy tengeri mérföldenként tartalmazza - amelyik a megfelelő. A táblázatban nem szerepelhetnek az OCA/H alatti magasságokhoz/tengerszint feletti magasságokhoz tartozó távolság adatok.

11.10.8.3 **Ajánlás.** - *A befejező megközelítési szakaszban DME berendezés használatát nem igénylő eljárás esetében, ha tájékoztató süllyedési profil információ biztosításához egy megfelelően telepített DME berendezés rendelkezésre áll, akkor a térképen legyen feltüntetve a tengerszint feletti magasság/terep feletti magasság táblázat.*

11.10.8.4 **Ajánlás.** - *A süllyedés mértékét megadó táblázat feltüntetése szükséges.*

11.10.8.5 A befejező megközelítési fixel rendelkező nem precíziós megközelítési eljárások esetében a befejező megközelítés süllyedési gradiensét a legközelebbi tized százalékra, és zárójelbe téve, a süllyedési szöget a legközelebbi tizedfokra kerekítve kötelező feltüntetni.

11.10.8.6 A függőleges irányvezetést biztosító precíziós megközelítési eljárások és megközelítési eljárások esetében a viszonyítási alap magasságát a legközelebbi fél méterre, vagy lábra kerekítve, és a siklópálya/magasság/függőleges pálya szöget a legközelebbi tized fokra kerekítve kötelező feltüntetni.

11.10.8.7 Ha egy ILS-re a befejező megközelítési fixet a befejező megközelítési pontnál jelölik ki, egyértelműen jelezni kell, hogy az vajon az ILS-re, a kapcsolatos csak ILS iránysáv eljárásra, vagy mindkettőre alkalmazandó. MLS esetében egyértelműen jelezni kell, ha a FAF-ot a befejező megközelítés pontjánál jelölték ki.

11.10.8.8 Figyelmeztető megjegyzést kötelező feltüntetni, ha bármiféle műszeres megközelítési eljárás befejező megközelítési süllyedési gardiense/szöge meghaladja a Légi-Navigációs Szolgálatok Eljárása – Légi-jármű Üzemeltetés (PANS-OPS, Doc 8168) II. Kötet, I. Rész, 4. Szakasz, 5. Fejezetében meghatározott maximum értéket.

11.10.9 Légiforgalmi adatbázis követelmények

A navigációs adatbázis kódolást támogató megfelelő adatokat a Légi-navigációs Szolgálatok Eljárásai – Légi-jármű Üzemeltetés (PANS-OPS, DOC 8168), II. Kötet, III. Rész, 5. Szakasz, 2. Fejezet, 2.3 pontja szerint kell közzétenni, vagy a térkép hátoldalán, vagy egy megfelelő hivatkozásokkal ellátott különálló lapon.

Megjegyzés.- A megfelelő adatok azok, amelyeket az eljárás specialisták biztosítanak.

13. FEJEZET - ICAO REPÜLŐTÉR/HELIKOPTER REPÜLŐTÉR TÉRKÉP

13.1 Rendeltetése

E térképnek kell a légi-jármű személyzet számára biztosítania a légi-járművek földi mozgását

megkönnyítő információt:
a) a légi-jármű állóhelyéről a futópályáig; és
b) a futópályától a légi-jármű állóhelyig;
valamint a helikopterek mozgását megkönnyítő információt:
a) a helikopter állóhelyéről a földet érési és elemelkedési területig és a befejező megközelítési és felszállási területig;
b) a befejező megközelítési és felszállási területről a földet érési és elemelkedési területig és a helikopter állóhelyig;
c) a helikopter földi és légi guruló utak mentén; és
d) a légi tranzit utak mentén;
továbbá, alapvető repülőtéri/helikopter repülőtéri üzemeltetési tájékoztatásokat is biztosítania kell.

13.2 Alkalmazási előírások

13.2.1 Az ICAO Repülőtér/helikopter repülőtér térkép-et a nemzetközi polgári repülés által rendszeresen használt összes repülőtérre/helikopter repülőtérre az 1.3.2 pontban leírt módon el kell készíteni.
13.2.2 **Ajánlás.** - *Az ICAO Repülőtér/helikopter repülőtér Térkép-et az 1.3.2. pontban előírt módon el kell készíteni a nemzetközi polgári repülés használatára rendelkezésre álló összes egyéb repülőtérről/helikopter repülőtérről is.*
Megjegyzés. - Bizonyos körülmények esetén szükségessé válhat az ICAO Repülőtéri Földi Mozgások Térkép és az ICAO Légi-jármű Állóhely/Beállító Térkép elkészítése (lásd a 14. és a 15. Fejezetben), amely esetben az ezeken a kiegészítő térképeken feltüntetett részleteket nem kell az ICAO Repülőtér/Helikopter repülőtér Térkép-en megismételni.

13.3 Fedésterület és méretarány

13.3.1 A fedésterület és a méretarány legyen elegendően nagy ahhoz, hogy a térkép a 13.6.1 pontban felsorolt valamennyi alkotóelemet világosan ábrázolja.
13.3.2 A térképen lineáris mérővonalat kell feltüntetni.

13.4 Azonosítás

A térképet a repülőtér/helikopter repülőtér által kiszolgált nagyváros, város, vagy körzet nevével, valamint a repülőtér/helikopter repülőtér nevével kell azonosítani.

13.5 Mágneses eltérés

A földrajzi és a mágneses Észak irányjelző nyilakat, a legközelebbi fokra kerekített mágneses eltérést és a mágneses eltérés éves változtatását fel kell tüntetni.

13.6 Repülőtéri/helikopter repülőtéri adatok

13.6.1 E térkép ábrázolja:
a) a repülőtér/helikopter repülőtér vonatkoztatási pontjának földrajzi koordinátáit fokokban, fokpercekben és fokmásodpercekben;
b) a legközelebbi egész méterre, vagy lábra kerekítve, a repülőtér/helikopter repülőtér, a nem precíziós megközelítési futópálya küszöbök és az előtér pontjainak (repülés előtti magasságmérő ellenőrzési helyek), ha alkalmazható, tengerszinthez viszonyított magasságát; és a nem-precíziós megközelítésekhez a futópálya küszöbök, valamint a földet érési és elemelkedési terület geometriai középpontjának tengerszinthez viszonyított magasságát és geoid egyenetlenségét;
c) a legközelebbi fél méterre, vagy lábra kerekítve, a futópálya küszöbök, a földet érési és elemelkedési terület geometriai középpontjának, valamint a precíziós megközelítési futópálya földet érési zónája legmagasabb pontjának tengerszinthez viszonyított magasságát és geoid egyenetlenségét;
d) az összes futópályát -beleértve az építés alatt állókat is-, a futópályák azonosítóját, a legközelebbi méterre kerekített hosszukat, szélességüket, teherbírásukat, a beljebb helyezett küszöböket a végbiztonsági

és az akadálymentes sávokat, a futópályák irányát a legközelebbi mágneses fokra kerekítve, a burkolat fajtáját és a futópálya burkolatának jeleit;
Megjegyzés. - A teherbírás megadható táblázatos formában a térkép előlapján, vagy a hátoldalán.
e) az összes előteret a légi-jármű/helikopter állóhelyekkel, a világítási rendszert, a jelöléseket és egyéb vizuális útmutató és irányító eszközöket, ahol alkalmazható, beleértve a vizuális beállító útmutató rendszerek típusát és elhelyezkedését, a helikopter repülőtér felületének típusát és teherbírását, vagy a légjármű korlátozás fajtáját ott, ahol a teherbírás kisebb, mint a kapcsolódó futópályák teherbírása;
Megjegyzés. - A teherbíró képesség, vagy a légi-jármű típus szerinti korlátozás táblázatos formában is megadható, a térkép előlapján, vagy a hátoldalán.
f) a küszöbök, a földet érési és elemelkedési terület geometriai középpontjának és/vagy a befejező megközelítés és felszállási terület küszöbjeinek földrajzi koordinátáit fokokban, fokpercekben és fokmásodpercekben (ahol alkalmazható);
g) az összes guruló utat, helikopter légi- és földi guruló utat a felület típusával együtt, a helikopter légi tranzit utakat, elnevezésükkel, szélességükkel, fénytechnikai rendszereikkel, burkolati jelzéseikkel (beleértve a gurulási várópontokat, és ahol biztosított, közbenső várópontokat) és a megállító kereszt fénysorokat, az egyéb vizuális útmutató és irányító eszközöket, a teherbíró képességet, vagy a légi-jármű típus szerinti korlátozásokat ott, ahol a teherbíró képesség kisebb, mint a kapcsolódó futópálya teherbíró képessége;
Megjegyzés. - A teherbíró képesség, vagy a légi-jármű típus szerinti korlátozás feltüntethető táblázatos formában a térkép előlapján, vagy hátoldalán.
h) ha meghatározták, a forró pontok helyét megfelelően feltüntetett további információval;
Megjegyzés.- A forró pontokra vonatkozó további információ a térkép elő-, vagy hátoldalán táblázatos formában közölhető.
i) megfelelő gurulóút középvonal pontok és légi-jármű állóhelyek földrajzi koordinátáit fokokban, fokpercekben és fokmásodpercekben;
j) ahol ilyet a guruló légi-járművek része kialakítottak, a szabvány útvonalakat, elnevezésükkel együtt;
k) a légiforgalmi irányító szolgálat területi határát;
l) a futópálya látástávolság (RVR) mérőberendezések helyét;
m) a bevezető és a futópálya fényeket;
n) az optikai siklópálya rendszer helyét és típusát, a névleges megközelítési siklószöget, valamint a névleges "siklópályán" jelhez tartozó küszöb feletti minimum szemmagasságot fel kell tüntetni. Továbbá ott, ahol a rendszer tengelye nem párhuzamos a futópálya középvonalával, fel kell tüntetni az irányeltérés szögét és irányát, úgy, mint jobbra, vagy balra.
o) kommunikációs létesítmények, csatornáikkal és, ha alkalmazható, bejelentkezési címeikkel együtt felsorolva;
p) a gurulási akadályokat;
q) a légi-jármű kiszolgáló területeket és az üzemeltetés szempontjából fontos épületeket;
r) a VOR ellenőrzési pontot és az adott berendezés frekvenciáját;
s) az ábrázolt mozgási terület légi-jármű részére tartósan alkalmatlan minden részét, ilyenként egyértelműen azonosítva azokat.
13.6.2 A 13.6.1-ben a helikopter repülőterekre vonatkozó tételek kiegészítéseképp a térképen fel kell tüntetni:
a) a helikopter repülőtér típusát;
Megjegyzés. - A helikopter repülőtér típusokat a 14. Annex II. Kötete, talajszinti, építményen kialakított, vagy hajófedélzeti helikopter repülőtérként azonosítja.
b) a földet érési és elemelkedési területet, beleértve a legközelebbi méterre kerekített méreteit, lejtését, a felület fajtáját és teherbírását tonnában kifejezve;
c) a befejező megközelítési és felszállás területet, beleértve típusát, földrajzi irányát a legközelebbi egész fokra kerekítve, (ahol megfelelő) azonosító számát, hosszát és szélességét a legközelebbi méterre kerekítve, lejtését és a felület fajtáját;

d) a biztonsági területet, beleértve hosszát, szélességét és a felület fajtáját;

e) a helikopter akadálymentes sávot, beleértve hosszát és talajának profilját;

f) az akadályokat, beleértve fajtájukat, tetejüknek a következő magasabb méter, vagy láb értékre kerekített szintmagasságát;

g) a megközelítési eljáráshoz tartozó látási segédeszközöket, a befejező megközelítési és felszállási terület valamint a földet érési és elemelkedési terület jelöléseit és fénytechnikai berendezéseit;

h) a helikopter repülőtér rendelkezésre állóként közzétett, legközelebbi méterre kerekített úthossz értékeit, ahol alkalmazható, beleértve:

1) a rendelkezésre álló felszálló úthosszat;

2) a rendelkezésre álló megszakított felszálló úthosszat;

3) a rendelkezésre álló leszálló úthosszat.

14. FEJEZET - ICAO REPÜLŐTÉRI FÖLDI MOZGÁSOK TÉRKÉPE

14.1 Rendeltetése

E kiegészítő térképnek kell a légi-jármű személyzet számára biztosítani a légi-járműnek a légi-jármű állóhelyekre/ről való földi mozgását és a légi-jármű parkolását/beállását megkönnyítő részletes tájékoztatást.

14.2 Alkalmazási előírások

Ajánlás. - *Az ICAO Repülőtéri Földi Mozgások Térképe-t az 1.3.2 pontban leírt módon biztosítani kötelező olyan esetekben, ha az információk zsúfoltsága miatt a légi-járműveknek a guruló utakon az állóhelyekre/ről való földi mozgásához szükséges részletes tájékoztatás nem tüntethető fel kielégítő láthatósággal az ICAO Repülőtér/Helikopter repülőtér Térkép-en.*

14.3 Fedésterület és méretarány

14.3.1 A térkép fedésterülete és méretaránya legyen elegendő nagyságú ahhoz, hogy a 14.6 pontban felsorolt összes alkotóelemet tisztán ábrázolja.

14.3.2 **Ajánlás**. - *A térképen lineáris mérővonalat kötelező feltüntetni.*

14.4 Azonosítás

A térképet a repülőtér által kiszolgált város, vagy nagyváros nevével valamint a repülőtér nevével kell azonosítani.

14.5 Mágneses eltérés

14.5.1 A térképen a földrajzi Északot jelző nyilat kötelező feltüntetni.

14.5.2 **Ajánlás. -** *A legközelebbi egész fokra kerekített mágneses eltérést és az évenkénti változását fel kell tüntetni.*

Megjegyzés. - E térképet nem szükséges a földrajzi Északra tájolni.

14.6 Repülőtéri adatok

E térképen a Repülőtér/Helikopter repülőtér Térképen megadott és azokkal megegyező módon kell feltüntetni az ábrázolt területre vonatkozó minden információt, beleértve:

a) az előtér legközelebbi méterre, vagy lábra kerekített tengerszinthez viszonyított magasságát;

b) az előtereket a légi-jármű állóhelyekkel, a teherbíró képességet, vagy a légi-jármű típus szerinti korlátozást, térvilágítást, a burkolati jeleket és egyéb vizuális útmutató és irányító eszközöket, ahol alkalmazható, beleértve a vizuális beállási útmutató rendszerek helyét és típusát is;

c) a légi-jármű állóhelyek földrajzi koordinátáit fokokban, fokpercekben és század fokmásodpercekben;

d) a guruló utakat elnevezésükkel, legközelebbi méterre kerekített szélességüket, teherbírásukat, vagy a légi-jármű típus szerinti korlátozásokat, ahol alkalmazható, a fényeket, a burkolati jeleket (beleértve a gurulási várópontokat és -ahol kialakították- közbenső várópontokat) a megállító kereszt fénysorokat, valamint az egyéb vizuális útmutató és irányító eszközöket;

e) ha meghatározták, a forró pontok helyét megfelelően feltüntetett további információval;

Megjegyzés.-A forró pontokra vonatkozó további információ a térképelő-, vagy hátoldalán táblázatos formában közölhető.

f) a guruló légi-járművek részére szolgáló szabvány útvonalakat, elnevezésükkel, ahol ilyet kialakítottak;

g) megfelelő guruló út középvonal pontok földrajzi koordinátáit fokokban, fokpercekben, fokmásodpercekben és század fokmásodpercekben;

h) a légiforgalmi irányító szolgálat területi határát;

i) a megfelelő kommunikációs létesítményeket csatornáik és –ha alkalmazható- belépési címeik felsorolásával együtt;

j) a gurulási akadályokat;

k) a légi-jármű kiszolgáló területeket és az üzemeltetés szempontjából fontos épületeket;

l) a VOR ellenőrzési pontot és az adott berendezés rádió frekvenciáját;

m) az ábrázolt mozgási terület légi-jármű részére tartósan alkalmatlan bármely részét, és azt ilyenként világosan azonosítva.

15. FEJEZET - ICAO LÉGI-JÁRMŰ ÁLLÓHELY/BEÁLLÍTÓ TÉRKÉP

15.1 Rendeltetése

A légi-jármű személyzetnek e kiegészítő térkép adjon tájékoztatást a légi-járműnek a guruló utak és a légi-jármű állóhelyek közötti mozgását, illetve a légi-jármű parkolását/beállását segítő részletekről.

15.2 Alkalmazási előírások

Ajánlás. - *Az ICAO Légi-jármű Állóhely/Beállító Térkép-et, az 1.3.2 pontban leírt módon el kell készíteni ott, ahol a forgalmi létesítmények rendszerének bonyolultsága miatt a tájékoztatás kielégítő áttekinthetőséggel nem adható meg az ICAO Repülőtér/Helikopter repülőtér Térkép-en, vagy az ICAO Repülőtér Földi Mozgások Térképe-n.*

15.3 Fedésterület és méretarány

15.3.1 A fedésterület és méretarány a 15.6 pontban felsorolt összes alkotóelem világos feltüntethetőségéhez elegendően nagy legyen.

15.3.2 **Ajánlás.** - *A térképen lineáris mérővonalat kötelező feltüntetni.*

15.4 Azonosítás

A térképet a repülőtér által kiszolgált város, vagy nagyváros, vagy térség nevével, valamint a repülőtér nevével kell azonosítani.

15.5 Mágneses eltérés

15.5.1 A térképen a földrajzi Északot jelző nyilat kötelező feltüntetni.

15.5.2 **Ajánlás.** - *A legközelebbi egész fokra kerekített mágneses eltérést és az évenkénti változását fel kell tüntetni.*

Megjegyzés. - E térképet nem szükséges a földrajzi Északra tájolni.

15.6 Repülőtéri adatok

E térképen, az ICAO Repülőtér/Helikopter repülőtér Térképen és az ICAO Földi Mozgások Térképen megadott és azokkal megegyező módon kell szerepelnie az ábrázolt területre vonatkozó minden információnak, beleértve:

a) az előtér legközelebbi méterre, vagy lábra kerekített tengerszinthez viszonyított magasságát;

b) az előtereket a légi-jármű állóhelyekkel, a teherbíró képességet, vagy a légi-jármű típus szerinti korlátozást, fényjelzéseket, a burkolati jeleket és egyéb vizuális útmutató és irányító eszközöket, ahol alkalmazható, beleértve a vizuális dokkolás irányító rendszerek helyét és típusát is;

c) a légi-jármű állóhelyek földrajzi koordinátáit fokokban, fokpercekben, fokmásodpercekben és század fokmásodpercekben;

d) a guruló út belépőpontokat elnevezéseikkel, beleértve a gurulási várópontokat és –ha van- a közbenső várópontokat és a megállító kereszt fénysorokat;

e) ha meghatározták, a forró pontok helyét megfelelően feltüntetett további információval;

Megjegyzés.-A forró pontokra vonatkozó további információ a térkép elő-, vagy hátoldalán táblázatos formában közölhető.

f) a megfelelő guruló út középvonal pontok földrajzi koordinátáit fokokban, fokpercekben, fokmásodpercekben és század fokmásodpercekben;

g) a légiforgalmi irányító szolgálat területi határát;

h) a megfelelő kommunikációs létesítményeket csatornáik és –ha alkalmazható- belépési címeik felsorolásával együtt;

i) a gurulási akadályokat;

j) a légi-jármű kiszolgáló területeket és az üzemeltetés szempontjából fontos épületeket;

k) a VOR ellenőrzési pontot és az adott berendezés rádió frekvenciáját;

l) az ábrázolt mozgási terület bármely olyan részét, amely tartósan alkalmatlan a légi-járművek részére és azokat ilyenként világosan azonosítva.

21. FEJEZET – ICAO - ATC ELLENŐRZŐ LEGKISEBB MAGASSÁG TÉRKÉP

21.1 Rendeltetése

21.1.1 E kiegészítő térképen kell közölni a légi-jármű személyzet részére az ATS ellenőrző rendszert használó irányító által kijelölt magasság betartását és kereszt ellenőrzését lehetővé tévő információt.
Megjegyzés. - A 11. Annex meghatározása szerint a légiforgalmi irányító szolgálat feladatai közé nem tartozik a földnek ütközés megelőzése. A Légi-Navigációs Szolgálatok Eljárásai – Légi-forgalom Kezelés (PANSATM, Doc 4444)-ben előírt eljárások nem mentesítik a repülőgép vezetőt azon felelőssége alól, hogy meggyőződjön róla, hogy a légiforgalmi irányító egység által kiadott bármely engedély e tekintetben biztonságos. Ha az IFR szerint repülő gépet vektorok adásával irányítják, vagy a repülőgépet az ATS útvonalon kívülre vivő direkt útvonalat engedélyeznek a Légi-navigációs Szolgálatok Eljárásai – Légi-forgalom Kezelés, *8. Fejezet 8.6.5.2.előírásai alkalmazandók.*
21.1.2 A térkép előlapján szembetűnő módon kell feltüntetni, miszerint a térkép csakis a már azonosított légi-jármű számára kijelölt magasság keresztellenőrzésére használható.

21.2 Alkalmazási rendelkezések

Ajánlás. - *Az ICAO – ATC Ellenőrző Legkisebb Magasság Térkép-et az 1.3.2 pontban leírt módon biztosítani kötelező olyan esetekben, amikor irányvezetési eljárást alakítottak ki és a legkisebb vektorálási magasságok megfelelő módon nem tüntethetők fel az ICAO Körzeti Térkép-en, az ICAO Szabvány Műszeres Indulási Eljárás Térképen (SID), vagy az ICAO Szabvány Műszeres Érkezési Eljárás Térképen (STAR).*

21.3 Fedésterület és méretarány

21.3.1 A térkép fedésterülete kellő mértékű legyen a vektorálási eljárással kapcsolatos minden információ feltüntetéséhez.
21.3.2 A térkép legyen méretarányos.
21.3.3 **Ajánlás.** - *A térkép ugyan olyan méretaránnyal készüljön, mint a kapcsolatos ICAO Körzeti Térkép.*

21.4 Vetület

21.4.1 **Ajánlás.** - *Szögtartó vetületet kell alkalmazni, amelyen az egyenes vonal hozzávetőleg a nagykörrel azonos.*
21.4.2 **Ajánlás.** - *A fokbeosztás jelzéseit azonos térközönként kell a térkép oldalvonalán elhelyezni.*

21.5 Azonosítás

21.5.1 A térkép azonosítása a következőkből álljon: a repülőtér neve, amelyre a vektorálási eljárást felépítették, vagy, ha az eljárás több repülőtérre vonatkozik, akkor az ábrázolt légtérhez kapcsolódó név.
Megjegyzés. – Ez a név lehet a repülőtér által kiszolgált városnak a neve, vagy ha a várost több repülőtér szolgálja ki, akkor a légiforgalmi szolgálati központ neve, avagy, a térkép fedésterületén belül elhelyezkedő legnagyobb város, vagy nagyváros neve.

21.6 Kultúr környezet és domborzat

21.6.1 Az összes nyílt vízfelületet, a nagy tavak és folyók elnagyolt partvonalát fel kell tüntetni kivéve akkor, ha az a térkép rendeltetésével szorosabban összefüggő adatokkal ütközne.
21.6.2 A megfelelő magasság pontokat és az akadályokat fel kell tüntetni.
Megjegyzés. - A megfelelő magasság pontok és akadályok azok, amelyeket az eljárás specialisták biztosítanak.

21.7 Mágneses eltérés

A térkép által fedett térség átlagos mágneses eltérését a legközelebbi egész fokra kerekítve fel kell tüntetni.

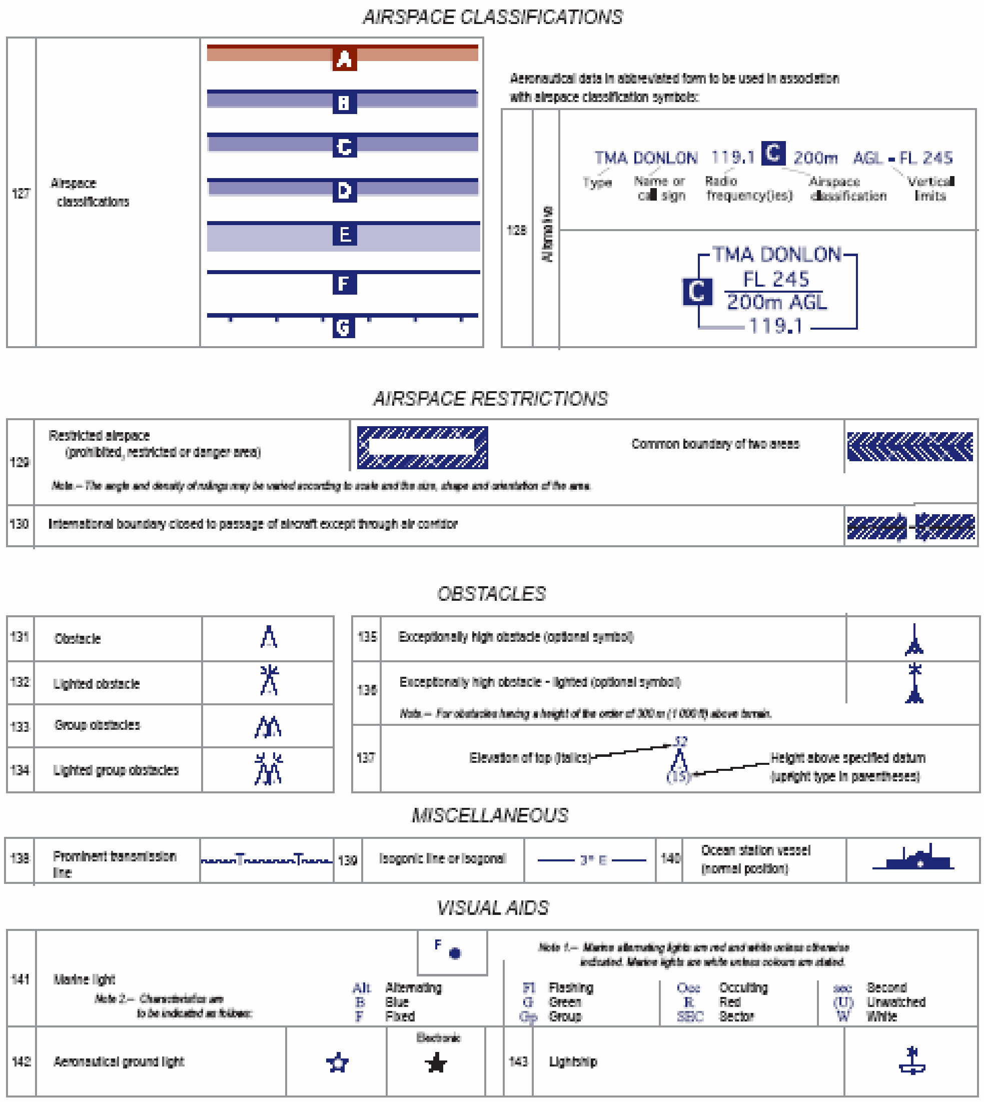
21.8 Irányok, útirányok és radiálok

21.8.1 Az irányoknak, útirányoknak és radiáloknak mágneses irányoknak kell lenniük, kivéve a 21.8.2 pontban előírtakat.
21.8.2 **Ajánlás.** - *Ha a magasabb földrajzi szélességű területek esetében az illetékes hatóság döntése szerint a mágneses Északhoz viszonyított iránymeghatározás nem megfelelő más alkalmas vonatkozatási alapot, például földrajzi Északot, vagy hálózati Északot kell alkalmazni.*
21.8.3 Ha az irányokat, útirányokat és radiálokat földrajzi Északhoz, vagy hálózati Északhoz viszonyítva teszik közzé, ott ezt világosan jelezni kell. Ahol hálózati Északot alkalmaznak, ott ennek a hálózati vonatkoztatási hosszúsági körét azonosítani kell.

21.9 Légiforgalmi adatok

21.9.1 Repülőterek
21.9.1.1 A közel-körzeti útvonalvezetést befolyásoló minden repülőteret fel kell feltüntetni a térképen. Ahol kivitelezhető, ott a futópályák elhelyezkedését mutató jelölést kell alkalmazni.
21.9.1.2 Fel kell tüntetni az elsődleges repülőtér tengerszinthez viszonyított és a legközelebbi méterre, vagy láb értékre felkerekített magasságát.
21.9.2 Tiltott, korlátozott és veszélyes légterek
A tiltott, korlátozott és veszélyes légtereket azonosítójukkal együtt kell feltüntetni.
21.9.3 Légiforgalmi Szolgálati Rendszer
21.9.3.1 A térképen fel kell tüntetni a kialakított légiforgalmi szolgálati rendszer alábbi összetevőit:
1) a vonatkozó rádió navigációs berendezéseket azonosítóikkal egyetemben;

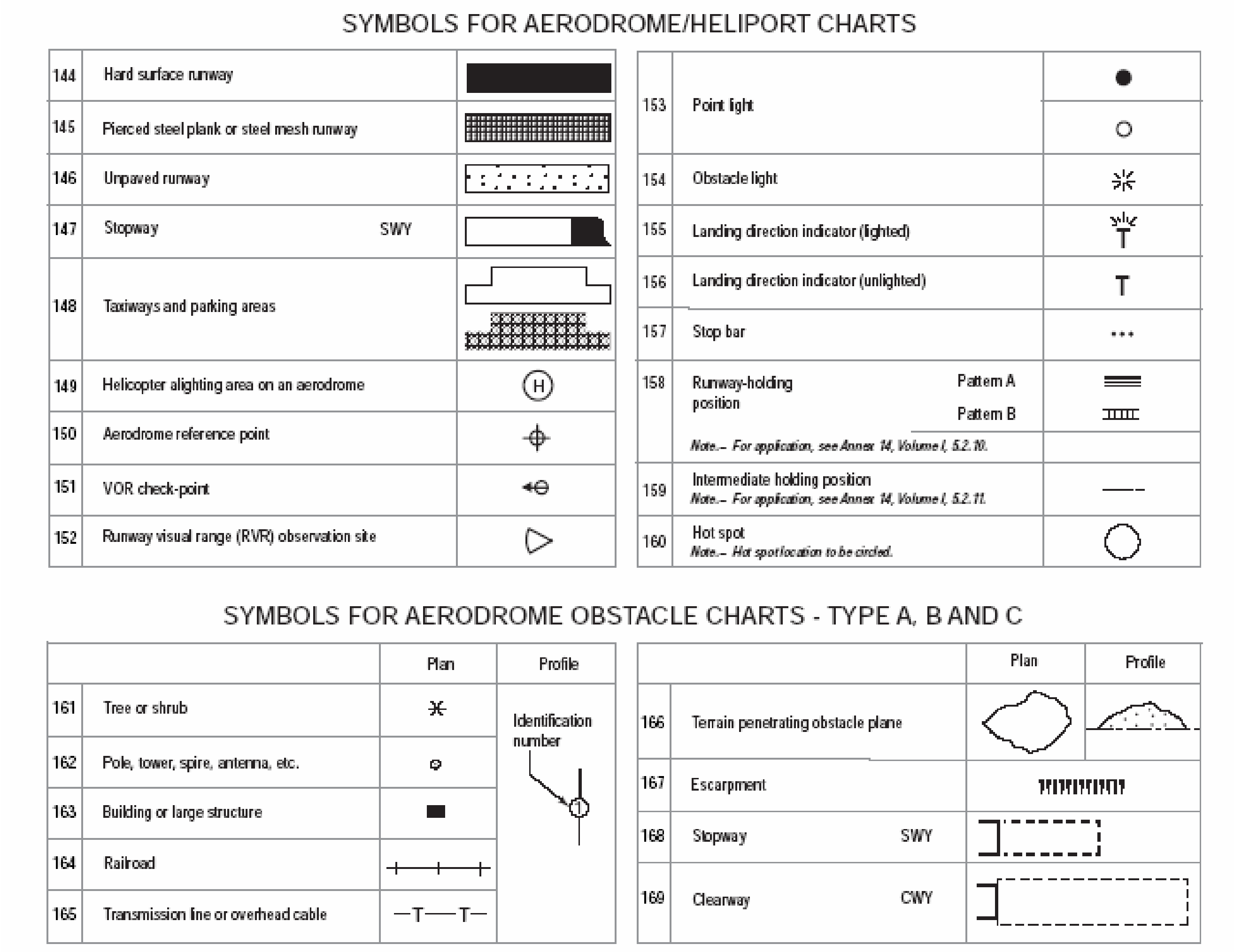
2) a vonatkozó, kijelölt légterek oldal határait;
3) a szabvány műszeres indulási és érkezési eljárásokhoz kapcsolódó vonatkozó mérvadó pontokat;
Megjegyzés. – A légi-járművek vektor irányítása során használatos, a mérvadó pontokhoz, illetve azoktól elvezető útvonalak feltüntethetők.
4) átváltási magasságot, ha kijelölték;
5) a vektor irányítással összefüggő információkat, beleértve:
a) egyértelműen azonosított módon, a legközelebbi magasabb 50 m-re, vagy 100 láb-ra kerekített legkisebb vektorálási magasságot;
b) a legkisebb vektorálási magasság-szektorok oldalhatárait rendszerint rádió navigációs berendezéshez viszonyított iránnyal és távolsággal, vagy, ha ez nem oldható meg, akkor fokokban, fokpercekben és másodpercekben kifejezett földrajzi koordinátákkal és vastag vonalakkal rajzolva oly módon, hogy a kialakított különféle radar szektorok egyértelműen megkülönböztethetők legyenek;
Megjegyzés. – Az áttekinthetőség érdekében, a zsúfolt térségekben a földrajzi koordináták elhagyhatók.
c) a megnevezett repülőtér fő VOR rádió navigációs berendezését, vagy ha ilyen nincs, akkor a repülőtér/helikopter repülőtér vonatkoztatási pontját véve központul, vastag szaggatott vonalakkal rajzolt távolság jelző koncentrikus köröket 20 km, vagy 10 tengeri mérföld térközökkel, vagy, ha lehetséges 10 km, vagy 5 tangeri mérföld térközökkel, a körívek mentén feltüntetve a kör sugarának méretét;
d) az alacsony hőmérséklet hatásainak helyesbítéseivel összefüggő megjegyzések, ha alkalmazandók;
6) rádió összeköttetési eljárásokat, beleértve a vonatkozó ATC egység(ek) hívójelé(ei)t és csatornáját (csatornáit).
21.9.3.2 **Ajánlás.** - *A rádió összeköttetés megszakadása estére vonatkozó eljárás szöveges leírását biztosítani kell, és- amikor csak lehetséges- a térképen kell feltüntetni, avagy a térképet tartalmazó oldalon.*



144 Szilárd burkolatú futópálya
145 Lyuggatott acéllap, vagy acélháló futópálya
146 Burkolat nélküli futópálya
147 Végbiztonsági sáv SWY
148 Guruló utak és parkolási területek
149 Helikopter le/felszállóhelyek a repülőtéren
150 A repülőtér vonatkoztatási pontja ARP
151 VOR ellenőrzési pont
152 Futópálya menti látástávolság (RVR) mérőhely
153 Pont fény
154 Akadály fény
155 Leszállási irányjelző (kivilágított)
156 Leszállási irányjelző (kivilágítatlan)

157 Megállító kereszt fénysor
158 Gurulóút várópont
"A" jelölési forma
"B" jelölési forma
Megjegyzés. - Alkalmazásáról lásd a 14. Annex I. Kötet 5.2.10 pontját
159 Közbenső várópont Megjegyzés: alkalmazásáról lásd a 14. Annex, I. Kötet, 5.2.11-et)
160 Forró pont Megjegyzés: a forró pont helye bekarikázandó

AZ A, B ÉS C TÍPUSÚ REPÜLŐTÉRI AKADÁLYTÉRKÉPEKEN ALKALMAZANDÓ JELÖLÉSEK
FELÜLNÉZET OLDALNÉZET
161 Fa, vagy bokor
162 Oszlop, torony, templomtorony, antenna, stb. azonosító szám
163 Épület, vagy nagyobb szerkezet
164 Vasútvonal
165 Távvezeték, vagy légvezeték
166 Az akadálysíkon átnyúló terep
167 Szakadék
168 Végbiztonsági sáv SWY
169 Akadálymentes terület CWY



SYMBOLS FOR AERODROME/HELIPORT CHARTS

144	Hard surface runway	
145	Pierced steel plank or steel mesh runway	
146	Unpaved runway	
147	Stopway SWY	
148	Taxiways and parking areas	
149	Helicopter alighting area on an aerodrome	H
150	Aerodrome reference point	
151	VOR check-point	
152	Runway visual range (RVR) observation site	

153	Point light	
154	Obstacle light	
155	Landing direction indicator (lighted)	
156	Landing direction indicator (unlighted)	T
157	Stop bar	
158	Runway-holding position Pattern A / Pattern B *Note.– For application, see Annex 14, Volume I, 5.2.10.*	
159	Intermediate holding position *Note.– For application, see Annex 14, Volume I, 5.2.11.*	
160	Hot spot *Note.– Hot spot location to be circled.*	

SYMBOLS FOR AERODROME OBSTACLE CHARTS - TYPE A, B AND C

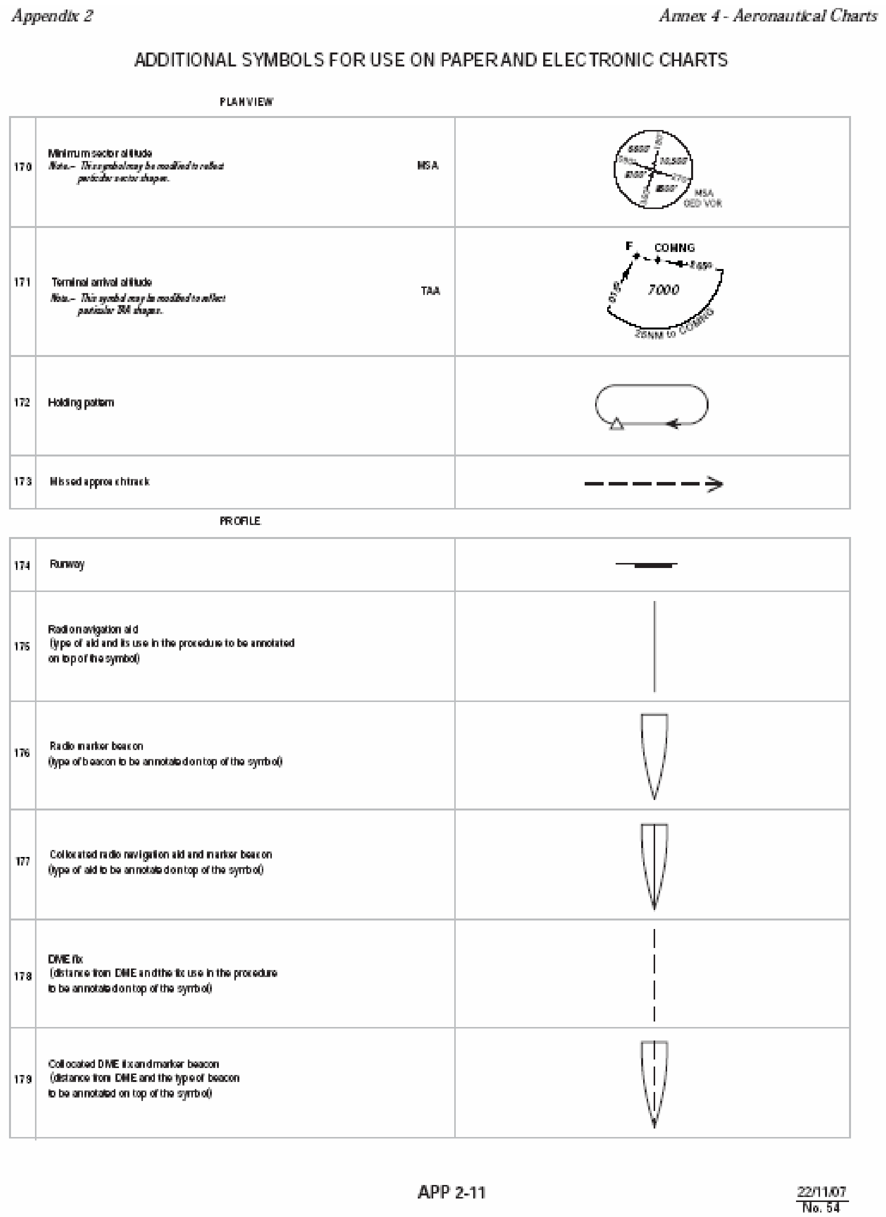
		Plan	Profile
161	Tree or shrub		Identification number
162	Pole, tower, spire, antenna, etc.		
163	Building or large structure		
164	Railroad		
165	Transmission line or overhead cable	—T—T—	

		Plan	Profile
166	Terrain penetrating obstacle plane		
167	Escarpment		
168	Stopway SWY		
169	Clearway CWY		

FELÜLNÉZET OLDALNÉZET

170 Biztonságos szektor magasság MSA
Megjegyzés. - E jelölés módosítható, hogy tükrözze az egyes szektorok alakját
171 Közel-forgalmi érkezési magasság TAA
Megjegyzés. - E jelölés módosítható, hogy tükrözze az illető TAA formáját
172 Várakozási eljárás
173 Megszakított megközelítési irány
174 Futópálya
175 Rádió navigációs berendezés
(a jel tetején a berendezés típusa és az eljárásbeli alkalmazása szerepeljen)
176 Rádió marker adó
(a jel tetején az adó típusa szerepeljen)

177 Együtt telepített rádió navigációs berendezés és marker adó
(a jel tetején a berendezés típusa és az eljárásbeli alkalmazása szerepeljen)
178 DME fix
(a DME-től mért távolság és a fix eljárásbeli alkalmazása szerepeljen a jel tetején)
179 Azonos helyű DME fix és marker adó
(a DME-től mért távolság és az adó típusa megadható a jel tetején)



Appendix 2 | *Annex 4 - Aeronautical Charts*

ADDITIONAL SYMBOLS FOR USE ON PAPER AND ELECTRONIC CHARTS

PLAN VIEW

170	Minimum sector altitude *Note.— This symbol may be modified to reflect particular sector shapes.*	MSA	
171	Terminal arrival altitude *Note.— This symbol may be modified to reflect particular TAA shapes.*	TAA	
172	Holding pattern		
173	Missed approach track		

PROFILE

174	Runway	
175	Radio navigation aid (type of aid and its use in the procedure to be annotated on top of the symbol)	
176	Radio marker beacon (type of beacon to be annotated on top of the symbol)	
177	Collocated radio navigation aid and marker beacon (type of aid to be annotated on top of the symbol)	
178	DME fix (distance from DME and the fix use in the procedure to be annotated on top of the symbol)	
179	Collocated DME fix and marker beacon (distance from DME and the type of beacon to be annotated on top of the symbol)	

APP 2-11 | 22/11/07 No. 54

6. FÜGGELÉK
LÉGIFORGALMI ADAT MINŐSÉGI KÖVETELMÉNYEK

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3. Táblázat – Gradiensek és szögek

Gradiensek és szögekGradiens/szög fajta	Térkép felbontás	Integritási osztály
Nem precíziós befejező megközelítés süllyedési gradiens	0,1 százalék	1 x 10 –8 kritikus
Befejező megközelítés süllyedési szög (Nem precíziós megközelítés, vagy megközelítés függőleges irányvezetéssel	0,1 fok	10-8 kritikus
Precíziós megközelítés süllyedési pálya/magasság szög	0,1 fok	10-8 kritikus

4 Táblázat - Mágneses eltérés

Mágneses eltérés	Térkép felbontás	Integritási osztály
Repülőtér/helikopter repülőtér mágneses eltérése	1 fok	1 x 10-5 fontos

5 Táblázat - Irányok

Irányok	Térkép felbontás	Integritási osztály
Útvonal szakasz	1 fok	1 x 10-3 szokványos
Útvonal és közel körzeti fix kialakítás	1/10 fok	1 x 10-3 szokványos
Közel körzeti érkezési/indulási útvonal szakasz	1 fok	1 x 10-3 szokványos
Műszeres megközelítési eljárás fix Kialakítás	1/10 fok	1 x 10-5 fontos
ILS iránysáv fekvés	1 fok	1 x 10-5 fontos
MLS zéró azimut fekvés	1 fok	1 x 10-5 fontos
Futópálya és FATO irány	1 fok	1 x 10-3 szokványos

6 Táblázat - Hosszúság/távolság/kiterjedés

Hosszúság / távolság / kiterjedés	Térkép felbontás	Integritási osztály
Útvonal szakasz hossza	1 km, vagy 1 NM	1 x 10-3 szokványos
Útvonal fix kialakítás távolsága	2/10 km (1/10 NM)	1 x 10-3 szokványos
Közel körzeti érkezési/indulási útvonal szakasz hossza	1 km, vagy 1 NM	1 x 10-5 fontos
Közel körzeti és műszeres megközelítési eljárás fix kialakítás távolsága	2/10 km (1/10 NM)	1 x 10-5 fontos
Futópálya és FATO hossza, TLOF kiterjedés	1 m	1 x 10-8 kritikus
Futópálya szélesség	1 m	1 x 10-5 fontos
Végbiztonsági sáv hossza és szélessége	1 m	1 x 10-8 kritikus
Rendelkezésre álló leszálló úthossz	1 m	1 x 10-8 kritikus
Rendelkezésre álló nekifutási úthossz	1 m	1 x 10-8 kritikus
Rendelkezésre álló felszálló úthossz	1 m	1 x 10-8 kritikus
Rendelkezésre álló gyorsítás-fékezési úthossz	1 m	1 x 10-8 kritikus
ILS iránysáv antenna-futópálya vég, távolság	berajzolás szerint	1 x 10-3 szokványos
ILS siklópálya antenna-küszöb, a középvonalon mért távolság	berajzolás szerint	1 x 10-3 szokványos
ILS marker-küszöb távolság	2/10 km (1/10 NM)	1 x 10-5 fontos
ILS DME antenna-küszöb, a középvonalon mért távolság	berajzolás szerint	1 x 10-5 fontos
MLS azimut antenna-futópálya vég távolsága	berajzolás szerint	1 x 10-3 szokványos
MLS magasság adó antenna-küszöb, a középvonalon mért távolság	berajzolás szerint	1 x 10-3 szokványos
MLS DME/P antenna-küszöb, a középvonalon mért távolság	berajzolás szerint	1 x 10-5 fontos

ANNEX 6/I.
A légijármű üzemeltetése: Nemzetközi kereskedelmi légiszállítás – Repülőgépek

I. kötet 8. kiadás – 2001. július
31. módosítással

A jelen kiadvány magába foglalja a 6. Annex I. részének 2001. március 10-e előtt elfogadott összes módosításait és 2001. november 1-től hatálytalanítja 6. Annex I. kötetének összes korábbi kiadásait.

A nemzetközi előírások és ajánlott gyakorlati eljárások alkalmazhatóságával kapcsolatosan lásd az Előszót.
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Módosítások

A módosítások kiadásáról az ICAO Journal és az egyéb ICAO kiadványok valamint Audio-vizuális kiképzési segédanyagok havi katalógusa rendszeres tájékoztatást biztosítanak. Kísérjék figyelemmel a fenti kiadványokat és a módosításokat az alábbi rovatokba vezessék be:

Módosítás			
száma	kiadás időpontja	alkalmazhatóság időpontja	bevezette
1. – 26.	2001. július 16.	2001. november 1.	
27. módosítás (A Tanács 2002. március 15-én fogadta el)	2002. július 15.	2002. november 28	
28. módosítás (A Tanács 2003. március 13-án fogadta el)	2003. július 14.	2003. november 27.	
29. módosítás (A Tanács 2005. március 9-én fogadta el)	2005. július 11	2005. november 24	
30. módosítás (A Tanács 2006. március 14-én fogadta el)	2006. július 17	2006. november 23	
31. módosítás (A Tanács 2007. március 14-én fogadta el) A következő oldalak cseréje: (iii), (iv), (vi) - (viii), (xxi), 1-5, 6-3, 6-10, 6-11, 7-1, 7-2, 8-3, 11-1, APP 2-2 és APP 2-3	2007. július 16	2007. november 22 2008. július 1 2009. január 1 2012. január 1	

Kiegészítés			
száma	kiadás időpontja	alkalmazhatóság időpontja	bevezette

Tartalomjegyzék

2. Függelék - Az üzemeltetési kézikönyv szerkezete és tartalma

1. Szerkezet
2. Tartalom

3. Függelék - Az egy gázsugár hajtóműves repülőgépek jóváhagyott üzemeltetésére vonatkozó kiegészítő követelmények éjszaka és/vagy műszeres időjárási körülmények (IMC) közötti repülések esetére

1. Gázturbinás hajtómű megbizhatósága
2. Rendszerek és felszerelések
3. Minimális felszerelések jegyzéke
4. A repülésvégrehajtási kézikönyv információi
5. Események jelentése
6. A járató tervezése
7. A hajózószemélyzet jártassága, képzése és ellenőrzése
8. Víz feletti útvonalak korlátozása
9. A járató tanúsítása vagy megerősítése

4. Függelék - Magasságmérő rendszerek RVSM légtérben való üzemeltetéséhez szükséges teljesítmény követelmények

5. Függelék - A járatók biztonsági felügyelete

1. Elsődleges légiközlekedési törvényhozás
2. Különleges üzemeltetési előírások
3. Polgári légiközlekedési hatóságok felépítése és biztonsági felügyeleti feladatok
4. Műszaki útmutatók
5. Jogosított műszaki személyzet
6. Igazolási és tanúsítási kötelezettségek
7. Folytatólagos ellenőrzési kötelezettségek
8. Biztonsági kérdésekről hozott döntések

A. Melléklet - Repülési idő és repülési szolgálati idő korlátozások

1. Cél és tárgykör
2. Meghatározások
3. A korlátozások módjai

B. Melléklet - Elsősegélynyújtó egészségügyi készletek

1. Típus
2. Az elsősegélynyújtó egészségügyi készletek száma
3. Elhelyezés
4. Tartalom

C. Melléklet - Repülőgép teljesítmény üzemeltetési korlátozások

1. példa
Cél és tárgykör
1. Meghatározások
2. Átesési sebesség — legalacsonyabb állandó(sult) repülési sebesség

3. Felszállás
4. Útvonalon
5. Leszállás

1. példa függeléke
1. Általános rész
2. Felszállás
3. Leszállás

2. példa
Cél és tárgykör
1. Meghatározások
2. Felszállás
3. Útvonalon
4. Leszállás

2. példa függeléke
1. Általános rész
2. Felszállás
3. Leszállás

3. példa
Cél és tárgykör
1. Általános rész
2. Repülőgép felszálló teljesítmény korlátozások
3. Felszállási akadálymentességi korlátozások
4. Korlátozások az útvonalon
5. Leszállási korlátozások

D. Melléklet - Repülési adatrögzítők

Bevezető
1. Repülési adatrögzítő (FDR)
2. Pilótakabin hangrögzítő (CVR)
3. A repülési adatrögzítő és a pilótakabin hangrögzítő rendszerek ellenőrzése

E. Melléklet - Két gázsugár hajtóművel felszerelt repülőgépek megnövelt hatótávolságú üzemeltetése

1. Cél és tárgykör
2. Meghatározások
3. Légialkalmassági követelmények a megnövelt hatótávolságú üzemeltetéshez
4. A meghajtó rendszer fejlettsége és megbízhatósága
5. Légialkalmassági módosítások és karbantartási program előírások
6. Repülés előkészítési követelmények
7. Az üzemeltetés alapelvei
8. Az üzemeltetés engedélyezése

F. Melléklet - Légijármű üzembentartási engedély és érvényesítés

1. Cél és tárgykör
2. Előírt műszaki biztonsági értékelések
3. Jóváhagyási intézkedések
4. Elfogadási tevékenységek
5. Egyéb jóváhagyási vagy elfogadási megfontolások
6. Az üzemeltetési előírások érvényesítése
7. A légijármű üzembentartási engedély módosítása

G. Melléklet - Minimális felszerelési jegyzék (MEL)

H. Melléklet - Repülésbiztonsági dokumentációs rendszer

1. Bevezető
2. Összeállítás és tartalom
3. Érvényesség
4. Tartalmi kialakítás
5. Terjesztés
6. Módosítás

I. Melléklet - Kiegészítő útmutató az egy gázsugár hajtóműves repülőgépek éjszaka és/vagy műszeres időjárási körülmények (IMC) közötti jóváhagyott üzemeltetésére

1. Cél és tárgykör
2. Gázturbinás hajtómű megbizhatósága
3. Üzemeltetési kézikönyv
4. A járató tanúsítása vagy megerősítése
5. Üzemeltetői és karbantartási program előírásai
6. A víz feletti repülés útvonalak korlátozásai

A 6. Annex I. részében alkalmazott rövidítések és jelzések

Rövidítések és jelzés

AC	váltóáram
ACAS	Összeütközés elkerülését biztosító fedélzeti rendszer
ADS	Automatikus légtérfelderítés
ADS-C	Automatikus légtérfelderítés - szerződés
AFCS	Automatikus repülésvezérlő rendszer
AGA	Repülőterek, légútvonalak és földi berendezések
AIG	Légijármű baleset kivizsgálás és megelőzés
AOC	Légiforgalmi üzemeltetési irányítás
AOC	Légijármű üzembentartási engedély
APU	Segédhajtómű
ASDA	Rendelkezésre álló gyorsításból történő megállási távolság
ASE	Magasságmérő rendszer hiba
ASIA/PACIFIC	Ázsia és Csendes Óceáni területek
ATC	Légiforgalmi irányító szolgálat
ATM	Légiforgalom szervezés
ATS	Légiforgalmi szolgálatok
CAS	Műszer szerint szabályozott helyesbített sebesség
CAT I	I. kategória
CAT II	II. kategória
CAT III	III. kategória
CAT IIIA	IIIA. kategória
CAT IIIB	IIIB. kategória
CAT IIIC	IIIC. kategória
Cm	centiméter
CDL	Repülésvezérlő szerkezetek alaphelyzettől történő eltéréseinek jegyzéke
CFIT	Földnek ütközés vezetett repülés során (szabályszerűen üzemelő légijárművel)
CPDLC	Légiforgalmi irányító és repülőgépvezető közötti adatátviteli összeköttetés
CVR	Pilótakabin hangrögzítő berendezés
DA	Tengerszint feletti elhatározási magasság
DA/H	Elhatározási magasság
DC	Berendezés vezérlés
D-FIS	Adatátvitelt alkalmazó repüléstájékoztatás
DH	Talajszint feletti elhatározási magasság

DME	Távolságmérő berendezés
DSTRK	Kívánatos repülési irány
ECAM	Központi elektronikus légijármű képernyő
EFIS	Elektronikus repülési műszerrendszer
EGT	Kilépő gázhőmérséklet
EICAS	Hajtómű ellenőrző és hajózószemélyzet riasztó rendszer
ELT	Vészhelyzeti helyjeladó berendezés
ELT(AD)	Automatikusan kibocsátható vészhelyzeti helyjeladó berendezés
ELT(AF)	Automatikus állandó vészhelyzeti helyjeladó berendezés
ELT(AP)	Automatikus hordozható vészhelyzeti helyjeladó berendezés
ELT(S)	Túlélési vészhelyzeti helyjeladó berendezés
EPR	Hajtómű nyomásviszony
ETOPS	Gázsugár hajtóműves repülőgép megnövelt hatótávolságú üzemeltetése
EUROCAE	Európai Polgári Légiközlekedési Elektronikai Szervezet
FDAU	Repülési adatgyűjtő egység
FDR	Légijármű repülési adatrögzítő
FL	Repülési szint
FM	Frekvencia moduláció
ft	láb
ft/min	láb/perc
g	Általános gyorsulás
GCAS	Földnek ütközés elkerülését biztosító fedélzeti rendszer
GNSS	Műholdas navigációs világ rendszer
GPWS	Földközelség jelző és riasztó rendszer
hPa	Hektopascal
IFR	Műszerrepülési szabályok
ILS	Műszeres leszállító rendszer
IMC	Műszeres időjárási körülmények
INS	Inerciális navigációs rendszer
ISA	Nemzetközi műlégkör
kg	kilogramm
kg/m^2	kilogramm/négyzetméter
km	kilométer
km/h	kilométer/óra
kt	csomó
kt/s	csomó/másodperc
lb	font (súlymérték)
LDA	Rendelkezésre álló leszállási távolság

m	méter
MDA	Legalacsonyabb tengerszint feletti süllyedési magasság
MDA/H	Legalacsonyabb süllyedési magasság tengerszint/földfelszín felett
MDH	Legalacsonyabb földfelszín feletti süllyedési magasság
MEL	Minimális berendezések jegyzéke
MHz	Megahertz
MLS	Mikrohullámú leszállító rendszer
MMEL	Gyártó minimális felszerelési jegyzéke
MNPS	Minimális navigációs teljesítmény előírás
MOPS	Minimális üzemi teljesítmény előírás
m/s	méter/másodperc
m/s^2	méter/másodperc négyzet
N	Newton (erő)
N_1	Kisnyomású kompresszor fordulatszáma (kétfokozatú kompresszor); ventillátor fokozat fordulatszáma (háromfokozatú kompresszor)
N_2	Nagynyomású kompresszor fordulatszáma (kétfokozatú kompresszor); közepes nyomású kompresszor fokozat fordulatszáma (háromfokozatú kompresszor)
N_3	Nagynyomású kompresszor fordulatszáma (háromfokozatú kompresszor)
NAV	Navigáció
NM	Tengeri mérföld
OCA	Akadálymentes tengerszint feletti magasság
OCA/H	Akadálymentes tengerszint/földfelszín feletti magasság
OCH	Akadálymentes földfelszín feletti magasság
PANS	Légiforgalmi szolgálatok eljárásai
RCP	Előírt kommunikációs teljesítmény
RNP	Előírt navigációs teljesítmény
RVR	Futópályamenti látástávolság érték
SICASP	Másodlagos légtérfelderítő radar fejlesztési és összeütközés elkerülési rendszereket kidolgozó munkacsoport
SOP	Szabványos üzemeltetési eljárások
SST	Hangsebesség feletti szállítás
STOL	Rövid fel és leszállás
TAS	Tényleges repülési sebesség
TAWS	Földfelszín közelség figyelmeztető rendszer
TCAS	Forgalmi riasztást és összeütközés elkerülést biztosító rendszer
TLA	Tolóerő szabályzó kar állásszöge
TLS	Megcélzott biztonsági szint
TODA	Rendelkezésre álló felszállási távolság

TORA	Rendelkezésre álló felszállási nekifutási távolság
TVE	Összegzett függőleges hiba
UTC	Egyeztetett világidő
VFR	Látvarepülési szabályok
V_D	Tervezési süllyedési sebesség
VMC	Látás utáni időjárási körülmények

(vii) oldal

V_{MC}	Legalacsonyabb sebesség, amelyen a légijármű üzemképtelen fő hajtómű mellett még kormányozható
VOR	Ultrarövidhullámú körsugárzó adóberendezés
V_{SO}	Átesési sebesség, azaz a legalacsonyabb állandó sebesség a repülésvezérlő szerkezetek leszálláshoz történő beállítása mellett
V_{S1}	Átesési sebesség, azaz a legalacsonyabb állandó sebesség a repülésvezérlő szerkezetek meghatározott beállítása mellett
VTOL	Függőleges fel és leszállás
WXR	Időjárás
Szimbólumok	
°C	Celsius fok
%	Százalék

(viii) oldal

A jelen Annex előírásaival kapcsolatos kiadványok

Egyezmény a Nemzetközi Polgári Légiközlekedésről (Doc 7300)

Európai Polgári Légiközlekedési Elektronikai Szervezet (EUROCAE) ED55A és ED56A jelzésű kiadványai

Nemzetközi előírások a nyílt tengeren történő összeütközés megelőzésére

A Nemzetközi Légiszállítás Szabályzásának Előírásai és Útmutatói (Doc 9587)

Jegyzőkönyv a nemzetközi polgári légiközlekedésről szóló Egyezmény (83. b cikkely) módosításáról (Doc 9318)

A Nemzetközi Polgári Légiközlekedési Egyezmény jelen kiadványban felhasznált **Annex**-ei

1. Annex	*Személyi jogosítás*
2. Annex	*Repülési szabályok*
3. Annex	*A nemzetközi légiközlekedés meteorológiai szolgálata*

4. Annex	*Léginavigációs térképek*
5. Annex	*A légi és földi üzemeltetésnél alkalmazott mértékegységek*
6. Annex	*Légijárművek üzemeltetése* *II. rész — Általános célú nemzetközi légiközlekedés — Repülőgépek* *III. rész — Nemzetközi üzemeltetés — Forgószárnyas légijárművek*
7. Annex	*Légijármű nemzetisége és lajstromozása*
8. Annex	*Légijármű légialkalmassága*
9. Annex	*Egyszerűsítések*
10. Annex	*Légiforgalmi távközlés III. kötet* *I. rész — Digitális adatátviteli rendszerek* *II. rész — Rádiótávbeszélő rendszerek*
10. Annex	*Légiforgalmi távközlés IV. kötet* *Légtérfelderítő radar és összeütközés elkerülését biztosító rendszerek*
11. Annex	*Légiforgalmi szolgálatok*
12. Annex	*Kutatás és mentés*
13. Annex	*Légijármű baleset kivizsgálás*
14. Annex	*Repülőterek* *I. kötet — Repülőtér tervezés és üzemeltetés*
15. Annex	*Légiforgalmi tájékoztató szolgálat*
16. Annex	*Környezetvédelem* *I. kötet — Légijármű zaj*
18. Annex	*Veszélyes áruk légi szállítása*

A Légiforgalmi Szolgálatok Eljárásai

ATM – Légiforgalmi Áramlásszervezés (Doc 4444)

OPS — Légijármű Üzemeltetés (Doc 8168)
I. kötet — Repülési eljárások
II. kötet — A látvarepülési (VFR) és műszerrepülési (IFR) szabályok kidolgozása
TRG – Képzés(DOC 9868)

Körzeti Kiegészítő Eljárások (Doc 7030)

Kézikönyvek

Légijármű baleset megelőzési kézikönyv (Doc 9422)

Repülőtér Szolgálati Kézikönyv (Doc 9137)
1. rész — Tűzoltó és mentő szolgálatok
8. rész — Repülőtér üzemeltető szolgálatok

Légijármű Légialkalmassági Kézikönyv (Doc 9760)

Emberi Tényezők Kiképzési Kézikönyv (Doc 9683)

A Földi Jégtelenítés Végrehajtási Kézikönyve (Doc 9640)

Időjárástól Független Légijármű Üzemeltetés Kézikönyve (Doc 9365)

A Repülési Szimulátorok Minősítési Kézikönyve (Doc 9625)

Üzemeltetés Felügyeleti, Jogosítási és Folyamatos Ellenőrzési Eljárások Kézikönyve (Doc 8335)

Az állami személyi jogosítási rendszer létrehozásáról szóló eljárások kézikönyve(DOC 9379)

A 300 méter (1000 Láb) Csökkentett Függőleges Elkülönítési Minimum FL290 és FL410 Közötti Bevezetésének Kézikönyve (Doc 9574)

Az Előírt Távközlési Teljesítmény (RCP) Kézikönyve (Doc 9869)

Az Előírt Navigációs Teljesítmény (RNP) Kézikönyve (Doc 9613)

Üzemeltetési Kézikönyv Elkészítése (Doc 9376)

Biztonság Irányítási Kézikönyv (SMM) (Doc 9859)

Biztonság Felülvizsgálati Kézikönyv (Doc 9734)
A rész – Az Állam Biztonsági Felülvizsgálati Rendszerének létrehozása és irányítása

Képzési Kézikönyv (Doc 7192)
D-3 rész – Repülésüzemi Tiszt / Szolgálatvezető

Körlevelek

126. szám Útmutató a hangsebesség feletti szállító légijármű üzemeltetéséhez

Útmutató a Nemzetközi Polgári Légiközlekedésről szóló Egyezmény 83. b cikkelyének bevezetéséhez (295. körlevél)

***(xxi)* oldal**

(módosítás – forrás – tárgy – elfogadva/ hatályos/ alkalmazható)

30) – Felügyeleti és a Konfliktusmegoldási Rendszerek munkacsoport első ülése, Hajózó személyzetek Szakszolgálati Engedélyeinek kiadásával és Képzésével foglalkozó munkacsoport második ülése, Akadálymentesség kérdésével foglalkozó munkacsoport tizennegyedik ülése, Egyesült Államok által benyújtott javaslat, Tanácsi kérés, A35-17 Közgyűlési Határozat, a Közgyülés 35. ülése és a Tizenegyedik Léginavigációs Konferencia:

a) nagyobb felbontóképességű magasság kódolók szállítása;

b) repülőgépvezetők folyamatos gyakorlatban tartási és szakmai jártassági ellenőrzésének követelményei, a személyzet kereszt jogosítása és a gyakorlati jártasság keresztirányú beszámítása, az alkalmasság értékelése, fenyegetés és hiba kezelés valamint a repülőgépvezetők félévenkénti szakmai jártasság ellenőrzése;

c) a repülőgépvezetők ismerete az eljárások tartalmi felépítése által meghatározott üzemeltetési követelményekről;

d) a Repülés-üzemi tisztek / szolgálatvezetők jogosítása és az állami szabályozó rendszer kritikus elemei;

e) a légijármű üzembentartási engedély másolatának szállítása a légijármű fedélzetén;

f) a biztonsági adatokat gyűjtő és feldolgozó rendszerből származó információk védelmére vonatkozó jogi útmutatások; és

g) a biztonság elfogadható szintjére vonatkozó új útmutató anyagokhoz kapcsolódó biztonság kezelési ajánlások és hivatkozások.

2006. március 14.	2006. július 17.	2006. november 23.

31) – Üzemeltetési Adatkapcsolat munkacsoport első ülése (OPLINKP/1) – Felügyeleti és a Konfliktusmegoldási Rendszerek munkacsoport első ülése (SCRSP/1) – Léginavigációs Bizottság tanulmánya:

a) előírások módosítása az automatikus légtérfelderítési adat szolgáltatási megállapodás (ADS-C) alkalmazásához rendelkezésre álló technológiák bevezetésének megkönnyítéséhez és a légiforgalmi szolgáltatások (ATS) biztosítása során az előírt távközlési teljesítmény RCP) bevezetéséhez;

b) a vészhelyzeti helyjeladók (ELT) kötelező szállításával kapcsolatosan meglévő ajánlások 2008. július 01-től érvényes módosítása; és

c) a válaszjeladóknál alkalmazott nyomás-magasság jel kialakítókra vonatkozó előírások változásai 2009. január 1-től és 2012. január 1-től.

2007. március 14.	2007. július 16.	2007. november 22. 2008. július 1 2009. január 1 2012. január 1

Operator – Járató

Valamely személy, szervezet vagy vállalat, amely légijárműveket üzemeltet vagy ilyen tevékenység végzésére ajánlkozik.

Operator's maintenance control manual – Járató karbantartás irányítási kézikönyve
A járató azon eljárásait ismertető dokumentum, amely biztosítja az összes tervezett és igény szerint végrehajtandó karbantartási feladat megfelelő időben, és szabályozott valamint kielégítő módon történő végrehajtását a járató légijárművén.

Pilot-in-command – Légijármű parancsnoka
A repülés biztonságos végrehajtásáért felelős, a járató vagy az általános célú légiközlekedés esetében a légijármű tulajdonosa részéről parancsnoknak kijelölt repülőgépvezető.

Pressure-altitude – Nyomásmagasság
Magasság fogalmakban kifejezett légköri nyomás érték, mely megfelel a nemzetközi Egyezményes Légkör adott nyomásértékének (a 8. Annex alapján).

Psychoactive substances – Szellemi tevékenységet befolyásoló anyagok
Alkohol, ópiumból vagy kenderből készített kábítószer, kokain, nyugtatók és altatók, egyéb izgató, serkentő, élénkítőszerek, képzeteket keltő erős izgatószerek és illékony oldószerek a kávé és a dohányféleségek kivételével.

Repair – Javítás
A légijármű bármely üzemi alkatrészének sérülést vagy üzemszerű kopást követő repülésre alkalmas állapotba történő helyreállítása annak biztosítása érdekében, hogy az továbbra is megfeleljen a vonatkozó légialkalmassági előírásoknak, amelyeket az adott légijármű típus bizonyítványának kiadásakor figyelembe vettek.

Required communication performance (RCP) – Előírt távközlési teljesítmény
A repülés közbeni távközlési teljesítmény követelményeire vonatkozó, meghatározott ATM feladatok támogatásával összefüggő közlemény.

Required communication performance type (RCP) – Előírt távközlési teljesítmény típus
A távközlés lebonyolítási idejét, folyamatosságát, rendelkezésre állását és integrítását meghatározó RCP paraméterekhez rendelt értékeket jellemző címkék (például: RCP 240).

Required navigation performance (RNP) – Előírt navigációs pontosság
Egy meghatározott légtérben történő repülés-végrehajtáshoz szükséges navigációs teljesítmény, azaz pontosság.

Megjegyzés: A navigációs teljesítményt és előírásokat az adott RNP típusra és/vagy alkalmazásra határozzák meg.

Rest period – Pihenőidő
A földön eltöltött bármely időtartam, amely alatt a járató a hajózószemélyzet tagját mentesíti összes feladata alól.

RNP type – Előírt navigációs pontosság típus
A repülőgép tervezett repülési helyzetéhez viszonyított, tengeri mérföldben kifejezett távolsággal meghatározott pontossági érték. A repülés végrehajtása során a repülési idő legalább 95 %-ában ezen a határértéken belül kell a repülőgépnek tartózkodnia.

Például: – Az RNP 4 olyan navigációs pontosság határértéket jelent, amelynek alapján az adott repülőgép repülési idejének legalább 95 százalékában mindenkori tervezett repülési helyzetéhez viszonyítva plusz/minusz 4 tengeri mérföld (7.4 km) távolságon belül repül.

Runway visual range (RVR*)* – Futópályamenti látástávolság érték
Az a távolság, ameddig a futópálya középvonalán álló légijármű vezetője látja a futópálya felületi jelzéseket vagy a futópálya szélét kijelölő, illetve a középvonalát azonosító fényeket.

Safe forced landing – Biztonságos kényszerleszállás
Elkerülhetetlen kényszerleszállás talajra vagy vízfelszínre, melynek során nagy valószínűséggel várható, hogy a légijármű fedélzetén valamint a földön tartózkodó személyek nem sérülnek meg.

Safety management system – Biztonság irányítási rendszer
A biztonság irányításának rendszerezett megközelítése, amely magában foglalja a szükséges szervezeti felépítést, felelősségi köröket, irányelveket és eljárásokat.

Safety programme – Biztonsági program
Előírások és tevékenységek egységes rendszere, amely a biztonság növelésére irányul.

Small aeroplane – Kis repülőgép
Olyan repülőgép, amelynek engedélyezett legnagyobb felszállósúlya (tömege) 5700 kg vagy kevesebb.

State of Registry – Lajstromozó állam
Azon állam, amelynek lajstromába a légijárművet bevezették.

Megjegyzés: A nem nemzeti alapon működő nemzetközi üzemeltető vállalkozás vagy szervezet légijárművének lajstromozása esetében az abban érintett államokra együttesen és külön-külön is vonatkozik az a kötelezettség, amely a Chicagó-i Egyezmény értelmében a lajstromozó államot illeti. Erre vonatkozóan lásd a Tanács 1967. december 14-i Határozatát a Nemzetközi Üzemeltető Szervezetek Által Üzemeltetett Légijárművek Nemzeti Hovatartozása és Lajstromozása címmel, amely megtalálható a Nemzetközi Légiszállítás Gazdasági Szabályzására vonatkozó Útmutatóban (Doc 9587).

State of the Operator – Járató állama
Az az állam, amelynek területén a járató legfőbb üzleti telephelye található. Ennek hiányában az az állam, amelyben a járató állandó tartózkodási helye (címe) van.

Target level of safety (TLS) – Megcélzott biztonsági szint (TLS)
Adott körülmények között elfogadhatónak ítélt kockázati szintet kifejező általános fogalom.

Total vertical error (TVE) – Összegzett magassági hiba (TVE)
A légijármű aktuális repülési nyomás magassága és a részére meghatározott nyomás magasság (repülési szint) közötti függőleges geometriai különbség.

Visual meteorological conditions (VMC) – Látás utáni időjárási körülmények
Látástávolsággal, felhőzettől mért távolsággal és felhőalappal kifejezett időjárási körülmények (a 2. Annex alapján), ha azok a látás utáni időjárási körülményekre meghatározott minimum értékeknél jobbak.

Megjegyzés: A látás utáni időjárási körülményekre meghatározott minimum értékeket a 2. Annex 4. fejezete tartalmazza.

Megjegyzés: Ez az előírás nem teszi szükségessé azt, hogy bármely repülőgép sárkányszerkezetén átvágható felületek legyenek.

6.3 Repülési adatrögzítők

1. Megjegyzés: A repülési adatrögzítők két rendszerből illetve berendezésből, a repülési adatrögzítőből (FDR) valamint a pilótakabin hangrögzítőből (CVR) állnak.

2. Megjegyzés: Az összetett repülési adat és pilótakabin hangrögzítő berendezések csak a jelen Annex-ben külön ismertetett repülési adatrögzítő berendezés előírások teljesítésére használhatók.

3. Megjegyzés: A repülési adatrögzítőkre vonatkozó részletes útmutató a D. Mellékletben található.

6.3.1 Repülési adatrögzítők – típusok

6.3.1.1 Az I. típusú repülési adatrögzítő rögzítse azokat az adatokat, amelyek a repülőgép repülési pályájának, sebességének, helyzetének, hajtómű teljesítményének és működésének valamint a repülésvezérlő szerkezetek beállításának és működésének pontos meghatározásához szükségesek.

6.3.1.2 A II. és IIA. típusú repülési adatrögzítő rögzítse azokat az adatokat, amelyek a repülőgép repülési pályájának, sebességének, helyzetének, hajtómű teljesítményének valamint a magassági és áramlásrontó (fékező) szerkezetei beállításának pontos meghatározásához szükségesek.

6.3.1.3 1995 január 1. után ne használjanak fémszalaggal üzemelő repülési adatrögzítő berendezést.

6.3.1.4 **Ajánlás** – *1998 november 5. után ne használják a frekvencia modulációt (FM) alkalmazó analóg adatrögzítőket.*

6.3.1.4.1 2003 január 1. után ne használják a fényképészeti filmmel működő repülési adatrögzítőket.

6.3.1.5 Az összes olyan digitális adathálózati összeköttetést alkalmazó repülőgép, amelynek egyedi légialkalmassági bizonyítványát először 2005 január 1. után adják ki, valamint pilótakabin hangrögzítő berendezés (CVR) szállítására kötelezett, az összes adathálózati digitális közleményváltást a repülési adatrögzítő berendezésén rögzítse. A legkisebb felvételi időtartam azonos legyen a pilótakabin hangrögzítő berendezés felvételi időtartamával és a felvétel összevethető legyen a pilótakabinban rögzített hangfelvétellel.

6.3.1.5.1 2007 január 1. után az összes digitális adathálózati összeköttetést alkalmazó repülőgép, amely pilótakabin hangrögzítő berendezés (CVR) szállítására kötelezett, az összes adathálózati digitális közleményváltást a repülési adatrögzítő berendezésén rögzítse. A legkisebb felvételi időtartam azonos legyen a pilótakabin hangrögzítő berendezés felvételi időtartamával és összevethető legyen a pilótakabinban rögzített hangfelvétellel.

6.3.1.5.2 Az adathálózati digitális közleményváltás tartalmának megismeréséhez szükség tájékoztatást és ahol ez lehetséges a közlemény megjelenítésének vagy a hajózószemélyzet által történt lehívásának időpontját rögzítsék.

Megjegyzés: Az adathálózati összeköttetések közé tartoznak, azonban nem csak ezekre korlátozódnak a következők:

ADS – C – automatikus légtérfelderítési adat szolgáltatási megállapodás
CPDLC – légiforgalmi irányító és repülőgépvezető közötti adathálózati összeköttetések
D-FIS – adathálózati és repüléstájékoztató szolgálati összeköttetések
AOC – légiközlekedési üzemi irányítási közlemények.

6.3.1.6 **Ajánlás** – *Minden olyan 5700 kg. legnagyobb engedélyezett felszálló-súlynál nagyobb tömegű repülőgépet, amely repülési adatrögzítő és pilótakabin hangrögzítő berendezések szállítására kötelezett, alternatív megoldásként kettő összetett repülési adat és pilótakabin hangrögzítő berendezéssel is (FDR/CVR) felszerelhetnek.*

6.3.1.7 ***Ajánlás*** – *Minden olyan több gázturbinás sugárhajtóművel felszerelt repülőgépet, amelynek legnagyobb engedélyezett felszálló-súlya 5700 kg. vagy kevesebb és amely repülési adatrögzítő és/vagy pilótakabin hangrögzítő berendezések szállítására kötelezett, alternatív megoldásként egy összetett repülési adat és pilótakabin hangrögzítő berendezéssel is (FDR/CVR) felszerelhetnek.*

6.3.1.8 Az I.A típusú repülési adatrögzítő rögzítse azokat a jellemző adatokat, amelyek a repülőgép repülési pályájának, sebességének, helyzetének, hajtómű teljesítményének és működésének valamint a repülésvezérlő szerkezetek beállításának és működésének pontos meghatározásához szükségesek. A következő pontokban ismertetjük azokat a jellemzőket, amelyek kielégítik az I.A típusú repülési adatrögzítőre vonatkozó előírásokat. A jelölés (*) nélküli jellemzők rögzítése kötelező. A jelöléssel ellátott (*) jellemzők akkor rögzítendők, ha a repülőgép rendszerei vagy a hajózószemélyzet a jellemzőt illetve adatot a repülőgép üzemeltetéshez használja fel.

6.3.1.8.1 A repülőgép repülési pályájára és sebességére vonatkozó előírásokat kielégítő jellemzők:

– nyomás-magasság
– műszer szerinti vagy kalibrált repülési sebesség
– levegő – föld viszonyítási helyzet és minden egyes futómű levegő – föld érzékelő; szükség szerint
– külső levegő hőmérséklete vagy össz-hőmérséklet
– géptengely irányszög (a hajózószemélyzet elsődleges műszerei alapján)
– függőleges gyorsulás
– oldalirányú gyorsulás
– hosszirányú gyorsulás (törzs tengely)
– idő vagy relatív idő számítás
– navigációs adatok*: széleltérítés sodródási szög, szélsebesség, szélirány, szélességi és hosszúsági fok adatok
– földi feletti sebesség*
– rádió magasságmérő által jelzett magasság*

6.3.1.8.2 A repülési helyzetre vonatkozó előírásokat kielégítő jellemzők:

– bólintási helyzet
– bedöntési helyzet
– legyezőmozgás vagy csúszás szög*
– állásszög*

6.3.1.8.3 A hajtóműre vonatkozó előírásokat kielégítő jellemzők:

– hajtómű tolóerő illetve teljesítmény: minden egyes hajtómű tolóereje, pilótakabin tolóerő szabályzó kar(ok) helyzete
– sugárfordító helyzete*

– hajtómű tolóerő utasítás*
– szükséges hajtómű tolóerő*
– hajtómű levegőelvételi-szelep helyzete*
– további hajtómű jellemzők*: hajtómű nyomásviszony, kijelzett hajtómű rezgési szint értékek, tüzelőanyag áramlási értékek, tüzelőanyag elvételi kar helyzete, N_1, N_2, EGT, TLA, N_3

6.3.1.8.4 A repülésvezérlő szerkezetek helyzetére vonatkozó előírásokat kielégítő jellemzők:

– bólintás trimm lap(ok) helyzete
– fékszárnyak*: belépőél helyzete, pilótakabin fékszárny vezérlőkar beállítás
– orrsegédszárnyak*: orrsegédszárny belépőél helyzete, pilótakabin orrsegédszárny vezérlőkar helyzete
– futómű*: futómű, futó vezérlőkar helyzete
– oldalkormány trimm lap helyzete*
– csűrő trimm lap helyzete*
– pilótakabin trimm vezérlő szervek helyzete *: bólintás
– pilótakabin trimm vezérlő szervek helyzete *: bedöntés
– pilótakabin trimm vezérlő szervek helyzete *: legyezőmozgás
– földi áramlásrontó és aerodinamikai fék*: földi áramlásrontó helyzet, földi áramlásrontó vezérlőkar helyzet, aerodinamikai fék helyzet, aerodinamikai fék vezérlőkar helyzet
– jégmentesítő és/vagy jégtelenítő berendezések kiválasztása*
– hidraulika nyomás (minden egyes rendszer)*
– tüzelőanyag-mennyiség*
– AC (váltóáramú) elektromos táplálások helyzete*
– DC (egyenáramú) elektromos táplálások helyzete*
– segédhajtómű levegőelvételi-szelep helyzete*
– számított súlyponthelyzet*

6.3.1.8.5 Az üzemeltetésre vonatkozó előírásokat kielégítő jellemzők:

– riasztások

– elsődleges repülés vezérlő szerkezetek helyzete és a kezelő egységek beállítása: bólintási, bedöntési és legyezőmozgás szerinti tengelyek
– marker adó átrepülése
– minden egyes navigációs vevőberendezés frekvencia kiválasztása
– kézi rádió adógomb helyzete és CVR/FDR szinkron jel
– robotpilóta, tolóerő automata, automatikus repülésvezérlés üzemmód és bekapcsolt állapot helyzete*
– választott barometrikus nyomás beállítás*: légijármű parancsok és első tiszt
– választott nyomásmagasság (repülőgépvezető részéről állítható összes üzemmód)*
– választott repülési sebesség (repülőgépvezető részéről állítható összes üzemmód)*
– választott MACH szám (repülőgépvezető részéről állítható összes üzemmód)*
– választott emelkedési és süllyedési sebesség (repülőgépvezető részéről állítható összes üzemmód)*
– választott géptengely irányszög (repülőgépvezető részéről állítható összes üzemmód)*
– választott repülési pálya (repülőgépvezető részéről állítható összes üzemmód)*; repülési irányszög, korrigált repülési pálya, megközelítési siklópálya szög
– választott elhatározási magasság*
– az elektronikus repülési műszerrendszer (EFIS) választott megjelenítési beállítása*: légijármű parancsok és első tiszt
– több funkciós hajtómű teljesítmény és állapot riasztás megjelenítési beállítása*
– GWPS/TAWS/GCAS helyzet*: földfelszín megjelenítési mód választás, beleértve a következőket: figyelmeztető jelzések és riasztások, riasztási állapot, tanácsadó rendszer állapot, üzemi kapcsolók helyzete
– alacsony nyomás riasztások*: hidraulika és pneumatika rendszerek
– számítógép meghibásodás*
– veszélyes kabinnyomás csökkenés riasztás*
– TCAS/ACAS (forgalmi riasztó és összeütközés elkerülését biztosító rendszer / összeütközés elkerülését biztosító fedélzeti rendszer*
– jegesedés jelzőrendszer*
– veszélyes hajtómű rezgés riasztás minden egyes hajtóműnél*
– veszélyes hajtómű túlmelegedés riasztás minden egyes hajtóműnél*
– veszélyes alacsony olajnyomás riasztás minden egyes hajtóműnél*
– veszélyes hajtómű fordulatszám (sebesség) túllépés riasztás minden egyes hajtóműnél*
– szélnyírás riasztás*
– repülés közben működő átesés elleni védelem, vezérlőkar rázás és elmozdítás működtetése*
– a pilótakabinban található összes repülésvezérlő egység erőhatásai*: kormányszarv, kormányoszlop, pedálok kabinból való működtetésének erőhatásai
– függőleges eltérések*: ILS siklópálya, MLS magasság irányvezetés, GNSS megközelítési pálya
– vízszintes eltérések*: ILS iránysáv, MLS oldalszög irányvezetés, GNSS megközelítési pálya
– távolságmérő jelzőműszerek által jelzett távolság értékek (1 és 2 DME készletek)*
– elsődleges navigációs rendszerek*: GNSS, INS, VOR/DME, MLS, ILS, Loran C
– fékberendezések*: bal és jobb oldali féknyomások, bal és jobb oldali fékpedál helyzete
– időpont*
– események jelzése*
– pilótakabin üvegre vetített megjelenítő rendszer bekapcsolása*

– paravizuális megjelenítő egységek bekapcsolása*

1. Megjegyzés: Az előírt jellemzők, közöttük a tartományok, a mintavételi pontosság és felbontás megtalálhatók az EUROCAE Polgári Légiközlekedési Berendezések Európai Szervezetének repülési adatrögzítő rendszerekre kidolgozott MOPS (minimális üzemi teljesítmény előírások) kiadványában vagy más egyenértékű dokumentumban.

2. Megjegyzés: A rögzítendő jellemzők száma a repülőgép típustól, annak összetettségétől függ, azonban a csillag (*) jelölés nélküli jellemzőket ettől függetlenül rögzíteni kell. A (*) jelöléssel ellátott jellemzők akkor rögzítendők, ha a repülőgép rendszerei vagy a hajózószemélyzet a jellemzőt illetve adatot a repülőgép üzemeltetéshez használja fel.

6.3.2 Repülési adatrögzítők – felvételi időtartam

Minden repülési adatrögzítő képes legyen a működése legalább utolsó 25 órájában rögzített tájékoztatások tárolására, kivéve a IIA. típusú repülési adatrögzítőt, amely képes legyen a működése legalább utolsó 30 percében rögzített tájékoztatások tárolására.

6.3.3 Repülési adatrögzítők – Repülőgépek, amelyek egyedi légialkalmassági bizonyítványát először 1989 január 1-én, vagy ezt követően adták ki

6.3.3.1 Minden olyan repülőgépet, amelynek legnagyobb engedélyezett felszállósúlya (tömege) több mint 27 000 kg. I. típusú repülési adatrögzítő berendezéssel szereljenek fel.

6 – 9 oldal

6.12 Az összes, 15 000 méter (49 000 láb) repülési magasság felett üzemeltetett repülőgép – sugárzásérzékelő és jelző berendezés

Minden olyan repülőgépet, amelyet 15 000 méter (49 000 láb) repülési magasság felett kívánnak üzemeltetni, szereljenek fel sugárzásmérő és jelző rendszerrel, amely folyamatosan méri és jelzi a teljes kozmikus sugárzás (azaz a galaktikus és szoláris eredetű ion és neutron sugárzás) kapott és a repülés során összegzett mennyiségét. A berendezés kijelző egysége egy hajózószemélyzeti tag számára közvetlenül látható legyen.

Megjegyzés: A berendezést az illetékes országos hatóság által elfogadhatónak tartott értékek alapján szabályozzák be (kalibrálják).

6.13 Az összes olyan repülőgép, amely megfelel a 16. Annex I. kötet zajbizonyítvány előírásoknak

A repülőgép szállítson olyan dokumentumot, amely megfelel a repülőgép zajbizonyítványának. Amikor ez az okmány vagy a lajstromozó állam részéről jóváhagyott más, egyéb dokumentumban található zajszint minősítést tartalmazó megfelelő nyilatkozat nem angol nyelvű, mellékeljék annak hiteles angol nyelvű fordítását is.

Megjegyzés: A zajszint minősítést bármely olyan dokumentum tartalmazhatja, amelyet a lajstromozó állam elfogad és a fedélzeten szállítanak.

6.14 MACH-szám jelzőműszer

Minden olyan repülőgépet, amelynek üzemeltetési sebesség korlátozásait Mach-szám érték(ek)ben fejezik ki, Mach-szám jelzőműszerrel szereljenek fel.

Megjegyzés: Ez az előírás nem zárja ki a repülési sebesség mérőműszer igénybevételét a légiforgalmi szolgálatok céljaira megadott Mach-szám érték kiszámításához.

6.15 Repülőgépek, amelyeket földközelség jelző és riasztó rendszerrel (GPWS) kell felszerelni

6.15.1 Minden olyan gázsugár hajtóműves repülőgépet, amelynek engedélyezett legnagyobb felszállósúlya (tömege) 5700 kg-nál nagyobb, vagy amely több mint 9 utas szállítására jogosított, földközelség jelző és riasztó rendszerrel szereljenek fel.

6.15.2 Minden olyan gázsugár hajtóműves repülőgépet, amelynek egyedi légialkalmassági bizonyítványát először 2001 január 1-én vagy ezt követően adják ki, engedélyezett legnagyobb felszállósúlya (tömege) 15000 kg-nál nagyobb, vagy amely több mint 30 utas szállítására jogosított, szereljenek fel olyan földközelség jelző és riasztó rendszerrel, ami előre irányuló veszélyes földfelszín közelség megelőző riasztási feladatra is képes.

6.15.3 Minden olyan gázsugár hajtóműves repülőgépet, amelynek egyedi légialkalmassági bizonyítványát először 2004 január 1-én vagy ezt követően adják ki, és engedélyezett legnagyobb felszállósúlya (tömege) 5700 kg-nál nagyobb, vagy amely több mint 9 utas szállítására jogosított, szereljenek fel olyan földközelség jelző és riasztó rendszerrel, ami előre irányuló veszélyes földfelszín közelség megelőző riasztási feladatra is képes.

6.15.4 2007 január 1-től minden olyan gázsugár hajtóműves repülőgépet, amelynek engedélyezett legnagyobb felszállósúlya (tömege) 5700 kg-nál nagyobb, vagy amely több mint 9 utas szállítására jogosított, szereljenek fel olyan földközelség jelző és riasztó rendszerrel, ami előre irányuló veszélyes földfelszín közelség megelőző riasztási feladatra is képes.

6.15.5 ***Ajánlás –*** *Minden olyan gázsugár hajtóműves repülőgépet, amelynek engedélyezett legnagyobb felszállósúlya (tömege) 5700 kg vagy kevesebb és ötnél több, de kilencnél kevesebb utas szállítására jogosított, szereljenek fel olyan földközelség jelző és riasztó rendszerrel, amely biztosítja a 6.15.8 a) valamint c) alpontokban előírt riasztást, a nem biztonságos földfelszín feletti magasság figyelmeztetést és* *előre irányuló veszélyes földfelszín közelség megelőző riasztási feladatra is képes.*

6.15.6 2007. január 1-től minden olyan dugattyús motorral felszerelt repülőgépet, amelynek engedélyezett legnagyobb felszállósúlya (tömege) 5700 kg-nál nagyobb vagy amely több mint 9 utas szállítására jogosított, szereljenek fel olyan földközelség jelző és riasztó rendszerrel, amely biztosítja a 6.15.8 a) valamint c) alpontokban előírt riasztást, a nem biztonságos földfelszín feletti magasság figyelmeztetést és előre irányuló veszélyes földfelszín közelség megelőző riasztási feladatra is képes.

6.15.7 A földközelség jelző és riasztó rendszer képes legyen a hajózószemélyzet részére önműködően, időben és jól megkülönböztethető módon figyelmeztető jelzést adni abban az esetben, ha a repülőgép a föld felszínét gyakorlati szempontból veszélyes mértékben megközelíti.

6.15.8 A földközelség jelző és riasztó rendszer legalább a következő körülmények között adjon figyelmeztető jelzést:

a) túlzott mértékű süllyedés;

b) túlzott mértékű közeledés a föld felszínéhez;

c) felszállást, vagy átstartolást követő túlzott mértékű magasságvesztés;

d) a földfelszín nem biztonságos megközelítése abban az esetben, amikor a repülőgép repülésvezérlő berendezései nem leszállási elrendezésben vannak;

> a) a futómű nincs kiengedett és rögzített helyzetben;
>
> b) fékszárnyak nincsenek leszállási helyzetben;

e) túlzott mértékű süllyedés a műszeres siklópálya alá.

6.16 Utasszállító repülőgépek – utaskabin személyzet ülései

6.16.1 Repülőgépek, amelyek egyedi légialkalmassági bizonyítványát először 1981 január 1-én, vagy ezt követően adták ki

Minden repülőgépet szereljenek fel a repülőgép hossztengelyéhez viszonyított 15° tartományon belül előre vagy hátrafelé néző, vállhevederekkel ellátott biztonsági övvel rendelkező üléssel minden utaskabin személyzeti tag részére, akikre a repülőgép vészkiürítésénél a 12.1 pont előírása céljából szükség van.

6.16.2 Repülőgépek, amelyek egyedi légialkalmassági bizonyítványát először 1981 január 1. előtt adták ki

Ajánlás – *Minden repülőgépet szereljenek fel a repülőgép hossztengelyéhez viszonyított 15° tartományon belül előre vagy hátrafelé néző, vállhevederekkel ellátott biztonsági övvel rendelkező üléssel minden utaskabin személyzeti tag részére, akikre a repülőgép vészkiürítésénél a 12.1 pont előírása céljából* *szükség van.*

Megjegyzés: A vállhevederekkel ellátott biztonsági öv egymástól függetlenül használható vállhevederekből és biztonsági övből áll.

6.16.3 A 6.16.1 és 6.16.2 pontok előírásai szerint biztosított utaskabin személyzeti tag üléseket úgy helyezzék el, hogy azok a padlószinten és egyéb helyeken található vészkijáratok közelében legyenek, ahogy azt a lajstromozó állam a vészhelyzeti kiürítésre vonatkozó előírásaiban meghatározta.

6.17 Vészhelyzeti helyjeladó berendezés (ELT)

2008. június 30-ig alkalmazható

6.17.1 Minden olyan, a 6.5.3 pont szerint vízfelszín felett hosszú távú repülést végrehajtó repülőgépet, amelynek egyedi légialkalmassági bizonyítványát először 2002 január 1. után adták ki, legalább kettő darab vészhelyzeti helyjeladó (ELT/S) berendezéssel szereljenek fel, amelyek közül az egyik automatikus működésű legyen.

6.17.2 2005 január 1-től minden, a 6.5.3 pont szerint vízfelszín felett hosszú távú repülést végrehajtó repülőgépet legalább kettő darab vészhelyzeti helyjeladó (ELT/S) berendezéssel szereljenek fel, amelyek közül az egyik automatikus működésű legyen.

6.17.3 Minden olyan, a 6.6 pont szerint kijelölt szárazföldi terület felett repülést végrehajtó repülőgépet, amelynek egyedi légialkalmassági bizonyítványát először 2002 január 1. után adták ki, legalább egy darab automatikus vészhelyzeti helyjeladó (ELT) berendezéssel szereljenek fel.

6.17.4 A 6.6 pont szerint kijelölt szárazföldi terület felett repülést végrehajtó repülőgépet 2005 január 1-től legalább egy darab automatikus vészhelyzeti helyjeladó (ELT) berendezéssel szereljenek fel.

6.17.5 **Ajánlás** – *Minden repülőgép szállítson egy automatikus működésű vészhelyzeti helyjeladó (ELT) berendezést.*

6.17.6 A fenti 6.17.1 – 6.17.5 pontok alapján felszerelt és szállított vészhelyzeti helyjeladó (ELT) berendezés a 10. Annex III. kötet vonatkozó előírásainak megfelelően üzemeljen.

2008. július 01-től alkalmazható

6.17.7 **Ajánlás** – *Minden repülőgép szállítson egy automatikus működésű vészhelyzeti helyjeladó (ELT) berendezést.*

6.17.8 A 6.17.9. pontban megadott esetet kivéve, 2008 július 01-től minden olyan repülőgépet, amely több mint 19 utas szállítására jogosított, szereljenek fel legalább egy darab automatikus vészhelyzeti helyjeladó (ELT) berendezéssel vagy két darab tetszőleges típusú vészhelyzeti helyjeladó (ELT) berendezéssel.

6.17.9 Minden olyan, több mint 19 utas szállítására jogosított repülőgépet, amelynek egyedi légialkalmassági bizonyítványát először 2008 július 1. után adták ki, legalább kettő darab vészhelyzeti helyjeladó (ELT) berendezéssel szereljenek fel, amelyek közül az egyik automatikus működésű legyen.

6.17.10 A 6.17.11. pontban megadott esetet kivéve, 2008 július 01-től minden olyan repülőgépet, amely 19 vagy attól kevesebb utas szállítására jogosított, szereljenek fel legalább egy darab tetszőleges típusú vészhelyzeti helyjeladó (ELT) berendezéssel.

6.17.11 Minden olyan, 19 vagy attól kevesebb utas szállítására jogosított repülőgépet, amelynek egyedi légialkalmassági bizonyítványát először 2008 július 1. után adták ki, szereljenek fel legalább egy darab automatikus működésű vészhelyzeti helyjeladó (ELT) berendezéssel.

6.17.12 A fenti 6.17.7 – 6.17.11 pontok alapján felszerelt és szállított vészhelyzeti helyjeladó (ELT) berendezés a 10. Annex III. kötet vonatkozó előírásainak megfelelően üzemeljen.

Megjegyzés: A vészhelyzeti helyjeladó (ELT) számának, típusának és a légijárművön való elhelyezésének valamint az uszóképességet támogató kiegészítő rendszerének megfelelő kiválasztása adja a legnagyobb esélyt a vészhelyzeti helyjeladó (ELT) működésbe hozására, amennyiben a kutatás és mentés szempontjából különösen nehéz területeket is beleértve, a víz vagy a szárazföld felett repülő légijárművet baleset érné. Az adóegység elhelyezése a legfontosabb tényező az optimális törés és tűz elleni védelem biztosításában. Az automatikus működésű beépített vészhelyzeti helyjeladó (ELT) vezérlő és kapcsoló eszközeinek (aktíváló kijelzők) elhelyezésénél és a kapcsolódó üzemeltetési eljárások kialakításánál tekintetbe kell venni a figyelmetlenségből adódó működésbe hozatal gyors felismerésének, valamint a manuális bekapcsolás esetén a személyzet általi könnyű kezelhetőség igényeit.

6 – 11 oldal

6.18 Repülőgépek, amelyeket összeütközést elkerülő fedélzeti rendszerrel (ACAS II) kell felszerelni

6.18.1 2003 január 1-től minden olyan gázturbinás sugárhajtóműves repülőgépet, amelynek engedélyezett legnagyobb felszállósúlya (tömege) 15000 kg-nál nagyobb, vagy amely több mint 30 utas szállítására jogosított, szereljenek fel összeütközést elkerülő fedélzeti rendszerrel (ACAS II).

6.18.2 2005 január 1-től minden olyan gázturbinás sugárhajtóműves repülőgépet, amelynek engedélyezett legnagyobb felszállósúlya (tömege) 5700 kg-nál nagyobb, vagy amely több mint 19 utas szállítására jogosított, szereljenek fel összeütközést elkerülő fedélzeti rendszerrel (ACAS II).

6.18.3 **Ajánlás** – *Minden repülőgépet szereljenek fel összeütközést elkerülő fedélzeti rendszerrel (ACAS II).*

6.18.4 Az összeütközést elkerülő fedélzeti rendszer a 10. Annex IV. kötet vonatkozó előírásainak megfelelően üzemeljen.

6.19 Repülőgépek, amelyeket nyomásmagasság-adó másodlagos radar válaszjeladóval kell felszerelni

6.19.1 A 10. Annex IV. kötet vonatkozó előírásainak megfelelően üzemelő minden repülőgépet szereljenek fel nyomásmagasság-adó másodlagos radar válaszjeladó berendezéssel.

6.19.2 Minden olyan repülőgépet, amelynek egyedi légialkalmassági bizonyítványát először 2009 január

1. után adják ki, szereljenek fel olyan adatforrással, amely biztosítja a 7,62 m (25 ft) vagy attól jobb felbontású nyomásmagasság jelet.

6.19.3 2012 január 1-ét követően minden repülőgépet szereljenek fel olyan adatforrással, amely biztosítja a 7,62 m (25 ft) vagy attól jobb felbontású nyomásmagasság jelet.

6.19.4 **Ajánlás** – *Az S módú válaszjeladónak biztosítsák a repülőgép levegőben/földön való tartózkodásának állapotáról szóló információt, amennyiben a repülőgép fel lett szerelve az ilyen állapot érzékelésére alkalmas automatikus eszközzel.*

Megjegyzés 1: Ennek az előírásnak célja az S módú radart alkalmazó légiforgalmi szolgálatok valamint az összeütközést elkerülő fedélzeti rendszerek hatékony működésének továbbfejlesztése. Különösen a követési folyamatok javulnak meg érzékelhetően a 7,62 m (25 ft) vagy attól jobb felbontás esetén.

Megjegyzés 2: A C módú választ adó válaszjeladók a nyomásmagasságot minden esetben 30.50 m (100) növekedésnél jelentik, függetlenül az adatforrás felbontási értékétől.

6.20 Mikrofonok

A pilótakabinban szolgálati feladatot ellátó összes hajózószemélyzeti tag az átváltási szint/magasság alatt közleményváltásaihoz kézi vagy fejhallgatóhoz erősített mikrofont használjon.

6.21 Sugárhajtóműves légijárművek – a repülés irányába előre irányuló (vizsgáló) fedélzeti szélnyírás jelző rendszer

6.21.1 **Ajánlás** – *Minden olyan sugárhajtóműves repülőgépet, amelynek engedélyezett legnagyobb felszállósúlya (tömege) 5700 kg-nál nagyobb, vagy amely több mint 19 utas szállítására jogosított, a repülés irányába előre vizsgáló fedélzeti szélnyírás jelző rendszerrel szereljenek fel.*

6.21.2 **Ajánlás** – *A repülés irányába előre vizsgáló fedélzeti szélnyírás jelző rendszer képes legyen időben hang és látjelzés útján figyelmeztetést adni a repülőgépvezető számára a légijármű előtt levő szélnyírásról, megfelelő tájékoztatást nyújtani annak elősegítésére, hogy szükség esetén biztonságosan megszakított megközelítést, átstartolást vagy egyéb elkerülő repülési műveletet kezdjen és hajtson végre. A rendszer továbbá az önműködő leszállító berendezés alkalmazása esetében jelezze a repülőgépvezető számára, ha a szélnyírás a berendezésre engedélyezett határértékeket megközelíti.*

6.22 Minden repülőgép, amelyet a műszerrepülési szabályok szerint (IFR), vagy éjszaka egy pilóta üzemeltet

A 4.9.1 fejezettel összhangban történő jóváhagyás megszerzése céljából, minden olyan repülőgépet, amelyet a műszerrepülési szabályok szerint (IFR), vagy éjszaka egy pilóta üzemeltet, fel kell szerelni az alábbiakkal:

a) működőképessé tehető (javítható) robotpilótával, amelyik legalább magasságtartási, valamint repülési irány kiválasztási üzemmóddal rendelkezik;

b) fejhallgatós mikrofonnal, vagy azzal megegyezővel; és

c) térképet megjelenítő eszközzel, amelyik biztosítja a térkép olvashatóságát minden környezeti megvilágítási feltétel között.

7 – 1 oldal

7. fejezet
Repülőgép távközlési és navigációs berendezések

7.1 Távközlési berendezés

7.1.1 A repülőgépet szereljék fel olyan rádió távközlésre alkalmas berendezéssel, amely képes:

a) a repülőtéri irányítás céljainak megfelelő kétoldalú összeköttetés fenntartására;

b) a repülés végrehajtása során bármikor alkalmas az időjárási tájékoztatások vételére; és

c) a repülés végrehajtása során bármikor alkalmas a kétoldalú rádióösszeköttetés fenntartására legalább egy légiforgalmi állomással valamint más olyan légiforgalmi állomásokkal és olyan hullámhosszokon, amelyeket az illetékes hatóság előírt.

Megjegyzés: A 7.1.1 pont előírásai teljesítettnek tekinthetők, ha az útvonalon szokásos hullámterjedési viszonyok között a repülőgép képes az itt meghatározott távközlési összeköttetések fenntartására.

7.1.2 A 7.1.1 pont alapján előírt rádió berendezés képes legyen rádió összeköttetés fenntartására a 121.5 MHz-es légiközlekedési vészfrekvencián.

7.1.3 A légtér meghatározott szakaszaiban vagy olyan útvonalakon történő repülések végrehajtásakor, ahol RCP típus lett előírva, a 7.1.1 pontban meghatározott követelményeken túl a repülőgép:

a) legyen felszerelve olyan távközlési berendezésekkel, amelyek lehetővé teszik az előírt RCP típus(ok) szerinti üzemeltetést; és

b) a járató állama részéről rendelkezzen jogosítással az ilyen légtérben történő üzemeléshez.

Megjegyzés: az előírt távközlési teljesítményre (RCP), az ezzel összefüggő eljárásokra valamint a jogosítási folyamatra vonatkozó tájékoztatásokat az előkészítés alatt lévő Előírt Távközlési Teljesítmény (RCP) *Kézikönyv (Doc 9869) tartalmazza. Ez a kiadvány felsorolja továbbá azokat a dokumentumokat is amelyeket az államok és a nemzetközi szervezetek a távközlési rendszerekre és az előírt távközlési teljesítményre (RCP) dolgoztak ki.*

7.2 Navigációs berendezés

7.2.1 A repülőgépet szereljék fel olyan navigációs berendezéssel, amelynek segítségével az képes:

a) az üzemeltetői repülési tervében meghatározott útvonal követésére; és

b) a légiforgalmi szolgálatok előírásainak megfelelő repülés végrehajtására;

kivéve, – amennyiben az illetékes hatóság ezt nem tiltja meg – amikor a látvarepülési szabályok szerint végrehajtott repülés során a navigációt a földi tájékozódási pontok látás utáni azonosításával hajtja vége.

7.2.2 A légtér meghatározott szakaszaiban, vagy olyan útvonalakon történő repülés esetében, amelyekre vonatkozóan RNP típust írtak elő, a repülőgép a 7.2.1 pontban ismertetett előírások mellett:

a) legyen felszerelve olyan navigációs berendezésekkel, amelyek lehetővé teszik az előírt RNP típus(ok) szerinti üzemeltetést;

b) a járató állama részéről rendelkezzen jogosítással az ilyen légtérben történő üzemeléshez.

Megjegyzés: Az előírt navigációs teljesítményre (RNP), az ezzel összefüggő eljárásokra valamint a jogosítási folyamatra vonatkozó tájékoztatásokat az RNP Kézikönyv *(Doc 9613) tartalmazza. A kiadvány átfogóan felsorolja azokat a dokumentumokat és egyéb anyagokat, amelyeket az államok és a nemzetközi szervezetek a navigációs rendszerekre valamint az előírt navigációs teljesítményre vonatkozóan készítettek el.*

7.2.3 A Körzeti Léginavigációs Egyezmény alapján kijelölt olyan légterekben végrehajtott repülések esetében, amelyekre vonatkozóan minimális navigációs teljesítmény előírást (MNPS) határoztak meg, a repülőgépet szereljék fel olyan navigációs berendezéssel:

a) amely a kijelölt repülési útvonal bármely pontján a hajózószemélyzet részére az előírt pontossággal és folyamatosan jelzi az útvonal-tartást vagy az ettől való eltérést; és

b) amelyet a járató állama az érintett MNPS üzemeltetésre engedélyezett.

Megjegyzés: Az előírt minimális navigációs teljesítményre vonatkozó értékek és alkalmazási eljárások a Körzeti Kiegészítő Eljárások *című kiadványban (Doc 7030) találhatók.*

7.2.4 A légtér azon meghatározott szakaszaiban történő repüléseknél, ahol a helyi Körzeti Léginavigációs Egyezmény értelmében FL 290 felett 300 méter (1000 láb) függőleges elkülönítési minimumot (RVSM) alkalmaznak:

a) a repülőgépet szereljék fel olyan berendezéssel, amely képes:

1) a tartott repülési szintet (FL) a hajózószemélyzet részére jelezni;

2) a kiválasztott repülési szintet automatikusan tartani;

3) a hajózószemélyzet részére riasztó jelzést adni, ha a kiválasztott repülési szinttől eltérnek – az eltérés riasztó jelzés határértéke ne haladja meg a ±90 métert (300 láb); és

4) a nyomás-magasságot automatikusan jelezni; és

b) a repülőgépet a járató állama az ilyen légtérben történő üzemeltetésre engedélyezze.

7.2.5 A 7.2.4 b) szerinti RVSM jóváhagyás kiadása előtt, az állam győződjön meg arról, hogy:

a) a légijármű függőleges navigációt biztosító felszereléseinek képességei kielégítik a 4. Függelék követelményeit;

b) a járató megfelelő eljárásokat vezet be a folyamatos légialkalmassághoz (karbantatás és javítás) kapcsolódó gyakorlati tevékenységek és programok vonatkozásában; és

c) a járató megfelelő hajózó személyzeti eljárásokat vezet be az RVSM szerinti légtérben való üzemeltetéshez.

Megjegyzés: Az RVSM szerinti jóváhagyás globálisan érvényes annak figyelembe vételével, hogy egy adott régióra érvényes bármely üzemeltetési eljárást tartalmazni fogja az üzemeltetési kézikönyv vagy a megfelelő személyzeti útmutató.

7.2.6 A járató állama, amennyiben szükséges a lajstromozó állammal konzultálva, a 7.2.4 fejezetben említett légijárművek vonatkozásában biztosítja, hogy megfelelő lépések történjenek:

a) amikor a 11. Függelék, 3.3.4.1 alfejezetével összhangban létrehozott ellenőrző szervezettől jelentés érkezik a magasság tartás körülményeiről;

b) helyesbítő intézkedések bevezetésére az előbbiek szerinti jelentésben szereplő egyedi repülőgép, vagy repülőgép típusba tartozó csoportra vonatkozóan, amennyiben eltérést tapasztalnak az RVSM szerinti légtérben való üzemeltetésre vonatkozó követelmények betartásában, ha az alkalmazásra került.

7.2.7 Mindegyik állam, amelyik felelős azon légterekért, ahol az RVSM alkalmazásra került, vagy a járatóknak RVSM jóváhagyást adott ki a saját államán belül, olyan intézkedéseket és eljárásokat vezet be, amelyek biztosítják a megfelelő lépések megtételét az RVSM légteret, RVSM jóváhagyás nélkül használó repülőgépek vagy járatók ellen.

Megjegyzés: ezeket az intézkedéseket és eljárásokat mindkét olyan esetben alkalmazni szükséges, amikor a kérdéses repülőgép üzemeltetése jóváhagyás nélkül történik az állam légterében, vagy amikor az állam rendszeres felügyeleti felelősségébe tartozó járató a szükséges jóváhagyás nélkül üzemeltet egy másik állam légterében.

7.2.8 A repülőgépet szereljék fel olyan navigációs berendezéssel, amely biztosítja, hogy a repülés végrehajtásának bármely szakaszában bekövetkező, az egyik rendszert érintő meghibásodás esetében a repülőgépet a 7.2.1, valamint ahol ez alkalmazható, a 7.2.2, 7.2.3 és 7.2.4 pontok előírásainak megfelelően tovább lehessen irányítani (navigálni).

Megjegyzés: A FL 290 felett 300 méter (1000 láb) függőleges elkülönítési minimum alkalmazására kijelölt légtérben szükséges légijármű berendezésekre vonatkozó útmutató a 300 méter (1000 láb) Függőleges Elkülönítési Minimum Bevezetése FL 290 és FL 410 Repülési Szintek Között *(Doc 9574*) kézikönyvben *található.*

7.2.9 A műszeres időjárási körülmények között végrehajtott leszállással tervezett repülések esetében a repülőgépet szereljék fel olyan rádió berendezéssel, amely alkalmas az irányvezetést biztosító rádiójelek vételére egy olyan pontig, ahonnan a leszállás látással végrehajtható. Ez a rádió berendezés képes legyen az irányvezetés biztosítására minden olyan tervezett leszállási, valamint bármely kijelölt kitérő repülőtéren, ahol műszeres időjárási körülmények között történő leszállás végrehajtását tervezik.

7.3 Felszerelés

A berendezéseket úgy szereljék fel, hogy bármely egyedi egység meghibásodása – amely akár rádió távközlési összeköttetési, akár navigációs illetve mindkét célra szükséges – ne okozza a távközlési összeköttetési vagy navigációs célokból szükséges másik egység meghibásodását.

7.4 Elektronikus navigációs adat kezelés

7.4.1 Egy járató nem vehet használatba elektronikus navigációs adat terméket, amelyet levegőben és földön történő alkalmazásra hoztak létre, amíg a járató állama jóvá nem hagyta a járató azon eljárásait, melyekkel bizonyítani lehet, hogy az alkalmazott módszer és a leszállított termékek kielégítik az elfogadható teljességi előírásokat és azt, hogy a termékek összeegyeztethetőek annak a berendezésnek a tervezett feladataival amelyek használni fogják azokat. A járató állama legyen meggyőződve arról, hogy a járató folyamatosan figyeli úgy az eljárásokat, mint a termékeket.

Megjegyzés: az adatokat szolgáltatók által követendő eljárásokra vonatkozó útmutatót az RTCA DO-200A/EUROCAE ED-76 *és az* RTCA DO-201A/EUROCAE ED-77 *tartalmazza.*

7.4.2 A járató alkalmazzon olyan eljárásokat, amelyek biztosítják a naprakész és változatlan elektronikus navigációs adatok időben való elosztását és beillesztését az azokat igénylő légijárművek felé.

8-3 oldal

8. fejezet
Repülőgép karbantartás

i) a járató további karbantartási eljárásai és az ezekkel kapcsolatos előírások teljesítésére vonatkozó eljárások szükség szerinti ismertetése;

j) a 8. Annex II. rész 4.2.3 f) és 4.2.4 pontjaiban előírt, a szolgálati tájékoztatások jelentésére vonatkozó követelmények teljesítésének eljárásai; és

k) a légialkalmasságot befolyásoló összes szükséges adatnak a típus-bizonyítvány tulajdonosától vagy a típust tervező szervezettől történő beszerzésének, értékelésének, módosításának és szétosztásának eljárásai a karbantartó szervezeten belül.

8.7.2.2 A karbantartó szervezet biztosítsa, hogy az eljárási kézikönyvet szükség szerint módosítsák és egészítsék ki abból a célból, hogy az abban található tájékoztatások mindig naprakészek legyenek.

8.7.2.3 Az eljárási kézikönyv összes módosításának megfelelő példányait haladéktalanul juttassák el minden olyan szervezetnek vagy személynek, amelynek a kézikönyv eredeti példányát átadták.

8.7.3 A biztonság irányítása

8.7.3.1 Az államok dolgozzanak ki biztonsági programot annak érdekében, hogy a légijárművek karbantartásánál elfogadható biztonsági szintet érjenek el.

8.7.3.2 A célul kitűzött elfogadható biztonsági szintet az érintett állam(ok) határozza(ák) meg.

Megjegyzés – a biztonsági programra és az elfogadható biztonsági szint meghatározására vonatkozó útmutatót a 11. Annex E. melléklete és a Biztonság Irányítási Kézikönyv (SMM) *(Doc 9859) tartalmazza.*

8.7.3.3 **Ajánlás** – *az államok követeljék meg, hogy a biztonsági programjuk részeként egy karbantartó szervezet vezessen be az államnak elfogadható biztonság irányítási rendszert, amely minimum:*

a) megnevezi a biztonsági veszélyeket;

b) biztosítja, hogy egy elfogadható biztonsági szint kialakításához szükséges megelőző intézkedések alkalmazásra kerülnek;

c) gondoskodik a folyamatos figyelésről és az elért biztonsági szint rendszeres felülvizsgálatáról; és

d) törekedik a teljeskörű biztonsági szint folyamatos tökéletesítésére.

8.7.3.4 2009 január 01-től az államok a biztonsági programjuk részeként követeljék meg, hogy egy karbantató szervezet vezessen be az állam számára elfogadható biztonság irányítási rendszert, amely minimum:

a) megnevezi a biztonsági veszélyeket;

b) biztosítja, hogy egy elfogadható biztonsági szint kialakításához szükséges megelőző intézkedések alkalmazásra kerülnek;

c) gondoskodik a folyamatos figyelésről és az elért biztonsági szint rendszeres felülvizsgálatáról; és

d) törekedik a teljeskörű biztonsági szint folyamatos tökéletesítésére.

8.7.3.5 A biztonság irányítási rendszer világosan határozza meg a biztonságért viselt felelősség függelmi viszonyait egy karbantartó szervezeten belül, beleértve a felső vezetés biztonságért viselt közvetlen felelősségét.

Megjegyzés: A biztonság irányítási rendszerre vonatkozó útmutató a Biztonság Irányítási Kézikönyv-*ben* (SMM) *(Doc 9859) található.*

8.7.4 Karbantartási eljárások és minőség biztosítási rendszer

8.7.4.1 A karbantartó szervezet dolgozzon ki és vezessen be az engedélyt kiadó állam részéről elfogadható eljárásokat, amelyek biztosítják a karbantartás megfelelő és szakszerű elvégzését továbbá összhangban vannak a jelen fejezet összes vonatkozó előírásával.

8.7.4.2 A karbantartó szervezet biztosítsa a 8.7.4.1 pont előírásának teljesítését egy független minőség biztosítási rendszer létrehozásával, amely figyelemmel kíséri és felülvizsgálja az alkalmazott eljárások helyességét vagy olyan ellenőrzési rendszer kialakításával, amely biztosítja az összes karbantartási feladat megfelelő előírás-szerű elvégzését.

8.7.5 Létesítmények

8.7.5.1 A létesítmények és a munkakörülmények az elvégzendő feladatra alkalmasak legyenek.

8.7.5.2 A karbantartó szervezet rendelkezzen azon munka elvégzéséhez szükséges műszaki adatokkal, berendezésekkel, felszerelésekkel, szerszámokkal és anyagokkal, amelyre engedéllyel illetve jóváhagyással rendelkezik.

8.7.5.3 Alakítsanak ki megfelelő raktár területet az alkatrészek, berendezések, szerszámok és anyagok tárolására. Hozzanak létre biztonságos raktározási körülményeket, valamint akadályozzák meg a raktározott egységek károsodását és sérülését.

8.7.6 Személyzet

8.7.6.1 A karbantartó szervezet jelöljön ki egy személyt vagy munkacsoportot, akik felelősek annak biztosításáért, hogy a szervezet megfelel az engedélyezett karbantartó szervezetre vonatkozó, a 8.7 szakaszban található előírásoknak.

8.7.6.2 A karbantartó szervezet alkalmazza a szükséges személyeket, akik az elvégzendő munkát megtervezik, végrehajtják, felügyelik, ellenőrzik és igazolják.

8.7.6.3 A karbantartó személyzet szakmai jártassága a feladattal (eljárással) legyen összhangban és az engedélyező állam részére elfogadható szintű legyen. A karbantartási munka megfelelő elvégzésének igazolására készített karbantartási nyilatkozatot az erre az 1. Annex alapján jogosított személy írja alá.

8.7.6.4 A karbantartó szervezet biztosítsa, hogy a karbantartásban résztvevő összes személy feladatának és felelősségének megfelelő alapkiképzésben és folyamatos továbbképzésben részesüljön. A karbantartó szervezet által kidolgozott és alkalmazott kiképzési program tartalmazzon emberi tevékenységet és teljesítményt fejlesztő elméleti és gyakorlati képzést, beleértve a többi karbantartó személlyel és a hajózószemélyzettel történő együttműködést is.

Megjegyzés: Az emberi teljesítmény fejlesztését célzó kiképzési programok tervezéséhez útmutató az Emberi Tényezők Kiképzési Kézikönyv-*ében (Doc 9683) található.*

8.7.7 Jegyzőkönyvek

8.7.7.1 A karbantartó szervezet készítsen részletes karbantartási jegyzőkönyvet annak bizonyítására, hogy a karbantartási nyilatkozat aláírásához szükséges összes előírásnak és feltételnek eleget tettek.

8.7.7.2 A 8.7.7.1 pontban előírt karbantartási jegyzőkönyveket a karbantartási nyilatkozat aláírását követően legalább egy évig őrizzék meg.

8.8 Karbantartási nyilatkozat

8.8.1 A karbantartási munka megfelelő, a karbantartó szervezet eljárási kézikönyvében ismertetett eljárásoknak és a jóváhagyott feltételeknek megfelelően történő sikeres elvégzésének igazolására készítsenek el és írjanak alá karbantartási nyilatkozatot.

8.8.2 A karbantartási nyilatkozat tartalmazzon igazolást az alábbiakról:

a) az elvégzett karbantartási munka alapvető részletei, beleértve a felhasznált engedélyezési illetve jóváhagyási feltételek részletezését;

b) a karbantartás befejezésének időpontja;

c) az engedélyezett karbantartó szervezet azonosítója; és

d) a karbantartási nyilatkozatot aláíró személy vagy személyek neve.

11. fejezet
Kézikönyvek, naplók és nyilvántartások

Megjegyzés: A következő kiegészítő kézikönyvek, nyilvántartások és jegyzőkönyvek a jelen Annex anyagával kapcsolatban vannak, azonban ezeket a fejezet nem tartalmazza:

tüzelőanyag és olaj jegyzőkönyvek	lásd 4.2.9
karbantartási nyilvántartás	lásd 8.4
repülési idő jegyzőkönyvek	lásd 4.2.10.3
repülés előkészítési formanyomtatványok	lásd 4.3
üzemeltetői repülési terv	lásd 4.3.3.1
légijármű parancsnok útvonal és repülőtér jogosítások nyilvántartásai	lásd 9.4.3.4

11.1 Repülésvégrehajtási kézikönyv

Megjegyzés: A repülésvégrehajtási kézikönyv a 8. Annex-ben meghatározott tájékoztatásokat tartalmazza
.
A repülésvégrehajtási kézikönyvet a lajstromozó állam előírásai alapján kötelező érvényű változások behelyezésével tartsák naprakészen.

11.2 Járató karbantartás irányítási kézikönyve

A járató 8.2 szakasz előírásai alapján biztosított karbantartás irányítási kézikönyve, amelyet több részben is kiadhat, a következő tájékoztatásokat tartalmazza:

a) a 8.1.1 pont alapján előírt eljárások ismertetése, szükség szerint:

1) a járató és az engedélyezett karbantartó szervezet közötti adminisztratív megállapodások;

2) a karbantartás végrehajtási eljárások valamint a karbantartási nyilatkozat elkészítési és aláírási eljárások, amikor a karbantartást olyan rendszerben hajtják végre, amely nem azonos az engedélyezett karbantartó szervezet eljárásaival;

b) a 8.1.4 pontban előírt személy vagy személyek neve és feladatai;

c) hivatkozás a 8.3.1 pontban előírt karbantartási programra;

d) a járató karbantartási jegyzőkönyveinek elkészítési és megőrzési módszerei a 8.4 szakasz előírásai alapján;

e) a 8.5.1 pontban előírt karbantartás és üzemeltetés felügyeleti, értékelési és jegyzőkönyvezési eljárások ismertetése;

f) a 8. Annex II. rész 4.2.3 f) és 4.2.4 pontjaiban előírt, a szolgálati tájékoztatások jelentésére vonatkozó követelmények teljesítésének eljárásai;

g) a 8.5.2 pontban előírt folyamatos légialkalmassági tájékoztatások értékelésének és ezek alapján végrehajtott bármely tevékenység elvégzésének eljárásai;

h) a kötelező folyamatos légialkalmassági tájékoztatás alapján szükséges intézkedések végrehajtásának eljárásai;

i) az ellenőrzési és elemzési rendszer kialakításának és fenntartásának ismertetése valamint a karbantartási program teljesítményének és hatékonyságának folyamatos felügyelete, melynek célja a program bármely hiányosságának kiküszöbölése;

j) az légijármű típusok és típusváltozatok ismertetése, amelyekre a kézikönyv alkalmazható;

k) azon eljárások ismertetése, amelyek biztosítják a légialkalmasságot befolyásoló meghibásodások, valamint hiányosságok jegyzőkönyvezését és kijavítását; és

l) azon eljárások ismertetése, amelyekkel a lajstromozó államot értesítik a repülés végrehajtás során bekövetkezett jelentősebb rendellenességekről.

11.3 Karbantartási program

11.3.1 Minden egyes repülőgép karbantartási programja a 8.3 szakasz előírásai alapján a következőket tartalmazza:

a) a karbantartási feladatok és ezek elvégzésének időszakai a repülőgép várható és tervezett igénybevételének figyelembevételével;

b) a repülőgép szerkezeti épségének folyamatos ellenőrzése – amikor ez a karbantartási feladat alkalmazható;

c) a fenti *a)* és *b)* alpontok előírásaitól való eltérés vagy azok megváltozatása céljából alkalmazott eljárások; és

d) a légijármű rendszereinek, alkatrészeinek és hajtóműveinek állapotát és megbízhatóságát felülvizsgáló programok szükség szerinti ismertetése.

11.3.2 A légijármű típusra kötelezőnek kijelölt karbantartási feladatokat és ezek elvégzésének időszakait ennek megfelelően azonosítsák.

11.3.3 **Ajánlás** – *A karbantartási programot a tervezés állama vagy a típus tervezéséért felelős szervezet által rendelkezésre bocsátott tájékoztatások valamint bármely más megfelelő gyakorlati tapasztalatok alapján dolgozzák ki.*

11.4 Útinapló

11.4.1 **Ajánlás** – *A repülőgép útinaplója a következő tételeket és a megfelelő római számokat tartalmazza:*

I _ A repülőgép nemzeti hovatartozása és lajstromjele.

II _ A repülés időpontja.

III _ A személyzeti tagok névsora.

IV _ A személyzet tagjainak kijelölt feladatai.

V _ Az indulási helye.

VI _ Az érkezés helye.

VII _ Az indulás időpontja.

VIII _ Az érkezés időpontja.

IX _ A repülés időtartama.

X _ A repülési feladat pontos meghatározása (magáncélú, munkarepülés, menetrendszerű vagy nem-menetrendszerű repülés).

XI _ Események és megfigyelések – ha van.

XII _ A felelős személy aláírása.

11.4.2 **Ajánlás** – *A repülőgép útinaplót naprakészen vezessék, a bejegyzéseket tollal vagy kitörölhetetlen ceruzával írják be.*

11.4.3 **Ajánlás** – *A kitöltött útinaplót őrizzék meg, hogy a repülőgép üzemeltetésének utolsó hat hónapjáról folyamatos feljegyzés álljon rendelkezésre*

.

11.5 A fedélzeten szállított vészhelyzeti és túlélési felszerelések jegyzéke

A járató mindig rendelkezzen a mentést koordináló központnak azonnal továbbítható jegyzékkel, amely tartalmazza a nemzetközi légiforgalomban üzemeltetett bármely repülőgépén szállított vészhelyzeti és túlélési felszerelések felsorolását. A tájékoztató szükség szerint tartalmazza a mentőtutajok számát, színét és típusát, a rendelkezésre álló pirotechnikai eszközök ismertetését, a vészhelyzeti egészségügyi készletek részletezését, a vízkészletek meghatározását valamint a hordozható vészhelyzeti rádióberendezések típusát és frekvenciáit.

11.6 Repülési adatrögzítő felvételei

A járató a lehetőségek határain belül biztosítsa, hogy amennyiben egyik légijárműve balesetet szenvedett vagy repeseményben érintett, az összes vonatkozó repülési adatrögzítő felvételt és ha szükséges, a repülési adatrögzítő berendezéseket is megőrizze és azokat a 13. Annex előírásaival összhangban biztonságos őrizet alatt tárolja.

2. Függelék
Az üzemeltetési kézikönyv szerkezete és tartalma

(Lásd 4. fejezet 4.2.2.1 pont)

1. Szerkezet

1.1 **Ajánlás –** *A 4. fejezet 4.2.2.1 pont előírásai alapján kiadott üzemeltetési kézikönyvet, amely a különböző üzemeltetési területek szerint esetleg külön részekből is állhat, a következő összeállítás szerint készítsék el:*

a) általános rész;

b) légijármű üzemeltetési tájékoztatások;

c) útvonalak és repülőterek; és

d) kiképzés.

1.2 2006.január 1-től a 4. fejezet 4.2.2.1 pont előírásai alapján kiadott üzemeltetési kézikönyvet, amely a különböző üzemeltetési területek szerint esetleg külön részekből is állhat, a következő összeállítás szerint készítsék el:

a) általános rész;

b) légijármű üzemeltetési tájékoztatások;

c) útvonalak és repülőterek; és

d) kiképzés.

2. Tartalom

Az 1.1 és az 1.2 bekezdések előírásainak megfelelő üzemeltetési kézikönyvek legalább az alábbiakat tatalmazzák:

2.1 Általános rész

2.1.1 A repülési üzemeltetés végrehajtásához szükséges üzemeltető személyzet felelősségi körének ismertetése.

2.1.2 A hajózószemélyzeti tagok és az utaskabin személyzeti tagok repülési idejének és repülési szolgálati idejének korlátozására továbbá megfelelő pihenőidejének biztosítására vonatkozó, a 4. fejezet 4.2.10.2 pontja előírásának megfelelő szabályok.

2.1.3 A szállítandó navigációs berendezések felsorolása, beleértve az RNP légtérben történő üzemeltetésre vonatkozó bármely előírást.

2.1.4 Ahol ez az üzemeltetés szempontjából szükséges, a hosszú távú navigációs eljárások, a két gázsugár hajtóműves repülőgépek megnövelt hatótávolságú üzemeltetésére (ETOPS) vonatkozó hajtómű meghibásodási valamint a kitérő repülőterek kijelölésére és használatára vonatkozó eljárások.

2.1.5 Azon körülmények ismertetése, amelyek között rádiófigyelést kell tartani.

2.1.6 A legalacsonyabb repülési magasság meghatározásának módszere.

2.1.7 A repülőtér üzemeltetési minimum meghatározásának módszere.

2.1.8 Biztonsági elővigyázatossági intézkedések az olyan tüzelő-anyag feltöltés esetére, amikor az utasok a fedélzeten tartózkodnak.

2.1.9 A földi kiszolgálás rendszere és eljárásai.

2.1.10 A balesetet észlelő légijármű parancsnok számára a 12. Annex-ben előírt eljárások.

2.1.11 Minden egyes típusú üzemeltetéshez meghatározott hajózószemélyzet, beleértve a parancsnokság sorrendjének megállapítását is.

2.1.12 Egyedi utasítások az útvonalra szükséges tüzelőanyag és olaj mennyiségének kiszámításához az üzemeltetés valamennyi körülményének figyelembevételével, beleértve a túlnyomás elvesztésének és az útvonalon bekövetkező egy vagy több hajtómű meghibásodás lehetőségét is.

2.1.13 Azon körülmények, amelyek között oxigén használatra van szükség továbbá a 4. fejezet 4.3.8.2 pont alapján meghatározott oxigén-készlet mennyisége.

2.1.14 Tömeg és súlypont (egyensúly) számítási utasítások.

2.1.15 A földi jégtelenítés illetve jégmentesítés végrehajtására és ellenőrzésére vonatkozó utasítások.

2.1.16 Az üzemeltetési repülési tervre vonatkozó előírások.

2.1.17 Előírt szabványos üzemeltetési eljárások (SOP) a repülés minden egyes szakaszára.

2.1.18 A rendes körülmények között használt ellenőrző jegyzékek használatára és a használat időpontjára vonatkozó előírások.

2.1.19 Az indulási korlátozásokra vonatkozó eljárások.

2.1.20 A repülési magasság folyamatos tartásának figyelésére és az automatikus vagy hajózószemélyzet által előidézett magasság változásra figyelmeztető jelző rendszer használatára vonatkozó utasítások.

2.1.21 A robotpilóta és az önműködő hajtómű teljesítmény szabályzás használatára vonatkozó utasítások műszeres időjárási körülmények (IMC) között.

2.1.22 A légiforgalmi irányítói engedélyek tisztázására és elfogadására vonatkozó utasítások különösen abban az esetben, ha azok földfelszín feletti biztonságos magassággal is kapcsolatosak.

2.1.23 Indulási és megközelítési tájékoztatások.

2.1.24 Útvonal és célállomás repülési körülmények ismertetése.

2.1.25 Stabilizált megközelítési eljárás.

2.1.26 Nagy mértékű süllyedésre vonatkozó korlátozások a földfelszín közelében.

2.1.27 A műszeres megközelítés megkezdéséhez vagy folytatásához szükséges feltételek.

2.1.28 A precíziós és nem-precíziós műszeres megközelítési eljárások végrehajtására vonatkozó utasítások.

2.1.29 A hajózószemélyzet feladatainak kiosztása valamint a tagok munkaterhelése helyes elosztásának eljárásai az éjszakai repülés valamint a műszeres időjárási körülmények között végrehajtott megközelítés és leszállás során.

2.1.30 A kormányzott földnek ütközés (CFIT) megakadályozására illetve megelőzésére vonatkozó utasítások és kiképzési követelmények továbbá a földközelség jelző és riasztó (GPWS) rendszer használatának módszerei.

2.1.31 Az összeütközés elkerülésére valamint az összeütközés elkerülését biztosító fedélzeti riasztó rendszer (ACAS) használatára vonatkozó utasítások, eljárások, üzemeltetői stratégia és kiképzési eljárások.

Megjegyzés: Az összeütközés elkerülését biztosító fedélzeti (ACAS) rendszer üzemeltetésére vonatkozó eljárásokat a PANS-OPS (Doc 8168) I. kötet, VIII. rész 3. fejezete és a PANS-ATM (Doc 4444) 12. és 15. fejezete tartalmazza.

2.1.32 A polgári légijármű elfogásával kapcsolatos tájékoztatások és utasítások, beleértve;

a) az elfogott légijármű parancsnoka számára a 2. Annex-ben előírt eljárások;

b) az elfogó és az elfogott légijárművek által használandó, a 2. Annex-ben előírt látjelek.

2.1.33 A 15 000 méter (49 000 láb) repülési magasság felett üzemeltetni szándékozott repülőgépek esetében;

a) tájékoztatás, amely a repülőgépvezető számára lehetővé teszi a legmegfelelőbb intézkedések végrehajtását abban az esetben, ha a repülőgépet kozmikus sugárzás éri; és

b) eljárások arra az esetre, amikor süllyedés végrehajtását határozták el és ekkor;

i) szükséges az illetékes légiforgalmi szolgálati egység értesítése illetve riasztása, tájékoztatást adva a helyzetről és előzetesen engedélyt kérve a süllyedésre;

ii) intézkedések arra az esetre, ha az illetékes légiforgalmi szolgálati egységgel nem tudnak összeköttetést teremteni vagy az összeköttetés megszakadt.

Megjegyzés: A biztosítandó tájékoztatásokra vonatkozó útmutató a 126 számú Körlevélben – SST Légijármű Üzemeltetési Tájékoztató – *található.*

2.1.34 A 3. fejezet 3.2 szakasz előírásai szerint biztosítandó baleset-megelőzési és repülésbiztonsági program részletezése, beleértve az alkalmazott biztonsági rendszert és személyi felelősséget.

2.1.35 Veszélyes árúk szállítására vonatkozó tájékoztatások és utasítások, beleértve a vészhelyzet esetén végrehajtandó intézkedéseket is.

Megjegyzés: Veszélyes árúk szállítása során a légijármű fedélzetén bekövetkező váratlan események kezelését érintő módszerek és eljárások kidolgozására valamint végrehajtására vonatkozó útmutató a Veszélyes áruk szállítása során a légijármű fedélzetén bekövetkező eseményekre hozott vészintézkedések *(Doc 9481) kiadványban található.*

2.1.36 Védelmi utasítások és útmutatók.

2.1.37 A 13. fejezet 13.3 pont előírása szerint biztosítandó repülőgép átkutatási ellenőrző jegyzék.

2.2 Légijármű üzemeltetési tájékoztatások

2.2.1 Légialkalmasság jogosítási és üzemeltetési korlátozások.

2.2.2 A 6. fejezet 6.1.4 pont alapján előírt általános, különleges és vészhelyzeti eljárások a hajózószemélyzet részére, az ezekre vonatkozó ellenőrző jegyzékek.

2.2.3 Az emelkedési teljesítményre vonatkozó üzemeltetési utasítások és tájékoztatások minden hajtómű működése mellett – amennyiben ezt a 4. fejezet 4.2.3.3 pont alapján biztosították.

2.2.4 Repülés tervezési adatok a repülés előtti és repülés közbeni tervezéshez, különböző hajtómű teljesítmény beállítások és repülési sebességek mellett.

2.2.5 A maximális oldalszél és hátszél összetevők minden egyes üzemeltetett repülőgép típusra és ezen értékekre alkalmazott korlátozások a széllökések, alacsony látástávolság, futópálya állapot, személyzet gyakorlottság, a robotpilóta használat, rendellenes vagy vészhelyzeti körülmények valamint egyéb más helytálló üzemeltetési tényező figyelembevételével.

2.2.6 Tömeg és súlypont (egyensúly) számítási utasítások.

2.2.7 Légijármű rakodási és teher rögzítési utasítások.

2.2.8 Légijármű rendszerek, megfelelő vezérlő szervek és használati utasítások a 6. fejezet 6.1.4 pont előírása szerint.

2.2.9 Az engedélyezett különleges üzemeltetésre és az üzemeltetett repülőgép típusra vonatkozó gyártó(i) minimális felszerelési jegyzék valamint konfigurációs eltérési jegyzék, beleértve az előírt navigációs teljesítmény (RNP) alapján kijelölt légtérben történő üzemeltetésre vonatkozó bármely előírást.

2.2.10 A vészhelyzeti és biztonsági berendezések ellenőrző jegyzéke valamint ezek használati utasítása.

2.2.11 A vészkiürítési eljárások, beleértve az adott légijármű típust érintő eljárásokat, a hajózószemélyzet közötti együttműködés szervezését, a hajózószemélyzet minden egyes tagjának vészhelyzeti helyét és kijelölt vészhelyzeti feladatait.

2.2.12 Az utaskabin személyzet részéről alkalmazott általános, különleges és vészhelyzeti eljárások, az ezekre vonatkozó ellenőrző jegyzékek valamint légijármű rendszer tájékoztatások, beleértve a szükséges együttműködési eljárásokat a hajózószemélyzet és az utaskabin személyzet között.

2.2.13 A különböző repülési útvonalakon szállított vészhelyzeti és túlélési felszerelések valamint azok helyes működésének felszállás előtt történő ellenőrzésének eljárásai, beleértve a szükséges oxigén mennyiség megállapításának és rendelkezésre álló mennyiségének meghatározását.

2.2.14 A túlélők részére a 12. Annex-ben meghatározott, alkalmazandó föld-levegő látjelek.

2.3 Útvonalak és repülőterek

2.3.1 Az útvonalra vonatkozó tájékoztatások, amelyek biztosítják, hogy a hajózószemélyzet minden egyes repülés vonatkozásában részletes tájékoztatást kapjon a távközlési létesítményekről, navigációs berendezésekről, repülőterekről, az üzemeltetéshez igénybe vehető műszeres megközelítésekről, érkezési és indulási eljárásokról valamint minden más olyan tényezőről, amelyet a járató a szabályszerű repülésvégrehajtás érdekében szükségesnek ítél.

2.3.2 Minden egyes lerepülendő útvonalszakasz legalacsonyabb repülési magassága.

2.3.3 Minden egyes olyan repülőtér üzemeltetési minimuma, amelyet tervezett leszállási vagy kitérő repülőtérként valószínűleg igénybe vehetnek.

2.3.4 A megközelítési vagy a repülőtéri létesítmény használhatóságának csökkenése esetére megnövelt repülőtér üzemeltetési minimum.

2.3.5 Az előírásokban szereplő összes repülési művelet teljesítéséhez szükséges tájékoztatások, beleértve, de nem csak ezekre korlátozva az alábbiakat:

a) futópálya felszállási távolságok száraz, nedves és szennyezett körülmények között, beleértve azon rendszer meghibásodások eseteit, amelyek a szükséges távolságot befolyásolhatják;

b) felszállási emelkedési korlátozások;

c) útvonal emelkedési korlátozások;

d) megközelítési és leszállási emelkedési korlátozások;

e) futópálya leszállási távolságok száraz, nedves és szennyezett körülmények között, beleértve azon rendszer meghibásodások eseteit, amelyek a szükséges távolságot befolyásolhatják;

f) egyéb kiegészítő tájékoztatások, mint például gumiabroncs sebesség korlátozások.

2.4 Kiképzés

2.4.1 A hajózószemélyzet kiképzési program a 9. fejezet 9.3 szakasz előírásai alapján..

2.4.2 Az utaskabin személyzet kiképzési program a 12. fejezet 12.4 szakasz előírásai alapján.

2.4.3 A repülésüzemi tiszt/szolgálatvezető kiképző program, ha azt a 4. fejezet 4.2.1 pont alapján repülés felügyelettel összefüggésben alkalmazzák.

Megjegyzés: A repülésüzemi tiszt/szolgálatvezető kiképző program részletezését a 10. fejezet 10.2 szakasza tartalmazza.

ANNEX 6/II.
A légijármű üzemeltetése: Általános célú nemzetközi repülés – Repülőgépek

II. rész hatodik kiadása – 1998 július
26. módosítással

A jelen kiadvány magába foglalja a 6. Annex II. részének 2000 március 15-e előtt elfogadott összes módosításait és 1998 november 5-től hatálytalanítja a 6. Annex II. kötetének összes korábbi kiadásait.

A nemzetközi előírások és ajánlott gyakorlati eljárások alkalmazhatóságával kapcsolatosan lásd az Előszót.

Módosítások

A módosítások kiadásáról az ICAO Journal és az egyéb ICAO kiadványok valamint Audio-vizuális kiképzési segédanyagok havi katalógusa rendszeres tájékoztatást biztosítanak. Kísérjék figyelemmel a fenti kiadványokat és a módosításokat az alábbi rovatokba vezessék be:

Módosítás			
száma	kiadás időpontja	alkalmazhatóság időpontja	bevezette
Hatodik kiadás 1–18. módosításokkal	1998. július 20.	1998. november 5.	
19. módosítás (a Tanács 1999. március 15-én fogadta el)	1999. július 19.	1999. november 4.	
20. módosítás (a Tanács 2000. március 15-én fogadta el)	2000. július 17.	2000. november 2.	
21. módosítás (a Tanács 2001. március 9-én fogadta el)	2001. július 16.	2001. november 1.	
22. módosítás (a Tanács 2002. március 15-én fogadta el)	2002. július 15.	2002. november 28.	
23. módosítás (a Tanács 2003. március 13-án fogadta el)	2003. július 14.	2003. november 27.	
24. módosítás (a Tanács 2005. február 28-án fogadta el)	2005. július 11.	2005. november 24.	
25. módosítás (a Tanács 2006. március 06-án fogadta el)	–	–	
26. módosítás (a Tanács 2007. március 14-én fogadta el) Az (v), (vi), (xiv), 3, 3A, 15, 16A, 16B, 17, 18 és 19. oldalak cseréje	2007. július 16.	2007. november 22. 2008. július 1.	

Kiegészítés			
száma	kiadás időpontja	alkalmazhatóság időpontja	bevezette

A 6. Annex II. részében alkalmazott rövidítések és jelzések

Rövidítések és jelzés

ACAS	Összeütközés elkerülését biztosító fedélzeti rendszer
ADREP	Légijármű baleset vagy esemény jelentés
ADS-C	Automatikus légtérfelderítési adat szolgáltatási megállapodás
AFCS	Automatikus repülésvezérlő rendszer
AGA	Repülőterek, légútvonalak és földi berendezések
AIG	Légijármű baleset kivizsgálás és megelőzés
ASIA/PAC	Ázsia és Csendes Óceáni területek
ASE	Magasságmérő rendszer hiba
ATC	Légiforgalmi irányító szolgálat
ATS	Légiforgalmi szolgálatok
CAT I	I. kategória
CAT II	II. kategória
CAT III	III. kategória
CAT IIIA	IIIA. kategória
CAT IIIB	IIIB. kategória
CAT IIIC	IIIC. kategória
CFIT	Földnek ütközés vezetett repülés során (szabályszerűen üzemelő légijárművel)
cm	centiméter
CVR	Pilótakabin hangrögzítő berendezés
DA	Tengerszint feletti elhatározási magasság
DA/H	Elhatározási magasság
DH	Talajszint feletti elhatározási magasság
DME	Távolságmérő berendezés
ECAM	Központi elektronikus légijármű képernyő
EFIS	Elektronikus repülési műszerrendszer
EGT	Kilépő gázhőmérséklet
EICAS	Hajtómű ellenőrző és hajózószemélyzet riasztó rendszer
ELT	Vészhelyzeti helyjeladó berendezés
ELT(AD)	Automatikusan kibocsátható vészhelyzeti helyjeladó berendezés
ELT(AF)	Automatikus állandó vészhelyzeti helyjeladó berendezés
ELT(AP)	Automatikus hordozható vészhelyzeti helyjeladó berendezés
ELT(S)	Túlélési vészhelyzeti helyjeladó berendezés
EPR	Hajtómű nyomásviszony

EUROCAE	Európai Polgári Légiközlekedési Elektronikai Szervezet
FDAU	Repülési adatgyűjtő egység
FDR	Légijármű repülési adatrögzítő
FL	Repülési szint
FM	Frekvencia moduláció
ft	láb
g	Általános gyorsulás
GPWS	Földközelség jelző és riasztó rendszer
hPa	Hektopascal
IFR	Műszerrepülési szabályok
IMC	Műszeres időjárási körülmények
INS	Inerciális navigációs rendszer
kg	kilogramm
km	Kilométer
km/h	Kilométer/óra
kt	csomó
m	méter
MDA	Legalacsonyabb tengerszint feletti süllyedési magasság
MDA/H	Legalacsonyabb süllyedési magasság tengerszint/földfelszín felett
MDH	Legalacsonyabb földfelszín feletti süllyedési magasság
MHz	Megahertz
MNPS	Minimális navigációs teljesítmény előírás
NAV	Navigáció
NM	Tengeri mérföld
N1	Nagynyomású turbina fordulatszáma
OCA	Akadálymentes tengerszint feletti magasság
OCA/H	Akadálymentes tengerszint/földfelszín feletti magasság
OCH	Akadálymentes magasság
RCP	Előírt távközlési teljesítmény
RNP	Előírt navigációs teljesítmény
RVR	Futópályamenti látástávolság érték
RVSM	Csökkentett függőleges elkülönítési minimum
SI	Nemzetközi mértékegység
SICASP	Másodlagos légtérfelderítő radar fejlesztési és összeütközés elkerülési rendszereket kidolgozó munkacsoport
TLS	Megcélzott biztonsági szint
TVE	Összegzett függőleges hiba
UTC	Egyeztetett világidő

VFR	Látvarepülési szabályok
V_D	Tervezési süllyedési sebesség
VFR	Látvarepülési szabályok
VMC	Látás utáni időjárási körülmények
V_{SO}	Átesési sebesség, azaz a legalacsonyabb állandó sebesség a repülésvezérlő szerkezetek leszálláshoz történő beállítása mellett
WXR	Időjárás
Szimbólumok	
°C	Celsius fok
%	Százalék

(vi) oldal

A jelen Annex előírásaival kapcsolatos kiadványok

Egyezmény a nemzetközi polgári légiközlekedésről (Doc 7300)

Nemzetközi előírások a nyílt tengeren történő összeütközés megelőzésére

Európai Polgári Légiközlekedési Elektronikai Szervezet (EUROCAE) ED55A és ED56A jelzésű kiadványai

A Nemzetközi légiszállítás szabályzásának előírásai és útmutatói (Doc 9587)

A Nemzetközi Polgári Légiközlekedési Egyezmény **Annex**-ei

1. Annex — *Személyi jogosítás*

2. Annex — *Repülési szabályok*

3. Annex — *A nemzetközi légiközlekedés meteorológiai szolgálata*

5. Annex — *A légi és földi üzemeltetésnél alkalmazott mértékegységek*

6. Annex — *Légijármű üzemeltetés*

I. rész – Nemzetközi kereskedelmi légiszállítás – Repülőgépek

II. rész – Általános célú nemzetközi légiközlekedés – Repülőgépek

III. rész – Nemzetközi üzemeltetés – Forgószárnyas légijárművek

8. Annex — *Légijármű légialkalmasság*

10. Annex *Légiforgalmi távközlés*
III. kötet

I. rész – Digitális adattovábbítási rendszerek

II. rész – Rádiótávbeszélő rendszerek

IV. kötet - Légtérfelderítő radar és összeütközés elkerülését biztosító rendszerek

11. Annex *Légiforgalmi szolgálatok*

12. Annex *Kutatás és mentés*

13. Annex *Légijármű baleset kivizsgálás*

14. Annex *Repülőterek*
I. kötet – Repülőtér tervezés és üzemeltetés

15. Annex *Légiforgalmi tájékoztató szolgálat*

16. Annex *Környezetvédelem*
I. kötet – Légijármű zaj

18. Annex *Veszélyes áruk légi szállítása*

A Légiforgalmi Szolgálatok Eljárásai (PANS)

OPS – Légijármű Üzemeltetés (Doc 8168)
I. kötet – Repülési eljárások
II. kötet – A látvarepülési (VFR) és műszerrepülési (IFR) szabályok kidolgozása

ATM – Légiforgalmi Áramlásszervezés (Doc 4444)

A nemzetközi polgári légiközlekedésről szóló Egyezmény 83/b. cikkelyének kiegészítő jegyzőkönyve (Doc 9318)

Körzeti Kiegészítő Eljárások (Doc 7030)

Kézikönyvek

ADREP Légijármű baleset és repesemény jelentése (Doc 9156)

Repülőtér szolgálati kézikönyv (Doc 9137)
1. rész – Tűzoltó és mentő szolgálatok
8. rész – Repülőtér üzemeltető szolgálatok

Légialkalmassági kézikönyv (Doc 9760)

A polgári légiközlekedés orvostana (Doc 8984)

A 300 méter (1000 láb) függőleges elkülönítési minimum FL290 és FL410 közötti bevezetésének kézikönyve – RVSM kézikönyv (Doc 9574)

Az Előírt Távközlési Teljesítmény (RCP) Kézikönyve (Doc 9869)

Az előírt navigációs teljesítmény (RNP) kézikönyve (Doc 9613)

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A. táblázat — A 6. Annex II. részének módosításai

(módosítás — forrás — tárgy — elfogadva / hatályos / alkalmazható)

…

18) – Hatodik kiadás – Repülési adatrögzítés munkacsoport első ülése – Léginavigációs Bizottság tanulmányai – Az ipari és ICAO CFIT munkabizottságok vizsgálatai – 1. Annex 162. módosítása és a 11. Annex 38. módosítása – Szerkesztői módosítások

a) új és módosított meghatározások a szellemi tevékenységet befolyásoló anyagokra és az előírt navigációs teljesítményre vonatkozóan;

b) a kölcsönbérlet és csere vonatkozó megjegyzéseinek módosítása;

c) a szellemi tevékenységet befolyásoló (pszichoaktív) anyagok használatára vonatkozó új megjegyzés bevezetése;

d) új és módosított előírások a földközelség jelző és riasztó rendszer, a repülési adatrögzítők valamint a nyomásmagasság adó válaszjeladók szállítására.

1998. március 20. 1998. július 20. 1998. november 5.

19) – Repülési adatrögzítés munkacsoport második ülése – Léginavigációs Bizottság tanulmányai

a) meghatározások módosítása;

b) új előírások a 406 MHz és 121,5 MHz frekvencián üzemelő vészhelyzeti helyjeladó berendezések kötelező szállítására; földközelség jelző és riasztó rendszer (GPWS) kiegészítő veszélyes földfelszín közelség megelőző riasztási funkcióval történő ellátására vonatkozóan; a digitális összeköttetések rögzítésére vonatkozó határidő kijelölése.

1999. március 15. 1999. július 19. 1999. november 4.

20) – Léginavigációs Bizottság tanulmányai

a) meghatározások módosítása;

b) a műszeres megközelítések követelményeinek bevezetése; a légijármű parancsnok feladatainak módosítása.

2000. március 15. 2000. július 17. 2000. november 2.

21) – Repülési adatrögzítés munkacsoport második ülése – Az egész világot átfogó műholdas navigációs rendszerrel foglalkozó munkacsoport harmadik ülése – Folyamatos légialkalmassági munkacsoport ötödik ülése

a) a repülési adatrögzítőkre vonatkozó előírások módosítása, amelyek tartalmazzák a digitális távközlési adatok rögzítését; az új légijármű repülési adatrögzítőjére (FDR) vonatkozó előírások; rögzítendő

jellemzők új felsorolása; a pilótakabin hangrögzítők (CVR) két órás felvételi időtartamának előírása;
b) a műszeres megközelítés és leszállás osztályozásának módosítása;
c) új előírások a függőleges irányvezetéssel (APV) végrehajtott megközelítésre vonatkozóan; és
d) új meghatározások és a karbantartással kapcsolatos előírások módosítása.

2001. március 9. 2001. július 16. 2001. november 1.

22) –Léginavigációs Bizottság tanulmányai
A földközelség jelző és riasztó rendszerre (GPWS) és az előre irányuló veszélyes földfelszín közelség megelőző riasztó feladatra vonatkozó előírások módosítása;

2002. március 15. 2002. július 15. 2002. november 28.

23) – Elkülönítési és Légtérbiztonsági munkacsoport
A RNP légtérben történő repülésvégrehajtás engedélyezése a lajstromozó állam részéről.

2003. március 13. 2003. július 14. 2003. november 27.

24) – Elkülönítési és Légtérbiztonsági munkacsoport és Léginavigációs Bizottság tanulmányai
a) Új meghatározások és intézkedések a magasságtartási teljesítőképesség és magasság ellenőrzési követelményekre vonatkozóan a csökkentett függőleges elkülönítési minimum (RVSM) szerinti üzemeltetéssel összefüggésben; és
b) Új követelmények az összeütközést elkerülő fedélzeti rendszer (ACAS II) kisgépes légiközlekedéshez tartozó repülőgépekre való felépítésével kapcsolatban, és ezzel összefüggő képzési követelmények a repülőgépvezetők számára.

2005. február 28. 2005. július 11. 2005. november 24.

25) – Az Akadály védelmi Munkabizottság tizennegyedik ülése (OCP/14)
A repülőgépvezetők tudomása az eljárás felépítése alapján meghatározott üzemeltetési követelményekről.

2006. március 06. – –

(xiv) oldal

26) – Üzemeltetési Adatkapcsolat munkacsoport első ülése (OPLINKP/1) – Léginavigációs Bizottság tanulmánya:

a) előírások módosítása az automatikus légtérfelderítési adat szolgáltatási megállapodás (ADS-C) alkalmazásához rendelkezésre álló technológiák bevezetésének megkönnyítéséhez és a légiforgalmi szolgáltatások (ATS) biztosítása során az előírt távközlési teljesítmény RCP) bevezetéséhez; és
b) a vészhelyzeti helyjeladó berendezések (ELT-k) kötelező szállítási követelményei.

2007. március 14. 2007. július 16. 2007. november 22.
2008. július 1.

Flight time – Aeroplanes – Repülési idő – Repülőgép

Az a teljes időtartam, amely akkor kezdődik, amikor a repülőgép a felszállás céljából először megindul és akkor fejeződik be, amikor a repülőgép a repülés után megáll.

Megjegyzés: Az itt meghatározott repülési idő azonos az általánosan használt „blokk-idővel" vagy a „féktuskó elvételétől annak visszahelyezéséig" tartó időtartammal, amelyet attól az időponttól mérnek, amikor a repülőgép a felszállás céljából először megindul és akkor fejeződik be, mikor a repülőgép a repülés után megáll.

General aviation operation – Általános célú légiközlekedés

A kereskedelmi légiszállító tevékenységtől valamint a munkarepüléstől eltérő légijármű üzemeltetés.

Instrument meteorological conditions (IMC) – Műszeres időjárási körülmények

Látástávolsággal, felhőzettől mért távolsággal és felhőalappal* kifejezett időjárási körülmények, ha azok a látás utáni időjárási körülményekre meghatározott minimum értékeknél alacsonyabbak.

Megjegyzés: A látás utáni időjárási körülményekre meghatározott minimum értékeket a 2. Annex 4. fejezete tartalmazza.

Maintenance – Karbantartás

A légijármű folyamatos légialkalmasságának biztosításához előírt feladatok, beleértve a következők bármelyikét vagy ezek kombinációját; nagyjavítás, ellenőrzés, hibajavítás, csere, módosítás vagy a meghibásodás elhárítása.

Maintenance programme – Karbantartási program

Az előírt tervszerű karbantartási feladatok felsorolását tartalmazó kiadvány, amely jelzi a feladatok végrehajtásának időrendi tervét és rendjét. Ilyen kiadvány lehet a légijármű üzemi megbízhatósági programja, amely azon légijármű biztonságos üzemeltetéshez szükséges, amelyre az vonatkozik.

Maintenance release – Karbantartási igazolás

Olyan igazolást tartalmazó dokumentum, amely megerősíti, hogy a megfelelő karbantartási feladatokat a karbantartást végző szervezet eljárási kézikönyve vagy más egyenértékű rendszer alapján az elfogadott jellemzők figyelembevételével kielégítően elvégezték.

Meteorological information – Időjárás tájékoztatás

A jelenlegi vagy várható időjárási körülményekre vonatkozó időjárás jelentés, elemzés, előrejelzés vagy bármely más kiadott közlemény.

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* A 2. Annex szerint.

Minimum descent altitude (MDA) / Minimum descent height (MDH) – Legalacsonyabb süllyedési magasság

A nem-precíziós megközelítési vagy a körözéssel végrehajtott megközelítési eljárásra előírt meghatározott tengerszint vagy földfelszín feletti magasság, amely alá az előírt látási feltételek létrejöttének hiányában süllyedni tilos.

1. Megjegyzés: A legalacsonyabb QNH süllyedési magasság a közepes tengerszinthez, a legalacsonyabb QFE süllyedési magasság a repülőtér magasságához vagy a futópálya küszöb magasságához viszonyított érték. Ez utóbbit akkor alkalmazzák, ha a futópálya küszöb magassága több mint 2 méterrel (7 láb) a repülőtér magassága alatt van. A megközelítéshez történő körözéshez meghatározott legalacsonyabb süllyedési magasság a repülőtér magasságához viszonyított érték.

2. Megjegyzés: A szükséges látási feltételek a fénytechnikai eszközök vagy a megközelítési terület azon elemeinek illetve részeinek látását jelentik, amelyeket a repülőgépvezetőnek elegendő ideig látnia kell ahhoz, hogy a légijármű helyzetét és a szükséges helyzetváltoztatás mértékét a kívánatos repülési pályához viszonyítva értékelhesse. A körözéssel végrehajtott megközelítés esetében a szükséges látási feltételek a futópálya környezetére vonatkoznak.

3. Megjegyzés: A gyakorlati alkalmazás megkönnyítése érdekében ott, ahol mindkét kifejezést használják, azok „QNH/OFE legalacsonyabb süllyedési magasság”-ként rövidítve pedig MDA/H-ként írhatók le.

Night – Éjszaka

Az esti polgári szürkület vége és a hajnali polgári szürkület kezdete között eltelt idő vagy olyan más, napnyugat és napkelte között eltelt időszak, amelyet az illetékes hatóság határoz meg.

Megjegyzés: Az esti polgári szürkület akkor fejeződik be, amikor a napkorong középpontja 6 fokkal a horizont alá süllyed és a hajnali polgári szürkület akkor kezdődik, amikor a napkorong középpontja 6 fokkal a horizont fölé emelkedik.

Obstacle clearance altitude (OCA) or Obstacle clearance height (OCH) – Akadálymentes tengerszint feletti magasság (OCA) vagy akadálymentes földfelszín feletti magasság (OCH)

A legalacsonyabb közepes tengerszinthez viszonyított magasság vagy a megfelelő futópálya küszöb illetve a repülőtér magassága feletti magasság – amelyik alkalmazható – amelyet az akadályoktól történő megfelelő függőleges elkülönítés biztosítása érdekében az akadálymentességi előírásokkal összhangban határoznak meg.

1. Megjegyzés: Az akadálymentes tengerszint feletti magasság a közepes tengerszinthez, az akadálymentes földfelszín feletti magasság a futópálya küszöb magasságához viszonyított érték. A nem-precíziós megközelítés esetében az akadálymentes földfelszín feletti magasság a repülőtér magasságához vagy a futópálya küszöb magasságához viszonyított érték. Ez utóbbit akkor alkalmazzák, ha a futópálya küszöb magassága több mint 2 méterrel (7 láb) a repülőtér magassága alatt van. A megközelítéshez történő körözéshez meghatározott akadálymentes földfelszín feletti magasság a repülőtér magasságához viszonyított érték.

2. Megjegyzés: A gyakorlati alkalmazás megkönnyítése érdekében ott, ahol mindkét kifejezést használják, azok „QNH/OFE akadálymentes magasság”-ként rövidítve pedig OCA/H-ként írhatók *le.*

Pilot-in-command – Légijármű parancsnoka

A repülés biztonságos végrehajtásáért felelős, a járató részéről parancsnoknak kijelölt repülőgépvezető vagy az általános célú légiközlekedés esetében a légijármű tulajdonosa.

Psychoactive substances – Szellemi tevékenységet befolyásoló anyagok

Alkohol, ópiumból vagy kenderből készített kábítószer, kokain, nyugtatók és altatók, egyéb izgató, serkentő, élénkítő-szerek, képzeteket keltő erős izgatószerek és illékony oldószerek a kávé és a dohányféleségek kivételével.

Required communication performance (RCP) – Előírt távközlési teljesítmény

A repülés közbeni távközlési teljesítmény követelményeire vonatkozó, meghatározott ATM feladatok támogatásával összefüggő közlemény

Required communication performance type (RCP) – Előírt távközlési teljesítmény típus

A távközlés lebonyolítási idejét, folyamatosságát, rendelkezésre állását és integrítását meghatározó RCP paraméterekhez rendelt értékeket jellemző címkék (például: RCP 240).

Repair – Javítás

A légijármű bármely üzemi alkatrészének sérülést vagy üzemszerű kopást követő repülésre alkalmas állapotba történő helyreállítása annak biztosítása érdekében, hogy az továbbra is megfelel a vonatkozó légialkalmassági előírásoknak, amelyeket az adott légijármű típus bizonyítványának kiadásakor figyelembe vettek.

3A oldal

Required navigation performance (RNP) – Előírt navigációs pontosság

Egy meghatározott légtérben történő repülés-végrehajtáshoz szükséges navigációs teljesítmény azaz pontosság.

Megjegyzés: A navigációs teljesítményt és előírásokat az adott RNP típusra és/vagy alkalmazásra határozzák meg.

Required navigation performance type (RNP type) – Előírt navigációs pontosság típus

Tengeri mérföldben kifejezett távolság érték, azaz pontossági határérték. A repülésvégrehajtás során a repülőgép tervezett repülési helyzetéhez viszonyítva a repülési idő legalább 95 %-ában ezen határértéken belül repüljön.

Például: – az RNP 4 olyan navigációs pontosság határértéket jelent, amelynek alapján az adott repülőgép repülési idejének legalább 95 százalékában mindenkori tervezett repülési helyzetéhez viszonyítva plusz/minusz 7.4 km (4 tmf) távolságon belül repül.

Runway visual range (RVR) – Futópályamenti látástávolság érték

Az a távolság, ameddig a futópálya középvonalán álló légijármű vezetője látja a futópálya felületi jelzéseket vagy a futópálya szélét kijelölő, illetve a középvonalát azonosító fényeket.

State of Registry – Lajstromozó állam

Azon állam, amelynek lajstromába a légijárművet bevezették.

Megjegyzés: A nem nemzeti alapon működő nemzetközi üzemeltető vállalkozás vagy szervezet légijárművének lajstromozása esetében az abban érintett államokra együttesen és külön-külön is vonatkozik az a kötelezettség, amely a Chicagó-i Egyezmény értelmében a lajstromozó államot illeti. Erre vonatkozóan lásd a Tanács 1967. december 14-i Határozatát a Nemzetközi Üzemeltető Szervezetek Által Üzemeltetett Légijárművek Nemzeti Hovatartozása és Lajstromozása címmel, amely megtalálható a Nemzetközi Légiszállítás Gazdasági Szabályzására vonatkozó Útmutatóban (Doc 9587).

Target level of safety (TLS) – Megcélzott biztonsági szint

Adott körülmények között elfogadhatónak ítélt kockázati szintet kifejező általános fogalom.

Total vertical error (TVE) – Összegzett magassági hiba

A légijármű aktuális repülési nyomás magassága és a részére meghatározott nyomás magasság (repülési szint) közötti függőleges geometriai különbség.

Visual meteorological conditions (VMC)- Látás utáni időjárási körülmények

Látástávolsággal, felhőzettől mért távolsággal és felhőalappal kifejezett időjárási körülmények, ha azok a látás utáni időjárási körülményekre meghatározott minimum értékeknél jobbak.

Megjegyzés: A látás utáni időjárási körülményekre meghatározott minimum értékeket a 2. Annex 4. fejezete tartalmazza.

6.10.1.4.1 2003 január 1. után ne használják a fényképészeti filmmel működő repülési adatrögzítőket.

6.10.1.5 Az összes olyan digitális adathálózati összeköttetést alkalmazó repülőgép, amelynek egyedi légialkalmassági bizonyítványát először 2005 január 1. után adták ki, valamint pilótakabin hangrögzítő berendezés (CVR) szállítására kötelezett, repülési adatrögzítő berendezésén rögzítse az összes, beérkező és kimenő digitális adathálózati közleményt. A legkisebb felvételi időtartam azonos legyen a pilótakabin hangrögzítő berendezés felvételi időtartamával és a felvétel összevethető legyen a rögzített hangfelvétellel.

6.10.1.5.1 2007 január 1.-től az összes digitális adathálózati összeköttetést alkalmazó repülőgép, amely pilótakabin hangrögzítő berendezés (CVR) szállítására kötelezett, repülési adatrögzítő berendezésén rögzítse az összes, beérkező és kimenő digitális adathálózati közleményt. A legkisebb felvételi időtartam azonos legyen a pilótakabin hangrögzítő berendezés felvételi időtartamával és a felvétel összevethető legyen a rögzített hangfelvétellel.

6.10.1.5.2 Az adathálózati digitális közleményváltás tartalmának megismeréséhez szükséges tájékoztatást és ahol ez lehetséges, a közlemény megjelenítésének vagy a hajózószemélyzet által történt lehívásának időpontját is rögzítsék.

Megjegyzés: Az adathálózati összeköttetések közé tartoznak, azonban nem csak ezekre korlátozódnak a következők:

ADS-C – automatikus légtérfelderítési adat szolgáltatási megállapodás

CPDLC – légiforgalmi irányító és repülőgépvezető közötti adathálózati összeköttetések

D-FIS – adathálózati és repüléstájékoztató szolgálati összeköttetések

AOC – légiközlekedési üzemi irányítási közlemények.

6.10.1.6 **Ajánlás** – *Minden olyan repülőgépet, amelynek engedélyezett legnagyobb felszállósúlya (tömege) több mint 5700 kg és repülési adatrögzítő és pilótakabin hangrögzítő berendezések szállítására kötelezett, alternatív megoldásként kettős (összetett) repülési adat és pilótakabin hangrögzítő berendezéssel is (FDR/CVR) felszerelhetnek.*

6.10.1.7 Az I.A típusú repülési adatrögzítő rögzítse azokat a jellemző adatokat, amelyek a repülőgép repülési pályájának, sebességének, helyzetének, hajtómű teljesítményének és működésének valamint a repülésvezérlő szerkezetek beállításának és működésének pontos meghatározásához szükségesek. A következő pontokban ismertetjük azokat a jellemzőket, amelyek kielégítik az I.A típusú repülési adatrögzítőre vonatkozó előírásokat. A (*) jelölés nélküli jellemzők rögzítése kötelező. A (*) jelöléssel ellátott jellemzők akkor rögzítendők, ha a repülőgép rendszerei vagy a hajózószemélyzet a jellemzőt illetve adatot a repülőgép üzemeltetéshez használja fel.

6.10.1.7.1 A repülőgép repülési pályájára és sebességére vonatkozó előírásokat kielégítő jellemzők:

– nyomás-magasság
– műszer szerinti vagy kalibrált repülési sebesség
– levegő – föld viszonyítási helyzet és minden egyes futómű levegő – föld érzékelő; szükség

szerint
- külső levegő hőmérséklete vagy össz-hőmérséklet
- géptengely irányszög (a hajózószemélyzet elsődleges műszerei alapján)
- függőleges gyorsulás
- oldalirányú gyorsulás
- hosszirányú gyorsulás (törzs tengely)
- idő vagy relatív idő számítás
- navigációs adatok*: széleltérítés sodródási szög, szélsebesség, szélirány, szélességi és hosszúsági fok adatok
- földi feletti sebesség*
- rádió magasságmérő által jelzett magasság*

6.10.1.7.2 A repülési helyzetre vonatkozó előírásokat kielégítő jellemzők:

- bólintási helyzet
- bedöntési helyzet
- legyezőmozgás vagy csúszás szög*
- állásszög*

6.10.1.7.3 A hajtóműre vonatkozó előírásokat kielégítő jellemzők:

- hajtómű tolóerő illetve teljesítmény: minden egyes hajtómű tolóereje, pilótakabin tolóerő szabályzó kar(ok) helyzete
- sugárfordító helyzete*
- hajtómű tolóerő utasítás*
- szükséges hajtómű tolóerő*
- hajtómű levegőelvételi-szelep helyzete*
- további hajtómű jellemzők*: hajtómű nyomásviszony, kijelzett hajtómű rezgési szint értékek, tüzelőanyag áramlási értékek, tüzelőanyag elvételi kar helyzete, N_1, N_2, EGT, TLA, N_3

6.10.1.7.4 A repülésvezérlő szerkezetek helyzetére vonatkozó előírásokat kielégítő jellemzők:

- bólintás trimm lap(ok) helyzete
- fékszárnyak*: belépőél helyzete, pilótakabin fékszárny vezérlőkar beállítás
- orrsegédszárnyak*: orrsegédszárny belépőél helyzete, pilótakabin orrsegédszárny vezérlőkar helyzete
- futómű*: futómű, futó vezérlőkar helyzete
- oldalkormány trimm lap helyzete*
- csűrő trimm lap helyzete*
- pilótakabin trimm vezérlő szervek helyzete *: bólintás
- pilótakabin trimm vezérlő szervek helyzete *: bedöntés
- pilótakabin trimm vezérlő szervek helyzete *: legyezőmozgás
- földi áramlásrontó és aerodinamikai fék*: földi áramlásrontó helyzet, földi áramlásrontó vezérlőkar helyzet, aerodinamikai fék helyzet, aerodinamikai fék vezérlőkar helyzet
- jégmentesítő és/vagy jégtelenítő berendezések kiválasztása*

– hidraulika nyomás (minden egyes rendszer)*
– tüzelőanyag-mennyiség*
– AC (váltóáramú) elektromos táplálások helyzete*
– DC (egyenáramú) elektromos táplálások helyzete*
– segédhajtómű levegőelvételi-szelep helyzete*
– számított súlyponthelyzet*

6.10.1.7.5 Az üzemeltetésre vonatkozó előírásokat kielégítő jellemzők:

– riasztások
– elsődleges repülés vezérlő szerkezetek helyzete és a kezelő egységek beállítása: bólintási, bedöntési és legyezőmozgás szerinti tengelyek
– marker adó átrepülése

16. oldal

– minden egyes navigációs vevőberendezés frekvencia kiválasztása
– kézi rádió adógomb helyzete és CVR/FDR szinkron jel
– robotpilóta, tolóerő automata, automatikus repülésvezérlés üzemmód és bekapcsolt állapot helyzete*
– választott barometrikus nyomás beállítás*: légijármű parancsok és első tiszt
– választott nyomásmagasság (repülőgépvezető részéről állítható összes üzemmód)*
– választott repülési sebesség (repülőgépvezető részéről állítható összes üzemmód)*
– választott MACH szám (repülőgépvezető részéről állítható összes üzemmód)*
– választott emelkedési és süllyedési sebesség (repülőgépvezető részéről állítható összes üzemmód)*
– választott géptengely irányszög (repülőgépvezető részéről állítható összes üzemmód)*
– választott repülési pálya (repülőgépvezető részéről állítható összes üzemmód)*; repülési irányszög, korrigált repülési pálya, megközelítési siklópálya szög
– választott elhatározási magasság*
– az elektronikus repülési műszerrendszer (EFIS) választott megjelenítési beállítása*: légijármű parancsok és első tiszt
– több funkciós hajtómű teljesítmény és állapot riasztás megjelenítési beállítása*
– GWPS/TAWS/GCAS helyzet*: földfelszín megjelenítési mód választás, beleértve a következőket: figyelmeztető jelzések és riasztások, riasztási állapot, tanácsadó rendszer állapot, üzemi kapcsolók helyzete
– alacsony nyomás riasztások*: hidraulika és pneumatika rendszerek
– számítógép meghibásodás*
– veszélyes kabinnyomás csökkenés riasztás*
– TCAS/ACAS (forgalmi riasztó és összeütközés elkerülését biztosító rendszer / összeütközés elkerülését biztosító fedélzeti rendszer*
– jegesedés jelzőrendszer*
– veszélyes hajtómű rezgés riasztás minden egyes hajtóműnél*
– veszélyes hajtómű túlmelegedés riasztás minden egyes hajtóműnél*
– veszélyes alacsony olajnyomás riasztás minden egyes hajtóműnél*

– veszélyes hajtómű fordulatszám (sebesség) túllépés riasztás minden egyes hajtóműnél*
– szélnyírás riasztás*
– repülés közben működő átesés elleni védelem, vezérlőkar rázás és elmozdítás működtetése*
– a pilótakabinban található összes repülésvezérlő egység erőhatásai*: kormányszarv, kormányoszlop, pedálok kabinból való működtetésének erőhatásai
– függőleges eltérések*: ILS siklópálya, MLS magasság irányvezetés, GNSS megközelítési pálya
– vízszintes eltérések*: ILS iránysáv, MLS oldalszög irányvezetés, GNSS megközelítési pálya
– távolságmérő jelzőműszerek által jelzett távolság értékek (1 és 2 DME készletek)*
– elsődleges navigációs rendszerek*: GNSS, INS, VOR/DME, MLS, ILS, Loran C
– fékberendezések*: bal és jobb oldali féknyomások, bal és jobb oldali fékpedál helyzete
– időpont*
– események jelzése*
– pilótakabin üvegre vetített megjelenítő rendszer bekapcsolása*
– paravizuális megjelenítő egységek bekapcsolása*

1. Megjegyzés: Az előírt jellemzők, közöttük a tartományok, a mintavételi pontosság és felbontás megtalálhatók az EUROCAE Polgári Légiközlekedési Berendezések Európai Szervezete repülési adatrögzítő rendszerekre kidolgozott MOPS (minimális üzemi teljesítmény előírások) kiadványában vagy más egyenértékű dokumentumban.
2. Megjegyzés: A rögzítendő jellemzők száma a repülőgép típustól, annak összetettségétől függ, azonban a csillag (*) jelölés nélküli jellemzőket ettől függetlenül rögzíteni kell. A (*) jelöléssel ellátott jellemzők akkor rögzítendők, ha a repülőgép rendszerei vagy a hajózószemélyzet a jellemzőt illetve adatot a repülőgép üzemeltetéshez használja fel.

6.10.2 Repülési adatrögzítők — felvételi időtartam

Az I. és II. típusú repülési adatrögzítő képes legyen a működése legalább utolsó 25 órájában rögzített adatok tárolására.

6.10.3 Repülési adatrögzítők — Repülőgépek, amelyek egyedi légialkalmassági bizonyítványát először 1989 január 1-én vagy ezt követően adták ki

6.10.3.1 Minden olyan repülőgépet, amelynek legnagyobb engedélyezett felszállósúlya (tömege) több mint 27 000 kg. I. típusú repülési adatrögzítő berendezéssel szereljenek fel.

6.10.3.2 **Ajánlás** — *Minden olyan repülőgépet, amelynek legnagyobb engedélyezett felszállósúlya (tömege) 5700 kg-tól 27 000 kg-ig terjed, II. típusú repülési adatrögzítő berendezéssel szereljenek fel.*

6.10.4 Repülési adatrögzítők — Repülőgépek, amelyek egyedi légialkalmassági bizonyítványát először 2005 január 1. után adták ki

Minden olyan repülőgépet, amelynek legnagyobb engedélyezett felszállósúlya (tömege) több mint 5700 kg. I.A típusú repülési adatrögzítő berendezéssel szereljenek fel.

6.10.5 Pilótakabin hangrögzítők — Repülőgépek, amelyek egyedi légialkalmassági bizonyítványát először 1987 január 1-én vagy ezt követően adták ki

Megjegyzés: A pilótakabin hangrögzítő berendezések teljesítmény előírásai megtalálhatók az EUROCAE

Polgári Légiközlekedési Berendezések Európai Szervezete repülési adatrögzítő rendszerekre kidolgozott MOPS (minimális üzemi teljesítmény előírások) kiadványában vagy más egyenértékű dokumentumban.

6.10.5.1 Minden olyan repülőgépet, amelynek legnagyobb engedélyezett felszállósúlya (tömege) több mint 27 000 kg. pilótakabin hangrögzítő berendezéssel szereljenek fel, amelynek célja a pilótakabin belső hangkörnyezetének rögzítése a repülés időtartama alatt.

6.10.5.2 **Ajánlás** — *Minden olyan repülőgépet, amelynek legnagyobb engedélyezett felszállósúlya (tömege) 5700 kg-tól 27 000 kg-ig terjed, pilótakabin hangrögzítő berendezéssel szereljenek fel, amelynek célja a pilótakabin belső hangkörnyezetének rögzítése a repülés időtartama alatt.*

16A oldal

6.10.6 Pilótakabin hangrögzítők — felvételi időtartam

6.10.6.1 A pilótakabin hangrögzítő berendezés képes legyen a működése legalább utolsó 30 percében rögzített információk tárolására.

6.10.6.2 **Ajánlás** —*Az a pilótakabin hangrögzítő berendezés, amelyet olyan repülőgépbe szereltek fel, melynek legnagyobb engedélyezett felszállósúlya (tömege) több mint 5700 kg. és egyedi légialkalmassági bizonyítványát először 1990 január 1-én vagy ezt követően adták ki, képes legyen a működése legalább utolsó két órájában rögzített információk tárolására.*

6.10.6.3 Az a pilótakabin hangrögzítő berendezés, amelyet olyan repülőgépbe szereltek fel, melynek legnagyobb engedélyezett felszállósúlya (tömege) több mint 5700 kg. és egyedi légialkalmassági bizonyítványát először 2003 január 1. után adták ki, képes legyen a működése legalább utolsó két órájában rögzített információk tárolására.

6.10.7 Repülési adatrögzítők — szerkezet és beszerelés

A repülési adatrögzítőket úgy készítsék el és helyezzék el illetve szereljék be a repülőgépbe, hogy biztosítsák a rögzített adatok gyakorlatilag lehetséges legnagyobb védelmét annak érdekében, hogy a rögzített tájékoztatások megőrizhetők, leolvashatók és feldolgozhatók legyenek.

Megjegyzés: A baleseti törési ellenálló képesség és a tűz elleni védelem ipari előírásai megtalálhatók a Polgári Légiközlekedési Berendezések Európai Szervezete (EUROCAE) ED55 és ED56A jelű és hasonló kiadványokban.

6.10.8 Repülési adatrögzítők — működés

6.10.8.1 A repülési adatrögzítőt a repülés időtartama alatt ne kapcsolják ki.

6.10.8.2 A repülési adatrögzítővel rögzített adatok megőrzése érdekében a berendezést egy baleset vagy repesemény utáni repülés befejezését követően kapcsolják ki és azt a 13. Annex előírásaival összhangban, az információkat tartalmazó adathordozó eltávolítása előtt ne kapcsolják ismét be.

1. Megjegyzés: A repülési adatrögzítővel rögzített adatok légijárműből történő eltávolításának szükségességét a vizsgálatot végző állam vizsgáló hatósága határozza meg az esemény súlyossága és körülményei alapján, beleértve az eseménynek a repülési üzemre gyakorolt hatását is.

2. Megjegyzés: A légijármű parancsnoknak a repülési adatrögzítővel rögzített adatok tárolására vonatkozó felelősségét a 6.10.9 pont tartalmazza.

6.10.9 Repülési adatrögzítő felvételei

A légijármű parancsnoka a lehetőségek határain belül biztosítsa, hogy amennyiben a repülőgép balesetet szenvedett vagy repeseményben érintett, az összes vonatkozó repülési adatrögzítő felvételt és ha szükséges, az alkalmazott repülési adatrögzítő berendezéseket is megőrizze, továbbá azokat a 13. Annex előírásaival összhangban biztonságos őrizet alatt tárolja.

6.10.10 Repülési adatrögzítők — folyamatos működőképesség

Végezzék el a repülési adatrögzítő és pilótakabin hangrögzítő rendszerek felvételeinek üzemi ellenőrzését és értékelését annak érdekében, hogy a rögzítő berendezések folyamatos működőképességét biztosíthassák.

Megjegyzés: A repülési adatrögzítők és pilótakabin hangrögzítő rendszerek ellenőrzésének eljárásait az A. Melléklet tartalmazza.

6.11 MACH-szám jelzőműszer

Minden olyan repülőgépet, amelynek üzemeltetési sebesség korlátozásait Mach-szám érték(ek)ben fejezik ki, szereljenek fel Mach-szám jelzőműszerrel.

Megjegyzés: Ez az előírás nem zárja ki a repülési sebesség mérőműszer igénybevételét a légiforgalmi szolgálatok céljaira megadott Mach-szám érték kiszámításához.

6.12 Vészhelyzeti helyjeladó berendezés (ELT)

2008. június 30-ig alkalmazható

6.12.1 Minden olyan, a 6.3.3 b) pont szerint vízfelszín felett hosszú távú, és a 6.4 pont szerint kijelölt szárazföld felett repülést végrehajtó repülőgépet, amelynek egyedi légialkalmassági bizonyítványát először 2002 január 1. után adták ki, egy darab automatikus vészhelyzeti helyjeladó (ELT) berendezéssel szereljenek fel.

6.12.2 2005 január 1-től minden, a 6.3.3 b) pont szerint vízfelszín felett hosszú távú, és a 6.4 pont szerint kijelölt szárazföld felett repülést végrehajtó repülőgépet egy darab automatikus vészhelyzeti helyjeladó (ELT) berendezéssel szereljenek fel.

6.12.3 **Ajánlás** — *Minden repülőgépet szereljenek fel automatikusan működésbe lépő vészhelyzeti helyjeladó (ELT) berendezéssel.*

16B oldal

6.12.4 A fenti 6.12.1 — 6.12.3 pontok alapján felszerelt vészhelyzeti helyjeladó (ELT) berendezés a 10. Annex III. kötet vonatkozó előírásai szerint üzemeljen.

2008. július 01-től alkalmazandó

6.12.5 **Ajánlás –** *Minden repülőgép szállítson egy automatikus működésű vészhelyzeti helyjeladó (ELT)* *berendezést.*

6.12.6 A 6.12.7. pontban megadott esetet kivéve, 2008 július 01-től minden repülőgépet szereljenek fel legalább egy darab tetszőleges típusú automatikus vészhelyzeti helyjeladó (ELT) berendezéssel.

6.12.7 Minden olyan repülőgépet, amelynek egyedi légialkalmassági bizonyítványát először 2008 július 1. után adták ki, szereljenek fel legalább egy darab automatikus működésű vészhelyzeti helyjeladó (ELT) berendezéssel.

6.12.8 A fenti 6.12.5 — 6.12.7 pontok alapján felszerelt vészhelyzeti helyjeladó (ELT) berendezés a 10. Annex III. kötet vonatkozó előírásai szerint üzemeljen.

Megjegyzés: A vészhelyzeti helyjeladó (ELT) számának, típusának és a légijárművön való elhelyezésének valamint az uszóképességet támogató kiegészítő rendszerének megfelelő kiválasztása adja a legnagyobb esélyt a vészhelyzeti helyjeladó (ELT) működésbe hozására, amennyiben a kutatás és mentés szempontjából különösen nehéz területeket is beleértve, a víz vagy a szárazföld felett repülő légijárművet baleset érné. Az adóegység elhelyezése a legfontosabb tényező az optimális törés és tűz elleni védelem biztosításában. Az automatikus működésű beépített vészhelyzeti helyjeladó (ELT) vezérlő és kapcsoló eszközeinek (aktíváló kijelzők) elhelyezésénél és a kapcsolódó üzemeltetési eljárások kialakításánál tekintetbe kell venni a figyelmetlenségből adódó működésbe hozatal gyors felismerésének, valamint a manuális bekapcsolás esetén a személyzet általi könnyű kezelhetőség igényeit.

6.13 Repülőgépek, amelyeket nyomásmagasság-adó másodlagos radar válaszjeladóval kell felszerelni

6.13.1 2003 január 1. után az illetékes hatóság felmentésének kivételével minden repülőgépet szereljenek fel a 10. Annex IV. kötet vonatkozó előírásainak megfelelően üzemelő nyomásmagasság-adó másodlagos radar válaszjeladó berendezéssel.

6.13.2 **Ajánlás** — *Minden repülőgépet szereljenek fel a 10. Annex IV. kötet vonatkozó előírásainak megfelelően üzemelő nyomásmagasság-adó másodlagos radar válaszjeladó berendezéssel.*

Megjegyzés: A 6.13.1 és 6.13.2 pontok előírásainak célja a légiforgalmi szolgálatok valamint az összeütközést elkerülő fedélzeti rendszerek hatékony működésének fejlesztése. Az ACAS rendszer felszerelésére és szállítására vonatkozó hatálybalépési időpontokat a 6. Annex I. rész 6.18.1 és 6.18.2 pontjai tartalmazzák. Az előírás célja továbbá az is, hogy a nyomásmagasság-adó másodlagos radar válaszjeladó berendezéssel fel nem szerelt légijármű ne üzemeljen közös légtérben olyan légijárművel, amely összeütközést elkerülő fedélzeti rendszerrel van felszerelve. Ezért a nyomásmagasság-adó másodlagos radar válaszjeladó berendezés szállítása alól történő felmentéseket olyan légtér kijelölése mellett adják ki, amelyben az ilyen berendezés szállítása nem kötelező.

6.14 Repülőgépek, amelyeket összeütközést elkerülő fedélzeti rendszerrel (ACAS II) kell felszerelni

6.14.1 **Ajánlás** *–minden olyan gázturbinás sugárhajtóműves repülőgépet, amelynek engedélyezett legnagyobb felszállósúlya (tömege) 15000 kg-nál nagyobb, vagy amely több mint 30 utas szállítására jogosított, és amennyiben ezen repülőgép egyedi légialkalmassági bizonyítványát először 2005 november*

24 után adták ki, szereljenek fel összeütközést elkerülő fedélzeti rendszerrel (ACAS II).

6.14.2 Minden olyan gázturbinás sugárhajtóműves repülőgépet, amelynek engedélyezett legnagyobb felszállósúlya (tömege) 15000 kg-nál nagyobb, vagy amely több mint 30 utas szállítására jogosított, és amennyiben ezen repülőgép egyedi légialkalmassági bizonyítványát először 2007 január 1 után adták ki, szereljenek fel összeütközést elkerülő fedélzeti rendszerrel (ACAS II).

6.14.3 **Ajánlás** *–minden olyan gázturbinás sugárhajtóműves repülőgépet, amelynek engedélyezett legnagyobb felszállósúlya (tömege) 5700 kg-nál nagyobb de nem haladja meg a 15000 kg értéket, vagy amely több mint 19 utas szállítására jogosított, és amennyiben ezen repülőgép egyedi légialkalmassági bizonyítványát először 2008 január 1 után adták ki, szereljenek fel összeütközést elkerülő fedélzeti rendszerrel (ACAS II).*

6.15 Mikrofonok

Ajánlás — *A pilótakabinban szolgálati feladat ellátására kijelölt minden hajózószemélyzeti tag közleményváltásaihoz az átváltási szint/magasság alatt gégemikrofont vagy fejhallgatóhoz erősített mikrofont használjon.*

7. fejezet
Repülőgép távközlési és navigációs berendezések

7.1 Távközlési berendezés

7.1.1 A műszerrepülési szabályok szerint vagy éjszaka üzemeltetett repülőgépet szereljék fel rádió-berendezéssel. Ez a berendezés a meghatározott frekvenciákon alkalmas legyen kétoldalú rádió-összeköttetés fenntartására az illetékes hatóság által előírt légiforgalmi állomásokkal.

Megjegyzés: A 7.1.1 pont előírásai teljesítettnek tekinthetők, ha az útvonalon szokásos hullámterjedési viszonyok között a repülőgép képes az itt meghatározott távközlési összeköttetések fenntartására.

7.1.2 Amikor a 7.1.1 előírásának teljesítése érdekében egynél több berendezést szerelnek fel, azok egymástól függetlenül működjenek úgy, hogy az egyik berendezés meghibásodása ne okozza bármely másik berendezés meghibásodását.

7.1.3 A látvarepülési szabályok szerint, de ellenőrzött repülésként üzemeltetett repülőgépet az illetékes hatóság mentesítő engedélyének hiányában szereljenek fel rádió-berendezéssel, amely a repülés végrehajtása alatt a meghatározott frekvenciákon bármikor alkalmas kétoldalú rádió-összeköttetés fenntartására az illetékes hatóság által kijelölt légiforgalmi állomásokkal.

7.1.4 Azt a repülőgépet, amelyet olyan repülés végrehajtására vesznek igénybe, amelyre a 6.3.3 vagy 6.4 pontok előírásai vonatkoznak, hacsak az illetékes hatóság nem ad mentesítő engedélyt, szereljenek fel rádió-berendezéssel, amely a repülés végrehajtása alatt a meghatározott frekvenciákon bármikor alkalmas kétoldalú rádió-összeköttetés fenntartására az illetékes hatóság által kijelölt légiforgalmi állomásokkal.

7.1.5 A 7.1.1 — 7.1.4 pontok alapján előírt rádió berendezés képes legyen rádió-összeköttetés fenntartására a 121.5 Mhz-es légiközlekedési vészfrekvencián.

7.1.6 A légtér meghatározott szakaszaiban vagy olyan útvonalakon történő repülések végrehajtásakor, ahol RCP típus lett előírva, a 7.1.1 – 7.1.5 pontokban meghatározott követelményeken túl a repülőgép:

a) legyen felszerelve olyan távközlési berendezésekkel, amelyek lehetővé teszik az előírt RCP típus(ok) szerinti üzemeltetést; és

b) a járató állama részéről rendelkezzen jogosítással az ilyen légtérben történő üzemeléshez.

Megjegyzés: az előírt távközlési teljesítményre (RCP), az ezzel összefüggő eljárásokra valamint a jogosítási folyamatra vonatkozó tájékoztatásokat az előkészítés alatt álló Előírt Távközlési Teljesítmény (RCP) Kézikönyv *(Doc 9869) tartalmazza. Ez a kiadvány felsorolja továbbá azokat a dokumentumokat is amelyeket az államok és a nemzetközi szervezetek a távközlési rendszerekre és az előírt távközlési teljesítményre (RCP) dolgoztak ki.*

7.2 Navigációs berendezés

7.2.1 A repülőgépet szereljék fel olyan navigációs berendezéssel, amelynek segítségével az képes:

a) a repülési tervében meghatározott útvonal követésére; és

b) a légiforgalmi szolgálatok előírásai szerint történő repülésre;

kivéve, ha ezt az illetékes hatóság nem tiltja meg, a látvarepülési szabályok szerint végrehajtott repülés során a navigációt az útvonal mentén egymástól legfeljebb 110 km (60 NM) távolságra levő földi tájékozódási pontok látás utáni azonosításával hajtják vége.

7.2.2 A légtér meghatározott szakaszaiban vagy olyan útvonalakon történő repülés esetében, amelyekre vonatkozóan RNP típust írtak elő, a repülőgép a 7.2.1 pontban ismertetett előírások mellett:

a) legyen felszerelve olyan navigációs berendezésekkel, amelyek lehetővé teszik az előírt RNP típus(ok) szerinti üzemeltetést; és

b) rendelkezzen jogosítással a lajtromozó állam részéről az ilyen légtérben történő üzemeléshez.

Megjegyzés: Az előírt navigációs pontosságra (RNP), az ezzel összefüggő eljárásokra valamint a jogosítási folyamatra vonatkozó tájékoztatásokat az RNP Kézikönyv *(Doc 9613) tartalmazza. A kiadvány átfogóan felsorolja azokat a dokumentumokat és egyéb anyagokat, amelyeket az államok és a nemzetközi szervezetek a navigációs rendszerekre valamint az előírt navigációs teljesítményre vonatkozóan készítettek el.*

7.2.3 A Körzeti Léginavigációs Egyezmény alapján kijelölt olyan légterekben végrehajtott repülések esetében, amelyekre vonatkozóan minimális navigációs teljesítmény előírást (MNPS) határoztak meg, a repülőgépet szereljék fel olyan navigációs berendezéssel, amely:

a) a hajózószemélyzet részére az előírt pontossággal és folyamatosan jelzi az útvonal-tartást vagy az ettől való eltérést a kijelölt repülési útvonal bármely pontján;

b) amelyet a lajstromozó állam az érintett MNPS üzemeltetésre engedélyezett.

Megjegyzés: Az előírt minimális navigációs teljesítményre vonatkozó előírások és alkalmazási eljárások a Helyi Kiegészítő Eljárások *című kiadványban (Doc 7030) találhatók.*

7.2.4 Azon légtér meghatározott szakaszaiban történő repüléseknél, ahol a helyi Körzeti Léginavigációs Egyezmény értelmében FL 290 felett 300 méter (1000 láb) függőleges elkülönítési minimumot alkalmaznak, a repülőgépet szereljék fel:

a) olyan berendezéssel, amely képes:

1) a tartott repülési szintet (FL) a hajózószemélyzet részére jelezni;

2) a kiválasztott repülési szintet automatikusan tartani;

3) a hajózószemélyzet részére riasztó jelzést adni, ha a kiválasztott repülési szinttől eltérnek. A riasztó jelzés vonatkozó határértéke +/- 90 méter (300 láb) legyen; és

4) automatikusan jelezni a nyomás-magasságot.

b) A lajstromozó állam a repülőgépet engedélyezze az ilyen légtérben történő üzemeltetésre.

7.2.5 A 7.2.4 b) szerinti RVSM jóváhagyás kiadása előtt, az állam győződjön meg arról, hogy:

a) a légijármű függőleges navigációt biztosító felszereléseinek képességei kielégítik a 2. Függelék követelményeit;

b) a járató megfelelő eljárásokat vezet be a folyamatos légialkalmassághoz (karbantatás és javítás) kapcsolódó gyakorlati tevékenységek és programok vonatkozásában; és

c) a járató megfelelő hajózó személyzeti eljárásokat vezet be az RVSM szerinti légtérben való üzemeltetéshez.

Megjegyzés: Az RVSM szerinti jóváhagyás globálisan érvényes annak figyelembe vételével, hogy egy adott régióra érvényes bármely üzemeltetési eljárást tartalmazni fogja az üzemeltetési kézikönyv vagy a megfelelő személyzeti útmutató.

7.2.6 A járató állama, amennyiben szükséges a lajstromozó állammal konzultálva, a 7.2.4 fejezetben említett légijárművek vonatkozásában biztosítja, hogy megfelelő lépések történjenek:

a) amikor a 11. Függelék, 3.3.4.1 alfejezetével összhangban létrehozott ellenőrző szervezettől jelentés érkezik a magasság tartás körülményeiről;

b) helyesbítő intézkedések bevezetésére az előbbiek szerinti jelentésben szereplő egyedi repülőgép, vagy repülőgép típusba tartozó csoportra vonatkozóan, amennyiben eltérést tapasztalnak az RVSM szerinti légtérben való üzemeltetésre vonatkozó követelmények betartásában, ha az alkalmazásra került.

7.2.7 Mindegyik állam, amelyik felelős azon légterekért, ahol az RVSM alkalmazásra került, vagy a járatóknak RVSM jóváhagyást adott ki a saját államán belül, olyan intézkedéseket és eljárásokat vezet be, amelyek biztosítják a megfelelő lépések megtételét az RVSM légteret, RVSM jóváhagyás nélkül használó repülőgépek vagy járatók ellen.

1. Megjegyzés: ezeket az intézkedéseket és eljárásokat mindkét olyan esetben alkalmazni szükséges, amikor a kérdéses repülőgépet jóváhagyás nélkül üzemeltetik az állam légterében, vagy amikor az állam rendszeres felügyeleti felelősségébe tartozó járató a szükséges jóváhagyás nélkül üzemeltet egy másik állam légterében.

2. Megjegyzés: a FL 290 felett 300 méter (1000 láb) függőleges elkülönítési minimum alkalmazására kijelölt légtérben szükséges légijármű berendezések alkalmazásának engedélyezésére vonatkozó útmutatás a következő kézikönyvben található: 300 méter (1000 láb) függőleges elkülönítési minimum (VSM) bevezetése FL 290 és FL 410 repülési szintek között *(Doc 9574).*

7.2.8 A repülőgépet olyan navigációs berendezéssel szereljék fel, amely biztosítja, hogy a repülés végrehajtásának bármely szakaszában bekövetkező, az egyik rendszert érintő meghibásodás esetében a repülőgépet a 7.2.1 valamint ahol ez alkalmazható, a 7.2.2 — 7.2.4 pontok előírásainak megfelelően tovább lehessen irányítani (navigálni).

1. Megjegyzés: Ezt az előírást a berendezések megkettőzésén kívül más módszerekkel is teljesíthetik.

2. Megjegyzés: A FL 290 felett 300 méter (1000 láb) függőleges elkülönítési minimum alkalmazására kijelölt légtérben szükséges légijármű berendezésekre vonatkozó útmutatás a következő kézikönyvben található: 300 méter (1000 láb) függőleges elkülönítési minimum (VSM) bevezetése FL 290 és FL 410 repülési szintek között *(Doc 9574).*

7.2.9 A műszeres időjárási körülmények között végrehajtott leszállással tervezett repülések esetében a repülőgépet olyan rádió berendezéssel szereljék fel, amely alkalmas az irányvezetést biztosító rádiójelek vételére egy olyan pontig, ahonnan a leszállás látással végrehajtható. Ez a rádió berendezés képes legyen az irányvezetés biztosítására minden olyan tervezett leszállási, valamint bármely kijelölt kitérő repülőtéren, ahol műszeres időjárási körülmények között történő leszállás végrehajtását tervezik.

8. fejezet
Repülőgép karbantartás

1. Megjegyzés: A jelen fejezetben történő alkalmazás során a repülőgép kifejezésbe tartoznak a hajtóművek, légcsavarok, komponensek, műszerek, szerkezeti egységek és felszerelések, beleértve a vészhelyzeti felszereléseket is.

2. Megjegyzés: A folyamatos légialkalmasság előírásaira vonatkozó útmutatást a Légialkalmassági Kézikönyv *(Doc 9760) tartalmazza.*

8.1 Felelősség

8.1.1 A repülőgép tulajdonosa vagy bérlet esetén annak bérlője biztosítsa, hogy:

a) a repülőgép repülésre alkalmas állapotban legyen;

b) a tervezett repüléshez szükséges üzemeltetési és vészhelyzeti felszerelések üzemképesek;

c) a repülőgép légialkalmassági bizonyítványa érvényes; és

d) a repülőgép karbantartását a lajstromozó állam által elfogadott karbantartási program szerint elvégezték.

8.1.2 A repülőgépet csak abban az esetben üzemeltessék, ha annak karbantartását a lajstromozó állam által elfogadott karbantartási rendszer alapján elvégezték és karbantartási nyilatkozatát kiadták.

8.1.3 Ha a karbantartási nyilatkozatot nem a 6. Annex I. rész 8.7 pontjában meghatározott jogosított karbantartó szervezet adja ki, a jegyzőkönyvet aláíró személy rendelkezzen az 1. Annexben megállapított szakszolgálati jogosítással.

8.2 Karbantartások nyilvántartása

8.2.1 A repülőgép tulajdonosa biztosítsa a következő nyilvántartási adatok tárolását a 8.2.2 pontban jelzett időtartamig:

a) a repülőgép és az élettartam korláttal rendelkező összes komponens teljes üzemideje (óra, naptári időtartam, repülési ciklus meghatározásban szükség szerint);

b) a valós állapot az összes kötelező folyamatos légialkalmassági előírás és tájékoztatás teljesítése vonatkozásában;

c) a módosítások és javítások megfelelő részletezése;

d) a repülőgép vagy a kötelező nagyjavítási időkorlátokkal rendelkező komponenseinek az utolsó nagyjavítástól számított üzemideje (óra, naptári időtartam, repülési ciklus meghatározásban szükség szerint);

e) a repülőgép valós állapota a karbantartási programnak való megfelelés szempontjából; és

f) részletes karbantartási jegyzőkönyvek annak bizonyítására, hogy a karbantartási nyilatkozat aláírásához az összes feltételt teljesítették.

8.2.2 A 8.2.1 a) — e) pontokban ismertetett nyilvántartási adatokat legalább 90 napig őrizzék meg, miután azt az egységet amelyre a nyilvántartási adatok vonatkoznak az üzemeltetésből teljesen kivonták. A 8.2.1 f) pont esetében a nyilvántartási adatokat a karbantartási nyilatkozat aláírását követően, legalább egy évig őrizzék meg.

8.2.3 A repülőgép bérlője a bérleti időtartam alatt szükség szerint teljesítse a 8.2.1 és 8.2.2 pontok előírásait.

Megjegyzés: A nemzetközi repülések esetében a repülőgép fedélzetén csak az érvényes légialkalmassági bizonyítványt kell elhelyezni, a karbantartások nyilvántartásának és ezzel kapcsolatos egyéb okmányoknak a szállítására nincs szükség.

8.3 Folyamatos légialkalmassági tájékoztatás

Az 5700 kg. engedélyezett legnagyobb felszállósúlynál (tömegnél) nehezebb repülőgép tulajdonosa vagy bérlet esetén annak bérlője a lajtromozó állam előírásai szerint biztosítsa, hogy a folyamatos légialkalmasság szempontjából szükséges karbantartási és üzemeltetési tájékoztatásokat az Annex 8, II. rész 4.2.3 f) és 4.2.4 pontok előírásainak megfelelő továbbítsák.

8.4 Módosítások és javítások

Az összes módosítást és javítást a lajstromozó állam által elfogadható légialkalmassági előírásoknak megfelelően végezzék el. Dolgozzanak ki eljárásokat annak biztosítására, hogy elegendő mennyiségű adatot gyűjtsenek össze és tároljanak a légialkalmassági követelmények teljesítéséről.

8.5 Karbantartási nyilatkozat

8.5.1 A karbantartási munka kielégítő elvégzéséről és annak igazolására készítsenek és írjanak alá a lajstromozó állam előírásainak megfelelő karbantartási nyilatkozatot.

8.5.2 A karbantartási nyilatkozat tartalmazzon igazolást az alábbiakról:

a) az elvégzett karbantartási munka alapvető részletei;

b) a karbantartás befejezésének időpontja;

c) amennyiben alkalmazható, a jóváhagyott karbantartó szervezet azonosítója; és

d) a karbantartási nyilatkozatot aláíró személy vagy személyek neve.

ANNEX 6/III.
A légijármű üzemeltetése: Nemzetközi üzemeltetés – Helikopterek

III. kötet 6. kiadás – 2007 július
12. módosítással
A jelen kiadvány magába foglalja a 6. Annex III. részének 2007 március 15-e előtt elfogadott összes módosításait és 2007 november 22-től hatálytalanítja a 6. Annex III. kötetének összes korábbi kiadásait.

A nemzetközi előírások és ajánlott gyakorlati eljárások alkalmazhatóságára vonatkozóan lásd az Előszót.

Módosítások

A módosítások kiadásáról az ICAO Journal és az egyéb ICAO kiadványok valamint Audio-vizuális kiképzési segédanyagok havi katalógusa rendszeres tájékoztatást biztosítanak. Kísérjék figyelemmel a fenti kiadványokat és a módosításokat az alábbi rovatokba vezessék be:

Módosítás			
száma	kiadás időpontja	alkalmazhatóság időpontja	bevezette
Hatodik kiadás 1–12. módosításokkal	Beépítve a jelen kiadásba		

Kiegészítés			
száma	kiadás időpontja	alkalmazhatóság időpontja	bevezette

Tartalomjegyzék

11. fejezet - Védelem

11.1 Forgószárnyas légijármű átkutatás ellenőrző jegyzéke
11.2 Kiképzési programok
11.3 A jogtalan beavatkozás jelentése

III. szakasz - Általános célú nemzetközi légiközlekedés

1. fejezet - Általános rész

1.1 A jogszabályok, előírások és eljárások betartása
1.2 Veszélyes áruk
1.3 Szellemi tevékenységet befolyásoló anyagok használata

2. fejezet – Repülésvégrehajtás

2.1 Az üzemeltetés létesítményeinek alkalmassága
2.2 Helikopter repülőtér üzemeltetési minimum
2.3 Repülés előtti tájékoztatás
2.4 Forgószárnyas légijármű légialkalmassága és biztonsági intézkedések
2.5 Időjárás jelentések és előrejelzések
2.6 Időjárási körülmények miatt szükséges korlátozások
2.7 Kitérő helikopter repülőterek
2.8 Tüzelőanyag (üzemanyag) és olajkészlet
2.9 Oxigén készlet
2.10 Oxigén használat
2.11 Vészhelyzeti utasítások a repülés alatt
2.12 Légijármű vezetők időjárás jelentése
2.13 Repülésre veszélyes körülmények
2.14 A hajózószemélyzet tagjainak fizikai állapota
2.15 A hajózószemélyzet tagjai szolgálati helyeiken
2.16 Műszerrepülési eljárások
2.17 Utasítások – Általános
2.18 Tüzelőanyag-feltöltés utasokkal a fedélzeten vagy a forgószárny(ak) mozgása közben
2.19 Vízfelszín feletti repülések

3. fejezet - Forgószárnyas légijármű teljesítmény üzemeltetési korlátozások

4. fejezet - Forgószárnyas légijármű műszerek, felszerelések és repülési okmányok

4.1 Minden forgószárnyas légijármű minden repülése
4.2 A látvarepülési (VFR) és műszerrepülési (IFR) szabályok szerint, nappal és éjszaka végrehajtott repülésekhez szükséges műszerek és berendezések
4.3 Minden vízfelszín felett üzemeltetett forgószárnyas légijármű
4.4 Minden kijelölt szárazföld felett üzemeltetett forgószárnyas légijármű
4.5 Minden nagy repülési magasságon üzemeltetett forgószárnyas légijármű

5. Események jelentése
6. A járató tervezése
7. A hajózószemélyzet jártassága, képzése és ellenőrzése
8. A járató tanúsítása vagy megerősítése

Mellékletek

A. Melléklet - Forgószárnyas légijármű teljesítmény és üzemeltetési korlátozások

Cél és tárgykör
1. Meghatározások
2. Általános rész

B. Melléklet - Repülési adatrögzítők

Bevezető
1. Repülési adatrögzítő (FDR)
2. Pilótakabin hangrögzítő berendezés (CVR)
3. A repülési adatrögzítő és a pilótakabin hangrögzítő rendszerek ellenőrzése

C. Melléklet - Repülési idő és repülési szolgálati idő korlátozások

1. Cél és tárgykör
2. Általános rész
3. Meghatározások
4. Megjegyzések a meghatározásokhoz
5. A korlátozások módjai
6. Repülési idő táblázat

D. Melléklet - Elsősegélynyújtó egészségügyi készletek

E. Melléklet - Minimális felszerelési jegyzék (MEL)

F. Melléklet - Légijármű üzembentartási engedély és érvényesítés

1. Cél és tárgykör
2. Előírt műszaki biztonsági értékelések
3. Jóváhagyási intézkedések
4. Elfogadási tevékenységek
5. Egyéb jóváhagyási vagy elfogadási megfontolások
6. Az üzemeltetési előírások érvényesítése
7. A légijármű üzembentartási engedély módosítása

G. Melléklet - Repülésbiztonsági dokumentációs rendszer

1. Bevezető

2. Összeállítás és tartalom
3. Érvényesség
4. Tartalmi kialakítás
5. Terjesztés
6. Módosítás

H. melléklet - Az üzemeltetési kézikönyv szerkezete és tartalma

1. Szerkezet
2. Tartalom

I. melléklet - A 3. osztályba sorolt teljesítményű helikopterek üzemeltetésére vonatkozó kiegészítő útmutatók műszeres időjárási körülmények (IMC) közötti repülések esetére

1. Cél és tárgykör
2. A hajtómű megbízhatósága
3. Repülésvégrehajtási kézikönyv
4. A járató tanúsítása vagy megerősítése
5. Repülések jóváhagyása és karbantartási program követelmények

A 6. Annex III. részében alkalmazott rövidítések és jelzések

Rövidítések és jelzések	
ACAS	Összeütközés elkerülését biztosító fedélzeti rendszer
ADS-C	Automatikus légtérfelderítési adat szolgáltatási megállapodás
AFCS	Automatikus repülésvezérlő rendszer
AIG	Légijármű baleset kivizsgálás és megelőzés
AOC	Légijármű üzembentartási engedély
AOC	Légiforgalmi üzemeltetési irányítás
ATC	Légiforgalmi irányító szolgálat
ATM	Légiforgalom szervezés
ATS	Légiforgalmi szolgálatok
CAA	Polgári Légiközlekedési Hatóság
CAT I	I. kategória
CAT II	II. kategória
CAT III	III. kategória
CAT IIIA	IIIA. kategória
CAT IIIB	IIIB. kategória
CAT IIIC	IIIC. kategória
CDL	Repülésvezérlő szerkezetek alaphelyzettől történő eltéréseinek jegyzéke
CFIT	Földnek ütközés vezetett repülés során (szabályszerűen üzemelő légijárművel)
Cm	centiméter
CPDLC	Légiforgalmi irányító és légijárművezető közötti adat-átviteli összeköttetés
CVR	Pilótakabin hangrögzítő berendezés
DA	Tengerszint feletti elhatározási magasság

DA/H	Elhatározási magasság
D-FIS	Adatátvitelt alkalmazó repüléstájékoztatás
DH	Talajszint feletti elhatározási magasság
DME	Távolságmérő berendezés
Distance DR	Az a vízszintes távolság, amelyet a forgószárnyas légijármű a rendelkezésre álló felszállási távolság végétől megtett
ECAM	Központi elektronikus légijármű képernyő
EFIS	Elektronikus repülési műszerrendszer
EGT	Kilépő gázhőmérséklet
EICAS	Hajtómű ellenőrző és hajózószemélyzet riasztó rendszer
ELT	Vészhelyzeti helyjeladó berendezés
ELT(AD)	Automatikusan kibocsátható vészhelyzeti helyjeladó berendezés
ELT(AF)	Automatikus állandó vészhelyzeti helyjeladó berendezés
ELT(AP)	Automatikus hordozható vészhelyzeti helyjeladó berendezés
ELT(S)	Túlélési vészhelyzeti helyjeladó berendezés
EUROCAE	Európai Polgári Légiközlekedési Elektronikai Szervezet
EPR	Hajtómű nyomásviszony
FATO	Végső megközelítési és felszállási terület
FDAU	Repülési adatgyűjtő egység
FDR	Repülési adatrögzítő
FM	Frekvencia moduláció
Ft	láb
g	Függőleges gyorsulás
hPa	Hektopascal
HUMS	Egészség és alkalmazás figyelő rendszer
IFR	Műszerrepülési szabályok
ILS	Műszeres leszállító rendszer
IMC	Műszeres időjárási körülmények
in Hg	Higany hüvelyk
kg	kilogramm
km	kilométer
kN	Kilo-Newton
kt	csomó
LDAH	Rendelkezésre álló leszállási távolság
LDP	Leszállási elhatározási pont
LDRH	Szükséges leszállási távolság
m	méter
mb	millibar
MDA	Legalacsonyabb tengerszint feletti süllyedési magasság
MDA/H	Legalacsonyabb süllyedési magasság tengerszint/földfelszín felett
MDH	Legalacsonyabb földfelszín feletti süllyedési magasság
MEL	Minimális berendezések jegyzéke
MHz	Megahertz

MLS	Mikrohullámú leszállító rendszer
MMEL	Gyártó minimális felszerelési jegyzéke
MOPS	Minimális üzemi teljesítmény előírás
NAV	Navigáció
N_1	Kisnyomású kompresszor fordulatszáma (kétfokozatú kompresszor); ventilátor fokozat fordulatszáma (háromfokozatú kompresszor)
N_f	Gázturbina terhelés nélküli fordulatszáma
NM	Tengeri mérföld
NVIS	Éjjel-látó megjelenítő készülék
OCA	Akadálymentes tengerszint feletti magasság
OCA/H	Akadálymentes tengerszint/földfelszín feletti magasság
OCH	Akadálymentes földfelszín feletti magasság
PANS	Légiforgalmi szolgálatok eljárásai
PNR	Az a pont, amelyen túl a visszafordulás nem lehetséges
psi	Font per négyzethüvelyk
R	Forgószárny sugár
RCP	Előírt távközlési teljesítmény
RNP	Előírt navigációs teljesítmény
RTODR	Szükséges megszakított felszállási távolság
RVR	Futópályamenti látástávolság érték
SI	Nemzetközi mértékegység rendszer
SICASP	Másodlagos légtérfelderítő radar fejlesztési és összeütközés elkerülési rendszereket kidolgozó munkacsoport
SOP	Szabványos üzemeltetési eljárások
T_4	Hajtómű kiáramló gázhőmérséklet
TDP	Felszállási elhatározási pont
TIT	Gázturbina belépő hőmérséklet
TLOF	Földetérési és elemelkedési terület
TODAH	Rendelkezésre álló felszállási távolság
TODRH	Szükséges felszállási távolság
UTC	Egyeztetett világidő
VFR	Látvarepülési szabályok
VMC	Látás utáni időjárási körülmények
V_{TOSS}	Legalacsonyabb sebesség, amelyen üzemképtelen fő hajtómű továbbá a többi hajtómű üzemeltetési határértékeken belül történő működése mellett még emelkedés érhető el
V_y	Legjobb emelkedési sebesség
WXR	Időjárás
°C	Celsius fok
%	Százalék

A jelen Annex előírásaira vonatkozó kiadványok

Egyezmény a nemzetközi polgári légi közlekedésről (Doc 7300)

Európai Polgári Légiközlekedési Elektronikai Szervezet (EUROCAE) ED55A és ED56A jelzésű kiadványai

A Nemzetközi Légiszállítás Gazdasági Szabályzásának Előírásai és Útmutatója (Doc 9587)

Jegyzőkönyv a nemzetközi polgári légiközlekedésről szóló Egyezmény (83. b cikkely) módosításáról (Doc 9318)

A Nemzetközi Polgári Légiközlekedési Egyezmény Annex-ei

1. Annex	*Személyi jogosítás*
2. Annex	*Repülési szabályok*
3. Annex	*A nemzetközi légiközlekedés meteorológiai szolgálata*
4. Annex	*Léginavigációs térképek*
5. Annex	*A légi és földi üzemeltetésnél alkalmazott mértékegységek*
6. Annex	*Légijármű üzemeltetés* *I. rész — Nemzetközi kereskedelmi légiszállítás — Repülőgépek* *II. rész — Általános célú nemzetközi légiközlekedés — Repülőgépek*
8. Annex	*Légijármű légialkalmassága*
9. Annex	*Egyszerűsítések*
10. Annex	*Légiforgalmi távközlés* *III. kötet* *I. rész — Digitális adattovábbítási rendszerek* *II. rész — Rádiótávbeszélő rendszerek* *IV. kötet* *Légtérfelderítő radar és összeütközés elkerülését biztosító rendszerek*
11. Annex	*Légiforgalmi szolgálatok*
12. Annex	*Kutatás és mentés*
13. Annex	*Légijármű baleset kivizsgálás*
14. Annex	*Repülőterek* *I. kötet — Repülőtér tervezés és üzemeltetés* *II. kötet — Forgószárnyas légijármű repülőterek*
15. Annex	*Légiforgalmi tájékoztató szolgálat*
16. Annex	*Környezetvédelem* *I. kötet — Légijármű zaj*
18. Annex	*Veszélyes árúk légi szállítása*

A Légiforgalmi Szolgálatok Eljárásai (PANS)

OPS — Légijármű Üzemeltetés (Doc 8168)
I. kötet — Repülési eljárások
II. kötet — A látvarepülési (VFR) és műszerrepülési (IFR) szabályok kidolgozása

ATM — Légiforgalom Szervezése (DOC 4444)

Körzeti Kiegészítő Eljárások (Doc 7030)

Kézikönyvek

Légijármű baleset megelőzési kézikönyv (Doc 9422)

Repülőtér Szolgálati Kézikönyv (Doc 9137)
1. rész — Tűzoltó és mentő szolgálatok
8. rész — Repülőtér üzemeltető szolgálatok

Légialkalmassági Kézikönyv (Doc 9760)

Veszélyes áruk szállítása során a légijármű fedélzetén bekövetkező események megoldása céljából
foganatosítandó intézkedések (Doc 9481)

Emberi Tényezők Kiképzési Kézikönyv (Doc 9683)

A Földi Jégtelenítés Végrehajtási Kézikönyve (Doc 9640)

Üzemeltetés Felügyeleti, Jogosítási és Folyamatos Ellenőrzési Eljárások Kézikönyve (Doc 8335)

Az állami személyi jogosítási rendszer létrehozásáról szóló eljárások kézikönyve(DOC 9379)

Az Előírt Távközlési Teljesítmény (RCP) Kézikönyve (Doc 9869)

Az Előírt Navigációs Teljesítmény (RNP) Kézikönyve (Doc 9613)

Üzemeltetési Kézikönyv Elkészítése (Doc 9376)

Biztonság Felülvizsgálati Kézikönyv (Doc 9734)
A rész – Az Állam Biztonsági Felülvizsgálati Rendszerének létrehozása és irányítása

Képzési Kézikönyv (Doc 7192)
D-3 rész – Repülésüzemi Tiszt / Szolgálatvezető

Körlevelek

Útmutató a Nemzetközi Polgári Légiközlekedésről szóló Egyezmény 83. b cikkelyének bevezetéséhez (295. körlevél)

Nemzetközi üzemeltetés — Forgószárnyas légijárművek

Előszó

Történeti háttér

A légijármű üzemeltetésre vonatkozó nemzetközi előírásokat és ajánlott gyakorlati eljárásokat a Tanács a Nemzetközi Polgári Légiközlekedési Egyezmény (Chicago 1944) 37. cikkelyének rendelkezései alapján először 1948 december 10-én a nemzetközi kereskedelmi légiszállításra, ezt követően 1968 december 2-án az általános célú légiközlekedésre vonatkozóan fogadta el és foglalta a 6. számú Annex-be. Ezek a nemzetközi előírások és ajánlott gyakorlati eljárások jelenleg a 6. Annex I. és II. részében találhatók; általánosságban ez a két rész a repülőgép üzemeltetéssel foglalkozik és egyértelműen egyik rész sem alkalmazható a helikopterekre, azaz a forgószárnyas légijárművekre.

Ezért a forgószárnyas légijárművek üzemeltetésére tekintettel kidolgozták a 6. Annex III. részét is. A forgószárnyas légijárművek részére kifejlesztett repülési adatrögzítőkkel és pilótakabin hangrögzítőkkel először a Balesetmegelőzési Munkacsoport 1979 évi 10/1 ajánlása alapján a Léginavigációs Bizottság foglalkozott. A kidolgozott előírásokat a Tanács 1986. március 14-én fogadta el, 1986. július 27-én léptek érvénybe és 1986. november 20-án váltak alkalmazhatóvá. Ezt követően a forgószárnyas légijárművek üzemeltetésének más területeire vonatkozó átfogó nemzetközi előírások és ajánlott gyakorlati eljárások kerületek kidolgozásra a Helikopter Üzemeltetési Munkacsoport segítségével; ezek az előírások az 1. Módosításba kerültek be, amelyet a Tanács 1990. március 21-én fogadott el. A módosítás 1990. július 30-án lépett érvénybe és 1990. november 15-én vált alkalmazhatóvá.

Az A. táblázat a vonatkozó fontosabb témakörök felsorolásával és az időpontok megjelölésével mutatja a módosításokat, amely időpontokban azokat a Tanács elfogadta, azok érvénybe léptek illetve alkalmazhatóvá váltak.

Alkalmazhatóság

A 6. Annex I. és II. részeiben található nemzetközi előírások és ajánlott gyakorlati eljárások — Légijármű üzemeltetés — az egyedileg meghatározottak kivételével a nemzetközi polgári légiközlekedésben üzemeltetett minden repülőgépre vonatkoznak. Ehhez hasonlóan a 6. Annex III. része azokat a nemzetközi előírásokat és ajánlott gyakorlati eljárásokat tartalmazza, amelyek a nemzetközi kereskedelmi légiszállításban valamint az általános célú nemzetközi légiközlekedésben üzemeltetett forgószárnyas légijárművekre vonatkoznak és alkalmazandók.

A szerződő államok tevékenysége

Az eltérések jelentése

Felhívjuk a szerződő államok figyelmét az Egyezmény 38. cikkelyéből adódó azon kötelezettségükre, hogy a szerződő állam értesítse a Szervezetet bármely eltérésről, amely saját országos előírásai és gyakorlata illetve a jelen Annex nemzetközi előírásai és ennek bármely módosítása között van. Felkérjük továbbá a szerződő államokat, hogy az ilyen értesítést terjesszék ki valamennyi olyan eltérésre is, amely a jelen Annex-ben található ajánlott gyakorlati eljárásokat és ezek bármely módosítását érinti, amennyiben ezen eltérések a légiközlekedés biztonsága szempontjából lényegesek. Ezen felül kérjük, hogy a szerződő államok folyamatosan tájékoztassák a Szervezetet bármilyen jövőbeni eltérésről valamint a korábbiakban jelzett eltérés megszűnéséről. A jelen Annex minden egyes módosításának elfogadása után külön az eltérésekről szóló értesítést kérő levelet küldünk majd minden szerződő államnak.

A szerződő államok figyelmét felhívjuk a 15. Annex rendelkezéseire, amelynek alapján saját országos szabályaik és gyakorlatuk valamint a vonatkozó ICAO előírások és ajánlott gyakorlati eljárások közötti eltérésekről szóló tájékoztatásaikat az Egyezmény 38. cikkelyében előírt kötelezettségük mellett a Légiforgalmi Tájékoztató Szolgálat útján is tegyék közzé.

A tájékoztatások továbbítása és közzététele

A jelen Annex-ben ismertetett nemzetközi előírások és ajánlott gyakorlati eljárások alapján biztosított, a légijárművek üzemeltetését érintő létesítmények, szolgálatok és eljárások létrehozását illetve megszüntetését a 15. Annex előírásainak megfelelően jelentsék be.

Az Annex részeinek jogállása

Az Annex a következő részekből áll, de nem feltétlenül szükséges, hogy minden rész megtalálható legyen minden egyes Annex-ben.
Az egyes részek jogállása a következő:

1.— Az Annex anyaga:

a) *Nemzetközi előírások és ajánlott gyakorlati eljárások*, amelyeket az Egyezmény rendelkezései szerint a Tanács fogad el. Ezek meghatározása a következő:
Előírás vagy Szabvány: Bármilyen fizikai jellemzőre, kialakításra, anyagra, teljesítményre, személyzetre vagy eljárásra vonatkozó követelmény, amelynek egységes alkalmazását szükségesnek tartják a nemzetközi légiközlekedés biztonsága és menetrendszerű fenntartása érdekében és amellyel kapcsolatban az Egyezmény alapján a Szerződő Államok megállapodnak. Amennyiben a teljes megállapodás nem lehetséges, az eltérést az Egyezmény 38. cikkelyében foglaltak alapján az érintett Államoknak a Tanács felé jelenteniük kell.

Ajánlott gyakorlati eljárás: Bármilyen fizikai jellemzőre, kialakításra, anyagra, teljesítményre, személyzetre vagy eljárásra vonatkozó követelmény, amely egységes alkalmazását a nemzetközi légiközlekedés biztonsága, menetrendszerű és hatékony lebonyolítása érdekében kívánatosnak minősítenek és amelyek alkalmazására a Szerződő Államok az Egyezmény értelmében törekszenek.

b) *Függelék:* A célszerűség érdekében külön csoportosított anyagok, amelyek azonban a Tanács által elfogadott nemzetközi előírások és ajánlott gyakorlati eljárások szerves részét képezik.

c) *Meghatározások:* A nemzetközi előírások és az ajánlott gyakorlati eljárások ismertetésénél alkalmazott azon fogalmak pontos magyarázata, amelyek elfogadott szótári jelentés hiányában nem maguktól értetődőek. A meghatározás külön jogállással nem rendelkezik, azonban szerves részét képezi azon nemzetközi előírásnak vagy ajánlott gyakorlati eljárásnak, amelyben előfordul, mert a meghatározás értelmének megváltoztatása az előírást befolyásolja.

d) *Táblázatok és ábrák:* Ezek egy nemzetközi előírást vagy ajánlott gyakorlati eljárást egészítenek ki vagy szemléltetnek, és amelyekre egy adott nemzetközi előírásban vagy ajánlott gyakorlati eljárásban utalnak. A táblázatok és az ábrák az adott nemzetközi előírás vagy ajánlott gyakorlati eljárás részét képezik és jogállásuk ezekkel megegyező.

Megjegyzendő, hogy a jelen Annex egyes előírásai olyan követelményeket is tartalmaznak, melyek jogállása ajánlott gyakorlati eljárás. Az ilyen esetekben ezek alkalmazására a Szerződő Államok az Egyezmény értelmében törekszenek.

2.— A nemzetközi előírásokkal és az ajánlott gyakorlati eljárásokkal együtt, a Tanács egyetértésével kiadott egyéb anyagok:

a) *Előszó:* Történeti áttekintés és magyarázat a Tanács tevékenysége alapján. Tartalmazza továbbá az államok kötelezettségeit, illetve az ezekre vonatkozó magyarázatokat a nemzetközi eljárások és gyakorlati eljárások alkalmazására az Egyezmény és a Bevezetési Határozat előírásainak megfelelően.

b) *Bevezető:* Az Annex egyes köteteinek, részeinek vagy fejezeteinek elején található magyarázó szöveg, amely segítséget nyújt a vonatkozó szöveg megértéséhez, illetve alkalmazásához.

c) *Megjegyzések:* Szükség szerint a szövegbe iktatott anyag, amely tényszerű tájékoztatást vagy utalást tartalmaz a szóban forgó nemzetközi előírásra vagy ajánlott gyakorlati eljárásra vonatkozóan, azonban nem képezi ezek szerves részét.

d) *Mellékletek:* A nemzetközi előírást és ajánlott gyakorlati eljárást kiegészítő anyagot tartalmaznak, vagy azok alkalmazásához szükséges tájékoztatással szolgálnak.

Az alkalmazandó nyelv kiválasztása

A jelen Annex-et az alábbi hat nyelven fogadták el - angol, arab, francia, kínai, orosz és spanyol. Minden egyes szerződő államot felkérünk, hogy ezek közül válasszon ki egy nyelvet az országos bevezetés céljára vagy bármely egyéb, az egyezményben előirt ténykedés megtételére akár az adott nyelv közvetlen felhasználásával, akár saját nemzeti nyelvére történő lefordításával. Erről kérjük, értesítsék a Szervezetet.

Szerkesztői gyakorlat

Annak érdekében, hogy minden egyes szerkezeti anyag jogállását az első pillantásra jelezhessük, az alábbi szerkesztői gyakorlatot követjük: A *nemzetközi előírásokat* vékony álló, az *ajánlott gyakorlati eljárásokat* vékony *dőlt* betűkkel nyomtatjuk. Ez utóbbiak jogállását **"Ajánlás"** felirattal is jelezzük. A vékony dőlt betűvel szedett megjegyzéseket a "*Megjegyzés:* " felirat egészíti ki.

Az írásmód / stílus szempontjából az angol szövegben az előírásokat "shall - kell" kifejezéssel és az ajánlott gyakorlati eljárásokat “should - szükséges" kifejezéssel jelezzük. Mindazonáltal a magyar fordítás alkalmával ezt a gyakorlatot nem minden esetben alkalmazzuk, mert a jelzett jogállás és a nyelvi sajátosságok ezt szükségtelenné teszik. Ha ez szükséges, a fordításban nyomatékos (kell) felszólító módot alkalmazunk.

A jelen kiadványban alkalmazott mértékegységek a nemzetközi polgári légiközlekedésről szóló Egyezmény 5. Annex előírásainak megfelelően összhangban állnak a nemzetközi mértékegység rendszerrel /SI/. Ahol az 5. Annex lehetővé teszi az alternatív (nem SI) mértékegységek alkalmazását, ott az alapegységet követően ezen mértékegységek zárójelben szerepelnek. Ahol az anyagban két mértékegység fajtát alkalmazunk, ott nem szabad azt feltételezni, hogy a mértékegységek értékei egyenlők és azok egymással korlátlanul felcserélhetők. Mindazonáltal lehetséges, hogy azonos biztonsági szint érhető el bármelyik mértékegység kizárólagos alkalmazásával.

A jelen kiadvány bármelyik részére történő hivatkozás akár számmal, akár címmel vagy pedig mindkettővel - vonatkozik az adott rész minden egyes alpontjára is.

A hímnem alkalmazása az Annex teljes szövegében egyaránt vonatkozik úgy a férfiakra, mint a nőkre.

A. táblázat — A 6. Annex III. részének módosításai

(módosítás — forrás — tárgy — elfogadva/ hatályos/ alkalmazható)

Első kiadás
Baleset-megelőzési és Kivizsgálási Munkacsoport 1979 évi körzeti ülésszaka
Repülési adatrögzítők elhelyezése a forgószárnyas légijárműben.

1986. március 14. 1986. július 27. 1986. november 20.

1) — Második kiadás — Helikopter Üzemeltetési Munkacsoport negyedik ülése a 6. Annex I. és II. részeinek 1990 évi módosítása alapján - Léginavigációs Bizottság tanulmányai

a) a forgószárnyas légijárművek üzemeltetésére vonatkozó, a 6. Annex I. és II. részeiben a repülőgépekkel kapcsolatos rendelkezésekhez hasonló előírások bevezetése; ezek a már korábban bevezetett repülési adatrögzítő berendezések felszerelésére vonatkozó előírásokkal (6. Annex III. rész első kiadás) együtt alkották a forgószárnyas légijárművek üzemeltetésre kidolgozott nemzetközi előírások és ajánlott gyakorlati eljárások első teljes anyagát;

b) meghatározások bevezetése a légijármű üzembentartási engedélyre, a minimális felszerelési jegyzékre, az üzemeltetési kézikönyvre valamint néhány új kifejezésre; ezekkel biztosították a 6. Annex három részének egybeesését illetve összhangját;
c) az elektronikus megjelenítő ernyőkel felszerelt forgószárnyas légijárművek üzemeltetési adatainak repülési adatrögzítő berendezéssel történő rögzítésével kapcsolatos útmutató bevezetése.

1990. március 21. 1990. július 30. 1990. november 15.

2) — Üzemeltetési munkacsoport ötödik ülése — az Elkülönítési munkacsoport általános elméletének módosítását célzó nyolcadik ülés — Baleset kivizsgálási munkacsoport 1992 évi ülése — Léginavigációs Bizottság tanulmányai

a) helikopter repülőtér üzemeltetési minimum, elhatározási magasság, legalacsonyabb süllyedési magasság kifejezések módosítása és akadálymentességi magasság kifejezés bevezetése;

b) vészhelyzeti helyjel adó (ELT) és előírt navigációs teljesítmény (RNP) illetve típus új meghatározások bevezetése;

c) a repülési adatrögzítőkben alkalmazott fém-szalagok használatára vonatkozó előírás módosítása;

d) a vészhelyzeti helyjel adó berendezés szállítására vonatkozó előírás bevezetése a vészrádió berendezés és helyjel adó helyett;

e) előírás, melynek alapján a légijárművön elhelyezett navigációs berendezés segítségével a légijármű előírt navigációs teljesítménye alapján repüljön tervezett útvonalán vagy területeken.

1994. március 21. 1994. július 25. 1994. november 10.

3) — Harmadik kiadás — Léginavigációs Bizottság tanulmányai — Veszélyes árúk munkacsoport tizennegyedik ülése — Szerkesztői módosítások — szöveg egyeztetése a 6. Annex II. és/vagy III. részével és a szükséges módosítások

a) új és módosított meghatározások bevezetése;

b) új előírások bevezetése a baleset megelőzéssel és a repülésbiztonsági programokkal kapcsolatosan;

c) az üzemeltetési létesítményekkel, a repülés közbeni történő vészhelyzeti gyakorlással, a legalacsonyabb repülési magasságokkal, a repülés előkészítéssel, a repülési idővel, a hajózószemélyzet repülési szolgálati és kötelező pihenőidejével, a hajózószemélyzet tagjai szolgálati helyeiken, az oxigén rendszerrel, a repülés-üzemi tiszt feladataival kapcsolatos előírások módosítása valamint új előírás a kézipoggyászra;

d) a tömeg korlátozással és az egészségügyi készletekkel kapcsolatos előírások módosítása;

e) új előírások az oxigén berendezéssel kapcsolatosan, a látvarepülési szabályok szerint és műszerrepülési szabályok szerint üzemeltetett forgószárnyas légijárműre vonatkozó előírások módosítása;

f) a hajózószemélyzet új kiképzési programjának előírásai különös tekintettel az emberi teljesítőképességre és ennek korlátaira;

g) a repülés-üzemi tiszt meghatározás egyeztetése az 1. Annex előírásaival;

h) üzemeltetési kézikönyv tartalmának felülvizsgálata és új előírások a helikopter repülőtér üzemeltetési minimum, oxigén tartalék rendszer, repülési szolgálati idő korlátozások, a hajózószemélyzet eljárásai és ellenőrző jegyzékei, az üzemeltetői repülési terv, a hajózószemélyzet kiképzési program, a légi-utaskísérők kiképzési programja, a biztonsági utasítások és útmutatók, a baleset megelőzési és repülésbiztonsági program, időzített indulási eljárások, tömeg és súlypont számítási eljárások vonatkozásában;

i) új előírások a repülési idő, légi-utaskísérők repülési szolgálati és kötelező pihenőideje vonatkozásában, a kiképzést érintő előírások felülvizsgálata és módosítása; és

j) módosított előírások az elsősegély készletekre vonatkozóan; és

k) új előírások a minimális felszerelési jegyzékre (MEL) vonatkozóan.
1995. március 10. 1995. július 24. 1995. november 9.

4) — A Másodlagos radarberendezések továbbfejlesztésével valamint az Összeütközés elkerülését biztosító rendszerekkel foglalkozó munkacsoportok negyedik ülése (SICASP/4)

A forgószárnyas légijárművek nyomásmagasság-adó másodlagos válaszjeladóval történő felszerelésére vonatkozó előírások felvétele (ACAS).

1996. február 19. 1996. július 15. 1996. november 7.

5) — Negyedik kiadás — Repülési adatrögzítés munkacsoport első ülése — Léginavigációs Bizottság tanulmányai — Az ICAO és ipari CFIT munkabizottságok vizsgálatai — 1. Annex 162. módosítása és a 11. Annex 38. módosítása — Szerkesztői módosítások

a) A légijármű üzemeltetési kézikönyv új és módosított meghatározásai, repülésvezérlő szerkezetek alaphelyzettől történő eltéréseinek felsorolása, emberi tényezők alapelvei, emberi teljesítőképesség és teljesítmény, gyártók minimális felszerelési jegyzéke, karbantartás, szellemi tevékenységet befolyásoló anyagok és előírt navigációs teljesítmény;

b) a kölcsönbérlet és csere vonatkozó megjegyzéseinek módosítása;

c) a pszichoaktív anyagok használatára vonatkozó új megjegyzés bevezetése;

d) a repülési adatrögzítőkkel kapcsolatos új és módosított előírások;

e) új és módosított előírások a függelékbe áthelyezett üzemeltetési kézikönyv tartalmára vonatkozóan;

f) az államok felelősségét érintő új előírások a légi szállítói engedély alapján végzett tevékenység felügyeletére, az üzemeltetési kézikönyv jóváhagyására valamint a járatói jogosítási és folyamatos ellenőrzési rendszer kialakítására;

g) új előírások a földi légijármű jégtelenítésre, a légijármű üzemeltetési teljesítmény korlátozásokra, tömeg korlátozásokra, érzékeny nyomásmagasság mérőműszerekre valamint az első tiszt meglévő gyakorlati tapasztalatára vonatkozóan;

h) módosított előírások a nyomásmagasság adó válaszjeladók szállítására; és

i) új előírások az emberi tényezők figyelembevétele alapján.

1998. március 20. 1998. július 20. 1998. november 5.

6) — Repülési adatrögzítés munkacsoport második ülése — A Közgyülés 32. ülése — Léginavigációs Bizottság tanulmányai

a) "légiutaskísérő" kifejezés módosítása "utaskabin személyzet" kifejezésre;

b) meghatározások módosítása;

c) új előírások a 406 MHz és 121,5 MHz frekvencián üzemelő vészhelyzeti helyjeladó berendezések kötelező szállítására; nyomásmagasság-adó másodlagos válaszjeladók; a digitális összeköttetések rögzítésére vonatkozó határidő kijelölése.

1999. március 15. 1999. július 19. 1999. november 4.

7) —Léginavigációs Bizottság tanulmányai

a) A műszeres megközelítés és leszállás osztályozásának bevezetése és a meghatározások módosítása;

b) új előírások a futópályamenti látástávolság érték biztosítására; a műszeres megközelítések követelményei; a parancsnok pilóta feladatainak módosítása.

2000. március 15. 2000. július 17. 2000. november 2.

8) — Ötödik kiadás — Repülési adatrögzítés munkacsoport második ülése — Az egész világot átfogó műholdas navigációs rendszerrel foglalkozó munkacsoport harmadik ülése — Folyamatos légialkalmassági munkacsoport ötödik ülése — Léginavigációs Bizottság tanulmányai

a) a repülési adatrögzítőkre vonatkozó előírások módosítása, amelyek tartalmazzák a digitális távközlési adatok rögzítését; az új légijármű repülési adatrögzítőjére vonatkozó előírások; rögzítendő jellemzők új felsorolása; a pilótakabin hangrögzítők két órás felvételi időtartamának előírása;

b) a műszeres megközelítés és leszállás osztályozásának módosítása;

c) új előírások a függőleges irányvezetéssel végrehajtott megközelítésre vonatkozóan;

d) új meghatározások és a karbantartással kapcsolatos előírások módosítása; és

e) a zajbizonyítvány angol nyelvre történő lefordítása.

2001. március 12. 2001. július 16. 2001. november 1.

9) — Elkülönítési és Légtérbiztonsági munkacsoport valamint a Léginavigációs Bizottság tanulmányai

a) (idegen) nyelvismeretre vonatkozó új előírások;

b) a járató repülésbiztonsági dokumentáció rendszerére vonatkozó új meghatározások és előírások;

c) a földi kiszolgálás biztonsági tényezőire vonatkozó új meghatározások és előírások;

d) a járató államának jogosítása a RNP légtérben történő üzemeltetésre;

e) légijármű összeütközés elkerülő fedélzeti rendszerek (ACAS) üzemeltetési kézikönyvének tartalmára vonatkozó új előírások.

2003. március 13. 2003. július 14. 2003. november 27.

10) – A légiközlekedési környezetvédelmi bizottság hatodik ülése

Új javaslatok a zajbizonyítványok hivatkozásaira vonatkozóan

2005. március 09. 2005. július 11. 2005. november 24.

11) – A hajózó személyzetek szakszolgálati engedélyeinek kiadásával és a képzéssel foglalkozó munkacsoport második ülése – Az akadálymentességi munkacsoport tizennegyedik ülése – Az Egyesült Államok javaslata – Tanácsi kérés – A Közgyülés 35. ülése – A Léginavigációs Konferencia tizenegyedik ülése

a) repülőgépvezetők folyamatos gyakorlatban tartási és szakmai jártassági ellenőrzésének követelményei, a személyzet kereszt jogosítása és a gyakorlati jártasság keresztirányú beszámítása, az alkalmasság értékelése, fenyegetés és hiba kezelés valamint a repülőgépvezetők félévenkénti szakmai jártasság ellenőrzése;

b) a repülőgépvezetők ismerete az eljárások tartalmi felépítése által meghatározott üzemeltetési követelményekről;

c) a repülés-üzemi tisztek / szolgálatvezetők jogosítása és az állami szabályozó rendszer kritikus elemei;

d) a légijármű üzembentartási engedély másolatának szállítása a légijármű fedélzetén;

e) biztonság irányítási intézkedések és hivatkozások az elfogadható biztonsági szint elképzeléseinek új útmutató anyagaira.

2006. március 14. 2006. július 17. 2006. november 23.

12) — Hatodik kiadás — Léginavigációs Bizottság tanulmánya — Üzemeltetési Adatkapcsolat munkacsoport első ülése (OPLINKP/1) – és a billenő rotor (Tiltrotor) hajtású helikopter Munkacsoport által támogatott Titkársági tanulmány

a) előírások módosítása az automatikus légtérfelderítési adatszolgáltatási megállapodás (ADS-C) alkalmazásához rendelkezésre álló technológiák bevezetésének megkönnyítéséhez és a légiforgalmi szolgáltatások (ATS) biztosítása során az előírt távközlési teljesítmény RCP) bevezetéséhez;

Törölt:

b) a 6. Annex III. részében foglalt ajánlások szorosabb egyeztetése az elfogadott gyakorlati eljárásokkal;

c) a teljesítmény osztályok meghatározásainak változása;

d) a biztonságos kényszerleszállás eléréséhez szükséges megfelelő szempontok engedélyezésének változásai a 2. és 3. teljesítmény osztályban végzett repülések során bekövetkező hajtómű meghibásodások esetére;

e) a műszeres meteorológiai feltételek alatt végrehajtott kereskedelmi repülésekhez kapcsolódó új rendelkezések kiegészítése;

f) az „üzemeltetés"kifejezés új meghatározása;

g) a „parttól távoli (vízfelszíni) üzemeltetés" elképzelés bemutatása; és

h) a vészhelyzeti helyjeladók (ELT) 2008. július 01-től érvényes kötelező szállításának követelményei

i) a válaszjeladóknál alkalmazott nyomás-magasság jel kialakítókra vonatkozó előírások változásai 2009. január 1-től és 2012 január 1-től.

2007. március 14. 2007. július 16. 2007. november 22.
2008. július 1.

I. szakasz
Általános rész
Nemzetközi előírások és ajánlott gyakorlati eljárások

1. fejezet
Meghatározások

Amennyiben a nemzetközi légiforgalomban üzemeltetett forgószárnyas légijárművekre vonatkozó nemzetközi előírások és ajánlott gyakorlati eljárások során a következő kifejezéseket alkalmazzák, azok az alábbi jelentéssel rendelkeznek:

Aerial Work – Munkarepülés
A légijármű olyan különleges szolgáltatások nyújtásához történő üzemeltetése, mint például mezőgazdasági, építési, légi-fényképezési, megfigyelési, felderítési, ellenőrzési, kutató és mentő feladatok

valamint hirdetési szolgáltatások.

Aircraft – Légijármű
Minden olyan szerkezet, amelynek levegőben maradását olyan aerodinamikai reakcióerők biztosítják, amelyek nem azonosak a földfelszínre ható aerodinamikai reakcióerőkkel.

Törölt: ¶

Aircraft operating manual – Légijármű üzemeltetési kézikönyv
A járató állama által elfogadható kézikönyv, amely tartalmazza az általános, különleges és vészhelyzeti eljárásokat, ellenőrző listákat, korlátozásokat, teljesítmény tájékoztatásokat, a légijármű rendszereinek részletezését valamint minden egyéb, a légijármű üzemeltetéséhez szükséges tájékoztató anyagot.

Megjegyzés: A légijármű üzemeltetési kézikönyv az üzemeltetési kézikönyvek közé tartozik.

Air operator certificate (AOC) —Légijármű üzembentartási engedély
A járatót meghatározott kereskedelmi légiszállítási tevékenység végrehajtására jogosító engedély.

Alternate heliport – Kitérő helikopter repülőtér
A repülési tervben meghatározott olyan helikopter repülőtér, amelyre a repülést folytatni lehet, ha a tervezett célállomás helikopter repülőtéren a leszállás végrehajtása nem tanácsos.

> *Take-off alternate - Felszállási kitérő helikopter repülőtér:* Egy kitérő helikopter repülőtér, ahova a forgószárnyas légijármű le tud szállni, amennyiben röviddel a felszállás után ez szükségessé válik és a kiindulási helikopter repülőtér használata nem lehetséges.
>
> *En-route alternate – Útvonal kitérő helikopter repülőtér*: Egy olyan helikopter repülőtér amelyre a forgószárnyas légijármű képes leszállni, amennyiben az útvonal repülés során az előírásostól eltérő állapot vagy vészhelyzet áll elő.
>
> *Destination alternate - Érkezési kitérő helikopter repülőtér:* Egy kitérő helikopter repülőtér amelyre a forgószárnyas légijármű folytathatja az útját, amennyiben lehetetlen vagy nem tanácsos azon a helikopter repülőtéren leszállni, amelyre a leszállást tervezeték.

Megjegyzés: Az útvonal- vagy kitérő helikopter repülőtér lehet az indulási helikopter repülőtér is.

Approach and landing operations using instrument approach procedures – Műszeres megközelítési eljárásokat alkalmazó megközelítés és leszállás
A műszeres megközelítési és leszállási eljárások osztályozása a következő:

Nem-precíziós megközelítés és leszállás (Non-precision approach and landing operations)
Olyan műszeres megközelítés és leszállás, amelynek végrehajtása során oldalirányú irányvezetést alkalmaznak, azonban függőleges irányvezetést nem vesznek igénybe.

Megközelítés és leszállás függőleges irányvezetéssel (Approach and landing operations with vertical guidance)
Olyan műszeres megközelítés és leszállás, amelynek végrehajtása során oldalirányú és függőleges irányvezetést alkalmaznak, azonban az a precíziós megközelítésre és leszállásra vonatkozó üzemeltetési előírásoknak nem tesz eleget.

Precíziós megközelítés és leszállás (Precision approach and landing operations)
Olyan műszeres megközelítés és leszállás, amelynek végrehajtása során precíziós oldalirányú és függőleges irányvezetést alkalmaznak az alábbiakban meghatározott üzemeltetési minimumok

figyelembevételével:

Megjegyzés: Az oldalirányú és függőleges irányvezetés a következő berendezések egyikének segítségével nyújtott iránysáv és siklópálya tájékoztatás:

a) földi telepítésű navigációs berendezés; vagy

b) számítógéppel biztosított navigációs adatok.

Precíziós megközelítés és leszállás kategóriái (Categories of precision approach and landing operations):

I. kategória (I. kat) (Category I (CAT I) operations)
Olyan műszeres megközelítés és leszállás, amelynek elhatározási magassága nem kevesebb, mint 60 méter (200 láb) valamint a látástávolság értéke nem kevesebb, mint 800 méter vagy a futópályamenti látástávolság értéke nem kevesebb, mint 550 méter.

II. kategória (II. kat) (Category II (CAT II) operations)
Olyan műszeres megközelítés és leszállás, amelynek elhatározási magassága kevesebb, mint 60 méter (200 láb) de nem kevesebb, mint 30 méter (100 láb) valamint a futópályamenti látástávolság értéke nem kevesebb, mint 350 méter.

III/A. kategória (III/A. kat) (Category IIIA (CAT IIIA) operations)
Olyan műszeres megközelítés és leszállás, amelynek:

a) elhatározási magassága kevesebb, mint 30 méter (100 láb) vagy ilyen elhatározási magasságot nem határoztak meg; és

b) a futópályamenti látástávolság értéke kevesebb, mint 200 méter, de nem kevesebb, mint 50 méter.

III/B. kategória (III/B. kat) (Category IIIB (CAT IIIB) operations)
Olyan műszeres megközelítés és leszállás, amelynek:

a) elhatározási magassága kevesebb, mint 15 méter (50 láb) vagy ilyen elhatározási magasságot nem határoztak meg; és

b) a futópályamenti látástávolság értéke kevesebb, mint 200 méter, de nem kevesebb, mint 50 méter.

III/C. kategória (III/C. kat) (Category IIIC (CAT IIIC) operations)
Olyan műszeres megközelítés és leszállás, amelyhez elhatározási magasság és futópályamenti látástávolság érték korlátozást nem határoztak meg.

Megjegyzés: Ahol az elhatározási magasság (DH) és futópályamenti látástávolság érték (RVR) különböző üzemeltetési kategóriákba esnek, a műszeres megközelítés és leszállás az igényesebb kategória alapján határozandó meg, azaz ott, ahol az elhatározási magasság érték a III/A. kategóriába, míg a futópályamenti látástávolság érték a III/B. kategóriába tartozik, a megközelítés és leszállás III/B. kategóriás lesz. Ugyanígy, amennyiben az elhatározási magasság érték II. kategóriás és a futópályamenti látástávolság érték az I. kategóriába tartozik, a megközelítés és leszállás II. kategóriásnak tekintendő.

Approach and landing phase – Helicopters – Megközelítési és leszállási szakasz – forgószárnyas légijárművek
A repülési feladatnak azon része, amely a végső megközelítési és felszállási terület1 tengerszint feletti

magassága feletti 300 méteren (1000 láb) kezdődik, ha a repülés tervezett magassága ennél nagyobb. Más esetekben a szakasz a süllyedés megkezdésével kezdődik és a leszállás végrehajtásáig vagy a megszakított leszállás pontjáig tart.

Cabin crew member – Utaskabin személyzeti tag
Személyzeti tag, aki a járató vagy a légijármű parancsnoka kijelölése alapján az utasok biztonsága érdekében szükséges feladatokat végzi, azonban nem a hajózószemélyzet tagja.

Commercial air transport operation – Kereskedelmi légiszállítási tevékenység
Utas, teheráru vagy postaküldemény szállítása érdekében, pénzbeli ellenszolgáltatásért vagy bérleti díjért végzett légijármű üzemeltetés.

Configuration deviation list (CDL) – Repülésvezérlő szerkezetek alaphelyzettől történő eltéréseinek jegyzéke
A típus tervezéséért felelős szervezet által kidolgozott és a tervezés állama által jóváhagyott lista, amely meghatározza a légijármű típus bármely olyan külső alkatrészét, amely a repülés megkezdésekor hiányozhat, továbbá szükség szerint tartalmazza az összes vonatkozó üzemeltetési korlátozást, valamint repülési teljesítmény korrekciós tájékoztatást.

Congested area – Sűrűn lakott terület
Város, falu vagy település közelében levő bármely olyan terület, amelyet elsősorban lakó, kereskedelmi vagy üdülési célokra vesznek igénybe.

Congested hostile environment – Kedvezőtlen körülményű sűrűn lakott terület
Kedvezőtlen körülmények egy sűrűn lakott területen belül.

Crew member – Személyzeti tag
A járató által a repülési időtartam alatt a légijárművön szolgálattételre kijelölt személy.

Dangerous goods – Veszélyes áruk
Olyan tárgyak vagy anyagok, amelyek az egészségre, a biztonságra vagy az anyagi javakra (tulajdonra) nagy kockázatot jelentenek és amelyek a Műszaki Utasításokban a veszélyes áruk felsorolásában találhatók vagy az Utasítások ilyennek minősítik.

Megjegyzés: A veszélyes árukat a 18. Annex 3. fejezete osztályozza.

Decision altitude (DA) / Decision height (DH) – Elhatározási magasság
A precíziós vagy a függőleges irányvezetéssel végrehajtott megközelítési eljárásra előírt meghatározott tengerszint vagy földfelszín feletti magasság, amelyen megszakított megközelítési eljárást kell kezdeményezni, ha a megközelítés folytatásához szükséges látás utáni tájékozódás feltételei nem jöttek létre.

1. Megjegyzés: A DA elhatározási magasság a közepes tengerszinthez, a DH elhatározási magasság pedig a futópálya küszöb magasságához viszonyított érték.

2. Megjegyzés: A szükséges látás utáni tájékozódás feltételei a fénytechnikai eszközök vagy a megközelítési terület azon elemeinek illetve részeinek látását jelentik, amelyeket a repülőgépvezetőnek elegendő ideig látnia kell ahhoz, hogy a légijármű helyzetét és a szükséges helyzetváltoztatás mértékét a kívánatos repülési pályához viszonyítva értékelhesse. III. kategóriás üzemelés során, amennyiben elhatározási magasságot jelölnek ki, a szükséges látási feltételek az adott eljárásra vagy üzemelésre vonatkoznak.

3. Megjegyzés: A gyakorlati alkalmazás megkönnyítése érdekében ott, ahol mindkét kifejezést használják, azok "QNH/QFE elhatározási magasság"-ként rövidítve pedig DA/H-ként írhatók le.

Defined point after take-off (DPATO) – Meghatározott pont a felszállás után
A felszállási és kezdeti emelkedési szakaszon belül az a pont, amely előtt a forgószárnyas légijármű repülésének biztonságos folytatása egy működésképtelen hajtóművel nincs biztosítva és kényszerleszállásra lehet szükség.

Megjegyzés: A meghatározott pont kifejezés csak a 2. teljesítmény osztályú forgószárnyas légijárművekre vonatkozik.

Defined point before landing – Meghatározott pont a leszállás előtt
A megközelítési és leszállási szakaszon belül az a pont, amely után a forgószárnyas légijármű repülésének biztonságos folytatása egy működésképtelen hajtóművel nincs biztosítva és kényszerleszállásra lehet szükség.

Megjegyzés: A meghatározott pont kifejezés csak a 2. teljesítmény osztályú forgószárnyas légijárművekre vonatkozik.

Elevated heliport – Emelt szinten létesített helikopter leszállóhely
Szárazföldön, talajszint felett levő emelt szerkezeten kialakított forgószárnyas légijármű leszállóhely.

Emergency locator transmitter (ELT) – Vészhelyzeti helyjeladó berendezés
Olyan berendezés leírására szolgáló általános kifejezés, amely megkülönböztetett (rádió)jeleket sugároz a kijelölt hullámhosszokon és alkalmazásától függően a baleset alkalmával automatikusan működésbe léphet vagy kézzel üzembe helyezhető. A vészhelyzeti helyjeladó berendezés az alábbi típusú lehet:

Automatikus rögzített (Automatic fixed ELT (ELT/AF))
Olyan vészhelyzeti helyjeladó berendezés, amely a légijárművön állandóan rögzítve helyezkedik el.

Automatikus hordozható (Automatic portable ELT (ELT/AP))
Olyan vészhelyzeti helyjeladó berendezés, amely a légijárművön rögzítve helyezkedik el, azonban a baleset után a légijármű fedélzetéről könnyen eltávolítható.

Automatikusan leváló (Automatically deployable ELT (ELT/AD))
Olyan vészhelyzeti helyjeladó berendezés, amely a légijárművön rögzítve helyezkedik el, azonban a baleset után, annak hatására automatikusan leválik a légijárműről. Szükség esetén lehetséges annak kézi eltávolítása is.

Túlélési (Survival ELT (ELT/S))
Olyan vészhelyzeti helyjeladó berendezés, amely eltávolítható légijárműről és a légijárművön úgy tárolják, hogy azt vészhelyzet esetén a túlélők egyszerűen üzembe helyezhetik és használhatják. A berendezés automatikus kapcsolószerkezettel is felszerelhető, azaz szükség esetén automatikusan is működésbe léphet.

En-route phase – Útvonal repülési szakasz
A repülésnek azon része, amely a felszállási és kezdeti emelkedési szakasz végétől a megközelítési és leszállási szakasz kezdetéig tart.

Megjegyzés: Amennyiben látás után végrehajtott repüléssel nem lehet megfelelő akadálymentességet *biztosítani, a repülést úgy tervezzék meg, hogy az akadályok elegendő távolsággal elkerülhetők legyenek. Kritikus hajtómű egység meghibásodás esetében szükségessé válhat, hogy az üzemeltetők egyéb, helyettesítő eljárásokat alkalmazzanak.*

Final approach and take-off area (FATO) – Végső megközelítési és felszállási terület
Meghatározott terület, amely felett végrehajtják a függés megkezdéséig vagy a teljes leszállásig tartó végső megközelítést és amelyen a felszállási műveletet megkezdik. Ahol a végső megközelítési és felszállási területet 1. teljesítmény osztályú forgószárnyas légijárművek veszik igénybe, a rendelkezésre álló megszakított felszállási terület is ehhez a meghatározott területhez tartozik.

Flight crew member – Hajózószemélyzeti tag
Szakszolgálati engedéllyel rendelkező személyzeti tag, akinek munkája a repülési szolgálati idő tartama alatt nélkülözhetetlen a légijármű üzemeltetéséhez.

Flight duty period – Repülési szolgálati munkaidő
Azon teljes időtartam, amely akkor kezdődik, amikor a hajózószemélyzeti tag pihenőidejét követően a repülés vagy repülési sorozat előtt szolgálatba lép és addig az időpontig tart, amikor a hajózószemélyzeti tag a repülés vagy repülési sorozat befejezése után összes szolgálati feladata alól mentesül.

Flight manual – Repülésvégrehajtási kézikönyv
A légialkalmassági bizonyítvánnyal összhangban kidolgozott és kiadott kézikönyv, amely tartalmazza azokat a korlátozásokat, amelyek mellett a légijármű repülésre alkalmasnak nyilvánítható, valamint azokat az utasításokat és tájékoztatásokat, amelyek a hajózószemélyzet tagjai számára a légijármű biztonságos üzemeltetéséhez szükségesek.

Flight operations officer/flight dispatcher – repülés-üzemi tiszt/szolgálatvezető
A járató által a légiüzemeltetés irányításába és felügyeletébe szakszolgálati engedéllyel vagy anélkül bevont, az 1. Annex előírásainak megfelelően jogosított személy, aki a légijármű parancsnokát támogatja, eligazítja és/vagy kiszolgálja a repülés biztonságos lefolytatása érdekében.

Flight plan – Repülési terv
A légiforgalmi szolgálati egységek rendelkezésére bocsátott, a légijármű tervezett repülésére vagy a repülés egy szakaszára vonatkozó meghatározott tájékoztatás.

Flight recorder – Repülési adatrögzítő
A légijárművön felszerelt bármely típusú adatrögzítő, amelynek célja a tájékoztatások biztosítása a légijármű baleset vagy repesemény kivizsgáláshoz.

Flight safety documents system – Repülésbiztonsági dokumentációs rendszer
A járató által kidolgozott és fenntartott, egymással összefüggő dokumentumok, amelyek rendezett formában tartalmazzák a légi- és földi üzemeltetéshez szükséges tájékoztatásokat. A rendszer legalább a repülés-végrehajtási kézikönyvből valamint a járató karbantartási ellenőrző kézikönyvéből álljon.

Flight simulation training device – Mesterséges repülés-gyakorló berendezés
Az alábbi három berendezés közül bármelyik, amely a repülési körülmények földi gyakorlati megjelenítésére, pontos utánzására alkalmas:

Repülési szimulátor – Flight simulator
Egy adott légijármű típus pilótakabinjának pontos utánzata olyan mértékben, hogy a mechanikus, elektromos továbbá elektronikus légijármű rendszerek működése és ezek hatása, a légijármű hajózószemélyzetének általános munkakörnyezete valamint az adott légijármű teljesítmény és repülési

jellemzői a valósághoz hűen utánozhatók;

Repülési eljárás gyakorló berendezés – Flight procedures trainer
Olyan berendezés, amely valóságos pilótafülke környezetet biztosít és mesterségesen ábrázolja a műszerek működését valamint reakcióit, megjeleníti a műszaki, mechanikus, elektromos és elektronikus rendszerek működését valamint az adott osztályba tartozó légijárművek teljesítmény és repülési jellemzőit;

Alap műszerrepülési gyakorló berendezés – Basic instrument flight trainer
Olyan megfelelő műszerekkel ellátott berendezés, amely mesterségesen biztosítja a légijármű műszerfal környezetét műszerrepülési körülmények között.

Flight time – Helicopters – Repülési idő – Forgószárnyas légijármű
Az a teljes időtartam, amely akkor kezdődik, amikor a légijármű forgó-szárnyai elindulnak és akkor fejeződik be, amikor a légijármű a repülés végén megáll és forgószárnyai leállnak.

1. Megjegyzés: Azokban az esetekben, amikor a repülési idő meghatározása nem írja le, vagy nem teszi lehetővé a normál gyakorlat alkalmazását az Állam útmutatót adhat ki. Például: a személyzet cseréje a forgószárnyak leállítása nélkül; és a forgószárnylapátok mosása járó hajtómű mellett a repülés befejezését követően. Mindenesetre, forgószárnyak repülési szakaszok közötti forgási idejét be kell számítani a repülési időbe.

2. Megjegyzés:A jelen meghatározást csak a repülési- és a szolgálati idő meghatározásához lehet felhasználni.

General aviation operation – Általános célú légiközlekedés
A kereskedelmi légiszállító tevékenységtől valamint a munkarepüléstől eltérő légijármű üzemeltetés.

Ground handling – Földi kiszolgálás
A légijármű érkezése után és indulása előtt a repülőtéren szükséges kiszolgálási feladatok, amelyeket nem a légiforgalmi szolgálatok végeznek el.

Helicopter – Forgószárnyas légijármű
Levegőnél nehezebb légijármű, amelynek levegőben maradását elsősorban a függőleges tengelyre felszerelt, egy vagy több hajtóművel meghajtott forgószárny levegővel szemben ható aerodinamikai reakció-erői biztosítják.

Megjegyzés: Némely államban a „helikopter" kifejezés alternatívájaként a „forgószárnyas légijármű" kifejezést használják.

Helideck – Helikopter leszállási hely
Úszó vagy parttól távol (nyílt vízen) rögzített szerkezeten a forgószárnyas légijárművek üzemeltetésére létesített leszállóhely.

Heliport – Helikopter repülőtér
Repülőtér vagy egy építmény meghatározott területén kialakított leszállóhely, amelyet teljes egészében vagy részben forgószárnyas légijárművek érkezésére, indulására és felszíni mozgására kívánnak felhasználni.

1. Megjegyzés: A jelen rész teljes egészében, amikor a „helikopter repülőtér" (heliport) alkalmazására kerül sor, akkor ez a kifejezés a repülőgépek által használt repülőterekre is vonatkozik.

2. Megjegyzés: a forgószárnyas légijárművek a helikopter repülőterektől eltérő helyekről (helyekre) is fel-, illetve leszállhatnak.

Törölt: s

Heliport operating minima – Helikopter repülőtér üzemeltetési minimum
Egy helikopter repülőtér igénybevételének a következő repülési feladatok végrehajtását érintő korlátozásai:

a) Felszállás – futópályamenti látástávolság (RVR) és/vagy látástávolság értékben és ha szükséges, felhőzet jellemzőkben kifejezve;

b) Precíziós megközelítés és leszállás – az üzemeltetés kategóriájának megfelelően látástávolság és/vagy futópályamenti látástávolság értékben (RVR) valamint elhatározási magasság értékben (DA/H) kifejezve;

c) Függőleges irányvezetéssel végrehajtott megközelítés és leszállás – látástávolság és/vagy futópályamenti látástávolság értékben (RVR) valamint elhatározási magasság értékben (DA/H) kifejezve;

d) Nem-precíziós megközelítés és leszállás – látástávolság és/vagy futópályamenti látástávolság értékben (RVR) valamint legalacsonyabb süllyedési magasság értékben (MDA/H) és ha szükséges, felhőzet jellemzőkben kifejezve.

***Hostile environment – K**edvezőtlen körülmények*
Olyan feltétel rendszer, amelyben:

a) A kényszerleszállást nem lehet végrehajtani, mivel a terep és annak környezete nem megfelelő; vagy

b) A helikopteren tartózkodókat nem lehet megfelelően megvédeni a körülményektől; vagy

c) A keresési és mentési intézkedések / lehetőségek nem állnak arányban a várható veszélyhelyzettel; vagy

d) A személyeket és a vagyoni eszközöket elfogadhatatlan kockázat érné a földön.

Human Factors principles – Emberi tényezők alapelvei
A légiközlekedési tervezés, jogosítás, kiképzés, üzemeltetés és karbantartás vonatkozó alapelvei, amelyek célja az emberi teljesítmény és teljesítő-képesség tényezőinek tökéletes figyelembevételével biztonságos kapcsolat kialakítása a személyek és a rendszer egyes (műszaki) elemei között.

Human performance – Emberi teljesítmény és teljesítőképesség
Az egyéni emberi képességek és korlátozó tényezők, amelyek hatással vannak a légiközlekedési üzemeltetés biztonságára és hatékonyságára.

Instrument meteorological conditions (IMC) – Műszeres időjárási körülmények
Látástávolsággal, felhőzettől mért távolsággal és felhőalappal (a 2. Annexben meghatározottak szerint) kifejezett időjárási körülmények, ha azok a látás utáni időjárási körülményekre meghatározott minimum értékeknél alacsonyabbak.

Megjegyzés: A látás utáni időjárási körülményekre meghatározott minimum értékeket a 2. Annex 4.

fejezete tartalmazza.

Integrated survival suit – egyesített túlélő öltözék
Olyan túlélő öltözék, amely kielégíti a mentő mellény és a túlélő öltözék egyesített követelményeit.

Landing decision point (LDP) – Leszállási elhatározási pont
A leszállási teljesítmény meghatározásánál alkalmazott pont, ahonnan hajtómű meghibásodás esetén a leszállási művelet biztonságosan folytatható vagy a leszállás megszakítása kezdeményezhető.

Megjegyzés: A leszállási elhatározási pont az I. teljesítmény osztályú forgószárnyas légijárműre vonatkozik.

Maintenance – Karbantartás
A légijármű folyamatos légialkalmasságának biztosításához előírt feladatok elvégzése, beleértve a következők bármelyikét vagy ezek kombinációját; nagyjavítás, ellenőrzés, átvizsgálás, javítás, csere, módosítás vagy a meghibásodás elhárítása.

Maintenance organization's procedures manual – Karbantartó szervezet eljárási kézikönyve
A karbantartó szervezet vezetője által jóváhagyott dokumentum, amely részletezi a karbantartó szervezet felépítését, a vezetői felelősségi rendszert, az elvégzendő munkafeladatokat, ismerteti a létesítményeket, a karbantartási eljárásokat valamint a minőségbiztosítási vagy felügyeleti illetve ellenőrzési rendszert.

Maintenance programme – Karbantartási program
Az előírt tervszerű karbantartási feladatok felsorolását tartalmazó kiadvány, amely a feladatok végrehajtásának időrendi tervét és rendjét jelzi. Ilyen kiadvány lehet a légijármű üzemi megbízhatósági programja, amely azon légijármű biztonságos üzemeltetéshez szükséges, amelyre az vonatkozik.

Maintenance release – Karbantartási nyilatkozat
Olyan igazolást tartalmazó dokumentum, amely megerősíti, hogy a megfelelő karbantartási feladatokat a karbantartást végző szervezet eljárási kézikönyve vagy más egyenértékű rendszer alapján az elfogadott jellemzők figyelembevételével kielégítően elvégezték.

Master minimum equipment list (MMEL) – Gyártó minimális felszerelési jegyzéke
Az adott légijármű típusra vonatkozóan a gyártó által kidolgozott és a gyártó állama által jóváhagyott felszerelési jegyzék, amely azokat a felszereléseket és egységeket tartalmazza, amelyek közül egy vagy több a repülés megkezdése előtt üzemképtelen lehet. A jegyzékhez (MMEL) különleges üzemeltetési feltételek, korlátozások vagy eljárások határozhatók meg.

Maximum mass – Legnagyobb tömeg
Legnagyobb engedélyezett felszállósúly.

Minimum descent altitude (MDA) / Minimum descent height (MDH) – Legalacsonyabb süllyedési magasság
A nem-precíziós megközelítési vagy a körözéssel végrehajtott megközelítési eljárásra előírt meghatározott tengerszint vagy földfelszín feletti magasság, amely alá az előírt látási feltételek létrejöttének hiányában süllyedni tilos.

1. Megjegyzés: A legalacsonyabb QNH süllyedési magasság a közepes tengerszinthez, a legalacsonyabb QFE süllyedési magasság a repülőtér magasságához vagy a futópálya küszöb magasságához viszonyított érték. Ez utóbbit akkor alkalmazzák, ha a futópálya küszöb magassága több mint 2 méterrel (7 láb) a *repülőtér magassága alatt van. A megközelítéshez történő körözéshez meghatározott legalacsonyabb süllyedési magasság a repülőtér magasságához viszonyított érték.*

2. Megjegyzés: A szükséges látási feltételek a fénytechnikai eszközök vagy a megközelítési terület azon elemeinek illetve részeinek látását jelentik, amelyeket a repülőgépvezetőnek elegendő ideig látnia kell ahhoz, hogy a légijármű helyzetét és a szükséges helyzetváltoztatás mértékét a kívánatos repülési pályához viszonyítva értékelhesse. A körözéssel végrehajtott megközelítés esetében a szükséges látási feltételek a futópálya környezetére vonatkoznak.

3. Megjegyzés: A gyakorlati alkalmazás megkönnyítése érdekében ott, ahol mindkét kifejezést használják, azok "QNH/QFE legalacsonyabb süllyedési magasság"-ként rövidítve pedig MDA/H-ként írhatók le.

Minimum equipment list (MEL) – Minimális felszerelési jegyzék
A légijármű üzemeletetéséhez rendelkezésre álló felszerelések jegyzéke, amely meghatározott feltételek alapján tartalmazza azokat a berendezéseket és egységeket, amelyek üzemképtelenek lehetnek. A jegyzéket a járató az adott légijármű vonatkozásában a MMEL alapján vagy ennél szigorúbb feltételek szerint dolgozza ki.

Night – Éjszaka
Az esti polgári szürkület vége és a hajnali polgári szürkület kezdete között eltelt idő vagy olyan más, napnyugat és napkelte között eltelt időszak, amelyet az illetékes hatóság határoz meg.

Megjegyzés: Az esti polgári szürkület akkor fejeződik be, amikor a napkorong középpontja 6 fokkal a horizont alá süllyed és a hajnali polgári szürkület akkor kezdődik, amikor a napkorong középpontja 6 fokkal a horizont fölé emelkedik.

Non-congested hostile environment – Ritkán lakott kedvezőtlen környezet
Sűrűn lakott területen kívüli, kedvezőtlen környezet.

Non-hostile environment – Kedvező környezet
Egy olyan környezet, amelyben:

Törölt: *Barátságos*

a) A kényszerleszállást végre lehet hajtani, mivel a terep és annak környezete megfelelő; vagy

b) A helikopteren tartózkodókat megfelelően meg lehet védeni a körülményektől; vagy

c) A keresési és mentési intézkedések / lehetőségek arányban állnak a várható veszélyhelyzettel; vagy

d) A személyeket és a vagyoni eszközök földön való veszélyeztetésének számított kockázatának mértéke elfogadható.

Megjegyzés: A sűrűn lakott területek fenti feltételeknek megfelelő részei kedvezőnek számítanak.

Obstacle clearance altitude (OCA) or Obstacle clearance height (OCH) – Akadálymentes tengerszint feletti magasság (OCA) vagy akadálymentes földfelszín feletti magasság (OCH)
A legalacsonyabb közepes tengerszinthez viszonyított magasság vagy a megfelelő futópálya küszöb illetve a repülőtér magassága feletti magasság – amelyik alkalmazható – amelyet az akadályoktól történő megfelelő függőleges elkülönítés biztosítása érdekében az akadálymentességi előírásokkal összhangban határoznak meg.

1. Megjegyzés: Az akadálymentes tengerszint feletti magasság a közepes tengerszinthez, az akadálymentes földfelszín feletti magasság a futópálya küszöb magasságához viszonyított érték. A nem-precíziós megközelítés esetében az akadálymentes földfelszín feletti magasság a repülőtér magasságához vagy a futópálya küszöb magasságához viszonyított érték. Ez utóbbit akkor alkalmazzák, ha a futópálya küszöb magassága több mint 2 méterrel (7 láb) a repülőtér magassága alatt van. A megközelítéshez történő körözéshez meghatározott akadálymentes földfelszín feletti magasság a repülőtér magasságához viszonyított érték.

2. Megjegyzés: A gyakorlati alkalmazás megkönnyítése érdekében ott, ahol mindkét kifejezést használják, azok "QNH/OFE akadálymentes magasság"-ként rövidítve pedig OCA/H-ként írhatók le.

Offshore operations – Parttól távoli (vízfelszíni) üzemeltetések
Olyan repülés, amelynek jelentős része tenger felett kerül végrehajtásra a nyílt tengeren lévő helyszínre való, vagy onnan történő visszarepülés során. Ezek a repülések magukba foglalják, de nem korlátozódnak csak a nyílt tengeri olaj-, gáz- és ásványi lelőhelyek kiszolgálására valamint hajó kormányosok szállítására.

Operation – üzemeltetés
Egy tevékenység, vagy tevékenységek csoportja, amelyek azonos vagy hasonló veszélyhelyzetnek vannak kitéve, és amelyek meghatározott berendezés készleteket, vagy meghatározott összetételű légijármű vezetői jártasság elérését és karbantartását igénylik, az ilyen jellegű veszélyhelyzetek elkerülése vagy legyőzése érdekében.

Megjegyzés:Az ilyen jelegű tevékenység magába foglalhatja, de nem korlátozódik csak a nyílt tengeri üzemeltetésre, a helikopterrel végzett teheremelésekre vagy vész-mentő szolgáltatásokra.

Operational control – Repülésüzemi irányítás
Felügyelet gyakorlása valamely repülési feladat megkezdésére, folytatására, befejezésére vagy kitérő repülőtérre történő irányítására a légijármű biztonsága valamint a repülés menetrendszerű és gazdaságos lebonyolítása érdekében.

Operational flight plan – Üzemeltetői repülési terv
A járató terve a repülési feladat biztonságos végrehajtására a forgószárnyas légijármű teljesítményének, üzemeltetési korlátozásainak valamint az útvonalon és az érintett repülőtereken várható repülésvégrehajtási körülmények figyelembevételével.

Operations in performance Class 1 – 1. teljesítmény osztályon belüli üzemeltetés
Azon teljesítménnyel történő üzemeltetés, amikor a kritikus hajtómű meghibásodás esetén a teljesítmény elegendő arra, hogy a helikopter biztonságosan folytassa a repülését a megfelelő leszálló helyig, hacsak a meghibásodás még azelőtt bekövetkezne, hogy a helikopter elérné a felszállási elhatározási pontot (TDP) vagy túlhaladna a leszállási elhatározási ponton (LDP), mely esetekben a helikopter legyen képes a leszállásra a megszakított felszállási vagy leszállási körzeten belül.

Operations in performance Class 2 – 2. teljesítmény osztályon belüli üzemeltetés
Azon teljesítménnyel történő üzemeltetés, amikor a kritikus hajtómű meghibásodás esetén a teljesítmény elegendő arra, hogy a helikopter biztonságosan folytassa a repülését a megfelelő leszálló helyig, kivéve, ha a meghibásodás a felszállás utáni meghatározott pont előtt vagy a leszállás előtti meghatározott pont után következik be, mert ebben az esetben kényszerleszállás végrehajtása válhat szükségessé.

Operations in performance Class 3 – 3. teljesítmény osztályon belüli üzemeltetés
Azon teljesítménnyel történő üzemeltetés, amikor a a repülés bármely szakaszán bekövetkező hajtómű

meghibásodás esetén kényszerleszállást kell végrehajtani.

Operations Manual – Üzemeltetési kézikönyv
Az üzemeltetéssel megbízott személyzet számára feladataik elvégzéséhez kiadott eljárásokat, utasításokat és tájékoztatásokat tartalmazó kézikönyv.

Operator – Járató
Valamely személy, szervezet vagy vállalat, amely légijárműveket üzemeltet vagy ilyen tevékenység végzésére ajánlkozik.

Operator's maintenance control manual – Járató karbantartás irányítási kézkönyve
A járató eljárásait ismertető dokumentum, amely segítségével a járató biztosítja, hogy légijárművén az összes tervezett és szükség szerint végrehajtandó karbantartási feladat az előírt időben valamint ellenőrzött és kielégítő módon elvégzésre kerül.

Pilot-in-command – Légijármű parancsnoka
A repülés biztonságos végrehajtásáért felelős, a járató vagy az általános célú légiközlekedés esetében a légijármű tulajdonosa részéről parancsnoknak kijelölt repülőgépvezető.

Psychoactive substances – Szellemi tevékenységet befolyásoló anyagok
Alkohol, ópiumból vagy kenderből készített kábítószer, kokain, nyugtatók és altatók, egyéb izgató, serkentő, élénkítő-szerek, képzeteket keltő erős izgatószerek és illékony oldószerek a kávé és a dohányféleségek kivételével.

Repair – Javítás
A légijármű bármely repülésüzemi alkatrészének sérülést vagy üzemszerű kopást követő repülésre alkalmas állapotba történő helyreállítása annak biztosítása érdekében, hogy az továbbra is megfelel a vonatkozó légialkalmassági előírásoknak, amelyeket az adott légijármű típus bizonyítványának kiadásakor figyelembe vettek.

Required communication performance (RCP) – Előírt távközlési teljesítmény
A repülés közbeni távközlési teljesítmény követelményeire vonatkozó, meghatározott ATM feladatok támogatásával összefüggő közlemény.

Required communication performance type (RCP type) – Előírt távközlési teljesítmény típus
A távközlés lebonyolítási idejét, folyamatosságát, rendelkezésre állását és integrítását meghatározó RCP paraméterekhez rendelt értékeket jellemző címkék (például: RCP 240).

Required navigation performance (RNP) – Előírt navigációs pontosság
Egy meghatározott légtérben történő repülés-végrehajtáshoz szükséges navigációs teljesítmény, azaz pontosság.

Megjegyzés: A navigációs teljesítményt és előírásokat egy adott RNP típusra és/vagy alkalmazásra határozzák meg.

Rest period – Pihenőidő
A földön eltöltött bármely időtartam, amely alatt a járató a hajózószemélyzet tagját összes feladata alól mentesíti.

RNP type (Required navigation performance type) – Előírt navigációs pontosság típus

Tengeri mérföldben kifejezett távolság, azaz pontossági határérték. A légijármű a repülésvégrehajtás során a repülési idő legalább 95 %-ában a tervezett repülési helyzetéhez viszonyítva ezen határértéken belül repüljön.

Például: – RNP 4 olyan navigációs pontosság határértéket jelent, amelynek alapján a légijármű repülési idejének legalább 95 százalékában mindenkori tervezett repülési helyzetéhez viszonyítva plusz/minusz 4 tengeri mérföld távolságon belül repül.

Runway visual range (RVR) – Futópályamenti látástávolság érték
Az a távolság, ameddig a futópálya középvonalán álló légijármű-vezetője látja a futópálya felületi jelzéseket vagy a futópálya szélét kijelölő, illetve a középvonalát azonosító fényeket.

Safe forced landing – Biztonságos kényszerleszállás
Elkerülhetetlen kényszerleszállás talajra vagy vízfelszínre, melynek során nagy valószínűséggel várható, hogy a légijármű fedélzetén valamint a földön tartózkodó személyek nem sérülnek meg.

Safety management system – Biztonsági irányítási rendszer
A biztonság irányításának rendszerezett megközelítése, amely magában foglalja a szükséges szervezeti felépítést, felelősségi köröket, irányelveket és eljárásokat.

Safety programme – Biztonsági program
Előírások és tevékenységek egységes rendszere, amely a biztonság növelésére irányul.

Series of flights – Repülési sorozat
A repülési sorozat olyan egymást követő repüléseket jelent, amelyek

a) egy 24 órás időszakon belül kezdődnek és fejeződnek be; és

b) és mindegyiket ugyanaz a légijármű parancsnok hajtja végre.

State of Registry – Lajstromozó állam
Azon állam, amelynek lajstromába a légijárművet bevezették.

Megjegyzés: A nem nemzeti alapon működő nemzetközi üzemeltető vállalkozás vagy szervezet légijárművének lajstromozás esetében az abban érintett államokra együttesen és külön-külön is vonatkozik az a kötelezettség, amely a Chicagó-i Egyezmény értelmében a lajstromozó államot illeti. Erre vonatkozóan lásd a Tanács 1967. december 17-i Határozatát a Nemzetközi Légiszállítás Gazdasági Szabályzásának Előírásai és Útmutatója (Doc 9587) címmel.

State of the Operator – Járató állama
Az az állam, amelynek területén a járató legfőbb üzleti telephelye található. Ennek hiányában az az állam, amelyben a járató állandó tartózkodási helye (címe) van.

Take-off and initial climb phase – Felszállási és kezdeti emelkedési szakasz
A repülésnek az a szakasza, amely a felszállástól a végső megközelítési és felszállási terület magassága felett 300 méter (1000 láb) magasságig tart abban az esetben, ha a repülés tervezett magassága ennél nagyobb. A szakasz más esetekben az emelkedés befejezéséig tart.

Take-off decision point (TDP) – Felszállási elhatározási pont
A felszállási teljesítmény meghatározásánál alkalmazott pont, ahonnan hajtómű meghibásodás esetén a felszállás megszakítható vagy a felszállási művelet biztonságosan folytatható.

Megjegyzés: A felszállási elhatározási pont az I. teljesítmény osztályú forgószárnyas légijárműre vonatkozik.

Visual meteorological conditions (VMC) – Látás utáni időjárási körülmények
Látástávolsággal, felhőzettől mért távolsággal és felhőalappal (A 2. Annex meghatározása szerint) kifejezett időjárási körülmények, ha azok a látás utáni időjárási körülményekre meghatározott minimum értékekkel azonosak vagy ezeknél jobbak.

Megjegyzés: A látás utáni időjárási körülményekre meghatározott minimum értékeket a 2. Annex 4. fejezete tartalmazza.

V_{TOSS}
Az a legalacsonyabb sebesség, amelynél üzemképtelen kritikus hajtóművel emelkedés érhető el úgy, hogy a többi hajtómű engedélyezett üzemeltetési határértékein belül működik.

Megjegyzés: A fent említett sebesség a légijármű műszerein vagy más, a repülés-végrehajtási kézikönyvben meghatározott eljárás segítségével mérhető.

2. fejezet
Alkalmazhatóság

A 6. Annex III. részében található nemzetközi előírások és ajánlott gyakorlati eljárások a nemzetközi kereskedelmi légiszállításban vagy az általános célú nemzetközi légiközlekedésben üzemeltetett forgószárnyas légijárművek működésére alkalmazandók, azonban ezek a nemzetközi előírások és ajánlott gyakorlati eljárások a munkarepülésben használt forgószárnyas légijárművekre nem vonatkoznak.

1. Megjegyzés: A nemzetközi kereskedelmi légiszállítási tevékenységre jogosított járatók repülőgépeinek üzemeltetésre vonatkozó nemzetközi előírások és ajánlott gyakorlati eljárások a 6. Annex I. részében találhatók.

2. Megjegyzés: Az általános célú nemzetközi légiközlekedésben üzemeltetett repülőgépekre vonatkozó nemzetközi előírások és ajánlott gyakorlati eljárások a 6. Annex II. részében találhatók.

II. szakasz
Nemzetközi kereskedelmi légiszállítás

1. fejezet
Általános rész

1. Megjegyzés: Bár a Nemzetközi Polgári Légiközlekedési Egyezmény a lajstromozó államra bizonyos feladatokat ír elő, amelyek végrehajtására az állam a helyzetnek megfelelően jogosult vagy kötelezett, a Közgyűlés A23-13 számú határozatában elismerte azt a tényt, hogy a lajstromozó állam bizonyos *körülmények között képtelen megfelelő módon eleget tenni a fenti kötelezettségének, amikor a légijárművet más állam járatója – elsősorban hajózószemélyzet nélkül – bérbe veszi, szerződés vagy csere megállapodás alapján üzemelteti valamint azt is, hogy amíg az Egyezmény 83/b. cikkelye hatályba nem lép, az Egyezmény nem határozza meg megfelelően a járató államára ilyen esetekben vonatkozó jogokat és kötelezettségeket. Ezért a Tanács felhívta a figyelmet arra, hogy ha a fenti esetekben a lajstromozó állam megállapítja, hogy az Egyezményben előírt kötelezettségei teljesítésére képtelen, azokat a feladatokat, amelyeket a járató állama jobban el tud végezni és ezen feladatok végrehajtását elvállalja, járató államára utalhatja át. Tudomásul vették, hogy a 83/b. cikkely hatályba lépéséig a fentiek csak gyakorlati szempontból lesznek célszerűek és nem érintik a Chicagó-i Egyezménynek a lajstromozó államra vagy bármely harmadik államra háruló kötelezettségeit. Mindazonáltal, mivel a 83/b. cikkely 1997. június 20-án hatályba lépett, a vonatkozó kiegészítést (Doc 9318) aláíró államok kötelesek az ilyen átadási megállapodásokban foglaltak teljesítésére.*

2. Megjegyzés: A nemzetközi légi üzemeltetés esetében, amelyet olyan forgószárnyas légijárművekkel bonyolítanak le, amelyek nem mindegyike van azonos szerződő államban lajstromozva, a jelen rész előírásai közül semmi sem akadályozza meg az érintett államokat abban, hogy szerződés alapján közösen végezzék el azokat a feladatokat, amelyek végrehajtására a jelen részben a lajstromozó államot jelöltük ki.

1.1 A jogszabályok, előírások és eljárások betartása

1.1.1 A járató biztosítsa, hogy minden külföldön tartózkodó alkalmazottja tudatában legyen annak, hogy eleget kell tenniük azon állam jogszabályainak, előírásainak és közzétett eljárásainak, amelyben forgószárnyas légijárműveiket üzemeltetik.

1.1.2 A járató biztosítsa, hogy összes forgószárnyas légijármű-vezetője ismerje a feladataik teljesítéséhez szükséges jogszabályokat, előírásokat és eljárásokat, amelyeket az átrepülendő területekre, az igénybe vett helikopter repülőterekre és léginavigációs létesítményekre előírtak. A járató biztosítsa, hogy a hajózószemélyzet többi tagja is ismerje a forgószárnyas légijármű üzemeltetésével kapcsolatos egyéni feladataik teljesítéséhez szükséges jogszabályokat, előírásokat és eljárásokat.

Megjegyzés: A repülőgépvezetőknek és a légiüzemeltetéssel foglalkozó személyeknek szóló azon információkat, amelyek a repülési eljárások paramétereire és az üzemeltetési eljárásokra vonatkoznak, a PANS-OPS I. kötete tartalmazza. A látás utáni és a műszeres repülési eljárások felépítésére vonatkozó követelményeket a PANS-OPS II. kötete tartalmazza. Az akadály mentesség követelményeinek és eljárásainak használata egyes államokban eltérhetnek a PANS-OPS előírásaitól, és biztonsági okokból fontos ezen különbségek ismerete.

1.1.3 A járató biztosítsa, hogy a hajózószemélyzet tagjai az 1. Annex előírásai szerint bizonyítsák képességüket a légiforgalmi rádiótávbeszélő összeköttetések során alkalmazott nyelv szóbeli használatára és megértésére.

1.1.4 A repülésüzemi irányításért a járató vagy kijelölt képviselője felelős.

Megjegyzés: Ez az előírás nem érinti az állam jogait és kötelezettségeit azon forgószárnyas légijárművek üzemeltetésére vonatkozóan, amelyeket abban az államban vettek lajstromba.

1.1.5 A repülésüzemi irányításért viselt felelősséggel csak a légijármű parancsnoka és a repülés-üzemi tiszt / szolgálatvezető hatalmazható fel, amennyiben a járató jóváhagyott módszere a légiüzemeltetés irányítására és felügyeletére megköveteli a repülés-üzemi tiszt / szolgálatvezető alkalmazását.

Megjegyzés: A repülésüzem irányításának megszervezésére vonatkozó útmutató és a repülés-üzemi tiszt /

szolgálatvezető szerepének leírása az Üzemeltetési Ellenőrzés, Jogosítás és Folyamatos Felülvizsgálat Kézikönyv-ben *(Doc 8335) található. A repülés-üzemi tiszt / szolgálatvezető felhatalmazására, kötelességeire, és felelősségi körére vonatkozó részletes útmutatót a* Repülésüzemi Kézikönyv Előkészítése (Doc 9376) *című anyagban található. A szakszolgálati engedéllyel rendelkező repülés-üzemi tiszt / szolgálatvezető korára, képzettségére, tudására és gyakorlati jártasságára vonatkozó követelmények az 1. Annexben találhatók.*

1.1.6 Amennyiben a forgószárnyas légijármű vagy az utasok biztonságát fenyegető vészhelyzetről először a repülés-üzemi tiszt / szolgálatvezető szerez tudomást, akkor annak a személynek a 2.6.1 bekezdés szerinti tevékenysége, ahol az lehetséges, tartalmazza a kialakult helyzet természetéről a megfelelő hatóságok késedelem nélküli értesítését, és a segítségre vonatkozó kérést, amennyiben szükséges.

1.1.7 Amennyiben a forgószárnyas légijármű vagy az utasok biztonságát fenyegető vészhelyzet esetében olyan tevékenységre van szükség, amellyel megsértik a helyi előírásokat vagy eljárásokat, a légijármű parancsnoka erről késedelem nélkül értesítse az illetékes helyi hatóságot. Ha az állam, amelynek felségterületén az esemény bekövetkezik így rendelkezik, a légijármű parancsnoka bármely ilyen előírás megsértéséről nyújtson be jelentést az állam illetékes hatósága számára; ebben az esetben a parancsnok a jelentés másolatát nyújtsa be a járató állama számára is. Az ilyen jelentéseket a lehető legrövidebb időn, általában tíz napon belül nyújtsák be.

1.1.8 A járató biztosítsa, hogy a forgószárnyas légijármű fedélzetén a légijármű parancsnokának rendelkezésére álljon az átrepült területen működő kutató és mentő szolgálatokra vonatkozó összes alapvető tájékoztatás.

Megjegyzés: Ezt a tájékoztatást a légijármű-vezető számára az üzemeltetési kézikönyv vagy más hasonló, alkalmasnak tekintető tájékoztató anyag is tartalmazhatja.

1.1.9 A járató dolgozzon ki és vezessen be baleset megelőzési és repülésbiztonsági programot.

Megjegyzés: A baleset megelőzéssel kapcsolatos útmutató a Baleset Megelőzési Kézikönyv-*ben (Doc 9422) valamint az* Üzemeltetési Kézikönyv Elkészítése *(Doc 9376) című kiadványokban található.*

1.1.10 **Ajánlás** *–A 7000 kg-nál nagyobb engedélyezett felszállósúllyal (tömeg), vagy kilencnél több utasüléssel rendelkező és repülési adatrögzítővel felszerelt forgószárnyas légijármű járatója biztonság irányítási rendszere részeként dolgozzon ki és vezessen be repülési adat elemző programot.*

Megjegyzés: A járató a repülési adat elemző program végrehajtásával megbízhat más szervezetet, azonban az ilyen programmal kapcsolatos általános felelősség a járatót terheli.

1.1.11 A repülési adat elemző program nem lehet szankcionáló jellegű és megfelelő intézkedéseket tartalmazzon az adatforrások védelmére.

1.2 A biztonság irányítása

1.2.1 Az államok dolgozzanak ki egy biztonsági programot, hogy a légijárművek üzemeltetése során el lehessen érni az elfogadható szintű biztonságot.

1.2.2 Az elérendő, elfogadható szintű biztonságot az érintett állam(ok) teremtse (teremtsék) meg.

Megjegyzés: A biztonsági programra vonatkozó útmutató a Biztonság Irányítási Kézikönyv-*ben* (SMM) *(Doc 9859), míg az elfogadható szintű biztonság meghatározása a 11. Annex E. mellékletében található.*

1.2.3 ***Ajánlás*** *– Az államok, mint a biztonsági programjuk részeként követeljék meg, hogy egy járató vezessen be a járató államának elfogadható biztonság irányítási rendszert, amely minimum:*

a) *megnevezi a biztonsági veszélyeket;*

b) *biztosítja, hogy egy elfogadható szintű biztonság kialakításához szükséges megelőző intézkedések alkalmazásra kerülnek;*

c) *gondoskodik a folyamatos figyelésről és az elért biztonsági szint rendszeres felülvizsgálatáról; és*

d) *törekedik a teljeskörű biztonsági szint folyamatos tökéletesítésére.*

1.2.4 2009 január 01-től az államok, mint a biztonsági programjuk részeként követeljék meg, hogy egy járató vezessen be a járató államának elfogadható biztonság irányítási rendszert, amely minimum:

a) megnevezi a biztonsági veszélyeket;

b) biztosítja, hogy egy elfogadható szintű biztonság kialakításához szükséges megelőző intézkedések alkalmazásra kerülnek;

c) gondoskodik a folyamatos figyelésről és az elért biztonsági szint rendszeres felülvizsgálatáról; és

d) törekedik a teljeskörű biztonsági szint folyamatos tökéletesítésére.

1.2.5 A biztonság irányítási rendszer világosan határozza meg a biztonságért viselt felelősség függelmi viszonyait a járató teljes szervezetén belül, beleértve a felső vezetés biztonságért viselt közvetlen felelősségét.

Megjegyzés: A biztonság irányítási rendszerre vonatkozó útmutató a Biztonság Irányítási Kézikönyv-*ben* (SMM) *(Doc 9859) található.*

1.2.6 A járató, biztonság irányítási rendszere részeként, az üzemeltető személyzet részére, felhasználás és útmutatás céljából dolgozzon ki egy repülésbiztonsági dokumentációs rendszert.

Megjegyzés: A repülésbiztonsági dokumentációs rendszer kidolgozására és elrendelésére vonatkozó útmutató a G. mellékletben található.

1.3 Veszélyes áruk

1. Megjegyzés: A veszélyes áruk szállítására vonatkozó előírások a 18. Annex-ben találhatók.

2. Megjegyzés: Az Egyezmény 35. cikkelye bizonyos teheráru korlátozási osztályokra vonatkozik.

1.4 Szellemi tevékenységet befolyásoló anyagok használata

Megjegyzés: A szellemi tevékenységet befolyásoló anyagok használatára vonatkozó előírások az 1. Annex 1.2.7 és a 2. Annex 2.5 pontjaiban találhatók.

1.2 Veszélyes áruk

1. Megjegyzés: A veszélyes áruk szállítására vonatkozó előírások a 18. Annex-ben találhatók.

2. Megjegyzés: Az Egyezmény 35. cikkelye bizonyos teheráru korlátozási osztályokra vonatkozik.

1.3 Szellemi tevékenységet befolyásoló anyagok használata

Megjegyzés: A szellemi tevékenységet befolyásoló anyagok 1 használatára vonatkozó előírások az 1. Annex 1.2.7 és a 2. Annex 2.5 pontjaiban találhatók.

2. fejezet
Repülésvégrehajtás

2.1 Az üzemeltetés létesítményeinek alkalmassága

2.1.1 A járató biztosítsa, hogy a repülés végrehajtása ne kezdődjön meg az előtt, hogy minden rendelkezésre álló lehetséges és ésszerű eszközzel meggyőződtek arról, hogy azok a rendelkezésre álló földi és/vagy vízfelszíni létesítmények, amelyek a forgószárnyas légijármű biztonságos üzemeltetése valamint az utasok védelme érdekében közvetlenül szükségesek, megfelelnek annak az üzemeltetési típusnak, amelyben a repülést végre fogják hajtani, továbbá azokat a fenti célnak megfelelő módon üzemeltetik.

Megjegyzés: A jelen előírásban alkalmazott „lehetséges és ésszerű eszköz" kifejezés a járató részére az indulási helyen rendelkezésre álló tájékoztatások felhasználását jelenti, amelyek a légiforgalmi tájékoztató szolgálatok által kiadott hivatalos közleményekből vagy más forrásokból származnak.

2.1.2 A járató biztosítsa, hogy az üzemeltetés során tapasztalt bármilyen működési rendellenességet indokolatlan késedelem nélkül jelentsék be a létesítmény üzemeltetéséért felelős hatóságnak.

2.2 Üzemeltetési engedélyek és ellenőrzés

2.2.1 Légijármű üzembentartási engedély

2.2.1.1 A járató kereskedelmi légiszállítási tevékenységet csak akkor végezhet, ha érvényes légijármű üzembentartási engedély van a birtokában, amelyet a járató állama bocsátott ki.

2.2.1.2 A légijármű üzembentartási engedély a meghatározott feltételek és korlátozások betartása mellett feljogosítja a járatót a kereskedelmi légiszállítási tevékenység végzésére.

Megjegyzés – a légijármű üzembentartási engedélyre vonatkozó útmutatót és a kapcsolódó felhatalmazásokat, feltételeket és korlátozásokat, melyeket az üzemeltetői specifikáció tartalmazhat, az Üzemeltetési Ellenőrzés, Jogosítás és Folyamatos Felülvizsgálat Kézikönyve (Doc 8335) tartalmazza.

2.2.1.3 A szerződő államok egy másik szerződő állam által kiadott légijármű üzembentartási engedélyt érvényesnek fogadhatnak el, feltételezve azt, hogy az engedély kiadásául szolgáló követelmények legalább azonosak a jelen Annexben meghatározott vonatkozó előírásokkal.

2.2.1.4 A légijármű üzembentartási engedély kibocsátása a járató állama részéről annak függvénye, hogy a járató a meghatározott üzemeltetés természetétől és nagyságrendjétől függően és figyelembevételével bizonyságot tesz a repülési tevékenység megfelelő szervezéséről, ellenőrzési módszereiről és átfogó irányításáról valamint a kiképzési és karbantartási programjairól.

Megjegyzés: A légijármű üzembentartási engedély kiadásával kapcsolatos tájékoztatás a 6. Annex I. rész F. Függelékben található.

2.2.1.5 A légijármű üzembentartási engedély vagy más ezzel egyenértékű dokumentum folyamatos érvényessége attól függ, hogy a járató a járató államának ellenőrzése alatt eleget tesz a 2.2.1.4 pont előírásának.

2.2.1.6 A légijármű üzembentartási engedély vagy más ezzel egyenértékű dokumentum legalább a következőket tartalmazza:

a) a járató megnevezése (cégnév vagy azonosító, székhelye);

b) a kiadás időpontja és az érvényesség időtartama;

c) az engedélyezett tevékenység típusok ismertetése;

d) a használatra engedélyezett légijármű típus(ok); és

e) üzemeltetésre engedélyezett területek vagy repülési útvonalak.

2.2.1.7 A járató állama az 1. Függelékkel öszhangban, dolgozzon ki és alkalmazzon járató üzemeltetés engedélyezési és folyamatos minőség ellenőrzési rendszert, mellyel biztosítja a 2.2 pontban található, a légijármű üzemeltetés színvonalára vonatkozó előírások betartását.

2.2.2 Üzemeltetési kézikönyv

2.2.2.1 A járató a H. Melléklet előírásaival összhangban, az érintett üzemeltető személyzet részére felhasználásra valamint tájékoztatásra biztosítson üzemeltetési kézikönyvet, amelyet szükség szerint módosítsanak és egészítsenek ki, hogy az mindig naprakész legyen. Minden ilyen kiegészítést és módosítást adjanak ki a kézikönyv használatára kötelezett összes személynek.

2.2.2.2 A járató állama írja elő, hogy az üzemeltetési kézikönyv egy példányát és az összes kiegészítést és/vagy módosítást ellenőrzésre, felülvizsgálatra, valamint amikor szükséges jóváhagyásra adja át a járató államának. A járató az üzemeltetési kézikönyvbe vegye fel azokat a további kötelező anyagokat, amelyeket a járató állama erre előírhat.

1. Megjegyzés: Az üzemeltetési kézikönyv tartalmára és szerkesztési elveire vonatkozó előírásokat az H. Melléklet tartalmazza.

2. Megjegyzés: Az üzemeltetési kézikönyvben szereplő egyes meghatározott tételekhez a 2.2.7, 4.1.3, 7.3.1 és 10.3 pontok előírásai alapján a járató államának jóváhagyása szükséges.

2.2.3 Üzemeltetési utasítások – Általános rész

2.2.3.1 A járató biztosítsa, hogy az üzemeltetésben résztvevő valamennyi dolgozója saját feladatairól, felelősségéről valamint a feladatainak a járató egész tevékenységében elfoglalt helyéről megfelelő oktatásban részesüljön.

2.2.3.2 A forgószárnyas légijármű forgószárnyát hajtómű segítségével csak akkor szabad megforgatni, ha a kormányoknál szakszolgálati engedéllyel rendelkező légijármű-vezető foglal helyet. A járató biztosítson megfelelő speciális képzést és folyamat leírást mindazon, a minősített légjármű vezető jogosítás nélküli személyek számára, akik repülési szándék nélkül végrehajthatják a forgószárnyak hajtómű segítségével való megforgatását.

2.2.3.3 ***Ajánlás*** *– A járató adjon ki üzemeltetési utasításokat és biztosítson tájékoztatásokat a forgószárnyas légijármű összes működő hajtóművel történő emelkedési képességéről, hogy ezzel a légijármű parancsnoka a meglevő felszállási körülmények és a tervezett felszállási módszer (repülés-technika) alapján meghatározhassa a felszállási és kezdeti emelkedési szakaszban elérhető emelkedés mértékét. Ez a tájékoztatás a forgószárnyas légijármű gyártója által kiadott vagy a járató állama által elfogadható egyéb adatokon alapuljanak és ezt a tájékoztatást vegyék fel az üzemeltetési kézikönyvbe.*

2.2.4 Vészhelyzet repülés közben történő gyakorlása

A járató biztosítsa, hogy amikor utasokat vagy teherárut szállítanak, a repülés közben vészhelyzeti vagy a rendes üzemeléstől eltérő gyakorlást illetve szimulációt ne végezzenek.

2.2.5 Ellenőrző jegyzékek

A hajózószemélyzet a forgószárnyas légijármű üzemeltetésének minden szakasza előtt, alatt és után továbbá vészhelyzetben alkalmazza a 4.1.4 pont előírása alapján elkészített és kiadott ellenőrző jegyzékeket annak biztosítására, hogy végrehajtották a légijármű üzemeltetési kézikönyvében, repülés-végrehajtási kézikönyvében vagy más, a légialkalmassági bizonyítvánnyal kapcsolatos egyéb dokumentumban valamint üzemeltetési tájékoztató kiadványokban található üzemeltetési eljárásokat. Az ellenőrző jegyzékek összeállítása és felhasználása alkalmával vegyék figyelembe az emberi tényezők alapelveit.

Megjegyzés: Az Emberi Tényezők alapelveinek alkalmazására vonatkozó útmutató az Emberi Tényezők Kiképzési Kézikönyv*-ében (Doc 9683) található.*

2.2.6 Legalacsonyabb repülési magasságok

2.2.6.1 A járató jogosult arra, hogy kijelölje a legalacsonyabb repülési magasságokat azokon a repülési útvonalakon, amelyekre az átrepült útvonal állama vagy az útvonalért felelős állam is kijelölt ilyen magasságokat, feltéve, hogy ezek nem alacsonyabbak, mint amelyeket az állam határozott meg. A fentieknél alacsonyabb magasság esetében külön eseti jóváhagyás szükséges.

2.2.6.2 A járató határozza meg és az üzemeltetési kézikönyvben tegye közzé azt a módszert, amely szerint meghatározni kívánja a legalacsonyabb repülési magasságokat azokra a repülési útvonalakra, amelyekre az átrepült útvonal állama vagy az útvonalért felelős állam nem jelölt ki ilyen magasságokat. A fenti módszer alapján megállapított legalacsonyabb repülési magasságok ne legyenek alacsonyabbak, mint a 2. Annex-ben meghatározott értékek.

2.2.6.3 ***Ajánlás*** *– A legalacsonyabb repülési magasságok meghatározásának módszerét a járató állama hagyja jóvá.*

2.2.6.4 ***Ajánlás*** *– A járató állama ezeket a legalacsonyabb repülési magasságokat kellő megfontolás után, a következő tényezők az üzemeltetés biztonságát valószínűleg befolyásoló hatásainak figyelembevételével hagyja jóvá:*

a) a pontosság és megbízhatóság, amellyel a forgószárnyas légijármű helyzete meghatározható;

b) a felhasznált magasságmérő berendezések jelzéseinek pontatlansága;

c) a földfelszín jellemzői (például a tengerszint feletti magasság hirtelen megváltozásai);

d) kedvezőtlen időjárási körülmények előfordulásainak valószínűsége (például erős turbulencia és leszálló légáramlatok);

e) a léginavigációs térképek lehetséges pontatlanságai; és

f) légtér korlátozások.

2.2.7 Helikopter repülőtér üzemeltetési minimum

2.2.7.1 A járató állama írja elő, hogy a járató határozzon meg helikopter repülőtér üzemeltetési minimumot minden olyan egyes helikopter repülőtérre, amelyet használni kíván, és a minimum meghatározásának módszerét a járató állama hagyja jóvá. Az ilyen minimum ne legyen alacsonyabb, mint amelyet a helikopter repülőtérre azon állam ír elő, amelyben a helikopter repülőtér elhelyezkedik, kivéve ha erre az érintett állam külön engedélyt ad.

Megjegyzés: Ez az előírás nem követeli meg attól az államtól, amelyben a helikopter repülőtér elhelyezkedik, hogy helikopter repülőtér üzemeltetési minimumot határozzon meg.

2.2.7.2 A járató állama írja elő, hogy a bármely üzemeltetési módra vonatkozó helikopter repülőtér üzemeltetési minimum meghatározásánál a következőket teljes mértékben vegyék figyelembe:

a) a forgószárnyas légijármű típusa, teljesítménye és kiszolgálási jellemzői;

b) a hajózószemélyzet összetétele, szakmai alkalmassága és tapasztalata;

c) a meghatározott és közzétett távolságok;

d) a rendelkezésre álló látás utáni és nem-látás utáni földi segédeszközök pontossága és jellemzői;

e) a forgószárnyas légijárművön a navigációhoz és/vagy a leszálláshoz történő megközelítés és a megszakított megközelítés repülési pályájának irányításához rendelkezésre álló berendezések;

f) a megközelítési és a megszakított megközelítési területeken elhelyezkedő akadályok, valamint a műszeres megközelítési eljárásokhoz meghatározott akadálymentes tengerszint és földfelszín feletti magasságok;

g) az időjárási körülmények felderítésére, meghatározására és jelentésére alkalmazott módszerek; és

h) a kezdeti emelkedési területeken levő akadályok és a szükséges biztonsági elkülönítés értékei.

2.2.7.3 II. és III. kategóriás műszeres megközelítést és leszállást csak akkor engedélyezzenek, ha futópályamenti látástávolság érték (RVR) tájékoztatás áll rendelkezésre.

2.2.7.4 **Ajánlás** – *A műszeres megközelítés és leszállás végrehajtására 800 méter látástávolság alatti helikopter repülőtéri üzemeltetési minimumot csak akkor engedélyezzenek, ha futópályamenti látástávolság érték (RVR) tájékoztatás, vagy pontosan mért illetve észlelt látástávolság érték áll rendelkezésre.*

Megjegyzés: a mérés és a megfigyelés repülés végrehajtása szempontjából kívánatos és jelenleg biztosítható pontosságára vonatkozó útmutató a 3. Annex, B. mellékletében található.

2.2.8 Tüzelőanyag és olaj nyilvántartás

2.2.8.1 A járató vezessen tüzelőanyag és olaj nyilvántartást annak érdekében, hogy a járató állama számára bizonyíthassa, hogy minden egyes repülés esetében eleget tettek a 2.3.6 pont előírásainak.

2.2.8.2 A tüzelőanyag és olaj nyilvántartást a járató három hónapig őrizze meg.

2.2.9 Személyzet

2.2.9.1 *Légijármű parancsnok* – A járató minden egyes járatra jelöljön ki egy légijármű-vezetőt, aki a parancsnoki feladatokat látja el.

2.2.9.2 *Repülési idő, repülési szolgálati időtartam és pihenőidő* – A járató dolgozzon ki szabályokat és előírásokat a repülési idő és a repülési szolgálati időtartam korlátozására, továbbá a megfelelő pihenőidő biztosítására a személyzet minden tagja számára. Ezeket a szabályokat a járató állama által meghatározott, vagy jóváhagyott előírásokkal összhangban dolgozzák ki és vegyék fel az üzemeltetési kézikönyvbe.

2.2.9.3 A járató rendszeresen tartsa nyilván a személyzet minden tagjának repülési idejét, repülési szolgálati, valamint pihenő idejét is.

Megjegyzés: A korlátozások kidolgozásával kapcsolatos útmutató a C. Mellékletben található.

2.2.10 Utasok

2.2.10.1 A járató biztosítsa, hogy az utasokkal megismertessék a következő eszközök elhelyezkedését és használatát:

a) biztonsági övek;

b) vészkijáratok;

c) mentőmellények, amennyiben ezek szállítását előírták;

d) oxigén légzőkészülék, amennyiben az utasok részére az oxigén szállítását előírták; és

e) más, egyéni használatra rendszeresített mentőfelszerelések, beleértve az utastájékoztató kiadványokat is.

2.2.10.2 A járató tájékoztassa az utasokat a közös használatra rendszeresített alapvető mentőfelszerelések elhelyezkedéséről és általános használatáról.

2.2.10.3 A repülés során bekövetkező vészhelyzetekben az utasokat a körülményeknek megfelelő vészhelyzeti tevékenységre utasítsák.

2.2.10.4 A járató biztosítsa, hogy a fel és leszállás során valamint bármikor, amikor a repülés alkalmával turbulencia, vagy bármely vészhelyzet következik be és ezt az óvintézkedést szükségesnek ítélik, a forgószárnyas légijármű fedélzetén tartózkodó valamennyi utas a rendelkezésre álló biztonsági övvel, vagy hevederrel az ülésbe legyen kötve.

2.2.11 Vízfelszín feletti repülések

A 4.5.1 pont előírásai alapján a vízfelület felett, kedvezőtlen időjárási körülmények között repülést végrehajtó összes forgószárnyas légijármű jogosítva legyen a vízfelszínre történő kényszerleszállásra, azaz vízreszállásra. A vonatkozó tájékoztatás szerves részét képezze a vízfelszín (tenger) jellemzőinek ismertetése.

2.3 Repülés előkészítés

2.3.1 A repülési feladat végrehajtását ne kezdjék meg mindaddig, amíg nem töltötték ki a repülés előkészítési nyomtatványokat annak bizonyítására, hogy a légijármű parancsnoka meggyőződött az alábbiakról:

a) a forgószárnyas légijármű repülésre alkalmas;

b) a 4. fejezetben az adott repülési feladat végrehajtására előírt műszerek és berendezések felszerelésre kerültek, megfelelőek és üzemképesek;

c) a forgószárnyas légijármű karbantartási nyilatkozatát a 6.7 pontban előírtak szerint kiállították;

d) a forgószárnyas légijármű tömege, valamint súlypont-helyzete a várható repülési körülmények figyelembevételével olyan, hogy a repülési feladat biztonságosan végrehajtható;

e) bármely szállítmányt megfelelő módon elhelyeztek és biztonságosan rögzítettek;

f) ellenőrízték, hogy a 3. fejezetben található üzemeltetési korlátozások az adott repülés vonatkozásában betarthatók; és

g) eleget tettek a 2.3.3 szakaszban található üzemeltetési repülés tervezési előírásoknak.

Megjegyzés: A repülési sorozat olyan egymást követő repüléseket jelent, amelyek

a) egy 24 órás időszakon belül kezdődnek és fejeződnek be; és

b) és mindegyiket ugyanaz a légijármű parancsnok hajtja végre.

2.3.2 A kitöltött repülés előkészítési nyomtatványokat a járató három hónapig őrízze meg.

2.3.3 Üzemeltetési repülés tervezés

2.3.3.1 Minden tervezett repüléshez, vagy repülési sorozathoz készítsenek üzemeltetési repülési tervet. Az üzemeltetési repülési tervet a légijármű parancsnoka, fogadja el és írja alá. Az üzemeltetési repülési tervet hagyják az illetékes hatóságnál. A járató határozza meg az üzemeltetési repülési terv elhelyezésének legalkalmasabb módját.

2.3.3.2 Az üzemeltetési kézikönyvben ismertetni kell az üzemeltetési repülési terv tartalmát és használatát.

2.3.4 Kitérő helikopter repülőterek

2.3.4.1 *Felszállási kitérő helikopter repülőtér*

2.3.4.1.1 Az üzemeltetési repülési tervekben határozzanak meg egy felszállási kitérő helikopter repülőteret, amennyiben az indulási helikopter repülőtéren az időjárási feltételek az adott repülőtérre elfogadott üzemeltetési minimumnak vagy a minimum alatti értékeknek felelnek meg.

2.3.4.1.2 A felszállás céljára kiválasztott kitérő helikopter repülőtérre vonatkozó tájékoztatás jelezze azt, hogy a tervezett felhasználási időpontban az időjárási feltételek az adott helikopter repülőtérre elfogadott üzemeltetési minimumnak vagy a minimum feletti értékeknek fognak megfelelni.

2.3.4.2 *Érkezési kitérő helikopter repülőtér*

2.3.4.2.1 A műszerrepülési szabályok szerint tervezett repülés esetében az üzemeltetési valamint a légiforgalmi szolgálatoknak benyújtott repülési tervekben határozzanak meg legalább egy alkalmas kitérő helikopter repülőteret vagy leszállási helyet, kivéve ha:

a) a repülés időtartama és az uralkodó időjárási körülmények olyanok, hogy nagy valószínűséggel feltételezhető, hogy a tervezett leszállási helikopter repülőtéren az érkezés számított időpontjában valamint ezt megelőzően és ezt követően ésszerű idő-határokon belül a megközelítés és a leszállás a járató állama előírása alapján látás utáni időjárási körülmények között végrehajtható lesz; vagy

b) a tervezett leszállási helikopter repülőtér elszigetelt fekvésű és alkalmas kitérő nem áll rendelkezésre. Határozzák meg azt a pontot (PNR), amelyen túl a visszafordulás már nem lehetséges.

2.3.4.2.2 Az érkezés céljára kiválasztott kitérő helikopter repülőtérre vonatkozó tájékoztatás jelezze azt, hogy a tervezett felhasználási időpontban az időjárási feltételek az adott helikopter repülőtérre elfogadott üzemeltetési minimumnak vagy a minimum feletti értékeknek fognak megfelelni.

2.3.4.2.3 **Ajánlás** – *Azon induló járatoknál, amelyek érkezési repülőterén az előrejelzések szerint a feltételek az üzemeltetési minimum alatt lesznek, két érkezési kitérő repülőteret válasszanak ki. Az első érkezési kitérő repülőtér minimuma legyen azonos vagy magasabb, mint a célrepülőtér üzemelési minimuma és a második érkezési kitérő repülőtér minimuma legyen azonos vagy magasabb mint a kitérő repülőtér üzemelési minimuma*

2.3.4.3 Az alkalmas, parttól távoli (vízfelszíni) kitérő helikopter repülőtereket vagy leszállási helyeket a következők alapján határozhatják meg:

a) a parttól távoli kitérőket csak azon pont átrepülése után használják, amely után a visszafordulás nem lehetséges (PNR). Ezen pont előtt a szárazföldi kitérőket vegyék igénybe;

b) a kitérő meghatározásánál vizsgálják meg és vegyék figyelembe a kritikus repülésvezérlő rendszerek, valamint egyéb lényeges részegységek (mechanikai) műszaki megbízhatóságát;

c) a kitérőre történő érkezés előtt határozzák meg és vegyék figyelembe a forgószárnyas légijármű egy működésképtelen hajtóművel történő üzemi teljesítményét;

d) a leszállási hely biztosan rendelkezésre áll;

e) az időjárási tájékoztatások minden körülmények között pontosak és megbízhatóak legyenek.

Megjegyzés: A repülésvégrehajtási kézikönyvben a repülésvezérlő rendszerek meghibásodása esetére meghatározott leszállási módszerek kizárhatják egyes leszállási helyek kitérőként történő igénybevételét.

2.3.4.4 ***Ajánlás*** – *Amennyiben a szárazföldi kitérő helikopter repülőtér vagy leszállási hely eléréséhez szükséges tüzelőanyag mennyiség szállítása lehetséges, parttól távoli (vízfelszíni) kitérőket ne vegyenek igénybe. A parttól távoli (vízfelszíni) kitérőket ne vegyék igénybe kedvezőtlen időjárási körülmények között.*

2.3.5 Időjárási körülmények

2.3.5.1 A látvarepülési szabályok szerint tervezett repülés végrehajtását ne kezdjék meg csak akkor, ha az érvényes időjárás-jelentések vagy az érvényes időjárás-jelentések és előrejelzések kombinációja azt jelzik, hogy az útvonalon vagy annak látvarepülési szabályok szerint tervezett repülési szakaszán a megfelelő időben az uralkodó időjárási körülmények olyanok lesznek, hogy a látás után történő repülésvégrehajtás szabályai (VFR) betarthatók lesznek.

Megjegyzés: Amikor a repülést a látvarepülési szabályok szerint hajtják végre, az éjjel-látó megjelenítő készülék (NVIS) vagy egyéb a látást javító rendszerek használata nem csökkenti a 2.3.5.1 pontban előírt követelmények teljesítésének szükségességét.

2.3.5.2 A műszerrepülési szabályok szerint tervezett repülés végrehajtását ne kezdjék meg csak akkor, ha a rendelkezésre álló tájékoztatások szerint az érkezés várható időpontjában a tervezett leszállási helikopter repülőtéren, vagy ahol kitérő meghatározása is szükséges, legalább egy ilyen helikopter repülőtéren az uralkodó (időjárási) körülmények helikopter repülőtér üzemeltetési minimumnak megfelelőek vagy annál jobbak lesznek.

Megjegyzés: Néhány állam gyakorlata szerint a repülés tervezési célokra magasabb minimumokat jelölnek meg arra az esetre, ha a helikopter repülőteret kitérőként választják szemben azzal, ha a helikopter repülőtér a tervezett leszállás helye.

2.3.5.3 Ismert vagy várható jegesedés körülményei között a repülést ne kezdjék meg, csak akkor, ha a forgószárnyas légijármű ilyen körülmények közötti üzemelésre van jogosítva és felszerelve.

2.3.5.4 Ismert vagy várható földi jegesedés körülményei között történő üzemelésre tervezett repülés ne szálljon fel mindaddig, amíg a forgószárnyas légijárművet jegesedés szempontjából nem vizsgálták felül és nem végezték el a megfelelő jégtelenítést vagy jégmentesítést. A jeget vagy más természetes szennyező anyagot úgy távolítsák el a forgószárnyas légijárműről, hogy az még közvetlenül a felszállás előtt is repülésre alkalmas állapotban legyen.

Megjegyzés: A fentiekre vonatkozó tájékoztatót a Légijármű földi jégtelenítés végrehajtása kézikönyv *(Doc 9640) tartalmazza.*

2.3.6 Tüzelőanyag (üzemanyag) és olajkészlet

2.3.6.1 *Minden forgószárnyas légijármű esetében* — A repülés végrehajtását ne kezdjék meg csak akkor, ha az időjárási körülmények valamint a repülés során várható bármely késés figyelembevételével a forgószárnyas légijármű elegendő tüzelőanyagot és olajt szállít ahhoz, hogy a repülést biztonságosan be tudja fejezni. Ezen kívül az előre nem látható eseményekre való tekintettel szállítsanak tüzelőanyag és olaj tartalékot is.

2.3.6.2 *Látvarepülési szabályok szerinti (VFR) üzemeltetés* — A 2.3.6.1 pont előírásának megfelelően szállított tüzelőanyag és olaj mennyisége a látvarepülési szabályok szerint történő üzemeltetés esetében legalább annyi legyen, ami lehetővé teszi, hogy a forgószárnyas légijármű:

a) elrepüljön arra a helikopter repülőtérre, amelyre a repülést tervezték;

b) ezt követően a legoptimálisabb utazósebességgel 20 percig valamint a tervezett repülési idő további 10 %-áig repüljön; és

c) a forgószárnyas légijármű ezen felül rendelkezzen annyi tüzelőanyaggal, amely fedezi a járató által meghatározott és a járató állama által jóváhagyott, előre nem látható esetekben bekövetkező fogyasztás növekedés mennyiségét.

2.3.6.3 *Műszerrepülési szabályok szerinti (IFR) üzemeltetés* — A 2.3.6.1 pont előírásának megfelelően szállított tüzelőanyag és olaj mennyisége a műszerrepülési szabályok szerint történő üzemeltetés esetében legalább annyi legyen, ami lehetővé teszi, hogy a forgószárnyas légijármű:

2.3.6.3.1 Ha a 2.3.4.2.1 a) előírása alapján kitérő kijelölése nem szükséges, elrepüljön arra a helikopter repülőtérre, amelyre a repülést tervezték és ezt követően;

a) a célállomás helikopter repülőtér felett 450 méter (1500 láb) magasságon, szabványos hőmérsékleti viszonyok között, a várakozásra előírt sebességgel 30 percet repüljön valamint megközelítést és leszállást hajtson végre; és

b) a forgószárnyas légijármű ezen felül rendelkezzen annyi tüzelőanyaggal, amely fedezi a járató által meghatározott és a járató állama által jóváhagyott, előre nem látható esetekben bekövetkező fogyasztás növekedés mennyiségét.

2.3.6.3.2 Ha kitérő kijelölése szükséges, elrepüljön arra a helikopter repülőtérre, amelyre a repülést tervezték, ott megközelítést és egy megszakított megközelítést hajtson végre majd ezt követően;

a) elrepüljön a repülési tervben meghatározott kitérő helikopter repülőtérre vagy leszállási helyre; és ott

b) a kitérő felett 450 méter (1500 láb) magasságon, szabványos hőmérsékleti viszonyok között, a várakozásra előírt sebességgel 30 percet repüljön valamint megközelítést és leszállást hajtson végre; és

c) a forgószárnyas légijármű ezen felül rendelkezzen annyi tüzelőanyaggal, amely fedezi a járató által meghatározott és a járató állama által jóváhagyott, előre nem látható esetekben bekövetkező fogyasztás növekedés mennyiségét.

2.3.6.3.3 Ha a 2.3.4.2.1 b) előírása alapján alkalmas kitérő nem áll rendelkezésre, (pl. a célállomás elszigetelt), akkor megfelelő mennyiségű tüzelőanyagot kell szállítani, amely lehetővé teszi a tervezett célállomásig történő elrepülést, és ezután még annyi időtartamra elegendő, amely a földrajzi és az időjárási feltételek figyelembevételével elégséges a biztonságos leszállás végrehajtásához.

2.3.6.4 A 2.3.6.1 pontban előírt szükséges tüzelőanyag és olaj készlet mennyiségének kiszámításánál legalább következő tényezőket vegyék figyelembe:

a) előrejelzett időjárási körülmények;

b) várható légiforgalmi irányítói engedélyek és útvonalak valamint forgalmi késések;

c) a műszerrepülési szabályok (IFR) szerint végrehajtott repülés esetében egy műszeres megközelítés végrehajtása a célállomás helikopter repülőtéren, beleértve egy megszakított megközelítést is;

d) az üzemeltetési kézikönyvben a repülés végrehajtása alatt bekövetkező egy hajtómű meghibásodása valamint — amennyiben alkalmazható — a túlnyomásos kabin dehermetizálódás esetére előírt eljárások; és

e) minden egyéb olyan körülmény, amely a forgószárnyas légijármű leszállását késleltetheti vagy a tüzelőanyag és/vagy olajfogyasztást növelheti.

Megjegyzés: A 2.3.6 pontban ismertetett tényezők nem korlátozzák a repülési terv repülés közben történő módosításának lehetőségét és a repülés áttervezését egy másik helikopter repülőtérre, feltéve hogy a 2.3.6 pont előírásai teljesíthetők attól a ponttól kezdődően is, ahol a repülés áttervezése megtörtént.

2.3.7 Tüzelőanyag-feltöltés utasokkal a fedélzeten, vagy a forgószárny forgása közben

***Ajánlás** — A forgószárnyas légijárművön ne végezzenek tüzelőanyag feltöltést akkor, amikor az utasok beszállnak, kiszállnak vagy a forgószárnyas légijármű fedélzetén tartózkodnak illetve ha a forgószárny mozgásban van, kivéve ha a járató a járató állama részéről megfelelő egyedi engedéllyel rendelkezik, amelyben meghatározzák azokat a feltételeket, amelyek betartásával a tüzelőanyag feltöltés ilyen esetekben is elvégezhető.*

1. Megjegyzés: A légijármű tüzelőanyag feltöltésére vonatkozó előírások a 14. Annex I. Kötetében, a biztonságos tüzelőanyag feltöltési módszerekkel kapcsolatos útmutató pedig a Repülőtér Kiszolgálási Kézikönyv *(Doc 9137) 1. illetve 8. Részeiben található.*

2. Megjegyzés: Amikor a forgószárnyas légijármű tüzelőanyaggal történő feltöltését nem kerozinnal végzik, a feltöltés alkalmával a kerozin más gázturbina hajtóanyagokkal keveredik, vagy nyílt töltővezetéket alkalmaznak, további elővigyázatossági rendszabályokra van szükség.

2.3.8 Oxigén készlet

Megjegyzés: A szövegben alkalmazott abszolút légnyomás értékeknek megfelelő, a nemzetközi műlégkör alapján meghatározott megközelítő magasságok a következők:

Abszolút légnyomás	magasság — méter	magasság — láb
700 hPa	3000	10 000
620 hPa	4000	13 000
376 hPa	7600	25 000

2.3.8.1 Olyan repülési magasságon végrehajtandó repülés esetén, amelyen a személyek részére rendszeresített kabin(ok)ban a légnyomás 700 hPa értéknél alacsonyabb lesz, a repülést ne kezdjék meg csak akkor, ha elegendő mennyiségű belélegzésre alkalmas oxigént biztosítottak, amely ellátja:

a) a személyzet minden tagját valamint az utasok 10 %-át 30 percet meghaladó bármely olyan időtartamra, amely alatt az általuk elfoglalt kabinban a légnyomás 700 hPa és 620 hPa érték között van; és

b) a személyzet tagjait valamint az utasokat bármely olyan időtartamra, amely alatt az általuk elfoglalt kabinban a légnyomás 620 hPa értéknél alacsonyabb.

2.3.8.2 A túlnyomásos kabinnal rendelkező forgószárnyas légijármű esetében a repülés végrehajtását ne kezdjék meg csak akkor, ha elegendő mennyiségű belélegzésre alkalmas oxigént biztosítottak, amely a túlnyomás megszűnése esetén, a repülés körülményeinek megfelelően ellátja a személyzet összes tagját valamint az utasokat bármely olyan időtartamra, amely alatt az általuk elfoglalt kabinban a légnyomás 700 hPa értéknél alacsonyabb. Ezen kívül, ha a forgószárnyas légijárművet olyan repülési magasságon üzemeltetik, amelyen az atmoszférikus légnyomás értéke 376 hPa-nál alacsonyabb és a forgószárnyas légijárművel négy percen belül nem lehet biztonságosan olyan magasságra süllyedni, amelyen az atmoszférikus légnyomás értéke 620 hPa-nak felel meg, az utaskabinban tartózkodó személyek részére legalább tíz percre elegendő oxigén készletet biztosítsanak.

2.4 Repülés végrehajtási eljárások – repülés közben

2.4.1 Helikopter repülőtér üzemeltetési minimum

2.4.1.1 A repülést ne folytassák a tervezett leszállási helikopter repülőtér felé csak abban az esetben, ha a rendelkezésre álló legújabb tájékoztatások azt jelzik, hogy az érkezés várható időpontjában az adott vagy legalább egy kitérő helikopter repülőtéren a leszállás a 2.2.7.1 pont előírásai szerint meghatározott üzemeltetési minimum mellett végrehajtható.

2.4.1.2 A műszeres megközelítést precíziós megközelítés esetében ne folytassák a külső jeladó (OM) navigációs ponton túl vagy nem precíziós megközelítés esetében a helikopter repülőtér feletti 300 méter (1000 láb) magasság alatt kivéve, ha a jelentett látástávolság vagy a meghatározó futópályamenti látástávolság érték (RVR) a megállapított minimum felett van.

2.4.1.3 Amennyiben precíziós megközelítés esetében a külső jeladó (OM) navigációs pont átrepülése után vagy nem precíziós megközelítés esetében a repülőtér feletti 300 méter (1000 láb) magasság alá történő süllyedésnél a jelentett látástávolság vagy a meghatározó futópályamenti látástávolság érték a megállapított minimum alá csökken, a megközelítés az elhatározási vagy a legalacsonyabb süllyedési magasságig folytatható. A forgószárnyas légijármű semmi esetre se folytassa a leszálláshoz történő megközelítését bármely helikopter repülőtérre azon a meghatározott ponton túl, amely után az arra megállapított helikopter repülőtér üzemeltetési minimum értéket megsértené.

2.4.2 Időjárási megfigyelések

Megjegyzés: A repülés végrehajtása során a forgószárnyas légijármű fedélzetén történő időjárás megfigyelés, észlelés, feljegyzés valamint jelentés eljárásait a 3. Annex, a PANS-ATM (Doc 4444) és a megfelelő Körzeti Kiegészítő Eljárások *(Doc 7030) tartalmazzák.*

2.4.3 Repülésre veszélyes körülmények

A repülésre veszélyes, az időjárási viszonyokkal kapcsolatostól eltérő, a repülés végrehajtása során tapasztalt egyéb körülményeket a lehető legrövidebb időn belül jelentsék az illetékes légiforgalmi állomásnak. A jelentések tartalmazzák a más légijárművek biztonságával kapcsolatos vagy kapcsolatba hozható részleteket is.

2.4.4 A hajózószemélyzet tagjai szolgálati helyeiken

2.4.4.1 *Fel és leszállás* — A pilótakabinban szolgálatra kijelölt valamennyi hajózószemélyzeti tag tartózkodjon szolgálati helyén.

2.4.4.2 *Útvonalon* — A pilótakabinban szolgálatra kijelölt valamennyi hajózószemélyzeti tag tartózkodjon szolgálati helyén, kivéve, ha távolléte a forgószárnyas légijármű üzemeltetésével kapcsolatos feladatok elvégzése vagy fiziológiai okok miatt szükséges.

2.4.4.3 *Biztonsági övek* — A hajózószemélyzet valamennyi tagja szolgálati helyén tartsa biztonsági övét becsatolva.

2.4.4.4 *Vállhevederekkel ellátott biztonsági övek* — A fel és leszállási szakaszokban a hajózószemélyzet valamennyi légijármű-vezetői ülést elfoglaló tagja vállhevederrel ellátott biztonsági övét tartsa becsatolva; a hajózószemélyzet többi tagja a fel és leszállási szakaszokban vállhevederrel ellátott biztonsági övét tartsa becsatolva, kivéve, ha a vállhevederek akadályozzák őket feladataik végrehajtásában, amely esetben a vállhevedereket kikapcsolhatják, azonban a biztonsági öveket bekapcsolva kell tartaniuk.

Megjegyzés: A vállhevederekkel ellátott biztonsági öv egymástól függetlenül használható vállhevederekből és biztonsági övből áll.

2.4.5 Oxigén használat

A forgószárnyas légijármű repülése alatt, annak biztonságos üzemeltetéséhez nélkülözhetetlen feladatokat ellátó összes hajózószemélyzeti tagja folyamatosan használja az oxigén légzőkészüléket, amikor ezt az uralkodó körülmények a 2.3.8.1 vagy 2.3.8.2 pontok előírásai alapján szükségessé teszik.

2.4.6 A túlnyomásos kabinnal felszerelt forgószárnyas légijármű utaskabin személyzetének és utasainak védelme dehermetizáció – a túlnyomás megszűnése - esetén

***Ajánlás** — Az utaskabin személyzeti tagok biztonságát úgy védelmezzék, hogy azok az esetleges túlnyomás megszűnése esetében szükségessé váló vészsüllyedés alkalmával eszméletüket nagy valószínűséggel ne veszítsék el továbbá képesek maradjanak arra, hogy a vészhelyzetet követő stabilizált repülés folyamán az utasokat elsősegélyben részesítsék. Az utasok biztonságát olyan eszközökkel, berendezésekkel vagy* *üzemeltetési eljárásokkal védelmezzék, amelyek nagy valószínűséggel biztosítják, hogy a túlnyomás megszűnése miatt fellépő oxigénhiány hatásait túlélik.*

Megjegyzés: Nem lehet előre meghatározni vagy feltételezni, hogy az utaskabin személyzet a túlnyomás megszűnése esetén szükségessé váló vészsüllyedés alkalmával mindig képes lesz segítséget nyújtani az utasoknak.

2.4.7 Műszerrepülési eljárások

2.4.7.1 Az az állam, amelynek területén a helikopter repülőtér elhelyezkedik, vagy ha egy állam területén kívül levő helikopter repülőtérről van szó, az az állam, amely a létesítményért felelős, a műszerrepülési szabályok szerint igénybe vett minden egyes végső megközelítési és felszállási területre vagy helikopter repülőtérre hagyjon jóvá és tegyen közzé egy vagy több műszeres megközelítési eljárást.

2.4.7.2 A műszerrepülési szabályok szerint üzemelő összes forgószárnyas légijármű hajtsa végre azokat a műszeres megközelítési eljárásokat, amelyeket az az állam hagyott jóvá, amelynek területén a helikopter repülőtér elhelyezkedik, vagy ha egy állam területén kívül levő helikopter repülőtérről van szó az, amely a létesítményért felelős.

1. Megjegyzés: A műszerrepülési eljárásokban érintett személyek részére ajánlott üzemeltetési eljárások a PANS OPS (Doc 8168) I. kötetében találhatók.

2. Megjegyzés: A műszerrepülési eljárások követelményeire vonatkozó útmutatás az eljárások kidolgozásában résztvevő szakértők részére a PANS-OPS (Doc 8168) II. kötetében található.

2.4.8 Forgószárnyas légijármű zajcsökkentő eljárások

***Ajánlás** — A járató tegye lehetővé, hogy a fel és leszállások végrehajtása során a zajcsökkentés követelményei betartásra kerüljenek.*

2.5 A légijármű parancsnok kötelmei

2.5.1 A légijármű parancsnoka felelős a forgószárnyas légijármű fedélzeten tartózkodó összes személyzeti tag, utas és az elhelyezett teheráru biztonságáért. A parancsnok felelős továbbá a forgószárnyas légijármű üzemeltetéséért és biztonságáért attól a pillanattól kezdve, amikor a hajtóműve(ke)t beindítják addig, mikor a forgószárnyas légijármű a repülés után végleg megáll, a hajtómű egysége(ke)t leállítják és a forgószárny megáll.

2.5.2 A légijármű parancsnoka biztosítsa, hogy pontosan és részletesen betartsák a repülési ellenőrző jegyzékekre vonatkozó, a 2.2.5 pontban ismertetett előírást.

2.5.3 A légijármű parancsnoka felelős a legközelebbi illetékes hatóság lehető leggyorsabb értesítéséért a forgószárnyas légijárművet érintő bármely olyan balesetről, amelynek következménye bármely személy súlyos vagy halálos sérülése illetve a forgószárnyas légijármű vagy más anyagi javak jelentős károsodása.

Megjegyzés: A "súlyos sérülés" kifejezés meghatározása a 13. Annex-ben található

.

2.5.4 A légijármű parancsnoka felelős a forgószárnyas légijárművön tapasztalt vagy feltételezett meghibásodások jelentéséért a repülés befejezését követően a járató felé.

2.5.5 A légijármű parancsnoka felelős a 9.4.1 pontban ismertetett tájékoztatásokat tartalmazó útinaplóért vagy általános nyilatkozatért.

Megjegyzés: A Közgyűlés 1956. június-július hónapjaiban, Caracasban tartott tizedik ülésszakán elfogadott A10-36 számú határozata értelmében a 9. Annex-ben ismertetett "Általános Nyilatkozat" (General Declaration) – amennyiben tartalmazza az Egyezmény 34. cikkelyében előírt tájékoztatásokat – a szerződő államok részéről az "Útinapló" (Journey Log Book) megfelelő változataként fogadható el.

2.6 A repülés-üzemi tiszt, vagy szolgálatvezető kötelmei

2.6.1 A repülés-üzemi tiszt/szolgálatvezető – ha a 2.2.1.4 pont előírásainak megfelelően repülés-felügyeleti feladatok ellátásával van megbízva – hajtsa végre a következőket:

a) segítse a légijármű parancsnokát a repülés előkészítésében és adjon meg számára minden szükséges tájékoztatást;

b) segítse a légijármű parancsnokát az üzemeltetési és a légiforgalmi szolgálati egységeknek benyújtott repülési tervek elkészítésében, amennyiben erre szükség van, írja alá a dokumentumokat és nyújtsa be a megfelelő repülési tervet az illetékes légiforgalmi szolgálati egységnek; és

c) a rendelkezésre álló eszközök segítségével a repülés közben adja meg a légijármű parancsnokának azokat a tájékoztatásokat, amelyek szükségesek lehetnek a repülés biztonságos végrehajtásához.

2.6.2 Vészhelyzet esetén a repülés-üzemi tiszt/szolgálatvezető:

a) kezdeményezze az üzemeltetési kézikönyvben található eljárásokat, mialatt kerüljön el minden olyan ténykedést, amellyel ellentétbe kerülne a légiforgalmi irányítás eljárásaival; és

b) továbbítsa a légijármű parancsnoka felé a repülés biztonságos végrehajtásához szükséges biztonsággal kapcsolatos információkat, beleértve a repülési terv összes módosításával kapcsolatos információkat is, melyek a repülés végrehajtása során váltak szükségessé.

Megjegyzés – azonos módon fontos, hogy repülés végrehajtása során a légijármű parancsnoka szintén továbbítson hasonló információkat a repülés-üzemi tiszt/szolgálatvezető felé, különösen a veszélyhelyzettel összefüggőket.

2.7 Kézipoggyász

A járató biztosítsa, hogy a forgószárnyas légijárműre felvitt és az utas-kabinban elhelyezett összes poggyászt megfelelő módon és biztonságosan tárolják (szállítsák).

3. fejezet

Forgószárnyas légijármű teljesítmény üzemeltetési korlátozások

3.1 Általános rész

3.1.1 A forgószárnyas légijárműveket a lajstromozó állam által a jelen fejezet alkalmazható előírásaival összhangban kidolgozott és közzétett, részletes és átfogó teljesítmény előírás betartásával üzemeltessék.

1. Megjegyzés: A repülések végrehajtásához a teljesítmény előírások térjenek ki úgy a különböző repülési fázisokra, mint az üzemelés körülményeire.

2. Megjegyzés: A teljesítmény előírásoknak való megfelelést illetően a jelen rész 1. fejezete megköveteli, hogy járatók feleljenek meg azon állam törvényeinek, előírásainak és eljárásainak, amelyben a forgószárnyas légijárműveiket üzemeltetik. Az Egyezmény 11. szakasza ad alapot erre a követelményre.

3.1.2. Amikor a repülési feltételek nem biztosítják a kritikus hajtómű meghibásodása esetén a biztonságos repülés folytatását, a forgószárnyas légijármű repülésénél olyan megfelelő megoldásokat kell alkalmazni, amelyek lehetővé teszik a biztonságos kényszerleszállás végrehajtását.

Megjegyzés: a „megfelelő megoldásra" vonatkozó útmutatót az A. melléklet, 2.4 szakasza tartalmazza.

3.1.2.1 Ahol 3. teljesítmény osztálynál a járató állama megengedi a műszeres időjárási feltételek (IMC) melletti üzemeltetést, az ilyen üzemeltetést a 3.4 pont ajánlásai szerint hajtsák végre.

3.1.3 **Ajánlás** – *Olyan forgószárnyas légijárművek esetében, amelyekre a 8. Annex IV. része az Egyezmény 41. cikkelyének előírásában található kivétel miatt nem alkalmazható, a lajstromozó állam biztosítsa, hogy az 3.2 szakaszban meghatározott teljesítmény szintet a lehető legnagyobb mértékben betartsák.*

3.1.4 Amikor a forgószárnyas légijárművel sűrűn lakott, kedvezőtlen feltételek közötti helikopter repülőtérről kell felszállni vagy arra leszállni, azon állam illetékes hatósága, amelyben a helikopter repülőtér elhelyezkedik, határozza meg azon követelményeket amelyek lehetővé teszik az ilyen üzemeltetésnél a hajtómű egység meghibásodásával járó kockázatra adott megfelelő megoldások alkalmazását.

Megjegyzés: a „megfelelő megoldásra" vonatkozó útmutatót az A. melléklet, 2.4 szakasza tartalmazza.

3.2 A 8. Annex IV. rész előírásaival összhangban jogosított forgószárnyas légijárművek

3.2.1 A 3.2.2 – 3.2.7 pontokban ismertetett előírások azokra a forgószárnyas légijárművekre alkalmazandók, amelyekre 8. Annex IV. része vonatkozik.

Megjegyzés: A következő nemzetközi előírások nem tartalmaznak az országos légialkalmassági előírásokban található rendelkezésekkel összevethető érték (mennyiség) előírásokat. Ezeket a 3.1.1 pont alapján a szerződő államok saját előírásaikban határozzák meg.

3.2.2 A 3.1.1 pontban jelzett, a 3.2.1 pontban kijelölt forgószárnyas légijárművekre vonatkozó átfogó és részletes országos (nemzeti) előírásokban meghatározott teljesítmény szintek legalább lényegükben feleljenek meg a jelen fejezetben megfogalmazott általános színvonalnak.

Megjegyzés: Az A. Melléklet útmutató anyagot tartalmaz, amely példák segítségével mutatja be a jelen *fejezet nemzetközi előírásaiban és ajánlott gyakorlati eljárásaiban biztosítani kívánt teljesítmény szintet.*

3.2.3 A forgószárnyas légijárművet a légialkalmassági bizonyítványában található feltételek alapján, a repülésvégrehajtási kézikönyvben meghatározott, jóváhagyott teljesítmény korlátozások betartásával üzemeltessék.

3.2.4 A lajstromozó állam az ésszerűség határain belül foganatosítson olyan elővigyázatossági intézkedéseket, amelyek lehetővé teszik az elvárható általános biztonsági szint fenntartását minden várható – még a jelen fejezetben tételesen nem jelzett – üzemeltetési körülmények között.

3.2.5 A repülés végrehajtását csak akkor kezdjék meg, ha a repülésvégrehajtási kézikönyvben található teljesítmény tájékoztatások azt jelzik, hogy a tervezett repülés során a 3.2.6 és 3.2.7 pontok előírásait be tudják tartani.

3.2.6 A jelen fejezet előírásainak alkalmazásakor vegyék figyelembe a forgószárnyas légijármű teljesítményét jelentősen befolyásoló összes tényezőt (mint például a tömeg, magasság, az üzemeltetési hely magasságának megfelelő nyomás-magasság, hőmérséklet, szélviszonyok, a talaj felület állapota). Ezeket a tényezőket közvetlenül üzemeltetési jellemzőként vagy közvetetten tűrési illetve határértékként vegyék figyelembe, amelyek azon teljesítmény adatok részletes ismertetésével vagy átfogó teljesítmény előírással adhatók meg, amelyek alapján a forgószárnyas légijárművet üzemeltetik.

3.2.7 Tömeg (súly) korlátozások

a) A felszállás végrehajtásának megkezdésekor a forgószárnyas légijármű tömege ne haladja meg azt az étéket, amelynél a 3.1.1 pontban meghatározott teljesítmény előírások teljesíthetők, figyelembe véve a repülés előrehaladása folyamán vagy az üzemanyag-kibocsátás miatt bekövetkező súlycsökkenést.

b) A felszállás végrehajtásának megkezdésekor a forgószárnyas légijármű tömege semmi esetre se haladja meg a forgószárnyas légijármű repülésvégrehajtási kézikönyvében, a 3.2.6 pontban előírtak figyelembe vételével meghatározott értéket.

c) A tervezett leszállási vagy bármely kijelölt kitérő helikopter repülőtéren az érkezés várható időpontjában a forgószárnyas légijármű számított tömege semmi esetre se haladja meg a forgószárnyas légijármű repülésvégrehajtási kézikönyvében, a 3.2.6 pontban előírtak figyelembe vételével meghatározott értéket.

d) A felszállás végrehajtásának megkezdésekor vagy a leszállási illetve bármely kijelölt kitérő helikopter repülőtéren az érkezés várható időpontjában a forgószárnyas légijármű számított tömege semmi esetre se haladja meg a legnagyobb engedélyezett tömeget, amely megfelel a 16. Annex I. kötet zajszint minősítési előírásainak kivéve, ha különleges körülmények között, bizonyos üzemeltetési helyeken, ahol zajszint probléma nem jelentkezik, erre az érintett állam illetékes hatósága – amelyben az üzemeltetési hely elhelyezkedik – külön engedélyt ad.

3.2.7.1 A teljesítmény előírások alkalmazása során a járató állama az A. mellékletben leírt útmutó szerinti kockázat értékelés módszerét alkalmazza. Azon államok, amelyek nem alkalmazzák a kockázat értékelési módszert, járjanak el s 3.2.7.2 – 3.2.7.4 pontok előírásai szerint.

3.2.7.2 Felszállási és kezdeti emelkedési szakasz

3.2.7.2.1 Az *1. teljesítmény osztályú forgószárnyas légijármű* – A forgószárnyas légijármű a felszállási elhatározási ponton vagy ez előtt bekövetkező kritikus hajtómű meghibásodás esetén képes legyen a felszállás megszakítására, valamint a megállásra a rendelkezésre álló megszakított felszállási területen belül. Amennyiben a meghibásodás a felszállási elhatározási ponton vagy ez után következik be, a forgószárnyas légijármű képes legyen a felszállás folytatására és a repülési pályán levő összes akadály feletti biztonságos magasságra történő emelkedésre addig, amíg olyan helyzetbe kerül, hogy eleget tud tenni a 3.2.7.3.1 pont előírásának.

3.2.7.2.2 A *2. teljesítmény osztályú forgószárnyas légijármű* –Amennyiben a felszállás után meghatározott pont elérését követően bármely időpontban kritikus hajtómű meghibásodás következik be, a forgószárnyas légijármű képes legyen a felszállás folytatására és a repülési pályán levő összes akadály feletti biztonságos magasságra történő emelkedésre addig, amíg olyan helyzetbe kerül, hogy eleget tud tenni a 3.2.7.3.1 pont előírásának. A felszállás után meghatározott pont elérése előtt bekövetkező hajtómű meghibásodás esetén a forgószárnyas légijármű kényszerleszállás végrehajtására kényszerülhet és ezért erre az esetre a 3.1.2 pont előírása alkalmazandó.

3.2.7.1.3 A *3. teljesítmény osztályú forgószárnyas légijármű* – A repülési pálya bármely pontján bekövetkező hajtómű meghibásodás esetén a forgószárnyas légijármű kényszerleszállás végrehajtására kényszerülhet és ezért erre az esetre a 3.1.2 pont előírása alkalmazandó.

3.2.7.3 Útvonalon

3.2.7.2.1 Az *1. és 2. teljesítmény osztályú forgószárnyas légijármű* – A forgószárnyas légijármű az útvonalrepülés bármely pontján bekövetkező kritikus hajtómű meghibásodás esetén képes legyen a repülés folytatására a repülési útvonal legalacsonyabb tengerszint feletti repülési magassága alá történő süllyedés nélkül olyan üzemeltetési helyig, amelyen eleget tudnak tenni a 3.2.7.4.1 (1. teljesítmény osztály) vagy a 3.2.7.4.2 (2. teljesítmény osztály) pontok előírásának.

Megjegyzés: Amennyiben az útvonal szakasz teljesítése kedvezőtlen környezet felett történik és a kitérő repülőtér elérésének időtartama meghaladja a két órát, javasolt, hogy a járató állama vizsgálja meg a hajtómű meghibásodásával járó kockázatokat.

Törölt: *barátságtalan*

3.2.7.3.2 *A 3. teljesítmény osztályú forgószárnyas légijármű* – A forgószárnyas légijármű összes működő hajtóművével képes legyen a repülés folytatására tervezett útvonalán vagy meghatározott kitérő repülési útján az útvonal legalacsonyabb tengerszint feletti repülési magassága alá történő süllyedés nélkül. A repülési pálya bármely pontján bekövetkező hajtómű meghibásodás esetén a forgószárnyas légijármű kényszerleszállás végrehajtására kényszerülhet és ezért erre az esetre a 3.1.2 pont előírása alkalmazandó.

3.2.7.4 Megközelítési és leszállási szakasz

3.2.7.4.1 Az 1. teljesítmény osztályú forgószárnyas légijármű – A megközelítési és leszállási szakasz bármely pontján a leszállási elhatározási pont előtt bekövetkező kritikus hajtómű meghibásodás esetén a forgószárnyas légijármű a repülési útvonalon levő összes akadály biztonságos elkülönítési magasságon történő átrepülése után képes legyen a célállomáson és bármely kitérőn leszállni valamint a rendelkezésre álló leszállási távolságon belül megállni, vagy megszakított megközelítést végrehajtani és a 3.2.7.2.1 pont előírásának megfelelően a repülési útvonalon levő összes akadály felett biztonságos elkülönítés tartásával repülni. Amennyiben a hajtómű meghibásodás a leszállási elhatározási pont után következik be, a forgószárnyas légijármű képes legyen leszállni és a rendelkezésre álló leszállási távolságon belül megállni.

3.2.7.4.2 A *2. teljesítmény osztályú forgószárnyas légijármű* –Ha a kritikus hajtómű meghibásodás a leszállás előtt meghatározott pont elérése előtt következik be, a forgószárnyas légijármű képes legyen a célállomáson és bármely kitérőn leszállni valamint a rendelkezésre álló leszállási távolságon belül megállni, vagy megszakított megközelítést végrehajtani és a 3.2.7.2.2 pont előírásának megfelelően a repülési útvonalon levő összes akadály felett biztonságos elkülönítés tartásával repülni. A leszállási elhatározási pont után bekövetkező hajtómű meghibásodás a forgószárnyas légijármű kényszerleszállását idézheti elő; ezért erre az esetre a 3.1.2 pont előírása alkalmazandó.

3.2.7.4.3 A *3. teljesítmény osztályú forgószárnyas légijármű* –A repülési pálya bármely pontján bekövetkező hajtómű meghibásodás esetén a forgószárnyas légijármű kényszerleszállás végrehajtására kényszerülhet és ezért erre az esetre a 3.1.2 pont előírása alkalmazandó.

3.3 Akadály adatok

A járató vegye figyelembe a rendelkezésre álló akadály adatokat, amikor kidolgozza a felszállásra, a kezdeti emelkedésre, a megközelítésre és a leszállásra vonatkozó eljárásokat, ahogy azokat a járató állama által meghatározott teljesítmény követelmények meghatározzák.

3.4 A 3. teljesítmény osztályú forgószárnyas légijárművek, látvarepülési szabályok (VFR) szerinti különleges repüléseinek kivételével végrehajtott műszeres időjárási körülmények (IMC) közötti repüléseire vonatkozó kiegészítő követelmények

3.4.1 A 3. teljesítmény osztályú forgószárnyas légijárművek műszeres időjárási körülmények (IMC) közötti repüléseit azon állam illetékes hatósága által elfogadott szárazföldi terület felett hajtsák végre, amely állam illetékességébe tartozik az adott terület.

3.4.2 A 3. teljesítmény osztályú forgószárnyas légijárművek műszeres időjárási körülmények (IMC) közötti üzemeltetésének jóváhagyásakor a járató államának meg kell győződnie arról, hogy a forgószárnyas légijármű tanúsítva lett a műszeres szabályok (IFR) szerinti repülések végrehajtására, valamint a 6. és 8. Annex-ben előírt teljeskörű repülésbiztonsági szintek teljesítését az alábbiak biztosítják-e:

a) A hajtóművek megbízhatósága;

b) A járató karbantartási eljárásai, légiüzemeltetési gyakorlata, repülés előkészítési eljárásai és a hajózó személyzet képzési programjai; és

c) A felszerelések és a 2. Függelékkel összhangban előírt követelmények teljesítése.

Megjegyzés: A 3. teljesítmény osztályú forgószárnyas légijárművek műszeres időjárási körülmények (IMC) közötti üzemeltetésének kiegészítő követelményeire vonatkozó útmutatót a 2. Függelék tartalmazza.

3.4.3 A műszeres időjárási körülmények (IMC) között üzemeltetett 3. teljesítmény osztályú forgószárnyas légijárművek járatója vezessen be a a hajtómű üzemi állapot változásának figyelésére a forgószárnyas légijármű valamint a hajtómű gyártója által javasolt műszereket, rendszereket valamint üzemeltetési / karbantartási eljárásokat.

3.4.4 Ajánlás - A műszeres időjárási körülmények (IMC) között üzemeltetett 3. teljesítmény osztályú forgószárnyas légijárművek mechanikai jellegű meghibásodásai bekövetkezésének csökkentése érdekében a farok rotor meghajtó rendszerének rezgésekre bekövetkező állapotváltozását figyelő rendszert kell alkalmazni.

4. fejezet
Forgószárnyas légijármű műszerek, felszerelések és repülési okmányok

Megjegyzés: A forgószárnyas légijármű távközlési és navigációs felszerelésére vonatkozó előírásokat az 5. fejezet tartalmazza.

4.1 Általános rész

4.1.1 A légialkalmassági bizonyítvány kiadásához szükséges alapvető felszereléseken kívül a felhasznált forgószárnyas légijármű típustól valamint a repülés végrehajtásának körülményeitől függően a következő pontokban előírt műszereket, felszereléseket és repülési okmányokat helyezzék el vagy szállítsák a forgószárnyas légijárművön. Az előírt műszereket és berendezéseket, beleértve azok felszerelését is a lajstromozó állam hagyja jóvá vagy fogadja el.

4.1.2 A forgószárnyas légijármű szállítson egy tanúsított hiteles másolatot a 2.2.1 fejezetben meghatározott légijármű üzembentartási engedélyből, és egy másolatot a forgószárnyas légijármű típusra érvényes felhatalmazásokból, feltételekből és korlátozásokból, melyek a tanúsítással összefüggésben kerültek kiadásra. Amikor a tanúsítás és a hozzá kapcsolódó felhatalmazások, feltételek és korlátozások a járató állama részéről az angoltól eltérő nyelven kerül kiadásra, akkor mellékeljék az angol nyelvű forditásokat is.

Megjegyzés – a légijármű üzembentartási engedélyére és az ahhoz kapcsolódó azon, az üzemeltetési specifikációban esetleg megadott felhatalmazásokra, feltételekre és korlátozásokra vonatkozó útmutatót az Üzemeltetés Felügyeleti, Jogosítási és Folyamatos Ellenőrzési Eljárások Kézikönyve *(Doc 8335) tartalmazza.*

4.1.3 A járató az üzemeltetési kézikönyvben helyezze el a járató állama által jóváhagyott minimális felszerelési jegyzéket (MEL), amelynek segítségével a légijármű parancsnoka eldöntheti, hogy a repülés végrehajtása megkezdhető vagy egy közbenső állomástól folytatható abban az esetben, ha bármely műszer, felszerelés vagy rendszer üzemképtelenné válik. Ahol a járató állama nem azonos a lajstromozó állammal, a járató állama biztosítsa, hogy a minimális felszerelési jegyzék az adott forgószárnyas légijármű esetében ne befolyásolja a lajstromozó állam vonatkozó légialkalmassági előírásainak teljesítését.

Megjegyzés: A minimális felszerelési jegyzék (MEL) tájékoztatót az E. Melléklet tartalmazza.

4.1.4 A járató az üzemeltetési valamint a hajózószemélyzet részére, minden egyes üzemeltetett légijármű típushoz biztosítson légijármű üzemeltetési kézikönyvet, amely tartalmazza az adott légijármű típus üzemeltetéséhez szükséges általános, rendellenes és vészhelyzeti üzemeltetési eljárásokat. A kézikönyvben továbbá részletezzék a légijármű rendszereit és a felhasználandó ellenőrzési jegyzékeket is. A kézikönyvet az emberi tényezők alapelveinek figyelembevételével készítsék el. A kézikönyv legyen könnyen hozzáférhető a személyzet minden tagja számára, a repülés teljes időtartama alatt.

Megjegyzés: Az Emberi Tényezők alapelveinek alkalmazására vonatkozó útmutató az Emberi Tényezők Kiképzési Kézikönyv*-ében (Doc 9683) található.*

4.2 Az összes forgószárnyas légijármű összes repülése

4.2.1 A forgószárnyas légijárművet szereljék fel azokkal a műszerekkel, amelyek a hajózószemélyzet számára lehetővé teszik a forgószárnyas légijármű repülési pályájának irányítását és ellenőrzését, bármely előírt eljárás művelet végrehajtását valamint a forgószárnyas légijármű üzemeltetési korlátozásainak a várható üzemeltetési körülmények között történő megfigyelését.

4.2.2 A forgószárnyas légijárművet szereljék fel:

a) hozzáférhető és a forgószárnyas légijárművön szállításra engedélyezett utasok számának megfelelő egy vagy több elsősegély-nyújtó készlettel;

Megjegyzés: Az elsősegély-nyújtó készletek tartalmára vonatkozó útmutató a D. Mellékletben található.

b) olyan típusú hordozható tűzoltó készülék(ek)kel, amelynek tűzoltó anyaga igénybevétel után nem szennyezi veszélyesen a forgószárnyas légijármű belső terének levegőjét. Legalább egy ilyen tűzoltó készüléket helyezzenek el;

1) a forgószárnyas légijármű pilótafülkéjében; és

2) minden egyes olyan utaskabinban, amely a pilótakabintól el van választva és amelyet a hajózószemélyzet nem tud azonnal megközelíteni.

Megjegyzés: Előírásosnak minősül bármely olyan hordozható tűzoltó készülék, amely a forgószárnyas légijármű légialkalmassági bizonyítványában előírtak szerint került elhelyezésre.

c) 1) a járató állama által meghatározott életkor felett minden egyes személy részére egy megfelelő ülő vagy fekvőhellyel;
2) minden üléshez egy biztonsági övvel valamint minden fekvőhelyhez egy bekötő biztonsági hevederrel; és
3) minden egyes hajózószemélyzeti tag üléshez egy vállhevederekkel ellátott biztonsági övvel. A biztonsági vállhevederekhez tartozzon egy olyan szerkezet is, amely a hirtelen lassulás esetében automatikusan visszatartja az ülésben helyet foglaló személy testét.

Ajánlás – *Kétkormányos gépek esetében* a *forgószárnyas légijármű-vezetőüléseken felszerelt, vállhevederekkel ellátott biztonsági övhöz tartozzon egy olyan szerkezet is, amely megakadályozza, hogy a hirtelen cselekvőképtelenné vált légijármű-vezető gátolja a kormányszervek működését.*

1. Megjegyzés: A kialakítástól függően, a tehetetlenségi erő hatására reteszelő csévéző szerkezet is alkalmas lehet erre a célra.

2. Megjegyzés: A vállhevederekkel ellátott biztonsági öv egymástól függetlenül használható vállhevederekből és biztonsági övből áll.
d) az utasok felé a következő tájékoztatások és utasítások továbbítására szolgáló eszközökkel;

1) mikor kapcsolják be a biztonsági öveket;

2) amennyiben oxigén szállítása van előírva, mikor és hogyan kell használni az oxigén-ellátó

berendezést;

3) dohányzás korlátozása;

4) a mentőmellények vagy egyéb megfelelő egyéni úszóeszközök elhelyezkedése és használata, amennyiben ezek szállítása van előírva; és

5) a vészkijáratok elhelyezkedése és nyitása;

e) megfelelő értékű elektromos biztosítékok tartalékként a repülés közben hozzáférhető biztosítékok cseréjéhez.

4.2.3 A forgószárnyas légijármű szállítson;

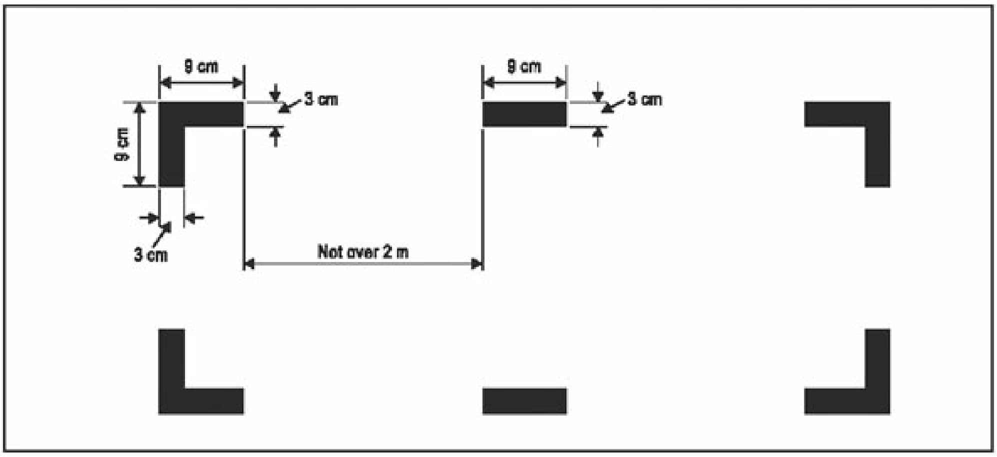
a) a 2.2.2 pont előírásának megfelelő üzemeltetési kézikönyvet vagy annak azon részeit, amelyek a repülés végrehajtására vonatkoznak;

b) az adott forgószárnyas légijármű repülésvégrehajtási kézikönyvét vagy más olyan dokumentumot, amely tartalmazza a 3. fejezet alkalmazásához szükséges teljesítmény adatokat valamint bármely más olyan tájékoztatást, amelyre a forgószárnyas légijármű üzemeltetéséhez – a légialkalmassági bizonyítványban meghatározott jellemzőkön belül – szükség van, kivéve, ha ezek az adatok az üzemeltetési kézikönyvben megtalálhatók; és

c) érvényes és alkalmas térképeket, amelyek fedik a tervezett repülés útvonalát, valamint bármely olyan egyéb útvonalat, amelyről joggal feltételezhető, hogy arra a repülés átirányítható.

4.2.4 Az átvágható felületek jelzése

4.2.4.1 Amennyiben a forgószárnyas légijárművön a mentőszemélyzet részére jelzik a kényszerhelyzet esetén a törzsön átvágható felületeket, azokat a következő ábrának megfelelő módon jelöljék meg. A jelölések színe vörös vagy sárga legyen és ha erre a háttértől történő megkülönböztethetőség érdekében szükség van, azokat fehér színű alapozásra készítsék el.



A légijármű törzsén levő átvágható felületek, azaz behatolási pontok

Jelölések közötti távolság nem több mint 2 méter

4.2.4.2 Amennyiben a sarkok jelölései egymástól több mint 2 méter távolságra vannak, fessenek fel 9 x 3 cm-es vonalakat olyan módon, hogy az egymás mellett levő vonalak közötti távolság 2 méternél nagyobb ne legyen.

Megjegyzés: Ez az előírás nem teszi szükségessé azt, hogy bármely forgószárnyas légijármű sárkányszerkezetén átvágható felületek legyenek.

4.3 Repülési adatrögzítők

1. *Megjegyzés: A repülési adatrögzítők két rendszerből illetve berendezésből, a repülési adatrögzítőből (FDR) valamint a pilótakabin hangrögzítőből (CVR) állnak.*

2. *Megjegyzés: Az összetett FDR/CVR berendezés csak a jelen Annex-ben külön ismertetett repülési adatrögzítő berendezés előírások teljesítésére használhatók.*

3. *Megjegyzés: A repülési adatrögzítőkkel kapcsolatos részletes útmutató a B. Mellékletben található.*

4.3.1 Repülési adatrögzítők – típusok

4.3.1.1 IV. típusú repülési adatrögzítő

4.3.1.1.1 A IV. típusú repülési adatrögzítő rögzítse azokat az adatokat, amelyek a forgószárnyas légijármű repülési pályájának, sebességének, helyzetének, hajtómű teljesítményének és működésének pontos meghatározásához szükségesek.

4.3.1.1.2 A IVA. típusú repülési adatrögzítő rögzítse azokat az adatokat, amelyek a forgószárnyas légijármű repülési pályájának, sebességének, helyzetének, hajtómű teljesítményének, működésének és repülésvezérlő szerkezetei helyzetének pontos meghatározásához szükségesek.

4.3.1.2 Az V. típusú repülési adatrögzítő rögzítse azokat az adatokat, amelyek a forgószárnyas légijármű repülési pályájának, sebességének, helyzetének és hajtómű teljesítményének pontos meghatározásához szükségesek.

4.3.1.3 A repülési adatrögzítő berendezésekben 1995 január 1. után ne használjanak fémszalagot.

4.3.1.4 ***Ajánlás*** *– 1998 november 5. után ne használják a frekvencia modulációt (FM) alkalmazó analóg adatrögzítőket.*

4.3.1.4.1 2003 január 1. után ne használják a fényképészeti filmmel működő repülési adatrögzítőket.

4.3.1.5 Az összes olyan digitális adathálózati összeköttetést alkalmazó valamint pilótakabin hangrögzítő berendezés (CVR) szállítására kötelezett forgószárnyas légijármű, amelynek egyedi légialkalmassági bizonyítványát először 2005 január 1. után adták ki, az összes adathálózati digitális közleményváltást a repülési adatrögzítő berendezésén rögzítse. A legkisebb felvételi időtartam azonos legyen a pilótakabin hangrögzítő berendezés felvételi időtartamával és a felvétel összevethető legyen a pilótakabinban rögzített hangfelvétellel.

4.3.1.5.1 2007 január 1-től az összes, digitális adathálózati összeköttetést alkalmazó valamint pilótakabin hangrögzítő berendezés szállítására kötelezett forgószárnyas légijármű rögzítse a légiforgalmi szolgálattal történt digitális közleményváltásait a pilótakabin hangrögzítő vagy repülési adatrögzítő berendezésén. A legkisebb felvételi időtartam azonos legyen a pilótakabin hangrögzítő berendezés felvételi időtartamával és a felvétel összevethető legyen a pilótakabinban rögzített hangfelvétellel.

4.3.1.5.2 Rögzítsék az adathálózati digitális közleményváltás tartalmának megismeréséhez szükség tájékoztatást és ahol ez lehetséges a közlemény megjelenítésének vagy a hajózószemélyzet által történt lehívásának időpontját is.

Megjegyzés: Az adathálózati összeköttetések közé tartoznak, azonban nem csak ezekre korlátozódnak a következők:

ADS- C – automatikus légtérfelderítési adat szolgáltatási megállapodás

CPDLC – légiforgalmi irányító és repülőgépvezető közötti adathálózati összeköttetések

D-FIS – adathálózati és repüléstájékoztató szolgálati összeköttetések

AOC – légiközlekedési üzemi irányítási közlemények.

4.3.1.6 **Ajánlás** – *Minden olyan 2700 kg. legnagyobb engedélyezett felszállósúlynál nagyobb tömegű forgószárnyas légijárművet, amely repülési adatrögzítő és pilótakabin hangrögzítő berendezések szállítására kötelezett, alternatív megoldásként egy összetett repülési adat és pilótakabin hangrögzítő berendezéssel is (FDR/CVR) felszerelhetnek.*

4.3.2 Repülési adatrögzítők – felvételi időtartam

A IV. és V. típusú repülési adatrögzítő képes legyen a működése legalább utolsó tíz órájában rögzített adatok tárolására.

4.3.3 Repülési adatrögzítők – Forgószárnyas légijárművek, amelyek egyedi légialkalmassági bizonyítványát először 1989 január 1. után adják ki

4.3.3.1 Minden olyan forgószárnyas légijárművet, amelynek legnagyobb engedélyezett felszállósúlya (tömege) több mint 7000 kg, szereljenek fel IV. típusú repülési adatrögzítő berendezéssel.

4.3.3.2 ***Ajánlás*** - *Minden olyan forgószárnyas légijárművet, amelynek legnagyobb engedélyezett felszállósúlya (tömege) több mint 2730 kg, egészen és beleértve 7000 kg-ig, szereljenek fel V. típusú repülési adatrögzítő berendezéssel.*

4.3.4 Repülési adatrögzítők – Forgószárnyas légijárművek, amelyek egyedi légialkalmassági bizonyítványát először 2005 január 1. után adták ki

Minden olyan forgószárnyas légijárművet, amelynek legnagyobb engedélyezett felszállósúlya (tömege) több mint 3175 kg, szereljenek fel IV.A típusú repülési adatrögzítő berendezéssel, melynek felvételi időtartama legalább 10 óra.

Megjegyzés: Elfogadható egy összetett (CVR/FDR) repülési adatrögzítő is.

4.3.5 Pilótakabin hangrögzítők – Forgószárnyas légijárművek, amelyek egyedi légialkalmassági bizonyítványát először 1987 január 1-én vagy ezt követően adták ki

4.3.5.1 Minden olyan forgószárnyas légijárművet, amelynek legnagyobb engedélyezett felszállósúlya (tömege) több mint 7000 kg, szereljenek fel pilótakabin hangrögzítő berendezéssel, amelynek célja a pilótakabin belső hangkörnyezetének rögzítése a repülés időtartama alatt. A repülési adatrögzítővel nem rendelkező forgószárnyas légijárművön a pilótakabin hangrögzítő berendezés egyik felvételi sávján rögzítsék legalább a fő forgószárny sebességét.

4.3.5.2 Minden olyan forgószárnyas légijárművet, amelynek legnagyobb engedélyezett felszállósúlya (tömege) 3175 kg-tól 7000 kg-ig terjed, szereljenek fel pilótakabin hangrögzítő berendezéssel, amelynek célja a pilótakabin belső hangkörnyezetének rögzítése a repülés időtartama alatt. A repülési adatrögzítővel nem rendelkező forgószárnyas légijárművön a pilótakabin hangrögzítő berendezés egyik felvételi sávján rögzítsék legalább a fő forgószárny sebességét.

4.3.6 Pilótakabin hangrögzítők – Forgószárnyas légijárművek, amelyek egyedi légialkalmassági bizonyítványát először 1987 január 1. előtt adták ki

Minden olyan forgószárnyas légijárművet, amelynek legnagyobb engedélyezett felszállósúlya (tömege) több mint 7000 kg, szereljenek fel pilótakabin hangrögzítő berendezéssel, amelynek célja a pilótakabin belső hangkörnyezetének rögzítése a repülés időtartama alatt. A repülési adatrögzítővel nem rendelkező forgószárnyas légijárművön a pilótakabin hangrögzítő berendezés egyik felvételi sávján rögzítsék legalább a fő forgószárny sebességét.

Megjegyzés: A pilótakabin hangrögzítő berendezésre előírt műszaki követelmények megtalálhatók az EUROCAE Polgári Légiközlekedési Berendezések Európai Szervezete repülési adatrögzítő rendszerekre kidolgozott MOPS (minimális üzemi teljesítmény előírások) kiadványában vagy más egyenértékű dokumentumban.

4.3.7 Pilótakabin hangrögzítők – felvételi időtartam

4.3.7.1 A pilótakabin hangrögzítő berendezés képes legyen a működése legalább utolsó 30 percében rögzített információk tárolására.

4.3.7.2 **Ajánlás** *—Az a pilótakabin hangrögzítő berendezés, amelyet olyan forgószárnyas légijárműbe szereltek be, amelynek egyedi légialkalmassági bizonyítványát először 1990 január 1-én vagy ezt követően adták ki, képes legyen a működése legalább utolsó két órájában rögzített információk tárolására.*

4.3.7.3 Az a pilótakabin hangrögzítő berendezés, amelyet olyan forgószárnyas légijárműbe szerelnek be, amelynek egyedi légialkalmassági bizonyítványát először 2003 január 1. után adták ki, képes legyen a működése legalább utolsó két órájában rögzített információk tárolására.

4.3.8 Repülési adatrögzítők – szerkezet és beszerelés

A repülési adatrögzítőket úgy készítsék el és helyezzék el, illetve szereljék be a légijárműbe, hogy biztosítsák a rögzített adatok gyakorlatilag lehetséges legnagyobb védelmét annak érdekében, hogy a rögzített információk megőrizhetők, leolvashatók és feldolgozhatók legyenek. A repülési adatrögzítők tegyenek eleget a baleseti törési ellenálló-képesség és tűzvédelemi előírásoknak.

Megjegyzés: A baleseti törési ellenálló-képesség és tűzvédelem ipari előírásai megtalálhatók az Európai

Polgári Légiközlekedési Elektronikai Szervezet (EUROCAE) ED55 és ED56A jelű és hasonló kiadványokban.

4.3.9 Repülési adatrögzítők – üzemeltetés

4.3.9.1 A repülési adatrögzítőt a repülés alatt ne kapcsolják ki.

4.3.9.2 A repülési adatrögzítővel rögzített adatok megőrzése érdekében a berendezést egy baleset vagy repesemény utáni repülés befejezését követően kapcsolják ki és azt a 13. Annex előírásaiban meghatározottakkal összhangban a tájékoztatásokat tartalmazó adathordozó eltávolítása előtt ne kapcsolják ismét be.

1. Megjegyzés: A repülési adatrögzítővel rögzített adatok légijárműből történő eltávolításának szükségességét a vizsgálatot végző állam vizsgáló hatósága határozza meg az esemény súlyossága és körülményei alapján, beleértve az eseménynek a repülési üzemre gyakorolt hatását is.

2. Megjegyzés: A járatónak a repülési adatrögzítővel rögzített információk tárolására vonatkozó felelősségét a 9.6 pont tartalmazza.

4.3.10 Repülési adatrögzítők – folyamatos működőképesség

Végezzék el a repülési adat és pilótakabin hangrögzítő rendszerek felvételeinek üzemi ellenőrzését és értékelését annak érdekében, hogy a rögzítő berendezések folyamatos működőképességét biztosíthassák.

Megjegyzés: A repülési adat és pilótakabin hangrögzítő rendszerek ellenőrzésének eljárásait a B. Melléklet tartalmazza

.

4.4 A látvarepülési (VFR) és műszerrepülési (IFR) szabályok szerint, nappal és éjszaka végrehajtott repülésekhez szükséges műszerek és berendezések

Megjegyzés: A 4.4.1 – 4.4.3 pontok repülőgépvezetési műszerekre vonatkozó követelményei műszer kombinációkkal, vagy elektronikus képernyőkkel teljesíthetők.

4.4.1 Az összes látvarepülési szabályok (VFR) szerint, nappal üzemeltetett forgószárnyas légijárművet szereljék fel a következőkkel:

a) egy mágneses iránytűvel;

b) egy pontos időmérő berendezéssel, amely az időt órában, percben és másodpercben jelzi;

c) érzékeny nyomás-magasság mérőműszerrel;

d) repülési sebesség mérőműszerrel; és

e) olyan további műszerekkel vagy berendezésekkel, amelyeket az illetékes hatóság előírt.

4.4.2 Az összes látvarepülési szabályok (VFR) szerint, éjjel üzemeltetett forgószárnyas légijárművet szereljék fel a következőkkel:

a) a 4.4.1 pontban felsorolt berendezésekkel;

b) helyzetjelző műszerrel (műhorizonttal), minden egyes légijárművezető számára és egy kiegészítő helyzetjelző műszerrel;

c) csúszásjelzővel;

d) irányjelző műszerrel (géptengely irány-jelző pörgettyűs – giroszkópikus – műszer);

e) emelkedési és süllyedési sebesség mérőműszerrel;

f) olyan kiegészítő műszerekkel és berendezésekkel, melyeket a megfelelő hatóság ír elő;

és a következő világító eszközökkel:

g) a 2. Annex előírásainak megfelelő fényekkel, a helikopter repülőtér mozgási területein üzemelő légijárművek fényeire meghatározottak szerint;

Megjegyzés: A fények általános jellemzőit a 8. Annex határozza meg. A repülés közben levő valamint a helikopter repülőtér mozgási területein üzemelő légijárművek fényeire vonatkozó, 2. Annex előírásainak megfelelő fények jellemzőit a Légialkalmassági Kézikönyv *-ben (Doc 9760) részletezi.*

h) két leszálló fényszóróval;

d) a forgószárnyas légijármű biztonságos üzemeltetése szempontjából alapvető fontosságú, a hajózószemélyzet által használt valamennyi műszer és berendezés (meg)világításával;

e) világítással valamennyi utastérben; és

f) elektromos kézilámpával minden egyes személyzet tag szolgálati helyen.

4.4.2.1 **Ajánlás** – *Az egyik leszálló fényszóró legalább függőleges síkban elfordítható legyen.*

4.4.3 A műszerrepülési szabályok szerint (IFR) üzemeltetett összes forgószárnyas légijárművet vagy azokat, amelyek üzemeltetésük során egy vagy több műszer segítsége nélkül nem tarthatók a kívánt repülési helyzetben, szereljék fel:

a) egy mágneses iránytűvel;

b) egy pontos időmérő berendezéssel, amely az időt órában, percben és másodpercben jelzi;

c) kettő érzékeny, nyomás-magasság mérőműszerrel;

d) repülési sebesség mérőműszerrel, amely olyan berendezéssel van ellátva, amely megakadályozza a párakicsapódás vagy jegesedés következtében lehetséges helytelen működést;

e) csúszás jelzőműszerrel;

f) repülési helyzetjelző műszerrel (műhorizont) az igényelt mennyiségű légijárművezetők számának megfelelően, és egy kiegészítő helyzetjelző műszerrel;

g) irányjelző műszerrel (géptengely irány-jelző pörgettyűs – giroszkópikus – műszer):

h) a pörgettyűs műszerek kielégítő elektromos táplálásának jelzésére szolgáló eszközzel;

i) a pilótakabinban felszerelt, a külső levegő hőmérsékletét jelző műszerrel;

j) emelkedési és süllyedési sebesség mérőműszerrel;

k) stabilizációs rendszerrel kivéve, ha a légialkalmasságot elbíráló illetékes hatóság számára kielégítően bizonyították, hogy a forgószárnyas légijármű tervezési sajátosságainál fogva ilyen berendezés vagy rendszer nélkül is képes a megfelelő stabilizált repülési helyzet fenntartására;

l) olyan további műszerekkel vagy berendezésekkel, amelyeket az illetékes hatóság előírt; és

m) éjszakai repülések esetére 4.4.2 g) – k) és 4.4.2.1 alpontokban meghatározott fényekkel.

4.4.3.1 A műszerrepülési szabályok szerint (IFR) üzemeltetett összes forgószárnyas légijárművet szereljék fel egy vész áramforrással, amely független a fő elektromos energia ellátó rendszertől. A vész áramforrás legalább 30 perc időtartamon keresztül tegye lehetővé a légijármű parancsnok számára jól látható repülési helyzetjelző műszer (műhorizont) elektromos energiával való táplálását és megvilágítását. A vész energia ellátás lépjen automatikusan működésbe a fő elektromos energia ellátó rendszer teljes meghibásodását követően, és legyen egyértelmű kijelzés a műszerfalon, hogy a helyzetjelző műszer(ek) vész energia hálózatról működnek.

4.4.4 Ajánlás – *A műszerrepülési szabályok szerint (IFR) üzemeltetett azon forgószárnyas légijárművek, melyek engedélyezett maximális felszálló tömege több mint 3175 kg, vagy a maximális utasülés szám meghaladja a kilencet, legyen felszerelve a repülés irányába előre néző, tereppel való összeütközést megakadályozó földközelség jelző rendszerrel.*

4.5 Az összes, vízfelszín felett üzemeltetett forgószárnyas légijármű

4.5.1 Úszóeszközök

Minden olyan forgószárnyas légijárművet, amelyet vízfelszín felett kívánnak üzemeltetni, állandó vagy gyorsan kibocsátható (üzembe helyezhető) úszóeszközzel szereljenek fel, amely biztosítja a forgószárnyas légijármű biztonságos vízreszállását, amennyiben:

a) a járató állama szerint meghatározott módon a forgószárnyas légijármű engedélyezve lett parttól távoli repülésekre, vagy egyéb vízfelszín feletti műveletekre; vagy

b) az 1. vagy a 2. teljesítmény osztályú forgószárnyas légijármű kedvezőtlen körülmények között a szárazföldtől olyan távolságra repül vízfelszín felett, amely tíz percnél hosszabb időtartamú (normál) utazósebességgel végrehajtott repülésnek felel meg; vagy

Törölt: barátságtalan

Megjegyzés: Kedvezőtlen körülmények közötti repülés esetén a biztonságos vízreszállás érdekében a forgószárnyas légijármű kialakítása tegye lehetővé a vízre való leszállást, legyen tanúsítva a vízreszállást biztosító eszközöknek megfelelően.

Törölt: *Barátságtalan*

Törölt:

c) az 1. teljesítmény osztályú forgószárnyas légijármű megfelelő környezeti feltételek mellett a szárazföldtől olyan távolságra repül a vízfelszín felett, amelyet a felelős állam illetékes hatósága engedélyezett; vagy

Megjegyzés: Amikor várható, hogy a távolság meghaladja azt a mértéket, amelynél úszóeszköz alkalmazása szükséges, az állam vegye figyelembe a forgószárnyas légijármű tanúsítási előírásait.

d) a 3. teljesítmény osztályú forgószárnyas légijármű a szárazföldtől olyan távolságra repül vízfelszín felett, amely nagyobb, mint az autórotációs vagy biztonságos kényszerleszállási távolság.

4.5.2 Vészhelyzeti felszerelések

4.5.2.1 A 4.5.1 pont előírása alapján üzemeltetett 1. vagy 2. teljesítmény osztályú forgószárnyas légijárművet szereljék fel;

a) a fedélzeten tartózkodó minden személy részére ülőhelyéről vagy fekvőhelyéről azonnal hozzáférhető helyen tárolt mentőmellénnyel vagy egyéb megfelelő egyéni úszóeszközzel. Ezeket az eszközöket úgy helyezzék el, hogy a fedélzeten tartózkodó minden személy részére ülőhelyéről vagy fekvőhelyéről azonnal hozzáférhető legyen. A parttól távoli (vízfelszíni) üzemeltetésnél a mentőmellényt viseljék állandóan, hacsak a fedélzeten tartózkodó személy nem visel egyesített túlélő öltözéket, amely magába foglalja a mentőmellényt is;

b) elegendő számú mentő-tutajjal a fedélzeten tartózkodó összes személy elhelyezésére, amelyeket úgy tárolnak, hogy azok a vészhelyzet esetén gyorsan üzembe helyezhetők és a repülési útvonal sajátosságainak megfelelő életmentő eszközökkel vannak ellátva, beleértve a létfenntartási eszközöket is; és

Ajánlás – *Amikor két mentő tutajjal szerelik fel a forgószárnyas légijárművet, akkor mindegyik legyen képes egyenként is befogadni - túlterhelt állapotban - a fedélzeten tartózkodó összes személyt*.

Megjegyzés: a túlterhelt állapot a maximális befogadóképesség 1,5-szeres tervezési biztonsági szorzóval számított értéke.

c) a 2. Annex-ben ismertetett pirotechnikai vészjelzések előállítására szolgáló eszközökkel.

4.5.2.2 A szárazföldtől az autórotációs távolságon kívül, azonban a felelős állam illetékes hatósága által megállapított távolságon belül üzemelő 3. teljesítmény osztályú forgószárnyas légijárművet szereljék fel a fedélzeten tartózkodó minden személy részére ülőhelyéről vagy fekvőhelyéről azonnal hozzáférhető helyen tárolt mentőmellénnyel vagy egyéb megfelelő egyéni úszóeszközzel.

Megjegyzés: A 4.5.2.2 pontban ismertetett szárazföldtől számított távolság meghatározása alkalmával vegyék figyelembe a környezeti körülményeket, valamint a kutató és mentő szolgálat (SAR) igénybevételének lehetőségeit.

4.5.2.2.1 A szárazföldtől az autórotációs távolságon kívüli, nyílt vízfelület feletti repülések esetén a mentőmellényt viseljék állandóan, hacsak a fedélzeten tartózkodó személy nem visel egyesített túlélő öltözéket, amely magába foglalja a mentőmellényt is.

4.5.2.3 A 4.5.2.2 pontban meghatározott távolságon túl üzemelő 3. teljesítmény osztályú forgószárnyas légijárművet szereljék fel a 4.5.2.1 pont előírása alapján szükséges vészhelyzeti felszereléssel.

4.5.2.4 A 2. és 3. teljesítmény osztályú forgószárnyas légijármű esetében, amennyiben az olyan helikopter repülőtéren száll fel vagy le, ahol a járató államának véleménye szerint a felszállási vagy leszállási útvonal olyan hosszan vezet vízfelszín felett, hogy az esetleges rendellenes üzemelés vagy repesemény alkalmával vízreszállás valószínű, a forgószárnyas légijárművet szereljék fel legalább a 4.5.2.1 a) alpont előírása alapján szükséges felszereléssel.

4.5.2.5 Minden egyes mentőmellényt és egyéb megfelelő egyéni úszóeszközt, amelyet a jelen 4.5 szakasz előírásai alapján szállítanak, a felhasználó személy feltalálásának megkönnyítése érdekében lássanak el elektromos világítással.

4.5.2.6 **Ajánlás** – *Bármely olyan forgószárnyas légijárművön, amelynek egyedi légialkalmassági bizonyítványát először 1991 január 1-én vagy ezt követően adták ki, a 4.5.2 pont előírása alapján szállított mentőtutajok legalább 50 %-a távirányítással legyen kibocsátható.*

4.5.2.7 **Ajánlás** – *A távirányítással nem kibocsátható és 40 kg-nál nehezebb mentőtutajok a kibocsátás megkönnyítése érdekében valamilyen mechanikus kibocsátó szerkezettel legyenek felszerelve.*

4.5.2.8 **Ajánlás** – *Bármely olyan forgószárnyas légijármű esetében, amelynek egyedi légialkalmassági bizonyítványát először 1991 január 1. előtt adták ki, 1992 december 31. előtt teljesítendők a 4.5.2.6 és 4.5.2.7 pontok előírásai.*

4.5.3 A kijelölt vízterület felett üzemeltetett összes forgószárnyas légijármű

5.5.3.1 Amennyiben a forgószárnyas légijárművet olyan vízterületek felett üzemeltetik, amelyeket az érintett államok olyan területként jelölnek meg, ahol a kutatás és mentés különös nehézségekbe ütközik, a forgószárnyas légijárművet szereljék fel olyan életmentő felszereléssel, beleértve a létfenntartási eszközöket is, amelyek nagy valószínűséggel megfelelnek az átrepülendő terület sajátosságainak.

4.5.3.2 **Ajánlás** – *A parttól távoli (vízfelszíni) repüléseknél a fedélzeten tartózkodó összes személy viseljen túlélő öltözéket, amennyiben a tengervíz hőmérséklete alacsonyabb 10 Celsius foknál, vagy a kutatás időtartama meghaladja a számított túlélési időt. Amikor a nap látóhatár feletti elhelyezkedése vagy a napsugárzás ereje veszélyesen magas hőmérsékletet hozna létre a pilótafülkében, hajózó személyzetek részére lehetővé kell tenni az előző követelményekkel szembeni könnyítést.*

Megjegyzés: A kutatási idő megállapításánál vegyék figyelembe a tenger állapotát és a környező világítási feltételeket.

4.6 A kijelölt szárazföld felett üzemeltetett összes forgószárnyas légijármű

Amennyiben a forgószárnyas légijárművet olyan szárazföldi területek felett üzemeltetik, amelyeket az érintett államok olyan területként jelölnek meg, ahol a kutatás és mentés különös nehézségekbe ütközik, a forgószárnyas légijárművet szereljék fel olyan jeladó berendezéssel és életmentő felszereléssel, beleértve a létfenntartási eszközöket is, amelyek nagy valószínűséggel megfelelnek az átrepülendő terület sajátosságainak.

4.7 Vészhelyzeti helyjeladó berendezés (ELT)

2008. június 30-ig alkalmazható

4.7.1 Minden olyan, a 4.5.1 a) alpont alapján vízfelszín felett üzemeltetett 1. és 2. teljesítmény osztályú forgószárnyas légijárművet amelynek egyedi légialkalmassági bizonyítványát először 2002 január 1. után adták ki, és minden olyan a 4.5.1 b) alpont alapján üzemeltetett 3. teljesítmény osztályú forgószárnyas légijárművet amelynek egyedi légialkalmassági bizonyítványát először 2002 január 1. után adták ki, és mentőtutajonként legalább egy darab automatikus ELT berendezéssel és egy darab (ELT/S) berendezéssel szereljenek fel

4.7.2 A 4.5.1 a) alpont alapján a vízfelszín felett üzemeltetett összes 1. és 2. teljesítmény osztályú és a 4.5.1 b) alpont alapján üzemeltetett 3. teljesítmény osztályú forgószárnyas légijárművet 2005. január 1-től mentőtutajonként legalább egy darab automatikus ELT berendezéssel és legalább egy darab (ELT/S) berendezéssel szereljenek fel.

4.7.3 A 4.6 szakasz alapján kijelölt szárazföldi területek felett repülést végrehajtó minden forgószárnyas légijárművet, amelynek egyedi légialkalmassági bizonyítványát először 2002 január 1. után adták ki, legalább egy darab automatikus vészhelyzeti helyjeladó (ELT) berendezéssel szereljenek fel.

4.7.4 2005 január 1-től a 4.6 szakasz alapján kijelölt szárazföldi területek felett repülést végrehajtó minden forgószárnyas légijárművet legalább egy darab automatikus vészhelyzeti helyjeladó (ELT) berendezéssel szereljenek fel.

4.7.5 **Ajánlás** – *Az összes forgószárnyas légijárművet szereljék fel automatikusan működésbe lépő vészhelyzeti helyjeladó (ELT) berendezéssel.*

4.7.6 A fenti 4.7.1 – 4.7.5 pontok alapján felszerelt vészhelyzeti helyjeladó (ELT) berendezés a 10. Annex III. kötet vonatkozó előírásai szerint üzemeljen.

2008. július 01-től alkalmazható

4.7.7 2008 július 01-től minden 1. és 2. teljesítmény osztályú forgószárnyas légijárművet szereljenek fel legalább egy darab automatikus ELT berendezéssel, és a 4.5.1 a) alpontban leírtak szerinti vízfelszín feletti üzemeltetés esetére pedig mentőtutajonként vagy mentőmellényenként szereljenek fel legalább egy darab automatikus ELT berendezéssel és legalább egy darab (ELT/S) berendezéssel.

4.7.8 2008 július 01-től minden 3. teljesítmény osztályú forgószárnyas légijárművet szereljenek fel legalább egy darab automatikus ELT berendezéssel, és a 4.5.1 b) alpontban leírtak szerinti vízfelszín feletti üzemeltetés esetére pedig mentőtutajonként vagy mentőmellényenként szereljenek fel legalább egy darab automatikus ELT berendezéssel és legalább egy darab (ELT/S) berendezéssel.

4.7.9 A fenti 4.7.7 és 4.7.8 pontok alapján felszerelt vészhelyzeti helyjeladó (ELT) berendezés a 10. Annex III. kötet vonatkozó előírásai szerint üzemeljen.

Megjegyzés: A vészhelyzeti helyjeladó (ELT) számának, típusának és a légijárművön való elhelyezésének valamint az uszóképességet támogató kiegészítő rendszerének megfelelő kiválasztása adja a legnagyobb esélyt a vészhelyzeti helyjeladó (ELT) működésbe hozására, amennyiben a kutatás és mentés szempontjából különösen nehéz területeket is beleértve, a víz vagy a szárazföld felett repülő légijárművet baleset érné. Az adóegység elhelyezése a legfontosabb tényező az optimális törés és tűz elleni védelem *biztosításában. Az automatikus működésű beépített vészhelyzeti helyjeladó (ELT) vezérlő és kapcsoló eszközeinek (aktíváló kijelzők) elhelyezésénél és a kapcsolódó üzemeltetési eljárások kialakításánál tekintetbe kell venni a figyelmetlenségből adódó működésbe hozatal gyors felismerésének, valamint a manuális bekapcsolás esetén a személyzet általi könnyű kezelhetőség igényeit.*

4.8 A nagy repülési magasságon üzemeltetett összes forgószárnyas légijármű

Megjegyzés: A szövegben alkalmazott abszolút légnyomás értékeknek megfelelő, a nemzetközi műlégkör alapján meghatározott megközelítő magasságok a következők:

Abszolút légnyomás	*magasság – méter*	*magasság – láb*
700 hPa	3000	10 000
620 hPa	4000	13 000
376 hPa	7600	25 000

4.8.1 Azt a forgószárnyas légijárművet, amelyet olyan repülési magasságokon kívánnak üzemeltetni, amelyeken a személyek részére rendszeresített kabin(ok)ban a légnyomás 700 hPa értéknél alacsonyabb lesz, szereljenek fel oxigén tároló és adagoló berendezéssel, amely lehetővé teszi a 2.3.8.1 pontban előírt oxigén készlet tárolását és szükség szerinti adagolását.

4.8.2 Azt a forgószárnyas légijárművet, amelyet olyan repülési magasságokon kívánnak üzemeltetni, amelyeken az atmoszférikus légnyomás 700 hPa értéknél alacsonyabb lesz, azonban a forgószárnyas légijármű személyek részére rendszeresített kabinjá(i)ban megfelelő módszerekkel 700 hPa értéknél nagyobb nyomást biztosítanak, szereljenek fel oxigén tároló és adagoló berendezéssel, amely lehetővé teszi a 2.3.8.2 pontban előírt oxigén készlet tárolását és szükség szerinti adagolását.

4.8.3 Azt a forgószárnyas légijárművet, amelyet olyan repülési magasságokon kívánnak üzemeltetni, amelyeken az atmoszférikus légnyomás 376 hPa értéknél magasabb, azonban a forgószárnyas légijármű négy percen belül nem tud olyan biztonságosan olyan repülési magasságra süllyedni, amelyen az atmoszférikus légnyomás értéke 620 hPa és amelynek egyedi légialkalmassági bizonyítványát 1998 november 9-én vagy ezt követően adták ki, a 2.3.8.2 pont előírásának megfelelő automatikusan működésbe lépő oxigén berendezéssel szereljenek fel. Az oxigén adagoló eszközök teljes száma legalább 10 %-al több legyen, mint az utasok és utaskabin személyzet üléseinek száma.

4.8.4 **Ajánlás** – *Azt a forgószárnyas légijárművet, amelyet olyan repülési magasságokon kívánnak üzemeltetni, amelyeken az atmoszférikus légnyomás 376 hPa értéknél magasabb, azonban a forgószárnyas légijármű négy percen belül nem tud olyan biztonságosan olyan repülési magasságra süllyedni, amelyen az atmoszférikus légnyomás értéke 620 hPa és amelynek egyedi légialkalmassági bizonyítványát 1998 november 9. előtt adták ki a 2.3.8.2 pont előírásának megfelelő automatikusan működésbe lépő oxigén berendezéssel, szereljenek fel. Az oxigén adagoló eszközök teljes száma legalább 10 %-al több legyen, mint az utasok és utaskabin személyzet üléseinek száma.*

4.9 Jegesedési körülmények között üzemeltetett összes forgószárnyas légijármű

Az összes olyan forgószárnyas légijárművet, amely ténylegesen jelentett vagy várható jegesedési időjárási körülmények között üzemeltetnek, alkalmas jegesedést gátló és/vagy jégtelenítő rendszerrel szereljenek fel.

4.10 Forgószárnyas légijárművek amikor utasokat szállítanak – időjárás-felderítő radarberendezés

Ajánlás *– A forgószárnyas légijárműveket, amikor azok utasokat szállítanak és ezeket olyan területeken üzemeltetik, amelyeken éjszaka vagy műszeres időjárási körülmények között az időjárás-felderítő radarberendezéssel várhatóan idejében felderíthető zivatarok és más gyakorlatilag veszélyt jelentő időjárási jelenségek fordulhatnak elő, üzemképes időjárás-felderítő radarberendezéssel vagy más szignifikáns időjárási jelenség jelzőkészülékkel szereljék fel.*

4.11 Minden olyan forgószárnyas légijármű, amely megfelel a 16. Annex I. kötet zajbizonyítvány előírásoknak

Minden forgószárnyas légijármű, amelynek meg kell felelnie a 16. Annex, I. kötet zajbizonyítvány előírásoknak, hordozza a forgószárnyas légijármű zajbizonyítványát. Amikor ez az okmány vagy a lajstromozó állam részéről jóváhagyott más dokumentumban található zajbizonyítványt tartalmazó megfelelő nyilatkozat nem angol nyelvű, mellékeljék annak hiteles angol nyelvű fordítását is.

1. Megjegyzés: A kötelezettségvállalást a fedélzeten tartott bármilyen dokumentum tartalmazhatja, amelyet a lajstromozó állam a 16. Annex, I. kötet rendelkezéseivel összhangban jóváhagyott.

2. Megjegyzés: A 16. Annex, I. kötetben közölt, és a forgószárnyas légijárműveknél alkalmazható, különböző zajbizonyítvány előírásokat a típusalkalmassági megkérésének dátumával, vagy az igazolást kiadó hatóság által meghatározott egyenértékű eljárás szerint benyújtott kérelem elfogadási dátumával lehet meghatározni. Néhány forgószárnyas légijárműnél nem követelmény, hogy megfeleljen bármelyik zajbizonyítvány előírásnak. Részletesebben lásd a 16. Annex, I. kötet, II. rész, 8 és 11 fejezeteit.

4.12 Utasszállító forgószárnyas légijárművek – utaskabin személyzet ülései

4.12.1 Minden forgószárnyas légijárművet szereljenek fel a forgószárnyas légijármű hossztengelyéhez viszonyított 15° értéken belül előre vagy hátrafelé néző, vállhevederekkel ellátott biztonsági övvel rendelkező üléssel minden egyes utaskabin személyzeti tag részére, akikre a 10.1 szakasz előírása alapján a forgószárnyas légijármű vészkiürítésénél szükség van.

1. Megjegyzés: A 4.2.2 c) 1) alpont előírásai alapján minden egyes további utaskabin személyzeti tag számára biztosítsanak biztonsági övvel ellátott ülőhelyet.

2. Megjegyzés: A vállhevederekkel ellátott biztonsági öv egymástól függetlenül használható vállhevederekből és biztonsági övből áll.

4.12.2 Az utaskabin személyzet üléseit úgy helyezzék el, hogy azok a padlószinten és egyéb helyeken található vészkijáratok közelében legyenek, ahogy azt a lajstromozó állam a vészhelyzeti kiürítésre vonatkozó előírásaiban meghatározta.

4.13 Forgószárnyas légijárművek, amelyeket nyomásmagasság-adó másodlagos radar válaszjeladóval kell felszerelni

Minden forgószárnyas légijárművet szereljenek fel a 10. Annex IV. kötetének előírásai szerint üzemelő nyomásmagasság-adó másodlagos radar válaszjeladóval.

Megjegyzés: Ennek az előírásnak célja a légiforgalmi szolgálatok valamint az összeütközést elkerülő fedélzeti rendszerek hatásos működésének fejlesztése. További célkitűzés annak elősegítése, hogy az összeütközést elkerülő fedélzeti rendszerekkel felszerelt légijárművek által használt légtereket ne kelljen megosztani azon légijárművekkel melyen nincsenek felszerelve nyomásmagasság-adó másodlagos radar válaszjeladóval.

4.14 Mikrofonok

A pilótakabinban szolgálati feladatot ellátó összes hajózószemélyzeti tag közleményváltásaihoz az átváltási szint/magasság alatt kézi vagy fejhallgatóhoz erősített mikrofont használjon.

4.15 Rezgésekre bekövetkező állapotváltozást figyelő rendszert

Ajánlás – *Azokat a forgószárnyas légijárműveket, amelyek engedélyezett felszállló tömege meghaladja a 3175 kg-ot, vagy a maximális utasbefogadó képessége több mint kilenc fő, szereljék fel rezgésekre bekövetkező állapotváltozást figyelő rendszerrel.*

5. fejezet
Forgószárnyas légijármű távközlési és navigációs berendezések

5.1 Távközlési berendezés

5.1.1 A forgószárnyas légijárművet olyan rádió távközlésre alkalmas berendezéssel szereljék fel, amely képes:

a) a helikopter repülőtéri irányítás céljainak megfelelő kétoldalú összeköttetés fenntartására;

b) a repülés végrehajtása során bármikor az időjárási tájékoztatások vételére; és

c) a repülés végrehajtása során bármikor kétoldalú rádióösszeköttetés fenntartására legalább egy légiforgalmi állomással valamint más olyan légiforgalmi állomásokkal és olyan hullámhosszokon, amelyeket az illetékes hatóság előírt.

Megjegyzés: A 5.1.1 pont előírásai teljesítettnek tekinthetők, ha a forgószárnyas légijármű az útvonalon szokásos hullámterjedési viszonyok között képes az itt meghatározott távközlési összeköttetések fenntartására.

5.1.2 A 5.1.1 pont alapján előírt rádió berendezés alkalmas legyen rádió összeköttetés fenntartására a 121.5 Mhz-es légiközlekedési vészfrekvencián.

5.1.3 A légtér meghatározott szakaszaiban vagy olyan útvonalakon történő repülések végrehajtásakor, ahol RCP típus lett előírva, az 5.1.1 pontban meghatározott követelményeken túl a forgószárnyas légijármű:

a) legyen felszerelve olyan távközlési berendezésekkel, amelyek lehetővé teszik az előírt RCP típus(ok) szerinti üzemeltetést; és

b) a járató állama részéről rendelkezzen jogosítással az ilyen légtérben történő üzemeléshez.

Megjegyzés: az előírt távközlési teljesítményre (RCP), az ezzel összefüggő eljárásokra valamint a jogosítási folyamatra vonatkozó tájékoztatásokat az előkészítés alatt lévő Előírt Távközlési Teljesítmény (RCP) *Kézikönyv (Doc 9869) tartalmazza. Ez a kiadvány felsorolja továbbá azokat a dokumentumokat is amelyeket az államok és a nemzetközi szervezetek a távközlési rendszerekre és az előírt távközlési teljesítményre (RCP) dolgoztak ki.*

5.2 Navigációs berendezés

5.2.1 A forgószárnyas légijárművet szereljék fel olyan navigációs berendezéssel, amelynek segítségével az képes:

a) az üzemeltetői repülési tervében meghatározott útvonal követésére; és

b) a légiforgalmi szolgálatok előírásainak megfelelő repülés végrehajtására;

kivéve, – amennyiben ezt az illetékes hatóság nem tiltja meg – amikor a látvarepülési szabályok szerint végrehajtott repülés során a navigációt a földi tájékozódási pontok látás utáni azonosításával hajtják vége.

5.2.2 A légtér meghatározott szakaszaiban vagy olyan útvonalakon történő repülés esetében, amelyekre vonatkozóan RNP típust írtak elő, a forgószárnyas légijármű az 5.2.1 pontban ismertetett előírások mellett:

a) legyen felszerelve olyan navigációs berendezésekkel, amelyek lehetővé teszik az előírt RNP típus(ok) szerinti üzemeltetést; és

b) a járató állama részéről rendelkezzen jogosítással az ilyen légtérben történő üzemeléshez.

Megjegyzés: Az előírt navigációs pontosságra (RNP), az ezzel összefüggő eljárásokra valamint a jogosítási folyamatra vonatkozó tájékoztatásokat az RNP Kézikönyv *(Doc 9613) tartalmazza. A kiadvány átfogóan felsorolja azokat a dokumentumokat és egyéb anyagokat, amelyeket az államok és a nemzetközi szervezetek a navigációs rendszerekre valamint az előírt navigációs teljesítményre vonatkozóan készítettek el.*

5.2.3 A forgószárnyas légijárművet olyan navigációs berendezéssel szereljék fel, amely biztosítja, hogy a repülés végrehajtásának bármely szakaszában bekövetkező, az egyik rendszert érintő meghibásodás esetében a forgószárnyas légijárművet a másik rendszerrel az 5.2.1 pont valamint ahol ez alkalmazható, az 5.2.2 pont előírásainak megfelelően tovább lehessen irányítani (navigálni).

5.2.4 A műszeres időjárási körülmények között végrehajtott leszállással tervezett repülések esetében a forgószárnyas légijárművet szereljék fel olyan rádió berendezéssel, amely alkalmas az irányvezetést biztosító rádiójelek vételére addig a pontig, ahonnan a leszállás látással végrehajtható. Ez a rádió berendezés képes legyen az irányvezetés biztosítására minden olyan tervezett leszállási, valamint bármely kijelölt kitérő helikopter repülőtéren, ahol műszeres időjárási körülmények között történő leszállás végrehajtását tervezik.

5.3 Felszerelés

A berendezéseket úgy szereljék fel, hogy bármelyik egyedi egység meghibásodása, amely akár rádió távközlés összeköttetési, akár navigációs illetve mindkét célra szükséges – ne okozza a távközlési összeköttetés vagy navigációs célra szükséges másik egység meghibásodását.

6. fejezet
Forgószárnyas légijármű karbantartás

1. Megjegyzés: A jelen fejezetben történő alkalmazás során a forgószárnyas légijármű kifejezésbe tartoznak a hajtóművek, meghajtás áttételek, forgószárnyak, légcsavarok, alkatrészek, műszerek, szerkezeti egységek és felszerelések, beleértve a vészhelyzeti felszereléseket is.

2. Megjegyzés: A jelen fejezetben megadott előírások a lajstromozó állam előírásait jelentik. Amennyiben a járató állama nem azonos a lajstromozó állammal, szükséges lehet a járató állama bármely további előírásainak figyelembevétele is.

3. Megjegyzés: A folyamatos légialkalmasság követelményeire vonatkozó útmutató a Légialkalmassági Kézikönyv-*ben (Doc 9760) található.*

6.1 A járató karbantartási felelőssége

6.1.1 A járató biztosítsa, hogy a lajstromozó állam részéről elfogadható eljárásokkal összhangban:

a) minden üzemeltetett forgószárnyas légijárműve repülésre alkalmas állapotban legyen;

b) a tervezett repüléshez szükséges üzemeltetési és vészhelyzeti berendezések működőképesek legyenek;

c) minden egyes általa üzemeltetett forgószárnyas légijármű Légialkalmassági Bizonyítványa érvényes legyen.

6.1.2 A járató csak abban az esetben üzemeltesse a forgószárnyas légijárművet, ha annak karbantartását és a karbantartásról szóló nyilatkozat kiadását a lajstromozó állam részéről elfogadható, a 6. Annex I. rész 8.7 szakasza, vagy azzal egyenértékű rendszer alapján jóváhagyott szervezet hajtja végre.

6.1.3 Amikor a lajstromozó állam elfogadja a fenti megfelelő (műszaki) rendszert, a karbantartás végrehajtásáról szóló nyilatkozatot aláíró személy az 1. Annex előírásainak megfelelő szakszolgálati jogosítással rendelkezzen.

6.1.4 A járató alkalmazzon egy személyt vagy munkacsoportot annak biztosítására, hogy az összes karbantartási feladatot a karbantartás irányítási kézikönyvnek megfelelően végzik el.

6.1.5 A járató biztosítsa, hogy forgószárnyas légijárműveinek karbantartását a lajstromozó állam által jóváhagyott karbantartási programnak megfelelően végzik el.

6.2 A járató karbantartás irányítási kézikönyve

6.2.1 A járató a karbantartást végző szervezetek és személyek tájékoztatására és használatára a 9.2 szakasz előírásaival összhangban, a lajstromozó állam által elfogadható karbantartás irányítási kézikönyvet biztosítson. A kézikönyv tartalmi kialakítása vegye tekintetbe az emberi tényezők alapelveit.

Megjegyzés: Az Emberi Tényezők alapelveinek alkalmazására vonatkozó útmutató az Emberi Tényezők Kiképzési Kézikönyv-*ében (Doc 9683) található.*

6.2.2 A járató biztosítsa, hogy a karbantartás irányítási kézikönyvet szükség szerint módosítsák és egészítsék ki annak érdekében, hogy az abban található tájékoztatások mindig naprakészek legyenek.

6.2.3 A járató karbantartás irányítási kézikönyve összes módosításának megfelelő példányait haladéktalanul juttassák el minden olyan szervezetnek vagy személynek, amelynek a kézikönyv eredeti példányát átadták.

6.2.4 A járató adja át a járatói karbantartás irányítási kézikönyv egy-egy példányát a lajstromozó és a járató államainak az összes módosítással és/vagy kiegészítéssel továbbá az összes olyan anyaggal együtt, amelyeket ezek kötelezően előírnak.

6.3 Karbantartási program

6.3.1 A járató a karbantartást végző szervezetek és személyek tájékoztatására és használatára a 9.3 szakaszban meghatározott tájékoztatásokat tartalmazó, a lajstromozó állam részéről jóváhagyott karbantartási programot adjon ki. A járató karbantartási programjának kidolgozása és felhasználása alkalmával vegyék figyelembe az emberi tényezők alapelveit.

Megjegyzés: Az Emberi Tényezők alapelveinek alkalmazására vonatkozó útmutató az Emberi Tényezők Kiképzési Kézikönyv-*ében (Doc 9683) található.*

6.3.2 A karbantartási program összes módosításának megfelelő példányait haladéktalanul juttassák el minden olyan szervezetnek vagy személynek, amelynek a karbantartási programot átadták.

6.4 Karbantartások nyilvántartása

6.4.1 A járató biztosítsa a következő karbantartási adatok megőrzését a 6.4.2 pontban jelzett időtartamig:

a) a forgószárnyas légijármű és az összes korlátozott ideig üzemeltethető alkatrészének teljes üzemideje (szükség szerint órában, naptári időszakban és repülési ciklusokban meghatározva);

b) a forgószárnyas légijármű állapota az összes kötelező folyamatos légialkalmassági előírás és tájékoztatás teljesítése vonatkozásában;

c) a forgószárnyas légijármű és főbb szerkezeti elemeinek, alkatrészeinek módosítása és javítása valamint ennek részletezése;

d) a forgószárnyas légijármű vagy meghatározott kötelező karbantartási időszakkal vagy ciklussal rendelkező részeinek teljes üzemideje az utolsó (nagy)javítás óta (szükség szerint órában, naptári időszakban és/vagy repülési ciklusokban meghatározva);

e) a forgószárnyas légijármű karbantartási programhoz viszonyított jelenlegi felülvizsgálati – ellenőrzési – helyzete a feladatok végrehajtása alapján; és

f) részletes karbantartási jegyzőkönyvek, amelyekből megállapítható, hogy teljesítették a karbantartási kézikönyvben található, a karbantartási nyilatkozathoz szükséges összes előírást.

6.4.2 A 6.4.1 *a)–e)* alpontokban ismertetett nyilvántartásokat azon egység üzemi élettartamának lejáratát és üzemeltetésből történő végleges kivonását követő legalább 90 napig őrizzék meg, amely egységre a nyilvántartás vonatkozik. A 6.4.1 *f)* alpontban ismertetett jegyzőkönyvet a karbantartási nyilatkozat aláírását követő egy évig őrizzék meg.

6.4.3 Amennyiben a forgószárnyas légijármű járatója ideiglenesen megváltozik, a nyilvántartást bocsássák az új járató rendelkezésére. Ha a járató véglegesen megváltozik, a nyilvántartást adják át az új járatónak.

6.5 Folyamatos légialkalmassági tájékoztatás

6.5.1 A 3175 kg. legnagyobb engedélyezett felszállósúlynál (tömeg) nehezebb forgószárnyas légijármű járatója a folyamatos légialkalmasság szempontjából kövesse figyelemmel és értékelje a forgószárnyas légijármű üzemeltetését és karbantartását, biztosítsa a lajtromozó állam részéről előírt tájékoztatásokat és azokat a 8. Annex II. rész 4.2.3 f) valamint 4.2.4 pontok előírásaiban meghatározott rendszerben jelentse.

6.5.2 A 3175 kg. legnagyobb engedélyezett felszállósúlynál (tömeg) nehezebb forgószárnyas légijármű járatója a forgószárnyas légijármű típus tervezéséért felelős szervezettől szerezze be és értékelje ki a rendelkezésre álló folyamatos légialkalmassági tájékoztatásokat és ajánlásokat, továbbá ezek alapján a lajstromozó állam által elfogadható eljárásokkal összhangban szükség szerint vezessen be megfelelő intézkedéseket.

Megjegyzés: A forgószárnyas légijármű típus tervezéséért felelős szervezet kifejezés értelmezésére vonatkozó útmutatót a Légialkalmassági Kézikönyv *(Doc 9760) tartalmazza.*

6.6 Módosítások és javítások

Az összes módosítást és javítást a lajstromozó állam által elfogadható légialkalmassági előírásoknak megfelelően végezzék el. Dolgozzanak ki eljárásokat annak biztosítására, hogy elegendő mennyiségű adatot gyűjtsenek össze és őrizzenek meg annak bizonyítására, hogy a légialkalmasságra vonatkozó követelményeknek eleget tettek.

6.7 Karbantartási nyilatkozat

6.7.1 A karbantartási munka kielégítő, a karbantartó szervezet működési kézikönyvében ismertetett eljárásoknak és a jóváhagyott feltételeknek megfelelően történő sikeres elvégzésének igazolására készítsenek el és írjanak alá karbantartási nyilatkozatot.

6.7.2 A karbantartási nyilatkozat tartalmazzon igazolást az alábbiakról:

a) az elvégzett karbantartási munka alapvető részletei, beleértve a felhasznált engedélyezési illetve jóváhagyási feltételek részletezését;

b) a karbantartás befejezésének időpontja;

c) az engedélyezett karbantartó szervezet azonosítója – amennyiben ez alkalmazható; és

d) a karbantartási nyilatkozatot aláíró személy vagy személyek neve.

6.8 Nyilvántartások

6.8.1 A járató biztosítsa a következő nyilvántartások vezetését:

a) a forgószárnyas légijármű teljes egésze vonatkozásában – a teljes üzemidő;

b) a forgószárnyas légijármű összes fő alkatrésze vonatkozásában:

1) teljes üzemidő;

2) az utolsó nagyjavítás időpontja;

3) az utolsó felülvizsgálat időpontja;

c) az összes korlátozott ideig üzemeltethető műszer és berendezés vonatkozásában;

1) az üzemképesség meghatározásához vagy az üzemi élettartam kiszámításához szükséges üzemidő nyilvántartás;

2) az utolsó felülvizsgálat időpontja.

6.8.2 Ezeket a nyilvántartásokat azon egység üzemi élettartamának lejáratát követő 90 napig őrizzék meg, amely egységre a nyilvántartás vonatkozik.

7. fejezet
A forgószárnyas légijármű hajózószemélyzete

7.1 A hajózószemélyzet összetétele

7.1.1 A hajózószemélyzet tagjainak száma és összetétele az üzemeltetési kézikönyv előírásaiban megállapítottnál ne legyen alacsonyabb. A repülésvégrehajtási kézikönyvben vagy a légijármű légialkalmassági bizonyítványával összefüggésben levő más egyéb dokumentumban meghatározott minimális létszámon felül a hajózószemélyzetet egészítsék ki további hajózószemélyzeti tagokkal abban az esetben, ha ezt a forgószárnyas légijármű vagy az adott üzemeltetés típusa valamint a hajózószemélyzet váltási pontok közötti repülés időtartama szükségessé teszi.

7.1.2 A hajózószemélyzetben legalább egy olyan tag legyen, aki az alkalmazott rádiótávbeszélő berendezés üzemeltetésére jogosító, a lajstromozó állam által kiadott vagy elfogadott érvényes rádiótávbeszélő kezelői engedéllyel rendelkezik.

Megjegyzés: Egyes államok megkapták a rádiótávbeszélő engedély kiadási jogot.

7.2 A hajózószemélyzeti tag vészhelyzeti kötelességei

A járató minden egyes forgószárnyas légijármű típusra jelölje ki és határozza meg a hajózószemélyzet minden tagjának vészhelyzetben vagy a forgószárnyas légijármű vészkiürítése esetében elvégzendő egyéni feladatait. A járató kiképzési programja tartalmazza ezen vészhelyzeti feladatok éves gyakorlását, beleértve az összes vészhelyzeti és előírás szerint szállított életmentő berendezés használatát valamint a forgószárnyas légijármű kiürítésének gyakorlását is.

7.3 A hajózószemélyzeti tag kiképző programok

7.3.1 A járató dolgozzon ki és folyamatosan tartson fenn a járató állama által elfogadott és jóváhagyott földi és repülési kiképzési programot, amely biztosítja, hogy kijelölt feladatainak ellátására a hajózószemélyzet minden tagja megfelelő kiképzésben részesüljön.
A kiképzési program:

a) tartalmazzon a járató állama által meghatározott földi és repülési kiképző létesítményeket, továbbá jól képzett és jogosított oktatókat is;

b) álljon földi és repülési kiképzésből minden olyan forgószárnyas légijármű típuson, amelyen a hajózószemélyzeti tag szolgálatot teljesít;

c) terjedjen ki a hajózószemélyzet tagjai közötti együttműködésre, továbbá az összes olyan vészhelyzet vagy rendellenes üzemelés esetén szükséges eljárás gyakorlására, amely a hajtómű, áttételi rendszer, forgószárny, sárkányszerkezet, repülési rendszerek meghibásodása, tűz vagy más rendellenesség esetében következhet be;

d) tartalmazzon olyan elméleti és gyakorlati képzést, amely a betervezett üzemeltetési területekre érvényes látás szerinti és műszeres repülési eljárásokra, a fenyegetések és hibák kezelését is magába foglaló emberi teljesítőképesség fejlesztésére, valamint a veszélyes áruk szállítására tér ki;

e) biztosítsa, hogy a hajózószemélyzet minden egyes tagja ismerje azokat a feladatokat, amelyek végrehajtásáért személyesen felelős, továbbá ezen feladatok kapcsolatát a hajózószemélyzet többi tagjának feladataival, különös tekintettel a vészhelyzeti, vagy rendellenes üzemelés esetében szükséges eljárásokra; és

f) a járató államának előírásai alapján rendszeres időközönként kerüljön megismétlésre, melynek alkalmával az érintettek jártasságukról tegyenek vizsgát.

1. Megjegyzés: A 2.2.4 pont tiltja, hogy vészhelyzeti vagy a rendes üzemeléstől eltérő gyakorlást illetve szimulációt végezzenek a repülés közben abban az esetben, ha a fedélzeten utasok tartózkodnak vagy teherárut szállítanak.

2. Megjegyzés: A repülési kiképzést a járató állama által megfelelőnek tartott mértékben a járató állama által erre a célra engedélyezett szintetikus repülési gyakorló berendezésen is végre lehet hajtani.

3. Megjegyzés: A 7.2 és 7.3 szakaszokban előírt ismétlődő kiképzés terjedelme változtatható és annak nem *kell olyan alaposnak lennie, mint az adott forgószárnyas légijármű típus vonatkozásában lebonyolított első (alap) kiképzés.*

4. Megjegyzés: Az időszakos földi kiképzés követelményeinek biztosítására a járató állama által megfelelőnek tartott mértékben levelező tanfolyamokat, írásbeli vizsgáztatást vagy más, elfogadott módszereket is alkalmazhatnak.

5. Megjegyzés: A veszélyes áruk szállításával kapcsolatos kiképzésre vonatkozó előírásokat a 18. Annex tartalmazza.

6. Megjegyzés: Az emberi teljesítmény és gyakorlati ismeretek fejlesztését célzó kiképzési programok tervezésére vonatkozó útmutató az Emberi Tényezők Kiképzési Kézikönyv*-ében (Doc 9683) található.*

7. Megjegyzés: A repülőgépvezetőknek és a légiüzemeltetéssel foglalkozó személyeknek szóló azon információkat, amelyek a repülősi eljárások paramétereire és az üzemeltetési eljárásokra vonatkoznak, a PANS-OPS I. kötete (Doc 8168) tartalmazza. A látás utáni és a műszeres repülési eljárások felépítésére vonatkozó követelményeket a PANS-OPS II. kötete (Doc 8168) tartalmazza. Az akadály mentesség követelményeinek és eljárásainak használata egyes államokban eltérhetnek a PANS-OPS előírásaitól, és biztonsági okokból fontos ezen különbségek ismerete.

8. Megjegyzés: A hajózószemélyzetek kiképzési programjainak tartalmi összeállítására vonatkozó útmutató anyag a Repülésüzemi Kézikönyv Előkészítése *(Doc 9376) című anyagban található.*

9. Megjegyzés: az alkalmasság megállapítására használatos különböző eszközökre vonatkozó útmutató A Légiforgalmi Szolgálatok Eljárásai – Képzés *(PANS-TRG, Doc 9868) című anyag 2. fejezetének mellékletében található.*

7.3.2 Az időszakos ismétlődő repülési képzés követelményei az adott forgószárnyas légijármű típus vonatkozásában teljesítettnek tekinthetők, amennyiben:

a) a járató állama által elfogadott mértékben olyan forgószárnyas légijármű szintetikus repülési gyakorló berendezést használnak, amelyet az érintett állam erre a célra elfogadott; vagy

b) az adott forgószárnyas légijármű típusra a 7.4.4 pontban előírt repüléstechnikai ellenőrzést megfelelő időszakon belül elvégzik.

7.4 Jogosítások

Megjegyzés: A személyzet kereszt jogosításának az eltérő típusokon való repülésnek és a képzettség beszámításának általános tulajdonságaira vonatkozó útmutatót lásd az Egyéni szakszolgálati engedélyek kiadását biztosító állami rendszer létrehozására vonatkozó eljárások kézikönyvében *(Doc 9379).*

7.4.1 Folyamatos gyakorlatban tartás – légijármű parancsnok

7.4.1.1 A járató a forgószárnyas légijárművön légijármű parancsnoknak csak olyan légijármű-vezetőt jelöljön ki, aki megelőző kilencven nap folyamán az adott forgószárnyas légijármű típussal, vagy annak típus változatával legalább három fel és leszállást hajtott végre.

7.4.1.2 Amikor egy légijármű parancsnok azonos típusú forgószárnyas légijármű különböző változatait, vagy a légiüzemeltetési eljárások, a rendszerek és a kiszolgálás tekintetében hasonló jellemzőkkel bíró, de eltérő típusú forgószárnyas légijárműveket vezeti, az állam döntse el, hogy a 7.4.1.1 bekezdés követelményeit milyen feltételekkel lehet összekapcsolni minden egyes változatra, vagy minden egyes forgószárnyas légijármű típusra vonatkozóan.

7.4.2 Folyamatos gyakorlatban tartás – másodpilóta

7.4.2.1 A járató a repülési rendszerek fel és leszállás végrehajtása közben történő kezelésére csak olyan másodpilótát jelöljön ki, aki a megelőző kilencven nap folyamán az adott forgószárnyas légijármű típuson légijármű parancsnokként, vagy másodpilótaként szolgálatot teljesített és a légijárművet ilyen minőségében vezette, vagy az erre a célra elfogadott mesterséges repülés gyakorló berendezésen bizonyította alkalmasságát a másodpilóta feladatainak ellátására.

7.4.2.2 Amikor egy másodpilóta azonos típusú forgószárnyas légijármű különböző változatait, vagy a légiüzemeltetési eljárások, a rendszerek és a kiszolgálás tekintetében hasonló jellemzőkkel bíró, de eltérő típusú forgószárnyas légijárműveket vezeti, az állam döntse el, hogy a 7.4.2.1 bekezdés követelményeit milyen feltételekkel lehet összekapcsolni minden egyes változatra, vagy minden egyes forgószárnyas légijármű típusra vonatkozóan.

7.4.3 Légijármű parancsnok repülési jogosítása

7.4.3.1 A járató a légijármű-vezetőt forgószárnyas légijármű parancsnokként mindaddig ne jelölje ki olyan útvonalra, vagy útvonal szakaszra, amelyre az érintett légijármű-vezetőnek nincs érvényes jogosítása, amíg az érintett légijármű-vezető eleget nem tesz a 7.4.3.2 és 7.4.3.3 pontok előírásainak.

7.4.3.2 Valamennyi érintett légijármű-vezető a járató számára bizonyítsa, hogy megfelelő mértékben ismeri a következőket:

a) a lerepülendő feladatot a következő jellemzők vonatkozásában;

1) domborzati viszonyok és legalacsonyabb biztonságos repülési magasságok;

2) az évszaknak megfelelő időjárási körülmények;

3) a meteorológiai, távközlési és légiforgalmi irányítási létesítmények, szolgálatok valamint eljárások;

4) a kutató és mentő szolgálati eljárások; és

5) a tervezett repülési útvonal teljes hosszán található navigációs létesítmények és eljárások.

b) a sűrűn lakott területek felett valamint a nagy-forgalmú légtereken átvezető repülési útvonalak eljárásai, akadályai, fizikai jellemzői, megközelítési segédeszközei, érkezési, indulási, várakozási és műszeres megközelítési eljárásai továbbá az alkalmazható üzemeltetési minimumok.

Megjegyzés: Az érkezési, indulási, várakozási és műszeres megközelítési eljárások ismeretét az erre a célra alkalmas kiképzési segédeszköz igénybevételével is bizonyítani lehet.

7.4.3.3 A légijármű parancsnoka hajtson végre egy tényleges megközelítést az útvonalon elhelyezkedő összes leszállási helikopter repülőtérre olyan légijármű-vezető megfigyelése mellett, aki az adott helikopter repülőtérre rendelkezik jogosítással és hajózószemélyzeti tagként vagy megfigyelőként a fedélzeten tartózkodik.

7.4.3.4 A járató vezessen megfelelő nyilvántartást, amellyel a járató állama részére kielégítően bizonyítja a légijármű-vezető jogosítását, valamint a jogosítás megszerzésének módját.

7.4.3.5 A járató egy légijármű-vezetőt egy útvonalon légijármű parancsnokként csak akkor foglalkoztasson tovább, ha az érintett a megelőző 12 hónapon belül hajózószemélyzeti tagként, ellenőrző légijármű-vezetőként vagy a pilótakabinban megfigyelőként legalább egy utat megtett az útvonal két végpontja között. Amennyiben több mint 12 hónap telt el azóta, hogy a légijármű-vezető nem repült az útvonal közvetlen közelében és hasonló adottságú terep felett, az adott útvonalon légijármű parancsnokként történő foglalkoztatása előtt a 7.4.3.2 és 7.4.3.3 pontok előírásai alapján ismételt útvonal-jogosítást kell szereznie.

7.4.4 A légijármű-vezető szakmai jártasságának ellenőrzése

7.4.4.1 A járató biztosítsa a légijármű-vezető repüléstechnikai felkészültségének és a vészhelyzeti eljárások megfelelő végrehajtásának ellenőrzését oly módon, amelyből egyértelműen kiderül a légijármű-vezető szakmai jártassága. Amennyiben az üzemeltetés műszerrepülési szabályok között is végrehajtható, a járató biztosítsa, hogy a forgószárnyas légijármű-vezető az ilyen (IFR) szabályok alapján történő megfelelő tevékenységét, szakmai jártasságát a járató ellenőrző légijármű-vezetője vagy a járató államának képviselője számára bizonyítsa. Az ilyen ellenőrzéseket egy éven belül két alkalommal végezzék el, azonban négy egymást követő hónapon belül kétszer végrehajtott hasonló jellegű ellenőrzés a fenti követelményt nem elégíti ki.

Megjegyzés: Az ellenőrzések olyan részleteinek végrehajtására felhasználhatók a járató állama által erre elfogadott mesterséges repülés gyakorló berendezés, amelyekre ezek külön jogosítással rendelkeznek.

7.4.4.2 Amikor egy járató a hajózó személyzetet azonos típusú forgószárnyas légijármű különböző változataira, vagy a légiüzemeltetési eljárások, a rendszerek és a kiszolgálás tekintetében hasonló jellemzőkkel bíró de eltérő típusú forgószárnyas légijárművekre osztja be, az állam döntse el, hogy a 7.4.4.1 bekezdés követelményeit milyen feltételekkel lehet összekapcsolni minden egyes változatra vagy minden egyes légijármű típusra vonatkozóan.

7.5. A hajózószemélyzet felszerelése

A hajózószemélyzet tagja rendelkezzen könnyen hozzáférhető, megfelelő tartalék szemüveggel abban az esetben, ha szakszolgálati tevékenységének végzésére csak megfelelő korrekciós szemüveg viselése mellett jogosult.

7.6 Repülési idő, repülési szolgálati idő és pihenőidő

A járató állama dolgozzon ki előírásokat a hajózószemélyzet tagjainak repülési idejének, valamint repülési szolgálati idejének korlátozására. Ezek az előírások biztosítsák a megfelelő pihenőidőt és olyanok legyenek, hogy a repülés vagy repülési sorozat végrehajtása során illetve bizonyos időszak alatt ezen feladatok és más események miatt felhalmozódott fáradtság ne veszélyeztesse a repülés biztonságát.

Megjegyzés: A korlátozások kidolgozására vonatkozó útmutató az A. Mellékletben található.

8. fejezet
Repülés-üzemi tiszt / szolgálatvezető

8.1 Amennyiben a járató állama megköveteli, hogy a légiüzemeltetés irányításának és felügyeletének jóváhagyott rendszerén belül alkalmazott repülés-üzemi tiszt/szolgálatvezető rendelkezzen szakszolgálati engedéllyel, akkor az érintett repülés-üzemi tisztet/szolgálatvezetőt az 1. Annex előírásainak megfelelő szakszolgálati engedéllyel lássák el.

8.2 Amennyiben a repülés-üzemi tiszt/szolgálatvezető szakszolgálati engedélytől eltérő más jogosítási módszert fogadnak el, akkor a légiüzemeltetés irányításának és felügyeletének jóváhagyott rendszerével összefüggésben, a járató állama követelje meg, hogy az ilyen személyek minimum feleljenek meg az 1. Annexben a repülés-üzemi tisztre/szolgálatvezetőre meghatározott követelményeknek.

8.3 A légiüzemeltetés irányításának és felügyeletének jóváhagyott rendszerével szolgálatra csak azt követően osztható be, hogy:

a) megfelelően elvégezte a járatóra meghatározott tanfolyamot, amely tartalmazza a 2.2.1.4 bekezdésben a járató légiüzemeltetés irányításának és felügyeletének jóváhagyott rendszerével összefüggő sajátságos összetevőket;

Megjegyzés: az ilyen tananyag összeállítására vonatkozó útmutató a Kiképzési Kézikönyv *(Doc 7192),* Repülés-üzemi tiszt/szolgálatvezető *című D-3 részében található.*

b) a megelőző 12 hónapon belül legalább egy alkalommal egy egy-irányú útvonal jogosító repülésen vett részt a forgószárnyas légijármű pilótakabinjában bármely olyan terület felett, amelyre repülésfelügyeleti jogosítással rendelkezik. A repülés gyakorlati szempontból a lehető legtöbb forgószárnyas légijármű leszállóhelyre való leszállást is foglaljon magába;

Megjegyzés: A jogosító repülés céljainak megfelelően a repülés-üzemi tiszt/szolgálatvezető legyen képes ellenőrizni a hajózó személyzet egymás közötti kommunikációját biztosító rendszert és a rádió kommunikációt, és legyen képes megfigyelni a hajózó személyzet tevékenységét.

c) a járatónak bizonyította, hogy kielégítő mértékben ismeri:

1) a H. mellékletben ismertetett üzemeltetési kézikönyv tartalmát;

2) az alkalmazott forgószárnyas légijárművek rádió berendezéseit; és

3) az alkalmazott forgószárnyas légijárművek navigációs berendezéseit;

d) bizonyította a járatónak, hogy ismeri azon feladatok következő részleteit, amelyekért felelős valamint azokat a területeket, amelyeken az érintett repülés-üzemi tiszt/szolgálatvezető repülés-felügyelet gyakorlására jogosult;

1) az évszaknak megfelelő időjárási körülmények és a meteorológiai tájékoztatások beszerzési forrásai;

2) az időjárási körülmények hatásai az alkalmazott forgószárnyas légijárművek rádió berendezéseinek vételi tulajdonságaira;

3) az üzemeltetés során használt egyes rádiónavigációs rendszerek jellegzetességei és üzemeltetési korlátozásai; és

4) a forgószárnyas légijármű terhelési utasítása;

e) bizonyította a járatónak, hogy rendelkezik az emberi teljesítőképességgel összefüggő olyan ismeretekkel és jártassággal, amelyek a szolgálatvezetői tevékenységgel állnak kapcsolatban; és

f) bizonyította a járatónak, hogy képes a 2.6 pontban kijelölt feladatainak ellátására.

8.4 ***Ajánlás*** *– A szolgálatra kijelölt repülés-üzemi tiszt/szolgálatvezető teljes mértékben ismerje a feladatkörét érintő üzemeltetés összes jellemzőit, beleértve az emberi teljesítőképességgel kapcsolatos elméleti és gyakorlati ismereteket.*

Megjegyzés: Az emberi teljesítmény és gyakorlati ismeretek fejlesztését célzó kiképzési programok tervezéséhez útmutató az Emberi Tényezők Kiképzési Kézikönyv*-ében (Doc 9683) található.*

8.5 ***Ajánlás*** *– A repülés-üzemi tisztet/szolgálatvezetőt ne jelöljék ki szolgálatra abban az esetben, ha egymást követő 12 hónapon keresztül ilyen szolgálatot nem látott el, kivéve, ha a 8.3 pont előírásainak eleget tesz.*

9. fejezet
Kézikönyvek, naplók és nyilvántartások

Megjegyzés: A következő kiegészítő kézikönyvek, nyilvántartások és jegyzőkönyvek a jelen Annex anyagához kapcsolódnak, azonban ezeket a fejezet nem tartalmazza:

tüzelőanyag és olaj jegyzőkönyvek	lásd 2.2.8
karbantartások nyilvántartása	lásd 6.8
repülési idő, repülési szolgálati idő és pihenőidő jegyzőkönyvek	lásd 2.2.9.3
repülés előkészítési formanyomtatványok	lásd 2.3
üzemeltetői repülési terv	lásd 2.3.3
légijármű parancsnok útvonal és repülőtér jogosításainak nyilvántartásai	lásd 7.4.3.4

9.1 Repülésvégrehajtási kézikönyv

Megjegyzés: A repülésvégrehajtási kézikönyv a 8. Annex-ben meghatározott tájékoztatásokat tartalmazza.

A repülésvégrehajtási kézikönyvet a lajstromozó állam előírásai alapján kötelező érvényű változások behelyezésével tartsák naprakészen.

9.2 Járató karbantartás irányítási kézikönyve

A járató 6.2 szakasz előírásai alapján biztosított karbantartás irányítási kézikönyve, amelyet több részben is kiadhat, a következő tájékoztatásokat tartalmazza:

a) a 6.1.1 pont alapján előírt eljárások ismertetése, szükség szerint:

1) a járató és az engedélyezett karbantartó szervezet közötti adminisztratív megállapodások;

2) a karbantartás végrehajtási eljárások valamint a karbantartási nyilatkozat elkészítési és aláírási eljárások, amikor a karbantartást olyan rendszerben hajtják végre, amely nem azonos az engedélyezett karbantartó szervezet eljárásaival;

b) a 6.1.4 pontban előírt személy vagy személyek neve és feladatai;

c) hivatkozás a 6.3.1 pontban előírt karbantartási programra;

d) a járató karbantartási jegyzőkönyveinek elkészítési és megőrzési módszerei a 6.4 szakasz előírásai alapján;

e) a 6.5.1 pontban előírt karbantartás és üzemeltetés felügyeleti, értékelési és jegyzőkönyvezési eljárások ismertetése;

f) a 8. Annex II. rész 4.2.3 f) és 4.2.4 pontjaiban előírt, a szolgálati tájékoztatások jelentésére vonatkozó követelmények teljesítésének eljárásai;

g) a 6.5.2 pontban előírt folyamatos légialkalmassági tájékoztatások értékelésének és az ennek alapján végrehajtott bármely tevékenység elvégzésének eljárásai;

h) a kötelező folyamatos légialkalmassági tájékoztatás alapján szükséges intézkedések végrehajtásának eljárásai;

i) az ellenőrzési és elemzési rendszer kialakításának és fenntartásának ismertetése valamint a karbantartási program teljesítményének és hatékonyságának folyamatos felügyelete, melynek célja a program bármely hiányosságának kiküszöbölése;

j) az légijármű típusok és típusváltozatok ismertetése, amelyekre a kézikönyv alkalmazható;

k) azon eljárások ismertetése, amelyek biztosítják a légialkalmasságot befolyásoló meghibásodások, valamint hiányosságok jegyzőkönyvezését és kijavítását; és

l) azon eljárások ismertetése, amelyekkel a lajstromozó államot értesítik a repülés végrehajtás során bekövetkezett jelentősebb rendellenességekről.

m) a légijármű és a hozzá tartozó szerkezeti elemek bérletének ellenőrzésére vonatkozó eljárások ismertetése; és

n) a karbantartás irányítási kézikönyv módosítási eljárásainak ismertetése.

9.3 Karbantartási program

9.3.1 Minden egyes forgószárnyas légijármű karbantartási programja a 6.3 szakasz előírásai alapján a következőket tartalmazza:

a) a karbantartási feladatok és ezek elvégzésének időszakai a forgószárnyas légijármű várható és tervezett igénybevételének figyelembevételével;

b) a forgószárnyas légijármű szerkezeti épségének folyamatos ellenőrzése – amikor ez a karbantartási feladat alkalmazható;

c) a fenti a) és b) alpontok előírásaitól való eltérés vagy azok megváltozatása céljából alkalmazott eljárások; és

d) a forgószárnyas légijármű rendszereinek, alkatrészeinek, meghajtás áttételeinek, forgószárnyainak valamint hajtóműveinek állapotát és megbízhatóságát felülvizsgáló programok szükség szerinti ismertetése.

9.3.2 A forgószárnyas légijármű típusra kötelezőnek kijelölt karbantartási feladatokat és ezek elvégzésének időszakait ennek megfelelően azonosítsák.

9.3.3 **Ajánlás** – *A karbantartási programot a tervezés állama vagy a típus tervezéséért felelős szervezet által rendelkezésre bocsátott tájékoztatások valamint bármely más megfelelő gyakorlati tapasztalatok alapján dolgozzák ki.*

9.4 Útinapló

9.4.1 **Ajánlás** – *A forgószárnyas légijármű útinaplója a következő tételeket és a vonatkozó római* *számokat tartalmazza:*

I - A forgószárnyas légijármű nemzeti hovatartozása és lajstromjele.
II - A repülés időpontja.
III - A személyzeti tagok névsora.
IV - A személyzet tagjainak kijelölt feladatai.
V - Az indulás helye.
VI - Az érkezés helye.
VII - Az indulás időpontja.
VIII - Az érkezés időpontja.
IX - A repülés időtartama.
X - A repülési feladat pontos meghatározása (magáncélú, menetrendszerű vagy nem-menetrendszerű repülés).
XI - Események és megfigyelések – ha van.
XII - A felelős személy aláírása.

9.4.2 **Ajánlás** – *A forgószárnyas légijármű útinaplót naprakészen vezessék, a bejegyzéseket tollal vagy kitörölhetetlen ceruzával írják be.*

9.4.3 **Ajánlás** – *A kitöltött útinaplót őrizzék meg, hogy a forgószárnyas légijármű üzemeltetésének utolsó hat hónapjáról folyamatos feljegyzés álljon rendelkezésre.*

9.5 A fedélzeten szállított vészhelyzeti és túlélési felszerelések jegyzéke

A járató mindig rendelkezzen a mentést koordináló központnak azonnal továbbítható jegyzékkel, amely tartalmazza a nemzetközi légiközlekedésben üzemeltetett bármely forgószárnyas légijárművének fedélzetén szállított vészhelyzeti és túlélési felszerelések felsorolását. A tájékoztató szükség szerint tartalmazza a mentőtutajok számát, színét és típusát, a rendelkezésre álló pirotechnikai eszközök ismertetését, a vészhelyzeti egészségügyi készletek részletezését, a vízkészletek meghatározását valamint a hordozható vészhelyzeti rádióberendezések típusát és frekvenciáit.

9.6 Repülési adatrögzítő felvételei

A járató a lehetőségek határain belül biztosítsa, hogy amennyiben egyik forgószárnyas légijárműve balesetet szenvedett vagy repeseményben érintett, az összes vonatkozó repülési adatrögzítő felvételt és ha szükséges, a repülési adatrögzítő berendezéseket is megőrizze és azokat a 13. Annex előírásaival összhangban biztonságos őrizet alatt tárolja.

10. fejezet
Utaskabin személyzet

10.1 Vészhelyzeti feladatok kijelölése

A járató a járató államának egyetértésével minden egyes forgószárnyas légijármű típusához az ülésszám vagy a szállított utasok száma alapján határozza meg az utaskabin személyzet legkisebb számát annak érdekében, hogy vészhelyzetben vagy olyan esetben, amikor a forgószárnyas légijármű vészkiürítése válik szükségessé, a fentiekre előírt feladatokat valamint a forgószárnyas légijármű biztonságos és gyors elhagyását végrehajtsák. Ezeket a feladatokat a járató minden egyes forgószárnyas légijármű típusára határozza meg.

10.2 Az utaskabin személyzet védelme a repülés alatt

A fel és leszállás végrehajtása alkalmával továbbá minden olyan esetben, amikor a légijármű parancsnoka erre utasítást ad, minden egyes utaskabin személyzeti tag foglaljon helyet és biztonsági övét vagy ha ilyet biztosítottak, vállhevederekkel ellátott biztonsági övét csatolja be.

Megjegyzés: Az előbbiek nem zárják ki, hogy a légijármű parancsnoka a fel és leszállás végrehajtásának kivételével bármely más alkalommal csak a biztonsági övek becsatolását rendelje el.

10.3 Kiképzés

A járató a járató államának jóváhagyásával dolgozzon ki és bonyolítson le kiképzési programot, amelyen utaskabin személyzeti tagnak történő kijelölése előtt minden érintett személynek részt kell vennie. Az utaskabin személyzet ezt követően évente vegyen részt ismétlődő képzési programon. Ezek a kiképzési programok biztosítsák, hogy minden érintett személy:

a) gyakorlottan végre tudja hajtani azokat a biztonsági feladatokat és kötelezettségeket, amelyek elvégzésére a repülés során bekövetkező vészhelyzet vagy vészkiürítést igénylő helyzet esetében az utaskabin személyzeti tagot kijelölték;

b) megfelelő gyakorlati tapasztalatokkal rendelkezzen a forgószárnyas légijármű fedélzetén történő szállításra előírt vészhelyzeti és életmentő felszerelések használatában és képes legyen ezen eszközök, mint például mentőmellények, mentőtutajok, vészcsúszdák, vészkijáratok, hordozható tűzoltó készülékek, oxigén berendezések és elsősegély-nyújtó készletek használatára;

c) amennyiben 3000 méter (10 000 láb) repülési magasság felett üzemeltetett forgószárnyas légijárművön teljesít szolgálatot, ismerje az oxigén hiány hatásait, valamint a túlnyomásos kabinnal rendelkező forgószárnyas légijármű esetében a hirtelen nyomásvesztést, azaz dehermetizációt kísérő fiziológiai tüneteket;

d) olyan mértékben ismerje a személyzet többi tagjának vészhelyzet esetére kijelölt feladatait, amennyire ez saját feladatainak ellátásához szükséges; és

e) ismerje a forgószárnyas légijármű utaskabinjában szállítható, illetve nem szállítható veszélyes árukat és végezze el a veszélyes áruk szállítására vonatkozó, a 18. Annex-ben előírt kiképzési programot; és

f) ismerje az utaskabinban végrehajtandó biztonsági feladatokat érintő emberi tevékenységet és teljesítményt, beleértve az utaskabin személyzet és a hajózószemélyzet közötti együttműködést is.

Megjegyzés: Az emberi teljesítmény ismeretének fejlesztését célzó kiképzési programok tervezésére vonatkozó útmutató az Emberi Tényezők Kiképzési Kézikönyv-*ében (Doc 9683) található.*

10.4 Repülési idő, repülési szolgálati idő és pihenőidő

A járató állama dolgozzon ki előírásokat az utaskabin személyzet repülési idejének és repülési szolgálati idejének korlátozására, valamint a megfelelő pihenőidő biztosítására.

Megjegyzés: A korlátozások kidolgozásával kapcsolatos útmutató az A. Mellékletben található.

11. fejezet
Védelem

Megjegyzés: A jelen fejezetben a "védelem" kifejezés a polgári légiközlekedéssel szemben végrehajtott jogellenes (törvénytelen) cselekedetek megakadályozását jelenti.

11.1 Forgószárnyas légijármű átkutatás ellenőrző jegyzéke

A járató biztosítsa, hogy a forgószárnyas légijármű fedélzetén helyezzenek el ellenőrző jegyzéket, amely tartalmazza azokat az eljárásokat, amelyek alapján a feltételezett szabotázs esetében a robbanószerkezet felkutatása érdekében végrehajtják a forgószárnyas légijármű átvizsgálását. Az ellenőrző jegyzék mellett biztosítsanak útmutatást azokról a feladatokról és tevékenységekről, amelyeket abban az esetben szükséges végrehajtani, ha robbanószerkezetet vagy gyanús tárgyat találnak.

11.2 Kiképzési programok

11.2.1 A járató dolgozzon ki és bonyolítson le kiképzési programot, amely biztosítja, hogy a személyzet minden tagja a helyzetnek leginkább megfelelő módon tevékenykedjen, a lehető legkisebbre csökkentve ezzel a jogellenes beavatkozás következményeit.

11.2.2 A járató dolgozzon ki és bonyolítson le további kiképzési programot, amelynek során az érintett alkalmazottai megismerik azokat a megelőző intézkedéseket és a szükséges módszereket, amelyek az utasok, poggyász, teheráru, postaküldemények, felszerelések és kellékek forgószárnyas légijárművön történő szállítására vonatkoznak, hozzájárulva ezzel a szabotázs vagy más jogellenes beavatkozás megelőzéséhez.

11.3 A jogellenes beavatkozás jelentése

A jogellenes beavatkozást követően a légijármű parancsnoka a kijelölt helyi hatóságnak késedelem nélkül tegyen jelentést erről az eseményről.

III. szakasz
Általános célú nemzetközi légiközlekedés

1. fejezet
Általános rész

1. Megjegyzés: Bár a Nemzetközi Polgári Légiközlekedési Egyezmény a lajstromozó államra bizonyos feladatokat ír elő, amelyek végrehajtására az állam jogosult vagy kötelezett, a Közgyűlés A23-13 számú határozatában elismerte azt a tényt, hogy a lajstromozó állam bizonyos körülmények között képtelen megfelelő módon eleget tenni a fenti kötelezettségének, amikor a légijárművet más állam járatója – elsősorban hajózószemélyzet nélkül – bérbe veszi, szerződés vagy csere megállapodás alapján üzemelteti valamint azt is, hogy amíg az Egyezmény 83/b. cikkelye életbe nem lép, az Egyezmény nem megfelelően határozza meg a járató államára ilyen esetekben vonatkozó jogokat és kötelezettségeket. Ezért a Tanács felhívja a figyelmet arra, hogy ha a fenti esetekben a lajstromozó állam megállapítja, hogy képtelen az Egyezményben előírt kötelezettségei teljesítésére, azokat a feladatokat, amelyeket a járató állama jobban el tud végezni és amennyiben ez a feladatok végrehajtását elvállalja, járató államára utalhatja át. Tudomásul vették, hogy a 83/b. cikkely hatályba lépéséig a fentiek csak gyakorlati szempontból lesznek célszerűek és nem érintik a Chicagó-i Egyezménynek a lajstromozó államra vagy egy harmadik államra háruló kötelezettségeit. Mindazonáltal, mivel a 83/b. cikkely 1997. június 20-án hatályba lépett, a vonatkozó kiegészítő jegyzőkönyvet (Doc 9318) aláíró államok kötelesek az ilyen átadási megállapodásokban foglaltak teljesítésére.

2. Megjegyzés: A nemzetközi légi üzemeltetés esetében, amelyet olyan forgószárnyas légijárművekkel bonyolítanak le, amelyek nem mindegyike van azonos szerződő államban lajstromozva, a jelen rész előírásai közül semmi sem akadályozza meg az érintett államokat abban, hogy szerződés alapján közösen végezzék el azokat a feladatokat, amelyek végrehajtására a vonatkozó Annex-ek a lajstromozó államot jelölik ki.

1.1 A jogszabályok, előírások és eljárások betartása

1.1.1 A légijármű parancsnoka tegyen eleget azon államok megfelelő törvényeinek, előírásainak és eljárásainak, amelyekben a forgószárnyas légijárművet üzemeltetik.

1. Megjegyzés: A lajstromozó állam az 1.1.1 pont előírásával nem ellentétes, fokozottan korlátozó intézkedéseket is előírhat.

2. Megjegyzés: A nyílt vizek feletti repülési feladatok végrehajtására vonatkozó előírásokat a 2. Annex tartalmazza.

3. Megjegyzés: A repülőgépvezetőknek szóló azon információkat, amelyek a repülési eljárások paramétereire és az üzemeltetési eljárásokra vonatkoznak, a PANS-OPS I. kötete (Doc 8168) tartalmazza. A látás utáni és a műszeres repülési eljárások felépítésére vonatkozó követelményeket a PANS-OPS II. kötete (Doc 8168) tartalmazza. Az akadály mentesség követelményeinek és eljárásainak használata egyes államokban eltérhetnek a PANS-OPS előírásaitól, és biztonsági okokból fontos ezen különbségek ismerete.

1.1.2 A légijármű parancsnoka felelős a forgószárnyas légijármű fedélzeten tartózkodó összes hajózószemélyzeti tag, utas és az elhelyezett teheráru biztonságáért. A parancsnok felelős továbbá a forgószárnyas légijármű üzemeltetéséért és biztonságáért attól a pillanattól kezdve, amikor a hajtóműve(ke)t beindítják addig, mikor a forgószárnyas légijármű a repülés után végleg megáll, a hajtóműve(ke)t leállítják és a forgószárny megáll.

1.1.3 Amennyiben a forgószárnyas légijármű vagy az utasok biztonságát fenyegető vészhelyzet esetében olyan tevékenységre van szükség, amellyel megsértik a helyi előírásokat vagy eljárásokat, erről a légijármű parancsnoka késedelem nélkül értesítse az illetékes helyi hatóságot. Ha az állam, amelynek felségterületén az esemény bekövetkezik így rendelkezik, a légijármű parancsnoka bármely ilyen előírás megsértéséről nyújtson be jelentést az állam illetékes hatósága számára; ebben az esetben a jelentés másolatát nyújtsa be továbbá a járató állama számára is. Az ilyen jelentéseket a lehető legrövidebb időn, általában tíz napon belül nyújtsák be.

1.1.4 A légijármű parancsnoka felelős a legközelebbi illetékes hatóság lehető leggyorsabb értesítéséért a forgószárnyas légijárművet érintő bármely olyan balesetről, amelynek következménye bármely személy súlyos vagy halálos sérülése illetve a forgószárnyas légijármű vagy más anyagi javak jelentős károsodása.

Megjegyzés: A "súlyos sérülés" kifejezés meghatározása a 13. Annex-ben található.

1.1.5 ***Ajánlás*** *– A forgószárnyas légijármű fedélzetén álljon a légijármű parancsnokának rendelkezésére az átrepült területen működő kutató és mentő szolgálatokra vonatkozó összes alapvető tájékoztatás.*

1.2 Veszélyes árúk

1. Megjegyzés: A veszélyes árukra vonatkozó előírások a 18. Annex-ben találhatók.

2. Megjegyzés: Az Egyezmény 35. cikkelye bizonyos teheráru korlátozási osztályokra vonatkozik.

1.3 Szellemi tevékenységet befolyásoló anyagok használata

Megjegyzés: A szellemi tevékenységet befolyásoló anyagok használatára vonatkozó előírások az 1. Annex 1.2.7 és a 2. Annex 2.5 pontjaiban találhatók.

2. fejezet
Repülésvégrehajtás

2.1 Az üzemeltetés létesítményeinek alkalmassága

A légijármű parancsnoka ne kezdje meg a repülés végrehajtását az előtt, hogy minden rendelkezésre álló lehetséges és ésszerű eszközzel meggyőződött arról, hogy azok a rendelkezésre álló földi és/vagy vízfelszíni létesítmények, amelyek a forgószárnyas légijármű biztonságos üzemeltetése valamint az utasok védelme érdekében közvetlenül szükségesek, megfelelnek annak az üzemeltetési típusnak, amelyben a repülést végre fogják hajtani és azokat a fenti célnak megfelelő módon üzemeltetik.

Megjegyzés: A jelen előírásban alkalmazott "lehetséges és ésszerű eszköz" kifejezés a parancsnok részére az indulási helyen rendelkezésre álló tájékoztatások felhasználását jelenti, amelyek a légiforgalmi tájékoztató szolgálatok által kiadott hivatalos közleményekből vagy más forrásokból származnak.

2.2 Helikopter repülőtér üzemeltetési minimum

A légijármű parancsnoka ne hajtson végre repülési feladatot olyan helikopter repülőtérre vagy repülőtérről, amelyen az üzemeltetési minimum értéke alacsonyabb, mint amit az az állam határozott meg, ahol az adott helikopter repülőtér elhelyezkedik, kivéve, ha erre az adott állam külön engedélyt ad.

Megjegyzés: Néhány állam gyakorlata szerint a repülés tervezési célokra magasabb minimumokat jelölnek meg arra az esetre, ha a helikopter repülőteret kitérőként választják szemben azzal, ha ez a helikopter repülőtér a tervezett leszállás helye.

2.3 Repülés előtti tájékoztatás

2.3.1 A légijármű parancsnoka biztosítsa, hogy a személyzet tagjai valamint az utasok szóbeli tájékoztatás útján vagy más módszerrel megismerjék a következő eszközök elhelyezkedését és használatát:

a) biztonsági övek vagy vállhevederek, és amennyiben helyénvaló;

b) vészkijáratok;

c) mentőmellények;

d) oxigén ellátó berendezések; és

e) más, egyéni használatra rendszeresített mentőfelszerelések, beleértve az utastájékoztató kiadványokat is.

2.3.2 A légijármű parancsnoka biztosítsa, hogy a fedélzeten tartózkodó összes személy ismerje a közös használatra rendszeresített alapvető mentőfelszerelések elhelyezkedését és általános használatát.

2.4 Forgószárnyas légijármű légialkalmassága és biztonsági intézkedések

A repülési feladat végrehajtását ne kezdjék meg mindaddig, amíg a légijármű parancsnoka meggyőződött arról, hogy:

a) a forgószárnyas légijármű repülésre alkalmas, azt előírásszerűen lajstromozták és az erre vonatkozó okmányok a forgószárnyas légijármű fedélzetén vannak;

b) a forgószárnyas légijárművön felszerelt műszerek és berendezések a várható repülési körülmények figyelembevételével az adott repülési feladat végrehajtására megfelelőek;

c) a 6. fejezet előírása szerint elvégezték az összes szükséges karbantartási munkát;

d) a forgószárnyas légijármű tömege valamint súlypont-helyzete a várható repülési körülmények figyelembevételével olyan, hogy a repülési feladat biztonságosan végrehajtható;

e) valamennyi szállítmányt megfelelő módon elhelyeztek és biztonságosan rögzítettek; és

f) a forgószárnyas légijármű üzemeltetési kézikönyvében vagy az ezzel egyenértékű dokumentumban meghatározott üzemeltetési korlátozásokat nem lépik túl.

2.5 Időjárás jelentések és előrejelzések

A repülés megkezdése előtt a légijármű parancsnoka ismerje meg a tervezett repüléshez rendelkezésre álló összes időjárási tájékoztatást. Az indulási hely közeléből eltávolodó és a műszerrepülési szabályok szerint végrehajtott összes repülés előkészítéséhez a következők tartozzanak:

1) a rendelkezésre álló érvényes időjárás-jelentések és előrejelzések tanulmányozása; valamint

2) kitérő tevékenység megtervezése, amely lehetővé teszi a repülés folytatását abban az esetben, ha az időjárási körülmények miatt azt nem lehet a tervek szerint végrehajtani.

Megjegyzés: A repülési tervekre vonatkozó követelményeket a 2. Annex (Repülési Szabályok) és a PANS-ATM Doc 4444 (Légiforgalmi Szolgálatok Szabályai) tartalmazza.

2.6 Időjárási körülmények miatt szükséges korlátozások

2.6.1 Látvarepülési szabályok szerint végrehajtott repülés

A kizárólag helyi, látás utáni időjárási körülmények között végrehajtott repülés kivételével a látvarepülési szabályok szerint tervezett repülés végrehajtását ne kezdjék meg csak akkor, ha az érvényes időjárás-jelentések vagy az érvényes időjárás-jelentések és előrejelzések azt jelzik, hogy a megfelelő időben, az útvonalon vagy annak látvarepülési szabályok szerint tervezett repülési szakaszán az uralkodó időjárási körülmények olyanok lesznek, hogy az ilyen (VFR) szabályok betartása lehetséges.

2.6.2 Műszerrepülési szabályok szerint végrehajtott repülés

2.6.2.1 *Ha kitérő helikopter repülőtér kijelölése szükséges*

A műszerrepülési szabályok szerint tervezett repülés végrehajtását ne kezdjék meg csak akkor, ha a rendelkezésre álló tájékoztatások szerint az érkezés várható időpontjában a tervezett leszállási és legalább egy kitérő helikopter repülőtéren az uralkodó (időjárási) körülmények helikopter repülőtér üzemeltetési minimumnak megfelelőek vagy annál jobbak lesznek.

Megjegyzés: Néhány állam gyakorlata szerint a repülés tervezési célokra magasabb minimumokat jelölnek meg arra az esetre, ha a helikopter repülőteret kitérőként választják szemben azzal, ha ugyanez a helikopter repülőtér a tervezett leszállás helye.

2.6.2.2 *Ha kitérő helikopter repülőtér kijelölése nem szükséges*

Amennyiben kitérő helikopter repülőtér nem szükséges, a műszerrepülési szabályok szerint tervezett repülés végrehajtását egy helikopter repülőtérre ne kezdjék meg csak akkor, ha a rendelkezésre álló érvényes időjárás tájékoztatások azt jelzik, hogy az érkezés számított időpontja előtt valamint ez után – két órával vagy az indulási időpontjától az érkezés számított időpontja után két óráig – amelyik a rövidebb időtartam – a következő időjárási körülmények állnak fenn:

a) a felhőalap a műszeres megközelítési eljáráshoz előírt minimum értéknél legalább 120 méterrel (400 láb) magasabb; és

b) a látástávolság legalább 1.5 km-el több mint az eljáráshoz előírt minimum érték.

Megjegyzés: A fentieket minimum értékként akkor fogadják el, ha megbízható és folyamatos (helyi) időjárás megfigyelést tartanak fenn. Ha csak úgynevezett területi előrejelzés van, a fenti értékeket ennek megfelelő mértékben növeljék meg.

2.6.3 Helikopter repülőtér üzemeltetési minimum

2.6.3.1 A repülést ne folytassák a tervezett leszállási helikopter repülőtér felé csak abban az esetben, ha a rendelkezésre álló legújabb tájékoztatások azt jelzik, hogy az érkezés várható időpontjában ezen a leszállási vagy legalább egy kitérő helikopter repülőtéren az időjárási körülmények a meghatározott helikopter repülőtér üzemeltetési minimum értéknek megfelelőek vagy ennél jobbak lesznek.

2.6.3.2 A precíziós megközelítés esetében a műszeres megközelítést ne folytassák a külső marker adó (OM) navigációs ponton túl vagy nem precíziós megközelítés esetében a helikopter repülőtér feletti 300 méter (1000 láb) magasság alatt, kivéve ha a jelentett látástávolság vagy a meghatározó futópályamenti látástávolság érték (RVR) a megállapított minimum felett van.

2.6.3.3 Amennyiben precíziós megközelítés esetében a külső marker adó (OM) navigációs pont átrepülése után vagy nem precíziós megközelítés esetében a repülőtér feletti 300 méter (1000 láb) magasság alá történő süllyedésnél a jelentett látástávolság vagy a meghatározó futópályamenti látástávolság érték a megállapított minimum alá csökken, a megközelítés az elhatározási (DA/H) vagy a legalacsonyabb süllyedési magasságig (MDA/H) folytatható. A forgószárnyas légijármű semmi esetre se folytassa a leszálláshoz történő megközelítését bármely helikopter repülőtérre azon a meghatározott ponton túl, amely után az arra megállapított helikopter repülőtér üzemeltetési minimum értéket megsértené.

2.6.4 Repülés jegesedés körülményei között

Ismert vagy várható jegesedés körülményei között a repülést ne kezdjék meg, csak akkor, ha a forgószárnyas légijármű ilyen körülmények közötti üzemelésre van jogosítva és felszerelve.

2.7 Kitérő helikopter repülőterek

2.7.1 A műszerrepülési szabályok szerint tervezett repülés esetében az üzemeltetési és a légiforgalmi szolgálati egységeknek benyújtott repülési tervekben határozzanak meg legalább egy alkalmas kitérő helikopter repülőteret vagy leszállási helyet, kivéve ha:

a) az uralkodó időjárási körülmények megfelelnek a 2.6.2.2 pontnak; vagy

b) 1) a tervezett leszállási helikopter repülőtér elszigetelt fekvésű és alkalmas kitérő nem áll rendelkezésre; és

2) az elszigetelt fekvésű tervezett leszállási repülőtéren műszeres megközelítési eljárást írnak elő; és

3) a vízfelszíni célállomás esetében olyan pontot határoznak meg, ahonnan a visszafordulás (PNR) már nem lehetséges.

2.7.2 Az alkalmas parttól, azaz szárazföldtől távoli vízfelszíni kitérő helikopter repülőtereket vagy leszállási helyeket a következők alapján határozhatják meg:

a) a vízfelszíni (parttól távoli) kitérőket csak azon pont átrepülése után használják, amely után a visszafordulás nem lehetséges (PNR). Ezen pont előtt a szárazföldi kitérőket vegyék igénybe;

b) a kitérő alkalmasságának meghatározásánál vizsgálják meg és vegyék figyelembe a kritikus repülésvezérlő rendszerek, valamint egyéb lényeges részegységek (mechanikai) műszaki megbízhatóságát;

c) a kitérőre történő érkezés előtt határozzák meg és vegyék figyelembe a forgószárnyas légijármű egy működésképtelen hajtóművel történő üzemi teljesítményét;

d) a leszállási hely biztosan rendelkezésre áll; és

e) az időjárási tájékoztatások minden körülmények között pontosak és megbízhatóak legyenek.

Megjegyzés: A repülés végrehajtási kézikönyvben a repülésvezérlő rendszerek meghibásodása esetére meghatározott leszállási módszerek kizárhatják egyes leszállási helyek kitérőként történő igénybevételét.

2.7.3 **Ajánlás** – *Amennyiben a szárazföldi kitérő helikopter repülőtér vagy leszállási hely eléréséhez szükséges tüzelőanyag mennyiség szállítása lehetséges, ne vegyenek igénybe parttól távoli (vízfelszíni) kitérőket. Ezek a körülmények kivételesek és a kedvezőtlen időjárási körülmények közötti terhelés növelés nem tartozik ezek közé.*

2.8 Tüzelőanyag (üzemanyag) és olajkészlet

2.8.1 *Minden forgószárnyas légijármű esetében* – A repülés végrehajtását ne kezdjék meg csak akkor, ha az időjárási körülmények valamint a repülés során várható bármely késés figyelembevételével a forgószárnyas légijármű elegendő tüzelőanyagot és olajat szállít ahhoz, hogy a repülést biztonságosan be tudja fejezni. Ezen kívül az előre nem látható eseményekre való tekintettel szállítsanak tartalékot is.

2.8.2 *Látvarepülési szabályok szerinti (VFR) üzemeltetés* – A 2.8.1 pont előírásának megfelelően szállított tüzelőanyag és olaj mennyisége a látvarepülési szabályok szerint történő üzemeltetés esetében legalább annyi legyen, ami lehetővé teszi, hogy a forgószárnyas légijármű:

a) elrepüljön arra a helikopter repülőtérre, amelyre a repülést tervezték:

b) ezt követően repüljön a legoptimálisabb utazósebességgel 20 percig; és

c) a forgószárnyas légijármű ezen felül rendelkezzen annyi tüzelőanyaggal, amely fedezi az általános célú légiközlekedést szabályzó előírásokban az állam által meghatározott, előre nem látható esetekben bekövetkező fogyasztás növekedés mennyiségét.

2.8.3 *Műszerrepülési szabályok szerinti (IFR) üzemeltetés* – A 2.8.1 pont előírásának megfelelően szállított tüzelőanyag és olaj mennyisége a műszerrepülési szabályok szerint történő üzemeltetés esetében legalább annyi legyen, ami lehetővé teszi, hogy a forgószárnyas légijármű:

2.8.3.1 Amennyiben a 2.6.2.2 előírása alapján kitérő kijelölése nem szükséges, elrepüljön arra a helikopter repülőtérre, amelyre a repülést tervezték és ezt követően;

a) a célállomás helikopter repülőtér felett 450 méter (1500 láb) magasságon, szabványos hőmérsékleti viszonyok között, a várakozásra előírt sebességgel 30 percet repüljön, valamint egy megközelítést és leszállást hajtson végre; és

b) a forgószárnyas légijármű ezen felül rendelkezzen annyi tüzelőanyaggal, amely fedezi az előre nem látható esetekben bekövetkező fogyasztás növekedés mennyiségét.

2.8.3.2 Amennyiben a 2.6.2.1 pont előírása alapján kitérő kijelölése szükséges, elrepüljön arra a helikopter repülőtérre, amelyre a repülést tervezték, ott egy megközelítést és egy megszakított megközelítést hajtson végre és ezt követően;

a) elrepüljön a repülési tervben meghatározott kitérőre; majd

b) a kitérő felett 450 méter (1500 láb) magasságon, szabványos hőmérsékleti viszonyok között, a várakozásra előírt sebességgel 30 percet repüljön, valamint megközelítést és leszállást hajtson végre; és

c) a forgószárnyas légijármű ezen felül rendelkezzen annyi tüzelőanyaggal, amely fedezi az előre nem látható esetekben bekövetkező fogyasztás növekedés mennyiségét.

2.8.3.3 Amennyiben alkalmas kitérő nem áll rendelkezésre (vagyis a tervezett leszállási helikopter repülőtér elszigetelt fekvésű és alkalmas kitérő nem áll rendelkezésre), elrepüljön a tervezett célállomás helikopter repülőtérre és ezt követően a játató állama által meghatározott további időtartamig repüljön.

2.8.4 A 2.8.1 pont előírása alapján szükséges tüzelőanyag és olaj készlet mennyiségének kiszámításánál a legalább következő tényezőket vegyék figyelembe:

a) előrejelzett időjárási körülmények;

b) várható légiforgalmi irányítói engedélyek és útvonalak valamint forgalmi késések;

c) a műszerrepülési szabályok szerint végrehajtott repülés esetében egy műszeres megközelítés végrehajtása a célállomás helikopter repülőterén, beleértve egy megszakított megközelítést is;

d) a repülés végrehajtása alatt bekövetkező egy hajtómű meghibásodás vagy – amennyiben alkalmazható – a túlnyomásos kabin dehermetizálódás esetére előírt eljárások; és

e) minden egyéb olyan körülmény, amely a forgószárnyas légijármű leszállását késleltetheti vagy a tüzelőanyag és/vagy olajfogyasztást növelheti.

Megjegyzés: A 2.8 szakaszban ismertetett tényezők nem korlátozzák a repülési terv repülés közben történő módosításának lehetőségét és a repülés áttervezését egy másik helikopter repülőtérre, feltéve hogy a 2.8 pont előírásai teljesíthetők attól a ponttól kezdődően is, ahol a repülés áttervezése megtörtént.

2.9 Oxigén készlet

Megjegyzés: A szövegben alkalmazott abszolút légnyomás értékeknek megfelelő, az Egyezményes Légkör alapján meghatározott megközelítő magasságok a következők:

Abszolút légnyomás	***magasság – méter***	***magasság – láb***
700 hPa	3000	10 000
620 hPa	4000	13 000

2.9.1 Olyan repülési magasságon végrehajtandó repülés esetében, amelyen a személyek részére rendszeresített kabin(ok)ban a légnyomás 700 hPa értéknél alacsonyabb lesz, a repülést ne kezdjék meg csak akkor, ha elegendő mennyiségű belélegzésre alkalmas oxigént biztosítottak, amely ellátja:

a) a személyzet minden tagját valamint az utasok 10 %-át 30 percet meghaladó bármely olyan időtartamra, amely alatt az általuk elfoglalt kabinban a légnyomás 700 hPa és 620 hPa érték között van; és

b) a személyzet tagjait valamint az utasokat bármely olyan időtartamra, amely alatt az általuk elfoglalt kabinban a légnyomás 620 hPa értéknél alacsonyabb.

2.9.2 A túlnyomásos kabinnal rendelkező forgószárnyas légijármű esetében a repülés végrehajtását ne kezdjék meg csak akkor, ha elegendő mennyiségű belélegzésre alkalmas oxigént biztosítottak, amely a túlnyomás megszűnése esetében, a repülés körülményeinek megfelelően ellátja a személyzet összes tagját, valamint az utasokat bármely olyan időtartamra, amely alatt az általuk elfoglalt kabinban a légnyomás 700 hPa értéknél alacsonyabb.

2.10 Oxigén használat

A forgószárnyas légijármű repülése alatt, annak biztonságos üzemeltetéséhez nélkülözhetetlen feladatokat ellátó összes hajózószemélyzeti tagja folyamatosan használja az oxigén légzőkészüléket, amikor ezt az uralkodó körülmények a 2.9.1 vagy 2.9.2 pontok előírásai szerint szükségessé teszik.

2.11 Vészhelyzeti utasítások a repülés alatt

A repülés közben bekövetkező vészhelyzetben a légijármű parancsnoka biztosítsa, hogy a fedélzeten tartózkodó valamennyi személy a körülményeknek megfelelő vészhelyzeti utasításokat és tájékoztatásokat kapjon.

2.12 Légijármű vezetők időjárás jelentése

Ajánlás – *Amennyiben olyan időjárási körülményeket észlelnek, amelyek valószínűleg más légijárművek biztonságát is befolyásolják, ezeket a lehető legrövidebb időn belül jelentsék.*

2.13 Repülésre veszélyes körülmények

Ajánlás – *A repülésre veszélyes, az időjárási viszonyokkal kapcsolatostól eltérő, a repülés végrehajtása során tapasztalt egyéb körülményeket a lehető legrövidebb időn belül jelentsék. Az ilyen leadott jelentések tartalmazzák a más légijárművek biztonságával összefüggő vagy kapcsolatba hozható részleteket is.*

2.14 A hajózószemélyzet tagjainak fizikai állapota

A légijármű parancsnoka felelős annak biztosításáért, hogy a repülést:

a) ne kezdjék meg, ha a hajózószemélyzet bármely tagja valamely okból képtelen előírt feladatainak teljesítésére; Ilyen okok közé tartozhat a testi sérülés, betegség, fáradtság, gyógyszeres vagy alkoholos befolyásoltság; és

b) ne folytassák a legközelebbi alkalmas helikopter repülőtéren túl, ha a hajózószemélyzet bármely tagjának teljesítőképessége valamely ok, mint például fáradtság, betegség vagy oxigén hiány miatt jelentős mértékben csökken.

2.15 A hajózószemélyzet tagjai szolgálati helyeiken

2.15.1 Fel és leszállás

A pilótakabinban szolgálatra kijelölt valamennyi hajózószemélyzeti tag tartózkodjon szolgálati helyén.

2.15.2 Útvonalon

A pilótakabinban szolgálatra kijelölt valamennyi hajózószemélyzeti tag tartózkodjon szolgálati helyén kivéve, ha távolléte a forgószárnyas légijármű üzemeltetésével kapcsolatos feladatok elvégzése vagy fiziológiai okok miatt szükséges.

2.15.3 Biztonsági övek

A hajózószemélyzet valamennyi tagja szolgálati helyén biztonsági övét tartsa becsatolva.

2.15.4 Vállhevederekkel ellátott biztonsági övek

Ajánlás – *Amennyiben ilyen biztonsági övet biztosítottak, a fel és leszállási szakaszokban a hajózószemélyzet bármely légijármű vezetői ülést elfoglaló tagja vállhevederrel ellátott biztonsági övét tartsa becsatolva; a hajózószemélyzet többi tagja a fel és leszállási szakaszokban vállhevederrel ellátott biztonsági övét tartsa becsatolva kivéve, ha a vállhevederek akadályozzák őket feladataik végrehajtásában, amely esetben a vállhevedereket kikapcsolhatják, azonban a biztonsági öveket bekapcsolva kell tartaniuk.*

Megjegyzés: A vállhevederekkel ellátott biztonsági öv egymástól függetlenül használható vállhevederekből és biztonsági övből áll.

2.16 Műszerrepülési eljárások

2.16.1 Az az állam, amelynek területén a helikopter repülőtér elhelyezkedik, vagy az az állam, amelyik felelős egy állam területén kívül levő helikopter repülőtérért hagyjon jóvá és tegyen közzé egy vagy több műszeres megközelítési eljárást a műszerrepülési szabályok szerint igénybe vett minden egyes helikopter repülőtérre vagy végső megközelítési és felszállási területre.

2.16.2 A műszerrepülési szabályok szerint üzemelő összes forgószárnyas légijármű tartsa be azokat a műszerrepülési eljárásokat, amelyeket az az állam hagyott jóvá, amelynek területén a helikopter repülőtér elhelyezkedik, vagy az az állam hagyott jóvá, amelyik felelős az állam területén kívül levő helikopter repülőtérért.

1. Megjegyzés: A műszerrepülési eljárásokban érintett személyek részére ajánlott üzemeltetési eljárások a PANS OPS (Doc 8168) I. kötetében találhatók.

2. Megjegyzés: A műszerrepülési eljárások követelményeire vonatkozó útmutatás az eljárások kidolgozásában résztvevő szakértők részére a PANS-OPS (Doc 8168) II. kötetében található.

2.17 Utasítások – Általános

A forgószárnyas légijármű forgószárnyát hajtómű segítségével csak akkor szabad megforgatni, ha a kormányoknál szakszolgálati engedéllyel rendelkező légijármű vezető foglal helyet.

2.18 Tüzelőanyag-feltöltés utasokkal a fedélzeten vagy a forgószárny(ak) mozgása közben

2.18.1 **Ajánlás** – *A forgószárnyas légijárművön ne végezzenek tüzelőanyag feltöltést akkor, amikor az utasok beszállnak, kiszállnak vagy a fedélzeten tartózkodnak illetve a forgószárny mozgása közben, kivéve ha a légijármű parancsnok vagy más kiképzett személyzet áll készenlétben a forgószárnyas légijármű leggyorsabb és legcélszerűbb módszerekkel történő kiürítésének megkezdésére és a kiürítés irányítására.*

2.18.2 **Ajánlás** – *Az utasok beszállása, kiszállása vagy a forgószárnyas légijármű fedélzetén történő tartózkodása alatt végzett tüzelőanyag feltöltés közben a belső távközlési berendezés vagy más alkalmas eszköz segítségével tartsanak fenn kétoldalú beszédüzemű összeköttetést a tüzelőanyag feltöltést ellenőrző földi személyzet és a légijármű parancsnoka vagy a 2.18.1 pontban előírt más kiképzett személyzet között.*

1. *Megjegyzés: A légijármű tüzelőanyag feltöltésére vonatkozó előírások a 14. Annex, I. Kötetében és a biztonságos tüzelőanyag feltöltési módszerekkel kapcsolatos útmutató a* Repülőtér Szolgálati Kézikönyv *(Doc 9137) 1. és 8. részeiben található.*

2. Megjegyzés: Amikor a forgószárnyas légijármű tüzelőanyaggal történő feltöltését nem kerozinnal végzik, a feltöltés alkalmával a kerozin más gázturbina hajtóanyagokkal keveredik, vagy nyílt töltővezetéket alkalmaznak, további elővigyázatossági rendszabályokra van szükség.

2.19 Vízfelszín feletti repülések

A 4.3.1 pont előírása alapján, a kedvezőtlen időjárási körülmények között, vízfelszín feletti repülést végrehajtó összes forgószárnyas légijármű jogosítva legyen a vízreszállásra. A vízreszállási tájékoztatások

Törölt: barátságtalan

tartalmazzák a vízfelszínre (tengerre) vonatkozó összes információt.

3. fejezet
Forgószárnyas légijármű teljesítmény üzemeltetési korlátozások

3.1 A forgószárnyas légijárművet a következők szerint üzemeltessék:

a) légialkalmassági bizonyítvánnyal vagy más egyenértékű okmánnyal összhangban;

b) a lajstromozó állam légialkalmasságot jogosító hatósága által kiadott teljesítmény korlátozások betartásával; és

c) a 16. Annex I. kötet zajszint minősítési előírásaiban meghatározott tömeg korlátozásoknak megfelelően kivéve, ha különleges körülmények között, bizonyos helikopter repülőtéren, ahol zajszint probléma nem jelentkezik, erre az érintett állam illetékes hatósága – amelyben a helikopter repülőtér elhelyezkedik – külön engedélyt ad.

3.2 A forgószárnyas légijárművön táblákkal, felsorolásokkal, jegyzékekkel, műszer jelölésekkel vagy ezek együttesével tüntessék fel azokat az üzemeltetési korlátozásokat, amelyeket a lajstromozó állam légialkalmasságot jogosító hatósága előírt.

Megjegyzés: A 8. Annex – Légijárművek légialkalmassága *(IV. rész) nemzetközi előírásai és ajánlott gyakorlati eljárásai vonatkoznak a nemzetközi légiközlekedésben utas, teheráru vagy postaküldemény szállítására felhasználni kívánt minden forgószárnyas légijárműre.*

3.3 Amikor a forgószárnyas légijárművel sűrűn lakott, kedvezőtlen időjárási körülmények közötti helikopter repülőtérről kell felszállni vagy arra leszállni, azon állam illetékes hatósága, amelyben a helikopter repülőtér elhelyezkedik, határozza meg azon követelményeket amelyek lehetővé teszik az ilyen üzemeltetésnél a hajtómű egység meghibásodásával járó kockázatra adott megfelelő megoldások alkalmazását.

Törölt: barátságtalan

Megjegyzés: Útmutató az A. Melléklet, 2.4 pontjában található..

4. fejezet
Forgószárnyas légijármű műszerek, felszerelések és repülési okmányok

Megjegyzés: A forgószárnyas légijármű távközlési és navigációs felszerelésére vonatkozó előírásokat a 5. fejezet tartalmazza.

4.1 Az összes forgószárnyas légijármű összes repülése

4.1.1 Általános rész

A légialkalmassági bizonyítvány kiadásához szükséges alapvető felszereléseken kívül a felhasznált forgószárnyas légijármű típustól valamint a repülés végrehajtásának körülményeitől függően a következő pontokban előírt műszereket, felszereléseket és repülési okmányokat helyezzék el vagy szállítsák a forgószárnyas légijárművön. Az előírt műszereket és berendezéseket, beleértve azok felszerelését is a lajstromozó állam hagyja jóvá vagy fogadja el.

4.1.2 Műszerek

A forgószárnyas légijárművet szereljék fel azokkal a műszerekkel, amelyek a hajózószemélyzet számára lehetővé teszik a forgószárnyas légijármű repülési pályájának irányítását és ellenőrzését, bármely előírt eljárás művelet végrehajtását valamint a forgószárnyas légijármű üzemeltetési korlátozásainak a várható üzemeltetési körülmények között történő megfigyelését.

4.1.3 Felszerelések

4.1.3.1 Minden forgószárnyas légijárművet minden repülésén szereljék fel:

a) egy hozzáférhető elsősegélynyújtó készlettel;

b) olyan típusú hordozható tűzoltó készülékkel, amelynek tűzoltó anyaga igénybevétel után nem szennyezi veszélyesen a forgószárnyas légijármű belső terének levegőjét. Legalább egy ilyen tűzoltó készüléket helyezzenek el;

1) a forgószárnyas légijármű pilótafülkéjében; és

2) minden egyes olyan utaskabinban, amely a pilótakabintól el van választva és amelyet a légijármű parancsnoka vagy másodpilótája nem tud azonnal megközelíteni.

c) 1) a lajstromozó állam által meghatározott életkor felett minden egyes személy részére egy megfelelő ülő vagy fekvőhellyel;

2) minden üléshez egy biztonsági övvel valamint minden fekvőhelyhez egy bekötő biztonsági hevederrel;

d) a következő kézikönyvekkel, térképekkel és tájékoztatásokkal:

1) az adott forgószárnyas légijármű repülésvégrehajtási kézikönyve vagy más olyan kiadvány illetve tájékoztató, amely tartalmazza a 3. fejezet alkalmazásához szükséges, a lajstromozó állam légialkalmasságot jogosító hatósága által a forgószárnyas légijárműre előírt bármely üzemeltetési korlátozást;

2) érvényes és alkalmas térképek, amelyek fedik a tervezett repülés útvonalát, valamint bármely olyan egyéb útvonalat, amelyről joggal feltételezhető, hogy arra a repülés átirányítható;

3) az elfogott légijármű parancsnok számára a 2. Annex-ben előírt eljárások; és

4) az elfogó és az elfogott légijárművek által használandó, a 2. Annex-ben előírt látjelek; és

e) megfelelő értékű elektromos biztosítékok tartalékként a repülés közben hozzáférhető biztosítékok cseréjéhez.

4.1.3.2 **Ajánlás** – *Minden forgószárnyas légijármű minden repülésén legyen felszerelve a kutatás és mentés céljait szolgáló föld-levegő látjelekkel.*

4.1.3.3 **Ajánlás** – *Minden forgószárnyas légijármű minden repülésén az összes hajózószemélyzeti tag ülése legyen felszerelve vállhevederekkel ellátott biztonsági övvel.*

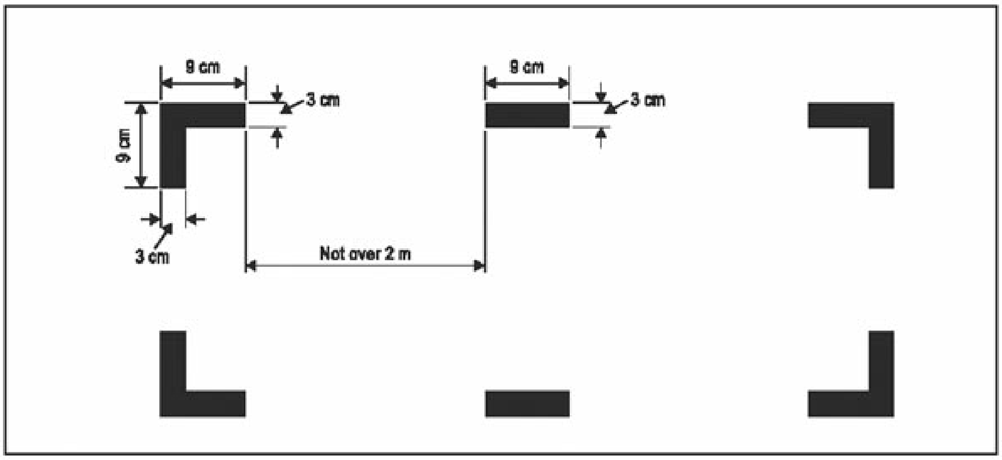
Megjegyzés: A vállhevederekkel ellátott biztonsági öv egymástól függetlenül használható vállhevederekből és biztonsági övből áll.

4.1.4 Az átvágható felületek jelzése

4.1.4.1 Amennyiben a forgószárnyas légijárművön a mentőszemélyzet részére jelzik a kényszerhelyzet esetében a törzsön átvágható felületeket, azokat az alábbi ábrának megfelelő módon jelöljék meg. A jelölések színe vörös vagy sárga legyen és ha erre a háttértől történő megkülönböztethetőség érdekében szükség van, azokat fehér színű alapozásra készítsék el.

4.1.4.2 Amennyiben a sarkok jelölése egymástól több mint 2 méter távolságra van, fessenek fel 9 x 3 cm-es vonalakat olyan módon, hogy az egymás mellett levő vonalak közötti távolság 2 méternél nagyobb ne legyen.

Megjegyzés: Ez az előírás nem teszi szükségessé azt, hogy bármely forgószárnyas légijármű sárkányszerkezetén átvágható felületek legyenek.



A légijármű törzsén levő átvágható felületek azaz behatolási pontok jelzése
a mentőszemélyzet számára
Jelölések közötti távolság nem több mint 2 méter

4.2 A látvarepülési (VFR) és műszerrepülési (IFR) szabályok szerint, nappal és éjszaka végrehajtott repülésekhez szükséges műszerek és berendezések

Megjegyzés: A 4.2.1 – 4.2.3 pontok repülőgépvezetési műszerekre vonatkozó követelményei műszer kombinációkkal, vagy elektronikus képernyőkkel teljesíthetők.

4.2.1 Az összes látvarepülési szabályok (VFR) szerint, nappal üzemeltetett forgószárnyas légijárművet szereljék fel a következőkkel:

a) egy mágneses iránytűvel;

b) egy pontos időmérő berendezéssel, amely az időt órában, percben és másodpercben jelzi;

c) érzékeny nyomás-magasság mérőműszerrel;

d) repülési sebesség mérőműszerrel; és

e) olyan további műszerekkel vagy berendezésekkel, amelyeket az illetékes hatóság előírt.

4.2.2 Az összes látvarepülési szabályok (VFR) szerint, éjjel üzemeltetett forgószárnyas légijárművet szereljék fel a következőkkel:

a) a 4.2.1 pontban felsorolt berendezésekkel;

b) helyzetjelző műszerrel (műhorizonttal), minden egyes légijárművezető számára;

c) csúszásjelzővel;

g) irányjelző műszerrel (géptengely irány-jelző pörgettyűs – giroszkópikus – műszer);

h) emelkedési és süllyedési sebesség mérőműszerrel;

i) olyan kiegészítő műszerekkel és berendezésekkel, melyeket a megfelelő hatóság ír elő;

és a következő világító eszközökkel:

g) a 2. Annex előírásainak megfelelő fényekkel, a helikopter repülőtér mozgási területein üzemelő légijárművek fényeire meghatározottak szerint;

Megjegyzés: A fények általános jellemzőit a 8. Annex határozza meg. A repülés közben levő valamint a helikopter repülőtér mozgási területein üzemelő légijárművek fényeire vonatkozó, 2. Annex előírásainak megfelelő fények jellemzőit a Légialkalmassági Kézikönyv *-ben (Doc 9760) részletezi.*

h) leszálló fényszóróval;

i) a forgószárnyas légijármű biztonságos üzemeltetése szempontjából alapvető fontosságú, a hajózószemélyzet által használt valamennyi műszer és berendezés (meg)világításával;

j) világítással valamennyi utastérben; és

k) elektromos kézilámpával minden egyes személyzet tag szolgálati helyen.

4.2.2.1 **Ajánlás** – *Az egyik leszálló fényszóró legalább függőleges síkban elfordítható legyen.*

4.2.3 A műszerrepülési szabályok szerint (IFR) üzemeltetett összes forgószárnyas légijárművet vagy azokat, amelyek üzemeltetésük során egy vagy több műszer segítsége nélkül nem tarthatók a kívánt repülési helyzetben, szereljék fel:

a) egy mágneses iránytűvel;

b) egy pontos időmérő berendezéssel, amely az időt órában, percben és másodpercben jelzi;

c) érzékeny, nyomás-magasság mérőműszerrel;

Megjegyzés: A már hosszabb ideje tapasztalható pontatlan mérések miatt a dob-mutatós magasságmérő használata nem javasolt.

d) repülési sebesség mérőműszerrel, amely olyan berendezéssel van ellátva, amely megakadályozza a párakicsapódás vagy jegesedés következtében lehetséges helytelen működést;

e) csúszás jelzőműszerrel;

f) repülési helyzetjelző műszerrel (műhorizont) az igényelt mennyiségű légijárművezetők számának megfelelően, és egy kiegészítő helyzetjelző műszerrel;

g) irányjelző műszerrel (géptengely irány-jelző pörgettyűs – giroszkópikus – műszer):

h) a pörgettyűs műszerek kielégítő elektromos táplálásának jelzésére szolgáló eszközzel;

i) a pilótakabinban felszerelt, a külső levegő hőmérsékletét jelző műszerrel;

j) emelkedési és süllyedési sebesség mérőműszerrel;

k) olyan további műszerekkel vagy berendezésekkel, amelyeket az illetékes hatóság előírt; és

l) éjszakai repülések esetére 4.2.2 g) – k) és 4.2.2.1 alpontokban meghatározott fényekkel.

4.3 Az összes, vízfelszín felett üzemeltetett forgószárnyas légijármű

4.3.1 Úszóeszközök

Minden olyan forgószárnyas légijárművet, amelyet vízfelszín felett kívánnak üzemeltetni, szereljenek fel állandó vagy gyorsan kibocsátható (üzembe helyezhető) úszóeszközzel, amely biztosítja a forgószárnyas légijármű biztonságos vízreszállását, ha:

a) a járató állama szerint meghatározott módon a forgószárnyas légijármű engedélyezve lett parttól távoli repülésekre, vagy egyéb vízfelszín feletti műveletekre; vagy

b) a szárazföldtől a megfelelő állami hatóság által meghatározott távolságra repül vízfelszín felett.

Megjegyzés: A 4.3.1 pontban ismertetett szárazföldtől számított távolság meghatározása alkalmával vegyék figyelembe a környezeti körülményeket, valamint a kutató és mentő szolgálat (SAR) igénybevételének lehetőségeit.

4.3.2 Vészhelyzeti felszerelések

4.3.2.1 A 4.3.1 pont előírása alapján üzemeltetett forgószárnyas légijárművet szereljék fel;

a) a fedélzeten tartózkodó minden személy részére azonnal hozzáférhető helyen tárolt mentőmellénnyel vagy egyéb megfelelő egyéni úszóeszközzel;

b) ha az alkalmazott forgószárnyas légijármű típusától függően nem rendelkeznek másként, elegendő számú mentő-tutajjal a fedélzeten tartózkodó összes személy elhelyezésére, amelyeket úgy tárolnak, hogy azok a vészhelyzet esetén gyorsan üzembe helyezhetők és a repülési útvonal sajátosságainak megfelelő életmentő eszközökkel vannak ellátva, beleértve a létfenntartási eszközöket is; és

c) a 2. Annex-ben ismertetett pirotechnikai vészjelzések előállítására szolgáló eszközökkel.

4.3.2.2 Ha a forgószárnyas légijármű olyan helikopter repülőtéren száll fel vagy le, ahol a járató államának véleménye szerint a felszállási vagy leszállási útvonal olyan hosszan vezet vízfelszín felett, hogy az esetleges rendellenes üzemelés vagy repesemény alkalmával vízreszállás valószínű, a forgószárnyas légijárművet szereljék fel legalább a 4.3.2.1 a) pont előírása alapján szükséges vészhelyzeti felszereléssel.

4.3.2.3 Minden egyes mentőmellényt és egyéb megfelelő egyéni úszóeszközt, amelyet a jelen 4.3 szakasz előírásai alapján szállítanak, a felhasználó személy feltalálásának megkönnyítése érdekében lássanak el elektromos világítással.

4.3.2.4 **Ajánlás** – *Bármely forgószárnyas légijárművön, amelynek egyedi légialkalmassági bizonyítványát először 1991 január 1-én vagy ezt követően adták ki, a 4.3.2 pont előírása alapján szállított mentőtutajok legalább 50 %-a távirányítással legyen kibocsátható.*

4.3.2.5 **Ajánlás** – *A távirányítással nem kibocsátható és 40 kg-nál nehezebb mentőtutajok a kibocsátás megkönnyítése érdekében valamilyen mechanikus kibocsátó szerkezettel legyenek felszerelve.*

4.3.2.6 **Ajánlás** – *Bármely forgószárnyas légijármű esetében, amelynek egyedi légialkalmassági bizonyítványát először 1991 január 1. előtt adták ki, 1992 december 31. előtt teljesítsék a 4.3.2.4 és 4.3.2.5 pontok előírásait.*

4.4 Az összes, kijelölt szárazföld felett üzemeltetett forgószárnyas légijármű

Amennyiben a forgószárnyas légijárművet olyan szárazföldi területek felett üzemeltetik, amelyeket az érintett államok olyan területként jelölnek meg, ahol a kutatás és mentés különös nehézségekbe ütközik, a forgószárnyas légijárművet szereljék fel olyan jeladó berendezéssel és életmentő felszereléssel, beleértve a létfenntartási eszközöket is, amelyek nagy valószínűséggel megfelelnek az átrepülendő terület sajátosságainak.

4.5 Az összes, nagy repülési magasságon üzemeltetett forgószárnyas légijármű

4.5.1 Túlnyomásos kabin nélküli forgószárnyas légijármű

Amennyiben a túlnyomásos kabinnal nem rendelkező forgószárnyas légijárművet nagy repülési magasságon kívánják üzemeltetni, azt szereljék fel a 2.9.1 pontban előírt oxigén tároló és adagoló berendezéssel.

4.5.2 Túlnyomásos kabinnal rendelkező forgószárnyas légijármű

Ajánlás – *Amennyiben a túlnyomásos kabinnal rendelkező forgószárnyas légijárművet nagy repülési magasságon kívánják üzemeltetni, azt szereljék fel a 2.9.2 pontban előírt belélegzésre alkalmas oxigén készlet tárolására megfelelő vészhelyzeti oxigén tároló és adagoló berendezéssel.*

4.6 Minden forgószárnyas légijármű, amelynek meg kell felelnie a 16. Annex I. kötet zajbizonyítvány előírásoknak

Minden forgószárnyas légijármű, amelynek meg kell felelnie a 16. Annex, I. kötet zajbizonyítvány előírásoknak, hordozza a zajbizonyítványt igazoló okmányt. Amikor ez az okmány vagy a lajstromozó állam részéről jóváhagyott más dokumentumban található zajbizonyítványt tartalmazó megfelelő nyilatkozat nem angol nyelvű, mellékeljék annak hiteles angol nyelvű fordítását is.

1. Megjegyzés: – A kötelezettségvállalást a fedélzeten tartott bármilyen dokumentum tartalmazhatja, amelyet a lajstromozó állam a 16. Annex, I. kötet rendelkezéseivel összhangban jóváhagyott.

2. Megjegyzés: – A 16. Annex, I. kötetben közölt, és a forgószárnyas légijárműveknél alkalmazható, különböző zajbizonyítvány előírásokat a típusalkalmassági megkérésének dátumával, vagy az igazolást kiadó hatóság által meghatározott egyenértékű eljárás szerint benyújtott kérelem elfogadási dátumával lehet meghatározni. Néhány forgószárnyas légijárműnél nem követelmény, hogy megfeleljen bármelyik zajbizonyítvány előírásnak. Részletesebben lásd a 16. Annex, I. kötet, II. rész, 8 és 11 fejezeteit.

4.7 Repülési adatrögzítők

1. Megjegyzés: A repülési adatrögzítők két rendszerből illetve berendezésből, a repülési adatrögzítőből (FDR) valamint a pilótakabin hangrögzítőből (CVR) állnak.

2. Megjegyzés: Az összetett repülési adat és pilótakabin hangrögzítő berendezések (FDR/CVR) csak a jelen Annex-ben külön ismertetett repülési adatrögzítő berendezés előírások teljesítésére használhatók.

3. Megjegyzés: A repülési adatrögzítőkkel kapcsolatos részletes útmutató a B. Mellékletben található.

4.7.1 Repülési adatrögzítők – típusok

4.7.1.1 *A IV. típusú repülési adatrögzítők*

4.7.1.1.1 A IV. típusú repülési adatrögzítő rögzítse azokat az adatokat, amelyek a forgószárnyas légijármű repülési pályájának, sebességének, helyzetének, hajtómű teljesítményének és működésének pontos meghatározásához szükségesek.

4.7.1.1.2 A IVA. típusú repülési adatrögzítő rögzítse azokat az adatokat, amelyek a forgószárnyas légijármű repülési pályájának, sebességének, helyzetének, hajtómű teljesítményének, működésének és repülésvezérlő szerkezetei helyzetének pontos meghatározásához szükségesek.

4.7.1.2 Az V. típusú repülési adatrögzítő rögzítse azokat az adatokat, amelyek a forgószárnyas légijármű repülési pályájának, sebességének, helyzetének és hajtómű teljesítményének pontos meghatározásához szükségesek.

4.7.1.3 A repülési adatrögzítő berendezésekben 1995 január 1. után ne használjanak fémszalagot.

4.7.1.4 ***Ajánlás*** *– 1998 november 5. után ne használják a frekvencia modulációt (FM) alkalmazó analóg adatrögzítőket.*

4.7.1.4.1 2003 január 1. után ne használják a fényképészeti filmmel működő repülési adatrögzítőket.

4.7.1.5 Az összes olyan digitális adathálózati összeköttetést alkalmazó valamint pilótakabin hangrögzítő berendezés (CVR) szállítására kötelezett forgószárnyas légijármű, amelynek egyedi légialkalmassági bizonyítványát először 2005 január 1. után adták ki, az összes adathálózati digitális közleményváltást a repülési adatrögzítő berendezésén rögzítse. A legkisebb felvételi időtartam azonos legyen a pilótakabin hangrögzítő berendezés felvételi időtartamával és a felvétel összevethető legyen a pilótakabinban rögzített hangfelvétellel.

4.7.1.5.1 2007 január 1-től az összes, digitális adathálózati összeköttetést alkalmazó valamint pilótakabin hangrögzítő berendezés szállítására kötelezett forgószárnyas légijármű rögzítse a légiforgalmi szolgálattal történt digitális közleményváltásait a pilótakabin hangrögzítő vagy repülési adatrögzítő berendezésén. A legkisebb felvételi időtartam azonos legyen a pilótakabin hangrögzítő berendezés felvételi időtartamával és a felvétel összevethető legyen a pilótakabinban rögzített hangfelvétellel.

4.7.1.5.2 Rögzítsék az adathálózati digitális közleményváltás tartalmának megismeréséhez szükség információkat és ahol ez lehetséges a közlemény megjelenítésének vagy a hajózószemélyzet által történt lehívásának időpontját is.

Megjegyzés: Az adathálózati összeköttetések közé tartoznak, azonban nem csak ezekre korlátozódnak a következők:

ADS- C – automatikus légtérfelderítési adat szolgáltatási megállapodás
CPDLC – légiforgalmi irányító és repülőgépvezető közötti adathálózati összeköttetések
D-FIS – adathálózati és repüléstájékoztató szolgálati összeköttetések
AOC – légiközlekedési üzemi irányítási közlemények.

4.7.1.6 **Ajánlás** – *Minden olyan 2730 kg. legnagyobb engedélyezett felszállósúlynál nagyobb tömegű forgószárnyas légijárművet, amely repülési adatrögzítő és pilótakabin hangrögzítő berendezések szállítására kötelezett, alternatív megoldásként egy összetett repülési adat és pilótakabin hangrögzítő berendezéssel is (FDR/CVR) felszerelhetnek.*

4.7.2 Repülési adatrögzítők – felvételi időtartam

A IV. és V. típusú repülési adatrögzítő legyen képes a működésének legalább utolsó tíz órájában rögzített adatok tárolására.

4.7.3 Repülési adatrögzítők – Forgószárnyas légijárművek, amelyek egyedi légialkalmassági bizonyítványát először 1989 január 1-én vagy ezt követően adták ki

4.7.3.1 Minden olyan forgószárnyas légijárművet, amelynek legnagyobb engedélyezett felszállósúlya (tömege) több mint 7000 kg, szereljenek fel IV. típusú repülési adatrögzítő berendezéssel.

4.7.3.2 ***Ajánlás*** *– Minden olyan forgószárnyas légijárművet, amelynek legnagyobb engedélyezett* *felszállósúlya (tömege) 2730 kg-tól 7000 kg-ig terjed, szereljenek fel V. típusú repülési adatrögzítő berendezéssel.*

4.7.4 Repülési adatrögzítők – Forgószárnyas légijárművek, amelyek egyedi légialkalmassági bizonyítványát először 2005. január 1. után adták ki

Minden olyan forgószárnyas légijárművet, amelynek legnagyobb engedélyezett felszállósúlya (tömege) több mint 3175 kg, szereljenek fel IV.A típusú repülési adatrögzítő berendezéssel, melynek felvételi időtartama legalább 10 óra.

Megjegyzés: Elfogadható az önálló (FDR) vagy az összetett (CVR/FDR) repülési adatrögzítő is.

4.7.5 Pilótakabin hangrögzítők – Forgószárnyas légijárművek, amelyek egyedi légialkalmassági bizonyítványát először 1987 január 1-én vagy ezt követően adták ki

Megjegyzés: A pilótakabin hangrögzítő berendezésre előírt műszaki követelmények megtalálhatók az EUROCAE Polgári Légiközlekedési Berendezések Európai Szervezete repülési adatrögzítő rendszerekre kidolgozott MOPS (minimális üzemi teljesítmény előírások) kiadványában vagy más egyenértékű dokumentumban.

4.7.5.1 Minden olyan forgószárnyas légijárművet, amelynek legnagyobb engedélyezett felszállósúlya (tömege) több mint 7000 kg, szereljenek fel pilótakabin hangrögzítő berendezéssel, amelynek célja a pilótakabin belső hangkörnyezetének rögzítése a repülés időtartama alatt. A repülési adatrögzítővel nem rendelkező forgószárnyas légijárművön a pilótakabin hangrögzítő berendezés egyik felvételi sávján rögzítsék legalább a fő forgószárny fordulatszámát.

4.9.5.2 ***Ajánlás*** *– Minden olyan forgószárnyas légijárművet, amelynek legnagyobb engedélyezett felszállósúlya (tömege) 3175 kg-tól 7000 kg-ig terjed, szereljenek fel pilótakabin hangrögzítő berendezéssel, amelynek célja a pilótakabin belső hangkörnyezetének rögzítése a repülés időtartama alatt. A repülési adatrögzítővel nem rendelkező forgószárnyas légijárművön a pilótakabin hangrögzítő berendezés egyik felvételi sávján rögzítsék legalább a fő forgószárny fordulatszámát.*

4.7.6 Pilótakabin hangrögzítők – felvételi időtartam

4.7.6.1 A pilótakabin hangrögzítő berendezés képes legyen a működése legalább utolsó 30 percében rögzített adatok tárolására.

4.7.6.2 **Ajánlás** *— Az a pilótakabin hangrögzítő berendezés, amelyet olyan forgószárnyas légijárműbe szereltek be, amelynek egyedi légialkalmassági bizonyítványát először 1990 január 1-én vagy ezt követően adták ki, képes legyen a működése legalább utolsó két órájában rögzített adatok tárolására.*

4.7.6.3 Az a pilótakabin hangrögzítő berendezés, amelyet olyan forgószárnyas légijárműbe szereltek be, amelynek egyedi légialkalmassági bizonyítványát először 2003 január 1. után adták ki, képes legyen a működése legalább utolsó két órájában rögzített adatok tárolására.

4.7.7 Repülési adatrögzítők – szerkezet és beszerelés

A repülési adatrögzítőket úgy készítsék el és helyezzék el illetve szereljék be a légijárműbe, hogy biztosítsák a rögzített adatok gyakorlatilag lehetséges legnagyobb védelmét annak érdekében, hogy a rögzített adatok megőrizhetők, leolvashatók és feldolgozhatók legyenek.

4.7.8 Repülési adatrögzítők – működés

4.7.8.1 A repülési adatrögzítőt a repülés alatt ne kapcsolják ki.

4.7.8.2 A repülési adatrögzítővel rögzített adatok megőrzése érdekében a berendezést egy baleset vagy repesemény utáni repülés befejezését követően kapcsolják ki és azt a 13. Annex előírásaival összhangban az adatokat tartalmazó adathordozó eltávolítása előtt ne kapcsolják ismét be.

1. Megjegyzés: A repülési adatrögzítővel rögzített tájékoztatások légijárműből történő eltávolításának szükségességét a vizsgálatot végző állam vizsgáló hatósága határozza meg az esemény súlyossága és körülményei alapján, beleértve az eseménynek a repülési üzemre gyakorolt hatását is.

2. Megjegyzés: A járatónak a repülési adatrögzítővel rögzített adatok tárolására vonatkozó felelősségét a 9.6 pont tartalmazza.

4.7.9 Repülési adatrögzítők – folyamatos működőképesség

Végezzék el a repülési adat és pilótakabin hangrögzítő rendszerek felvételeinek üzemi ellenőrzését és értékelését annak érdekében, hogy a rögzítő berendezések folyamatos működőképességét biztosíthassák.

Megjegyzés: A repülési adat és pilótakabin hangrögzítő rendszerek ellenőrzésének eljárásait a B. Melléklet tartalmazza.

4.8 Vészhelyzeti helyjeladó berendezés (ELT)

2008. június 30-ig alkalmazható

4.8.1 Minden olyan, a 4.3.1 a) alpont alapján vízfelszín felett üzemeltetett 1. és 2. teljesítmény osztályú forgószárnyas légijárművet amelynek egyedi légialkalmassági bizonyítványát először 2002 január 1. után adták ki, és minden olyan a 4.3.1 b) alpont alapján üzemeltetett 3. teljesítmény osztályú forgószárnyas légijárművet amelynek egyedi légialkalmassági bizonyítványát először 2002 január 1. után adták ki, és mentőtutajonként legalább egy darab automatikus ELT berendezéssel és egy darab (ELT/S) berendezéssel szereljenek fel

4.8.2 A 4.3.1 a) alpont alapján a vízfelszín felett üzemeltetett összes 1. és 2. teljesítmény osztályú és a 4.3.1 b) alpont alapján üzemeltetett 3. teljesítmény osztályú forgószárnyas légijárművet 2005 január 1-től mentőtutajonként legalább egy darab automatikus ELT berendezéssel és legalább egy darab (ELT/S) berendezéssel szereljenek fel.

4.8.3 A 4.6 szakasz alapján kijelölt szárazföldi területek felett repülést végrehajtó minden forgószárnyas légijárművet, amelynek egyedi légialkalmassági bizonyítványát először 2002 január 1. után adták ki, legalább egy darab automatikus vészhelyzeti helyjeladó (ELT) berendezéssel szereljenek fel.

4.8.4 2005 január 1-től a 4.4 szakasz alapján kijelölt szárazföldi területek felett repülést végrehajtó minden forgószárnyas légijárművet legalább egy darab automatikus vészhelyzeti helyjeladó (ELT) berendezéssel szereljenek fel.

4.8.5 **Ajánlás** – *Az összes forgószárnyas légijárművet szereljék fel automatikusan működésbe lépő vészhelyzeti helyjeladó (ELT) berendezéssel.*

4.8.6 A fenti 4.8.1 – 4.8.5 pontok alapján felszerelt vészhelyzeti helyjeladó (ELT) berendezés a 10. Annex III. kötet vonatkozó előírásai szerint üzemeljen.

2008. július 01-től alkalmazható

4.8.7 2008 július 01-től minden 1. és 2. teljesítmény osztályú forgószárnyas légijárművet szereljenek fel legalább egy darab automatikus ELT berendezéssel, és a 4.3.1 a) alpontban leírtak szerinti vízfelszín feletti üzemeltetés esetére pedig mentőtutajonként vagy mentőmellényenként szereljenek fel legalább egy darab automatikus ELT berendezéssel és legalább egy darab (ELT/S) berendezéssel.

4.8.8 2008 július 01-től minden 3. teljesítmény osztályú forgószárnyas légijárművet szereljenek fel legalább egy darab automatikus ELT berendezéssel, és a 4.3.1 b) alpontban leírtak szerinti vízfelszín feletti üzemeltetés esetére pedig mentőtutajonként vagy mentőmellényenként szereljenek fel legalább egy darab automatikus ELT berendezéssel és legalább egy darab (ELT/S) berendezéssel.

4.8.9 A fenti 4.8.7 és 4.8.8 pontok alapján felszerelt vészhelyzeti helyjeladó (ELT) berendezés a 10. Annex III. kötet vonatkozó előírásai szerint üzemeljen.

Megjegyzés: A vészhelyzeti helyjeladó (ELT) számának, típusának és a légijárművön való elhelyezésének valamint az uszóképességet támogató kiegészítő rendszerének megfelelő kiválasztása adja a legnagyobb esélyt a vészhelyzeti helyjeladó (ELT) működésbe hozására, amennyiben a kutatás és mentés szempontjából különösen nehéz területeket is beleértve, a víz vagy a szárazföld felett repülő légijárművet baleset érné. Az adóegység elhelyezése a legfontosabb tényező az optimális törés és tűz elleni védelem biztosításában. Az automatikus működésű beépített vészhelyzeti helyjeladó (ELT) vezérlő és kapcsoló eszközeinek (aktíváló kijelzők) elhelyezésénél és a kapcsolódó üzemeltetési eljárások kialakításánál tekintetbe kell venni a figyelmetlenségből adódó működésbe hozatal gyors felismerésének, valamint a manuális bekapcsolás esetén a személyzet általi könnyű kezelhetőség igényeit.

4.9 Forgószárnyas légijárművek, amelyeket nyomásmagasság-adó másodlagos radar válaszjeladóval kell felszerelni

4.9.1 2003 január 1-től az illetékes hatóság felmentésének kivételével minden forgószárnyas légijárművet szereljenek fel a 10. Annex IV. kötet vonatkozó előírásainak megfelelően üzemelő nyomásmagasság-adó másodlagos radar válaszjeladó berendezéssel.

4.9.2 **Ajánlás** – *Minden forgószárnyas légijárművet szereljenek fel a 10. Annex IV. kötet vonatkozó előírásainak megfelelően üzemelő nyomásmagasság-adó másodlagos radar válaszjeladó berendezéssel.*

Megjegyzés: A 4.9.1 és 4.9.2 pontok előírásainak célja a légiforgalmi szolgálatok valamint az összeütközést elkerülő fedélzeti rendszerek hatékony működésének fejlesztése. Az ACAS rendszer felszerelésére és szállítására vonatkozó hatálybalépési időpontokat a 6. Annex I. rész 6.18.1 és 6.18.2 pontjai tartalmazzák. Az előírás célja továbbá az is, hogy a nyomásmagasság-adó másodlagos radar válaszjeladó berendezéssel fel nem szerelt légijármű ne üzemeljen közös légtérben olyan légijárművel, amely összeütközést elkerülő fedélzeti rendszerrel (ACAS) van felszerelve. Ennek érdekében a nyomásmagasság-adó másodlagos radar válaszjel adó berendezés szállítása alól történő felmentéseket olyan légtér kijelölése mellett adják ki, amelyben az ilyen berendezés szállítása nem kötelező.

4.10 Mikrofonok

Ajánlás – *A pilótakabinban szolgálati feladatot ellátó összes hajózószemélyzeti tag közleményváltásaihoz az átváltási szint/magasság alatt gégemikrofont vagy fejhallgatóhoz erősített mikrofont használjon.*

5. fejezet
Forgószárnyas légijármű távközlési és navigációs berendezések

5.1 Távközlési berendezés

5.1.1 A műszerrepülési szabályok szerint vagy éjszaka üzemeltetett forgószárnyas légijárművet szereljék fel rádió távközlési berendezéssel. Az ilyen berendezés a meghatározott frekvenciákon alkalmas legyen kétoldalú rádióösszeköttetés fenntartására az illetékes hatóság által előírt légiforgalmi állomásokkal.

Megjegyzés: A 5.1.1 pont előírásai teljesítettnek tekinthetők, ha az útvonalon szokásos hullámterjedési viszonyok között a forgószárnyas légijármű képes az itt meghatározott távközlési összeköttetések fenntartására.

5.1.2 Amikor a 5.1.1 előírásának teljesítése érdekében egynél több berendezés felszerelése szükséges, azok egymástól függetlenül működjenek úgy, hogy az egyik berendezés meghibásodása ne okozza bármely másik berendezés meghibásodását.

5.1.3 A látvarepülési szabályok szerint, de ellenőrzött repülésként üzemeltetett forgószárnyas légijárművet az illetékes hatóság mentesítő engedélyének hiányában szereljenek fel rádió távközlési berendezéssel, amely a repülés végrehajtása alatt bármikor alkalmas az illetékes hatóság által meghatározott frekvenciákon és kijelölt légiforgalmi állomásokkal a kétoldalú rádió-összeköttetés fenntartására.

5.1.4 Azt a forgószárnyas légijárművet, amelyet olyan repülés végrehajtására használnak fel, amelyre a 4.3 vagy 4.4 szakaszok előírásai vonatkoznak, az illetékes hatóság mentesítő engedélyének hiányában szereljenek fel rádió távközlési berendezéssel, amely a repülés végrehajtása alatt bármikor alkalmas az illetékes hatóság által meghatározott frekvenciákon és kijelölt légiforgalmi állomásokkal a kétoldalú rádió-összeköttetés fenntartására.

5.1.5 **Ajánlás** – *Az 5.1.1 – 5.1.4 pontok alapján előírt rádió berendezés alkalmas legyen rádió összeköttetés fenntartására a légiközlekedési vészfrekvencián.*

5.1.6 A légtér meghatározott szakaszaiban vagy olyan útvonalakon történő repülések végrehajtásakor, ahol RCP típus lett előírva, az 5.1.1 – 5.1.5 pontokban meghatározott követelményeken túl a forgószárnyas légijármű:

a) legyen felszerelve olyan távközlési berendezésekkel, amelyek lehetővé teszik az előírt RCP típus(ok) szerinti üzemeltetést; és

b) a járató állama részéről rendelkezzen jogosítással az ilyen légtérben történő üzemeléshez.

Megjegyzés: az előírt távközlési teljesítményre (RCP), az ezzel összefüggő eljárásokra valamint a jogosítási folyamatra vonatkozó tájékoztatásokat az előkészítés alatt lévő Előírt Távközlési Teljesítmény

(RCP) *Kézikönyv (Doc 9869) tartalmazza. Ez a kiadvány felsorolja továbbá azokat a dokumentumokat is amelyeket az államok és a nemzetközi szervezetek a távközlési rendszerekre és az előírt távközlési teljesítményre (RCP) dolgoztak ki.*

5.2 Navigációs berendezés

5.2.1 A forgószárnyas légijárművet olyan navigációs berendezéssel szereljék fel, amelynek segítségével az képes:

a) az üzemeltetői repülési tervében meghatározott útvonal követésére; és

b) a légiforgalmi szolgálatok előírásainak megfelelő repülés végrehajtására;

kivéve, ha ezt az illetékes hatóság nem tiltja meg, a látvarepülési szabályok szerint végrehajtott repülés során a navigációt a földi tájékozódási pontok látás utáni azonosításával hajtja vége. Az általános célú nemzetközi légiközlekedés esetében a földi vonatkozási pontok (tereptárgyak illetve jellegzetes tájolási pontok) közötti legnagyobb távolság 110 km (60 NM) lehet.

5.2.2 A légtér meghatározott szakaszaiban vagy olyan útvonalakon történő repülés esetében, amelyekre vonatkozóan RNP típust írtak elő, a forgószárnyas légijármű az 5.2.1 pontban ismertetett előírások mellett:

a) legyen felszerelve olyan navigációs berendezésekkel, amelyek lehetővé teszik az előírt RNP típus(ok) szerinti üzemeltetést; és

b) a lajstromozó állam részéről rendelkezzen jogosítással az ilyen légtérben történő üzemeléshez.

Megjegyzés: Az előírt navigációs pontosságra (RNP), az ezzel összefüggő eljárásokra valamint a jogosítási folyamatra vonatkozó tájékoztatásokat az RNP Kézikönyv *(Doc 9613) tartalmazza. A kiadvány átfogóan felsorolja azokat a dokumentumokat és egyéb anyagokat, amelyeket az államok és a nemzetközi szervezetek a navigációs rendszerekre valamint az előírt navigációs teljesítményre vonatkozóan készítettek el.*

5.2.3 A forgószárnyas légijárművet olyan navigációs berendezéssel szereljék fel, amely biztosítja, hogy a repülés végrehajtásának bármely szakaszában bekövetkező, az egyik rendszert érintő meghibásodás esetében a forgószárnyas légijárművet a 5.2.1 pont valamint ahol ez alkalmazható, az 5.2.2 pont előírásainak megfelelően tovább lehessen irányítani (navigálni).

Megjegyzés: Az általános célú nemzetközi légiközlekedés vonatkozásában ezt az előírást a berendezések megkettőzésén kívül más módszerekkel is teljesíthetik.

5.2.4 A műszeres időjárási körülmények között végrehajtott leszállással tervezett repülések esetében a forgószárnyas légijárművet szereljék fel olyan rádió berendezéssel, amely alkalmas az irányvezetést biztosító rádiójelek vételére addig a pontig, ahonnan a leszállás látással végrehajtható. Ez a rádió berendezés alkalmas legyen az irányvezetés biztosítására minden olyan tervezett leszállási, valamint bármely kijelölt kitérő helikopter repülőtéren, ahol műszeres időjárási körülmények között történő leszállás végrehajtását tervezik.

6. fejezet
Forgószárnyas légijármű karbantartás

1. Megjegyzés: A jelen fejezetben történő alkalmazás során a forgószárnyas légijármű kifejezésbe tartoznak a hajtóművek, meghajtás áttételek, forgószárnyak, légcsavarok, alkatrészek, műszerek, szerkezeti egységek és felszerelések, beleértve a vészhelyzeti felszereléseket is.

2. Megjegyzés: A folyamatos légialkalmasság követelményeire vonatkozó útmutató a Légialkalmassági Kézikönyv-*ben (Doc 9760) található*
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6.1 Karbantartási felelősség

6.1.1 A forgószárnyas légijármű tulajdonosa vagy bérlet esetében annak bérlője biztosítsa, hogy:

a) minden üzemeltetett forgószárnyas légijárműve repülésre alkalmas állapotban legyen;

b) a tervezett repüléshez szükséges üzemeltetési és vészhelyzeti berendezések működőképesek legyenek;

c) minden egyes üzemeltetett forgószárnyas légijárművének Légialkalmassági Bizonyítványa érvényes legyen;

d) a forgószárnyas légijármű karbantartását a lajstromozó állam részéről elfogadható program szerint elvégezték.

6.1.2 A forgószárnyas légijárművet csak akkor üzemeltessék, ha azt a lajstromozó állam részéről elfogadható rendszerben tartják karban és adják ki további üzemeltetésre.

6.1.3 Amikor a karbantartási nyilatkozatot nem a 6. Annex I. rész 8.7 szakasza alapján jóváhagyott szervezet adja ki, a karbantartási nyilatkozatot aláíró személy az 1. Annex előírásainak megfelelő szakszolgálati jogosítással rendelkezzen.

6.2 Karbantartások nyilvántartása

6.2.1 A tulajdonos biztosítsa a karbantartásokra vonatkozó következő nyilvántartások megőrzését a 6.2.2 pontban jelzett időtartamig:

a) a forgószárnyas légijármű és az összes korlátozott ideig üzemeltethető alkatrészének teljes üzemideje (szükség szerint órában, naptári időszakban és repülési ciklusokban meghatározva);

b) a forgószárnyas légijármű állapota az összes kötelező folyamatos légialkalmassági előírás és tájékoztatás teljesítése vonatkozásában;

c) a forgószárnyas légijármű és főbb szerkezeti elemeinek, alkatrészeinek módosítása és javítása valamint ennek részletezése;

d) a forgószárnyas légijármű vagy meghatározott kötelező karbantartási időszakkal vagy ciklussal rendelkező részeinek teljes üzemideje az utolsó (nagy)javítás óta (szükség szerint órában, naptári időszakban és/vagy repülési ciklusokban meghatározva);

e) a forgószárnyas légijármű karbantartási programhoz viszonyított jelenlegi felülvizsgálati – ellenőrzési – helyzete a feladatok végrehajtása alapján; és

f) részletes karbantartási jegyzőkönyvek, amelyekből megállapítható, hogy teljesítették a karbantartásból való kiadáshoz szükséges összes előírást.

6.2.2 A 6.2.1 a)–e) alpontokban ismertetett nyilvántartásokat azon egység üzemi élettartamának lejáratát és üzemeltetésből történő végleges kivonását követő legalább 90 napig őrizzék meg, amely egységre a nyilvántartás vonatkozik. A 6.2.1 f) alpontban ismertetett jegyzőkönyvet a karbantartási nyilatkozat aláírását követő egy évig őrizzék meg.

6.2.3 A forgószárnyas légijármű bérlője a bérleti időtartam alatt szükség szerint teljesítse a 6.2.1 és 6.2.2 pontok előírásait.

6.3 Folyamatos légialkalmassági tájékoztatás

A 3175 kg. legnagyobb engedélyezett felszállósúlynál (tömeg) nehezebb forgószárnyas légijármű tulajdonosa vagy bérlet esetében annak bérlője a lajstromozó állam előírásai szerint biztosítsa, hogy a folyamatos légialkalmasságra vonatkozó tájékoztatásokat és gyakorlati tapasztalatokat a 8. Annex II. rész 4.2.3 f) valamint 4.2.4 pontok előírásaiban meghatározott rendszer alapján továbbítsák.

6.4 Módosítások és javítások

Az összes módosítást és javítást a lajstromozó állam által elfogadható légialkalmassági előírásoknak megfelelően végezzék el. Dolgozzanak ki eljárásokat annak biztosítására, hogy a légialkalmasságra vonatkozó követelmények teljesítésének bizonyítására elegendő mennyiségű adatot őriznek meg.

6.5 Karbantartási nyilatkozat

6.5.1 A lajtromozó állam előírásai szerint a karbantartási munka kielégítő és sikeres elvégzésének igazolására készítsenek el és írjanak alá karbantartási nyilatkozatot.

6.5.2 A karbantartási nyilatkozat tartalmazzon igazolást az alábbiakról:

a) az elvégzett karbantartási munka alapvető részletei;

b) a karbantartás befejezésének időpontja;

c) az engedélyezett karbantartó szervezet azonosítója – amennyiben ez alkalmazható; és

d) a karbantartási nyilatkozatot aláíró személy vagy személyek neve.

7. fejezet
A forgószárnyas légijármű hajózószemélyzete

7.1 Jogosítások

A légijármű parancsnoka biztosítsa, hogy a hajózószemélyzet minden egyes tagja rendelkezzen a lajstromozó állam által kiadott vagy érvényesített szakszolgálati engedéllyel és jogosításuk megfelelő, továbbá bizonyosodjon meg arról, hogy a hajózószemélyzet tagjai rendelkeznek a szükséges szakmai jártassággal.

Megjegyzés: A repülőgépvezetőknek szóló azon információkat, amelyek a repülési eljárások paramétereire és az üzemeltetési eljárásokra vonatkoznak, a PANS-OPS I. kötete (Doc 8168) tartalmazza. A látás utáni és a műszeres repülési eljárások felépítésére vonatkozó követelményeket a PANS-OPS II. kötete (Doc 8168) tartalmazza. Az akadály mentesség követelményeinek és eljárásainak használata egyes államokban eltérhetnek a PANS-OPS előírásaitól, és biztonsági okokból fontos ezen különbségek ismerete.

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7.2 A hajózószemélyzet összetétele

A hajózószemélyzet tagjainak száma és összetétele a repülésvégrehajtási kézikönyvben vagy a légijármű légialkalmassági bizonyítványával összefüggésben levő más egyéb dokumentumban meghatározott minimális létszámnál alacsonyabb ne legyen.

6. Annex – III. rész
Függelékek

1. FÜGGELÉK
A járatók biztonsági felülvizsgálata

(lásd: II. rész, 2. fejezet, 2.2.1.7)

1. Elsődleges légiközlekedési törvényhozás

1.1 A járató állama léptessen érvénybe és alkalmazzon olyan törvényt, amely képessé teszi az államot a polgári légiközlekedés szabályozására a Polgári Légiközlekedési Hatóság (CAA), vagy erre a célra létrehozott azonos szervezet bevonásával. A törvény jogosítsa fel a Hatóságot az állam felülvizsgálati tevékenységének végrehajtására. A törvény tegye lehetővé előírások kiadását, a járatók tanúsítását és folyamatos felügyeletét, és határozat meghozatalát a Hatóság által megállapított biztonsági ügyekben.

Megjegyzés: A jelen Függelékben használatos Hatóság kifejezés megfelel a Polgári Légiközlekedési Hatóságnak, valamint a felügyelőket és az állományt magába foglaló azonos szervezeteknek.

1.2 A járató állama biztosítsa, hogy az állam törvényei írják elő a járatók számára azt a követelményt, hogy a Hatóság hozzáférhessen a járatók személyi állományához, légijárműveihez, üzemeltetéséhez és létesítményeihez valamint a nyilvántartásokhoz a a tanúsítások és a folyamatos felülvizsgálatok céljából.

Megjegyzés: Azon rendszer kritikus elemeire vonatkozó útmutató, amely képessé teszi az államot az üzemeltetés ellenőzésében, tanúsításában és folyamatos felülvizsgálatában viselt felelősségének gyakorlására, a Biztonsági Felülvizsgálati Kézikönyvnek *(Doc 9734)* az Állami Biztonsági Felülvizsgálati Rendszer Létrehozása és Irányítása című A. részében, az Üzemeltetés Felügyeleti, Jogosítási és Folyamatos Ellenőrzési Eljárások Kézikönyvben *(Doc 8335)* és a Légialkalmassági Kézikönyvben *(Doc 9760) található.*

2. Különleges üzemeltetési előírások

2.1 A járató állama olyan előírásokat fogadjon el a légijárművek üzemeltetésének folyamatos felügyeletére és tanúsítására, valamint a légijárművek karbantartására, amelyek biztosítják a Nemzetközi Polgári Légiközlekedési Egyezmény Annexeivel való összhangot.

2.2 A járató állama biztosítsa, hogy a technológia és az üzemeltetési környezet változásainak tekintetében az állam előírásai eléggé átfogóak, részletezettek és naprakészek legyenek, amelyek garantálják, hogy az előírásokhoz való alkalmazkodás az adott üzemeltetés elfogadható biztonsági szintjét eredményezi.

3. A Polgári Légiközlekedési Hatóság felépítése és a biztonsági felülvizsgálati feladatok

3.1 Az állami felelősség hatékony vállalása érdekében a járató állama biztosítsa, hogy a Hatóság legyen felelős a légiüzemeltetés biztonsági felülvizsgálatáért, valamint a Hatóság rendelkezzen az állam fennhatósága alá tartozó polgári légiközlekedés összetettségének és méretének megfelelő erőforrásokkal.

3.2 A járató állama biztosítsa, hogy a hatósági ellenőrök rendelkezzenek megfelelő támogatással, felhatalmazással és szállítóeszközzel annak érdekében, hogy függetlenül láthassák el a tanúsítási és folyamatos felügyeleti tevékenységüket.

4. Műszaki útmutatók

4.1 A járató állama biztosítsa, hogy a hatósági ellenőrök a járatók tanúsításához és folyamatos felülvizsgálatához szükséges irányelveket, eljárásokat és szabványokat tartalmazó műszaki útmutató kézikönyvekkel rendelkezzenek.

4.2 A járató állama biztosítsa, hogy a hatósági ellenőrök a biztonsági kérdésekkel összefüggő és a hatályba léptetést is magukba foglaló döntésekhez szükséges irányelveket, eljárásokat és szabványokat tartalmazó műszaki útmutató kézikönyvekkel rendelkezzenek.

4.3 A járató állama biztosítsa, hogy a hatósági ellenőrök a hivatalos kötelezettségek teljesítésekor követendő erkölcsre, személyes viselkedésre valamint a valós vagy vélt érdek ütközések elkerülésére irányuló műszaki útmutató kézikönyvekkel rendelkezzenek.

5. Jogosított műszaki személyzet

5.1 A járató állama használjon módszertant az ellenőri állományára vonatkozó követelmények meghatározására, az adott állam polgári légiközlekedésének összetettségéhez és méretéhez igazodva.

5.2 **Ajánlás –** az 5.1 bekezdés módszertanát dokumentálják.

5.3 A járató állama határozzon meg jogosítási követelményeket annak biztosítása érdekében, hogy az ellenőrző személyzetük rendelkezzen a tanúsításhoz és ellenőrzéshez szükséges tevékenységükkel összhangban álló üzemeltetési és műszaki végrehajtási tapasztalattal és képzettséggel.

Megjegyzés: az ellenőrök gyakorlati jártasságára és képzésére vonatkozó útmutatót az Üzemeltetés Felügyeleti, Jogosítási és Folyamatos Ellenőrzési Eljárások Kézikönyvben *(Doc 8335) című anyag, Fejezet 9, 9.4 része tartalmazza.*

5.4 A járató állama követelje meg, hogy a tanúsítási és a folyamatos felügyeleti feladataik hatékony ellátásához, a hatósági ellenőrök részesüljenek alap- és ismétlő képzésben a vonatkozó műszaki témakörökből (beleértve a légijármű specifikus témaköröket) és gyakorlati ismeretekből.

5.5 **Ajánlás** – *a járató állama hozzon megfelelő intézkedéseket az alkalmazási feltételek és a javadalmazás terén, hogy biztosítani lehessen felkészült ellenőrök jelentkezését és megtartását.*

6. Igazolási és tanúsítási kötelezettségek

6.1 A járató állama alkalmazzon dokumentált eljárást a járatók tanúsításához, amely magába foglalja a II. Részben meghatározott eljárások, dokumentációk és üzemeltetések elfogadásához vagy jóváhagyásához vezető átfogó műszaki értékeléseket is.

6.2 A járató állama követelje meg, hogy új kereskedelmi légiszállítási tevékenység megkezdése előtt a járatók bizonyítsák be, hogy a beterjesztett üzemeltetést biztonságosan tudják elvégezni.

7. Folytatólagos felügyeleti kötelezettségek

7.1 A járató állama alkalmazzon dokumentált eljárást a járatók folyamatos felügyeletéhez, amellyel igazolni lehet a járatók részére a Hatóság által kiadott légijármű üzembentartási engedélyek folyamatos érvényességét.

7.2 A járató állama alkalmazzon egy használatban lévő felügyeleti tervet annak alátámasztására, hogy a járatók változatlanul megfelelnek az alaptanúsításra megállapított követelményeknek és, hogy az összes járató megfelelőképpen működik.

8. Biztonsági kérdésekről hozott döntések

8.1 A felismert biztonsági problémák megoldása érdekében, a járató állama alkalmazzon dokumentált eljárást a végrehajtást is magába foglaló megfelelő helyesbítő intézkedések meghozatalához.

8.2 A járató által a felismert biztonsági problémák megoldására hozott intézkedéseket is magába foglaló fejlődést nyomonkövető és nyilvántartó rendszer segítségével, a járató állama győződjön meg arról, hogy a felismert biztonsági problémák a megfelelő időben megoldásra kerültek.

2. Függelék

A 3. teljesítmény osztályú helikopterek üzemeltetésére vonatkozó kiegészítő követelmények műszeres időjárási körülmények (IMC) közötti repülések esetére

(Lásd II. Rész, 3. fejezet 3.4.1)

A II. Rész, 3. fejezet, 3.4.1 alpontjában előírt légialkalmassági és üzemeltetési követelmények betartása az alábbiakkal biztosítható:

1. Gázturbinás hajtómű megbizhatósága

1.1 A 3. teljesítmény osztályú helikopterek műszeres időjárási körülmények (IMC) közötti repüléseinél alkalmazott hajtóművek jóváhagyásának megszerzésénél és annak fenntartásánál:

1.1.1 Annak érdekében, hogy az üzemeltetésben meglévő hajtómű típus kezdeti jóváhagyását meg lehessen szerezni, kockázat kezelési eljárással mutassák be, hogy a hajtómű megbízhatósági mutatóját jellemző teljesítmény elvesztési mérték egynél kevesebb 100 000 hajtómű órára vetítve.

Megjegyzés: A teljesítmény elvesztését ebben az esetben a hajtómű vagy hajtómű komponens – beleértve a tüzelőanyag segédberendezéseket vagy a hajtómű vezérlő rendszereket is – hibás tervezésére vagy beépítésére visszavezethető ok miatt bekövetkező bármely teljesítményvesztéssel lehet értelmezni (lásd: I melléklet).

1.1.2 Egy új hajtómű típus kezdeti jóváhagyásának megszerzése érdekében a Tervező állama egyenként vizsgálja meg a hajtómű mintákat a műszeres időjárási körülmények (IMC) közötti 3. teljesítmény osztályú repüléseknél.

1.1.3 A jóváhagyás fenntartása érdekében a Tervező állama folyamatos légialkalmassági eljárás keretében mutassa be, hogy a hajtómű megbízhatósága összhangban marad az 1.1.1 pont előírásának céljával.

1.2 A járató felel a hajtómű üzemállapot változásának figyeléséért.

1.3 A repülésközbeni hajtómű meghibásodás valószínűségének csökkentése érdekében a hajtóművet fel kell szerelni:

a) Gázturbinás hajtómű esetében egy automatikusan működésbe lépő ismételt gyújtást biztosító rendszerrel, vagy kézzel kiválasztható folyamatos gyújtást biztosító rendszerrel, amíg a hajtómű tanúsításánál megállapításra nem kerül, hogy ilyen rendszerre nincs szükség. A tanúsításnál figyelembe kell venni azt a legvalószínűbb környezeti feltétel rendszert, amelyen belül a hajtómű felhasználásra kerül;

b) Egy mágneses részecske érzékelő vagy ahhoz hasonló rendszerrel, amely figyeli a hajtómű, a segédberendezéseket meghajtó ház és az áttétel ház állapotát, és amely magába foglalja a műszerfalra figyelmeztető jelzést kiadó rendszert is; és

c) Egy vész hajtómű teljesítmény szabályozó berendezéssel, amely biztosítja a hajtómű folyamatos üzemeltetését egy megfelelő teljesítmény tartományon keresztül, amellyel biztonságosan befejezhető a repülés a tüzelőanyag szabályozó egység ésszerű keretek között bekövetkező valószínű meghibásodása esetén.

2. Rendszerek és felszerelések

A műszeres időjárási körülmények (IMC) közötti 3. teljesítmény osztályú repülésekre alkalmazott forgószárnyas légijárművek legyenek felszerelve az összes megengedett üzemeltetési feltételek mellett, egy hajtómű meghibásodás bekövetkezését követően, a folyamatos biztonságos repülés fenntartását és a biztonságos kényszerleszállás végrehajtását támogató alábbi rendszerekkel és felszerelésekkel:

a) Vagy két, egymástól elválasztott, elektromos energiát előállító rendszerrel, melyek mindegyike alkalmas az IMC feltételek közötti folyamatos repülésekhez előírt műszerek, felszerelések és rendszerek elektromos terhelésének összes valószínűsíthető kombinációjában való táplálásához; vagy egy elsődleges áramforrással és egy tartalék akkumulátorral vagy egy egyéb tartalék áramforrással amely képes legalább egy órán keresztül a helikopter vész üzemmódban való repülésének biztonságos fenntartásához szükséges berendezések és műszerek elektromos terhelésének 150 százalékával megegyező táplálás biztosítására; és

b) A fő elektromos energia ellátó rendszer elvesztését követően működésbe lépő megfelelő kapacitású és terhelhetőségű vész elektromos energia ellátó rendszerrel, amely minimum legyen képes:

Megjegyzés: ha akkumulátor biztosítja a másodlagos áramforrással szemben támasztott követelmények teljesítését (lásd 2 a) fentebb) akkor kiegészítő áramforrás alkalmazása nem követelmény.

1) Az összes olyan repülőgépvezetési műszer, kommunikációs és navigációs rendszer működtetésére, amelyek a maximálisan engedélyezett magasságról, siklási konfigurációban a leszállás végrehajtásához szükségesek;

2) A stabilizálást biztosító rendszerek működtetésére, amennyiben szükségesek;

3) A futóművek kiengedésére, amennyiben szükségesek;

4) Egy olyan pitot cső fűtéséhez szükséges energia biztosítására, amely a légijárművezető számára világosan látható légsebességmérő műszer táplálását látja el;

5) A leszálló fény működtetésére;

6) Egy hajtómű újraindítására, amennyiben szükséges; és

7) A rádiómagasság mérő működtetésére.

c) Egy rádió magasságmérővel;

d) Egy robotpilótával, ha a másodpilóta helyett kerülne alkalmazásra. Ebben az esetben a járató állama gondoskodjon arról, hogy a járató jóváhagyása világosan tartalmazza a robotpilóta alkalmazásának feltételeit vagy korlátozásait;

e) Olyan eszközzel, amely legalább egy kísérletet lehetővé tesz a hajtómű újraindítására;

f) Műszer szerinti repülésekre tanúsított körzeti navigációs rendszerrel, amely alkalmas biztonságos leszálló helyek meghatározására vész üzemmód esetén;

g) A futóműtől független leszálló fényre, amely alkalmas a földetérés körzetének megfelelő megvilágítására, az éjszakai vészleszállás során; és

h) Egy hajtómű tűzjelző rendszerre.

3. Minimális felszerelések jegyzéke

A járató állama határozza meg a műszeres időjárási feltételek (IMC) közötti, 3. teljesítmény osztályú repülésekhez szükséges berendezésekre vonatkozó minimális üzemképességi követelményeket.

4. A repülésvégrehajtási kézikönyv információi

A repülésvégrehajtási kézikönyvnek tartalmaznia kell azokat a korlátozásokat, eljárásokat, jóváhagyási állapotokat és egyéb információkat, amelyek a 3. teljesítmény osztályú forgószárnyas légijárművek IMC feltételek közötti repüléseihez szükségesek.

5. Események jelentése

5.1 A 3. teljesítmény osztályú forgószárnyas légijárművek IMC feltételek közötti üzemeltetésére jóváhagyott járató jelentse az összes lényeges meghibásodást, rendellenességet vagy hibás működést a járató államának és az másfelől a tervező államának.

5.2 A járató állama kisérje figyelemmel a 3. teljesítmény osztályú forgószárnyas légijárművek IMC feltételek közötti üzemeltetését, hogy képes legyen a szükséges intézkedéseket megtenni a kívánt repülésbiztonsági szint elérése érdekében. A járató állama tájékoztatást ad a jelentős eseményekről vagy egyedi problémákról az érintett tipusalkalmassági bizonyítvány tulajdonosnak és a tervező államának.

6. A járató tervezése

A járató útvonal tervezése vegye figyelembe a tervezett útvonal vagy üzemeltetési körzet felülvizsgálata során az összes kapcsolódó információt, a következőket is beleértve:

a) A repült útvonal alatt található felszín tulajdonságait, beleértve a biztonságos kényszerleszállás végrehajtásához szükséges lehetőségeket egy hajtómű meghibásodás vagy jelentős rendellenesség esetére;

b) A repülésre hatást gyakorolható időjárási információkat, beleértve a szezonális és más kedvezőtlen meteorológiai hatásokat; és

c) Más jellemzőket és korlátozásokat a járató államának meghatározásai szerint.

7. A hajózószemélyzet jártassága, képzése és ellenőrzése

7.1 A járató állama írja elő a hajózó személyzet minimális jártasságát, ami a 3. teljesítmény osztályú forgószárnyas légijárművek IMC feltételek közötti üzemeltetéséhez szükségesek.

7.2 A járató rendelkezzen megfelelő képzéssel és ellenőrzéssel a 3. teljesítmény osztályú forgószárnyas légijárművek IMC feltételek közötti üzemeltetését végző hajózó személyzetek számára, amely lefedi a normál, rendellenes és vészhelyzetekre vonatkozó eljárásokat, és különösen a hajtómű meghibásodások esetét, beleértve a kényszerleszálláshoz való süllyedést éjszaka és/vagy IMC feltételei között. A képzés és ellenőrzés terjedjen ki az egyhajtóműves forgószárnyas légijárművek stabilizált autorotációs üzemmódba való átállására is.

8. A járató tanúsítása vagy megerősítése

A járató állama által meghatározott tanúsítási és jóváhagyási folyamattal a járatónak bizonyítania kell a képességét a 3. teljesítmény osztályú forgószárnyas légijárművek IMC feltételek közötti repüléseinek végrehajtására.

Megjegyzés – a légialkalmassági és üzemeltetési követelményekre vonatkozó útmutatót az I Melléklet tartalmazza.

Mellékletek

A. Melléklet
Forgószárnyas légijármű teljesítmény és üzemeltetési korlátozások

II. szakasz 3. fejezet és III. szakasz 3. fejezet kiegészítése

Cél és tárgykör

A következő példa célja azon teljesítmény szint bemutatása, amelyet a 6. Annex III. rész II. szakasz 3. fejezet és III. szakasz 3. fejezet előírásaival kívánunk biztosítani. A jelen anyagot az állam kiindulási alapként kezelheti a saját teljesítmény előírásainak létrehozásakor, bár más olyan lehetőséget vagy könnyítéseket is alkalmazhat, amelyek kielégítik a 6. Annex biztonsági célkitűzéseit.

Megjegyzés: Mennyiségi előírásokat az alább bemutatott példák tartalmazzák.

1. Meghatározások

A kategória **(Category A)** A forgószárnyas légijárművekkel kapcsolatosan jelenti azt a több-hajtóműves forgószárnyas légijárművet, melyet a IVB Részben meghatározott hajtómű és rendszer szétválasztási jellemzőkkel terveztek meg és képes üzemelni a kritikus hajtómű meghibásodás előfordulása esetére előre kiszámított felszállási és leszállási adatokkal, melyek megfelelő nagyságú talajfelszínt és kielégítő teljesítmény kapacitást biztosítanak a repülés biztonságos folytatására, vagy a felszállás biztonságos megszakítására.

B kategória **(Category B)** A forgószárnyas légijárművekkel kapcsolatosan jelenti azt az egyhajtóműves, vagy többhajtóműves forgószárnyas légijárművet, amely nem felel meg az A kategória szabványainak. A B kategóriájú forgószárnyas légijárműveknek nincs garantált képességük a repülés biztonságos folytatására egy hajtómű meghibásodás esetén, és egy kényszerleszállást feltételezve.

2. Általános rész

2.1 Az 1. és 2. teljesítmény osztályú forgószárnyas légijárművek A kategóriájú tanúsítással rendelkezzenek.

2.2 A 3. teljesítmény osztályú forgószárnyas légijárművek vagy A kategóriájú vagy B kategóriájú (vagy azokkal egyenértékű) tanúsítással rendelkezzenek.

2.3 Kivéve, ha a megfelelő hatóság másképp nem rendelkezik:

2.3.1 Egy kedvezőtlen körülményű sűrűn lakott területen található helikopter leszállóhelyen a fel és leszállást csak 1. teljesítmény osztályú forgószárnyas légijárművel hajtsák végre.

2.3.2 A 2. teljesítmény osztályú repüléseket csak akkor lehet végrehajtani, ha a fel- és leszállás során rendelkezésre állnak a biztonságos kényszerleszállás feltételei.

2.3.3 A 3. teljesítmény osztályú repüléseket csak kedvező környezeti feltételek mellett lehet végrehajtani.

Törölt: barátságos

2.4 A 2.3.1 – 2.3.3 pontokban leírt változatok szerinti repülések engedélyezéséhez a hatóság végezzen kockázat elemzést, amelyhez vegye figyelembe a következő tényezőket:

a) az üzemeltetés típusát és a repülési körülményeket;

b) a területet / felszínt, amely felett a repülést végrehajtják;

c) a kritikus hajtómű egység meghibásodásának valószínűségét és az ilyen esemény következményeit;

d) a hajtómű egység(ek) megbízhatóságának teljesítéséhez szükséges eljárásokat;

e) a kritikus hajtómű egység meghibásodásából adódó következmények csökkentéséhez szükséges üzemeltetési eljárásokat és képzéseket;

f) állapotfigyelő rendszerek beszerelését és felhasználását.

1. Megjegyzés: Elfogadott, hogy előfordulhatnak olyan esetek, amelyeknél biztonságos kényszerleszállást nem lehet végrehajtani a környezeti vagy egyéb feltételek miatt. Több állam alkalmazta már a kockázatkezelés módszerét és engedélyezett sajátos üzemeltetési változatokat, mint például úszó leszállóhelyekről végrehajtott repüléseket, melyeknél a hajtómű meghibásodás miatti veszélyhelyzet kényszerleszállás nélkül is fennállhat. A kockázat elemzésen alapuló változatok engedélyezése elfogadott részét képezik az államok teljesítmény előírások kidolgozásánál alkalmazott folyamatainak. Amikor a repülések végrehajtására úgy kerül sor, hogy a kényszerleszállásokhoz nem áll rendelkezésre megfelelő terület, akkor az összes vonatkozó tényezőt vegyék figyelembe. Ez magába foglalhatja az esemény bekövetkezésének valószínűségét, a lehetséges következményeket, az elkerülési módszereket továbbá az üzemeltetés potenciális eredményeit és a szükséges ráfordításokat. Az ilyen jellegű értékeléshez alkalmazandó sajátos eljárásokat az államnak kell meghatároznia. Mindenesetre a kényszerleszállás biztonságos végrehajtására vonatkozó megfontolások egyértelműen és világosan jelenjenek meg a teljesítmény előírások kialakításában. A balesetek áttekintésének és egyéb vonatkozó biztonsági adatok és értékelések alkalmazásának döntő szerepe van az üzemeltetési előírások kidolgozásánál az adott területen belül. Az eredményként megjelenő követelmények több féle formában jelenhetnek meg, mint például a jóváhagyott üzemeltetési területek, a repülési útvonalak és az akadálymentességi követelmények kijelölése.

2. Megjegyzés: Ha a repülések végrehajtása olyan útvonalakon történik, ahol hozzá lehet férni megfelelő kényszerleszállási területekhez, akkor ezeket kell használni a sűrűn lakott területekre való be- és kirepüléseknél. Ha ilyen útvonalak nem állnak rendelkezésre, akkor az üzemeltetési feltételek értékelése során vegyék figyelembe a veszélyhelyzetet csökkentő tényezőket is, mint például a meghajtó rendszer megbízhatósága azokon a rövid szakaszokon, ahol nem biztosítottak a megfelelő kényszerleszálló hely feletti repülés végrehajtási feltételei.

Példa

Cél és hatókör

A következő példa mennyiségi megfontolásokat tartalmaz a II. szakasz, 3. fejezet előírásainak teljesítéséhez szükséges teljesítmény szintek bemutatására. Egy állam ezeket a példákat felhasználhatja alapként a saját teljesítmény előírásainak megalkotásánál, de alkalmazhat más változatokat is, amennyiben ezek a változatok kielégítik a II. szakasz, 3. fejezet és az A. melléklet biztonsági célkitűzéseit.

A forgószárnyas légijárművek üzemeltetésénél alkalmazott rövidítések

Rövidítések

D	A forgószárnyas légijármű maximális befoglaló mérete
DPBL	Leszállás előtt meghatározott pont
DPATO	Meghatározott pont felszállás után
DR	Forgószárnyas légijármű által megtett út
FATO	Végső megközelítési és felszállási terület
HFM	Forgószárnyas légijármű repülésvégrehajtási kézikönyve
LDP	Leszállási elhatározási pont
LDAH	Rendelkezésre álló leszállási távolság
LDRH	Szükséges leszállási távolság
R	Forgószárny sugár
RTODR	Szükséges megszakított felszállási távolság
TDP	Felszállási elhatározási pont
TLOF	Földetérési és elemelkedési terület
TODAH	Rendelkezésre álló felszállási távolság
TODRH	Szükséges felszállási távolság
V_{TOSS}	Felszállási biztonságos sebesség

1. Meghatározások

1.1 Csak 1. teljesítmény osztályú forgószárnyas légijárművekre alkalmazandó

Szükséges leszállási távolság (LDRH) – Landing distance required
A leszállási felület felett 15 méter (50 láb) magasságról történő leszálláshoz és teljes megálláshoz szükséges vízszintes távolság.

Szükséges megszakított felszállási távolság (RTODR) – Rejected take-off distance required
A felszállás megkezdésétől a forgószárnyas légijármű teljes megállásáig szükséges vízszintes távolság a hajtómű meghibásodás és a felszállási elhatározási ponton végrehajtott felszállás megszakítás után.

Szükséges felszállási távolság (TODRH) – Take-off distance required
A felszállás megkezdésétől addig a pontig szükséges vízszintes távolság, ahol a felszállási elhatározási ponton (TDP) bekövetkező kritikus hajtómű meghibásodás után elérik a V_{TOSS}, a kiválasztott magasság valamint pozitív emelkedés értékeket, miközben a többi hajtómű egység engedélyezett üzemi határértékein belül működik.

Megjegyzés: A fentiekben megjelölt kiválasztott magasság meghatározása történhet, vagy:

a) *a felszállási terephez viszonyítva; vagy*

b) *azon magassághoz viszonyítva, amelyet a felszálláshoz szükséges távolságon belül található legmagasabb akadályhoz képest állapítanak meg.*

1.2 Minden teljesítmény osztályú forgószárnyas légijárműre alkalmazandó

D – A forgószárnyas légijármű maximális befoglaló mérete.

DR Távolság – Distance DR
Az a vízszintes távolság, amelyet a forgószárnyas légijármű a rendelkezésre álló felszállási távolság végétől megtett.

Rendelkezésre álló leszállási távolság (LDAH) – Landing distance available
A rendelkezésre álló végső megközelítési és felszállási terület valamint bármely más terület együttes hossza, amelyet a forgószárnyas légijárművek egy meghatározott magasságból történő leszállásának végrehajtására alkalmasnak nyilvánítottak.

R - Forgószárny sugár.

Rendelkezésre álló felszállási távolság (TODAH) – Take-off distance available
A rendelkezésre álló végső megközelítési és felszállási terület, valamint ha ilyet meghatároztak, a helikopter biztonsági terület együttes hossza, amelyet a forgószárnyas légijárművek felszállásának végrehajtására alkalmasnak nyilvánítottak.

Felszállási repülési pálya – Take-off flight path
A felszállásnál meghatározott ponttól a felszín feletti 300 m (1000 láb) magasságig terjedő, üzemképtelen kritikus hajtómű egységgel megtett függőleges és vízszintes repülési pálya.

Földetérési és elemelkedési terület (TLOF) – Touchdown and lift-off area
Olyan teherviselő felület, amelyre a forgószárnyas légijármű leszállhat, vagy amelyről elemelkedhet.

V_{TOSS} - Felszállási biztonságos sebesség

V_{y} - Legjobb emelkedési sebesség.

2. Általános rész

2.1 Alkalmazhatóság

2.1.1 Azok a forgószárnyas légijárművek, melyek utasbefogadó képessége meghaladja a 19 főt, vagy sűrűn lakott kedvezőtlen körülményű területen üzemelnek, 1. teljesítmény osztálynak megfelelően kerüljenek alkalmazásra.

2.1.2 A 19 vagy attól kevesebb, de 9-nél több utas befogadására alkalmas forgószárnyas légijárművek 1. vagy 2. teljesítmény osztálynak megfelelően kerüljenek felhasználásra. Amennyiben az üzemeltetés sűrűn lakott kedvezőtlen körülményű területen történik, a forgószárnyas légijárműveket 1. teljesítmény osztálynak megfelelően alkalmazzák.

2.1.3 A 9 vagy attól kevesebb utas befogadására alkalmas forgószárnyas légijárművek 1. 2. vagy 3. teljesítmény osztálynak megfelelően kerüljenek felhasználásra. Amennyiben az üzemeltetés sűrűn lakott kedvezőtlen körülményű területen történik, a forgószárnyas légijárműveket 1. teljesítmény osztálynak megfelelően alkalmazzák.

2.2 Jelentős teljesítmény tényezők

A forgószárnyas légijármű teljesítményének meghatározásához legalább a következő tényezőket vegyük figyelembe:

a) a forgószárnyas légijármű tömege;

b) a tengerszint feletti magasság vagy nyomás-magasság valamint a hőmérséklet;

c) szél: fel és leszállásnál bármely jelentett állandó 5 csomós vagy nagyobb szembeszél esetében a szél nem több mint 50 %-át, amennyiben a repülésvégrehajtási kézikönyvben engedélyezik a hátszélben történő fel és leszállás végrehajtását, bármely jelentett hátszél érték nem kevesebb mint 150 %-át vegyük figyelembe. Ahol pontos szélsebesség mérő berendezés a felszállási és leszállási ponton lehetővé teszi a szél sebességének pontos mérését, ezek az értékek változhatnak.

2.3 Légijármű üzemeltetési módszerek

2.3.1 Ahol a repülés bármely szakaszában bekövetkező hajtómű meghibásodás a 2. és 3. teljesítmény osztályú forgószárnyas légijárművek kényszerleszállását okozhatja:

a) a járatónak a forgószárnyas légijármű jellemzőinek figyelembevételével legalacsonyabb látástávolság értéket kell meghatároznia, azonban ez soha nem lehet alacsonyabb, mint 3. teljesítmény osztályú forgószárnyas légijármű esetében 800 méter;

b) a járató köteles igazolni, hogy a tervezett repülési pálya alatti felület lehetővé teszi, hogy a légijármű vezető kényszerleszállást hajtson végre.

2.3.2 A 3. teljesítmény osztályú üzemeltetés nem végezhető:

a) felszínlátás nélkül; vagy

b) éjszaka; vagy

c) ha a felhőalap 180 méternél (600 láb) alacsonyabb.

Megjegyzés: A 2.3 fejezet szövege a biztonságos kényszerleszállás esetére tartalmazza a „megfelelő megoldás” magyarázatát (a II. Szakasz, 3. Fejezet, 3.1.2 pontban található). Azon államok esetében, amelyek előnyben részesítik a II. Szakasz, 3. Fejezet, 3.4 pont előírásait, vagy amelyek a kockázat értékelésen alapuló hatásvizsgálatot hajtanak végre és/vagy engedélyezik az éjszakai látásszerinti repüléseket, a 2.3 előírásait helyettesítsék megfelelően kidolgozott alternatív szöveggel.

2.4 Akadály felelősségi terület

2.4.1 Az alábbi 4. alpontban leírtakra vonatkozóan az akadálymentességi követelmények céljára a forgószárnyas légijármű útjában akadálynak tekintendő az a tárgy, amelynek távolsága a tervezett repülési pálya alatt a felszínen levő legközelebbi ponttól kevesebb mint:

a) látásszerinti (VFR) üzemeltetés esetén:

1) forgószárnyas légijármű repülésvégrehajtási kézikönyvében meghatározott végső megközelítési és felszállási terület (vagy a forgószárnyas légijármű repülésvégrehajtási kézikönyvében használatos fogalomnak megfelelő terület) legkisebb szélességének fele (vagy ha a szélesség nem került meghatározásra, akkor 0,75 D), ezen felül 0,25 x D (vagy 3 m, amelyik nagyobb), ezen felül:

- 0.10 DR, nappali VFR üzemeltetés esetén;
- 0.15 DR, éjszakai VFR üzemeltetés esetén.

b) műszerszerinti (IFR) üzemeltetés esetén:

1) 1.5 D (vagy 30 m, amelyik nagyobb), ezen felül:

- 0.10 DR, pontos irányvezetéssel rendelkező IFR üzemeltetés esetén;
- 0.15 DR, szabványos irányvezetéssel rendelkező IFR üzemeltetés esetén;
- 0.30 DR, elektronikus irányvezetéssel nem rendelkező IFR üzemeltetés esetén.

c) ha a felszállás kezdeti szakasza látás után történik, és az átváltási ponttól kezdve műszer szerinti (IFR) vagy műszeres meteorológiai körülmények (IMC) közötti repüléssel folytatják, akkor az átváltási pontig a 2.4.1 a) pont követelményeit, míg az átváltási pont után a 2.4.1 b) pont követelményeit alkalmazzák.

2.4.2 A hátrafelé repülésből (vagy oldalirányú átmenetből) végrehajtott felszállás esetén az alábbi 4. alpontban leírt akadálymentességi követelmények céljára vegyék figyelembe a forgószárnyas légijármű hátrafelé (vagy oldalirányban) történő elmozdulásának pályája alatt elhelyezkedő akadályt, amelynek oldalirányú távolsága a tervezett repülési pálya alatti felszínen levő legközelebbi ponttól kevesebb mint a forgószárnyas légijármű repülésvégrehajtási kézikönyvében meghatározott végső megközelítési és felszállási terület (vagy a forgószárnyas légijármű repülésvégrehajtási kézikönyvében használatos fogalomnak megfelelő terület) legkisebb szélességének fele (vagy ha a szélesség nem került meghatározásra, akkor 0,75 D és ezen felül 0,25 x D, vagy 3 m, amelyik nagyobb), ezen felül:

Törölt: váltásból

a) a végső megközelítési és felszállási terület hátsó szélétől megtett távolság 10 százaléka nappali VFR üzemeltetés esetén;

b) a végső megközelítési és felszállási terület hátsó szélétől megtett távolság 15 százaléka éjszakai VFR üzemeltetés esetén

2.4.3 Az akadályokat figyelmen kívül lehet hagyni, amennyiben a következő távolság értéken kívül helyezkednek el:

a) 7 R nappali üzemeltetés esetében, ha biztosítják, hogy az emelkedés során alkalmas látás utáni segédeszközökkel pontos navigáció végezhető;

b) 10 R éjszakai üzemeltetés esetében, ha biztosítják, hogy az emelkedés során alkalmas látás utáni segédeszközökkel pontos navigáció végezhető;

c) 300 méter, ha navigációs berendezésekkel pontos navigáció végezhető; és

d) 900 méter egyéb esetekben.

Megjegyzés: A szabványos irányvezetés az ADF (automatikus rádióiránytű) és a VOR (VHF körsugárzó rádió-irányadó) szerinti irányvezetést jelenti. A pontos irányvezetés az ILS, MLS vagy azokkal megegyező navigációs pontosságot biztosító irányvezetési módszerek alkalmazását jelenti.

2.4.4 Az átmeneti pont nem helyezkedhet el az 1. teljesítmény osztály szerint üzemelő forgószárnyas légijárművek esetében a szükséges felszállási távolság (TODRH) vége előtt, és a 2. teljesítmény osztály szerint üzemelő forgószárnyas légijárművek esetében pedig a felszállás utáni meghatározott pont (DPATO) előtt.

Törölt: átváltási

2.4.5 Ha a megközelítési repülési pálya eltévesztésével kell számolni, akkor az akadály felelősségi területtől való eltérést csak a rendelkezésre álló felszállási távolság vége után alkalmazzák.

2.5 Teljesítmény adatok forrása

A járató tegye lehetővé, hogy forgószárnyas légijármű repülésvégrehajtási kézikönyvében található jóváhagyott teljesítményadatokat alkalmazzák a jelen példával való megfelelőség meghatározása érdekében. Szükség szerint a repülésvégrehajtási kézikönyvet egészítsék ki a járató állama számára elfogadható egyéb adatokkal.

3. Üzemeltetési terület

3.1 Végső megközelítési és felszállási terület (FATO)

Az 1. teljesítmény osztályú üzemeltetés esetén a végső megközelítési és felszállási terület (FATO) mérete legalább a forgószárnyas légijármű repülésvégrehajtási kézikönyvében meghatározott értékű legyen.

Megjegyzés: Egy, a forgószárnyas légijármű repülésvégrehajtási kézikönyvében meghatározottnál kisebb méretű megközelítési és felszállási terület (FATO) elfogadható, amennyiben a forgószárnyas légijármű egy hajtómű meghibásodása esetén képes a párnahatás zónáján kívüli függésre (HOGE OEI), és az alábbi 4.1 alpontban leírt feltételek teljesíthetők.

4. Teljesítménytől függő korlátozások

4.1 Az 1. teljesítmény osztályú forgószárnyas légijármű üzemeltetése

4.1.1 *Felszállás*

4.1.1.1 A forgószárnyas légijármű felszállósúlya (tömege) olyan legyen, hogy ne lépje túl a repülésvégrehajtási kézikönyvben az alkalmazott eljárásra meghatározott maximális felszállósúlyt (tömeget), és a kritikus hajtómű meghibásodása esetén a működőképes hajtómű egységek megfelelő teljesítmény értékénél tegye lehetővé a 100 láb/perc emelkedési sebesség elérését a helikopter repülőtér felszínéhez viszonyított 60 m (200 láb) magasságon és a 150 láb/perc emelkedési sebesség elérését a helikopter repülőtér felszínéhez viszonyított 300 m (1000 láb) magasságon. Ennek során vegyék figyelembe a 2.2 pontban (A-1 ábra) meghatározott jellemzőket.

4.1.1.2 Megszakított felszállás

A forgószárnyas légijármű felszállósúlya (tömege) olyan legyen, amelynél a szükséges megszakított felszállási távolság nem több, mint a rendelkezésre álló megszakított felszállási távolság.

4.1.1.3 Felszállási távolság

A forgószárnyas légijármű felszállósúlya (tömege) olyan legyen, amelynél a szükséges felszállási távolság nem több, mint a rendelkezésre álló felszállási távolság.

1. Megjegyzés: Más megoldásként a fenti követelmény figyelmen kívül hagyható feltéve, hogy a felszállási elhatározási ponton bekövetkező kritikus hajtómű meghibásodás esetében a forgószárnyas légijármű felszállását folytatva a rendelkezésre álló felszállási távolság végétől a szükséges felszállási távolság végéig legkevesebb 10.7 m (35 láb) értékű biztonságos magasságon (A-2 ábra) átrepül az összes akadály felett.

2. Megjegyzés: Az emelt szinten létesített helikopter repülőtérre vonatkozóan a légialkalmassági előírások megfelelő biztonsági határértéket állapítanak meg (A-3. ábra).

4.1.1.4 Hátrafelé repülési eljárások (vagy oldalirányú átmenetet alkalmazó eljárások)

Törölt: átváltást

A járató gondoskodjon arról, hogy üzemképtelen kritikus hajtóművel hátrafelé (oldalirányban) végrehajtott repülés pályája az alatta elhelyezkedő összes akadály felett kellő magasságban legyen. Csak a 2.4.2 pontben meghatározott akadályokat kell tekintetbe venni.

4.1.2 *Felszállási repülési pálya*

A szükséges repülési pálya végétől üzemképtelen kritikus hajtóművel történő repülésnél:

4.1.2.1 A forgószárnyas légijármű felszállósúlya (tömege) olyan legyen, hogy a felszállási elhatározási ponton (TDP) bekövetkező kritikus hajtómű meghibásodás esetében az emelkedési pálya VFR üzemeltetés esetében legalább 10.7 méter (35 láb), IFR üzemeltetés esetében pedig 10.7 méter (35 láb) és ezen felül (+) 0.01 DR függőleges biztonsági távolságot biztosít az emelkedési pályán levő összes akadály felett. Csak a 2.4. pontban meghatározott akadályokat kell tekintetbe venni.

4.1.2.2 Ahol több mint 15°-os irányváltoztatást hajtanak végre, az akadályokra vonatkozó biztonsági távolság értékeket a forduló megkezdésének pontja előtt 5 méterrel (15 láb) növeljék meg. Ennek a fordulónak végrehajtását ne kezdjék meg a felszállási felület feletti 60 méter (200 láb) magasság elérése előtt, kivéve ha a repülésvégrehajtási kézikönyvben jóváhagyott eljárás részeként másként nem engedélyezik.

4.1.3 *Útvonal*

A forgószárnyas légijármű felszállósúlya (tömege) olyan legyen, hogy a teljes repülési pálya bármely pontján bekövetkező kritikus hajtómű meghibásodás esetében lehetséges legyen a repülés folytatása a megfelelő leszállási helyig és a forgószárnyas légijármű elérje a lerepülendő útvonalnak megfelelő legalacsonyabb repülési magasságot.

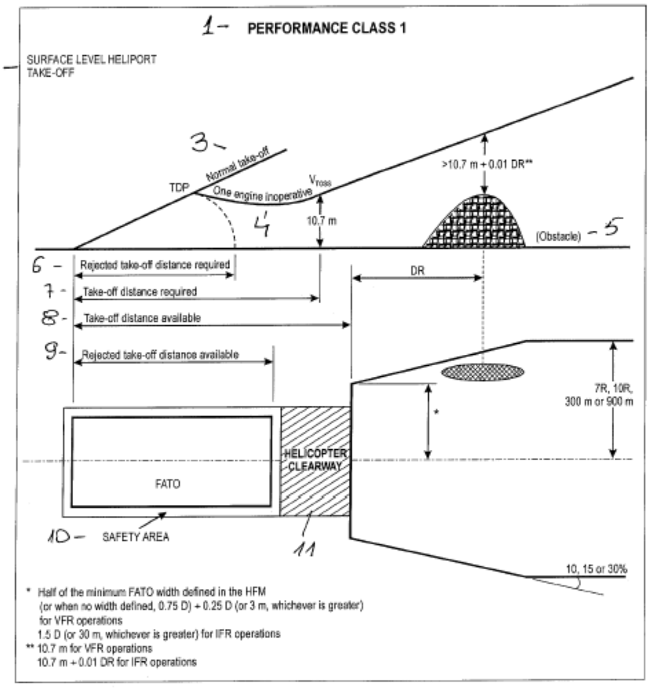


Figure A-1

A-1. ábra

1	1. teljesítmény osztály
2	Forgószárnyas légijármű felszállása felszíni helikopter repülőtérről
3	Normál üzemű felszállás
4	Egy hajtómű üzemképtelen
5	Akadály
6	Szükséges megszakított felszállás távolság
7	Szükséges felszállási távolság
8	Rendelkezésre álló felszállási távolság
9	Rendelkezésre álló megszakított felszállás távolság
10	Biztonsági terület
11	Forgószárnyas légijármű biztonsági terület
*	Forgószárnyas légijármű repülésvégrehajtási kézikönyvében (HFM) meghatározott végső megközelítési és felszállási terület (FATO) legkisebb szélességének fele (vagy ha a szélesség nem került meghatározásra, akkor 0,75 D) + 0,25D (vagy 3 m, amelyik nagyobb) - VFR üzemeltetés esetén
	1.5 D (vagy 30 m, amelyik nagyobb) - IFR üzemeltetés esetén
**	10,7 m - VFR üzemeltetés esetén
	10,7 m + 0,01 DR - IFR üzemeltetés esetén

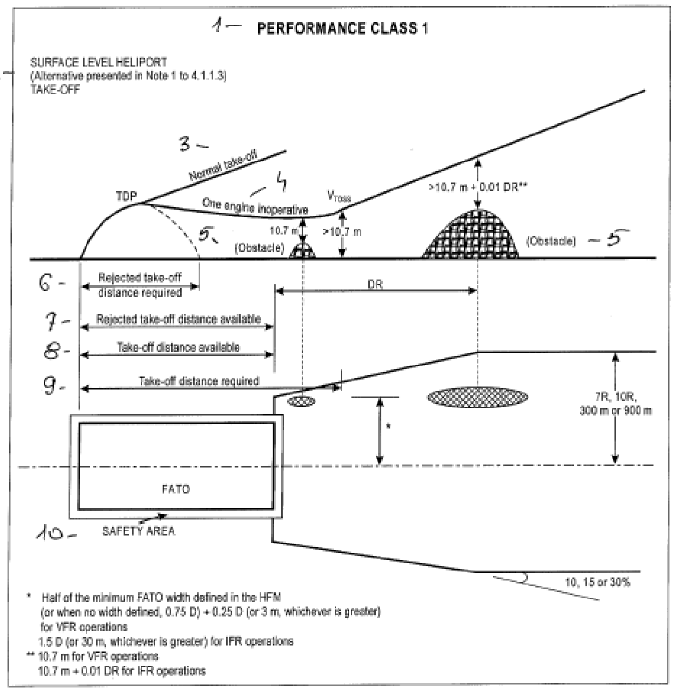


Figure A-2

A-2. ábra

1	1. teljesítmény osztály
2	Forgószárnyas légijármű felszállása felszíni helikopter repülőtérről (a kitérő repülőtér bemutatását a 4.1.1.3 pont 1. megjegyzése tartalmazza)
3	Normál üzemű felszállás
4	Egy hajtómű üzemképtelen
5	Akadály
6	Szükséges megszakított felszállás távolság
7	Rendelkezésre álló megszakított felszállás távolság
8	Rendelkezésre álló felszállási távolság
9	Szükséges felszállási távolság
10	Biztonsági terület
11	Forgószárnyas légijármű biztonsági terület
*	Forgószárnyas légijármű repülésvégrehajtási kézikönyvében (HFM) meghatározott végső megközelítési és felszállási terület (FATO) legkisebb szélességének fele (vagy ha a szélesség nem került meghatározásra, akkor 0,75 D) + 0,25D (vagy 3 m, amelyik nagyobb) - VFR üzemeltetés esetén 1.5 D (vagy 30 m, amelyik nagyobb) - IFR üzemeltetés esetén
**	10,7 m - VFR üzemeltetés esetén 10,7 m + 0,01 DR - IFR üzemeltetés esetén

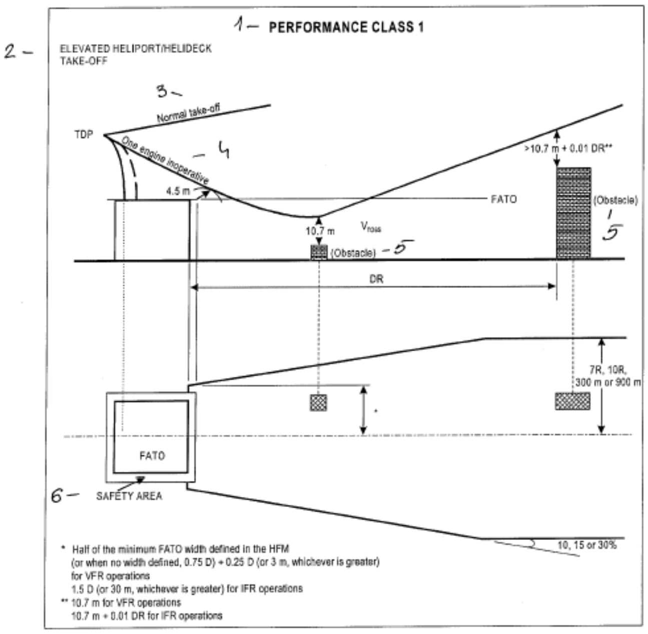


Figure A-3

A-3. ábra

1 1. teljesítmény osztály

2 Forgószárnyas légijármű felszállása emelt szinten / úszó szerkezeten létesített helikopter repülőtérről

3 Normál üzemű felszállás

4 Egy hajtómű üzemképtelen

5 Akadály

6 Biztonsági terület

***** Forgószárnyas légijármű repülésvégrehajtási kézikönyvében (HFM) meghatározott végső megközelítési és felszállási terület (FATO) legkisebb szélességének fele (vagy ha a szélesség nem került meghatározásra, akkor 0,75 D) + 0,25D (vagy 3 m, amelyik nagyobb) - VFR üzemeltetés esetén
1.5 D (vagy 30 m, amelyik nagyobb) - IFR üzemeltetés esetén

****** 10,7 m - VFR üzemeltetés esetén
10,7 m + 0,01 DR - IFR üzemeltetés esetén

4.1.4 Megközelítés, leszállás és megszakított leszállás (A-4 és A-5 ábrák)

A forgószárnyas légijármű számított leszálló súlya (tömege) a célállomáson vagy a kitérőn olyan legyen, hogy:

a) a leszálló súly (tömeg) ne haladja meg a repülésvégrehajtási kézikönyvben az alkalmazott eljárásra meghatározott legnagyobb leszálló súly (tömeg) értéket és a kritikus hajtómű meghibásodása esetén a működőképes hajtómű egységek megfelelő teljesítmény értékénél tegye lehetővé a 100 láb/perc emelkedési sebesség elérését a helikopter repülőtér felszínéhez viszonyított 60 m (200 láb) magasságon és a 150 láb/perc emelkedési sebesség elérését a helikopter repülőtér felszínéhez viszonyított 300 m (1000 láb) magasságon. Ennek során vegyék figyelembe a 2.2 pontban meghatározott jellemzőket;

b) a szükséges leszállási távolság ne legyen több mint a rendelkezésre álló leszállási távolság, amennyiben a leszállási elhatározási pont (LDP) után bárhol bekövetkező kritikus hajtómű meghibásodás esetében elkerüli az akadályokat a végső megközelítés során;

c) a leszállási elhatározási pont után bárhol bekövetkező kritikus hajtómű meghibásodás esetében lehetséges legyen a leszállás és a megállás a végső megközelítési és felszállási területen (FATO) belül;

d) amennyiben a kritikus hajtómű meghibásodás a leszállási elhatározási pont (LDP) után következik be, lehetséges legyen a leszállás és megállás a végső megközelítési és felszállási területen belül vagy a megszakított leszállás (átstartolás) végrehajtása és a repülési pályán levő összes akadály felett, a 4.1.2.1 és 4.1.2.2 pontokban meghatározott feltételek megtartása mellett.

Megjegyzés: Az emelt szinten létesített helikopter repülőtérre vonatkozóan a légialkalmassági előírások megfelelő biztonsági határértéket állapítanak meg.

4.2 A 2. teljesítmény osztályú forgószárnyas légijármű üzemeltetése

4.2.1 *Felszállás* (A-6 és A-7 ábrák)

A forgószárnyas légijármű felszállósúlya (tömege) olyan legyen, hogy ne lépje túl a repülésvégrehajtási kézikönyvben az alkalmazott eljárásra meghatározott maximális felszállósúlyt (tömeget), és a kritikus hajtómű meghibásodása esetén a működőképes hajtómű egységek megfelelő teljesítmény értékénél tegye lehetővé a 150 láb/perc emelkedési sebesség elérését a helikopter repülőtér felszínéhez viszonyított 300 m (1000 láb) magasságon. Ennek során vegyék figyelembe a 2.2 pontban meghatározott jellemzőket.

4.2.2 *Felszállási repülési pálya*

A kritikus hajtómű meghibásodása esetén, a felszállás utáni meghatározott ponttól (DPATO), vagy másik lehetőségként, legkésőbb a felszálló terület felszínéhez viszonyított 60 m (200 láb) magasságtól tartsák be a 4.1.2.1 és 4.1.2.2 pontok előírásait.

4.2.3 *Útvonal*

Tartsák be a 4.1.3 pont előírásait

4.2.4 Megközelítés, leszállás és megszakított leszállás (A-8 és A-9 ábrák)

A forgószárnyas légijármű számított leszálló súlya (tömege) a célállomáson vagy a kitérőn olyan legyen, hogy:

a) a leszálló súly (tömeg) ne haladja meg a repülésvégrehajtási kézikönyvben az alkalmazott eljárásra meghatározott legnagyobb leszálló súly (tömeg) értéket és a kritikus hajtómű meghibásodása esetén a működőképes hajtómű egységek megfelelő teljesítmény értékénél tegye lehetővé a 150 láb/perc emelkedési sebesség elérését a helikopter repülőtér felszínéhez viszonyított 300 m (1000 láb) magasságon. Ennek során vegyék figyelembe a 2.2 pontban meghatározott jellemzőket;

b) előfordulhat, hogy amennyiben a kritikus hajtómű meghibásodása a leszállás előtt meghatározott pontnál (DPBL), vagy azt megelőzően következik be, biztonságos kényszerleszállást vagy átstartolást kell végrehajtani a 4.1.2.1 és 4.1.2.2 pontokban meghatározott feltételek megtartása mellett.

Csak a 2.4 pontban meghatározott akadályokat kell tekintetbe venni.

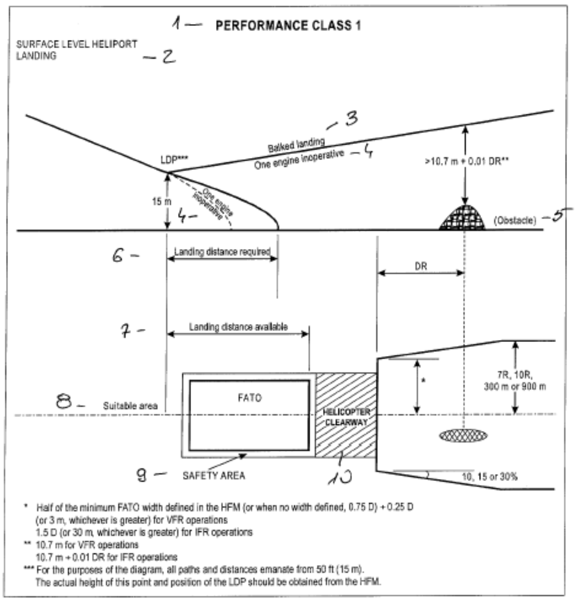


Figure A-4

A-4 ábra

1	1. teljesítmény osztály
2	Leszállás felszíni helikopter repülőtérre
3	Megszakított leszállás
4	Egy hajtómű üzemképtelen
5	Akadály
6	Szükséges leszállási távolság
7	Rendelkezésre álló leszállási távolság
8	Megfelelő terület
9	Biztonsági terület
10	Forgószárnyas légijármű biztonsági terület
*	Forgószárnyas légijármű repülésvégrehajtási kézikönyvében (HFM) meghatározott végső megközelítési és felszállási terület (FATO) legkisebb szélességének fele (vagy ha a szélesség nem került meghatározásra, akkor 0,75 D) + 0,25D (vagy 3 m, amelyik nagyobb) - VFR üzemeltetés esetén
	1.5 D (vagy 30 m, amelyik nagyobb) - IFR üzemeltetés esetén
**	10,7 m - VFR üzemeltetés esetén
	10,7 m + 0,01 DR - IFR üzemeltetés esetén
***	A jelen diagram céljaira az összes repülési pályát és távolságot 50 láb (15 m) magasságtól számítsa.
	A jelen pont tényleges magasságát és az LDP helyzetét a forgószárnyas légijármű repülésvégrehajtási kézikönyvéből (HFM) határozzák meg.

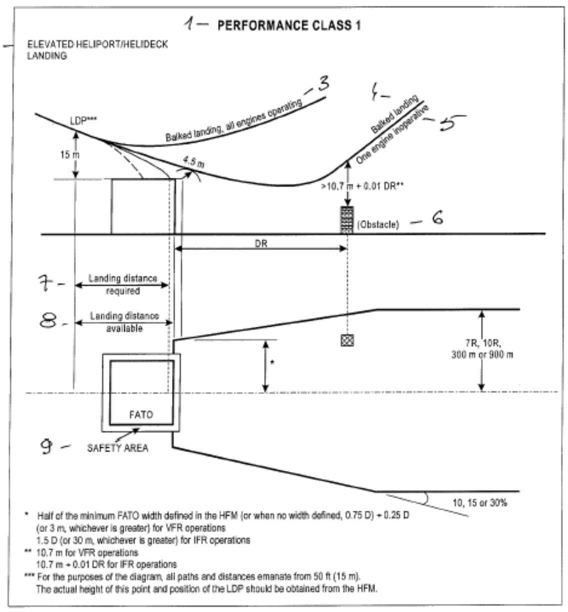


Figure A-5

A-5 ábra

1	1. teljesítmény osztály
2	Leszállás emelt szinten / úszó szerkezeten létesített helikopter repülőtérre vagy leszállóhelyre
3	Megszakított leszállás, az összes hajtómű üzemképes
4	Megszakított leszállás
5	Egy hajtómű üzemképtelen
6	Akadály
7	Szükséges leszállási távolság
8	Rendelkezésre álló leszállási távolság
9	Biztonsági terület
*	Forgószárnyas légijármű repülésvégrehajtási kézikönyvében (HFM) meghatározott végső megközelítési és felszállási terület (FATO) legkisebb szélességének fele (vagy ha a szélesség nem került meghatározásra, akkor 0,75 D) + 0,25D (vagy 3 m, amelyik nagyobb) - VFR üzemeltetés esetén
	1.5 D (vagy 30 m, amelyik nagyobb) - IFR üzemeltetés esetén
**	10,7 m - VFR üzemeltetés esetén
	10,7 m + 0,01 DR - IFR üzemeltetés esetén
***	A jelen diagram céljaira az összes repülési pályát és távolságot 50 láb (15 m) magasságtól számítsa.
	A jelen pont tényleges magasságát és az LDP helyzetét a forgószárnyas légijármű repülésvégrehajtási kézikönyvéből (HFM) határozzák meg.

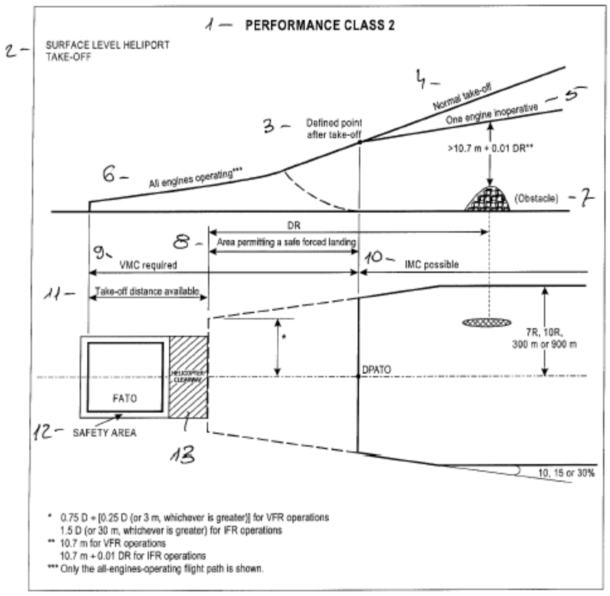


Figure A-6

A-6 ábra

1	2. teljesítmény osztály
2	Felszállás felszíni helikopter repülőtérről
3	Felszállás utáni meghatározott pont
4	Normál üzemű felszállásállás
5	Egy hajtómű üzemképtelen
6	Az összes hajtómű üzemképes
7	Akadály
8	Biztonságos kényszerleszállást lehetővé tevő terület
9	VMC szükséges
10	IMC lehetséges
11	Rendelkezésre álló felszállási távolság
12	Biztonsági terület
13	Forgószárnyas légijármű biztonsági terület
*	Forgószárnyas légijármű repülésvégrehajtási kézikönyvében (HFM) meghatározott végső megközelítési és felszállási terület (FATO) legkisebb szélességének fele (vagy ha a szélesség nem került meghatározásra, akkor 0,75 D) + 0,25D (vagy 3 m, amelyik nagyobb) - VFR üzemeltetés esetén 1.5 D (vagy 30 m, amelyik nagyobb) - IFR üzemeltetés esetén
**	10,7 m - VFR üzemeltetés esetén 10,7 m + 0,01 DR - IFR üzemeltetés esetén
***	Csak az összes üzemképes hajtómű esetére meghatározott repülési pálya lett bemutatva.

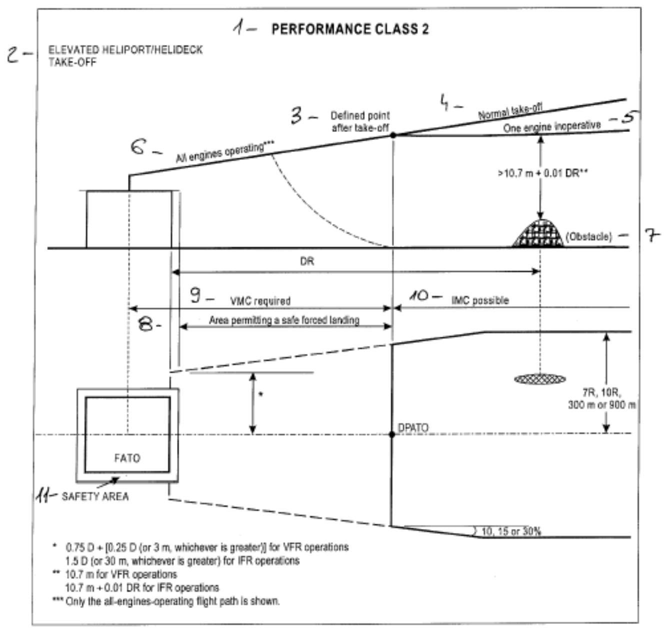


Figure A-7

A-7 ábra

1	2. teljesítmény osztály
2	Felszállás emelt szinten / úszó szerkezeten létesített helikopter repülőtérről vagy leszállóhelyről
3	Felszállás utáni meghatározott pont
4	Normál üzemű felszállásállás
5	Egy hajtómű üzemképtelen
6	Az összes hajtómű üzemképes
7	Akadály
8	Biztonságos kényszerleszállást lehetővé tevő terület
9	VMC szükséges
10	IMC lehetséges
11	Biztonsági terület
*	0,75 D + (0,25D (vagy 3 m, amelyik nagyobb) - VFR üzemeltetés esetén 1.5 D (vagy 30 m, amelyik nagyobb) - IFR üzemeltetés esetén
**	10,7 m - VFR üzemeltetés esetén 10,7 m + 0,01 DR - IFR üzemeltetés esetén
***	Csak az összes üzemképes hajtómű esetére meghatározott repülési pálya lett bemutatva.

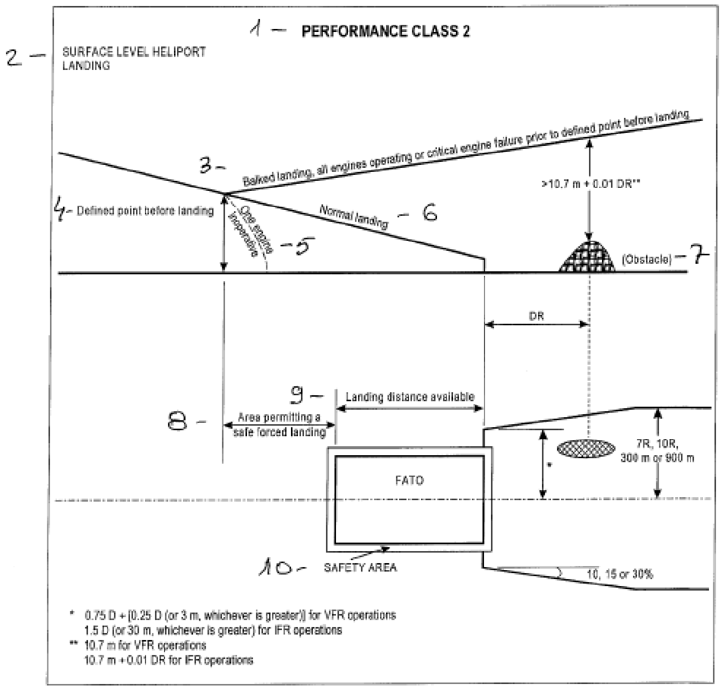


Figure A-8

A-8 ábra

1	2. teljesítmény osztály
2	Leszállás felszíni helikopter repülőtérre
3	Megszakított leszállás, az összes hajtómű működik vagy a kritikus hajtómű meghibásodása a leszállás előtt meghatározott pontot (DPBL) megelőzően következik be
4	Leszállás előtt meghatározott pont
5	Egy hajtómű üzemképtelen
6	Normál üzemű leszállás
7	Akadály
8	Biztonságos kényszerleszállást lehetővé tevő terület
9	Rendelkezésre álló leszállási távolság
10	Biztonsági terület
*	0,75 D + (0,25D (vagy 3 m, amelyik nagyobb) - VFR üzemeltetés esetén 1.5 D (vagy 30 m, amelyik nagyobb) - IFR üzemeltetés esetén
**	10,7 m - VFR üzemeltetés esetén 10,7 m + 0,01 DR - IFR üzemeltetés esetén

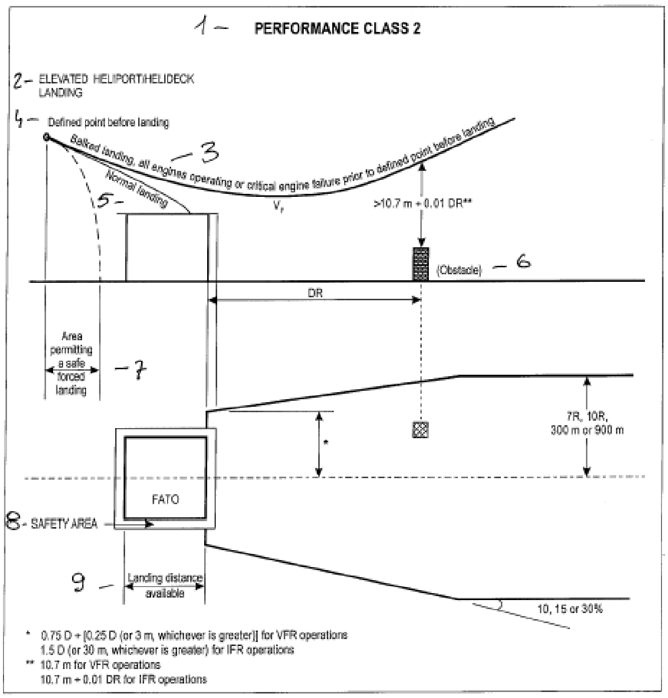


Figure A-9

A-9 ábra

1	2. teljesítmény osztály
2	Leszállás emelt szinten / úszó szerkezeten létesített helikopter repülőtérre vagy leszállóhelyre
3	Megszakított leszállás, az összes hajtómű működik vagy a kritikus hajtómű meghibásodása a leszállás előtt meghatározott pontot (DPBL) megelőzően következik be
4	Leszállás előtt meghatározott pont
5	Normál üzemű leszállás
6	Akadály
7	Biztonságos kényszerleszállást lehetővé tevő terület
8	Biztonsági terület
9	Rendelkezésre álló leszállási távolság
*	0,75 D + (0,25D (vagy 3 m, amelyik nagyobb) - VFR üzemeltetés esetén 1.5 D (vagy 30 m, amelyik nagyobb) - IFR üzemeltetés esetén
**	10,7 m - VFR üzemeltetés esetén 10,7 m + 0,01 DR - IFR üzemeltetés esetén

4.3 A 3. teljesítmény osztályú forgószárnyas légijármű üzemeltetése

4.3.1 *Felszállás*

A forgószárnyas légijármű felszállósúlya (tömege) a 2.2 pontban ismertetett jellemzők figyelembevételével ne haladja meg a repülésvégrehajtási kézikönyvben meghatározott legnagyobb felszállósúly értéket, amelyet a felszállás során minden hajtómű működése esetén kell alkalmazni a párnahatás magasságán belül végrehajtott függésnél. Ha a feltételek nem teszik lehetővé a párnahatás figyelembevételét, akkor a forgószárnyas légijármű felszállósúlya (tömege) a 2.2 pontban ismertetett jellemzők figyelembevételével ne haladja meg azt a legnagyobb felszállósúly értéket, amelyet a felszállás során minden hajtómű működése esetén kell alkalmazni a párnahatás magasságán kívüli függésnél.

4.3.2 *Kezdeti emelkedés*

A forgószárnyas légijármű felszállósúlya (tömege) olyan legyen, hogy az emelkedési pálya minden hajtómű működése mellett megfelelő függőleges biztonsági távolságot biztosítson az emelkedési pálya mentén levő összes akadály felett.

4.3.3 *Útvonal*

A forgószárnyas légijármű felszállósúlya (tömege) olyan legyen, hogy minden hajtómű működése mellett a forgószárnyas légijármű elérje a lerepülendő útvonalnak megfelelő legalacsonyabb repülési magasságot.

4.3.4 *Megközelítés és leszállás*

A forgószárnyas légijármű számított leszálló súlya (tömege) a célállomáson vagy a kitérőn olyan legyen, hogy:

a) a számított leszálló súly (tömeg) a 2.2 pontban ismertetett jellemzők figyelembevételével ne haladja meg a repülésvégrehajtási kézikönyvben meghatározott legnagyobb leszállósúly értéket, amelyet a felszállás során minden hajtómű működése esetén kell alkalmazni a párnahatás magasságán belül végrehajtott függésnél. Ha a feltételek nem teszik lehetővé a párnahatás figyelembevételét, akkor a forgószárnyas légijármű felszállósúlya (tömege) a 2.2 pontban ismertetett jellemzők figyelembevételével ne haladja meg azt a legnagyobb felszállósúly értéket, amelyet a felszállás során minden hajtómű működése esetén kell alkalmazni a párnahatás magasságán kívüli függésnél.

b) az összes hajtómű működése mellett a repülési pálya bármely pontján megszakított leszállás végrehajtása lehetséges és a forgószárnyas légijármű a repülési pályán levő összes akadály felett megfelelő függőleges biztonsági távolságot tart.

B. melléklet
Repülési adatrögzítők

Kiegészítés a II. szakasz 4. fejezet 4.3 és III. szakasz 4. fejezet 4.9 pontokhoz

Bevezető

A jelen mellékletben található anyag a nemzetközi légiközlekedésben üzemeltetett forgószárnyas légijárműveken felszerelni kívánt repülési adatrögzítő berendezésekkel foglalkozik. A repülési adatrögzítők két rendszerből, a forgószárnyas légijármű repülési adatrögzítőből valamint a pilótakabin hangrögzítőből állnak. A forgószárnyas légijármű repülési adatrögzítők a rögzítendő adatok mennyiségétől függően IV., IV.A típus és V. típus csoportba tartoznak.

1. Repülési adatrögzítő (FDR)

1.1 Általános követelmények

1.1.1 A repülési adatrögzítő a repülési idő alatt folyamatosan rögzítse az adatokat.

1.1.2 A repülési adatrögzítő burkolata:

a) feltűnő narancssárga vagy sárga színű legyen;

b) feltalálásának megkönnyítése érdekében helyezzenek el rajta tükröződést biztosító anyagot; és

c) rendelkezzen biztonságosan rögzített és automatikusan működésbe lépő víz alatti helyzetjelző berendezéssel.

1.1.3 A repülési adatrögzítőt úgy szereljék be, hogy:

a) a lehető legkisebbre csökkentsék a berendezés sérülésének lehetőségét;

b) a berendezés elektromos táplálását olyan áramkörről kapja, amely biztosítja az üzemeltetés legnagyobb fokú megbízhatóságát a nélkülözhetetlen, alapvető vagy vészhelyzeti fogyasztók ellátásának veszélyeztetése nélkül; és

c) hallás vagy látás utáni lehetőség legyen az adatrögzítő megfelelő működésének repülés előtt történő ellenőrzésére.

1.2 Rögzítendő adatok

1.2.1 *A IV.A típusú repülési adatrögzítő*

Ez a repülési adatrögzítő képes legyen a forgószárnyas légijárműnek megfelelő, legalább a B-1. táblázatban található negyvennyolc féle repülési adat rögzítésére. A (*) csillagjel nélküli adatok kötelező adatok, melyeket rögzíteni szükséges. Ezenkívül a (*) csillaggal megjelölt adatok rögzítése is kötelező, ha az adatot szolgáltató jelforrást a forgószárnyas légijármű rendszerei vagy hajószemélyzete is felhasználja a forgószárnyas légijármű üzemeltetéséhez. Mindazonáltal a forgószárnyas légijármű típusának és a rögzítő berendezés jellemzőinek figyelembevételével a felsoroltaktól eltérő más adatok is rögzíthetők.

1.2.2 *A IV. típusú repülési adatrögzítő*
Ez a repülési adatrögzítő képes legyen a forgószárnyas légijárműnek megfelelő, legalább a B-1. táblázatban található harminc féle repülési adat rögzítésére. Mindazonáltal a forgószárnyas légijármű típusának és a rögzítő berendezés jellemzőinek figyelembevételével a felsoroltaktól eltérő más adatok is rögzíthetők.

1.2.2 *Az V. típusú repülési adatrögzítő*
Ez a repülési adatrögzítő képes legyen a forgószárnyas légijárműnek megfelelő, legalább a B-1. táblázatban található első tizenöt repülési adat rögzítésére. Mindazonáltal a forgószárnyas légijármű típusának és a rögzítő berendezés jellemzőinek figyelembevételével a felsoroltaktól eltérő más adatok is rögzíthetők.

1.2.4 Ha további rögzítési kapacitás is rendelkezésre áll, akkor a következő kiegészítő adatokat is vegyék figyelembe:

a) az elektronikus képernyőkről, mint az elektronikus repülési műszerrendszerről (EFIS), a központi elektronikus légijármű képernyőről (ECAM), a hajtómű ellenőrző és hajózószemélyzet riasztó rendszerről (EICAS) kapott kiegészítő üzemeltetési adatok;

b) kiegészítő hajtómű paraméterek (EPR, N1, tüzelőanyag áramlás, stb.).

1.3 Kiegészítő tájékoztatások

1.3.1 A felszerelt berendezés mérési tartományát, rögzítési időközeit, a repülési adatok és jellemzők pontosságát általában a légialkalmassági bizonyítványt kiadó hatóság módszerei alapján jogosítják.

1.3.2 A repülési adatrögzítőre vonatkozóan a gyártó általában a következő tájékoztatásokat adja meg az országos engedélyező hatóságnak:

a) a gyártó üzemeltetési utasításai, a berendezés korlátozásai valamint a felszerelési eljárások;

b) a repülési adatok és jellemzők eredetét vagy forrását valamint a megfelelő mértékegységre történő átszámítás módozatait; és

c) a gyártó ellenőrző felülvizsgálatának eredményét.

1.3.3 A rögzített adatok jellemzőire, az átváltási számításokra, időszakos kalibrálásokra, valamint egyéb karbantartási és/vagy üzemeltetési tájékoztatásokra vonatkozó dokumentációt a járató tartsa naprakész állapotban. Ez a dokumentáció alkalmas legyen arra, hogy a baleset kivizsgáló hatóságok a rögzített adatok megfelelő létesítményekben történő feldolgozásához beszerezhessék a szükséges tájékoztatásokat.

2. Pilótakabin hangrögzítő berendezés (CVR)

2.1 Általános követelmények

2.1.1 A hangrögzítő berendezést úgy tervezzék meg, hogy az legalább a következőket rögzítse:

a) a forgószárnyas légijármű fedélzetén elhelyezett rádióberendezéssel vett és adott szóbeli közlemények;

b) a forgószárnyas légijármű pilótakabinjának belső hangkörnyezete;

c) a hajózószemélyzet tagjainak szóbeli közleményei, amelyhez a forgószárnyas légijármű belső távközlési rendszerét használják;

d) a navigációs vagy megközelítési berendezéseket azonosító szó vagy hangjelek, amelyek a fejhallgatóban vagy a külső hangszóróban hallhatók;

e) az utastájékoztató rendszer segítségével adott szóbeli tájékoztatások a hajózószemélyzet tagjaitól – amennyiben ilyet felszereltek és

f) a légiforgalmi szolgálatokkal folytatott digitális adatcsere kivéve, ha ezt a repülési adatrögzítő veszi fel.

2.1.2 A hangrögzítő burkolata:

a) feltűnő narancssárga vagy sárga színű legyen;

b) feltalálásának megkönnyítése érdekében helyezzenek el rajta tükröződést biztosító anyagot; és

c) rendelkezzen biztonságosan rögzített és automatikusan működésbe lépő víz alatti helyzetjelző berendezéssel.

2.1.3 A beszéd és a hangok megkülönbözetésének megkönnyítése érdekében a mikrofonokat a pilótakabinban a felvétel szempontjából legalkalmasabb helyekre helyezzék el, hogy azok a legjobb minőségben vegyék a légijármű vezetője és a másodpilóta munkahelyéről származó, valamint a pilótakabinban más hajózószemélyzeti tagoktól az előbbieknek szánt közleményeket és szóbeli tájékoztatásokat. Ez az igény legjobban mikrofonos fejhallgató bekötésével teljesíthető, a hangfelvételek folyamatos, külön felvételi csatornákon való rögzítésével.

2.1.4 A pilótakabin hangrögzítőt úgy szereljék be, hogy:

a) a lehető legkisebbre csökkentésék a hangfelvételek sérülésének lehetőségét;

b) a hangrögzítő berendezés elektromos táplálását olyan áramkörről kapja, amely biztosítja az üzemeltetés legnagyobb fokú megbízhatóságát a nélkülözhetetlen, alapvető vagy vészhelyzeti fogyasztók ellátásának veszélyeztetése nélkül; és

c) hallás vagy látás utáni lehetőség legyen a hangrögzítő berendezés megfelelő működésének repülés előtt történő ellenőrzésére; és

d) amennyiben a hangrögzítő berendezés gyorstörlő egységgel rendelkezik, a felszerelést úgy tervezzék meg, hogy megakadályozzák a gyorstörlőnek a repülés időtartama alatti vagy egy becsapódástól származó ütés következtében történő működésbe lépését.

2.2 Teljesítmény követelmények

2.2.1 A hangrögzítő berendezés képes legyen legalább négy felvételi sáv egyidejű rögzítésére. A sávok közötti pontos idő összefüggés biztosítása érdekében a hangrögzítő berendezés soros *(in-line)* rendszerben működjön. Amennyiben két felvételi irányt (oda-vissza játszó) alkalmaznak, a soros működést és a csatorna elosztást mindkét irányba biztosítsák.

2.2.2 A legkívánatosabb sáv elosztás a következő:

1. sáv – a másodpilóta fejhallgatója és élő hangot közvetítő szerelt mikrofonja

2. sáv – a légijármű vezető fejhallgatója és élő hangot közvetítő szerelt mikrofonja

3. sáv – pilótakabin belső mikrofonja

4. sáv – idő referencia jel valamint a hajózószemélyzet harmadik és negyedik tagjának (ha van) fejhallgatója és élő hangot közvetítő szerelt mikrofonja

1. Megjegyzés: Az 1. sáv a felvevőfej aljához legközelebb levő sáv legyen.

2. Megjegyzés: Az ajánlott felvételi sáv kijelölés a jelenleg általánosan alkalmazott mágnes-szalag továbbító mechanizmus használatát feltételezi. A kijelölés oka az, hogy a sérülés veszélye a mágnes-szalag szélein nagyobb, mint annak középső (belső) részén. Nem kívánjuk más hangrögzítő berendezés használatát kizárni, amelyek esetében a fenti korlátozások nem szükségesek.

2.2.3 Amikor a hangrögzítő berendezést az illetékes légialkalmasságot elbíráló hatóság elfogadott módszereivel ellenőrzik, mutassák be, hogy a berendezés képes olyan szélsőséges körülmények között működni, amelyek között történő üzemelésre azt tervezték.

2.2.4 Megfelelő módszert alkalmazzanak a repülési adatrögzítő, valamint a pilótakabin hangrögzítő berendezések közötti pontos-idő kapcsolat fenntartására.

Megjegyzés: Ennek egyik módszere a repülési adatrögzítő idő-jelének átvétele a pilótakabin hangrögzítő 4. sávjára.

2.3 További tájékoztatások

A pilótakabin hangrögzítőre vonatkozóan a gyártó általában a következő tájékoztatásokat adja meg az országos engedélyező hatóságnak:

a) a gyártó üzemeltetési utasításai, a berendezés korlátozásai valamint a felszerelési eljárások; és

b) a gyártó ellenőrző felülvizsgálatának eredményét.

3. A repülési adatrögzítő és a pilótakabin hangrögzítő rendszerek ellenőrzése

3.1 Az adott nap első repülési feladatának megkezdése előtt vizsgálják felül a repülési adatrögzítő (FDR), a pilótakabin hangrögzítő (CVR) rendszerek és a repülési adatgyűjtő egység (FDAU) – ha ilyeneket felszereltek – pilótakabinban levő beépített ellenőrző egységeit.

3.2 Az éves ellenőrző vizsgálatot a következők szerint hajtsák végre:

a) a repülési adatrögzítő és pilótakabin hangrögzítő (FDR és CVR) berendezések felvett adatainak visszajátszásával biztosítsák, hogy a rögzítő berendezések a névleges felvételi időtartamon belül megfelelően működnek;

b) a repülési adatrögzítő adatainak elemzésével értékeljék a rögzített adatok minőségét annak meghatározása érdekében, hogy a bit-hiba arány elfogadható értékek között van továbbá, hogy a hibák természete és eloszlása milyen képet mutat;

c) a repülési adatrögzítő rendszer működését ellenőrző műszaki szervezetnél az összes rögzített jellemző érvényességének vizsgálata érdekében elemezzék ki egy teljes repülés adatait. Különösen nagy figyelmet szenteljenek a repülési adatrögzítőnek közvetlen adatot biztosító érzékelőktől származó jellemzőknek. A légijármű elektromos hálózatától származó jellemzőket nem szükséges felülvizsgálni abban az esetben, ha annak működőképességét a légijármű más rendszerei segítségével ellenőrizni lehet;

d) a repülési adatrögzítő ellenőrző szervezet rendelkezzen a rögzített értékek pontos leolvasásához és átalakításához, valamint az egyes jelek pontos megkülönböztethetőségéhez szükséges software csomagokkal;

e) pilótakabin hangrögzítő berendezés felvett adatainak éves vizsgálatát a felvétel visszajátszásával végezzék el. Amikor a berendezést a légijármű fedélzetén felszerelik, a pilótakabin hangrögzítő berendezés (CVR) vegye fel az ellenőrző jeleket minden egyes belső fedélzeti és a megfelelő külső forrásokból annak biztosítása érdekében, hogy az összes felvétel megfelel-e az érthetőségre vonatkozó előírásoknak; és

f) ahol ez gyakorlatilag lehetséges, az éves ellenőrzés során vizsgálják meg a pilótakabin hangrögzítő repülés közbeni felvételeinek egy részét annak biztosítása érdekében, hogy a jelek érthetősége elfogadható-e.

3.3 A repülési adatrögzítő rendszerek működésképtelennek tekintendők, ha az adatok jelentősebb ideig rossz minőségűek, érthetetlenek vagy a kötelezően rögzítendő jellemzők közül egy vagy több pontatlanul illetve nem helyesen kerül rögzítésre.

3.4 Az éves ellenőrzésről készített jegyzőkönyvet kérésre bocsássák az állam felügyeleti hatósága rendelkezésére.

3.5 A repülési adatrögzítő rendszer kalibrálása:

a) a repülési adatrögzítő rendszert a kötelező jellemzők műszaki rögzítés átalakítási módszereinek helyességét érintő bármely hiányosságok megállapítása érdekében és annak biztosítása céljából, hogy a jellemzőket a kalibrálási tűrési határértéken belül rögzíti, legalább öt-évente kalibrálják újra; és

b) amikor a repülési magasság és sebesség jellemzők a repülési adatrögzítő rendszernek közvetlen adatat biztosító érzékelőktől származnak, ezeket az érzékelők gyártó szervezet ajánlásai alapján vagy legalább két-évente kalibrálják újra.

B-1. táblázat

Forgószárnyas légijármű - repülési adatrögzítővel rögzítendő jellemző adatok

Sor-szám	Jellemző adat	Mérési tartomány	Mintavétel és rögzítés max. időköze (mp)	Mérési pontosság (az érzékelő bemenő jele összehasonlítva az FDR kiértékelésével)	Adatrögzí-tés felbontása	Megjegyzés
1	idő (UTC vagy eltelt repülési idő)	24 óra (UTC) vagy 0-4095 (eltelt idő)	4	±0.125% óránként	1 mp	az eltelt idő 4 mp-ként növekszik a rendszer működése alatt
2	nyomás-magasság	-300 m (- 1000 láb) -tól a légijármű legnagyobb engedélyezett repülési magassága +1500 m (5000 láb) -ig	1	±30 méter – ±200 méter (±100 láb – ±700 láb)	5 láb	
3	műszer szerinti repülési sebesség	a mérőrendszer kijelzése szerint	1	±3%	1 csomó	
4	géptengely irányszög	360°	1	±2°	±0,5°	
5	függőleges gyorsulás	-3 g-től +6 g-ig	0.125	±0,09 g, kivéve a ±0,045 g adathibát		
6	bólintási helyzet	±75° vagy az alkalmazott értéktartomány 100%-a, amelyik nagyobb	0.5	±2°	0,5°	
7	dőlési helyzet	±180°	0.5	±2°	0,5°	
8	rádióadás kapcsolása	be/ki kapcsolva (egy parancsjel)	1	-	-	
9	az egyes hajtóművek teljesítménye	teljes tartomány	1 (hmű-ként)	±2%	a teljes tartomány 0,1%-a	elegendő jellemző adatot rögzítsenek a hmű teljesítmény meghatározhatósága érdekében.
10	fő forgószárny: fordulatszáma fék rendszere	 50 – 130% parancsjel	 0.51	 ±2% -	 a teljes tartomány 0,3%-a -	 ha a jelek azonnal rendelkezésre állnak
11	a forgószárnyas légijármű elsődleges repülésvezérlő szerkezeteinek működtetése a légijármű vezető által és/vagy a kormányfelületek helyzete (kollektív állásszög, hosszirányú ciklikus állásszög, oldalirányú ciklikus állásszög, farok légcsavar pedál)	teljes tartomány	0,5 (0,25 javasolt)	±2% kivéve, ha nagyobb pontosságot írnak elő	a műkö-dési tartomány 0,5%-a	hagyományos vezérlés rendszer esetén „vagy” , nem-mechanikus vezérlés rendszer esetén „és” alkalmazása szükséges.
12	hidraulika, minden rendszer (kis nyomás és kiválasztás)	parancsjel	-	-		

Sor-szám	Jellemző adat	Mérési tartomány	Mintavétel és rögzítés max. időköze (mp)	Mérési pontosság (az érzékelő bemenő jele összehasonlítva az FDR kiértékelésével)	Adatrögzí -tés felbontása	Megjegyzés
13	külső levegő hőmérséklete	a mérőműszer érzékelési tartománya	2	±2°C	0,3°C	
14*	robotpilóta/ tolóerő automata / automatikus repülésvezérlő (AFCS) rendszer üzemmód és működési helyzet	egyszeri parancsjelek megfelelő kombinációja	1	-	-	a parancsjelek mutassák a bekapcsolt rendszert
15*	stabilizáló rendszer igénybevétele	egyszeri parancsjel	1			a parancsjelek mutassák a bekapcsolt rendszert
Megjegyzés: az előző 15 jellemző adat az V. típusú repülési adatrögzítőnek felel meg						
16*	fő áttételház olajnyomás	felszerelés szerint	1	felszerelés szerint	6,895kN/m^2 (1 psi)	
17*	fő áttételház olajhőmérséklet	felszerelés szerint	2	felszerelés szerint		
18	legyező mozgás szögsebessége	±400°/mp	0.25	maximális tartomány ±1.5%-a, a ±5% adathiba kivételével	±2°/mp	a legyezőmozgás gyorsulása is elfogadható
19*	függési (emelőerő) terhelés	az engedélyezett terhelés 0 – 200%-a	0.5	maximális tartomány ±3%-a	maximális eng. terhelés 0,5%-a	ha a jelek azonnal rendelkezésre állnak
20	hosszirányú gyorsulás	±1g	0.25	±0,015g, a ±0,05g adathiba kivételével	0,004 g	
21	oldalirányú gyorsulás	±1g	0.25	±0,015g, a ±0,05g adathiba kivételével	0,004 g	
22*	rádió magasságmérő	-6 m és 750 m között (- 20 láb és 2500 láb között)	1	150 m (500 láb) alatt ±0.6 m (±2 láb) vagy 3% – amelyik a nagyobb, és 150 m (500 láb) felett ±5%	150 m (500 láb) alatt 0,3 m (1 láb) + a telj. tartomány 0,5%-a 150 m (500 láb) felett	
23*	eltérés a siklópályától	jeltartomány	1	±3%	teljes tartomány 0,3%-a	
24*	eltérés az iránysávtól	jeltartomány	1	±3%	teljes tartomány 0,3%-a	
25	marker adók átrepülése	egyszeri parancsjel	1	-	-	egy darab egyszeri parancsjel elegendő mindegyik marker adóra

Sor-szám	Jellemző adat	Mérési tartomány	Mintavétel és rögzítés max. időköze (mp)	Mérési pontosság (az érzékelő bemenő jele összehasonlítva az FDR kiértékelésével)	Adatrögzí-tés felbontása	Megjegyzés
26	központi riasztó jelzés	egyszeri parancsjel(ek)	1	-	-	egyszeri parancsjelet rögzítsenek központi riasztás, áttételház alacsony olajnyomás és SAS meghibásodás esetén. Másik „piros” riasztást rögzítsenek amikor a riasztás okát nem lehet megállapítani más jellemzőkből, vagy a fedélzeti beszédrögzítőről.
27	mindegyik navigációs vevő frekvencia beállítás	elégséges a kiválasztott frekvencia meghatározásához	4	felszerelés szerint	-	ha a jel digitális formában rendelkezésre áll.
28*	1. és 2. DME távolságok	0 – 280 NM	4	felszerelés szerint	1 NM	ha a jel digitális formában rendelkezésre áll. Az INS-től vagy más navigációs rendszertől való hosszúsági és szélességi érték rögzítése megfelelő változat.
29*	navigációs adatok {szélesség és hosszúság, föld feletti sebesség, szélsebesség, szélirány}	felszerelés szerint	2	felszerelés szerint	felszerelés szerint	
30*	futómű vagy futókibocsátó kar helyzete	egyszeri parancsjel	4	-	-	
Megjegyzés: A fenti 30 jellemző megfelel a IV. típusú repülési adatrögzítőre vonatkozó követelményeknek						
31*	hajtómű kiáramló gáz hőmérséklet (T_4)	felszerelés szerint	1	felszerelés szerint		
32*	turbina bemenő hőmérséklet (TIT/ITT)	felszerelés szerint	1	felszerelés szerint		
33*	tüzelőanyag térfogata	felszerelés szerint	4	felszerelés szerint		
34*	magasságváltozás sebessége	felszerelés szerint	1	felszerelés szerint		csak akkor szükséges, ha a fedélzeti műszerekről megszerezhető
35*	jegesedés érzékelés	felszerelés szerint	4	felszerelés szerint		egyszeri parancsjelek megfelelő összetétele az összes érzékelő állapotának meghatározására
36*	a forgószárnyas légijármű állapotát és felhasználását figyelő rendszer	felszerelés szerint	-	felszerelés szerint	-	
37	hajtómű vezérlési üzemmódok	egyszeri parancsjel	1	-	-	

Sor-szám	Jellemző adat	Mérési tartomány	Mintavétel és rögzítés max. időköze (mp)	Mérési pontosság (az érzékelő bemenő jele összehasonlítva az FDR kiértékelésével)	Adatrögzí-tés felbontása	Megjegyzés
38*	kiválasztott légnyomás beállítása (parancsnok és első tiszt)	felszerelés szerint	64 (4 javasolt)	felszerelés szerint	0,1 mb (0,01 Hgmm-ben)	csak az elektronikus képernyővel felszerelt forgószárnyas légijárműveken kell rögzíteni
39*	kiválasztott magasság (pilóták által kiválasztható összes üzemmód)	felszerelés szerint	1	felszerelés szerint	Elegendő a személy-zet általi kiválasz-tás meghatá-rozásához	
40*	kiválasztott sebesség (pilóták által kiválasztható összes üzemmód)	felszerelés szerint	1	felszerelés szerint		
41*	kiválasztott Mach szám (pilóták által kiválasztható összes üzemmód)	felszerelés szerint	1	felszerelés szerint		
42*	kiválasztott függőleges sebesség (pilóták által kiválasztható összes üzemmód)	felszerelés szerint	1	felszerelés szerint		
43*	kiválasztott útirányszög (pilóták által kiválasztható összes üzemmód)	felszerelés szerint	1	felszerelés szerint		
44*	kiválasztott repülési pálya (pilóták által kiválasztható összes üzemmód)	felszerelés szerint	1	felszerelés szerint		
45*	kiválasztott elhatározási magasság	felszerelés szerint	4	felszerelés szerint		
46*	EFIS képernyő formátum (parancsnok és első tiszt)	egyszeri parancsjel(ek)	4	-	-	az egyszeri parancsjelek fejezzék ki a képernyőn látható rendszerek állapotát, pl.: kikapcsolva, normál, meghibásodott, összetétel, szektor, sík, szélrózsa, navigációs eszközök, időjárási radar, értéktartomány, ismétlés.
47*	többfeladatú/hajtómű/ riasztó képernyő formátum	egyszeri parancsjel(ek)	4	-	-	az egyszeri parancsjelek fejezzék ki a képernyőn látható rendszerek állapotát, pl.: kikapcsolva, normál, meghibásodott és a képernyő oldalak azonosítását vészeljárások esetén. A felolvasó listák közleményeit és a szükséges eljárásokat ne rögzítsék.
48*	Esemény kijelölés	egyszeri parancsjel	1	-	-	

Megjegyzés: A fenti 48 jellemző megfelel a IV.A típusú repülési adatrögzítőre vonatkozó követelményeknek

C. Melléklet
Repülési idő és repülési szolgálati idő korlátozások

Kiegészítés a II. szakasz 2. fejezet 2.2.9.3 ponthoz

1. Cél és tárgykör

1.1 A repülési idő és a repülési szolgálati idő korlátozásának egyedüli célja, hogy csökkenjen annak valószínűsége, hogy a hajózószemélyzet tagjának fáradtsága a repülésbiztonságot hátrányosan befolyásolja.

1.2 A fenti lehetőség kiküszöbölése érdekében kétféle fáradtságot, nevezetesen az átmeneti és a hosszabb időn át felgyülemlett fáradtságot kell figyelembe venni. Az átmeneti fáradtság úgy irható le, mint ami az egészséges személynél munkával, feszültséggel vagy erőkifejtéssel járó időszakot követően alakul ki és amit általában egyszeri, megfelelő időtartamú alvással ki lehet pihenni. A felgyülemlett fáradtság ezzel szemben az átmeneti fáradtság nem időben vagy nem teljes mértékben történő kipihenése esetében vagy nagyobb mértékű munkavégzés, különösen nagyfokú izgalom vagy erőkifejtés utóhatásaként jöhet létre, amelyet az érintett személy nem tudott kipihenni.

1.3 A jelen rész előírásai alapján kidolgozott korlátozások védelmet biztosítanak mindkét típusú fáradtsággal szemben, mert figyelembe veszik a következőket:

1.3.1 A repülési idő korlátozása szükséges olyan módon, hogy ezzel védelmet biztosítsanak mindkét fajta fáradtsággal szemben.

1.3.2 A földön, a repülést közvetlenül megelőző vagy a közbenső pontokon a repülési sorozatok között eltöltött szolgálati idő korlátozása szükséges elsősorban az átmeneti fáradtsággal szembeni védelem érdekében.

1.3.3 Szükség van arra, hogy a hajózószemélyzet tagjai számára megfelelő lehetőséget biztosítsanak a fáradtság kipihenésére.

1.3.4 Elsősorban a felgyülemlett fáradtság hatásaival szemben történő védelem érdekében szükséges, hogy a hajózószemélyzet tagjának más előírt feladatait is figyelembe vegyék.

2. Általános rész

2.1 A légijármű vezető felelős azért, hogy szakszolgálati engedélyével és jogosításaival összefüggő jogait ne gyakorolja abban az esetben, ha tudatában van annak, hogy egészségi állapota, beleértve a fáradtsággal összefüggésben levő fizikai állapot szint csökkenést is, képtelenné teheti ezen jogok biztonságos gyakorlására.

2.2 A következő pontokban ismertetett korlátozások minimális követelményként tekintendők és a járató felelős azért, hogy azokat az alábbiakban jelzett tényezők figyelembevétel az egyes esetekre alkalmazza. A korlátozásoknál a következő egyedi tényezőket vegyék figyelembe:

a) a légijármű hajózószemélyzetének összetétele;

b) az üzemeltetés során előforduló késések valószínűsége;

c) a légijármű típusa és a lerepülendő útvonal nehézségi foka, amelyet a következő tényezők befolyásolnak: a forgalom sűrűsége, a navigációs berendezések, a szállított berendezések minősége és fajtái; a távközlési nehézségek, nagy magasságon történő repülés túlnyomás nélküli vagy magas értékű utaskabin nyomás-magasság mellett üzemelő túlnyomással ellátott légijárművel;

d) a repülési feladat során teljesített éjszakai repülések részaránya;

e) az útvonal megszakítás pihenő helyén a személyzetnek biztosított elhelyezés, amennyiben az megfelelő pihenést tesz lehetővé;

f) a fel és leszállások száma;

g) a rendszeres menetrendi tervezés rendszerének szükségessége, amely nagyfokú rendszerességet biztosít (ehhez lényeges tényező a megfelelő tartalék személyzet biztosítása);

h) az általános alvási és ébrenléti ciklusok megszakításából származó egyedi alváskárosodás, azaz pihenési nehézségek; és

i) a légijármű pilótakabin belső környezete.

2.3 A járató repülésbiztonsági okokból felelős annak biztosításáért, hogy ha a hajózószemélyzet tagjai a munkaadó részére végzendő, nem repülési szolgálati feladatokkal foglalkoznak, a repülési szolgálat felvétele előtt legalább a minimális előírt időt pihenéssel töltsék el.

3. Meghatározások

Kitelepült személyzet – Deadheading crew
A járató által légi vagy szárazföldi úton előre küldött személyzeti tag.

Szolgálati idő – Duty period
Az az időtartam, amely alatt a hajózószemélyzet tagja munkaadójának részére, annak utasítására adott feladatot elvégez.

Repülési szolgálati munkaidő – Flight duty period
Azon teljes időtartam, amely akkor kezdődik, amikor a hajózószemélyzeti tag pihenőidejét követően a repülés vagy repülési sorozat előtt szolgálatba lép és addig az időpontig tart, amikor a hajózószemélyzeti tag a repülés vagy repülési sorozat befejezése után mentesül összes szolgálati feladata alól.

Repülési szakasz – Flight sector
Egy repülés vagy repülések sorozatának egyike, amely a légijármű állóhelyén kezdődik és a légijármű megérkezése után annak állóhelyén végződik.

A repülési szakasz a következő részekből áll:

– repülés előkészítés

– repülési idő (tényleges)

– repülés utáni idő, a repülési szakasz vagy a repülési szakaszok sorozatának végrehajtása után.

Repülési idő – Forgószárnyas légijárművek – Flight time – Helicopters
Az a teljes időtartam, amely akkor kezdődik, amikor a légijármű forgószárnyai elindulnak és akkor fejeződik be, amikor a légijármű a repülés végén megáll és forgószárnyai leállnak.

Pihenőidő – Rest period
A földön eltöltött bármely időtartam, amely alatt a járató a hajózószemélyzet tagját mentesíti összes feladata alól.

Repülések sorozata – Series of flights
Két pihenő időszak között teljesített két vagy több repülési szakasz.

Tartalék – Standby
Olyan meghatározott időtartam, amely alatt a személyzet tagja azonnali szolgálattételre hívható be.

Fordulóidő – Turnaround time
Két repülési szakasz között a repülési szolgálati munkaidőn belül a földön töltött időtartam.

4. Megjegyzések a meghatározásokhoz

4.1 Repülési idő

A repülési idő meghatározás szükségszerűen nagyon általános, de a hajózószemélyzet tagjaira korlátozások vonatkozásában természetesen a "hajózószemélyzeti tag" meghatározás szerint alkalmazandó. Ennek megfelelően az utasként utazó, szakszolgálati engedéllyel rendelkező személyzeti tagok nem tekinthetők hajózószemélyzeti tagnak, bár az utazási idejüket a pihenőidő megállapításánál figyelembe vehetik.

4.2 Repülési szolgálati idő

4.2.1 A repülési szolgálati idő meghatározás célja egy olyan folyamatos szolgálati időtartam megnevezése, amely mindig egy repülésre vagy repülési sorozatra vonatkozik. Tartalmazza a hajózószemélyzet tagjának minden olyan feladatát, amelyeknek elvégzésére a repülés napján szolgálati helyen történő jelentkezéstől a repülés vagy repülési sorozat befejezését követően a szolgálatból történő felmentéséig utasítható. Álláspontunk szerint szükséges ezen időtartam korlátozása, mert a hajózószemélyzet tagjának ezen időtartamon belül történő tevékenysége átmeneti vagy felgyülemlett fáradtságot eredményez, amely a repülésbiztonságot veszélyezteti. Másrészt viszont (a repülésbiztonság szempontjából) egyéb olyan időszakokat illetően, amelyek során a hajózószemélyzet tagja a járató által számára kijelölt más feladatokat végez, nincs elegendő nyomós indok a korlátozás bevezetésére. Az ilyen feladatokat ezért csak a pihenőidővel kapcsolatos rendelkezéseknél és csak a fáradtság kialakulásához vezető számos tényező egyikeként vegyék figyelembe.

4.2.2 A repülési szolgálati idő meghatározásánál nem tekintjük szükségesnek egyéb olyan időtartamok beszámítását, mint például azt, amely alatt a hajózószemélyzet tagja otthonából a munkahelyére utazik.

4.2.3 Fontos elővigyázatossági intézkedés valósítható meg, amennyiben az államok és a járatók elismerik a személyzeti tag jogát a további repülési szolgálat elutasítására, ha az olyan természetű fáradtságot érez, amely hátrányosan befolyásolja a repülésbiztonságot.

4.3 Pihenőidő

A pihenőidő meghatározás szolgálattól való távollétet jelent, amelynek célja a fáradtság kipihenése; a pihenés módját az érintett személy önmaga határozza meg.

5. A korlátozások módjai

5.1 A korlátozások az időtartam tekintetében nagyon különbözőek; például az ICAO-nak erről tájékoztatást nyújtó államok többsége napi, havi és éves repülési idő korlátozásokat ír elő valamint igen sokan negyedévi korlátozást is alkalmaznak. Valószínűlege elegendő a napi repülési szolgálati időszakok korlátozása, mindazonáltal meg kell érteni, hogy ezek a korlátozások az egyedi helyzetek különbségei miatt jelentős mértékben eltérőek egymástól.

5.2 A repülési idő korlátozását szabályozó előírások vagy utasítások kidolgozásánál vegyék figyelembe a személyzet összetételét, valamint azt is, hogy a különböző feladatok milyen mértékben oszthatók fel a személyzet tagjai között. Abban az esetben, ha a légijárművön megfelelő pihenésre alkalmas helyet biztosítanak arra, hogy a személyzet tagja ott elkülönítetten és vízszintes (fekvő) testhelyzetben pihenjen, a repülési szolgálati idő meghosszabbítható. A földön, ahol a személyzet tagjai a pihenőidőt töltik, megfelelő pihenőhelyek kialakítása szükséges. Az államok vagy járatók továbbá a következő tényezőket is vegyék figyelembe: a forgalom sűrűsége, a rendelkezésre álló navigációs és távközlési létesítmények, a munka és alvásidő ciklusa illetve ritmusa, a fel és leszállások száma, a légijármű kezelés, kiszolgálás valamint teljesítmény jellemzők és az időjárási körülmények.

6. Repülési idő táblázat

A sok lehetséges változat közül az alábbiakban bemutatjuk azt a nyilvántartó táblázatot, amelyben a szolgálati idő a II. szakasz 2.2.9.3 pontjának megfelelően vezethető.

Hajózó személyzet	*Leghosszabb repülési szolgálati idő 24 óra alatt*	*Leghosszabb repülési időtartam (óra)*				*Pihenőidő*	
		napi 24 óra	*havi*	*negyedévi*	*évi*	*napi*	*heti*
Légijármű parancsnok							
Első tiszt							

D. Melléklet
Elsősegélynyújtó egészségügyi készletek

Kiegészítés a II. szakasz 4. fejezet 4.2.2 a) alponthoz

A következőkben ismertetjük a forgószárnyas légijármű fedélzetén szállítandó általános Elsősegélynyújtó készlet tartalmát:

∗ elsősegély-nyújtási kézikönyv
∗ ”Túlélők által használt föld – levegő látjelek” a 12. Annex alapján
∗ sérülések ellátására szolgáló egészségügyi anyagok
∗ szemcseppek
∗ orrváladék oldó permet(szóró)k
∗ rovarirtó illetve riasztó szerek
∗ lágyító/puhító szemkenőcs
∗ napsugárzásból származó égési sérülések kezelésére szolgáló kenőcs
∗ vízzel keverhető fertőtlenítő és bőrtisztító anyag
∗ kiterjedt égési sérülések kezelésére szolgáló anyagok
∗ szájon át bevehető tabletták a következők szerint:
érzéstelenítő, görcsoldó, a központi idegrendszert élénkítő, keringést serkentő, koszorú-ér tágító, hasmenés valamint egyensúlyi zavarok elleni orvosságok
∗ műanyagcső a mesterséges lélegeztetéshez
∗ műanyag csonttörés rögzítő.

E. Melléklet
Minimális felszerelési jegyzék (MEL)
Kiegészítés a II. szakasz 4. fejezet 4.1.3 ponthoz

1. Ha az állami előírásoktól való eltéréseket a légijármű jogosítása alkalmával nem engedélyezték, a légijármű csak akkor üzemeltethető a levegőben, ha minden rendszere és berendezése üzemképes. A tapasztalatok szerint rövidtávon bizonyos egységek üzemképtelensége elfogadható, ha a többi üzemeltetési rendszer és berendezés biztosítja az üzemeltetés biztonságos folytatását.

2. A minimális felszerelési jegyzék elfogadásával az állam jelezze azokat a rendszereket és felszerelési tárgyakat, amelyek bizonyos repülési körülmények között üzemképtelenek lehetnek – azzal a céllal, hogy a meghatározottakon felül más üzemképtelen rendszerrel vagy berendezéssel a repülés nem hajtható végre.

3. Ezért a légijármű típushoz a típus megtervezéséért felelős szervezet által, a tervezés államának jóváhagyásával kidolgozott gyártói minimális felszerelési jegyzéknek megfelelően meghatározott és a járató állama által elfogadott minimális felszerelési jegyzék minden légijármű részére szükséges.

4. A járató állama kérje fel a járatót a minimális felszerelési jegyzék elkészítésére annak érdekében, hogy lehetővé tegyék a légijármű üzemeltetését bizonyos rendszerek vagy berendezések üzemképtelensége mellett feltéve, hogy a biztonság elfogadható szintjét fenntartják.

5. A minimális felszerelési jegyzéknek nem célja, hogy a légijármű nem működő rendszerekkel vagy berendezésekkel történő üzemeltetését korlátlan ideig biztosítsa. A minimális felszerelési jegyzék alapvető célja a légijármű egyes nem működő rendszerekkel vagy berendezésekkel történő biztonságos üzemeltetésének meghatározott és ellenőrzött karbantartási valamint alkatrész csere program kereteken belül történő tartása.

6. A járató biztosítsa, hogy a repülés végrehajtását ne kezdjék meg a minimális felszerelési jegyzékbe tartozó több tétel működésképtelensége mellett annak megállapítása előtt, hogy az üzemképtelen rendszerek vagy alkatrészek közötti kapcsolat nem okozza a biztonság elfogadhatatlan szint alá csökkenését és/vagy a hajózószemélyzet munkaterhelésének szükségtelen mértékű növekedését.

7. Az elfogadható biztonsági szint meghatározása alkalmával figyelembe kell venni az üzemképtelen rendszerekkel vagy berendezésekkel történő üzemeltetés folytatása során bekövetkező további meghibásodások lehetőségét is. A minimális felszerelési jegyzék nem térhet el a repülésvégrehajtási kézikönyv korlátozásaitól, a vészhelyzeti eljárásoktól vagy más, a járató vagy a lajstromozó állam légialkalmassági előírásaitól kivéve, ha az illetékes légialkalmassági hatóság vagy a repülésvégrehajtási kézikönyv másként rendelkezik.

8. Egy repülés során üzemképtelennek elfogadott rendszereket vagy berendezéseket szükség szerint lássák el feliratokkal vagy jelzésekkel és az összes ilyen tételt vezessék be a repülőgép műszaki jegyzékébe (naplójába), hogy a hajózó és a karbantartó személyzetet tájékoztassák az üzemképtelen rendszerekről vagy berendezésekről.

9. Egy adott üzemképtelennek elfogadott rendszer vagy berendezés esetében a repülés megkezdése előtt szükség lehet egy karbantartási eljárás megállapítására annak érdekében, hogy az üzemképtelen rendszert vagy berendezést lekapcsolják vagy elkülönítsék. Ehhez hasonlóan szükség lehet a megfelelő hajózószemélyzeti üzemeltetési eljárás kidolgozására is.

10. A légijármű parancsnokának felelősségét a minimális felszerelési jegyzéknek megfelelő hiányosságokkal rendelkező forgószárnyas légijármű üzemeltetésre történő elfogadására a II. szakasz 2. fejezet 2.3.1 pont határozza meg.

F. Melléklet

A légi üzemeltető (járató) tanúsítása és megerősítése

Kiegészítés a II alrész. 2. fejezet, 2.2.1 ponthoz

1. Cél és tárgykör

1.1 Bevezetés

A jelen melléklet célja, hogy az államok által a járatók 2. fejezet, 2.2.1 pont szerinti tanúsítási követelményeivel kapcsolatban előírt tevékenységekkel, különös tekintettel ezen tevékenységek végrehajtásához és nyilvántartásához szükséges eszközökkel kapcsolatban útmutatót adjon.

1.2 A tanúsítást megelőző követelmények

A 2.2.1.4 alpontban előírtaknak megfelelően a légijármű üzembentartási engedély (AOC) kibocsátása a járató állama részéről annak függvénye, hogy a járató a meghatározott üzemeltetés természetétől és nagyságrendjétől függően valamint figyelembevételével bizonyságot tesz a repülési tevékenység megfelelő ellenőrzéséről és szervezéséről, kiképzési programjairól, földi kiszolgálásáról és karbantartási intézkedéseiről. A tanúsítási folyamat magába foglalja az összes járatónak az állam részéről történő értékelését, vagy későbbi engedélyek hozzáadását az AOC-hez, valamint annak a meghatározását, hogy az AOC első kibocsátását megelőzően a járató képes a biztonságos üzemeltetés lefolytatására.

1.3 Szabványos tanúsítási gyakorlatok

A 2.2.1.7 alpont előírja, hogy a járató állama hozzon létre egy tanúsítási rendszert az üzemeltetés hatályába tartozó típusra vonatkozó előírások betartásának igazolására,. Számos állam az iparág lehetőségeinek megfelelően alakította ki a saját politikáját és eljárásait, hogy ezen tanúsítási követelményeknek megfeleljen. Noha ezek az államok egymással való koordináció nélkül alakították ki saját gyakorlatukat, ezen gyakorlati megoldások szerfelett hasonlítanak egymásra és összhangban állnak saját követelményeik tekintetében. Ezen gyakorlati megoldások hatékonysága az évek során igazolást nyert, a járatók számára javuló biztonsági nyilvántartásokat eredményezve a világ minden részén. Ezen gyakorlati megoldások jelentős része hivatkozásként bépítésre került az ICAO ajánlásokba.

2. Előírt műszaki biztonsági értékelések

2.1 Jóváhagyási és elfogadási tevékenységek

2.1.1 A járatók tanúsítása és folyamatos ellenőrzése magába foglalja az államnak, az általa történő felülvizsgálatra benyújtott tárgykörben tett vizsgálatait. Az államnak, az általa történő felülvizsgálatra benyújtott tárgykörben tett válaszainak jellegétől függően a tevékenységeket jóváhagyási vagy elfogadási kategóriába lehet sorolni.

2.1.2 Egy jóváhagyás az állam által adott aktív válasz a felülvizsgálat céljából hozzá benyújtott tárgykörben. Egy jóváhagyás a megfelelő előírásnak való megfelelés meghatározását vagy tényét állapítja meg. Egy jóváhagyás bizonyosságát a jóváhagyó hivatalos személy aláírása, egy dokumentum vagy tanúsítvány kibocsátása, vagy az állam által hozott egyéb formális tevékenység igazolja.

2.1.3 Egy elfogadás nem feltétlenül igényli az állam aktív válaszát a felülvizsgálat céljából hozzá benyújtott tárgykörben. Egy állam a hozzá felülvizsgálat céljából benyújtott anyagot elfogadhatja, mint a megfelelő előírással megegyezőt, ha az állam kifejezetten nem utasítja el a felülvizsgálat alá tartozó anyag egészét vagy egy részét, általában a benyújtást követő meghatározott időtartam után.

2.1.4 Az „Állam által jóváhagyva" kifejezés, vagy a „jóváhagyva" szót alkalmazó hasonló kifejezések gyakran fordulnak elő a III. rész, II. alrészében. Az állam részéről jóváhagyást vagy legalább „elfogadást" igénylő felülvizsgálatot jelző intézkedések fordulnak még elő gyakran a III. rész, II. alrészében. Ezen sajátos kifejezéseken felül, a III. rész, II. alrésze számos hivatkozást tartalmaz olyan követelményekre, amelyek minimum legalább az állam által végrehajtandó műszaki felülvizsgálat igényét fogalmazzák meg. Az államok általi használat megkönnyítése céljából ez a melléklet csoportokba szedi és összefoglalja ezeket a sajátos előírásokat és ajánlott gyakorlati eljárásokat.

2.1.5 A jóváhagyás vagy az elfogadás kibocsátása előtt az állam hajtson végre vagy készítsen elő műszaki biztonsági értékelést. Az értékelést:

a) olyan személy hajtsa végre, aki különleges jogosítással rendelkezik az ilyen műszaki értékelések végrehajtására;

b) leírt, szabványos módszer szerint hajtsák végre; és

c) gyakorlati bemutató bevonásával hajtsák végre, amennyiben a biztonság érdekében szükséges a járató valós képességeinek vizsgálata az ilyen üzemeltetések végrehajtásához.

2.2 Szemléltetés néhány jóváhagyás kibocsátása előtt

2.2.1 A 2.2.1.4 alpontban leírtak kötelezik a járató államát arra, hogy a járató tanúsítását megelőzően követeljen meg a járatótól egy olyan szemléltetést, amely alapján az állam el tudja dönteni, hogy a járató szervezete, a repülési tevékenység, a földi kiszolgálás valamint a karbantartási programok irányítására és felügyeletére használt módszerei megfelelőek-e. Ezek a szemléltetések a kézikönyvek, nyilvántartások, létesítmények és eszközök értékelésén és ellenőrzésén felül kerülnek alkalmazásra. Ezen részben megkövetelt egyes jóváhagyások, mint például a III. kategória szerinti üzemeltetés jóváhagyása, érzékelhető biztonsági kihatással rendelkeznek, így szemléltetés alapján kerülnek elbírálásra mielőtt az állam jóváhagyná az ilyen üzemeltetést.

2.2.2 Habár az előírt szemléltetések és értekelések mértéke és sajátos módszerei eltérőek az államok között, mégis azon államok esetében, ahol a járatók jó biztonsági adatokkal rendelkeznek, a tanúsítási folyamatok általában összhangban vannak. Ezekben az államokban, az AOC kibocsátása vagy az AOC kiegészítéseinek jóváhagyása előtt, a műszakilag felkészített ellenőrök egy reprezentatív mintát vizsgálnak a tényleges képzés, karbantartás és üzemeltetés területéről.

2.3 A tanúsítási tevékenységek jegyzőkönyvezése

2.3.1 Nagyon fontos, hogy az államok tanúsítási, jóváhagyási és elfogadási tevékenysége megfelelően legyen dokumentálva. A tevékenységek hivatalos feljegyzéseként az állam adjon ki egy okiratot, mint például egy levelet vagy egy hivatalos dokumentumot. Ezt az okiratot mindaddig meg kell őrizni, amíg a járató gyakorolja a felhatalmazása szerinti tevékenységet, amelyre a jóváhagyási vagy elfogadási műveleteket lefolytatták. Ezen okirat a járató felhatalmazásának egyértelmű tanúbizonysága, és bizonyítékként szolgál abban az esetben, ha az állam és a járató eltérő véleménnyel van arról az üzemeltetésről, amelynek folytatására a járatót felhatalmazták.

2.3.2 Egyes államok egy okmánygyűjtőben összesítik a tanúsítással kapcsolatos adatokat, mint az ellenőrzés, a szemléltetés, a jóváhagyás és az elfogadás iratait, és mindaddig megőrzik, míg a járató aktív. Más államok ezeket az adatokat a végrehajtott tanúsítási tevékenységnek megfelelő gyűjtőben tárolják, és a gyűjtőt a jóváhagyási vagy az elfogadási okmány naprakészségének megfelelően módosítják. Az alkalmazott módszertől függetlenül, ezek a tanúsítási adatok meggyőző tanúbizonyságul szolgálnak, hogy az államok eleget tesznek a járató tanúsításával kapcsolatos ICAO kötelezettségeiknek.

2.4 Az üzemeltetés és a légialkalmasság értékelésének összehangolása

A III. rész, II. alrészének a jóváhagyásra vagy az elfogadásra vonatkozó egyes hivatkozásai megkövetelik a járatók értékelését és a légialkalmasság értékelését. Az alacsony minimumokra voantkozó jóváhagyás, amely a II kategóriájú és a III kategóriájú alacsony feltételek szerinti ILS megközelítések végrehajtásához szükségesek, például az üzemeltetési és a légialkalmassági szakemberek összehangolt előzetes értékelését igényli. A légiüzemeltetési szakemberek értékeljék az üzemeltetési eljárásokat, képzéseket és jogosításokat. A légialkalmassági szakemberek értékeljék a légijármű és a berendezések megbízhatóságát és a karbantartási eljárásokat. Ezen értékeléseket önállóan is el lehet végezni, de a biztonsághoz szükséges összes tényező figyelembevételének biztosítása érdekében, a jóváhagyás kibocsátása előtt az értékeléseket össze kell hangolni.

2.5 A járató államának és a lajstromozó államnak a felelőssége

2.5.1 A III. rész, II. alrésze a járató államának felelősségébe utalja az alaptanúsítást, az AOC kibocsátását és a járató működés alatti felügyeletét. A III. rész, II. alrésze megköveteli a járató államától azt is, hogy vegye figyelembe a lajstromozó állam által kiadott különböző jóváhagyásokat és elfogadásokat, vagy cselekedjen azok szerint. Ezen kérésekre tekintettel, a járató állama biztosítsa, hogy az intézkedései összhangban állnak a lajstromozó állam jóváhagyásaival és elfogadásaival, és azt is, hogy a járató megfelel a lajstromozó állam követelményeinek.

2.5.2 Jelentős fontosságú, hogy a járató állama kapja meg mindazon intézkedéseket, különösen a karbantartásra és a hajózó személyzetek képzésére vonatkozókat, melyek alapján a légi üzemeltetői használják egy másik állam lajstromába tartozó légijárművet. Az ilyen intézkedéseket a lajstromozó állammal összhangban tekintse át a járató állama. Ahol helyénvaló, a Nemzetközi Polgári Légiközlekedési Egyezmény 83 bis cikkelye értelmében egy olyan egyezményt kell előkészíteni, amelyik a lajstromozó állam felülvizsgálati felülvizsgálati felelősségét átruházza a járató államára, hogy ki lehessen zárni bármely arra vonatkozó félreértést, hogy melyik állam felelős a különös felülvizsgálati felelősségért.

Megjegyzés: a bérbevétel, a különjárati és a közös üzemeltetéssel összefüggésben a járató államának és a lajstromozó államnak a felelősségére vonatkozó útmutatót az Üzemeltetés Felügyeleti, Jogosítási és Folyamatos Ellenőrzési Eljárások Kézikönyv *(Doc 8335) tartalmazza. A lajstromozó állam felelősségének a járató államára való átruházására vonatkozó útmutató, amikor a felelősség átruházása a 83. bis cikkely értelmében valósul meg,* a Nemzetközi Polgári Légiközlekedési Egyezmény 83 bis cikkelyének alkalmazási útmutatójában *(Cir 295) található meg.*

3. Jóváhagyási intézkedések

3.1 Jóváhagyások

A „jóváhagyás” fogalom sokkal több hivatalos tevékenységre utal a tanusítás tárgyára vonatkozó állami szerepvállalásban, mint azt az „elfogadás” fogalom teszi. Egyes államok megkövetelik, hogy a Polgári Légiközlekedési Hatóság (CAA) igazgatója, vagy egy kijelölt alacsonyabb beosztású CAA hivatalnok bocsásson ki egy hivatalos okmányt minden egyes elvégzett „jóváhagyási” tevékenységre. Egyes államok megengedik különféle okiratok kibocsátását a jóváhagyás bizonyítékaként. A jóváhagyó okirat és az abban meghivatkozott tárgy a hivatalnokra ruházott hatáskörtől fog függeni. Az ilyen államokban a rutin jóváhagyások aláírásának jogát, mint például a járató minimális berendezéseinek jegyzéke egy meghatározott légijárműre, a műszaki ellenőrökre bízzák. Normál esetben az összetettebb vagy jelentős jóváhagyások kibocsátása magasabb szintű hivatalos személyek feladata.

3.2 Légijármű üzembentartási engedély (AOC)

3.2.1 A 6. Annex, III. rész, 2.2.1 alpontja által előírtak szerint az AOC egy hivatalos okmány, amely a 2.2.1.6 alpont követelményeinek megfelelően legalább a következőket tartalmazza:

a) a járató megnevezése (cégnév vagy azonosító, székhelye);

b) a kiadás időpontja és az érvényesség időtartama;

c) az engedélyezett üzemeltetés típusok ismertetése;

d) a használatra engedélyezett légijármű típus(ok); és

e) üzemeltetésre engedélyezett területek vagy repülési útvonalak.

3.2.2 Egyes államok az AOC-t és a kapcsolódó okiratokat, mint például az üzemeltetések részletezését a III. rész, II. alrésze által előírt egyéb engedélyek alátámasztására alkalmazzák.

3.3 Jóváhagyást igénylő intézkedések

Az alábbi intézkedések megkövetelik, vagy támogatják a meghatározott államok által történő jóváhagyást. A járató államának jóváhagyása szükséges az alább felsorolt minden olyan tanúsítás esetén, amelyet nem előz meg egy vagy több csillagjel. Az alább felsorolt tanúsítási esetek közül, amelyeket egy vagy több csillagjel előz meg, vagy a lajstromozó állam (egy csillag, vagy ”*”), vagy a tervező állam (kettős csillag, vagy ”**”) jóváhagyása szükséges. Ennek ellenére a járató állama tegyen meg minden szükséges lépést annak biztosítása érdekében, hogy a felelősségi körébe tartozó járatók, az ő követelményein felül, feleljenek meg minden szükséges, a lajstromozó állam és/vagy a tervező állam által kiadott jóváhagyásnak.

a) **Repülésvezérlő szerkezetek alaphelyzettől történő eltéréseinek jegyzéke (CDL) (Meghatározások);

b) **Gyártó minimális felszerelési jegyzéke (MMEL) (Meghatározások);

c) A legalacsonyabb repülési magasságok meghatározásának módszere (2.2.6.3);

d) A helikopter repülőtér üzemeltetési minimum meghatározásának módszere (2.2.7.1);
e) Repülési idő, repülési szolgálati időtartam és pihenőidő (2.2.9.2);

f) Helikopter-specifikus minimális felszerelési jegyzék (MEL) (4.1.3);

g) RNP üzemeltetések (5.2.2 b));

h) *Engedélyezett karbantartó szervezet (6.1.2);

i) *Helikopter-specifikus karbantartási program (6.3.1);

j) Hajózószemélyzeti tag kiképző programok (7.3.1);

k) Veszélyes áruk szállítására vonatkozó képzés (7.3.1, 5. Megjegyzés);

l) Szintetikus repülési gyakorló berendezés használata (7.3.2 a), 7.4.2. és 7.4.4, Megjegyzés);

m) A repülési üzem irányításának és felügyeletének módszere (2.2.1.4 és 8.1);

n) **Kötelező karbantartási feladatok és ezek elvégzésének időszakai (9.3.2); és

o) Utaskabin személyzeti tagok képzési programjai (10.3).

3.4 Műszaki értékelést igénylő intézkedések

A jelen részben található egyéb intézkedések igénylik, hogy az államok műszaki értékelést hajtsanak végre. Ezek az intézkedések olyan kifejezéseket tartalmaznak, mint „az állam számára elfogadható”, „az állam számára megfelelő”, „az állam által meghatározva”, „az állam által elfogadhatónak itélve” és az „állam által előírva”. Miközben nem feltételenül várják el az állam által történő jóváhagyást, ezek az előírások megkövetelik az államtól, hogy legalább fogadja el a szóbanforgó ügyet, miután hajtson végre egy sajátos felülvizsgálatot vagy értékelést. Ezek az intézkedéseka következők:

a) a helikopter-specifikus ellenőrző lista részletei (Meghatározás: légijármű üzemeltetési kézikönyv és 4.1.4);

b) a légijármű specifikus rendszerek részletei (Meghatározás: légijármű üzemeltetési kézikönyv és 4.1.4);

c) kötelező anyag az üzemeltetési kézikönyv számára (2.2.2.2 és H. Melléklet);

d) *a járató légijármű-specifikus karbantartási felelősségei (6.1.1);

e) *a karbantartás és a karbantartási nyilatkozat kiadásának módszere (6.1.2);

f) *karbantartás irányítási kézikönyv (6.2.1);

g) *kötelező anyag a karbantartás irányítási kézikönyv számára (6.2.4);

h) *a karbantartási gyakorlatra vonatkozó információk jelentése (6.5.1);

i) *a karbantartás szükséges helyesbítő intézkedéseinek bevezetése (6.5.2);

j) *módosítási és javítási követelmények (6.6);

k) oktatási létesítmények (7.3.1);

l) az oktatók jogosítása (7.3.1);

m) ismeretfelújító képzése szükségessége (7.3.1);

n) levelező tanfolyamok és írásbeli vizsgáztatás alkalmazása (7.3.1, 4. melléklet);

o) szintetikus repülési gyakorló berendezés alkalmazása (7.3.2);

p) a hajózó személyzetek jogosításainak nyilvántartása (7.4.3.4);

q) a járató államának kijelölt képviselője (7.4.4.1);

r) *a repülésvégrehajtási kézikönyv változásai (9.1); és

s) meghatározott légijárművekre kijelölt légiutaskisérők minimális száma (10.1).

4. Elfogadási tevékenységek

4.1 Elfogadás

4.1.1 A járató meghatározott légiüzemeltetés végrehajtásához való felkészültségének ellenőrzésénél, az állam által végrehajtott műszaki értékelés valós terjedelme legyen sokkal átfogóbb, mint az az előírás, amelyik megköveteli, vagy maga után vonja a jóváhagyást. A járató nemzetközi kereskedelmi légiszállítási feladatainak megkezdése előtt, az állam győződjön meg a tanúsítás során arról, hogy a járató megfelel a III. rész, II. alrész összes követelményének.

4.1.2 Egyes államok az „elfogadás" fogalmát hivatalos módszerként használják, amikor meg akarnak győződni arról, hogy az AOC hivatalos kibocsátását megelőzően, a járató tanúsításának összes kritikus elemét megvizsgálta az állam. Az előbbi fogalom használatával, ezek az államok érvényesítik azon előjogukat, hogy rendelkeznek a műszaki ellenőröknek a járatók üzemeltetési biztonságot befolyásoló politikájáról és eljárásairól szóló beszámolóival. Ezen elfogadást tükröző okmány tényleges kiadásával (feltételezve, hogy egy ilyen dokumentum kibocsátásra kerül) a tanúsítás végrehajtására kijelölt műszaki ellenőrt is meg lehet bízni.

4.1.3 Az „elfogadás"-i tevékenység egy meghatározott jóváhagyás kiadásához kapcsolódó kiegészítésnek tekinthető. Például, az üzemeltetési utasítás egy adott részét el lehet „fogadni" egy hivatalos okmány kiadásával, míg más részeit, mint például a légijármű-specifikus minimális felszerelési jegyzéket, egy önálló hivatalos okmány kiadásával „jóváhagyják".

4.2 Megfelelőségi jelentés

Egyes államok a megfelelőségi jelentést konkrét járatóra vonatkozó elfogadás okmányolására használják. Ez egy olyan, a járató által beterjesztett dokumentum, amelyben a járató az üzemeltetési vagy a karbantartási kézikönyv megfelelő részeire való hivatkozással azt részletezi, hogy miként fog megfelelni az állam összes alkalmazható követelményének. Ezt a fajta dokumentumot a Doc 8335, 3.3.2 e) része és a Légialkalmassági Kézikönyv (Doc 9760), I. kötet, 6.2.1 c) 4) része hivatkozza meg. A tanúsítás során az ilyen megfelelőségi jelentést aktívan kell alkalmazni és szükség szerint módosítani, a járató politikájában és eljárásaiban az állam igényei alapján végrehajtott változtatások bemutatása érdekében. Ezt követően a végleges megfelelőségi jelentést elhelyezik az állam tanúsítási nyilvántartásában, más egyéb tanúsítási jelentésekkel együtt. A megfelelőségi jelentés egy kiváló módszer annak bemutatására, hogy a járató tanúsítása az összes, alkalmazandó hatósági előírás szerint megfelelően lett végrehajtva.

4.3 Üzemeltetési és karbantartási kézikönyvek

4.3.1 Az üzemeltetési és a karbantartási kézikönyveket, valamint az összes további módosításukat terjesszék be az államnak (2.2.2.2, 6.1.1, 6.2.4, 6.3.2). Továbbá, az állam meghatározza ezen kézikönyvek minimális tartalmát (9.2, 9.3, 9.4 és H. Melléklet). Az állam műszaki kézikönyvében határozzák meg a járató kézikönyveinek (például, az üzemeltetési politika kézikönyve, üzemeltetési kézikönyv, utaskabin személyzet kézikönyve, útvonal ismertető és képzési kézikönyv) értékelésre szolgáló adagját. Egyes államok hivatalos okmányt adnak ki az összes kézikönyv és minden további módosítás elfogadásáról.

4.3.2 Az állam műszaki értékelése, az előírt tartalom meglétének ellenőrzésén kívül, téren ki arra is, hogy a sajátosan jellemző politika és eljárások az elvárt eredményt hozzák-e. Például az üzemeltetési repülési tervre (H. Melléklet, 2.1.15) vonatkozó részletes leírás, az említett tervek tartalmára és megőrzésére vonatkozó 2.3 alfejezet előírásainak teljesítése érdekében, határozzon meg egy lépésenkénti kitöltési útmutatót.

4.3.3 A kipróbált iparági alkalmazásokat hivatkozás céljából, mint például a hajózó személyzetek és a szolgálatvezetők által ténylegesen kitöltött üzemeltetési repülési tervet (habár nem egy szabványosat), a tanúsítás során az állam műszaki felülvizsgálója elkérheti. A műszaki értékelés ezen részét az üzemeltetés tanúsításában gyakorlott ellenőr végezze. A kipróbált iparági gyakorlat értékelésének alkalmazásával kapcsolatos legfőbb megfontolás tárgyát képezi, hogy ez a módszer légijármű-specifikus, berendezés-specifikus, vagy korlátozottan állnak rendelkezésre olyan értékelő személyek, akik naprakész jogosítással rendelkeznek az értékelendő alkalmazás vonatkozásában.

5. Egyéb jóváhagyási vagy elfogadási megfontolások

Jóváhagyás vagy elfogadás céljából egyes államok bekérnek bizonyos, a jelen részben meghatározott kritikus dokumentumokat, feljegyzéseket vagy eljárásokat, noha a 6. Annexben található vonatkozó előírás nem követeli meg a járató állama általi jóváhagyást vagy elfogadást. Néhány erre vonatkozó példa látható az alábbiakban:

a) biztonsági program (1.1.9);

b) légiközlekedési adatok beszerzésének módja (2.1.1);

c) a tüzelőanyag és olaj jegyzékek megfelelősége (2.2.8);

d) a repülési időre, a repülési szolgálati időtartamra és a pihenőidőre vonatkozó adatok megfelelősége (2.2.9.3, 7.6 és 10.4);

e) a légijármű karbantartási naplójának megfelelősége (2.3.1 a), b) és c));

f) a terhelési nyilatkozat megfelelősége (2.3.1 d), e) és f));

g) a repülési terv megfelelősége (2.3.1 g));

h) az időjárási adatok beszerzési módja (2.3.5.1 és 2.3.5.2);

i) a kézi poggyász megfelelő elhelyezésének módja (2.7);

j) forgószárnyas légijármű teljesítmény üzemeltetési korlátozások (3.2.4);

k) helikopter repülőtéri akadály adatok beszerzésének és felhasználásának módja (3.3);

l) az utastájékoztató kártyák megfelelősége (4.2.2 d));

m) a hosszútávú navigáció eljárásai (5.2.1 b));

n) az útinapló tartalma (9.4); és

o) a repülésvédelmi képzésre vonatkozó program tartalma (11.2).

6. Az üzemeltetési előírások megerősítése

A 2.2.1.5 alpont előírása meghatározza, hogy a légijármű üzembentartási engedély (AOC) folyamatos érvényessége attól függ, hogy a járató a járató államának ellenőrzése alatt rendszeresen eleget tesz az eredeti tanúsítási előírásnak (2.2.1.4). Ez az ellenőrzés megköveteli egy olyan folyamatos minőség ellenőrzési rendszer létrehozását, amellyel biztosítani lehet a 2.2.1.7 alpontban található, a légijármű üzemeltetés színvonalára vonatkozó előírások betartását. Megfelelő kiindulási pont egy ilyen rendszer létrehozásában, ha éves vagy féléves ellenőrzéseket, megfigyeléseket vagy vizsgálatokat követelnek meg, az igényelt tanusítás jóváhagyási és elfogadási tevékenységek érvényesítéséhez.

7. A légijármű üzembentartási engedély módosítása

A járató tanúsítása egy folyamatos tevékenység. Kevés járató fog egy idő elteltével megfelelni a légijármű üzembentartási engedélyével megszerzett kezdeti felhatalmazásának. A piaci lehetőségek kibontakozása arra készteti a járatót, hogy változtasson légijármű modellt és kérjen jóváhagyást egyéb járulékos feltételeket igénylő üzemeltetési területekre. Az eredeti légijármű üzembentartói engedély bármely változását és egyéb felhatalmazását jóváhagyó hivatalos okmány kiadása előtt az állam hajtson végre kiegészítő műszaki értékelést. Ahol lehetséges, minden kérést az eredeti felhatalmazásra támaszkodva vizsgáljanak meg, hogy a hivatalos okmány kiadása előtt meg lehessen határozni az állam előtt álló értékelési feladat mértékét.

G. Melléklet
Repülésbiztonsági dokumentációs rendszer

Kiegészítés a II. rész 1. fejezet 1.1.10 ponthoz

1. Bevezető

1.1 A következő anyag útmutatót biztosít a járató repülésbiztonsági dokumentum rendszerének kidolgozásához és megszervezéséhez. Vegyék figyelembe, hogy a dokumentációs rendszer kidolgozása összetett feladat és ezért a rendszer részét képező minden egyes dokumentum módosítása hatással lehet az egész rendszerre. Az üzemeltetési dokumentumok elkészítésére vonatkozó irányelveket az állami, kormány és ipari szervek dolgozták ki és ezek a járatók rendelkezésére állnak. Mindazonáltal a járatók számára nehézséget jelenthet ezek átfogó felhasználása, mivel az irányelvek csak több különböző kiadványból szerezhetők be.

1.2 Az üzemeltetési dokumentumok kidolgozásához alkalmazható útmutató elsősorban a kiadvány szerkesztésére vonatkozik, csak ritkán terjed ki az üzemeltetési dokumentum teljes körű elkészítésére. Nagyon fontos, hogy az egyes anyagok egymással összhangban, az előírásokkal, a gyártói rendelkezésekkel és az emberi tényezők alapelveivel egybehangzók legyenek. Fontos továbbá a szervezeti és alkalmazási egység biztosítása. Ezért a hangsúly az átfogó kidolgozáson van, az üzemeltetési dokumentumok közös rendszerként alkalmazandók.

1.3 A jelen melléklet anyaga a járató (üzemeltető) repülésbiztonsági dokumentum rendszerének kidolgozási eljárásával foglalkozik annak érdekében, hogy az a II. szakasz 1. fejezet 1.1.10 pontnak megfelelő legyen. Az útmutató nemcsak a tudományos kutatás, hanem a legutóbbi ipari gyakorlatok felhasználásával, különös hangsúllyal a magas szintű gyakorlati felhasználhatóságra készült.

2. Összeállítás és tartalom

2.1 A repülésbiztonsági dokumentum rendszert úgy dolgozzák ki és szerkesszék meg, hogy az biztosítsa a légi- és földi üzemeltetéshez szükséges tájékoztatások egyszerű megtalálását a biztonsági rendszert alkotó különböző dokumentumokban és megkönnyítse ezek szétosztását, illetve a módosítások után történő kiadását is.

2.2 A repülésbiztonsági dokumentum rendszerbe tartozó tájékoztatásokat azok fontossága és felhasználási módja szerint, a következők alapján csoportosítsák:

a) idő szempontjából alapvető fontosságú tájékoztatások, mint például azok a tájékoztatások, amelyek azonnal elérhetőség hiányában veszélyeztethetik az üzemeltetés biztonságát;

b) idő szempontjából lényeges tájékoztatások, amelyek gyors elérhetőség hiányában befolyásolhatják az üzemeltetés biztonságának szintjét vagy késleltethetik az üzemeltetést;

c) gyakran használt tájékoztatások;

d) hivatkozások, például olyan tájékoztatások, amelyek az üzemeltetéshez szükségesek, azonban nem tartoznak a fenti b) vagy c) alpontok hatálya alá;

e) olyan tájékoztatások, amelyek az üzemeltetés szakaszai szerint csoportosíthatók.

2.3 Az idő szempontjából alapvető tájékoztatásokat idejekorán és figyelemfelkeltő módon helyezzék el a repülésbiztonsági dokumentum rendszerben.

2.4 Az idő szempontjából alapvető és lényeges, továbbá a gyakran felhasznált tájékoztatásokat cserelapokra és gyorsan alkalmazható ellenőrző jegyzékekre készítsék el.

3. Megerősítés

A repülésbiztonsági dokumentum rendszert a bevezetés előtt, valós körülmények között vizsgálják felül és az alkalmazáshoz szükséges megerősítést csak ez után adják ki. A megerősítés illetve engedélyezési eljárás a hatékonyság igazolása érdekében terjedjen ki a felhasználás fontos tényezőire, továbbá vizsgálják meg a különböző szakmai csoportok közötti együttműködés kérdéseit is.

4. Tartalmi kialakítás

4.1 A repülésbiztonsági dokumentum rendszer szakkifejezései egymással összhangban legyenek, a közös témakörök, egységek és feladatok leírására szabványos meghatározásokat használjanak.

4.2 Az üzemeltetési dokumentumok tartalmazzák a meghatározások, kifejezések és rövidítések gyűjteményes magyarázatát, amelyet a műszaki fejlődés alapján rendszeresen és folyamatosan vizsgáljanak felül, illetve naprakészen módosítsanak. A repülésvégrehajtási dokumentumokban található összes fontos meghatározás, kifejezés és rövidítés ismertetését a kiadványban tegyék közzé.

4.3 A repülésbiztonsági dokumentum rendszer elkészítése során biztosítsák az egységes dokumentum típus alkalmazást, beleértve a szöveg stílust, a kifejezéseket, a táblázatokat és rajzokat valamint a nyomdai kialakítást is. Egyes meghatározott tájékoztatások mindig állandó helyen szerepeljenek, az alkalmazott mértékegységek és kódok mindig azonosak, egymásnak megfelelők legyenek.

4.4 A repülésbiztonsági dokumentum rendszer tartalmazzon az alkalmazási időpont szerint összeállított lényegi (fő) tartalomjegyzéket, amelynek célja az egynél több üzemeltetési dokumentumban található tájékoztatások egyszerű megtalálása.

Megjegyzés: Ezt a fő tartalomjegyzéket minden egyes dokumentum elején kell elhelyezni. A tartalomjegyzék háromnál több szintet nem tartalmazhat. A különleges és vészhelyzeti tájékoztatásokat a közvetlen kiválaszthatóság érdekében fülekkel kell ellátni.

4.5 A repülésbiztonsági dokumentum rendszer feleljen meg a járató minőségbiztosítási rendszere előírásainak, amennyiben ilyet meghatároztak.

5. Terjesztés

A járató kísérje figyelemmel a repülésbiztonsági dokumentum rendszer terjesztését, biztosítva ezzel a dokumentumok helyes és időszerű alkalmazását az üzemeltetési környezet jellemzői alapján valamint olyan módon, amely üzemeltetési szempontból megbízható és hasznos a felhasználók számára. Ide tartozik a járató részéről fenntartott információs rendszer, amelynek segítségével az üzemeltető személyzettől visszajelzéseket szerez be.

6. Módosítás

6.1 A járató dolgozzon ki tájékoztatás gyűjtési, felülvizsgálati, szétosztási és ellenőrzési rendszert az üzemeltett típusnak megfelelő összes forrásból beszerzendő tájékoztatások és adatok feldolgozására, beleértve, de nem csak ezekre korlátozva a járató, a lajstromozó és a tervezés államait, a gyártókat és a berendezések kereskedőit.

Megjegyzés: A gyártók egy adott légijármű üzemeltetéséhez olyan tájékoztatásokat nyújtanak, amelyek a légijármű rendszerekre és eljárásokra vonatkoznak olyan általános üzemeltetési körülmények között, amelyek nem mindig egyeznek meg teljes mértékben a járató igényeivel. A járatók biztosítsák, hogy a beszerzett tájékoztatások feleljenek meg egyedi igényeknek és a helyi hatóságok elvárásainak.

6.2 A járató dolgozzon ki tájékoztatás összegyűjtési, felülvizsgálati, szétosztási és ellenőrzési rendszert az üzemeltetésből származó vagy az üzemeltetés során bekövetkező változások feldolgozására, beleértve:

a) egy új berendezés felszereléséből származó változások;

b) az üzemeltetés gyakorlati tapasztalatai miatt bekövetkező változások;

c) a járató tevékenységének, céljainak, és eljárásainak változásai;

d) a járató jogosításainak változása;

e) a légiflotta állomány egységesítésének igénye érdekében bekövetkező változások.

Megjegyzés: A járató biztosítsa, hogy személyzeti politikája, szakmai egyeztetési tevékenysége és személyi erőforrás módszerei megfeleljenek az üzemeltetési típusának.

6.3 A repülésbiztonsági dokumentum rendszer vizsgálják felül;

a) rendszeresen (legalább évente egyszer);

b) jelentősebb eseményeket követően (egyesülés, bővítés, a vállalat gyors növekedése vagy csökkenése, stb.);

c) technológiai változások után (új berendezések és felszerelések felszerelése és használata); és

d) a biztonsági szabályok változásai után.

6.4 A járatók dolgozzanak ki módszereket az új tájékoztatások szétosztására, amely módszerek feleljenek meg a tájékoztatások közzététele sürgősségének és fontosságának.

Megjegyzés: Tekintettel arra, hogy a gyakori változások csökkentik az új vagy módosított eljárások fontosságát, kívánatos a repülésbiztonsági dokumentum rendszer változásainak legalacsonyabb szinten tartása.

6.5 Az új tájékoztatást a teljes repülésbiztonsági dokumentum rendszerre gyakorolt hatásai alapján vizsgálják felül és hitelesítsék.

6.6 Az új tájékoztatás közzétételét olyan módszerrel egészítsék ki, amelynek segítségével az üzemeltető személyzet nyomon követheti a tájékoztatás hitelességét, érvényességét valamint annak tényleges igazolását, hogy a közzétett tájékoztatások naprakészek. Az ellenőrző rendszer tartalmazzon eljárást annak igazolására, hogy az üzemeltető személyzet minden esetben megkapja a legutóbbi módosításokat.

H. Melléklet
Az üzemeltetési kézikönyv szerkezete és tartalma

Kiegészítés a II. szakasz 2. fejezet 2.2.2.1 ponthoz

1. Szerkezet

1.1 A II. szakasz 2. fejezet 2.2.2.1 pont előírásai alapján kiadott üzemeltetési kézikönyvet, amely a különböző üzemeltetési területek szerint esetleg külön részekből is állhat, a következő összeállítás szerint készítsék el:

a) általános rész;

b) légijármű üzemeltetési tájékoztatások;

c) útvonalak és repülőterek; és

d) kiképzés.

1.2 2006. január 1-től a 2. fejezet 2.2.2.1 pont előírásai alapján kiadott üzemeltetési kézikönyvet, amely a különböző üzemeltetési területek szerint esetleg külön részekből is állhat, a következő felépítésben alakítsák ki:

a) általános rész;

b) légijármű üzemeltetési tájékoztatások;

c) útvonalak és repülőterek; és

d) kiképzés.

2. Tartalom

Az 1.1 és az 1.2 bekezdések előírásainak megfelelő üzemeltetési kézikönyvek legalább az alábbiakat tatalmazzák:

2.1 Általános rész

2.1.1 A repülési üzemeltetés végrehajtásához szükséges üzemeltető személyzet felelősségi körének ismertetése.

2.1.2 A hajózószemélyzeti tagok és az utaskabin személyzeti tagok repülési idejének és repülési szolgálati idejének korlátozására továbbá megfelelő pihenőidejének biztosítására vonatkozó szabályok.

2.1.3 A szállítandó navigációs berendezések felsorolása.

2.1.4 Azon körülmények ismertetése, amelyek között rádiófigyelést kell tartani.

2.1.5 A legalacsonyabb repülési magasság meghatározásának módszere.

2.1.6 A repülőtér üzemeltetési minimum meghatározásának módszere.

2.1.7 Biztonsági elővigyázatossági intézkedések az olyan tüzelő-anyag feltöltés esetére, amikor az utasok a fedélzeten tartózkodnak.

2.1.8 A földi kiszolgálás rendszere és eljárásai.

2.1.9 A balesetet észlelő légijármű parancsnok számára a 12. Annex-ben előírt eljárások.

2.1.10 Minden egyes típusú üzemeltetéshez meghatározott hajózószemélyzet, beleértve a parancsnokság sorrendjének megállapítását is.

2.1.11 Egyedi utasítások az útvonalra szükséges tüzelőanyag és olaj mennyiségének kiszámításához az üzemeltetés valamennyi körülményének figyelembevételével, beleértve a túlnyomás elvesztésének és az útvonalon bekövetkező egy vagy több hajtómű meghibásodás lehetőségét is.

2.1.12 Azon körülmények, amelyek között oxigén használatra van szükség továbbá a II. szakasz, 2. fejezet 2.3.8.2 pont alapján meghatározott oxigén-készlet mennyisége.

2.1.13 Tömeg és súlypont (egyensúly) számítási utasítások.

2.1.14 A földi jégtelenítés illetve jégmentesítés végrehajtására és ellenőrzésére vonatkozó utasítások.

2.1.15 Az üzemeltetési repülési tervre vonatkozó előírások.

2.1.16 Előírt szabványos üzemeltetési eljárások (SOP) a repülés minden egyes szakaszára.

2.1.17 A rendes körülmények között használt ellenőrző jegyzékek használatára és a használat időpontjára vonatkozó előírások.

2.1.18 Az indulási korlátozásokra vonatkozó eljárások.

2.1.19 A repülési magasság folyamatos tartásának figyelésére vonatkozó utasítások.

2.1.20 A légiforgalmi irányítói engedélyek tisztázására és elfogadására vonatkozó utasítások különösen abban az esetben, ha azok földfelszín feletti biztonságos magassággal is kapcsolatosak.

2.1.21 Indulási és megközelítési tájékoztatások.

2.1.22 Útvonal és célállomás repülési körülmények ismertetése.

2.1.23 A műszeres megközelítés megkezdéséhez vagy folytatásához szükséges feltételek.

2.1.24 A precíziós és nem-precíziós műszeres megközelítési eljárások végrehajtására vonatkozó utasítások.

2.1.25 A hajózószemélyzet feladatainak kiosztása valamint a tagok munkaterhelése helyes elosztásának eljárásai az éjszakai repülés valamint a műszeres időjárási körülmények (IMC) között végrehajtott megközelítés és leszállás során.

2.1.26 A polgári légijármű elfogásával kapcsolatos tájékoztatások és utasítások, beleértve;

a) az elfogott légijármű parancsnoka számára a 2. Annex-ben előírt eljárások;

b) az elfogó és az elfogott légijárművek által használandó, a 2. Annex-ben előírt látjelek.

2.1.27 A II. szakasz, 1. fejezet 1.1.9 pont előírásai szerint biztosítandó baleset-megelőzési és repülésbiztonsági program részletezése, beleértve az alkalmazott biztonsági rendszert és személyi felelősséget.

2.1.28 Veszélyes áruk szállítására vonatkozó tájékoztatások és utasítások, beleértve a vészhelyzet esetén végrehajtandó intézkedéseket is.

Megjegyzés: Veszélyes árúk szállítása során a légijármű fedélzetén bekövetkező váratlan események kezelését érintő módszerek és eljárások kidolgozására valamint végrehajtására vonatkozó útmutató a Veszélyes áruk szállítása során a légijármű fedélzetén bekövetkező eseményekre hozott vészintézkedések *(Doc 9481) kiadványban található.*

2.1.29 Védelmi utasítások és útmutatók.

2.1.30 A II. szakasz, 11. fejezet 11.1 pont előírása szerint biztosítandó repülőgép átkutatási ellenőrző jegyzék.

2.2 Légijármű üzemeltetési tájékoztatások

2.2.1 Légialkalmasság jogosítási és üzemeltetési korlátozások.

2.2.2 A II. szakasz, 4. fejezet 4.1.4 pont alapján előírt általános, különleges és vészhelyzeti eljárások a hajózószemélyzet részére, az ezekre vonatkozó ellenőrző jegyzékek.

2.2.3 Repülés tervezési adatok a repülés előtti és repülés közbeni tervezéshez, különböző hajtómű teljesítmény beállítások és repülési sebességek mellett.

2.2.4 Tömeg és súlypont (egyensúly) számítási utasítások.

2.2.5 Légijármű rakodási és teher rögzítési utasítások.

2.2.6 Légijármű rendszerek, megfelelő vezérlő szervek és használati utasítások a II. szakasz, 4. fejezet 4.1.4 pont előírása szerint.

2.2.7 Az engedélyezett különleges üzemeltetésre és az üzemeltetett forgószárnyas légijármű típusra vonatkozó gyártó(i) minimális felszerelési jegyzék.

2.2.8 A vészhelyzeti és biztonsági berendezések ellenőrző jegyzéke valamint ezek használati utasítása.

2.2.9 A vészkiürítési eljárások, beleértve az adott légijármű típust érintő eljárásokat, a hajózószemélyzet közötti együttműködés szervezését, a hajózószemélyzet minden egyes tagjának vészhelyzeti helyét és kijelölt vészhelyzeti feladatait.

2.2.10 Az utaskabin személyzet részéről alkalmazott általános, különleges és vészhelyzeti eljárások, az ezekre vonatkozó ellenőrző jegyzékek valamint légijármű rendszer tájékoztatások, beleértve a szükséges együttműködési eljárásokat a hajózószemélyzet és az utaskabin személyzet között.

2.2.11 A különböző repülési útvonalakon szállított vészhelyzeti és túlélési felszerelések valamint azok helyes működésének felszállás előtt történő ellenőrzésének eljárásai, beleértve a szükséges oxigén mennyiség megállapításának és rendelkezésre álló mennyiségének meghatározását.

2.2.12 A túlélők részére a 12. Annex-ben meghatározott, alkalmazandó föld-levegő látjelek.

2.3 Útvonalak és repülőterek

2.3.1 Az útvonalra vonatkozó tájékoztatások, amelyek biztosítják, hogy a hajózószemélyzet minden egyes repülés vonatkozásában részletes tájékoztatást kapjon a távközlési létesítményekről, navigációs berendezésekről, repülőterekről, az üzemeltetéshez igénybe vehető műszeres megközelítésekről, érkezési és indulási eljárásokról valamint minden más olyan tényezőről, amelyet a járató a szabályszerű repülésvégrehajtás érdekében szükségesnek ítél.

2.3.2 Minden egyes lerepülendő útvonalszakasz legalacsonyabb repülési magassága.

2.3.3 Minden egyes olyan helikopter repülőtér üzemeltetési minimuma, amelyet tervezett leszállási vagy kitérő helikopter repülőtérként valószínűleg igénybe vehetnek.

2.3.4 A megközelítési vagy a helikopter repülőtéri létesítmény használhatóságának csökkenése esetére megnövelt helikopter repülőtér üzemeltetési minimum.

2.4 Kiképzés

2.4.1 A hajózószemélyzet kiképzési program a II. szakasz, 7. fejezet 7.3 pont előírásai alapján..

2.4.2 Az utaskabin személyzet kiképzési program a II. szakasz, 10. fejezet 10.3 pont előírásai alapján.

2.4.3 A repülésüzemi tiszt/szolgálatvezető kiképző program, ha azt a II. szakasz, 2. fejezet 2.2 pont alapján repülés felügyelettel összefüggésben alkalmazzák.

Megjegyzés: A repülésüzemi tiszt/szolgálatvezető kiképző program részletezését a II. szakasz, 8. fejezet 8.3 pontja tartalmazza.

I. Melléklet

Kiegészítő útmutató a 3. teljesítmény osztályú forgószárnyas légijárművek műszeres időjárási körülmények (IMC) közötti üzemeltetésére

Kiegészítés a II. szakasz 3. fejezet 3.4 ponthoz és a 2. Függelékhez

1. Cél és tárgykör

A jelen melléklet azt a célt szolgálja, hogy kiegészítő útmutatót adjon a II. szakasz, 3. fejezet 3.4 alfejezetében és a 2. Függelékben leírt légialkalmassági és üzemeltetési követelményekhez, melyeket a 3. teljesítmény osztályú forgószárnyas légijárművek IMC feltételek közötti jóváhagyott üzemeltetéséhez szükséges teljes körű biztonsági szint létrehozására fogalmaztak meg.

2. Hajtómű megbízhatósága

2.1 A 3. fejezet, 3.4.1 alfejezetében és a 2. Függelékben előírtaknak megfelelően a tolóerő megszűnésének arányát úgy kell meghatározni, hogy amennyiben lehetséges az feleljen meg a kereskedelmi üzemeltetésből nyert adatoknak, kiegészítve azokat a hasonló körülmények között lebonyolított egyéb forgalomból szerzett üzemeltetési adatokkal. Az értékelés megalapozásához az aktuális forgószárnyas légijármű/hajtómű kombinációra vonatkoztatva a tervező állama által elfogadható óraszámú gyakorlati tapasztalat szükséges, kivéve, ha a rendelkezésre álló hajtóművel kiegészítő vizsgálatot vagy kísérletet hajtottak végre teljesen azonos kialakítás mellett.

2.2 A gázturbinás hajtómű megbízhatóságának vizsgálata során a bizonyítékokat a világszerte használatos teljes flotta adatbázisából kell meríteni, hogy az üzemeltetést jellemző minél nagyobb számú minta álljon rendelkezésre, melyeket a típusalkalmassági bizonyítványok tulajdonosainak kell összesíteniük és a tervező államának kell felülvizsgálnia. Mivel a járatók által használatos típusok nem mindegyikére kötelező a repült órák jelentése, ezért megfelelő statisztikai becslésekre lehet támaszkodni a hajtómű megbízhatósági adatok kimunkálása során. Az ilyen üzemeltetésre jóváhagyott egyedi járatók által létrehozott adatokat, beleértve az állapotváltozás figyelését és az események jelentését, a járatók államainak kell figyelnie és felülvizsgálnia annak igazolása érdekében, hogy a járatók által betartott gyakorlat megfelel az elvárásoknak.

2.2.1 A hajtómű állapotváltozásának figyelése a következőket tartalmazza:

a) Egy, a gyártó javaslatain alapuló, olajfogyasztást ellenőrző programot; és

b) Egy, a hajtómű állapotát ellenőrző programot, meghatározva az ellenőrzésre kijelölt paramétereket, az adatok összegyűjtésének módját és a helyesbítő műveletekre vonatkozó eljárásokat. Mindezeknek a gyártók javaslatain kell alapulniuk. Az ellenőrzésnek az a célja, hogy minél korábbi szakaszban meg lehessen állapítani a hajtómű állapot romlását, és helyesbítő intézkedést lehessen tenni, mielőtt a biztonságos üzemeltetés feltételei megváltoznának.

2.2.2 A megbízhatósági program fedje le a hajtóművet és kapcsolódó rendszereit is. A hajtómű program tartalmazza a vizsgált időszakra vonatkozó repülésközbeni üzemórák számát és az okokra vetített repülésközbeni hajtómű leállások statisztikai értékét. Az események jelentési rendszere fedje le az IMC feltételek közötti repülések biztonságos végrehajthatóságát befolyásoló összes eseményt. Az adatok legyenek elérhetők a típusbizonyítvány tulajdonos és a tervező állama számára annak megállapítása érdekében, hogy a kitűzött megbízhatósági szint elérésre került-e. Bármely folyamatosan fennálló kedvezőtlen állapotváltozás esetén, a járató haladéktalanul végezzen értékelést, amelybe vonja be a tervező államát és a típusbizonyítvány tulajdonosát.

Megjegyzés: A kiválasztott aktuális időszaknak tükröznie kell a világméretű felhasználás és a figyelembe vett tapasztalati eredmény kapcsolatát (például egy korai adat alkalmatlan lehet, az adat felvételét követően végrehajtott kötelező módosítás miatt, amely befolyásolhatja a tolóerő csökkenésének arányát). Egy új hajtómű változat bevezetését követően, és amíg a világméretű felhasználás viszonylag alacsony, az összes rendelkezésre álló gyakorlati eredményt hasznosítani kell a statisztikailag értékelhető átlag elérése érdekében.

2.3 A tolóerő megszűnésének arányát egy meghatározott időszakot meghaladó gördülő átlaggal kell jellemezni. A tolóerő megszűnésének aránya kerül inkább alkalmazásra, mint a repülés közbeni hajtómű leállási arány, mivel ez sokkal kifejezőbb a 3. teljesítmény osztályú forgószárnyas légijárművek esetén. Ha egy 1. vagy 2. teljesítmény osztályú körümények között üzemelő forgószárnyas légijárművön olyan hiba keletkezik, amely jelentős, de nem teljes mértékű tolóerő csökkenést eredményez egy hajtóművön, akkor valószínüleg ez nem fog hajtómű leállításhoz vezetni, mivel ezen a hajtóművön még mindig marad elegendő tolóerőt eredményező teljesítmény. Azonban a 3. teljesítmény osztályú forgószárnyas légijárműveknél még további segítséget jelenthet a maradék tolóerő felhasználása a siklási távolság megnövelésére.

3. Üzemeltetési kézikönyv

Az üzemeltetési kézikönyvnek tartalmaznia kell mindazon tudnivalókat, melyek a 3. teljesítmény osztályú forgószárnyas légijárművek IMC feltételek közötti üzemeltetésével összefüggésben szükségesek. Ennek magába kell foglalnia az összes kiegészítő felszerelést, és az ilyen üzemeltetéshez szükséges eljárást és képzést, az üzemeltetés útvonalát és/vagy körzetét, valamint a repülőterekre vonatkozó ismereteket (beleértve a tervezési és üzemeltetési minimumokat is).

4. A járató tanúsítása, vagy megerősítése

A járató állama által meghatározott tanúsítási vagy megerősítési folyamatnak igazolnia kell a járató eljárásainak alkalmasságát a normál, rendellenes és vészhelyzetekre vonatkozóan, beleértve hajtómű, a rendszerek és felszerelések meghibásodását követő műveleteket is. A járató tanúsítására vagy megerősítésére vonatkozó általános követelményeken felül, a következő előírásokat is figyelembe kell venni a 3. teljesítmény osztályú forgószárnyas légijárművek IMC feltételek közötti üzemeltetésével kapcsolatban:

a) a hajtómű elért megbízhatóságának igazolását az adott hajtómű-forgószárnyas légijármű összeállításban (lásd: 2. Függelék, 1. bekezdés);

b) a sajátos és a megfelelő képzésre valamint az ellenőrzésre vonatkozó eljárásokat a 2. Függelék, 7. bekezdésében leírtak szerint;

c) a karbantartási programot, amely kiterjesztésre került a 2. függelék, 2. bekezdésében meghatározott felszerelésekre és rendszerekre;

d) a MEL-t, amely módosításra került az IMC feltételek közötti repülésekhez szükséges felszerelésekre és rendszerekre;

e) az IMC feltételek közötti üzemeltetéshez tartozó tervezési és üzemeltetési minimumokat;

f) az indulási és érkezési eljárásokat, valamint az útvonal korlátozásokat;

g) a légijárművezetők jogosítását és jártasságát; és

h) az üzemeltetési kézikönyvet, amely tartalmazza a korlátozásokat, a vész eljárásokat, az üzemeltetéshez jóváhagyott útvonalakat és körzeteket, a MEL-t és a 2. függelék, 2. bekezdésében meghatározott felszerelésekre vonatkozó normál eljárásokat.

5. Üzemeltetői és karbantartási program előírások

5.1 A 3. teljesítmény osztályú forgószárnyas légijárműveknek a légiüzemeltetői engedélyben vagy azzal megegyező dokumentumban leírt és az IMC feltételek közötti üzemeltetésére vonatkozó jóváhagyása, magába kell, hogy foglalja az adott sárkány/hajtómű összeállítást, beleértve az ilyen üzemeltetésre vonatkozó naprakész típustervezési előírásokat, a jóváhagyott különös forgószárnyas légijárművet és az ilyen üzemeltetésekhez tartozó útvonalakat vagy körzeteket.

5.2 A járató karbantartás irányítási kézikönyve magába kell, hogy foglalja a szükséges kiegészítő felszerelések tanúsítására vonatkozó nyilatkozatot, és a hajtóművet is beleértve az ilyen felszerelés karbantartási és megbízhatósági programját.

ANNEX 9.
Egyszerűsítések

12. kiadás – 2005. július

20. módosítás

TARTALOMJEGYZÉK

Oldal

NEMZETKÖZI SZABVÁNYOK ÉS AJÁNLOTT GYAKORLATOK

1. FEJEZET - MEGHATÁROZÁSOK ÉS ÁLTALÁNOS IRÁNYELVEK

A. – Meghatározások

Ha a repüléssel kapcsolatos szabványokban és ajánlott gyakorlatokban az alább következő kifejezéseket használják, akkor azok jelentése a következő:

Azonosítatlan személypoggyász - Unidentified baggage

A repülőtéren lévő, címkével ellátott, vagy anélküli személypoggyász, amelyet senki sem visz el és azonosíthatatlan, hogy mely utashoz tartozhat.

Általános célú repülési tevékenység - General aviation operation

A kereskedelmi légi szállító tevékenységtől és a munkarepüléstől eltérő bármely repülőtevékenység.

Behozatali illetékek és adók - Import duties and taxes

Vám illetékek és minden egyéb illeték, adó, vagy díj, amelyet behozatalkor, vagy azzal összefüggésben szednek be. Ebbe nem tartozik bele a nemzet más hatósága nevében a vámhatóság által nyújtott, vagy beszedett szolgáltatások megközelítőleges költségére korlátozódó egyéb díj.

Belépés/bebocsátás – admission

Személyre szóló engedély, amely az ország törvényei alapján az országba való belépésre a közhivatal biztosít

Berakodás - Lading

A teheráru, posta küldemény, vagy ellátmány elhelyezése a légi-járművön abból a célból, hogy azokat a járat magával vigye.

Beszáll(ít)ás – Embarkation

A repülés megkezdése céljából az illető személy légi-jármű fedélzetre lépése, kivéve az ugyanazon továbbinduló járat egy megelőző szakaszán beszállt repülő személyzetet, vagy utasokat

Csökkent képességű személy - Person with disabilities

Fizikai (érzékszervi, vagy mozgásszervi) cselekvési korlát, szellemi fogyatékosság, öregség, betegség, vagy a cselekvőképességet korlátozó egyéb más oknál fogva a szállítás igénybevételekor magatehetetlen személy, akinek állapota külön figyelmet és azt igényli, hogy a többi utas számára rendelkezésre álló szolgáltatásokat az illető személy szükségletéhez igazítsák.

Egyjelű többszakaszos légi-járat - Through flight

A légi-jármű sajátos üzemeltetése, amelyet az üzemeltető ugyanazon jel használatával azonosít az indulási ponttól a közbeeső ponton át a rendeltetési pontig.

Ellátmány/készlet - Stores/Supplie

a) Ellátmány/készlet elfogyasztásra; és b) ellátmány/készlet elvitelre.

Ellátmány/készlet elvitelre - Stores/Supplies for taken away

A légi-jármű utasainak és személyzetének elvitel céljából eladásra szánt cikkek.

Ellátmány/készlet fogyasztásra - Stores/Supplies for consumption

A fedélzeten lévő utasok és a személyzet fogyasztására szánt javak - akár árusították azok, akár nem – és a légi-jármű üzemeléséhez és karbantartásához szükséges javak, ideértve az üzemanyagot és a kenőanyagokat is.

Eltávolítási rendelkezés - Removal order

Az állam által kiállított, a felségterületéről való elvitelre utasítást adó írásos rendelkezés azon üzemeltető felé, amelynek a járatán a nem bebocsátható személy utazott az adott államba.

Fertőzött körzet (humán egészségügyi célokra) - Infected area

A helyi-, vagy nemzeti közegészségügyi hatóság, vagy az Egészségügyi Világszervezet jelentése szerint földrajzi területként meghatározott térségek, amelyben aktívan terjednek az emberi és/vagy állati közvetítéssel hordozott betegségek.

Megjegyzés - Az egészségügyi hatóságok által bejelentett fertőzött körzetekről az Egészségügyi Világ Szervezet „Weekly Epidemiological Record" (Heti Epidemiológiai Jegyzék) című kiadványában tesznek közzé tájékoztatást

Féregtelenítés – Disinsection

A légi-járművön, illetve a konténerben lévő rovarokat ellenőrző illetve elpusztító tevékenység.

Földi berendezések (Ground equipment) - A légi-jármű földi karbantartásához, javításához és kiszolgálásához használt speciális eszközök, ideértve az ellenőrző berendezéseket, a teheráru- és az utas kezelő berendezéseket is.

Gazdátlan poggyász - Unclaimed baggage

A repülőtérre érkező olyan személypoggyász, amelyet senki sem visz el, illetve nem követel.

Hajózószemélyzeti tag - Crew member

Az üzemeltető által megbízott személy, aki a repülés ideje alatt a légi-járművön feladatot lát el.

Határ integritás - Border integrity

Az állam azon törvényeinek és rendelkezéseinek az alkalmazása, amelyek az áruk és/vagy személyek határokon át való mozgására vonatkoznak.

Határőrizeti ellenőrzés (Immigration control) – Az államok által alkalmazott intézkedés a levegőben utazók ellenőrzésére, amikor felségterületükre be kívánnak lépni, azon leszállva tovább utaznak, vagy onnan el kívánnak utazni.

Ideiglenes bebocsátás - Temporary admission

Vámeljárás, amely révén bizonyos cikkek a behozatali illetékek és adók alól feltételesen teljes egészében vagy részben mentesítve bevihetők egy adott vámterületre; az ilyen cikkeket egy meghatározott céllal kell importálni és azzal a szándékkal, hogy meghatározott időtartamon belüli ismét exportálni kell anélkül, hogy változást hajtanának végre rajtuk, kivéve a használatukból eredő állagromlást.

Javak engedélyezése - Clearance of goods

A javak hazai felhasználáshoz való belépéséhez, exportálásához, vagy egy másfajta vám eljárás alá helyezéséhez szükséges vám formaságok elvégzése.

Javak felszabadítása - Release of goods

A vizsgálaton áteső javaknak a kapcsolatos személyek rendelkezésére bocsátását engedélyező vámhatósági felszabadító ténykedés.

Járulékos készletek - Commissary supplies

Egyszer használatos, vagy ismételt használatra szánt cikkek, amelyeket az üzemeltető a repülés folyamán szolgáltatásnyújtáshoz, főként az utas ellátásához és az utas kényelemhez alkalmaz.

Kábítószer ellenőrzés - Narcotics control

A kábítószerek és a bódítószerek légi szállítását ellenőrző intézkedések.

Kirakodás – Unlading

Leszállást követően a teheráru, postaküldemény, vagy ellátmány kirakodása a légi-járműről.

Kíséret nélküli személypoggyász - Unaccompanied baggage

Teher áruként szállított személypoggyász, amely lehet ugyanazon, vagy másik légi-járművön is, mint amelyiken tulajdonosa utazik.

Kiszáll(ít)ás – Disembarkation

A repülő személyzet és az útjukat ugyanazon továbbinduló járat következő szakaszán is folytató utasok kivételével, a légi-jármű elhagyása leszállását követően.

Kiutasítási rendelkezés - Deportation order

Az illetékes állam hatósága által kiadott írásos rendelkezés, amely a kiutasítottat utasítja az ország elhagyására.

Kiutasított – Deportee

Személy, akit az adott állam hatósága törvényesen beléptetett, vagy aki törvénytelenül lépett be az országba, és az illetékes hatóságok egy későbbi időpontban hivatalosan az ország elhagyására utasít.

Kockázat kezelés - Risk management

A határőrizeti szervek számára a kockázatot jelentő küldemények és mozgások kézben tartásához szükséges információkat biztosító kezelési eljárások és gyakorlatok módszeres alkalmazása.

Kockázat megállapítás - Risk assessment

A kiutasító állam megállapítása, hogy a kiutasított személy kísérettel vagy kíséret nélkül alkalmas a kereskedelmi légi szolgáltatás igénybevételével történő elvitelre. A megállapításnak tekintettel kell lennie minden vonatkozó tényezőre, beleértve kereskedelmi járaton történő szállításra való egészségi, szellemi és fizikai alkalmasságot, az utazási hajlandóságot vagy ellenállást, a viselkedési jegyeket és bármely erőszakra utaló előéletet.

Közegészségügyi kockázat - Public health risk

A lakosság egészségét valószínűsíthetően hátrányosan érintő esemény, hangsúlyozottan olyan, amely nemzetközi méreteket ölthet, vagy súlyos és közvetlen veszélyt jelenthet.

Közszolgálati hatóságok - Public authorities

A szerződő állam, jelen szabványokkal és ajánlott eljárásokkal bármiféle szempontból kapcsolatban álló minden különleges törvénye és szabályzata kiadásáért és végrehajtásáért felelős szervei, vagy tisztviselői.

Közvetlen tranzit megállapodás - Direct tranzit agreement

Az érintett állami hatóságok által jóváhagyott különleges megállapodás, mely szerint a szerződő államon áthaladó és rövid ideig ott tartózkodó forgalom a hatóság közvetlen ellenőrzése alatt maradhat.

Közvetlen tranzit terület – Direct tranzit area

A nemzetközi repülőtéren, a szerződő államon való áthaladás közben rövid ideig az államban tartózkodó forgalom felvételére létesített, az érintett állami hatóságok által jóváhagyott és közvetlen ellenőrzés alatt tartott külön terület.

Lajstromozó állam - State of registry

Az állam, amelynek lajstromába a légi-járművet bevezették.

Látogató - Visitor

Bármely személy, aki a szokásos lakóhelyétől eltérő Szerződő Állam felségterületén száll ki és lép be; törvényesen ott marad, ahogy a meglátogatott Szerződő Állam előírja a hivatalos nem bevándorlási célokra, mint például túrizmus, üdülés, sportolás, gyógykezelés, családi kapcsolatok ápolása, vallási célú zarándoklat, vagy üzletkötés esetére; és a meglátogatott felségterületen eltöltött tartózkodás alatt semmilyen haszonszerző elfoglaltságot nem folytat.

Légi-jármű felszerelés - aircraft equipment

Repülés közben a légi-jármű fedélzetén használt felszerelések, ideértve az elsősegély és életmentő felszerelést és a járulékos készleteket, de nem a raktárkészletet, vagy a tartalék alkatrészt.

Légi-jármű üzemeltető - Aircraft operator

A légi-jármű üzemeltetést folytató vagy az ezt felajánló személy, szervezet vagy vállalkozás.

Légi-jármű üzemeltetői dokumentumok - Airline operator's document

A légiforgalmi vállalatok és üzemeltetők használatára rendszeresített légi-szállító levelek /fuvarlevelek, utas jegyek és beszállító kártyák, banki és ügynöki elszámolás terv dokumentumok, túlsúlyos csomag jegyek, bemutatóra szóló egyes számlák (M.C.O.), kár és rendellenesség jelentés, csomag és árucímkék, menetrendek és tömeg, illetve súlypont helyzeti dokumentumok.

Légitársaság – Airline

Az Egyezmény 96. cikkelyében meghatározottak szerint menetrendszerű nemzetközi légi szolgáltatást felajánló vagy folytató bármely légi szállító vállalkozás.

Megbízott ügynök - Authorized agent

A légi-jármű üzemeltetőt képviselő személy, akit az üzemeltető felhatalmazott vagy megbízott, hogy az üzemeltető légi-járműveit, személyzeteit, utasait, teheráruit, postaküldeményeit, poggyászait és készleteit érintő minden beléptetési és engedélyezési formaságot a nevében intézzen, és magában foglal - ahol azt a nemzeti jogszabályok lehetővé teszik - egy, a légi-jármű fedélzetén rakomány kezelésére felhatalmazott harmadik felet.

Nem bebocsátható személy - Inadmissable person

Az a személy, akinek bebocsátását az állami hatóságok visszautasítják, vagy vissza fogják utasítani.

Nem megfelelő dokumentumokkal rendelkező személy - Improperly documented person

Utazó vagy utazni szándékozó személy, aki: a) lejárt úti-okmánnyal vagy érvénytelen vízummal; b) utánzott, hamisított vagy megmásított úti-okmánnyal vagy vízummal; c) más személy úti-okmányával vagy vízumával; d) úti-okmány nélkül; vagy e) a kötelező vízum nélkül kísérel meg utazni.

Nemzetközi repülőtér - International airport

A szerződő állam saját felségterületén arra kijelölt minden repülőtér, hogy nemzetközi belépő és induló repülőtérként szolgáljon, amelyen elvégzik a vámolással, bevándorlással, közegészséggel, állati és növényi karanténozással és hasonlókkal kapcsolatos formaságokat.

Nemzetközi szintű közegészségügyi veszélyhelyzet - Public health emergency of international concern)

Rendkívüli esemény, amelyet az Egészségügyi Világszervezet Nemzetközi Egészségügyi Szabályai (2005) szerint határoznak meg, hogy: (1) megállapítsák a betegség nemzetközi terjedése által más Államokra irányuló közegészségügyi kockázatot és (2) a koordinált nemzetközi válaszlépéseket lehetőség szerint megköveteljék.

Nyilatkozó – Declarant

Áru nyilatkozatot kiállító, vagy bármely személy, akinek a nevében az ilyen nyilatkozatot kiállították.

Parancsnokpilóta - Pilot-in-command

A repülési idő alatt a légi-jármű üzemeltetéséért és biztonságáért felelős repülőgép-vezető.

Postaküldemény – Mail

Postai hatóság által a Általános Postaszövetség (UPU – Universal Postal Union) szabályaival egyezésben vállalt és egy másik postai hatósághoz szállítás céljából indított levelek és egyéb tárgyak szállítmányai.

Repülő személyzeti tag - Flight crew member

Szakszolgálati engedéllyel ellátott személyzeti tag, akit a légi-jármű üzemeltetéséhez alapvető feladatok ellátásával bíznak meg a repülési idő tartamára.

Segélynyújtó repülés - Relief flights

Humanitárius célból végzett repülések - segélynyújtó személyzet és segély ellátmány (mint például élelmiszer, ruházat, menedékhely, orvosi és egyéb cikkek) szállítására - vészhelyzet és/vagy katasztrófa során és/vagy azt követően. Olyan esetben is, amikor az ilyen vészhelyzet és/vagy katasztrófa miatt a személyeket - az életüket és/vagy egészségüket veszélyeztető helyről ugyanazon államon belüli, vagy az ilyen személyek befogadására hajlandó más állam területén lévő, biztonságos helyre - menekítenek.

Személy eltávolítása – Removal of a person

Az illetékes állam arra irányuló törvényes cselekedete, hogy egy személyt az állam elhagyására utasítson.

Személy poggyász - Baggage

Az utas, vagy a repülő személyzet személyi tulajdona, amelyet a légi-jármű az üzemeltetővel létrejött megegyezés alapján visz magával.

Tartalék alkatrészek - Spare parts

A légi-járműbe, ideértve a hajtóművet és a légcsavart is, beszerelendő javítási, vagy csere jellegű cikkek.

Teheráru / rakomány – Cargo

A posta küldemény, az ellátmány, illetve a kísérettel rendelkező, vagy tévesen kezelt személypoggyászon kívül a légi-járművön szállított minden tulajdon.

Tévesen kezelt (elveszett) poggyász - Mishandled baggage

Az utastól vagy a repülő személyzettől tévedésből, vagy elkerülhetetlen módon elidegenített személypoggyász.

Utazási dokmentum - Travel document

Az állam vagy szervezet által kiadott útlevél vagy egyéb – személyazonosság igazolását szolgáló – okmány, amelyet a jogos birtokos nemzetközi utazásra használ.

Utazás megkezdése - Commencement of journey

Az a pont, ahol a személy megkezdte az utazását anélkül, hogy tekintetbe vennénk bármely repülőteret, amelyen akár továbbmenő akár csatlakozó járat céljából a közvetlen tranzitban megállt feltéve, hogy a kérdéses repülőtér közvetlen tranzit területét nem hagyta el.

Vámmentes terület (Free zone) – A szerződő állam felségterületének egy része, amelyre a bejuttatott bármiféle javat általában – az import illetékek és adók értelmében - úgy tekintik, mint amely a vámterületen kívül van.

Védelmi felszerelés - Security equipment

A polgári repülés és létesítményei ellen irányuló jogellenes cselekmények megakadályozásában, vagy észlelésében speciális használatra szánt egyedi eszköz, vagy rendszer alkotórésze.

B. – Általános irányelvek

1.1 A jelen Annex-ben szereplő szabványok és ajánlott gyakorlatok előírásai a légi-jármű üzemeltetés minden kategóriájára alkalmazandók, kivéve azokat az eseteket, ahol a rendelkezés más üzemeltetési kategória említése nélkül nevez meg egyfajta üzemeltetési kategóriát.

1.2 A szerződő állam tegye meg a szükséges lépéseket az alábbiak biztosítására:

a) a személyek és a légi-jármű tekintetében a határ ellenőrzés végrehajtásához és a javak vizsgálatához/engedélyezéséhez szükséges időt a minimumon tartsák;

b) az adminisztratív és a vizsgálati követelmények alkalmazása a legkisebb kényelmetlenséget okozza;

c) a szerződő államok, üzemeltetők és repülőterek közötti vonatkozó információcserét a lehető legteljesebb mértékben bátorítsák és mozdítsák elő; és

d) optimális védelmi szint és a törvény betartása valósuljon meg.

1.3 A szerződő állam a javak határellenőrzést szolgáló ellenőrző/engedélyező eljárásaiban alkalmazza a kockázat kezelést.

1.4 Az eljárások hatékonyságának és hatásosságának fokozása érdekében, a szerződő állam hatékony információs módszert fejlesszen ki repülőterein.

1.5 A szerződő állam dolgozzon ki eljárást az adatok érkezést megelőző beszerzésére oly módon, hogy lehetővé váljon a gyorsított vizsgálat/engedélyezés.

1.6 Ezen Annex rendelkezései nem akadályozzák a nemzeti jogszabályok alkalmazását a repülés védelmi intézkedések, vagy egyéb szükséges ellenőrzések tekintetében.

2. FEJEZET – LÉGI-JÁRMŰVEK BELÉPÉSE ÉS KILÉPÉSE

A. – Általános rész

2.1 A szerződő állam megfelelő intézkedéseket léptessen érvénybe a más szerződő államba induló, vagy onnan érkező légi-jármű engedélyezéséhez, amely intézkedéseket olyan módon kell bevezetni, hogy a szükségtelen késlekedést megakadályozzák.

2.2 Az induló, vagy az érkező légi-járművek hatékony engedélyezését célzó eljárások kidolgozásakor a szerződő állam – ahol szükséges - vegye figyelembe a repülésvédelem és a kábítószer ellenőrzés céljára alkalmazott eljárásokat.

2.3 **Ajánlott gyakorlat**. - *A szerződő állam megfelelő ellenőrző hatóságai kössenek egyetértési szerződést az állam területére nemzetközi szolgáltatást biztosító légi-jármű üzemeltetőkkel és nemzetközi repülőtereik üzemeltetőivel, lefektetve benne a kábító és személyiség befolyásoló szerek nemzetközi forgalmazása által jelentett veszély leküzdése terén való együttműködésük irányelveit. Az ilyen egyetértési szerződést a vámügyi világszervezet által e célra kidolgozott mintái közül megfelelő szerint kell megformázni. Ezen felül, a szerződő államokat ösztönözzük, hogy egyetértési szerződést maguk között is létrehozzanak.*

2.4 **Ajánlott gyakorlat**. - *Az Egészségügyi Világszervezet Nemzetközi Egészségügyi Szabályzatával egyezésben, a szerződő állam egészségügyi okok miatt ne szakítsa meg a légi szállító tevékenységet. Olyan esetekben, amikor kivételes körülmények miatt e szolgáltatása felfüggesztését fontolgatja, mielőtt a szerződő állam a légi szállító tevékenység felfüggesztésére bármiféle lépést tenne, először konzultáljon az Egészségügyi Világszervezettel és a betegség előfordulási helye szerinti állam egészségügyi hatóságaival.*

B. – Dokumentumok - követelmény és alkalmazás

2.5 Légi-jármű belépéséhez, vagy indulásához a szerződő állam a jelen Fejezetben előírt okiratokon felül mást ne követeljen meg.

2.6 A szerződő állam ne követeljen vízumot, ne szedjen be vízum, vagy egyéb díjat a légi-jármű belépéséhez, vagy indulásához szükséges bármiféle okirat alkalmazásával összefüggésben

2.7 **Ajánlott gyakorlat.** - *Az arab, angol, francia, orosz vagy spanyol nyelven benyújtott légi-jármű belépéséhez, vagy indulásához szolgáló okiratot a szerződő állam fogadja el. A szerződő állam előírhatja, hogy ezeket, szóban, vagy írásban, a saját nemzeti nyelvére lefordítsák.*

2.8 A szerződő állam műszaki lehetőségeinek függvényében a légi-jármű induláshoz és belépéséhez az alábbiak szerint benyújtott dokumentumokat el kell fogadni:

a) a közszolgálati hatóságok információs rendszerére elektronikus formában továbbított dokumentum;

b) az elektronikus úton előállított, vagy továbbított papír alapú dokumentum; vagy

c) a jelen Annex-ben bemutatott formát követve kézzel kitöltött papír alapú dokumentum.

2.9 Ha adott dokumentumot továbbította az üzemeltető, vagy nevében továbbították azt, és a közszolgálati hatóságok azt elektronikus formában megkapta, akkor a szerződő állam ne követelje meg, hogy ugyanazt a dokumentumot papírformában is bemutassák.

2.10 Az Általános Nyilatkozatot (General Declaration) megkövetelő szerződő állam köteles az 1. Függelékben feltüntetett tételekre korlátozni tájékoztatására vonatkozó igényét. A tájékoztatást papír vagy elektronikus formában is el kell fogadnia.

2.11 Ha a szerződő állam az Általános Nyilatkozatot (General Declaration) már csak tanúsítás céljából követeli meg, olyan intézkedést alkalmazzon, amely révén a tanúsítási követelmény teljesíthető a Teheráru Bizonylat (Cargo Manifest) valamely oldalán a kívánt szövegezést tartalmazó kiegészítő nyilatkozat akár kézírással, akár gumi-bélyegzővel történő felvitelével. Az ilyen tanúsítást vagy a meghatalmazott ügynök, vagy a repülőgép parancsnok köteles aláírni.

2.12 A szerződő állam szokványos körülmények között ne írja elő az Utas Bizonylat (Passenger Manifest) benyújtását. Ha a szerződő állam az Utas Bizonylat benyújtását továbbra is megkívánja, követelményeit korlátozza a 2. Függelékben rögzített elemekre. A tájékoztatást - legyen papír vagy elektronikus formában - el kell fogadni.

2.13 Ha a szerződő állam az Utas Bizonylat papír alapú bemutatását írja elő, azt fogadja el, az alábbiak közül bármelyik változatban:

a) a 3. Függelékben bemutatott és az utasítás szerint kitöltött bizonylat; vagy
b) a 3. Függelékben bemutatott, részben kitöltött bizonylat a légi-járművön lévő rakomány mindegyike légi fuvarlevelének másolatával.

6.57 A nemzetközi repülőtereken helyszíni elsősegélynyújtó személyzetet és létesítményt kell fenntartani, és alkalmas szervezési megoldással kell rendelkezni, hogy az alkalmanként előforduló - gyors beavatkozást igénylő - súlyosabb esetek előre megszervezett szakorvosi ellátásban részesüljenek.

D. - Az engedélyező ellenőrzéshez és az ellenőrző szolgálatok működéséhez szükséges eszközök

6.58 **Ajánlott gyakorlat. -** *Az engedélyező ellenőrzés végzésével megbízott hatóságok számára szolgáló helyet és létesítményeket amennyire csak lehetséges közpénzen biztosítsák.*

6.59 Ha a 6.58 ajánlott gyakorlatban említett helyet és létesítményeket nem közpénzen biztosítja, a szerződő állam köteles gondoskodni arról, hogy e területeket és létesítményeket ne kedvezőtlenebb feltételekkel biztosítsák, mint amilyenek az állam területére belépő - és hasonló méretű területet és létesítményeket igénylő - egyéb szállítási mód üzemeltetőjére vonatkoznak.

6.60 A szerződő államok kötelesek az érintett hatóságok elégséges és illetékmentes szolgáltatás nyújtásáról gondoskodni az üzemeltetők részére, az e hatóságok által megállapított üzemidőn belül.

Megjegyzés - Ha a forgalom nagysága és a rendelkezésre álló terület és létesítmények szükségessé teszik, a szerződő állam kívánatosnak tarthatja, hogy az utasok és személypoggyászaik részére ne csak egyetlen helyen biztosítsanak engedélyező ellenőrzést.

6.60.1 A szerződő állam a közszolgálati hatóságok szolgáltatásait elegendő mértékben úgy köteles biztosítani, hogy a tényleges igényeket és ily módon a hatóságok által meghatározott munkaidőszak alatt a forgalom nagyságát kielégítve reagáljon.

1. Megjegyzés. - A 6.60 és a 6.60.1 szabványt a Nemzetközi Egészségügyi Szabályok (1969) harmadik, 1983. évi javított kiadásának 82. cikkelye szerint kell alkalmazni, amely értelmében az egészségügyi hatóság -a Nemzetközi Egészségügyi Szabályzatban (IHR) előírt orvosi vizsgálatok egyike esetében sem vagy egy érkező utas oltásáért illetve annak igazolásáért sem róhat fel illetéket. Az IHR előírja, hogy fizetség behajtása, vagy elfogadása nem engedhető meg sem a nappali, sem az éjszakai órákban végzett vizsgálat ellenében. A 24. Cikkely előírja, hogy az egészségügyi intézkedéseket azonnal meg kell kezdeni, és késedelem nélkül végre kell hajtani.
2. Megjegyzés. - A 15. Annex - Légiforgalmi Tájékoztató Szolgálatok - értelmében az állam köteles a nemzetközi repülőterein biztosított határátlépést engedélyező szerveinek (vám, bevándorlás, egészségügy) fajtáját és üzemidejét közzétenni.

6.61 A 6.60 és 6.60.1 pontban említett nemzetközi repülőtereken a lényeges munkateher lefedésére megállapított munkaidőszakon kívül, a légi-jármű üzemeltetők részére az ilyen hatóságok szolgáltatását a szerződő állam köteles nem kedvezőtlenebb feltételekkel biztosítani, mint amilyen feltételek az állam területére belépő egyéb szállítási mód üzemeltetőjére vonatkoznak.

6.62 **Ajánlott gyakorlat. -** *A szerződő állam intézkedjen, hogy felségterületén lehetővé váljon más állam vonatkozó közszolgálati hatóságai képviselőinek tartózkodása a légi-járművek, utasok, hajózószemélyzeti tagok, személypoggyász, teheráru megvizsgálása, illetve a vámkezelési, bevándorlási, közegészségügyi, állati- és növényi karanténozás dokumentálása céljából azt megelőzően, hogy ezek az illető másik állam felé elindulnának feltéve, hogy ez az eljárás a másik állam területére megérkezéskor szükséges engedélyezési eljárásokat segíti. Alternatív megoldásként a szerződő államok megegyezés szerint, a fentiekben felsorolt funkciók közül bármelyik esetében, a másik államba érkezéskori engedélyeztetés elősegítését célzó, elektronikus elő-engedélyeztetést alakíthatnak ki.*

E. – Pénzváltási eszközök

6.63 A szerződő állam köteles gondoskodni arról, hogy nemzetközi repülőterein láthatók legyenek más államok pénznemeinek saját nemzeti pénznemre való átváltását szabályozó rendelkezései.

6.64 Más állam pénznemeire továbbra is átváltás ellenőrzést fenntartó szerződő állam köteles intézkedni arról, hogy:

a) közzétegye az ilyen pénznemek hivatalos és érvényes átváltási árfolyamait;
b) nemzetközi repülőterein jelenítse meg, vagy egyéb módon tegye hozzáférhetővé az illető repülőtéren az érdeklődésre elsődlegesen számításba vehető átváltási árfolyamokat.

6.65 Ha más államok pénznemei közül némelyik vagy mindegyik átváltását a szerződő állam nem ellenőrzi, nemzetközi repülőterein köteles ilyen értelmű tájékoztatást megjeleníteni.

6.66 **Ajánlott gyakorlat. -** *Más államok olyan pénznemei esetében, amelyekre az illető szerződő állam ellenőrzött beváltási árfolyamot nem alakított ki, a szerződő állam tegyen kivitelezhető intézkedéseket arra, hogy nemzetközi repülőterein az éppen érvényes szabadpiaci átváltási árfolyamról tájékoztatás álljon rendelkezésre.*

6.67 A szerződő állam köteles biztosítani, hogy nemzetközi repülőterein kormányzati ügynökségek vagy arra felhatalmazott magánügynökségek révén, az utazóközönség igényeit kielégítő időben, megfelelő lehetőség álljon rendelkezésre más államok pénznemeinek törvényes átváltásához. E lehetőség az induló és az érkező utas számára egyaránt legyen igénybe vehető.

Megjegyzés - E rendelkezés megvalósítása során a szerződő állam lehetséges megoldásként, az induló utas számára külföldi valuta beszerzésre a nappal, vagy az éjszaka bármely időszakában lehetőséget nyújtó pénzváltó automaták alkalmazását vegye fontolóra, amelyek a nemzetközi repülőtereken igen hasznosnak bizonyultak.

8.8 A szerződő államok kötelesek elősegíteni az ENSZ részéről elismert nemzetközi szervezet által, vagy maguk az államok által, illetve megbízásukból végrehajtott segélynyújtó repülésben résztvevő légi-járművek területükre történő belépését, arról történő kilépését, vagy azon történő áthaladását, és minden lehetséges intézkedést meg kell hozniuk azok biztonságos üzemelésének garantálására. Ilyen repülések azok a segélyrepülések, amelyeket a természeti, vagy ember által előidézett katasztrófákra, valamint hasonló, az ENSZ segítségét igénylő és az emberi egészséget, vagy a környezetet súlyosan veszélyeztető vészhelyzeti körülményekre reagálva hajtanak végre. Az ilyen repüléseket a lehető leggyorsabban meg kell kezdeni azt követően, hogy a fogadó államtól a beleegyezés megérkezett.

1. Megjegyzés. - Az Alapfogalmak Nemzetközileg Elfogadott Gyűjteménye szerint, az Egyesült Nemzetek Humanitárius Ügyek Osztálya a vészhelyzetet "hirtelen és előre nem látható, a hátrányos következmények minimumra csökkentéséhez azonnali intézkedéseket igényelő" eseménynek, míg a katasztrófát olyan eseménynek tekinti, amely "a társadalom működésében nagymértékű emberi, anyagi vagy környezeti veszteséget okozó súlyos törés, amelynek csak saját erőből történő leküzdése meghaladja az illető társadalom erejét".
2. Megjegyzés - A segélynyújtó repülések biztonságos üzemének biztosítására szolgáló intézkedésekkel összefüggésben a következőkre hívjuk fel a figyelmet: 11. Annex – Légi-forgalmi szolgálatok; A polgári légi-jármű üzemelésre potenciálisan veszélyes katonai tevékenységekkel kapcsolatos biztonsági intézkedések kézikönyve (Doc 9554); és a Polgári légi-jármű elfogásának kézikönyve (Doc 9433).

8.9 A szerződő államoknak biztosítaniuk kell, hogy a 8.8 szabvány szerinti segélynyújtó repülésekkel érkező személyzet és cikkek belépésének engedélyezési eljárása szükségtelen késedelem nélkül végbemenjen.

D. Vészhelyzeti műveletek tenger szennyeződés és a tengeri biztonság terén

8.10 Vészhelyzet alkalmával a szerződő államok felségterülete tekintetében segítsék elő azoknak a légi-járműveknek belépését, átrepülését és kilépését, amelyek a tenger szennyezettségének leküzdésében vagy megakadályozásában, vagy a tenger biztonsága, az élővilág biztonsága, vagy a tengeri környezet megóvása érdekében szükséges egyéb tevékenységben vesznek részt.

8.11 Vészhelyzet esetén a szerződő államok a lehető legnagyobb mértékben segítsék elő a 8.10 szabványban leírt tengeri szennyezettség elleni és tengerbiztonsági tevékenységhez szükséges személyek, felszerelés, anyagok és berendezések belépését, átrepülését, kilépését.

E. A nemzetközi egészségügyi előírások és vonatkozó rendelkezések végrehajtása

8.12 A szerződő államok tegyenek eleget az Egészségügyi Világszervezet (WHO) *Nemzetközi Egészségügyi Szabályainak* (2005) érvényes kiadásában szereplő rendelkezéseknek.

8.13. Az említett szabályok 23. cikkelyével egyezésben, a szerződő államok legfeljebb azokat az intézkedéseket alkalmazhatják az utasok, személypoggyászaik, a rakomány és egyéb cikkek beléptetésénél, amelyek a szabályzatban megengedettek.

8.13 A szerződő államoknak minden lehetséges intézkedést meg kell tenniük, hogy rendelkezzenek oltókkal, akik alkalmazzák az Oltási vagy Kórmegelőzési Nemzetközi Tanúsítvány Modellt, összhangban a *Nemzetközi Egészségügyi Szabályok* (2005) 36. cikkelyével és 6. Annex-ével, biztosítandó az egységes jóváhagyást.

8.14 Minden egyes szerződő állam köteles megszervezni, hogy minden érdekelt légi-jármű üzembentartó és ügynökség számára biztosítsa, hogy utasainak lehetőség szerint utazásuk megkezdése előtt rendelkezésére álljon a cél-országok oltási követelményeiről szóló tájékoztató csakúgy, mint a *Nemzetközi Egészségügyi Szabályok* (2005) 36. cikkelyével és 6. Annex-szel összhangban álló Oltási vagy Kórmegelőzési Nemzetközi Tanúsítvány Modellről.

8.15 A légi-jármű parancsnoka köteles gondoskodni egy feltételezett fertőző betegség haladéktalan jelentéséről a légiforgalmi irányítás felé, hogy elősegítsék az érkezéskori közegészségügyi kockázatkezeléshez szükséges intézkedéstételt speciális egészségügyi szakszemélyzet és eszközök előállítására.

1. Megjegyzés – Fertőző betegség feltételezhető és további értékelést követel meg, amennyiben egy személy lázas (38°C illetve 100°F, vagy ennél magasabb a testhőmérséklete, amelyet bizonyos tünetek kísérnek, így például: nyilvánvalóan rosszul lévőnek látszik, állandóan köhög, gyengén lélegzik, állandó hasmenése van, bőrkiütései vannak, állandóan hány, horzsolásai vannak, illetve vérzik előzetes sérülés nélkül, zavart egy nem régi roham következtében

2. Megjegyzés – A légi-jármű fedélzetén feltételezett fertőző betegség felmerülése esetén a légi-jármű parancsnoka szükségszerűen követheti az üzembentartó rendtartását és irányelveit az indulási és érkezési ország egészségüggyel kapcsolatos jogszabályai kiegészítéseként. Utóbbiak a kialakított rend szerint megtalálhatók az érintett államok Légiforgalmi Tájékoztató Kiadványában (AIP.)

8.15.1 **Ajánlott gyakorlat. -** *Olyan esetekben, amikor beazonosítják a közegészségügyet fenyegető veszélyt, és az érintett államok közegészségügyi hatóságai igényt támasztanak az utasok és a személyzet utazási adatairól vagy kapcsolatairól tájékoztatásra annak érdekében, hogy a fertőző betegségnek esetlegesen kitett személyeket beazonosítsák, a szerződő állam fogadja el erre a célra egyedüli dokumentumként a 13. Függelékben bemutatott „Utas helymeghatározó kártya közegészségügyi célra" nyomtatványt.*

Megjegyzés – Javallott, hogy az államok az „Utas helymeghatározó kártya"-ból nemzetközi repülőtereiken és a légi-jármű üzembentartók felé történő elosztásra elegendő készlettel rendelkezzenek, hogy kitöltésre az utasok és a személyzet hozzáférjenek.

F. Nemzeti légi-közlekedési terv a fertőző betegségkitörés esetére

8.16 A szerződő állam köteles létrehozni egy nemzeti légi-közlekedési tervet, felkészülve a nemzetközi méretű közegészségügyi kockázatot vagy közegészségügyi kényszerhelyzetet felvető fertőző betegségkitörésre.

Megjegyzés – A nemzeti légi-közlekedési terv kialakítására vonatkozó útmutatás található az ICAO web lapján az „Aviation Medicine” oldalon.

G. Nemzeti alakiság egyszerűsítő programok létrehozása

8.17 Minden egyes szerződő államnak ki kell alakítania nemzeti alakiság egyszerűsítő programokat az Egyezmény és a 9. Annex követelményeinek megfelelően.

8.18 Minden egyes szerződő állam köteles biztosítani, hogy a nemzeti légi szállítási alakiság egyszerűsítő programjának célja az legyen, hogy elfogadjon minden hasznos intézkedést a légi-járművek, hajózószemélyzeti tagok, utasok, teheráru, posta küldemények és raktárkészletek mozgásának elősegítése érdekében, a szükségtelen akadályok és késlekedés megszüntetésével.

8.18.1 **Ajánlott gyakorlat**. - *Az államok a nemzeti polgári alakiság egyszerűsítési programjuk létrehozásakor használják a 12. Függelékben közölt útmutató anyagot.*

8.19 Minden egyes szerződő állam köteles létrehozni nemzeti légi-szállítási alakiság egyszerűsítő bizottságot és repülőtéri alakiság egyszerűsítő bizottságot vagy hasonló koordinációs testületet a kormányhivatalok, ügynökségek és más olyan érintett állami szervek közötti együttműködés elősegítése érdekében, amelyek illetékesek vagy felelősek a nemzetközi polgári repülés és hasonlóképpen a repülőterek és a légi-jármű üzemeltetők sokféle nézőpontja tekintetében.

8.20 **Ajánlott gyakorlat. -** *A szerződő állam törekedjen a polgári repülésvédelem és az alakiság egyszerűsítési programja közötti, körülményekhez igazított szoros koordináció megvalósítására. E célból, az Alakiság Egyszerűsítési Bizottság bizonyos tagjai egyben legyenek tagjai a Repülésvédelmi Bizottságnak is.*

8.21 **Ajánlott gyakorlat. -** *A nemzeti légi-szállítási alakiság egyszerűsítő bizottság és a repülőtéri alakiság egyszerűsítő bizottság létrehozásakor az állam használja fel a 11. és 12. Függelékben található útmutatást.*

H. - Különleges segítséget igénylő utasok szállításának elősegítése

I. Általános rész

8.22 **Ajánlott gyakorlat. -** *Csökkent képességű személyeknek – utazásukkor - megkülönböztetett segítségség nyújtása szükséges annak érdekében, hogy számukra is igénybe vehető legyen a nagyközönség számára általában nyújtott minden szolgáltatás. E segítség körébe tartozik a média útján közzétett - a felismerési vagy érzékszervi hiányossággal bíró utas számára - érthető tájékoztatás és útbaigazítás.*

8.23 **Ajánlott gyakorlat. -** *A szerződő államoknak arra való tekintettel is működjenek együtt, hogy minden szükséges lépést megtesznek, amellyel az utazás kezdetétől a végéig biztosítható, hogy a csökkent képességű személyek az utazásuk elejétől a végéig annak egymáshoz kapcsolódó összes láncszeméhez hozzáférnek.*

8.24 **Ajánlott gyakorlat. -** *A szerződő államok a légi-jármű üzemeltetőkkel, repülőterekkel és a földi kiszolgáló üzemeltetőkkel tegyék meg a szükséges lépéseket a csökkent képességű személyek szállítási szolgáltatásai tekintetében egységes hozzáférési minimum szabványok létrehozására, az indulási* *repülőtérre érkezéstől egészen a célrepülőtér elhagyásáig.*

8.25 **Ajánlott gyakorlat. -** *A szerződő államok a légi-jármű üzemeltetőkkel, a repülőterekkel, a földi kiszolgáló üzemeltetőkkel és az utazási ügynökségekkel együtt tegyék meg a szükséges lépéseket, hogy a csökkent képességű személyek a számukra fontos információkat megkapják. Gondoskodjon arról, hogy a légi-jármű üzemeltetők, a repülőterek, a földi kiszolgáló üzemeltetők és az utazási ügynökségek legyenek olyan helyzetben, hogy a csökkent képességű személyeknek utazásukhoz az igényüktől függő szükséges segítséget megadják.*

8.26 **Ajánlott gyakorlat. -** *A szerződő államok tegyenek meg minden szükséges lépést, amellyel kiképző programok létrehozása és összehangolása céljából biztosítható a légi-jármű üzemeltetők, a repülőterek és a földi kiszolgáló üzemeltetők együttműködése, amelynek révén elérhető, hogy kiképzett személyzet áll rendelkezésre a csökkent képességű személyek segítségére.*

II. A repülőtér megközelíthetősége

8.27 A szerződő államok kötelesek meghozni a szükséges intézkedéseket, amelyekkel biztosítható, hogy a repülőtéri létesítmények és szolgáltatások alkalmazkodjanak a csökkent képességű személyek igényeihez.

8.28 **Ajánlott gyakorlat. -** *A szerződő államok gondoskodjanak arról, hogy megfelelő emelő rendszer, vagy más alkalmas berendezés legyen biztosított érkezéskor és induláskor is ott, ahol utas-híd használatának hiányában ez szükséges az idősebb, vagy a csökkent képességű utasok légi-jármű és utas-terminál közötti közlekedésének segítésére.*

8.29 **Ajánlott gyakorlat. -** *Intézkedések megtételével biztosítsák, hogy a hallás- és látáskárosult személyek a repülési információkhoz hozzájuthassanak.*

8.30 **Ajánlott gyakorlat. -** *Az utas-terminál épületnél az odavitt vagy onnan elviendő idősebb és a csökkent képességű személyek részére a fenntartott helyeket a főbejárathoz lehető legközelebb kell kijelölni. A repülőtér különböző területei elérésének megkönnyítéséhez a megközelítési útvonalaknak akadálymenteseknek kell lenniük.*

8.31 **Ajánlott gyakorlat. -** *Ahol a közérdekű szolgáltatáshoz a hozzáférhetőség korlátozott, minden erőfeszítést tegyenek meg a mozgásukban segítségre szoruló személyek részére az elérhető és elfogadható áru földi szállítási szolgáltatás biztosítására, a meglévő és a tervezett nyilvános átszállító rendszer alkalmassá tételével vagy speciális szállító szolgáltatás biztosításával.*

8.32 **Ajánlott gyakorlat. -** *A mozgásukban segítségre szoruló személyek részére megfelelő parkolási létesítményt biztosítsanak, továbbá a parkoló épület és az utas-terminál közötti közlekedésük elősegítésére hozzanak megfelelő intézkedéseket.*

8.33 **Ajánlott gyakorlat. -** *Elsősorban az idősebb és a csökkent képességű személyek egyik légi-járműről egy másikra történő közvetlen átszállását, ahol szükséges és lehetséges, engedélyezni kell minden esetben, amikor ezt a csatlakozó járatok közötti időtartam vagy egyéb más körülmény megkívánja.*

III. A légi szolgáltatások hozzáférhetősége

8.34 A szerződő államok kötelesek a szükséges lépéseket megtenni, amelyekkel biztosítható, hogy a csökkent képességű személyek a légi szolgáltatásokhoz a kívánatos módon hozzáférhessenek.

8.35 **Ajánlott gyakorlat. -** *A szerződő államok léptessenek életbe rendelkezéseket, amelyek által az újonnan vagy nagyobb átalakítás után szolgálatba állított légi-járműveknek teljesíteniük kell a* *hozzáférésükre vonatkozó egységes minimum szabványt a légi-jármű fedélzeti berendezések tekintetében, amelyek körébe tartozik a felhajtható kartámasz, a fedélzeti tolószék, a mosdók, az alkalmas világítás és a jelzések.*

8.36 **Ajánlott gyakorlat. -** *A csökkent képességű személy számára szükséges kerekesszék, különleges készülék és felszerelés utas-kabinban történő szállítása legyen díjmentes, ha a légi-jármű üzemeltető nézete szerint az ilyen szállítást az elhelyezés és a biztonsági követelmények lehetővé teszik, vagy elsőbbséget élvező poggyásznak minősítik. A vonatkozó nemzeti, vagy légi-jármű üzemeltetői szabályzatok alkalmazásának függvényében ugyancsak díjmentesen szállítandó a csökkent képességű utas társaságában lévő szolgálatot ellátó állat.*

8.37 **Ajánlott gyakorlat. -** *Elviekben, a csökkent képességű személynek legyen megengedve a döntés, hogy igényt tart-e kísérőre és, hogy orvosi engedély iránti igény nélkül repül. Ha viszont segítség vagy emelés szükséges, akkor előzetes értesítés legyen kötelező. Csak olyan orvosi esetekben legyen megengedve a légi-jármű üzemeltetőnek orvosi engedélyt követelni a csökkent képességű utastól, amikor egyértelmű, hogy az illető állapota miatt saját vagy a többi utas biztonsága nem garantálható, vagy ha nem garantálható, hogy az illető jól fogja érezni magát. Továbbá, csak olyan esetekben legyen megengedve a légi-jármű üzemeltetőnek a csökkent képességű utashoz kísérőt követelni, amikor egyértelmű, hogy az illető magatehetetlen, és mint ilyen, nem garantálható a saját vagy a többi utas biztonsága, vagy ha nem garantálható, hogy az illető jól fogja érezni magát.*

8.38 **Ajánlott gyakorlat. -** *Arra az esetre, ha kísérő jelenléte szükséges, a szerződő államok a légi-jármű üzemeltetőt bátorítsák, hogy csökkentett díjtételű szállítást kínáljon az illető kísérő személy számára.*

I. Segítségnyújtás a légi-jármű baleset áldozatainak és családtagjaiknak

8.39 A légi-jármű baleset helyszínének állama és a szomszédos államok kötelesek úgy intézkedni, hogy elősegítsék a légi-jármű baleset áldozatai családtagjainak ideiglenes alapú belépését felségterületükre.

8.40 A légi-jármű balest helyszínének állama és a szomszédos államok kötelesek olyan intézkedéseket is tenni, amellyel elősegítik, hogy felségterületükre ideiglenes alapon beléphessenek a balesetet szenvedett légi-jármű üzemeltető vagy szövetséges partnere képviselői, hogy lehetővé tegyék számukra a segítségnyújtást a túlélőknek és családtagjaik, a baleset elhunyt áldozatai családtagjainak, és az állam illetékes hatóságainak.

Megjegyzés – A „code-sharing" és hasonló szövetségesi megállapodások néha szükségessé teszik, hogy a szövetséges partner, mint „első felelős" lépjen fel az érintett üzemeltető nevében, abban az esetben, amikor a szövetséges partner a baleset helyszínére előbb tud odaérni, mint az érintett üzemeltető.

8.41 **Ajánlott gyakorlat –** *A 8.39 pontban felsorolt személyek belépésének elintézésekor a baleset helyszínének állama és a szomszédos államok a kizárólagosan e személyek számára kiadott útlevélen vagy vészhelyzeti utazási dokumentumon kívül más utazási dokumentumot ne igényeljenek ahhoz, hogy ezen államokba beutazhassanak. Ha a 8.39 és 8.40 pontban felsorolt személyek számára a baleset helyszínének állama vagy egy szomszédos állam belépő vízumot igényel, gyorsítsa meg e vízumoknak a kiadását.*

8.42 A szerződő államok kötelesek szükség esetén a vészhelyzeti utazási dokumentumokat kiadni a balesetet túlélt állampolgárainak.

8.43. A szerződő államok kötelesek az összes szükséges segítségnyújtást kiterjeszteni, mint például az elszállítás és vámengedély elintézése tekintetében, az emberi maradványok hazatelepítésére a származási államba az áldozat családtagjainak vagy a balesetet szenvedett üzemeltetőnek a kérésére.

1. FÜGGELÉK - ÁLTALÁNOS NYILATKOZAT (GEN.DEC.)

ÁLTALÁNOS NYILATKOZAT
(indulási/érkezési)

Üzemeltető:……

Felség- és lajstromjel:……………………………………….. Járatszám:…………………Dátum:……………………...

Indulási helv:……………………………………… Érkezési helv:……………………………………………

A JÁRAT ÚTVONALA
(a „HELY” rovatban mindig felsorolandó: az első indulási, a közbeeső megálló és a rendeltetési hely)

HELY	**A SZEMÉLYZETI TAGOK NEVE***	**UTASOK SZÁMA EZEN A SZAKASZON****
		Indulási helyen: Beszállók:…………………………………… Ugyanazon járaton továbbutazók:……………………………….. *Érkezési helyen:* Kiszállók:…………………………………… Ugyanazon járaton tovább utazók:………………………………...

Egészségügyi nyilatkozat:*

A fedélzeten tartózkodó azon személyek neve, üléshelye vagy tartózkodási jogcíme, akik - légi-betegséget vagy egy baleset következményeit nem számítva,- fertőző betegségtől szenvedhetnek (láz 38°C illetve 100°F, vagy ennél magasabb testhőmérséklet, amelyet egy vagy több tünet kísér, mint például: nyilvánvalóan rosszul lévőnek látszik, állandóan köhög, gyengén lélegzik, állandó hasmenése van, bőrkiütései vannak, állandóan hány, horzsolásai vannak, illetve sérülés nélkül vérzik, zavart közeli roham következtében, amelyek növelik annak valószínűségét, hogy a személy fertőző betegségben szenved), hasonlóképpen a megelőző megálláskor a fedélzetről kivitt hasonló betegség eseteit…………………………………………………

………………………………………………. ………………………………

Repülés közben végzett minden rovar-mentesítés vagy higiéniai kezelés adatai (hely, dátum, idő, módszer). Ha repülés folyamán rovar-mentesítést nem végeztek, az azt megelőző legutóbbi rovar-mentesítés adatait kell megadni…..

……………………………………………………………………………..

Aláírás, ha megkövetelik, időpont és dátum____________________________

érintett személyzeti tag

Hivatalos feljegyzések

Kijelentem, hogy az Általános Nyilatkozatban és a vele együtt benyújtandó összes kiegészítő űrlapon tett valamennyi nyilatkozat és részlet legjobb tudásom szerint teljes, pontos és a valóságnak megfelel, továbbá, hogy minden tranzit utas folytatja / folytatni fogja útját a járaton.

ALÁÍRÁS____

Felhatalmazott ügynök vagy a légi-jármű parancsnoka

A dokumentum mérete 210mm x 297mm (vagy 8 ¼ x 11 ¾ inch legyen).
* akkor kell kitölteni, ha az állam megköveteli.
** Nem kell kitölteni, ha az „Utas bizonylat”-okat bemutatják, és csak akkor kell, ha az állam megköveteli.

← 210 mm (vagy 8 ¼ inch) →

11. FÜGGELÉK - A REPÜLŐTÉRI ALAKISÁG EGYSZERŰSÍTÉS

(FAL) MODELJE

1. A REPÜLŐTÉRI ALAKISÁG EGYSZERŰSÍTŐ PROGRAM CÉLJA

A repülőtéri alakiság egyszerűsítő program célja, hogy a 9. Annex célkitűzéseit kövesse üzemeltetési szinten, a légi-járművek, hajózószemélyzetek, utasok, és a teheráruk tekintetében a repülőtereken elősegítse a határ engedélyezési formalitások teljesítését.

2. A REPÜLŐTÉRI ALAKISÁG EGYSZERŰSÍTÉSI PROGRAM HATÓKÖRE

A repülőtéri alakiság egyszerűsítési program átöleli a 9. Annex valamennyi előírását, amely a repülőtéri határengedélyezési eljárásokra vonatkozik, de ezen eljárások megtervezését és irányítását is. Az alábbi táblázat reprezentatív felsorolást biztosít a teljesítendő feladatokról és az alkalmazandó szabványokról vagy ajánlott gyakorlatokról (SARP-ok).

Repülőtéri alakiság egyszerűsítő program feladata	*A 9. Annex (13. kiadás) szabványai vagy ajánlott gyakorlatai*
Alakítson ki, vizsgálja felül, és szükség szerint igazítsa ki adott repülőtéren a járatok belépésére és engedélyezésére vonatkozó eljárásokat	6.1.1, 8.16 szabvány
Rendszeresen vizsgálja felül valamennyi résztvevő teljesítését a tekintetben, hogy milyen mértékben tartják a belépő utasok kezelésére vonatkozó 45 perces és a kilépő utasok kezelésére vonatkozó 60 perces célkitűzést. A szükséges korrekció meghatározásához alkalmazzon időméréseket és sorbaállás elemzést.	3.36 és 3.39 ajánlott gyakorlat
Alakítson ki a határőrizeti és vámvizsgálat céljára korszerű rendszereket, felhasználva az alkalmazható technológiát. Az automatizált utas engedélyező rendszer felállításában működjön együtt.	3.40 , 3.51 és 6.26 szabvány
A növekvő forgalommal lépést tartva hajtsa végre a szükséges változtatásokat a repülőtéri forgalom áramoltatásban és az ellenőrző pontokon.	6.3 szabvány
Az utasok zavarának mérséklése érdekében a vizsgálati berendezéseknél javítsa a jelzések minőségét és mennyiségét.	6.9 és 6.12.1 ajánlott gyakorlat
A vizsgálati pontok munkaerő ügyeit – műszakbeosztások, túlmunkák stb. – vizsgálja felül és törekedjen a forgalom igényéhez igazodó korrekció megtételére.	6.3.1 ajánlott gyakorlat
Az ott székelő légi-jármű üzemeltetők és vizsgálati szervek nevében az új repülőterek tervezéséhez és új vizsgálati berendezésekhez adjon inputokat.	6.2 és 6.7 és 6.57 szabvány
Figyelje és javítsa a poggyász eljutását a vámvizsgálati területre.	6.28 szabvány
A pénzváltással összefüggő mindennemű szolgáltatási problémára hívja fel az illetékes hatóság figyelmét. Ajánlja az érkező területeken az ATM-ek telepítését.	6.63, 6.64 és 6.65 szabvány
Úgy koordinálja az alakiság egyszerűsítési, kábítószer ellenőrzési, légi-közlekedés védelmi	8.19 szabvány

és veszélyes áru kezelési eljárásokat, hogy mind a négy program célkitűzései teljesüljenek.	
Ne feledkezzen el a teheráruról! Koordinálja a különféle vizsgálati szervek tevékenységét és elvárásait úgy, hogy a légi teheráru szállítmányok azonnali engedélyezése és elszállítása biztosítva legyen. Gondoskodjon arról, hogy a vámengedélyre várakozás közben a teheráru ki- és berakodására és biztonságos tárolására alkalmas eszközök álljanak rendelkezésre.	4.25 szabvány és 4.28, 4.29, 6.38és 6.50 ajánlott gyakorlat
Állítson fel és működtessen elektronikus rendszereket a teheráru bizonylatolására, vámengedélyezésére és feladására.	4.15 és 4.4 szabvány

3. SZERVEZET ÉS VEZETÉS

3.1 Üzemelői szinten az alakiság egyszerűsítő program vezetésére szolgáló ajánlott eszköz a Repülőtéri Alakiság Egyszerűsítési Bizottság. Bár e bizottságok bátorítása, és a problémáikról, haladásukról való tájékoztatása szükséges a Nemzeti Alakiság Egyszerűsítési Bizottság részéről, de nem feltétlenül taroznak a nemzeti testület felügyelete alá. Legfőbb érdekük a napi problémák megoldása és a 9. Annex teljesítése.

3.2. Ajánlott, hogy a repülőtér igazgatója vezesse a bizottságot és tartson rendszeres megbeszéléseket. A tagok között kapjanak helyet a repülőtéri vizsgálati szervek – mint például a vámhatóság, a határőrség, a közegészségügy - felelős vezető tisztségviselői ugyanúgy, mint a nemzetközi forgalomban részt vevő légi-jármű üzemeltetők azon a repülőtéren tevékenykedő állomásvezetői. Mindegyik fél részvétele fontos ahhoz, hogy a repülőtéri alakiság egyszerűsítési program sikeres legyen.

A Chicago-i Egyezmény megbízása	*Alkalmazási feladatok*
10. Cikkely – *Leszállás vámköteles repülőtéren* …a szerződő állam felségterületére belépő mindegyik légi-jármű köteles - amennyiben az állam rendelkezései így kívánják meg – leszállni az állam által kijelölt repülőtéren vámellenőrzés és egyéb vizsgálatok céljából. A szerződő állam felségterületéről történő elinduláskor az ilyen légi-jármű köteles egy hasonlóan kijelölt vámköteles repülőtérről ezt megenni.	- Vámköteles repülőterek létesítése és ennek megfelelő újak nyitása - Olyan eljárások kidolgozása, amelyek révén a menetrendszerinti és nem menetrendszerinti üzemeltetők engedélyt kérhetnek a vámköteles repülőtereken való leszállásra és onnan való elindulásra. - A vámköteles repülőtéren a határ-ellenőrzési szolgálatok megszervezése.
13. Cikkely – *Belépési és engedélyeztetési rendelkezések* A szerződő állam azon törvényei és rendeletei, amelyek a légi-járművek utasainak, hajózószemélyzeteinek és teherárujának felségterületére történő be- és kiléptetésére vonatkoznak, mint például a belépési, engedélyezési, határőrizeti, útlevél, vám és karantén rendelkezések, az ilyen utasok, hajószemélyzetek által vagy a teheráruk tekintetében betartandók az államba történő belépéskor és abból való kilépéskor és felségterületén tartózkodás során.	- Az érdekelt határőrizeti ügynökségek támogatása, a repülőtereken hatékony vizsgálati rendszerek létrehozatalára és fenntartására, és a vonatkozó eljárásaik ésszerűsítésére tett erőfeszítéseik tekintetében. - Programok kidolgozása a védelmi problémák kezelésére, így például a dokumentumhamisításra, az illegális bevándorlásra és a csempészésre. - Különleges eseményekkor, mint például nemzetközi atlétikai verseny esetében, a nagy számú nemzetközi látogató engedélyezési előkészületeinek

	koordinálása.
14. Cikkely – *a fertőzés terjedésének megelőzése* Minden egyes szerződő állam egyetért azzal, hogy hatékony lépéseket tesz annak megelőzésére, hogy a légi-közlekedés útján ne terjedjen a kolera, a tífusz (járványos), a fekete himlő, pestis és ehhez hasonló más, fertőzés útján terjedő betegség, miután a szerződő államok időről időre kötelesek kijelölni…	- A légi úton terjedő fertőző betegségek megelőzésére vonatkozó nemzeti irányelvek kialakítása, felülvizsgálata és szükség szerinti módosítása, így például a légi-jármű rovarmentesítése és fertőtlenítése, a közegészségügyhöz tartozó karantén programok és egy egészségügyi vészhelyzetben alkalmazandó védelmi intézkedések.
22. Cikkely – *a formalitások egyszerűsítése* Minden egyes szerződő állam egyetért abban, hogy speciális rendeletek kiadása útján vagy más módon minden hasznos lépést megtesz, hogy elősegítse és meggyorsítsa a légi-járművek navigációját a szerződő államok felségterületei között és, hogy megelőzi a légi-járművek, hajózó személyzetek, utasok és teheráruk szükségtelen késleltetését, különösen a bevándorlásra, a karanténozásra, a vámolásra és az engedély megadásra vonatkozó törvények meghozatalakor.	- A légi úton történő nemzetközi mozgásokra vonatkozó állami vám-, határőrizeti- és karantén törvényeket alkalmazó nemzeti rendelkezéseknek a létrehozása, felülvizsgálata és szükség szerinti módosítása.
23. Cikkely – *vám- és határőrizeti eljárások* Minden egyes szerződő állam, amennyire hasznosnak tartja, megvalósítja a nemzetközi légi-fuvarozásra ható vám- és határőrizeti eljárások létesítését, azokkal a gyakorlatokkal összefüggésben, amelyek ezen egyezmény alapján időről időre létrehozhatók vagy ajánlottak.	- A 9. Annex-ben lefektetett szabványokkal és ajánlott gyakorlatokkal való harmonizáláshoz a repülőtereken teljesítendő vám- és határőrizeti eljárások létrehozása és megfelelő módosítása - A Doc 9303 – *„Gépi Feldolgozású Utazási Dokumentumok”-ban* levő ICAO specifikációnak megfelelően támogatja és pártolja az útlevelek és más utazási dokumentumok nemzeti kiadását.
37. Cikkely – *a nemzetközi szabványok és eljárások bevezetése* Minden egyes szerződő állam vállalja, hogy együttműködik mindazon rendelkezések, szabványok, eljárások és szervezetek lehető legnagyobb mértékű egységesítésének biztosításában, amelyek a légi-járművekre, a személyzetekre, a légi folyosókra és a kisegítő szolgáltatásokra vonatkoznak minden olyan esetben, amikor az ilyen egységesítések egyszerűsítik és javítják a légi-közlekedést. … (j) Vám- és határőrizeti eljárások…	- A 9. Annex ICAO általi fejlesztésében való részvétel - A nemzeti eljárások rendszeres időközönkénti felülvizsgálata annak érdekében, hogy a 9. Annex előírásaival való összhang biztosított legyen.
38. Cikkely – *kiindulás a nemzetközi szabványokból és eljárásokból* Bármely állam, amelyik nem találja célravezetőnek azt, hogy bármely ilyen nemzetközi szabványt vagy eljárást kövessen, vagy teljes összhangba hozza a saját rendeleteit és gyakorlatait a nemzetközi szabványokkal és eljárásokkal az utóbbi módosítását követően, vagy szükségesnek tartja olyan rendelkezések és gyakorlatok elfogadását, amelyek bármely sajátos tekintetben eltérnek egy nemzetközi szabvány által meghatározottaktól, köteles haladéktalanul értesíteni a Nemzetközi Polgári Légi-közlekedési Szervezetet a	- Rendszeres időközönként annak áttekintése, hogy valamennyi ide tartozó szerv tartja-e magát a 9. Annex előírásaihoz, és az ICAO értesítése a nemzeti gyakorlat és a vonatkozó szabványok közötti eltérésekről.

saját gyakorlata és a nemzetközi szabványban megállapítottak közötti eltérésről.

13. FÜGGELÉK – UTAS HELYMEGHATÁROZÓ KÁRTYA KÖZEGÉSZSÉGÜGYI CÉLRA

UTAS HELYMEGHATÁROZÓ KÁRTYA KÖZEGÉSZSÉGÜGYI CÉLRA

A Utas helymeghatározó kártya közegészségügyi célra kitöltendő, ha a közegészségügyi hatóság fertőző betegségre gyanakszik. Az Ön által nyújtott tájékoztatás segíti a közegészségügyi hatóságot abban, hogy a közegészségügyi eseményt ellenőrzés alatt tartsa azáltal, hogy a fertőző betegségnek esetlegesen kitett utasokat be tudja azonosítani. A tájékoztatást a közegészségügyi hatóság a vonatkozó törvények szerint kezeli, és kizárólag közegészségügyi célokra használja fel.

A repülés adatai

1. Légitársaság és járatszám *2. Érkezés ideje* *3. Az Ön tényleges ülőhelye a repülőgépen*

_ _

Légitársaság Járatszám nap hónap év

Személyi adatok

4. Név

_ _

Családnév Utónév

Jelenlegi lakhelye (ország név is)

_ _

Utcanév Város Megye/Tartomány

_ - _ _ _

Ország Irányítószám

Elérhetőség telefonon (lakóhelyi, munkahelyi, mobil)

_ _

Ország kód Körzetszám Telefonszám E-mail cím

_ _

Útlevél vagy más úti-okmány száma Kiadó ország vagy szervezet

Kapcsolat felvételi adatok

5. Tartózkodási helyének címe és telefonszáma, ahol elérhető, vagy ha több helyet látogat meg, akkor a mobil-száma és az első tartózkodási helye.

_ _

Utcanév Város Megye/Tartomány

_ - _

Ország Irányítószám Telefonszám (ország kóddal) vagy mobiltelefon szám

6. Azon személy elérhetőségi adatai, aki a következő 31 napban a legjobban tudja, hogy Ön merre tartózkodik - veszély esetére vagy hogy ellássa Önt a kritikus egészségügyi információval. Közeli családtagot vagy munkatársat nevezzen meg. Ön NEM lehet!

a. Név

_ _

Családnév Utónév

b. Telefonszám

_ _

Ország kód Körzetszám Telefonszám E-mail cím

c. Cím

_ - _ _ _

Ország Irányítószám

7. Együtt utazik valakivel? IGEN/NEM (Karikázza be a helytálló választ!) Ha igen, kivel? (Az egyén vagy csoport neve.)

_ _
_ _

- VÉGE -

ANNEX 10/I.
Légiforgalmi távközlés: Rádiónavigációs segédeszközök

I. kötet 6. kiadás – 2006. július
82. módosítással
A NEMZETKÖZI POLGÁRI REPÜLÉSI EGYEZMÉNYHEZ
AZ I. KÖTET HATODIK KIADÁSA – 2006. JÚLIUS
NEMZETKÖZI POLGÁRI REPÜLÉSI SZERVEZET
Az Annex 10 I. Kötet Módosításainak ellenőrző jegyzéke

	A hatályba lépés dátuma	Az alkalmazhatóság dátuma
Hatodik Kiadás (magába foglalja az 1.-től a 81.-ig terjedő módosításokat)	2006. júl.17.	2006. nov.23.
82. Módosítás A Tanács 2007. febr. 26-án fogadta el	2006. júl. 16.	2007. nov. 22.
Cserelapok (xviii) C-109, ATT C-73, ATT C-75 és ATT C-76	2007. júl.16.	2007. nov.22.

82. Módosítás a Légiforgalmi Távközlés nemzetközi szabványok és ajánlott eljárásokban (Annex 10. I. Kötet, Nemzetközi Polgári Repülési Egyezmény

1. Az alábbi cserelapok helyezendők az Annex 10 I. Kötetébe (hatodik kiadás) a 82. sz. Módosításként, amely 2007. november 22-től alkalmazandó:

a) (xviii) oldal – Előszó

b) 3-109 oldal - 3. Fejezet

c) ATT C-73, ATT C-75, ATT C-76 oldalak – C Melléklet

2. Ezt a módosítást a (ii) oldalon kell bejegyezni

Módosítás	*Forrás (ok)*	*Tárgy*	*Elfogadva Hatályos Alkalmazható*
70	ANC; az Állandó Településű Repülési Szolgálati Rendszerek Adatcsere Bizottságának 3. ülése; a 34. Európai légi navigációs tervező csoport értekezlete	Az Annex 10 átdolgozása és 5 kötetbe foglalása, elavult anyagok és útmutatások törlése, a kézi morze kódos eljárások és telexgépes rendszerek megszüntetése; anyagok felvétele az ICAO közös adatcsere hálózatára (CIDIN)	1995. márc. 20 1995. júl.24. 1995. nov.9.
71	ANC speciális COM/OPS szekció ülése (1995); a 12. 13. és 14. számú AWOP. Meteorológiai Bizottsági ülés; titkársági javaslat az elavult anyagok selejtezésére	A SARPs-ok (ajánlott gyakorlati eljárások) végső formába öntése és útmutató anyagok a mikrohullámú leszállító rendszerhez (MLS), új stratégiai a nem látáson alapuló bevezetési és leszállítási berendezések elfogadása az ILS/MLS átmeneti tervek helyett; anyagok áthelyezése a III. IV és V. kötetbe való megfelelő áthelyezése, elavult specifikációk törlése a Consol és Loran-A rendszerekhez, tájékoztató anyagok a berendezések használatára, kutatás, fejlesztés és kiértékelés	1996. márc. 12. 1996. júl.15. 1996. nov.7.
72	-----	Változtatás nélkül	
73	Léginavigációs Bizottság	Az Emberi Tényező anyag bemutatása	1998. márc. 19. 1998. júl.20. 1998. nov.5.
74	AWOP Meteorológiai Bizottság l6. ülése; Léginavigációs Bizottság	Az alábbiak bemutatása: a) RNP (előírt navigációs pontosság) bevezetési, leszállítási és indulási műveleteknél; b) ILS műszeres leszállító rendszer és az MLS mikrohullámú leszállító rendszer specifikációk frissítése, és c) kapcsolódó tájékoztató anyagok	1999. márc. 18. 1998. júl.19. 1999. nov.4.
75	-	változtatás nélkül	
76	A GNSS Bizottság 3. ülése; az Egyesült Királyság javaslata az	A Világméretű műholdas navigációs rendszer (GNSS); a szolgáltatási követelmények folyamatossága ILS és	2001. márc. 12. 2001. júl.16.

	ILS és MLS szolgáltatási követelmények folyamatosságáról	MLS rendszerekre III. A osztályú műveleteknél; az ITU nemzetközi távközlési referenciák frissítése.	2001. nov.1.
77	GNSSP Bizottság	A GLONASS-al kapcsolatos műszaki specifikációk beépítése a műholdas kiterjesztő rendszerekbe (SBAS) és a GNSS követelmények beépítése a földfelszíni kiterjesztő rendszerekbe (GBAS); rendelkezések a GBAS szolgáltatásra az előírt navigációs pontosság beállítására (RNAV) műveleteknél; rendelkezések az új Message Type 28 használatára az SBAS teljesítményének fokozására; és további tájékoztató anyagok beépítése, valamint pontosítások/szerkesztői javítások a SARPs-hoz és egyéb útmutatás.	2002. febr. 27. 2002. júl.15. 2002. nov.28.
78	-	Változtatás nélkül	
79	A GNSS Bizottság 4. ülése	Változások a GNSS szabványokban és az ajánlott gyakorlati eljárásokban (SARPs) és a vonatkozó tájékoztató anyagokban a precíziós függőleges vezetésű megközelítés (APV) teljesítmény specifikációkkal kapcsolatban; világméretű helymeghatározó rendszer (GPS), korlátozott hozzáférés (SA), a jelerősség szintjének megszakadása; specifikációk a korszerűsített világméretű műholdas navigációs rendszerhez (GLONASS-M); frekvenciatervezési kritériumok földfelszíni kiterjesztő rendszerekhez (GBAS) és számos egyéb kiterjesztések	2004. febr. 23. 2004. júl.12. 2004. nov.25.
80	11. Léginavigáció Konferencia	Nem-vizuális berendezések bevezetési és leszállító alkalmazási stratégiáinak frissítése	2005. febr. 25. 2005. júl.11. 2004. nov.24.
81	Navigációs Rendszerek Bizottság (NSP)	a) földfelszíni regionális kiterjesztő rendszer (GRAS) szabványok és Ajánlott Eljárások (SARPs)	2006. febr. 24. 2006. júl.11.

82	Légiforgalmi Távközlési Bizottság (ACP)	b) módosítások a SARPs-hoz az ILS műszeres szeszállító rendszerhez, távolságmérő berendezéshez (DME) és mikrohullámú leszállító rendszerhez (MLS) UAT adó-vevő működési frekvencia meghatározása. * semmilyen szabványt vagy ajánlott eljárást nem befolyásol	2006. nov.23. 2007. febr. 26. 2007. júl.16. 2007. nov.22.

Csatornapárosítás				DME paraméterek					
				Kérdező				Válasz	
				Frekvencia MHZ	Impulzus kódok			Frekvencia MHZ	Impulzus kódok µs
					DME/N µs	DME/P mód			
DME csatorna szám	VHF frekvencia MHZ	MLS szög frekv. MHz	MLS csatorna szám			Kezdeti megk. µs	Végső megköz. µs		
120X	117.30	-	-	1 144	12	-	-	1 207	12
120Y	117.35	-	-	1 144	36	-	-	1 081	30
121X	117.40	-	-	1 145	12	-	-	1 208	12
121Y	117.45	-	-	1 145	36	-	-	1 082	30
122X	117.50	-	-	1 146	12	-	-	1 209	12
122Y	117.55	-	-	1 146	36	-	-	1 083	30
123X	117.60	-	-	1 147	12	-	-	1 210	12
123Y	117.65	-	-	1 147	36	-	-	1 084	30
124X	117.70	-	-	1 148	12	-	-	1 211	12
**124Y	117.75	-	-	1 148	36	-	-	1 085	30
125X	117.80	-	-	1 149	12	-	-	1 212	12
**125Y	117.85	-	-	1 149	36	-	-	1 086	30

126X	117.90	-	-	1 150	12	-	-	1 213	12
**126 Y	117.95	-	-	1 150	36	-	-	1 087	30
-	-	-	-	-	-	-	-	-	-

* Ezek a csatornák kizárólag nemzeti kiosztásra vannak fenntartva.

** Ezeket a csatornákat másodlagos alapon lehet nemzeti kiosztásra felhasználni. Ezen csatornák tartalékolásának elsődleges oka az, hogy védelmet biztosítsunk a másodlagos légtérellenőrző radar (SSR) rendszerek részére.

A 108,0 MHz-nek ILS szolgáltatási frekvenciaként való kijelölése nem tervezett. A hozzá kapcsolódó DME a 17X sz. üzemeltetési csatornát kényszerhelyzeti alkalmazásra lehet kijelölni. A 17X csatorna válaszfrekvenciáját (978 MHz) az UAT is használja. Az UAT szabványok és ajánlott eljárások az Annex 10, III. kötet, I. rész, 12 fejezetében találhatók.

B-táblázat: A megengedhető DME/P hibák

Hely	Szabv.	Mód	Útvonal-követési hiba (PFE)	Kormányzási elmozdulási zaj (CMN)
Az MLS megközelítési vonatkoztatási ponttól 37 km-től (20 tmf) 9,3 km-ig (5 tmf)	1 és 2	IA Kezdeti megköz.	250 m (820 láb) lineárisan csökkenően 85 m (279 láb)	68 m (223 láb) lineárisan csökkenően 34 m (111 láb)
A 9,3 km-től (5 tmf) az MLS megközelítési vonatkoztatási pontig	1	FA Végső megköz.	85 m (279 láb) lineárisan csökkenően 30 m (100 láb)	18 m (60 láb)
2	FA Végső megköz.	85 m (279 láb) lineárisan csökkenően 12 m (40 láb)	12 m (40 láb)	
Lásd a Megj.-t	IA Kezdeti megköz.	100 m (328 láb)	68 m (223 láb)	
Az MLS megközelítési vonatkoztatási pontnál és a teljes fedésterületen	1	FA Végső megköz.	30 m (100 láb)	18 m (60 láb)
2	FA Végső megköz.	12 m (40 láb)	12 m (40 láb)	
A hátsó irányszektor teljes fedésterületi légterében	1 és 2	FA Végső megköz.	100 m (328 láb)	68 m (223 láb)
Lásd a Megj.-t	IA Kezdeti megköz.	100 m (328 láb)	68 m (223 láb)	

Megjegyzés. - A 9,3 km-es (5 tmf) távolságból az MLS megközelítési vonatkoztatási pontig és a hátsó irányszektor teljes fedésterületén a kezdeti megközelítési (IA) módot lehet használni akkor, amikor a végső megközelítési (FA) mód nem üzemel.

7. 1. 13. Az UAT-vel kapcsolatos tényezők
7. 1. 13. 1. A frekvencia tervezési kritériumok a DME és az UAT közötti kompatibilitás biztosítása végett az UAT kézikönyv II. Kötetében található (Doc. 9861: előkészítés alatt)

7. 2 a csak a DME / N berendezésre vonatkozó útmutató anyag

7. 2. 1 *a DME / N berendezések kisugárzott teljesítménye (ERP)*

7. 2. 1. 1 a 3. Fejezet 3. 5. 4. 1. 5. 1 pontjában előírt teljesítmény-sűrűség a következő alapfeltételeken alapszik:

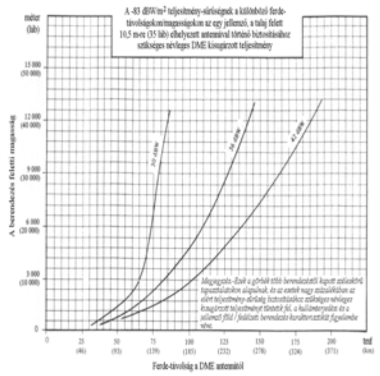
Légijármű fedélzeti vevő érzékenység	-112 dBW
Légijármű fedélzeti tápvonal veszteség	+3 dB
Légijármű fedélzeti sugárzási diagram veszteség egy izotróp antennához viszonyítva	+4 dB
Az antennánál szükséges teljesítmény	-105 dBW

Az antennánál a mínusz 105 dBW mínusz 83 dBW/m^2-nek felel meg a közepes átviteli frekvenciánál.
Megjegyzés. - Az egy izotróp antennára vonatkozó teljesítmény-sűrűséget a következő módon lehet kiszámítani:

$$P_d = P_a - 10 \log \frac{\lambda^2}{4\pi}$$

ahol: P_d *= a teljesítmény-sűrűség dBW/m*^{2}*-ben;*
P_a *= a teljesítmény a vételi pontnál dBW-ban;*

λ *= a hullámhossz méterben.*
7. 2. 1. 2 A mínusz 83 dBW/m^2 teljesítmény-sűrűség eléréséhez szükséges kisugárzott teljesítmény névleges értékei a C-20. számú ábrán kerültek megadásra. A nehéz terepviszonyok, és telepítési körülmények melletti fedésterületre szükséges lehet az, hogy a kisugárzott teljesítményt megfelelően növeljék. Ellenkező esetben kedvező telepítési körülmények esetén a megállapított teljesítmény-sűrűséget kisebb kisugárzott teljesítménnyel is el lehet érni.
7.2.1.3 A C-20. sz. ábra alkalmazását a következő példák mutatják be. Azért, hogy a szükséges névleges teljesítmény-sűrűség elérésre kerüljön a 342 km-es ferdetávolságnál (185 tmf) a 12 000 m (40 000 láb) magasságon és a 263 km-es (142 tmf) ferdetávolságnál a 12 000 m (40 000 láb) magasságon, illetve a 135 km-es (73 tmf) ferdetávolságnál a 6 000 m-es (20 000 láb) magasságon külön-külön plusz 42 dBW, plusz 36 dBW, illetve plusz 30 dBW kisugárzott teljesítményre lesz szükség.



C-20. ábra

7. 3 A csak a DME / P berendezésre vonatkozó útmutató anyag

7. 3. 1 *A DME / P berendezés rendszer leírása*

7. 3. 1. 1 A DME / P berendezés a 3. Fejezet 3. 11 pontjában leírt mikrohullámú leszállító rendszer szerves része. A DME / P jel formátum két üzemelési módot határoz meg, a kezdeti megközelítési (IA) és a végső megközelítési (FA) módot. A kezdeti megközelítési mód kompatibilis és együtt működtethető a DME / N-el és arra a célra tervezett, hogy javított pontosságot biztosítson a megközelítés és a leszállás kezdeti szakaszaiban. A végső megközelítési mód lényegesen nagyobb pontosságot biztosít a végső megközelítési területen. Mindkét üzemmód egy egyedüli DME / P földi berendezésben van egyesítve, és a rendszer jellemzője olyan, hogy a DME / N és a DME / P funkcióit össze lehet kapcsolni egy egyedüli kérdező adó-vevőben. A kezdeti megközelítési és a végső megközelítési módok a 3. Fejezet 3. 5. 4. 4 pontjában meghatározott impulzus kódokkal kerülnek azonosításra. Az MLS megközelítési szektorában a DME / P berendezés fedésterületének legalább 41 km-nek (22 tmf) kell lenni a földi válaszadótól mérve. Az a cél, hogy a kérdező adó-vevő ne működjön a válaszadó telepítési helyétől mért 13 km-nél (7 tmf) nagyobb távolságban végső megközelítési üzemmódban, jóllehet, a kezdeti megközelítési módról való átállás a válaszadótól mért 15 km-nél (8 tmf) kezdődhet meg. Ezek a számok azon az előfeltételen alapulóan kerültek kiválasztásra, hogy a válaszadó a futópálya megállási végén túl, a futópálya küszöbétől körülbelül 3 600 m (2 tmf) távolságra van telepítve.

7. 3. 1. 2 A megközelítési és leszállási műveletek végső szakaszaiban előforduló pontosság csökkenés nagyobb lehetséges okozója a többutas (jel-visszaverődéses) interferencia. A DME / P berendezés végső megközelítési módja minimálisra csökkenti ezeket a hatásokat úgy, hogy olyan szélessávú impulzus jelfeldolgozást alkalmaz, amelynél gyors az impulzus-felfutás felfutási ideje és a beérkezési időt a vett impulzusok egy olyan alacsony pontján méri, ahol még nincs a több-utas terjedés miatt jelentős jel-romlás. Ezzel szemben egy alacsonyabb impulzus felfutási időt és egy magasabb, az 50 százalékos jelszintnél bekövetkező küszöbértéket alkalmaznak a DME / N berendezésekben.

7. 3. 1. 3 Mivel a végső megközelítési mód a 13 km-nél (7 tmf) kisebb távolságban kerül alkalmazásra, az adó megfelelő jelszintet tud biztosítani ahhoz, hogy a szükséges pontosságot anélkül kielégítse, hogy a gyors impulzus felfutási idő rontaná a válaszadó impulzus spektrum követelményeit. Az 50 százalékos küszöbérték és a keskenyebb vevő sávszélesség alkalmazása a kezdeti megközelítési módnál lehetővé tesz egy kielégítő, de kisebb követelményű teljesítményt a fedésterületi határvonalakig. A válaszadó határozza meg a lekérdezési módot egy lekérdező kódnak az olyan felhasználásával, ami időzíti a válasz késését a megfelelő mérési referenciától. A kezdeti megközelítési mód együttműködő-képes a DME / N berendezéssel és lehetővé teszi azt, hogy egy DME / N kérdező adó-vevő kerüljön a DME / P válaszadóval együtt felhasználásra úgy, hogy legalább elérje a DME / N válaszadó pontosságát.

Hasonlóképpen a DME / P kérdező adó-vevőt fel lehet használni a DME / N válaszadóval együtt.

7. 3. 2 *A DME / P berendezés rendszer* pontossági követelményei

7. 3. 2. 1 *A DME / P berendezés pontossági követelményei*

7. 3. 2. 1. 1 Amikor a DME / P berendezés pontossági követelményeit mérlegelik, akkor azok az üzemeltetések, amelyeket a végső megközelítési mód szolgálati hatótávolságában végre lehet hajtani, két csoport valamelyikébe sorolhatók. Ez vezetett arra, hogy két pontossági szabvány került meghatározásra a végső megközelítési módra:

a) *1. pontossági szabvány:* ez a kisebb követelményű és a legtöbb hagyományos fel- és leszállású (CTOL) üzemeltetés kiszolgálására tervezett pontosság;

b) *2. pontossági szabvány:* ez megnövelt pontosságot ad, és ez lehet a függőleges fel- és leszállású (VTOL), valamint a rövid fel- és leszállású (STOL) üzemeltetésekhez, valamint az MLS kilebegtetési magassági vezérlést felhasználó hagyományos fel- és leszállású üzemeltetések kilebegtetési manővereihez és a hagyományos fel- és leszállású üzemeltetések nagysebességű futópálya elhagyási manővereihez szükséges.

7. 3. 2. 1. 2 A C-5. táblázat mutatja be a DME és a jellemző pontossági követelmények alkalmazását. Ez segítséget fog nyújtani a megfelelő pontossági szabvány kiválasztásához úgy, hogy azok megfeleljenek az üzemeltetési követelményeknek. A számítások a DME antenna és a futópálya küszöb közötti 1768 méteres (5 800 láb) távolságon alapulnak. A következő pontok a C-5. táblázatra vonatkoznak.

7. 3. 2. 1. 3 Az a cél, hogy a DME / P pontossága körülbelül feleljen meg az oldalszög funkció útvonal-követési hiba (PFE) értékének az MLS vonatkozási ponttól mért 37 km-es (20 tmf) távolságnál, mind a meghosszabbított középvonal mentén, mind a 40 fokos oldalszög értékeknél. Ugyanígy a DME / N berendezés hibája az MLS fedésterületének határvonalainál egyezzen meg a 3. Fejezet 3. 5. 3. 1. 3. 3 pontja rendszer pontossági 0, 37 km-es (0, 2 tmf) értékével. A kormányzási elmozdulási zaj (CMN) a plusz vagy mínusz 0, 1 fok kormányzási elmozdulási érték lineáris megfelelője legyen, ahogy az az oldalszög útirány-vezetési szög funkcióra meghatározásra került.

7. 3. 2. 1. 4 Az útvonal-követési hiba (PFE) az oldalszög szöghibának felel meg, a kormányzási elmozdulás zaj (CMN) körülbelül az oldalszög útirány-vezetési szög rendszerre meghatározott 0, 1 fok kormányzási elmozdulási zaj (CMN) lineáris megfelelője.

7. 3. 2. 1. 5 A plusz vagy mínusz 30 méteres útvonal-követési hiba (PFE) plusz vagy mínusz 1, 5 méteres függőleges hibának felel meg egy 3 fokos magassági szögnél.

7. 3. 2. 1. 6 A kilebegtetés megkezdése az MLS megközelítési vonatkozási pont közelében történik, az MLS magassági szöge és a DME / P biztosítja a függőleges útirány-vezetést az automatikus leszálláshoz akkor, amikor a futópálya küszöbe alatti terepfelszín egyenetlen.

7. 3.2. 1. 7 Az érzékenység módosulása vagy a robotpilóta erősítés szabályozására vonatkozó körülmények nem függnek közvetlenül a pontosságtól.

C-5. táblázat

Funkció	Jellemző távolság a küszöbtől	Útvonal-követési hiba (95 %-os valószínűség)	Kormányzási elmozdulási zaj
Megközelítés (7. 3.2. 1. 3)			
— a futópálya meghosszabbított középvonalán	37 km (20 tmf)	±250 m (820 láb)	±68 m (±223 láb)
— a 40°-os oldalszögnél	37 km (20 tmf)	±375 m (±1 230 láb)	±68 m (±223 láb)
Megközelítés (7. 3. 2. 1. 4)			
— a futópálya meghosszabbított középvonalán	9 km (5 tmf)	±85 m (±279 láb)	±34 m (±111 láb)
— a 40°-os oldalszögnél	9 km (5 tmf)	±127 m (±417 láb)	±34 m (±111 láb)
Helyjeladó helyettesítés			
— külső helyjeladó	9 km (5 tmf)	±800 m (±2 625 láb)	nem alkalmazható
— középső helyjeladó	1 060 m (0,57 tmf)	±400 m (±1 312 láb)	nem alkalmazható
A 30 méteres elhatározási magasság meghatározása (100 láb) (7. 3. 2. 1. 5)			
— 3°-os siklópálya (hagyományos fel- és leszállás)	556 m (0, 3 tmf)	±30 m (±100 láb)	nem alkalmazható
— 6°-os siklópálya (rövid fel- és leszállás)	556 m (0, 3 tmf)	±15 m (±50 láb)	nem alkalmazható
A kilebegtetés megkezdése egyenetlen terep felett (7. 3. 2. 1. 6)			
— 3°-os siklópálya (hagyományos fel- és leszállás)	0	±30 m (±100 láb)	±18 m (±60 láb)
— 6°-os siklópálya (rövid fel- és leszállás)	0	±12 m (±40 láb)	±12 m (±40 láb)
Érzékenység módosulás (7. 3. 2. 1. 7)			
(robotpilóta erősítés szabályozása)	37 km-től (20 tmf) 0-ig	±250 m (±820 láb)	nem alkalmazható
Kilebegtetési manőver MLS kilebegtetési magassággal (7. 3. 2. 1. 8)			
— Hagyományos fel- és leszállás	0	±30 m (±100 láb)	±12 m (±40 láb)

— Rövid fel- és leszállás	0	±12 m (±40 láb)	±12 m (±40 láb)
Hosszú kilebegtetési riasztás (7. 3. 2. 1. 9)	A futópálya körzete	±30 m (±100 láb)	nem alkalmazható
Hagyományos fel- és leszállás nagysebességű leszállás utáni kifutás / futópálya elhagyás (7. 3. 2. 1. 10)	A futópálya körzete	±12 m (±40 láb)	±30 m (±100 láb)
Felszállási emelkedés és megszakított megközelítés	0-tól 9 km-ig (5 tmf)	±100 m (±328 láb)	±68 m (±223 láb)
Függőleges fel- és leszállású megközelítések (7. 3. 2. 1. 11)	925 m-től (0, 5 tmf) 0-ig	±12 m (±40 láb)	±12 m (±40 láb)
Koordináta "áttétel" (7. 3. 2. 1. 12)	-	±12 m-től ±30 m-ig (±40 láb-tól ±100 láb-ig)	±12 m (**±40 láb)**

ANNEX 10/II.
Légiforgalmi távközlés: Összeköttetési eljárások

NEMZETKÖZI SZABVÁNYOK, AJÁNLOTT GYAKORLATI ELJÁRÁSOK LÉGINAVIGÁCIÓS SZOLGÁLATOK SZÁMÁRA
LÉGIFORGALMI TÁVKÖZLÉS
10. ANNEX
A NEMZETKÖZI POLGÁRI REPÜLÉSI EGYEZMÉNYHEZ
II. KÖTET
KOMMUNIKÁCIÓS ELJÁRÁSOK
beleértve a PANS státuszúakat is
A II KÖTET HATODIK KIADÁSA – 2001. JÚLIUS
82. módosítással

MÓDOSÍTÁSOK ELLENŐRZŐ JEGYZÉKE AZ ANNEX 10. II. KÖTETÉHEZ

MÓDOSÍTÁSOK			
Sorszám	Hatálybalépés dátuma	Bevezetés dátuma	Bevezette
Hatodik kiadás (magában foglalja az 1-76 Módosításokat)	2001. július 16.	2001. november 1.	
77. Módosítás (a II. Kötetet nem érintette)			
78. Módosítás (a Tanács 2003. március 5-én fogadta el)	2003. július 14.	2003. november 27.	
79. Módosítás (a II. Kötetet nem érintette)			

80. Módosítás
(a Tanács 2005. február 25-én fogadta el. 2005. július 11. 2005. november 24.

81. Módosítás
(a II. Kötetet nem érintette

82. Módosítás
(a Tanács 2007. február 27-én fogadta el)
Cserelapok: (iv), (xii), 4-3, 4-8, 4-11, 4-22, 4-24, 5-5
5-6, 5-7, 5-9, 5-10, 5-15, 8-2, 8-3, 8-5, 8-6, 8-7 2007. július 16. 2007. november 22.

82. MÓDOSÍTÁS

LÉGIFORGALMI TÁVKÖZLÉS

A Léginavigációs Szolgálatokra vonatkozó nemzetközi szabványok és ajánlott gyakorlati eljárások

Nemzetközi Polgári Repülési Egyezmény

Annex 10

II. KÖTET

ÖSSZEKÖTTETÉSI ELJÁRÁSOK

II. KÖTET HATODIK KIADÁS - 2001. JÚLIUS

1. Az alábbi cserelapokat kell behelyezni az Annex 10 II. Kötetébe (Hatodik kiadás), amelyek a 82. módosításokat foglalják magukban, és amelyek 2007. november 22-én lépnek hatályba.

a) (iv) oldal	- tartalomjegyzék
b) (xii) oldal	- Előszó
c) a 4-3, 4-8, 4-11, 4-22 és 4-24 oldalak	- 4. Fejezet
d) az 5-5, 5-6, 5-7, 5-9, 5-10 és 5-15 oldalak	- 5. Fejezet
e) a 8-2, 8-3, 8-5, 8-6, 8-7 oldalak	- 8. Fejezet

2. A módosításokat a borító- és az előzéklapra 2001. júliusi dátummal, kézzel kell rávezetni

3. A módosítást a (ii) oldalra kell bejegyezni.

TARTALOMJEGYZÉK

Oldal

- Szabad szöveges közlemények
- Kényszerhelyzetek, veszélyhelyzetek és a berendezés meghibásodása során követendő eljárások
- A soron következő irányító egységtől származó engedélytovábbítási szolgálat

Módosítás	Forrás(ok)	Tárgy	Elfogadva Hatályba lépés Alkalmazhatóság
62	Az Automatizált Adatcsere Rend-szerek Szakcsoportjának Nyolcadik ülése	Változások és kiegészítések a szolgálati közleményekre, a többsoros címzésre és a rövid címzésre vonatkozó előírásokban; változások és kiegészítések a csatorna-ellenőrző adásokra és a vezérelt áramkörök protokolljának használatára vonatkozó előírásokban; változások és kiegészítések a sérült közlemények észlelésére vonatkozó előírásokban; kiegészítés az AFTN közleményeknek kód- és bájt-független vonalakon és hálózatokon történő leadására vonatkozó előírásokhoz.	1981. december 14. 1982. április 14. 1982. november 25.
63	Az Automatizált Adatcsere Rend-szerek Szakcsoportjának Kilencedik ülése	A közlemények elsőbbségére és az elsőbbség jelzőkre vonatkozó előírások változása.	1982. december 13. 1983. április 13. 1983. november 24.
64	Léginavigációs Bizottság	Új és javított rádió-távbeszélő eljárások bevezetése a légiforgalmi mozgó szolgálatban történő használatra	1983. március 30. 1983. július 29. 1984. június 7.
65	A Léginavigációs Bizottságnak /ANC/ a dátum/idő meghatározási módjára vonatkozó ajánlásai; Hírközlési / Meteorológiai /COM/MET/ Szekció ülés (1982); A	Egyesített világ-idő (UTC); változások az AFTN közlemények szöveghosszában és a mozgási és irányítási közlemények elsőbbségei; az AFTN csatornák tesztelésének eljárásai; új anyag az AFTN címek rövidítéséről	1984. december 6. 1985. április 6. 1985. november 21.

	Légiforgalmi Szolgálat Adat- gyűjtési, -feldolgozási és -továbbítási Szakcsoport /ATS/ Harmadik ülése; az Automatizált Adatcsere Rendszerek Szakcsoportjának Tizedik Ülése	a "C" Mellékletben.	
66	Nincs változás		
67	Nyolcadik ülés, a Tanács 10. ülésszaka; a Hírközlési/Meteorológiai /COM/MET/ Szakcsoport ülése (1982.); Léginavigációs Bizottság	Az ICAO új három-betűs jelölések eredményeként változások és szerkesztési átrendezések az AFTN eljárásokban; változások az AFTN-re vonatkozó, előre meghatározott szétosztási rendszerben; egy új eljárás bevezetése az egész százasoknak a továbbítási eljárásaira vonatkozóan; új eljárások bevezetése az ultrarövidhullámú /VHF/ levegő-levegő összeköttetési csatornák használatára; az Annex 10 II. Kötet összes angol nyelvű változatának a szerkesztői átrendezése a jelenlegi angol nyelvű rádiótelefon kifejezésekben.	1987. március 16. 1987. július 27. 1987. október 22.
68	Léginavigációs Bizottság	Új eljárások a légijárművek rádiótelefon hívójelének szabályokba foglalásához; változtatások a légijárművek káros interferencia hatások elleni védelmére; új eljárásokra 121,5 MHz-es frekvencia figyelésére vonatkozóan.	1990. március 29. 1990. július 30. 1990. november 15.
69	Hírközlési/Meteorológiai /COM/MET/	Változások az AFTN közlemény eljárásokban	1993. március 22. 1993. július 26.

	Szakcsoport ülés (1982.); Hírközlési/Meteorológiai / Üzemeltetési /COM/MET/OPS/ Szakcsoportülés (1990)	és egy kiegészítő anyag a világméretű területi /meteorológiai/ előrejelző rendszer (WAFS) távközlési követelményeivel kapcsolatban; kiegészítő anyag az ultrarövidhullámú /VHF/ levegő-föld adatkapcsolat összeköttetésekre vonatkozólag és a VHF eltolt-frekvenciájú vivőhullám rendszerekre vonatkozó anyag változásai.	1993. november 11.
70 (ötödik kiadás)	Léginavigációs Bizottság	Új kifejezések a számoknak a rádiótelefonon történő továbbítására. Számos változás az AFTN eljárásokban a közlemények elfogadásával és továbbításával, a közlemények kategóriáival kapcsolatban, és a rádió-távbeszélőre vonatkozó elavult anyag törlése.	1995. március 20. 1995. július 24. 1995. november 9.
71	Léginavigációs Bizottság; a Légiforgalmi Távközlési Hálózat Szak- csoport (ATNP) első ülése	Változások a Légiforgalmi Állandóhelyű Távközlési Hálózat eljárásaiban.	1996. március 12. 1996. július 15. 1996. november 7.
72	Léginavigációs Bizottság; a Légiforgalmi Mozgószolgálati Összeköttetések Szakcsoport (AMCP) negyedik ülése	A rádiótelefon / R/T / eljárások módosítása a 8.33 kHz-es csatornaosztás bevezetését érintően; a VDL (VHF Data Link) meghatározásának törlése	1997. március 12. 1997. július 21. 1997. november 6.
73	Léginavigációs Bizottság; a Légiforgalmi Távközlési	A Légiforgalmi Állandóhelyű Távközlési Hálózaton /AFTN/ keresztül	1998. március 19. 1998. július 20. 1998. november 5.

	Hálózat Szak- csoport (ATNP) második ülése	továbbított meteorológiai közlemények összeállításának változásai; az Emberi Tényezőkkel (Human Factors) kapcsolatos anyagok bevezetése	
74 75	Léginavigációs Bizottság	A légijárművezetők közötti /összeköttetési/ levegő-levegő csatorna bevezetése. Nincs változás	1999. március 18. 1999. július 19. 1999. november 4.
76 (6. kiadás)	A Légiforgalmi Távközlési Hálózat Szakcsoport (ATNP) harmadik ülése; a Titkárság tevékenysége a Több résztvevő Ügynökséget érintő Légiforgalmi Szolgálai Eljárásokat Koordináló Munkacsoport (MAPCOG) javaslatai alapján; a Berendezésfüggő Automatikus Légtér-ellenőrzési Szakcsoport (ADSP) ötödik ülése; a Légiforgalmi Mozgó Szolgálati Összeköttetések Szakcsoport (AMCP) hetedik ülése; Titkárság	A Légiforgalmi Állandóhelyű Szolgálat (AFS) eljárási előírásai a beszéd-üzemű és adat-összeköttetési elemekre; az egyedüli, a légijárművezetők közötti levegő/levegő frekvencia bevezetésének eredményéből következő változások; az elavult rádió-távíró technikák referenciáinak törlése; rádiótelefon élőszavas és szabvány kifejezések; számos adatkapcsolati alkalmazásra vonatkozó technológia; a Nemzetközi Távközlési Unió (ITU) Rádiószabályzatára vonatkozó referenciák felfrissítése.	2001. március 12. 2001. július 16. 2001. november 1.
77	-	Nincs változás	
78	Léginavigációs Bizottság	Nyelvi jártassági követelmény	2003. március 5. 2003. július14. 2003. november 27.
79	Nincs változás		

80	Európai Légi-navigációs Tervező Csoport (EANPG); Légiforgalmi Távközlési Szak-csoport (ACP)	A VHF rádió-távbeszélő összeköttetési adó-csatornák jelölési el-járásainak változtatásai.	2005. febr. 25. 2005. júl. 11. 2005. nov. 24.
81	Nincs változás		
82	Légiforgalmi Távközlési Szak-csoport (ACP); OPLINKP Szak-csoport; Titkárság	AFTN hálózat frissítése/közös ICAO adatcsere hálózati (CIDIN) előírások, a rádió-távbeszélő R/T kommunikáció eljárások, hang-távközlő rendszerhibák esetén; a légiforgalmi irányító és a légijárművezető közötti adatkapcsolati közlemények használata. (CPDLC)	2007. február 26. 2007. július 16. 2007. november 22.

4.4 Légiforgalmi állandóhelyű távközlési hálózat (AFTN)

4.4.1 Általános rész

4.4.1.1 *Közlemények kategóriái.* A 3.3 pont előírásait is figyelembe véve, a légiforgalmi állandóhelyű távközlési hálózatnak az alábbi kategóriákba sorolható közleményeket kell kezelnie:

a) vészhelyzeti közlemények *(distress messages)*;

b) sürgősségi közlemények *(urgency messages)*;

c) repülésbiztonsággal kapcsolatos közlemények; *(flight safety messages)*

d) meteorológiai közlemények;

e) a repülések rendszerességét elősegítő közlemények;

f) a Légiforgalmi Tájékoztató Szolgálat (AIS) közleményei;

g) légiforgalmi adminisztrációs, igazgatási közlemények;

h) szolgálati közlemények.

4.4.1.1.1 *Vészhelyzeti közlemények (SS sürgősségi jelzéssel).* Ebbe a kategóriába azok a közlemények tartoznak, amelyeket a mozgó állomások adnak föl, és amelyben azt közlik, hogy súlyos és közvetlen veszély fenyegeti őket, valamint minden egyéb olyan közlemény, amely a vészhelyzetben lévő mozgó állomásnak történő azonnali segítségnyújtással kapcsolatos.

4.4.1.1.2 *Sürgősségi közlemények (DD elsőbbségi jelzéssel).* Ebbe a kategóriába azok a közlemények tartoznak, amelyek egy hajó, légijármű vagy egyéb jármű biztonságával, vagy a fedélzetén, illetve a látótávolságában lévő személy biztonságával kapcsolatosak.

4.4.1.1.3 Repülésbiztonsági közlemények (FF elsőbbségi jelzéssel). Ebbe a kategóriába tartoznak:

a) a légijárművek mozgásával és irányításával kapcsolatos közlemények, ahogy azokat a PANS-ATM (Doc 4444) 11. Fejezete meghatározza;

b) a légijárművet üzemeltető ügynökség (járató) által feladott közlemények, amelyek közvetlenül, haladék nélkül érintenek egy repülésben lévő, vagy indulni készülő légijárművet;

c) a meteorológiai közlemények a SIGMET tájékoztatásra, a különleges légijelentésekre, az AIRMET közleményekre, a vulkáni hamufelhők és trópusi ciklonok tanácsadói információira és az előrejelzések módosításaira korlátozottak.

4.4.1.1.4 Meteorológiai közlemények (GG elsőbbségi jelzéssel).

Ebbe a kategóriába tartoznak:

a) az előrejelzéseket, pl. közelkörzeti/repülőtéri előrejelzéseket (TAF-okat), területi és útvonali előrejelzéseket tartalmazó közlemények;

b) észleléseket és jelentéseket tartalmazó közlemények, mint pl. a METAR és a SPECI.

4.4.1.1.5 A repülések rendszerességét elősegítő közlemények (GG elsőbbségi jelzéssel).

Ebbe a kategóriába tartoznak:

a) légijárművek terhelésével kapcsolatos, a súly és súlypont számításához szükséges közlemények;

b) a légijárművek üzemeltetési menetrendjében beálló változásokkal kapcsolatos közlemények;

c) a légijárművek karbantartásával, szervizelésével kapcsolatos közlemények;

d) az utasokra, személyzetre és árura vonatkozó kollektív követelmények változásával kapcsolatos közlemények, melyek a szokásos üzemeltetési menetrendtől való eltérésre vonatkoznak;

e) a nem tervezett - szokásostól eltérő - leszállásokkal kapcsolatos közlemények;

f) a nem menetrendszerű repülések számára a repülés előtti léginavigációs szolgálatok biztosítását és operatív kiszolgálást kérő közlemények, pl. átrepülési engedély kérése;

g) a légijármű-üzemeltető ügynökségek (járatók) által feladott, a légijármű érkezését, vagy indulását jelentő közlemények;

h) alkatrészekkel vagy anyagokkal kapcsolatos közlemények, melyekre sürgősen szükség van a légijárművek üzemeltetéséhez.

4.4.1.1.6 Légiforgalmi tájékoztató szolgálat (AIS) közleményei (GG elsőbbségi jelzéssel).

Ebbe a kategóriába tartoznak:

a) A NOTAM-okkal kapcsolatos közlemények;

b) A SNOWTAM-okkal kapcsolatos közlemények.

4.4.1.1.7 Légiforgalmi adminisztratív közlemények (KK elsőbbségi jelzéssel).

Ebbe a kategóriába tartoznak:

a) a légijárművek üzemeltetésének biztonsága vagy rendszeressége érdekében biztosított létesítmények üzemeltetésével, vagy fenntartásával, karbantartásával kapcsolatos közlemények;

b) a légiforgalmi távközlési szolgálatok működésével kapcsolatos közlemények;

c) a Polgári Légügyi Hatóságok között váltott, a légiforgalmi szolgálatokkal kapcsolatos közlemények.

4.4.1.1.8 Az információ-kérő közleményeket ugyanolyan elsőbbségi jelzéssel kell ellátni, mint amilyennel azt a közleményt láttak el, amellyel kérnek, kivéve, ha a repülés biztonsága érdekében ennél magasabb prioritás indokolt.

4.4.1.1.9 *Szolgálati közlemények (megfelelő elsőbbségi jelzéssel).*

Ebbe a kategóriába tartoznak a légiforgalmi állandóhelyű állomásoktól származó közlemények, amelyekben tájékoztatást vagy megerősítést kérnek más, olyan közleményekkel kapcsolatban, amelyeket a légiforgalmi állandóhelyű hálózat látszólag helytelenül továbbított, vagy amelyekkel a csatorna-sorszámok megerősítését kérik, stb.

4.4.1.1.9.1 A szolgálati közleményeket a 4.4.2 vagy a 4.4.15 pontban előírt formában kell elkészíteni. Amikor a 4.4.3.1.2 vagy a 4.4.15.2.1.3 pont előírásait alkalmazzák egy olyan szolgálati közleményre, amelynek címzettje egy csak helységkóddal azonosított légiforgalmi állandóhelyű állomás, akkor közvetlenül ez után a helységkód után az ICAO három-betűs "YFY" azonosítóját kell beilleszteni, amelyet egy megfelelő nyolcadik betű kövessen.

4.4.1.9.2 A szolgálati közleményeket a megfelelő elsőbbségi jelzéssel kell ellátni.

4.4.1.1.9.2.1 **Ajánlás.** - *Ha a szolgálati közlemények korábban feladott közleményekre vonatkoznak, lehetőleg ugyanazzal az elsőbbségi jelzéssel lássák el, mint az (oka) t, amely (ek) re vonatkoznak.*

4.4.1.1.9.3 Az átviteli hibákat javító szolgálati közleményeket minden olyan címzettnek meg kell küldeni, aki a hibás adást meg fogja kapni.

4.4.1.1.9.4 A szolgálati közleményre adott választ annak az állomásnak kell megcímezni, amely az eredeti szolgálati közleményt feladta.

4.4.1.1.9.5 **Ajánlás.** - *A szolgálati közlemények szövege a lehető legtömörebb legyen.*

4.4.1.1.9.6 A szolgálati közleményeket, kivéve azokat, amelyek SS közlemény vételét nyugtázzák, az SVC rövidítéssel kell azonosítani, amely a szöveg első eleme legyen.

4.4.1.1.9.7 Amikor a szolgálati közlemény egy korábban kezelt közleményre hivatkozik, akkor a korábbi közleményre a megfelelő közlemény-azonosítóval (lásd a 4.4.2.1.1 b) és 4.4.15.1.1. b) pontokat), vagy a feladási időt és a feladót jelző azonosító karaktercsoportok megadásával (lásd a 4.4.4 és a 4.4.15.2.2 pontokat) kell hivatkozni, azokkal, amelyekkel a hivatkozott közleményt egyértelműen meghatározzák

4.4.1.2 *Elsőbbségi sorrend.*

4.4.1.2.1 A Légiforgalmi állandóhelyű távközlési hálózaton a közlemények továbbításának elsőbbségi sorrendje a következő:

A Közlemény továbbításának elsőbbségi sorrendje	*Elsőbbségi jelzés*
1	SS
2	DD FF
3	GG KK

4.4.1.2.2 **Ajánlás.** *Az azonos elsőbbségi jelzéssel rendelkező közleményeket lehetőleg abban a sorrendben továbbítsák, amilyen sorrendben azokat feladásra benyújtották.*

4.4.1.3 *A közlemények továbbítási útvonalának meghatározása*

4.4.1.3.1 Minden közleményt a rendelkezésre álló leggyorsabb továbbítási útvonalon kell a címzettnek leadni.

4.4.1.3.2 A közlemény-forgalom gyorsítására, ha szükséges, előzetes megállapodásokat kell kötni a kitérő útvonalakról. Minden távközlési központnak rendelkeznie kell a megfelelő kitérő útvonal listával, amelyet az érintett távközlési központokat üzemeltető Hatóság (ok) jóváhagyott (jóváhagytak), és szükség esetén ezeket kell használni.

4.4.1.3.2.1 **Ajánlás.-** *Kitérő továbbítási útvonalat kell választani:*

1) egy teljesen automatizált távközlési központban:

a) közvetlenül a vonal megszakadásának észlelése után, ha a forgalmazást egy teljesen automatizált távközlési központon keresztül irányítják át;

b) a vonal megszakadásának észlelésétől számított 10 percen belül, ha a forgalmazást egy nem teljese automatizált távközlési központon keresztül irányítják át;

2) egy nem teljesen automatizált távközlési központban a vonal megszakadásának észlelésétől számított 10 percen belül.

Ott, ahol nem kötöttek előzetes kétoldalú vagy többoldalú megállapodásokat, az átirányítás szükségességéről az érintetteket szolgálati közleményben kell értesíteni.

4.4.1.3.3 Mihelyt nyilvánvalóvá válik az, hogy a légiforgalmi állandóhelyű szolgálat segítségével nem lehet a közleményt elfogadható időintervallumon belül továbbítani, és amennyiben a közlemény annál az állomásnál van, ahol azt benyújtották, akkor meg kell kérdezni a feladót, hogy milyen intézkedéseket tegyenek, kivéve, ha:

a) erről másképp nem egyezik meg az érintett állomás és a közlemény feladója; vagy

b) léteznek olyan megállapodások, amelyek értelmében a késedelmet szenvedő közleményeket automatikusan átirányítják a kereskedelmi távközlési szolgálatokhoz, a feladó értesítése nélkül.

Megjegyzés.- Az "elfogadható időintervallum" azt jelenti, valószínűnek látszik az, hogy a közleményt nem tudják kézbesíteni a címzettnek az érintett közlemény kategóriájára vonatkozó rögzített átviteli idő-intervallumon belül, vagy, ha ilyen nincs, azon időtartamon belül, amelyben a feladó és az érintett távközlési állomás előzetesen megegyezett.

4.4.1.4 *A közlemények forgalmának felügyelete*

4.4.1.4.1 *A közlemények forgalmának folytonossága.* A vevő állomásnak ellenőriznie kell a bejövő közlemények közlemény-azonosítóját, hogy meggyőződjön róla, az adott csatornán érkező összes közlemény csatorna-sorszáma a helyes sorrendben érkezik-e.

4.4.1.7.2 Amennyiben az AFTN távközlési állomások között nyugtázás történik, akkor az átjátszó állomás úgy tekinthető, hogy a továbbiakban nem felelős azon közlemények újra feladásáért vagy ismétléséért, amelyekre pozitív nyugtázást kapott, és így azt a feljegyzéseiből törölheti.

Megjegyzés. - Az AFTN forgalmazási jegyzőkönyveknek az AFTN távközlő központokban történő hosszú távú megőrzéséről a 4.4.1.6 pont rendelkezik.

4.4.1.8 Az AFTN csatornákon történő ellenőrzések eljárásai

4.4.1.8.1 **Ajánlás**. - *Az AFTN csatornákon ellenőrzés és vonal-javítás céljából leadott ellenőrző közlemények lehetőleg az alábbiakat tartalmazzák:*

1) a közlemény eleje jel;

2) a QJH eljárás-jel;

3) a feladó azonosítója;

*4) az ITA-2 kód használata esetén az RY karakter, vagy az IA-5 kód használata esetén az U (5/5) *(2/10) karakterek sorozata három sorban egymás után; és*

5) a "közlemény vége" jel.

4.4.2 Közlemény-formátumok - 2-es számú Nemzetközi Távíró ABC (ITA-2)

A 4.4.1.8 és a 4.4.9.3 pontokban előírtak kivételével minden közleménynek a 4.4.2.1-től a 4.4.6.1-ig terjedő pontokban előírt elemeket kell tartalmaznia.

1.Megjegyzés: Az ITA-2 közlemény-formátumot a 4-1. ábra mutatja be.

2.Megjegyzés: A következőkben leírt, közlemény-formátumra vonatkozó szabványokban az alábbi szimbólumokat használtuk a 2-es sz. Nemzetközi Távíró ABC bizonyos karaktereihez rendelt funkciók megjelölésére (lásd a III. Kötet, 1 Rész, 8.2.1 pontját és a 8-1. táblázatát):

Szimbólum	*Jelentés*
<	KOCSI VISSZA (*27-es számú jel*)
≡	SOREMELÉS (*28-as számú jel*)
↓	BETŰVÁLTÓ (*29-es számú jel*)
↑	SZÁMVÁLTÓ (*30-as számú jel*)
→	SZÓKÖZ (*31-es számú jel*)

4.4.2.1 *Fejrész*

4.4.2.1.1 A fejrésznek az alábbi elemekből kell állnia:

a) "közlemény eleje" jelzés, a **ZCZC** karakterek;

b) a közlemény azonosítója, amelynek elemei:

1) a vonal /áramkör/ azonosítója;

2) a csatorna-sorszám.

c) további szolgálati információk (ha szükséges), amelynek elemei:

1) egy SZÓKÖZ;

2) legfeljebb tíz karakter.

d) jelköz.

4.4.2.1.1.1. A vonal azonosítója az adóállomás által kiválasztott és hozzárendelt három betűből kell, hogy álljon; az első betű a vonal adóállomás felöli végét, a második a vonal vevő-állomás felőli végét azonosítja, a harmadik pedig a csatornát. Ahol az adó- és a vevőállomás között csak egyetlen csatorna létezik, akkor erre a célra az "A" betűt kell használni. Ha az állomások között több csatorna is van, akkor a csatornákat az "A", "B", "C", stb. betűkkel kell azonosítani, a megfelelő sorrendben.

4.4.2.1.1.2 A távközlési állomásoknak 001 és 000 (az 1000 helyett) közötti háromjegyű, sorrendben növekvő csatorna-sorszámokat kell kijelölni valamennyi, közvetlenül egyik állomástól a másiknak küldött közleményhez. Minden csatornán külön sorszámozást kell alkalmazni, és minden nap 0000 órakor új sorozatot kell kezdeni.

4.4.2.1.1.2.1 **Ajánlás. -** *Hogy elkerüljék ugyanazon sorszámok ismétlődését 24 órán belül, megengedhető a négy-jegyű csatorna-sorszámok használata, amennyiben erről a vonal üzemeltetéséért felelős hatóságok megállapodást kötnek.*

4.4.2.1.1.3 A közlemény-azonosítót a vonalon a következő sorrendben kell leadni:

a) SZÓKÖZ [→];

b) az adó végberendezés betűjele;

c) a vevő végberendezés betűjele;

d) csatorna-azonosító betű;

e) SZÁMVÁLTÓ [↑];

f) csatorna-sorszám (3 számjegy).

4-1. ábra: Az ITA-2 közlemény-formátum

Közlemény rész	A közlemény rész összetevője		Távgépíró jele	
FEJLÉC (lásd 4.4.2.1)	Közlemény kezdete jel		—	**ZCZC**
Közlemény azonosítója		a) Egy SZÓKÖZ /SPACE/ b) Feladó végberendezés betűjele c) Vevő végberendezés betűjele d) Csatorna - azonosító betű e) Egy SZÁMVÁLTÓ /FIGURE SHIFT/ f) Csatorna - sorszám (3 számjegy) (*Példa:* **NRA062)**	→...↑...	
(ha szükséges) további szolgálati jelzések				
Elválasztó jelsorozat		Öt SZÓKÖZ /SPACES/ Egy BETŰVÁLTÓ /LETTER SHIFT/	→→→→→↓	

CÍMZÉS (lásd 4.4.3)	A K Ö Z L E M É N Y Á L L A N D Ó R É S Z E	Kijelölési funkció	Egy KOCSI VISSZA /CARRIAGE RETURN/, egy SOREMELÉS /LINE FEED/	<≡
Elsőbbségi jelzés	A megfelelő két-betűs csoport	..		
Címzettek megjelölése	Egy SZÓKÖZ /SPACE/ egy nyolc-betűs csoport (minden egyes címzettre) (*Példa:* **EGLLZRZX→EDLLYKYX→EGLLACAM**)			
Kijelölési funkció (k)	Egy KOCSI VISSZA, egy SOREMELÉS	<≡		

FELADÓ (lásd 4.4.4)	Feladási idő	Egy SZÁMVÁLTÓ /FIGURE SHIFT/ Az a hat-betűs dátum-idő csoport, ami meghatározza azt, hogy a közlemény mikor került továbbításra be- nyújtásra. Egy BETŰVÁLTÓ	**↑......↓**
Feladó azonosítója	Egy SZÓKÖZ A feladót azonosító nyolc-betűs csoport	**→........**	
Elsőbbségi Riasztó Jelzés (*csak távgépíró üzemben, a Vészhelyzeti Közlemények megjelölésére*)	Egy SZÁMVÁLTÓ A 2-es számú Távíró ABC 10. számú jele, ötször leadva Egy BETŰVÁLTÓ	**↑figyelmeztető jel (ek)↓**	
Kiegészítő Fejléc Információ	a) Egy Szóköz b) A Kiegészítő adatok nem haladhatják meg a sor maradványt, lásd 4.4.4.4 alatt		
Kijelölési Funkció	Egy KOCSI VISSZA, egy SOREMELÉS	<≡	

SZÖVEG (lásd 4.4.5)	A szöveg kezdete	A Címzett (ek) közelebbről meghatározott (speciális) megjelölése (*ha szükséges*), és mindegyiket követően egy KOCSI VISSZA, egy SOREMELÉS (*ha szükséges*). Az angol **FROM** szó (*ha szükséges*) (lásd 4.4.5.2.3) A feladó közelebbről meghatározott (speciális) megjelölése (*ha szükséges*) Az angol **STOP** szó, utána egy KOCSI VISSZA, egy SOREMELÉS (*ha szükséges*) (lásd 4.4.5.2.3); *és/vagy* A feladó hivatkozási jele /referenciája/ (*ha használatos*)	
Közlemény szövege	A közlemény szövege, egy KOCSI VISSZA és egy SOREMELÉS a szöveg minden egyes sora után az utolsó sor kivételével (lásd a 4.4.5.3 pontot)		
Megerősítés (*ha szükséges*)	a) Egy KOCSI VISSZA, egy SOREMELÉS b) A CFM megerősítés rövidítés, amelyet a szövegnek az a része követ, amelyik megerősítésre kerül.		
Helyesbítés (*ha szükséges*)	a) Egy KOCSI VISSZA, egy SOREMELÉS b) a COR rövidítés, és a megelőző szövegben ejtett hibák javítása		
A szöveg vége jel	a) Egy BETŰVÁLTÓ b) Egy KOCSI VISSZA, egy SOREMELÉS	↓<≡	

BEFEJEZÉS (lásd 4.4.6)	Lapemelés jelsorozat	Hét SOREMELÉS	≡≡≡≡≡≡≡
Közlemény vége jel	Négy nagy-betűs N (14 számú jel)	**NNNN**	
	Közlemény elválasztó jel *(csak a kézi /"tépett szalagos"/ közlemény forgalomtovábbító állomásoknál használatos)*	Tizenkettő darab BETŰVÁLTÓ	↓↓↓↓ ↓↓↓↓
		Szalagemelés (ld. 4.4.7)	További BETŰVÁLTÓK /LETTER SHIFTS/ jelennek meg azokban az esetekben, ahol egyezményeket kötöttek arra, hogy a szalag-továbbításos eljárású átvitel kerül alkalmazásra egy bejövő áramkörön. . (lásd 4.4.7)

(a fenti ábra a 4.4.2 - 4.4.9.1 pontokban leírt távgépíró közlemény formátumát mutatja be)

4.4.4.2.2 Amennyiben a közleményt levegőben repülő légijármű adta fel, és a közlemény útjának egy részét az AFTN hálózaton teszi meg, mielőtt kézbesítik, a feladó csoportban azt a légiforgalmi állomást kell megjelölni, amelyik a közleményt az AFTN-hez továbbította, ami után közvetlenül az ICAO három-betűs ZZZ jelölés és a helykitöltő X betű következik. A légijármű azonosító jelét (hívójelét) a közlemény szövegének első elemeként kell feltűntetni.

4.4.4.2.3 Az AFTN-en továbbított olyan közlemények számára, amelyeket egy másik hálózatban adtak föl, ki kell jelölni egy érvényes AFTN feladó megjelölést, amelyet - megegyezés alapján - az AFTN hálózatot a külső hálózattal összekötő közvetítő, vagy kapu- (gateway) berendezés használ.

Megjegyzés:- Az alábbi példa a 4.4.4.2.2 pontban leírt eljárás alkalmazását mutatja be, egy fiktív közleménnyel, amelyet a KLM153 hívójelű légijármű adott fel, a CZEG-ben található Körzeti Irányító Központnak (ACC-nek) címezve, és a közleményt a CYCB-ben lévő légiforgalmi állomáson keresztül küldik el. A példa a közleményt a távgépíró nyomtatott formájú példányán mutatja, a fejrész és a záró rész nélkül:

(Cím)	*FF*	*CZEGZRZX*
(Feladó)	*031821*	*CYCBZZZX*
(Szöveg)	*KLM153 [a szöveg hátralevő része, ahogy azt a légijárműtől vették]*	

4.4.4.3 Az elsőbbségi jelzést csak a vészhelyzeti közlemények esetén kell használni. Ha használják, akkor az alábbi elemekből álljon, az alábbi sorrendben:

a) SZÁMVÁLTÓ [↑];

b) ÖT darab 10-es számú jel egymás után (szám-készletben);

c) BETŰVÁLTÓ [↓].

1. Megjegyzés. - A 2. számú Nemzetközi Távíró ABC 10-es számú jelének szám-készletbeli alakja általában megegyezik a légiforgalmi állandóhelyű vonalakon használatos távgépírókon a "J" betű szám-készletbeli alakjával.

2. Megjegyzés. - Az elsőbbségi riasztó jelzés a vevő távgépíró-állomáson megszólaltatja a csengőt. A teljesen automatizált állomások hasonló figyelmeztető jelzést adhatnak az SS sürgősségi jelzés észlelésekor. Ezek a jelzések hívják fel az automata átjátszó központokban a felügyelő személyzet, az alárendelt állomásokon pedig kezelő személyzet figyelmét arra, hogy a közlemény azonnali figyelmet követel.

4.4.4.4 A feladó sorban további adatok közlését is meg kell engedni, feltéve hogy a feladó rész teljes hossza nem haladja meg a 69 karaktert, és hogy ez az érintett hatóságok megállapodásának tárgyát kell, hogy képezze. A további adatmezők jelenlétét egy szóközzel kell jelezni közvetlenül a kiegészítő az adatok előtt.

4.4.4.4.1 **Ajánlás.** *Ha egy közleményben a forrás és a cél címzések között további címzési információk cseréje szükséges, akkor azt lehetőleg a szabadon választható adatmezőben (ODF) tegyék, az alábbi meghatározott formátumban:*

a) a kiegészítő címzés funkció paraméter-kódját egy egyes számmal és egy ponttal (1.) kell jelezni;

b) ezután három módosító karakter és egy egyenlőségjel (=) következik, majd a kiadott 8-karakteres ICAO címzés; és

c) a kiegészítő címzés paraméter-mezőjét egy kötőjellel (-) zárják le.

4.4.4.4.1.1 **Ajánlás.** *Ha a szolgálati közleményekre, vagy kérdésekre a külön cím nem egyezik meg a feladó megjelölésével, akkor lehetőleg az SVC módosító jelzést kell használni.*

4.4.4.5 A feladó részt egy kijelölési funkcióval [<≡] kell lezárni.

4.4.5 Szöveg

4.4.5.1 A közlemények szövegét a 4.1.2 pont előírásainak megfelelően kell megfogalmazni.

4.4.5.2 Ha a feladóra utaló hivatkozást használnak, akkor az a szövegrész elején legyen, kivéve a 4.4.5.2.1 és a 4.4.5.2.2 pontban leírtak esetét.

4.4.5.2.1 Ha a címzett-megjelölés második elemét az YXY, YYY vagy ZZZ három-betűs ICAO jelölés alkotja (lásd a 4.4.3.1.2.1 és a 4.4.3.1.2.2 pontokat), és ezért szükség van a szövegben a közlemény címzettjének pontos meghatározására, akkor ezt az azonosító karakter-csoportot a feladóra való hivatkozás elé kell írni (ha van ilyen), és ezzel ez a szöveg első eleme lesz.

4.4.5.2.2 Ha a feladó-megjelölés második elemét az ICAO három-betűs YXY, YYY vagy ZZZ jelölés alkotja (lásd a 4.4.4.2.1 és a 4.4.4.2.2 pontokat), és ezért szükség van a szövegben azon szervezet (vagy katonai szolgálat), vagy légijármű nevének közlésére, amely a közleményt feladta, akkor ezt az azonosítót a szöveg első elemeként kell beilleszteni a közleménybe.

4.4.5.2.3 Amikor a 4.4.5.2.1 és a 4.4.5.2.2 pontok előírásait alkalmazzák olyan közleményekre, amelyekben az ICAO három-betűs YXY, YYY vagy ZZZ azonosítóját/azonosítóit két vagy több különböző szervezet (vagy katonai szolgálat) megjelölésére használják, akkor a szövegbe illesztett azonosítók sorrendje meg kell egyezzen a közlemény címzési és feladó részében használt teljes sorrenddel. Ilyen esetben minden címzett-megjelölés után közvetlenül egy kijelölési funkciót kell küldeni. Ilyenkor a közleményt feladó (YXY, YYY vagy ZZZ kóddal jelölt) szervezet neve elé a "FROM" ("...-TÓL") szót kell írni. Az ilyen azonosítók után a szövegrészbe, a szöveg többi részének kezdete elé a "STOP" szót és egy kijelölési funkciót kell írni.

4.4.5.3 A szöveg minden nyomtatott sora után egy kijelölési funkciót [<≡] kell küldeni, kivéve a szöveg utolsó sorát (lásd a 4.4.5.6 pontot).

4.4.5.4 Távgépíró üzemben, ha a szöveg egy részét meg kívánják erősíteni, akkor ezt a megerősítést az utolsó szövegcsoporttól egy kijelölési funkcióval [<≡] kell elválasztani, majd a CFM rövidítéssel kezdve a megerősített szövegrész következik.

4.4.5.5 Távgépíró hálózatban, ha észlelik, hogy a szövegben gépelési hiba történt, akkor a hibajavítást az utolsó szövegcsoporttól, vagy megerősítéstől (ha van ilyen) egy kijelölési funkcióval [<≡] kell elválasztani. Ezután a COR rövidítés és maga a helyesbítés következik.

4.4.5.5.1 A helyi kikézbesítés előtt, az állomás személyzetének el kell végeznie a nyomtatott példányon az összes jelzett helyesbítést.

4.4.5.6 A szöveg végén az alábbi szöveg vége jelet kell küldeni:
Egy BETŰVÁLTÓ [↓], kijelölési funkció [<≡].

4.4.5.7 Az AFTN feladó állomás által begépelt közlemény szövegének hossza nem haladhatja meg az 1800 karaktert.

1. Megjegyzés - Ha a légiforgalmi állandóhelyű távközlési hálózaton keresztül olyan közleményt kívánnak továbbítani, amelynek szövegrész hossza meghaladja az 1800 karaktert, akkor a 4.4.5.7 pont előírásainak értelmében az AFTN feladó állomásnak az ilyen közleményt több közleményre bontva kell feladnia, amely közlemények szövege egyenként sem haladhatja meg az 1800 karakter hosszúságot. A II. kötet "B" melléklete tartalmaz útmutatást arra vonatkozóan, hogyan kell egy hosszú közleményt több különálló közleményre bontani.

2. Megjegyzés - A karakterek számába bele kell számítani minden, a szövegben található nyomtatható és nem nyomtatható karaktert is, a szöveg elejét jelző kijelölő funkciót és a szöveg vége jelet kivéve.

4.4.6 A záró rész

4.4.6.1 A záró résznek az alábbi elemekből kell állnia:

a) lap-emelés jel, vagyis hét darab SOREMELÉS [≡ ≡ ≡ ≡ ≡ ≡ ≡];
Megjegyzés - Ez, valamint az ezt megelőző kijelölési funkcióban található egy SOREMELÉS, már elegendő elkülönítést biztosít a közlemények között, a nyomtatott példányokon.

b) a "közlemény vége" jel, vagyis négy darab "N" betű (a 14-es számú jel betű-készletbeli alakja), megszakítatlan karakter-sorozatként.

Megjegyzés. - Ez az összetevő - amelyet a közlemény első továbbításának pillanatától a végső *kézbesítésig mindig sértetlenül továbbítani kell, - azért szükséges, hogy a félautomata vagy teljesen automatikus átjátszó berendezéseken az állomások közötti továbbítás érdekében létrehozott összeköttetéseket fel lehessen szabadítani a további közlemények fogadásához.*

Ezt kiegészítendő, ha a közleményt csak kézi ("tépett szalagos") átjátszó állomásnak adják le:

c) közlemény-elválasztó jel, azaz BETŰVÁLTÓ [↓] tizenkétszer egymás után megszakítatlan karakter-sorozatként.

1. Megjegyzés. - Az egyik közlemény "közlemény vége" jele és a következő közlemény "közlemény eleje" jele között a közlemények továbbítása során csak betűváltó jeleket szabad továbbítani.

2. Megjegyzés. - Az alábbi példa a 4.4.2-től a 4.4.6.1-ig terjedő pontokban leírt eljárások alkalmazását mutatja be, a közlemény nyomtatott példányán:

(Fejrész)	**ZCZC*		*LPA183*
(Cím)	*GG*	*LGGGZRZX*	*LGATKLMW*
(Feladó)	*201838*		*EGLLKLMW*
(Szöveg)	*Szükség*		*szerint*
(Zárórész)	*(Lapemelés)*		
	*NNNN***		

**2.A Megjegyzés. - Ha ez a közlemény egy sorozat egyik tagja, és a vevő távgépíró kezelője nem alkalmazott kézi lapemelést az egyes közlemények között, akkor az előző közlemény NNNN jelzése itt jelenik meg.*

***2.B Megjegyzés. - A 2A megjegyzésben leírt körülmények között a következő vett üzenet fejrésze a nyomtatott lapon ezen a helyen íródik ki.*

2.C Megjegyzés. - A gyakorlatban az állomásokon a nyomtatott közleményeket úgy választják el, hogy a lapemelés sorozatnál tépik el a papírt. A "közlemény vége" jel ezért a következő közlemény részévé válik. Nem valószínű azonban, hogy ez a nyilvánvaló áthelyeződés bármilyen félreértést okozna a feladó és a vevő között, hiszen a gyakorlatban a "közlemény vége" jelnek nyomtatott formában nincs jelentősége.

4.4.6.2 Az AFTN feladó állomás által leírt AFTN közlemény hossza nem haladhatja meg a 2100 karaktert.

Megjegyzés.- A karakterek számába bele kell számolni a közleményben található összes nyomtatható és nem nyomtatható karaktert, a beleértve közlemény eleje jelet (ZCZC), és a "közlemény vége" (NNNN) jelet is.

4.4.7 Szalagtovábbítás

4.4.7.1 **Ajánlás.-** *A kézi ("tépett szalagos - torn tape") és a félautomata, folyamatos szalagot használó állomások esetében, ha a 4.4.6.1 pontban leírt jeleken kívül további vezérlő jelekre van szükség annak biztosítására, hogy a szalag a vevőállomás újralyukasztó gépéről megfelelően kerüljön tovább, amikor a "közlemény vége" jelet nem követi azonnal a következő közlemény kezdetét jelző jel, akkor lehetőleg a vevő állomáson helyben intézkedjenek annak elkerülése érdekében, hogy ezeket a vezérlőjeleket ne az adó állomásnak kelljen leadnia.*

Megjegyzés. - A kézi ("tépett szalagos") állomásokon általában szükség van olyan berendezésre, amelynek segítségével a szalagot előre lehet mozgatni az újralyukasztó berendezésből, legalább annyira, hogy a kezelő a megfelelő ponton tudja eltépni a szalagot, olyan esetekben, amikor a kezelő már készen áll a szalag eltépésére, de még nem jött következő közlemény, amely a szalagot a berendezésen előre mozgatta volna. A félautomata állomásokon, ahol folyamatos *szalaggal dolgoznak, hasonló körülmények között, hasonló eljárásra lehet szükség, hogy a szalagot annyira előre lehessen mozgatni, hogy a "közlemény vége" jel eljusson a leadó berendezésig.*

4.4.15 Közlemények formátuma - 5-ös számú Nemzetközi ABC (IA-5)

Ha az érintett Hatóságok az 5-ös számú Nemzetközi (IA-5) ABC használatában állapodtak meg, akkor a 4.4.15-től a 4.4.15.3-ig terjedő pontokban leírt közlemény-formátumot kell használniuk. Az IA-5-öt használó Hatóságok felelőssége annak biztosítása, hogy alkalmazkodjanak azokhoz a szomszédos AFTN állomásokhoz, amelyek a 4.4.2 pontban leírt formátumú ITA-2 kódot használják.

Minden közleményt - a 4.4.1.8 és a 4.4.9.3 pontban leírtak kivételével - a 4.4.15.1-től a 4.4.15.6-ig terjedő pontokban leírt elemekből kell összeállítani.

1. Megjegyzés. - A 4-4. ábra mutatja be az IA-5 közlemény-formátumot.
2. Megjegyzés. - Az alább részletezett, a közlemény-formátumra vonatkozó szabványokban a következő szimbólumokat használtuk az IA-5 bizonyos jeleihez rendelt funkciók megjelölésére. (Lásd a III. Kötet, I.Rész, 8.6.1 pontját, valamint a 8-2. és 8-3. Táblázatokat.)

Jel	*Jelentés*
<	KOCSI VISSZA (a 0/13 karakter pozíció)
≡	SOREMELÉS (a 0/10 karakter pozíció)
→	SZÓKÖZ (a 2/0 karakter pozíció)

4.4.15.1 *Fej-rész*

4.4.15.1.1. A fej-résznek az alábbi elemekből kell állnia:

a) fej-rész - kezdete jel (SOH), a 0/1 karakter;

b) közlemény-azonosító, amelynek az elemei:

1) az áramkör vagy vonal azonosítója;

2) csatorna-sorszám;

c) további szolgálati információk (ha szükséges), amelynek elemei:

1) egy SZÓKÖZ;

2) és legfeljebb 10 karakter.

4.4.15.1.1.1 A pont-pont közötti áramkörök vagy vonalak esetén az azonosító az adó-állomás által kiválasztott és hozzárendelt három betűből áll; az első betű a vonal adó felőli végét, a második a vevő felőli végét, a harmadik pedig a csatornát azonosítja. Ha csak egy csatorna létezik, akkor az " A" betűt kell használni. Ha az állomások között több csatorna is van, akkor a csatornákat sorrendben az “A”, “B”, “C”, stb. betűkkel kell azonosítani. Több-pontú csatornák esetében az azonosító a vonalat ellenőrző vagy vezérlő (“master”) állomás által kiválasztott és hozzárendelt három betűből áll.

4.4.15.1.1.2 A 4.4.15.1.1.3 pontban leírtak kivételével, a távközlési állomásoknak minden, közvetlenül az egyik állomástól a másikhoz küldött közleménynek háromjegyű csatorna-sorszámot kell kijelölniük, amely 001-től 000-ig (mely 1000-et jelent) terjed. Minden csatornán külön kell a közleményeket sorszámozni, és minden nap 0000 órakor új számsorozatot kell kezdeni.

4.4.15.1.1.3 **Ajánlás. -** *Annak érdekében, hogy elkerülhető legyen ugyanazon sorszámok ismételt előfordulása 24 órán belül, lehetőleg meg kell engedni a csatorna-sorszámok bővítését, ha erről a vonal üzemeltetéséért felelős Hatóságok megállapodást kötöttek.*

4.4.15.1.1.4 A közlemény-azonosítót a vonalon az alábbi sorrendben kell leadni:

a) az adó-terminál betűjele;

b) a vevő-terminál betűjele;

c) csatorna-azonosító betű;

d) a csatorna-sorszám.

4.4.15.1.1.5 Megengedhető további szolgálati tájékoztatás beszúrása a közlemény-azonosító után, ha erről a vonal üzemeltetéséért felelős Hatóságok megállapodást kötöttek. Az ilyen további szolgálati információ elé egy SZÓKÖZT [→] kell tenni, majd ezt legfeljebb tíz karakter követheti, melyeket a közlemény fej-részébe kell beilleszteni közvetlenül a csatorna-sorszám utolsó számjegye után, és nem tartalmazhatnak semmilyen kijelölési funkciót. Ha ilyen tájékoztatást nem szúrtak be, akkor a 4.15.1.1.4 pontban részletezett adatok után közvetlenül a 4.4.15.2 pontban leírt adatok következzenek.

4.4.15.2 *Címzés*

4.4.15.2.1 A címzés az alábbi elemekből kell, hogy álljon:

a) kijelölési funkció [<≡];

b) elsőbbségi jel;

c) címzett(ek) megjelölése;

d) kijelölési funkció [<≡].

4.4.15.2.1.1 Az elsőbbségi jelnek - a feladó által hozzárendelt - megfelelő két-betűs csoportból kell állnia a következőknek megfelelően:

Közlemény rész		A közlemény rész összetevője	Az összetevő eleme	Távgépíró jele
A FEJRÉSZ	FEJRÉSZ SOR (ld. 4.4.15.1.1)	A „FEJRÉSZ KEZDETE” karakter	Egy karakter (0/1)	SOH
		Közlemény azonosító	a) Egy szóköz b) Vevő terminál betűjele c) Csatorna - azonosító betű d) Csatorna sorszám (Példa: NRA062)	……………..
		(ha szükséges) további szolgálati jelölések, tájékoztatások	a) Egy szóköz b) Nem több mint legfeljebb a sor végéig (Példa: 270930)	→
	CÍMZÉS (ld. 4.4.15.2.1)	Szövegigazító funkció	Egy KOCSI-VISSZA, egy SOREMELÉS	<≡
		Elsőbbségi jelzés	A megfelelő kétbetűs csoport.	
		Címzett (ek) megjelölése	Egy szóköz sorban Egy nyolcbetűs minden csoport címzettnek (Példa: **EGLLZRZX →** **EGLLYKYX** **→ EGLLACAD**	
		Szövegigazító funkció(k)	Egy KOCSI-VISSZA, egy SOREMELÉS <≡	<≡
	FELADÓ RÉSZ (ld. 4.4.15.2.2.)	Feladási idő	6 számjegyből álló dátum-idő csoport, amikor a közleményt továbbításra benyújtották	**......**
		Feladó megjelölése	a) Egy szóköz b) Egy nyolcbetűs csoport a feladó azonosítására	→**......**

		Elsőbbségi Riasztó Jelzés (csak távgépíró üzemmódban használják Vészhelyzeti-közlemények esetén)	Öt karakter (0/7)(BEL)	
		Opcionális Fejrész információ	a) Egy szóköz b) További adatok, legfeljebb a sor végéig. Ld. 4.4.15.2.2.6	
		Szövegigazító funkció	Egy KOCSI-VISSZA, egy SOREMELÉS	<≡
		Szöveg eleje karakter	Egy karakter (0/2)	**STX**
SZÖVEG (Ld. 4.4.15.3)		Szöveg kezdete	(ha szükséges) a címzett (ek) közelebbi megjelölése (ha szükséges) valamint mindegyik után egy KOCSI VISSZA, egy SOREMELÉS. Az angol FROM szó (ha szükséges) (Ld.4.4.15.3.5) A feladó közelebbi megjelölése (ha szükséges) Az angol STOP szó, melyet egy KOCSI VISSZA, egy SOREMELÉS követ (ha szükséges) (Ld. 4.4.15.3.5) és/vagy a feladó hivatkozási adata (ha használnak ilyet)	
		A közlemény szövege	A közlemény szövege, mely szöveg minden nyomtatott sorát egy KOCSI-VISSZA, egy SOREMELÉS karakter zár, kivéve az utolsó sort (Ld. 4.4.15.3.6)	

	Megerősítés (ha szükséges)	a) Egy KOCSI-VISSZA, egy SOREMELÉS b) a CFM rövidítés, melyet a szöveg megerősítendő része követ	
	Javítás (ha szükséges)	a) Egy KOCSI-VISSZA, egy SOREMELÉS b) a COR rövidítés, melyet a megelőző szövegben elkövetett hibák javítása követ	
ZÁRÓRÉSZ (Ld. 4.4.15.3.12.1)	Szövegigazító funkció	Egy KOCSI-VISSZA, egy SOREMELÉS	<≡
	Lapemelés	Egy karakter (0/11)	VT
	“Szöveg vége” karakter	Egy karakter (0/3)	ETX

4-4. ábra Az 5-ös számú Nemzetközi ABC (IA-5)

(ez az ábra a 4.4.15 pont alatt részletezett közlemény-formátumot mutatja be)

Elsőbbségi jelzés	*Közlemény kategóriája*
SS	vészhelyzeti közlemények
DD	sürgősségi közlemények (*lásd* a 4.4.1.1.2 pontot)
FF	repülésbiztonsági közlemények (*lásd* a 4.4.1.1.3 pontot)
GG	meteorológiai közlemények (*lásd* a 4.4.1.1.4 pontot)
GG	a repülések rendszerességét elősegítő közlemények (*lásd* a 4.4.1.1.5 pontot)
GG	légiforgalmi tájékoztató szolgálatok közleményei (*lásd* a 4.4.1.1.6 pontot)
KK	légiforgalmi adminisztrációs közlemények (*lásd* a 4.4.1.1.7 pontot)
	ahogy megfelelő szolgálati közlemények (*lásd* a 4.4.1.1.9 pontot)

4.4.15.2.1.2 Az elsőbbségi sorrend megegyezik a 4.4.1.2 pontban leírtakkal.

4.4.15.2.1.3 Minden címzett megjelölés elé egy SZÓKÖZ-t kell tenni, kivéve, ha az a második vagy harmadik címzett sorban található első ilyen címzett megjelölés. A címzett megjelölés az alábbi elemekből kell, hogy álljon:

a) a célállomás négy-betűs helység jelölése;

b) a címzett szervezetet (légiforgalmi hatóságot, szolgálatot, vagy légijármű üzemeltető ügynökséget) azonosító három-betűs jelzés;

c) egy további betű, amely a címzett szervezeten belül egy osztályt, részleget, vagy eljáró egységet azonosít. Az X betűt kell használni helykitöltésre, ha ilyen további azonosításra nincs szükség.

4.4.15.2.1.3.1 Ha egy közleményt olyan szervezetnek kell címezni, amelynek nem osztottak ki a 4.4.15.2.1.3 pontban leírt típusú ICAO három-betűs jelzést, akkor a célállomás négy-betűs helység jelölése után az ICAO három-betűs YYY (vagy, katonai szervezet, vagy szolgálat esetében az ICAO három-betűs YXY) jelzést kell írni. A címzett szervezet nevét ilyenkor a közlemény szövegének első elemeként kell feltüntetni. Az ICAO három-betűs YYY vagy YXY jelzés után a következő nyolcadik) betűnek a helykitöltő X betűnek kell lennie.

4.4.15.2.1.3.2 Amikor egy közleményt egy repülésben lévő légijárműnek kell megcímezni, és a közlemény - mielőtt a Légiforgalmi Mozgó Szolgálat továbbítaná - útjának egy részét az AFTN hálózaton keresztül teszi meg, akkor annak a légiforgalmi állomásnak a helység jelölése után, amelynek továbbítania kell a közleményt a légijármű részére, az ICAO három-betűs ZZZ jelzést kell írni. Ezután a légijármű azonosítóját a közlemény szövegrészének első elemeként kell feltüntetni. Az ICAO három-betűs ZZZ jelzés után a következő (nyolcadik) betűnek a helykitöltő X betűnek kell lennie.

4.4.15.2.1.4 A teljes címzés a nyomtatott példányon legfeljebb három sort foglalhat el, és a 4.4.16 pontban leírtak kivételével, külön címzett megjelölést kell használni minden egyes címzettre, akár egy helyen találhatók azok, akár nem.

4.4.15.2.1.5 A címzett megjelölés csoport(ok) befejezése után közvetlenül egy kijelölési funkciót kell beilleszteni.

4.4.15.2.1.6 Ha a közleményt továbbításra nyomtatott formában veszik át, és a közlemény több címzett megjelölést tartalmaz, mint amennyi a nyomtatott lapon három sorban elfér, akkor az ilyen közleményeket, tovább küldés előtt két vagy több közleményre kell bontani, amelyek már megfelelnek a 4.4.15.2.1.5 pont előírásainak. Az ilyen átalakítás során - amennyire az gyakorlatilag lehetséges – a címzett megjelöléseket olyan sorrendbe kell rendezni, hogy a soron következő távközlési központokban a lehető legkevesebb számú újra-feladásra legyen szükség.

4.4.15.2.2 *Feladó rész*

A feladó résznek az alábbi elemekből kell állnia:

a) feladási idő;

b) feladó megjelölése;

c) elsőbbségi jelzés (ha szükséges);

d) választható fej-rész információ;

e) kijelölési funkció [<≡];

f) szöveg-kezdete karakter, a 0/2 karakter (STX).

4.4.15.2.2.1 A feladási idő egy hat-számjegyű dátum-idő csoportból kell, hogy felépüljön, mely azt jelzi, hogy a közleményt feladásra mikor nyújtották be (*lásd* a 3.4.2 pontot).

4.4.15.2.2.2 A feladó megjelölése, amely elé közvetlenül egy SZÓKÖZ-t kell tenni, a következő elemekből kell, hogy álljon:

a) a feladás helyének négy-betűs helység jelölése;

b) a közleményt feladó szervezetet/hatáskört (légiforgalmi hatóságot, légiforgalmi szolgálatot vagy légijármű-üzemeltető ügynökséget) azonosító három-betűs jelzés;

c) egy további betű, amely a feladó szervezeten belül egy osztályt, részleget vagy eljáró egységet azonosít. Az X betűt kell használni helykitöltésre, ha ilyen további azonosításra nincs szükség.

4.4.15.2.2.3 Ahol a közlemény feladója olyan szervezet, amelynek nem osztottak ki a 4.4.15.2.2.2 pontban leírt típusú ICAO három-betűs jelzést, a feladás helyének négy-betűs helység jelölése után azonnal az ICAO három-betűs YYY jelzést és a helykitöltő X betűt kell írni (vagy, katonai szervezet vagy szolgálat esetében az ICAO három-betűs YXY jelzést és a helykitöltő X betűt kell írni). A szervezet (vagy katonai szolgálat) nevét ezután a közlemény szövegének első elemeként kell feltűntetni.

4.4.15.2.2.3.1 Az AFTN-en továbbított olyan közlemények számára, amelyeket egy másik hálózatban adtak fel, ki kell jelölni egy érvényes AFTN feladót, amelyet - megegyezés alapján – az AFTN-t a külső hálózattal összekötő relé- (relay), vagy kapu- (gateway) berendezés használ.

4.4.15.2.2.4 Ha a közlemény feladója egy repülésben lévő légijármű, és a közleményt útvonalának egy részén az AFTN hálózaton keresztül kell továbbküldeni, mielőtt kézbesíteni lehetne, akkor a feladó megjelölése annak a légiforgalmi állomásnak a négy-betűs helység jelölése, amely a közleményt az AFTN-nek továbbította, majd az ICAO három-betűs ZZZ jelzés és a helykitöltő X betű következik. A légijármű azonosítóját (hívójelét) ezután a közlemény szövegének első elemeként kell megadni.

4.4.15.2.2.5 Az elsőbbségi jelzést csak vészhelyzeti közlemények esetében kell használni. Amikor használják, akkor öt egymás után következő BEL (0/7, csengő) karakterből kell, hogy álljon.

Megjegyzés.- Az elsőbbségi jelzés a vevő távgépíró-készülékben lévő csengőt (figyelemfelkeltő jelzést) szólaltatja meg, eltérően a teljesen automatikus távközlési állomások esetén, melyek hasonló figyelmeztető jelzést adhatnak az SS sürgősségi jelzés észlelésekor, ezáltal riasztják az átjátszó központokban a felügyelő személyzet, az alárendelt állomásokon pedig a kezelő személyzet figyelmét, és így a közleményre azonnali figyelmet fordíthatnak.

4.4.15.2.2.6 A feladó sorban további szabadon választható adatok közlését is meg kell engedni, feltéve, hogy teljes hossza nem haladja meg a 69 karaktert, és hogy ez az érintett Hatóságok megállapodásának tárgyát képezi. A szabadon választható adatmező kezdetét egy SZÓKÖZ-el kell jelezni.

4.4.15.2.2.6.1 **Ajánlás. -** *Ha egy közleményben a 'forrás' és a 'cél' címzések között további címzési információk cseréje szükséges, akkor azt lehetőleg a szabadon választható adatmezőben (ODF) tegyék,*
A feladó megjelölése, amely elé közvetlenül egy SZÓKÖZ -t kell tenni, a következő elemekből kell, hogy álljon:

a) (1.) a feladás helyének a további címzési információk paramétereinek jelzésére;

b) három módosító karakter, amelyet egyenlőség jel követ (=) és a 8 karakterből álló ICAO jelzés, és;

c) egy (-) kötőjel karakter a további címjegyzék mező befejezésére;

4.4.15.2.2.6.1.1 **Ajánlás. –** *Ha a szolgálati közleményekre, vagy kérdésekre a külön cím nem egyezik meg a feladó megjelölésével, akkor lehetőleg az SVC módosító jelzést kell használni.*

.

4.4.15.2.2.7 A feladó részt egy kijelölési funkcióval [<≡] és a “szöveg-kezdete” (STX) (0/2) karakterrel kell lezárni.

4.4.15.3 *Szöveg*

4.4.15.3.1 A közlemények szövegét a 4.1.2 pont előírásainak megfelelően kell megfogalmazni, és az STX és az ETX között lévő valamennyi adatból kell állnia.

Megjegyzés.- Ha a közlemény szövegét nem kell ITA-2 kódba és formátumba átalakítani, és nem ütközik azokkal az ICA0 közlemény típusokkal vagy formátumokkal, amelyek a PANS - ATM-ben (Doc 4444) vannak leírva, a Hatóságok teljes mértékben kihasználhatják az 5-ös számú Nemzetközi ABC-ben (IA-5) rendelkezésre álló karaktereket.

4.4.15.3.2 Ha feladóra vonatkozó hivatkozási adatot használnak, akkor azt a szöveg elejére kell tenni,
kivéve a 4.4.15.3.3 és a 4.4.15.3.4 pontban megadottakat.

4.4.15.3.3 Ha a címzett megjelölés második elemét, az YXY, az YYY vagy a ZZZ három-betűs ICAO
jelölés alkotja (*lásd* a 4.4.15.2.1.3.1 és a 4.4.15.2.1.3.2 pontokat), és ezért szükségessé válik a szövegben a közlemény címzettjének közlése, akkor ezt az azonosító karakter-csoportot a feladóra való hivatkozás elé kell írni (ha van ilyen), és ezzel ez a szöveg első elemévé válik.

4.4.15.3.4 Ha a feladó megjelölés második elemét az YXY, az YYY vagy a ZZZ három-betűs ICAO jelzés alkotja (*lásd* a 4.4.15.2.2.3 és 4.4.15.2.2.4 pontokat), és ezért szükségessé válik a szövegben a közleményt feladó szervezet (vagy katonai szolgálat), vagy a légijármű nevének közlése, akkor ezt az azonosítót a szöveg első elemeként kell megadni.

4.4.15.3.5 Amikor a 4.4.15.3.3 és a 4.4.15.3.4 pontok előírásait alkalmazzák olyan közlemények esetében, amelyekben az ICAO három-betűs YXY, YYY vagy ZZZ jelzéseket két vagy több különböző szervezet (vagy katonai szolgálat) megjelölésére is használták, akkor a szövegben a további azonosítók sorrendjének meg kell egyeznie a közlemény címzés- és címzett-megjelölésében használt teljes sorrendjével. Ilyen esetben minden címzett megjelölés után egy kijelölési funkciót kell tenni. A közleményt feladó (YXY, YYY vagy ZZZ jelzéssel megjelölt) szervezet neve elé ilyenkor a "FROM" szót kell írni.
Az azonosítók után, a szöveg többi része elé, a "STOP" szót kell írni, amelyet egy kijelölési funkció kell, hogy kövessen.

4.4.15.3.6 A szöveg minden nyomtatott sora után egy kijelölési funkciót kell küldeni. A távgépíró üzemben - ha a szöveg egy részét meg kívánják erősíteni, akkor - a megerősítést az utolsó szövegcsoporttól egy kijelölési funkcióval kell elválasztani [<≡] , és ezt a CFM rövidítéssel kell jelezni, amely után a megerősített szöveg-rész következik

tengerszint feletti magasság (altitude)	*továbbításuk*
800	**eight hundred**
3 400	**three thousand four hundred**
12 000	**one two thousand**
felhőalap (cloud height)	*továbbításuk*
2 200	**two thousand two hundred**
4 300	**four thousand three hundred**
látástávolság (visibility)	*továbbításuk*
1 000	visibility **one thousand**
700	visibility **seven hundred**
futópálya menti látástávolság (runway visual range)	*továbbításuk*
600	RVR **six hundred**
1 700	RVR **one thousand seven hundred**

5.2.1.4.1.3 A tizedespontot tartalmazó számokat az 5.2.1.4.1.1 pontban található szabályok szerint kell továbbítani, úgy, hogy a tizedespontot a megfelelő sorrendet betartva a "DECIMAL" (TIZEDES) szóval kell jelölni.

1. Megjegyzés. - Az alábbi példák ennek az eljárásnak az alkalmazását mutatják be:

Szám	*Továbbítás módja*
100.3	ONE ZERO ZERO DECIMAL THREE
38 143.9	THREE EIGHT ONE FOUR THREE DECIMAL NINE

2. Megjegyzés. - A VHF frekvenciák azonosítására a tizedespont után használt számjegyek számát a csatorna-osztás határozza meg (a 25 kHz-es osztással elválasztott frekvenciákra az 5.2.1.7.3.4.3 pont, illetve a 8,33 kHz-es osztással elválasztott frekvenciákra pedig az 5.2.1.7.3.4.4 pont előírásai vonatkoznak).

3. Megjegyzés. - A 8.33 kHz-es és a 25 kHz-es osztáshoz tartozó csatorna-osztási / frekvencia párosítási kapcsolatokat az V. kötet 4.1 (bis) táblázata foglalja össze.

5.2.1.4.1.4 **PANS. -** *Időadat továbbításakor általában csak az óra perceit szükséges megadni. Minden egyes számjegyet külön kell kimondani. Az órát is közölni kell azonban, ha annak elhagyása bármilyen zavart okozhatna.*

Megjegyzés. - Az alábbi példák ennek az eljárásnak az alkalmazását mutatják be, amennyiben az 5.2.1.2.2 pont előírásait alkalmazzák:

Idő	*Továbbítása*	
0920	*(de. 9:20)*	TOO ZE-RO, vagy ZE-RO NIN-er TOO ZE-RO
1643	*(du.. 4:43)*	FOW-er TREE, vagy WUN SIX FOW-er TREE

5.2.1.4.2 *Számok ellenőrzése, megerősítése*

5.2.1.4.2.1 Ha szükséges a számok pontos vételének ellenőrzése, megerősítése, akkor a közleményt továbbító személy felkéri a közleményt vevő személyt a számok visszaolvasására.

5.2.1.4.3 *Számok kiejtése*

5.2.1.4.3.1 Az 5.2.1.2.2 pont előírásainak alkalmazása során a számokat az alábbi kiejtéssel kell továbbítani:

Szám, vagy közlemény	*Kiejtés (angol kiejtési számrésze megfeleltetéssel)*
0	ZE-RO
1	WUN
2	TOO
3	TREE
4	FOW-er
5	FIFE
6	SIX
7	SEV-en

8	AIT
9	NIN-er
Decimal	DAY-SEE-MAL
Hundred	HUN-dred
Thousand	TOU-SAND

Megjegyzés. - A fenti táblázatban a nagybetűvel írt szótagok a hangsúlyosak. Például, a ZE-RO szóban mindkét szótag egyformán hangsúlyos, míg a FOW-er szóban a hangsúly az első szótagra esik.

5.2.1.5 *Adás-technika*

5.2.1.5.1 **PANS**. - *Minden írott közleményt az adás megkezdése előtt lehetőség szerint egyszer végig kell olvasni, hogy elkerülhető legyen a fölösleges késedelem a továbbítás során.*

5.2.1.5.2 A közleményt adó fogalmazzon tömören, normál társalgási hanghordozást használva.

Megjegyzés. – Lásd a nyelvismereti követelményeket az Annex 1-hez tartozó Függelékben.

5.2.1.5.3 **PANS. -** *A beszéd adás-technikája lehetőség szerint olyan legyen, hogy biztosítsa minden adás során az elérhető legtisztább érthetőségét. Ennek a célnak az elérése érdekében szükséges, hogy a hajózó és a földi személyzet lehetőleg:*

a) minden szót tisztán és világosan ejtsen ki;

b) egyenletes tempóban beszéljen, a beszéd sebessége ne haladja meg a 100 szót percenként. Ha a közlemény légijárműnek szól és a tartalmát le kell írni, akkor beszéljen lassabban, hogy legyen elég idő a közlemény leírására. A számok előtti és utáni kis szünet elősegítheti azok megértését;

c) tartsa a beszéd hangerejét állandó szinten;

d) ismerje a mikrofon-kezelési technikát, különösen azt, hogy a mikrofont állandó távolságban tartsa a szájától, ha nem alkalmaznak állandó hangerőt beállító áramkört;

e) ha szükséges elfordítania a fejét a mikrofontól, átmenetileg függessze fel a beszédet.

5.2.1.5.4 **Ajánlás**.- *A beszéd- és adás-technikát lehetőleg az adás idején uralkodó körülményekhez kell igazítani.*

5.2.1.5.5 **PANS. -** *A továbbításra elfogadott közleményeket lehetőség szerint vagy jól érthető szövegként, vagy jóváhagyott szakkifejezések használatával kell továbbítani anélkül, hogy a közlemény értelmét bármilyen módon megváltoztatnák. A közlemény szövegében előforduló, elfogadott ICAO rövidítéseket általában azokkal a nem-rövidített szavakkal vagy kifejezésekkel ajánlott helyettesíteni, melyeket ezek a rövidítések a továbbításra használt nyelven jelentenek, kivéve azokat a rövidítéseket, amelyeket a gyakori és általános használat következtében a légiközlekedés szakszemélyzete rendszerint megért.*

Megjegyzés. - A PANS-ABC (Doc 8400) kiadvány rövidítéseket kódoló része külön is jelzi azokat a rövidítéseket, amelyek a fenti 5.2.1.5.5 pontban említett kivételek közé tartoznak.

5.2.1.5.6 **PANS. -** *Az összeköttetés meggyorsítása céljából a fonetikus betűzést el lehet hagyni, ha ez nem veszélyezteti a közlemény pontos vételét és érthetőségét.*

5.2.1.5.7 **PANS. -** *Hosszú közlemények továbbításakor, az adást lehetőleg időről időre meg kell szakítani néhány pillanatra, hogy a közleményt adó személy meggyőződhessen arról, hogy a használt frekvencián nincs zavarás, és ezzel lehetőséget adjon a vevő személynek arra, hogyha szükséges, a közlemény nem vett részeinek ismétlését kérhesse.*

5.2.1.5.8 Szükség szerint az alábbi szavakat és kifejezéseket kell használni a rádió-távbeszélő összeköttetések során, a táblázatban megadott jelentés szerint:

Kifejezés	*Jelentés*
ACKNOWLEDGE	"Tudassa velem, hogy vette és megértette ezt a közleményt!"
AFFIRM	"Igen."
APPROVED	"A tervezett tevékenységre az engedély megadva."
BREAK	"Jelzem a közlemény egyes részei közötti elválasztást." *(Akkor kell használni, ha nem különülnek el világosan a szöveg és a közlemény egyéb részei.)*
BREAK BREAK	"Jelzem, hogy itt van a különböző légijárműveknek szóló közlemények közötti elválasztás a frekvencia nagy terhelése miatt."
CANCEL	"Vegye semmisnek a korábban kiadott engedélyt!"
CHECK	"Ellenőrizzen egy rendszert vagy eljárást!"
	(Más jelentésben ne használja. Általában nem várnak rá választ.)
CLEARED	"Felhatalmazom, hogy a megadott feltételek szerint járjon el."
CONFIRM	"Kérem a következők megerősítését: *(engedély, utasítás, rendelkezés, információ).*"
CONTACT	"Létesítsen összeköttetést ... -val."
CORRECT	"Helyes", vagy "Pontos".
CORRECTION	"Hiba történt ebben az adásban *(vagy* a jelzett közleményben). A helyes változat a következő: ...."
DISREGARD	"Ne vegye figyelembe!"
HOW DO YOU READ	"Milyen az adásom érthetősége?"*(lásd az* 5.2.1.8.4 *pontot).*
I SAY AGAIN	"Ismétlem az érthetőség, vagy a nyomatékosítás érdekében"
MAINTAIN	"Folytassa a meghatározott körülmény(ek)nek megfelelő módon", vagy szó szerinti értelmében, pl. "Maintain VFR" ("Folytassa VFR szabályok szerint").
MONITOR	"Figyeljen a ... (frekvencián)."
NEGATIVE	"Nem" *vagy* "Nincs engedélyezve." *vagy* "Ez nem helyes." *vagy* "Nem alkalmas."
OVER	"A közleményemnek vége, választ várok Öntől." *(Megjegyzés.- VHF csatornákon általában nem használatos.)*

OUT	"Ezt a közleményváltást befejeztem, választ nem várok." *(Megjegyzés: VHF csatornákon általában nem használatos.)*
READ BACK	"Ismételje meg a teljes közleményt, vagy annak meghatározott részét, pontosan úgy, ahogyan azt vette!"
RECLEARED	"Az utoljára kiadott engedélyében változás történt, és ez az új engedély hatálytalanítja a korábbi engedélyt vagy annak egy részét."
REPORT	"Jelentse nekem a következő információkat ..."
REQUEST	"Szeretném tudni..." *vagy* "Szeretném megszerezni (megkapni) az ..."
ROGER	"Teljes egészében vettem az utolsó közleményét." *Megjegyzés. - Semmilyen körülmények között sem szabad válaszul olyan közleményekre használni, amelyek visszaolvasást (READ BACK) igényelnek, vagy közvetlen megerősítő (AFFIRM), vagy elutasító (NEGATIVE) választ.*
SAY AGAIN	"Ismételje meg a teljes utolsó adását, vagy az alábbi részét!"
SPEAK SLOWER	"Csökkentse a beszéd sebességét." *(Megjegyzés: A normál beszédsebességet lásd az 5.2.1.5.3 b) pontban.)*
STANDBY	"Várjon, hívni fogom." *Megjegyzés.- A hívó fél rendszerint ismét megpróbálja a kapcsolat felvételét, ha a késedelem hosszúra nyúlik. A STANDBY nem egy jóváhagyás, vagy visszautasítás.*
UNABLE	"Nem tudom teljesíteni a kérését, utasítását, vagy engedélyét." *Megjegyzés. - Az UNABLE kifejezés után általában közölni szokták az okot is.*
WILCO	*(A "will comply" kifejezés rövidítése.)* "Megértettem a közleményét, és az abban foglaltaknak megfelelően fogok eljárni."
WORDS TWICE	a) *Kérésként:* "A kommunikáció (vétel) nehézségekbe ütközik. Kérem, minden szót, vagy szócsoportot adjon kétszer!" b) *Információként:* "Mivel az adás nehézségekbe ütközik, ezért ebben a közleményben minden szót vagy szócsoportot kétszer adok."

5.2.1.6 *Közlemények összeállítása*

5.2.1.6.1 Azoknak a közleményeknek, amelyeket kizárólag a légiforgalmi mozgó szolgálat kezel, az alábbi részekből kell állnia, az itt leírt sorrendben:

a) hívás, amely tartalmazza a címzettet és a feladót (*lásd* az 5.2.1.7.3 pontot);

b) szöveg (*lásd* az 5.2.1.6.2.1.1 pontot).

Megjegyzés.- Az alábbi példák ennek az eljárásnak az alkalmazását mutatják be:

(hívás) NEW YORK RADIO SWISSAIR ONE ONE ZERO

(szöveg) REQUEST SELCAL CHECK ("SELCAL ellenőrzést kérek!"),

vagy

(hívás) SWISSAIR ONE ONE ZERO NEW YORK RADIO

(szöveg) CONTACT SAN JUAN ON FIVE SIX ("Lépjen összeköttetésbe ..... ").

5.2.1.6.2 Azokat a közleményeket, melyeket a továbbítás során részben AFTN-en keresztül is kell kezelni, valamint hasonlóképpen azokat a közleményeket, melyeket nem az előre meghatározott szétosztási rendnek megfelelő módon kezelnek (*lásd* a 3.3.7.1 pontot), az alábbiak szerint kell összeállítani:

5.2.1.6.2.1 *Ha egy légijármű a közlemény feladója:*

1) hívás (lásd az 5.2.1.7.3 pontban);

2) a "FOR" szó;

3) a címzett szervezet neve;

4) a célállomás neve;

5) a szöveg.

5.2.1.6.2.1.1 A szöveg a lehető legrövidebb formában tartalmazza a szükséges információkat; teljes mértékben ki kell használni az ICAO kifejezéseket.

Megjegyzés. - Az alábbi példa ennek az eljárásnak az alkalmazását mutatja be:

(hívás) BOSTON RADIO SWISSAIR ONE TWO EIGHT

(címzés) FOR SWISSAIR BOSTON

(szöveg) NUMBER ONE ENGINE CHANGE REQUIRED (Az egyes számú hajtómű cseréje szükséges)

5.2.1.6.2.2 *Ha a közleményt egy légijárműnek címezik:* Ha egy, a 4.4.2 pont előírásai szerint összeállított közleményt egy légiforgalmi állomás közvetít egy, a levegőben lévő légijármű számára, akkor a közleménynek a légiforgalmi mozgó szolgálat segítségével történő továbbítása során az AFTN közlemény-formátum fej-részét és címzését el kell hagyni.

5.2.1.6.2.2.1 Amikor az 5.2.1.6.2.2 pont előírásait alkalmazzák, a légiforgalmi mozgó szolgálat közleménye az alábbi részeket kell, hogy magában foglalja:

a) a szöveget [beleértve az AFTN közleményben található minden helyesbítést (COR) is];

b) a "FROM" szót;

c) a feladó szervezet nevét és a feladás helyét (az AFTN közlemény feladó-részéből átvéve).

5.2.1.6.2.2.2 **PANS.** .- *Ha a légiforgalmi állomás által egy repülésben lévő légijárműnek továbbítandó közleményben elfogadott ICAO rövidítések vannak, akkor a közlemény továbbítása során ezeket általában azokkal a nem-rövidített szavakkal vagy kifejezésekkel ajánlott helyettesíteni, melyeket ezek a rövidítések a továbbításra használt nyelven jelentenek, kivéve azokat a rövidítéseket, amelyeket a gyakori és általános használat következtében a légiközlekedés szakszemélyzete rendszerint megért.*

Megjegyzés. - Az 5.2.1.6.2.2.2 pontban említett kivételeket képező rövidítések a PANS-ABC (Doc 8400) rövidítések kódolási részében vannak külön meghatározva.

5.2.1.7 *Hívás*

5.2.1.7.1 R*ádió-távbeszélő hívójelek légiforgalmi állomások számára*

Megjegyzés. - A hívójelek összeállítási szabályait az ITU S19 Rádió Szabályzatának III. és VII. Része tartalmazza.

5.2.1.7.1.1 A légiforgalmi mozgó szolgálat keretein belül a légiforgalmi állomásokat az alábbiakkal kell azonosítani:

a) a hely nevével; és

b) a rendelkezésre álló egység vagy szolgálat megjelölésével.

5.2.1.7.1.2 Az egységet vagy szolgálatot az alábbi táblázat alapján kell azonosítani, azzal a kivétellel, hogy a hely, vagy az egység/szolgálat nevét el lehet hagyni, feltéve, hogy már kielégítő összeköttetést sikerült létesíteni.

Egység/szolgáltatás megjelölése	*Hívójel utótag*
Körzeti irányító központ	CONTROL
Bevezető irányítás	APPROACH
Bevezető radar-irányítás érkezőknek	ARRIVAL
Bevezető radar-irányítás indulóknak	DEPARTURE
Repülőtéri irányítás	TOWER
Gurító irányítás	GROUND
Radar-irányítás (általában)	RADAR
Precíziós bevezető- radar-irányítás	PRECISION
Iránymérő állomás	HOMER
Repülés-tájékoztató szolgálat	INFORMATION
Engedély-kiadás	DELIVERY
Előtéri irányítás	APRON
Társasági diszpécser	DISPATCH
Légiforgalmi állomás	RADIO

5.2.1.7.2 A légijárművek rádió-távbeszélő hívójelei

5.2.1.7.2.1 *Teljes hívójelek*

5.2.1.7.2.1.1 Egy légijármű rádió-távbeszélő hívójele az alábbi típusok valamelyike kell , hogy legyen:

a) típusú – a karakterek megegyeznek a légijármű lajstromjelével; vagy

b) típusú – a légijármű járatójának rádió-távbeszélő megjelölése, amelyet a légijármű lajstromjelének utolsó négy karaktere követ;

c) típusú – a légijármű járatójának rádió-távbeszélő megjelölése, amelyet a járatot azonosító jelzés követ.

1. Megjegyzés. - A fenti a) típusú hívójelben használható előtag lehet a légijármű gyártójának neve vagy modelljének neve (lásd az 5.1 táblázatot).

2. Megjegyzés. - A b) és c) típusú rádió-távbeszélő azonosítókat a Doc 8585, Légijármű Járatók, Légiforgalmi Szervezetek, Hatóságok és Szolgálatok Azonosítói /Designators for Aircraft Operating Agencies, Aeronautical Authorities and Services/ *tartalmazza*.

3. Megjegyzés. - Az előbbiekben felsorolt hívójelek közül bármelyik beírható az ICAO repülési terv 7. rovatába, mint a légijármű azonosítója. A repülési terv kitöltésére vonatkozó útbaigazításokat a PANS-ATM, Doc 4444 tartalmazza.

5.2.1.7.2.2 *Rövidített hívójelek*

5.2.1.7.2.2.1 A légijárművek fenti 5.2.1.7.2.1.1 pontban bemutatott rádió-távbeszélő hívójeleit - a c) típusú hívójel kivételével, - az 5.2.1.7.3.3.1 pontban leírt feltételekkel le lehet rövidíteni. A rövidített hívójeleknek az alábbi formátumúaknak kell lenniük:

a) típusú – a lajstromjel első karaktere és legalább a hívójel utolsó két karaktere; vagy

b) típusú – a légijármű járatójának rádió-távbeszélő megjelölése és legalább a hívójel utolsó két karaktere;

5-1. táblázat: Példák teljes és rövidített hívójelekre

(lásd az 5.2.1.7.2.1 és az 5.2.1.7.2.2 pontokat)

	a) típus			b) típus	c) típus
Teljes hívójel	N 57826	*CESSNA FABCD	*CITATION FABCD	VARIG PVMA	SCANDINAVIAN 937
Rövidített hívójel	N26	CESSNA CD	CITATION CD	VARIG MA	(nem rövidíthető)
	vagy	vagy	vagy	vagy	
	N826	CESSNA BCD	CITATION BCD	VARIG VMA	

* Ezek a példák az 5.2.1.7.2.1.1 pont 1. Megjegyzésében található előírások alkalmazását mutatják be.

c) típusú – nem rövidíthető formátum.

Megjegyzés.- A fenti a) típusú hívójelben az első karakter helyett akár a légijármű gyártójának, akár a légijármű modelljének neve használható.

5.2.1.7.3 *Rádió-távbeszélő eljárások*

5.2.1.7.3.1 A légijármű a rádió-távbeszélő hívójelének típusát repülés közben nem változtathatja meg, kivéve, ha erre - ideiglenes jelleggel - egy légiforgalmi irányító egység a repülés biztonsága érdekében utasítja.

5.2.1.7.3.1.1 Hacsak nem a repülés biztonsága érdekében szükséges, a légijárműhöz felszállás közben, a végső megközelítés utolsó fázisában és a leszállás utáni kifutás közben nem szabad közleményt intézni.

5.2.1.7.3.2 *Rádió-távbeszélő összeköttetés létesítése*

5.2.1.7.3.2.1 Az összeköttetés felvételekor mindig a teljes rádió-távbeszélő hívójelet kell használni. Az összeköttetést létesítő légijárműnek a hívást az 5-2. táblázatban foglaltak szerint kell végrehajtania.

5.2.1.7.3.2.2 **PANS**. - *Azoknak az állomásoknak, melyeknek egy közleményt valamennyi olyan állomás számára kell továbbítaniuk, amelyek azt valószínűleg hallani fogják, az ilyen adást lehetőleg az "ALL STATIONS" ("MINDEN ÁLLOMÁSNAK") általános hívással kell kezdeniük, amelyet a hívó állomás azonosítója kell, hogy kövessen.*

Megjegyzés. - Az ilyen általános hívásokra nem várnak választ, kivéve, ha ezt követően az egyes állomásokat fel nem kérik a nyugtázásra.

5.2.1.7.3.2.3 Az előbbi hívásokra az 5-3. táblázatnak megfelelően kell válaszolni. A légiforgalmi állomás hívásakor az állomás hívójelét, - amelyet légiforgalmi állomás hívójelével történő válaszadás követ - úgy tekinteni mint kérést az adás megkezdésére

5.2.1.7.3.2.4 **PANS. -** *Ha egy állomás hívást vett, de nem biztos a hívó állomás azonosítójában, akkor lehetőleg az alábbiak adásával válaszoljon.*

STATION CALLING (*a meghívott állomás neve*), SAY AGAIN YOUR CALL SIGN ("Ismételje a hívójelét!").

Megjegyzés. - Az alábbi példa ennek az eljárásnak az alkalmazását mutatja be:
(CAIRO állomás válasza)

STATION CALLING CAIRO *(szünet)* SAY AGAIN YOUR CALL SIGN
/"A Kairó-t hívó állomásnak. *(szünet)* Ismételje meg a hívójelét!"/

5.2.1.7.3.2.5 A közlemény-váltást egy hívással és egy válasz-adással kell kezdeni, amikor az összeköttetést szeretnék létrehozni, kivéve, ha bizonyosak abban, hogy a hívott állomás venni fogja a hívást; ebben az esetben a hívó állomás leadhatja a közleményét anélkül, hogy megvárná a hívott állomás jelentkezését.

5.2.1.7.3.2.6 A légijárművezetők közötti, levegő-levegő közlemény-váltást a 123,45 MHz-es csatornán kell kezdeményezni, akár egy meghatározott légijármű állomásnak szóló közvetlen hívással, vagy általános hívással, figyelembe véve e csatorna használatának feltételeit.

Megjegyzés. - A levegő-levegő csatornák használatának feltételeit lásd az Annex 10, V. Kötet, 4.1.3.2.1 pontban, valamint a II. Kötet, 5.2.2.1.1.4 pontban.

5.2.1.7.3.2.6.1 **PANS .-** *Mivel a légijármű egynél több frekvencián is figyelhet, a kezdeti hívás lehetőleg tartalmazza a csatorna megkülönböztető "INTERPILOT" megjelölését.*

Megjegyzés. - Az alábbi példák ezen hívási eljárások alkalmazását mutatják be:

CLIPPER123 – SABENA901 – INTERPILOT – DO YOU READ
("CLIPPER123 – A SABENA901 hívja az INTERPILOT csatornán – hallja az adásomat?")

vagy

ANY AIRCRAFT VICINITY OF 30 NORTH 160 EAST - JAPANAIR 401 - INTERPILOT – OVER
("Bármely légijármű az Északi szélesség 30 és a Keleti hosszúság 160 körzetében – a JAPANAIR 401 hívja az INTERPILOT csatornán – Vétel")

5-2. táblázat: Rádió-távbeszélő hívási eljárások*

(lásd az 5.2.1.7.3.2.1 p*ontot)*

	a) típus	*b) típus*	*c) típus*
A hívott állomás megnevezése	NEW YORK RADIO	NEW YORK RADIO	NEW YORK RADIO
A hívó állomás megnevezése	GABCD**	SPEEDBIRD ABCD**	AEROFLOT321**

** Bizonyos esetekben, amikor a hívást a légiforgalmi állomás kezdeményezi, a hívást kódolt impulzus-jelek leadásával is végre lehet hajtani.*

*** A rádió-távbeszélő hívójel és a légijármű típusa kivételével a hívójel minden karakterét külön ki kell mondani. Az egyes betűket az 5.2.1.3 pontban előírt rádió-távbeszélő ABC szerint kell kiejteni. A számokat az 5.2.1.4 pont előírásai szerint kell kimondani.*

5-3. táblázat: Rádió-távbeszélő eljárások válasz esetére

(lásd az 5.2.1.7.3.2.3 *pontot)*

	a) típus	*b) típus*	*c) típus*
A hívott állomás megnevezése	GABCD*	SPEEDBIRD ABCD*	AEROFLOT321*
A válaszoló állomás megnevezése	NEW YORK RADIO	NEW YORK RADIO	NEW YORK RADIO

** A rádió-távbeszélő megjelölés és a légijármű típusa kivételével a hívójel minden karakterét külön ki kell mondani. Az egyes betűket az 5.2.1.3 pontban előírt rádió-távbeszélő ABC szerint kell kiejteni. A számokat az 5.2.1.4 pont előírásai szerint kell kimondani.*

5.2.1.7.3.3 *A kapcsolat-felvétel utáni rádió-távbeszélő közlemény-váltások*

5.2.1.7.3.3.1 A fenti 5.2.1.7.2.2 pontban leírt rövidített rádió-távbeszélő hívójeleket csak akkor szabad használni, ha már sikeres összeköttetést sikerült létrehozni, és ha hívójel összetévesztés bekövetkezése nem valószínű. A légijármű állomásnak csak akkor szabad a rövidített hívójelét használnia, ha a légiforgalmi állomás már intézett hozzá hívást ilyen módon.

5.2.1.7.3.3.2 Az összeköttetés létrehozása után a folyamatos kétirányú kommunikáció engedélyezett minden további azonosítás, vagy hívás nélkül, a közlemény-váltás befejezéséig.

5.2.1.7.3.3.3 Az esetleges összetévesztés elkerülése érdekében, amikor ATC engedélyeket adnak ki, valamint az ilyen engedélyek visszaolvasásakor, a légiforgalmi irányítók és a légijárművezetők mindig kötelesek hozzátenni annak a légijárműnek a hívójelét, amelyre az adott engedély vonatkozik.

5.2.1.7.3.4 *Az adó frekvencia azonosítása, jelölése*

5.2.1.7.3.4.1 **PANS. -** *Mivel a légiforgalmi állomás kezelője általában több frekvencián figyel, a hívás után lehetőleg azonosítania kell a használt frekvenciát, hacsak nincs egyéb ismert, megfelelő módszer a frekvencia azonosítására.*

5.2.1.7.3.4.2 **PANS. -** *Ha nem valószínű, hogy összetéveszthetik, akkor a HF csatornák azonosításakor az első két számjegyet kell megadni (kHz-ben) az adó csatorna azonosítására.*

Megjegyzés. - Az alábbi példa ennek az eljárásnak az alkalmazását mutatja be:

(PAA 325 hívja Kingstont a 8871 kHz-es frekvencián)
KINGSTON CLIPPER THREE TWO FIVE - ON EIGHT EIGHT

5.2.1.7.3.4.3 **PANS. -** *Ha a VHF kommunikációs csatornákat 25 kHz-es osztással választják el egymástól, a rádió-távbeszélő közlemény-váltások során az adó vivőfrekvencia azonosítására csak az első 5 számjegy használata szükséges. A tizedespont után csak két fontos számjegyet kell használni. Ha itt két nulla áll, akkor egy nulla számít fontos számjegynek.*

Megjegyzés. - Az alábbi példa ennek az eljárásnak az alkalmazását mutatja be:

Csatorna	*Továbbítása*
118.000	*ONE ONE EIGHT DECIMAL ZERO*
118.025	*ONE ONE EIGHT DECIMAL ZERO TWO*

5.2.2.5.2 **PANS. -** *Egyik hálózatról a másikra történő áttérés esetén az átadásnak lehetőleg addig kell megtörténnie, amíg a légijármű egy olyan állomással áll összeköttetésben, amely mindkét hálózatban üzemel, hogy ezzel biztosítsák az összeköttetés folyamatosságát. Ha azonban a hálózatok közti váltást azzal egyidőben kell elvégezni, hogy az összeköttetést egy másik hálózati állomásnak átadják, akkor az átadást a két hálózati állomásnak lehetőség szerint koordinálnia kell, mielőtt a frekvenciaváltást tanácsolnák, vagy arra felhatalmazást adnának. A légijárművel közölni kell az átadás után használandó elsődleges és másodlagos frekvenciákat is.*

5.2.2.5.3 Amikor egy légijármű-állomás az egyik rádiófrekvencia figyeléséről egy másik frekvencia figyelésére tért át, ha az illetékes ATS Hatóság ezt megköveteli, tájékoztassa az érintett légiforgalmi állomást, hogy megkezdte az összeköttetés figyelését az új frekvencián.

5.2.2.5.4 **PANS. -** *Amikor a légijármű felszállása után a légijármű-állomás bejelentkezik egy hálózathoz, akkor meg kell adnia felszállásának idejét, vagy az utolsó ellenőrző pont átrepülésének idejét a megfelelő illetékes állomásnak.*

5.2.2.5.5 **PANS. -** *Amikor a légijármű-állomás új hálózatba lép át, akkor meg kell adnia az utolsó ellenőrző pont feletti átrepülésének idejét, vagy az utolsó jelentett pozíciója idejét a megfelelő illetékes állomásnak.*

5.2.2.5.6 **PANS. -** *Mielőtt a légijármű-állomás elhagyná a hálózatot, lehetőleg minden esetben értesítse a megfelelő illetékes állomást erről a szándékáról - az alábbiak közül - a megfelelő kifejezés továbbításával:*

a) amikor a légijármű-vezető - légiforgalmi irányító között használt csatornára tér át:

Légijármű: CHANGING TO ... (ÁTKAPCSOLOK A) ... – *(a megfelelő légiforgalmi szolgálati egység neve)*

b) leszállás után:

Légijármű: LANDED ... (LESZÁLLTAM) .... *(hely) ... (idő)*

5.2.2.6 *VHF összeköttetés átadása*

5.2.2.6.1 A légijárművet az illetékes légiforgalmi állomásnak kell felkérnie arra, hogy térjen át egyik frekvenciáról a másikra, a jóváhagyott eljárásoknak megfelelően. Ilyen felkérés hiányában a légijármű-állomásnak kell értesítenie az illetékes légiforgalmi állomást, mielőtt áttér egyik frekvenciáról a másikra.

5.2.2.6.2 Amikor az első kapcsolatot felveszi, illetve a VHF frekvencia elhagyásakor, a légijármű-állomásnak továbbítania kell minden olyan tájékoztatást, amit az illetékes Hatóság előírt számára.

5.2.2.7 *Hang összeköttetési hiba*

5.2.2.7.1 *Levegő-föld összeköttetés*

5.2.2.7.1.1 Ha egy légijármű-állomásnak nem sikerül összeköttetést létesítenie a légiforgalmi állomással a kijelölt frekvencián, akkor meg kell kísérelnie az összeköttetés felvételét a korábban használt frekvencián, ennek sikertelensége esetén pedig egy - az útvonalnak megfelelő - másik frekvencián. Amennyiben ez a kísérlet sem sikerül, a légijármű-állomásnak az útvonalnak megfelelő frekvencián meg kell próbálnia összeköttetést létesíteni más légijárművekkel, vagy más légiforgalmi állomásokkal. Ezen kívül, egy hálózatban működő légijárműnek a megfelelő VHF frekvenciát figyelnie kell, hogy képes legyen a közelében lévő légijáművektől érkező hívások vételére.

5.2.2.7.1.2 Ha az 5.2.2.7.1.1 pontban leírt kísérletek eredménytelenek maradnak, a légijármű-állomásnak a "TRANSMITTING BLIND" (vak-adás) kifejezés után közleményét kétszer le kell adnia a kijelölt csatorná(ko)n, és ha szükséges, hozzá kell tennie a címzette(ke)t is, aki(k)nek a közleményt szánja.

5.2.2.7.1.2.1 **PANS. -** *Hálózati üzemelés esetén a vak-adással leadandó közleményt kétszer kell leadni az elsődleges és a másodlagos frekvencián is. A frekvencia-váltás előtt a légijármű-állomásnak be kell jelentenie, hogy melyik frekvencia az, amire át fog váltani.*

5.2.2.7.1.3 A v*evőkészülék meghibásodása*

5.2.2.7.1.3.1 Ha egy légijármű-állomás a vevőkészülék hibája miatt nem képes összeköttetést létesíteni, akkor jelentéseit továbbítania kell a használatos frekvencián a kívánt időpontokban vagy földrajzi helyeken, a "TRANSMITTING BLIND DUE TO RECEIVER FAILURE" ("VAK-ADÁS A VEVŐKÉSZÜLÉK HIBÁJA MIATT") kifejezés után. A légijármű-állomás le kell, hogy adja a szükségesnek ítélt közleményét, majd meg kell ismételnie az egészet. Az eljárás során a légijárműnek közölnie kell a következő tervezett adásának időpontját is.

5.2.2.7.1.3.2 Ha a légijármű, légiforgalmi irányítói szolgáltatásban vagy tanácsadói szolgáltatásban részesül, az 5.2.2.7.1.3.1 pont előírásainak betartásán felül adjon tájékoztatást a légijármű parancsnok-pilótájának a repülés folytatásával kapcsolatos szándékáról is.

5.2.2.7.1.3.3 Ha a légijármű a fedélzeti berendezés hibája miatt nem képes összeköttetést létesíteni, akkor - ha rendelkezik az ehhez szükséges berendezéssel - állítsa be a megfelelő SSR kódot a rádióhiba jelzésére.

Megjegyzés. - A rádióhiba esetén használható általános szabályokat a Chicagói Egyezmény, ICAO Annex 2 (a Nemzetközi Polgári Repülési Szervezet Egyezményének 2. Függeléke) tartalmazza.

5.2.2.7.2 *Föld-levegő összeköttetés*

5.2.2.7.2.1 Amikor a légiforgalmi állomás nem képes összeköttetést létesíteni egy légijármű-állomással, miután hívta azokon a frekvenciákon, amelyeken a légijármű feltételezhetően figyel, akkor:

a) kérjen fel segítség-nyújtásra más légiforgalmi állomásokat, úgy, hogy a légijárművet meghívják és közvetítik a forgalmazást, ha az szükséges;

b) kérje fel az útvonalon repülő légijárműveket, hogy kíséreljék meg az összeköttetés felvételét az adott légijárművel, és közvetítsék a forgalmazást, ha szükséges.

5.2.2.7.2.2 Az 5.2.2.7.2.1 pont előírásait szintén alkalmazni kell:

a) az érintett légiforgalmi szolgálati egység kérésére;

b) ha a várt összeköttetés egy légijárművel a várható időszakon belül nem jön létre, és ezért rádióhiba előfordulására gyanakszanak.

Megjegyzés. - Az adott időtartamot az illetékes ATS Hatóság írhatja elő.

5.2.2.7.2.3 **Ajánlás. -** *Ha az 5.2.2.7.2.1 pontban leírt kísérletek sikertelenek maradnak, a légiforgalmi állomás a légijárműnek címzett közleményeket - a légiforgalmi irányítói engedélyeket tartalmazó közlemények kivételével - vak-adással kell, hogy leadja azo(ko)n a frekvenciá(ko)n, amelye(ke)n a légijármű feltételezhetően figyel.*

5.2.2.7.2.4 Vak-adással a légijárművek számára nem szabad légiforgalmi irányítói engedélyeket továbbítani, kivéve azt az esetet, ha a közlemény feladója ezt határozottan kéri.

5.2.2.7.3 *A rádióhiba bejelentése.* A levegő-föld irányítói rádióállomás a lehető leghamarabb értesítse a levegő-föld összeköttetés bármely hibájáról az érintett légiforgalmi szolgálati egységeket és a légijárművek járatóit.

5.2.3 A HF közlemények kezelése

5.2.3.1 *Általános előírások*

5.2.3.1.1 **PANS. -** *Hálózati üzemelés esetén a légijármű-állomásnak - ha az össszeköttetés körülményei megengedik - a közleményeit lehetőleg a hálózat azon állomásainak kell leadnia, amelyektől azokat a lehető legkönnyebben, leggyorsabban lehet továbbítani a végső rendeltetési helyeikre. A légijárműveknek különösen a légiforgalmi szolgálatok által megkívánt jelentéseket kell annak a hálózati állomásnak leadniuk, amely azt a repülés-tájékoztató központot, vagy körzeti irányító központot szolgálja ki, amelynek területén belül a légijármű éppen repül. Fordított esetben, a repülésben lévő légijárműveknek szánt közleményeket - amikor csak lehetséges - a légijárművekhez közvetlenül arról a hálózati állomásról kell továbbítani, amelyik a közlemény feladójának helyét szolgálja ki.*

Megjegyzés. - Egy légijárműnek kivételesen szüksége lehet arra, hogy olyan légiforgalmi állomással vegye fel az összeköttetést, amely a repülés adott útvonal-szakaszán belül illetékes hálózaton kívül esik. Amikor a figyelést az illetékes ATS Hatóság előírja, ez megengedhető a légijárművek számára, amennyiben ezt meg lehet tenni anélkül, hogy a légijármű megszakítaná a figyelést azon az összeköttetési hálózaton, amely a repülés adott útvonal-szakaszán illetékes, és feltéve, hogy ezzel nem okoznak zavaró kölcsönhatást más légiforgalmi állomások működésében.

5.2.3.1.2 **PANS. -** *Egy bizonyos légijárműtől valamely hálózati állomásnak szóló közleményeket - amennyiben lehetséges - a hálózat többi olyan állomásának is vennie és nyugtáznia kell, amelyek olyan helyeket szolgálnak ki, ahol az adott információra szintén szükség van.*

1. Megjegyzés. - A címzés nélküli levegő-föld közlemények szétosztására vonatkozó eljárások meghatározása több-oldalú vagy helyi megállapodások útján történik.

2. Megjegyzés. - Elvben az adásokat venni köteles állomások számát, az operatív követelményeknek megfelelően, a lehetséges minimumon kell tartani.

5.2.3.1.2.1 **PANS. -** *Az adás vételét lehetőleg közvetlenül azután kell nyugtázni, miután azon állomás, amelyiknek a közleményt továbbították nyugtázta azt.*

5.2.3.1.2.2 **PANS. -** *A vett adást úgy kell nyugtázni, hogy a közleményt vevő állomás leadja a saját rádió-hívójelét, amelyet a ROGER szó követ - ha szükségesnek ítélik -, valamint annak az állomásnak a hívójelét, amelyik a közleményt leadta.*

5.2.3.1.2.3 **PANS. -** *Ha az adás vételét egy percen belül nem nyugtázzák, akkor annak az állomásnak kell azt továbbítania, amelyik vette a légijárműtől a közleményt, általában a légiforgalmi állandóhelyű szolgálaton keresztül, annak/azoknak/ az állomás(ok)nak, amely(ek) nem nyugtázta/nyugtázták/ az adás vételét.*

5.2.3.1.2.3.1 **PANS. -** *Ha rendkívüli körülmények között szükség van rá, hogy az adást a levegő-föld csatornákon keresztül továbbítsák, akkor lehetőség szerint az 5.2.2.3.4 pont előírásait kell betartani.*

5.2.3.1.2.4 **PANS. -** *Ha a továbbítás a légiforgalmi állandóhelyű távközlési hálózaton keresztül történt, akkor a közleményeket az érintett hálózati állomás(ok)nak kell megcímezni.*

5.2.3.1.2.5 **PANS. -** *Az(ok)nak az állomás(ok)nak, amely(ek) részére a közleményeket továbbították, el kell, hogy végezze/végezzék/ a közlemények helyi szétosztását, ugyanolyan módon, mintha a közleményeket közvetlenül a légijárművektől kapta/kapták/ volna a levegő-föld csatornán.*

5.2.3.1.2.6 Az a légiforgalmi állomás, amelyik egy repülésben lévő légijárműről leadott légijelentést (AIREP), vagy meteorológiai tájékoztatást tartalmazó közleményt vesz, köteles késedelem nélkül továbbítani:

1) az állomással kapcsolatban álló légiforgalmi szolgálati egységnek és meteorológiai hivatalnak;

2) az érintett légijármű járatójának, vagy képviselőjének, ha az adott járató kifejezetten kérte, hogy az ilyen közleményeket megkapja.

5.2.3.1.3 **PANS. -** *Az 5.2.3.1.2 pont előírásait, ha ez megvalósítható, a nem-hálózati üzemelés esetén is alkalmazni kell.*

8. FEJEZET LÉGIFORGALMI MOZGÓ SZOLGÁLAT - ADATKAPCSOLATI ÖSSZEKÖTTETÉSEK

8.1 Általános előírások

1. Megjegyzés. - Jóllehet a 8. Fejezet előírásai elsődlegesen a Légiforgalmi Irányítás – légijárművezető közötti digitális adatkapcsolati összeköttetések alkamazására (CPDLC) vonatkoznak, a 8.1 pont előírásai más jellegű adatkapcsolati alkalmazásokra is érvényesek lehetnek, ahol alkalmazhatóak, beleértve az Adatkapcsolat – Légiforgalmi Tájékoztató Szolgálat felhasználást (pl. D-ATIS, D-VOLMET, stb.) is.

2. Megjegyzés. - Ezen rendelkezések értelmében a légiforgalmi mozgó szolgálatra alkalmazható összeköttetési eljárások, értelemszerűen, a légiforgalmi mozgó-műholdas szolgálatra is alkalmazhatók.

8.1.1 Az adatkapcsolati közlemények összeállítása

8.1.1.1 A közlemények szövegét a szabványos közlemény formátumban kell összeállítani (pl. szabványos CPDLC közlemények), nyílt szöveggel, vagy rövidítések és kódok felhasználásával, ahogy ez a 3.7 pontban leírásra került. A nyílt szöveges változat kerülendő, amennyiben a közlemény szövege nagymértékben rövidíthető megfelelő rövidítések és kódok használatával. Kerülni kell az olyan felesleges szavakat és szókapcsolatokat, mint amilyenek az udvariassági kifejezések.

8.1.1.2 Az alábbi karaktereket lehet felhasználni a közlemények összeállítására:

Betűk: ABCDEFGHIJKLMNOPQRSTUVWXYZ

(csak nagybetűk használatával)

Számok: 1 2 3 4 5 6 7 8 9 0

Egyéb jelek:

-	kötőjel)
?	(kérdőjel)
:	kettőspont)
(	nyitó zárójel)
)	záró zárójel)
.	pont, pont a mondat végén, vagy tizedes pont)

,	(vessző)
'	(aposztróf)
=	(kettős kötőjel, vagy egyenlőségjel)
/	törtvonal, vagy ferde zárójel)
+	összeadásjel)

és a szóköz karakter.

A felsorolt karaktereken kívül más karaktereket nem szabad használni a közleményekben.

8.1.1.3 Római számokat nem lehet használni. Ha a közlemény feladója azt szeretné, hogy a címzettet értesítsék arról, hogy római számokat akartak használni a közleményben, akkor arab számot, vagy számokat kell írni, melyek elé a ROMAN ("római") szót kell beszúrni.

8.1.2 Az adatkapcsolati közlemények kijelzése

8.1.2.1 A földi és fedélzeti berendezések lehetővé teszik a közlemények megfelelő megjelenítését, szükség szerinti nyomtatását, valamint tárolását olyan formában, hogy azok szükség esetén, megfelelő időben kényelmes módon visszakereshetők legyenek.

8.1.2.2 Amikor szöveges kijelzésre van szükség, az angol nyelvű megjelenítés a minimális követelmény.

8.2 CPDLC - A Légiforgalmi Irányítás és a légijárművezető közötti digitális adatkapcsolati összeköttetési eljárások

Megjegyzés. - A CPDLC közlemények ebben a fejezetben hivatkozott készlete a PANS-ATM (Légiforgalmi Szolgálatok Eljárásai - Légiforgalmi Irányítás Szervezés), 5. Függelékében található meg.

8.2.1 Valamennyi összeköttetés során mindig a legtökéletesebb fegyelmet kell tanúsítani, betartani.

8.2.1.1 **Ajánlás. -** *A közlemények összeállításánál lehetőleg figyelembe kell venni az emberi teljesítőképesség azon korlátait, amelyek hatással lehetnek a közlemények hibátlan vételére és megértésére.*

Megjegyzés. - Az emberi teljesítőképességgel foglalkozó tájékoztató anyagok az alábbi kiadványokban találhatóak: Az Emberi Tényezőkkel Kapcsolatos Oktatási Kézikönyv *(Doc 9683) és az* Emberi Tényezővel Kapcsolatos Irányelvek az ATM (Légiforgalmi Irányítás Szervezési) Rendszerekben *(Doc 9758).*

8.2.2 A földi és fedélzeti berendezéseknek biztosítaniuk kell, hogy a légiforgalmi irányítók és a légijárművezetők az általuk küldendő bármely üzemeltetéssel kapcsolatos közleményt átnézhessék és jóváhagyhassák.

8.2.3 A földi és fedélzeti rendszereknek biztosítaniuk kell, hogy a légiforgalmi irányítók és a légijárművezetők bármely általuk vett, üzemeltetéssel kapcsolatos közleményt átnézhessék, jóváhagyhassák, és ha ez alkalmazható, nyugtázhassák.

8.2.4 A légiforgalmi irányító számára biztosítani kell a lehetőségét arra, hogy válaszolhasson a közleményekre, beleértve a kényszerhelyzeti közleményeket is, engedélyeket, utasításokat és tanácsokat adhasson, valamint hogy információkat kérhessen és adhasson.

8.2.5 A légijárművezető számára biztosítani kell a lehetőséget, hogy válaszolhasson a közleményekre, engedélyeket és információkat kérhessen, tájékoztatásokat jelenthessen, valamint hogy egy kényszerhelyzetet bejelenthessen vagy törölhessen.

8.2.6 A légijárművezető és a légiforgalmi irányító számára biztosítani kell a lehetőséget, hogy egymással olyan közleményeket válthassanak, melyek nem felelnek meg az előre meghatározott közlemény formátumoknak (azaz szabad szöveges közlemények /free text messages/).

8.2.7 Hacsak az illetékes ATS hatóság másként nem rendelkezik, a CPDLC közlemények szóbeli visszaolvasását nem szabad megkövetelni.

8.2.8 A CPDLC létesítése

8.2.8.1 A légiforgalmi irányítót és a légijárművezetőt tájékoztatni kell akkor, amikor a CPDLC kapcsolat sikeresen létrejött.

8.2.8.2 **PANS. -** *A CPDLC-t elegendő időben kell létrehozni ahhoz, hogy biztosítható legyen a légijármű és a illetékes ATC egység közötti összeköttetés.*

8.2.8.3 A légiforgalmi irányítót és a légijárművezetőt tájékoztatni kell, amikor a CPDLC kapcsolat rendelkezésre áll üzemeltetési felhasználásra az első kapcsolat-felvételnél, valamint akkor is, ha meghibásodás után a CPDLC kapcsolat újra helyreáll.

8.2.8.4 A légijárművezetőnek bármikor tudnia kell azonosítani a légiforgalmi irányító szolgáltatást biztosító légiforgalmi irányító egységet a szolgáltatás igénybevétele során.

8.2.8.5 Amikor a fedélzeti rendszer úgy érzékeli, hogy rendelkezésre áll a CPDLC kapcsolat üzemeltetési felhasználásra, akkor el kell küldenie a FOLYAMATOS ADAT JOGOSULTSÁG /CURRENT DATA ATHORITY/ CPDLC fedélzetről leadott közlemény elemet.

8.2.8.6 *A fedélzetről kezdeményezett CPDLC*

8.2.8.6.1 **PANS. -** *Amikor a Légiforgalmi Irányítás /ATC/ valamely egysége egy váratlan, CPDLC-re irányuló kérést vesz egy légijárműről, akkor meg kell tudnia a légijárműtől a kérés okát, hogy meghatározhassa a további intézkedéseket.*

8.2.8.6.2 **PANS. -** *Amikor az ATC egység visszautasít egy CPDLC-re irányuló kérést, meg kell adnia a légijárművezető számára a visszautasítás okát, egy megfelelő CPDLC közlemény felhasználásával.*

8.2.8.7 *Az ATC egység által kezdeményezett CPDLC*

8.2.8.7.1 Egy ATC egység csak akkor létesíthet CPDLC kapcsolatot egy légijárművel, ha az adott légijármű még nem létesített CPDLC összeköttetést, vagy ha erre a légijárművel folyamatos CPDLC összeköttetésben lévő ATC egység feljogosítja.

8.2.8.7.2 Amikor egy CPDLC kapcsolat-felvételre irányuló kérést egy légijármű utasít vissza, akkor a visszautasítás okát vagy a NINCS FOLYAMATOS ADAT JOGOSULTSÁG /NOT CURRENT DATA AUTHORITY/, vagy a "NOT AUTHORIZED NEXT DATA AUTHORITY" NEM ENGEDÉLYEZETT A KÖVETKEZŐ ADAT JOGOSULTSÁG /NOT AUTHORIZED NEXT DATA AUTHORITY/ CPDLC fedélzetről küldött közlemény elem segítségével kell közölnie, amelyik értelemszerűen az ideillő. A helyi eljárásoknak kell szabályozniuk azt, hogy vajon a visszautasítás okát megjelenítik-e a légiforgalmi irányító számára. Az ATC egység által kezdeményezett CPDLC kapcsolat-felvétel fedélzeti visszautasításának más, az előbb felsoroltaktól eltérő oka nem megengedett.

8.2.9 Az üzemeltetési CPDLC közlemények cseréje

8.2.9.1 A légiforgalmi irányítók és a légijárművezetők CPDLC közleményeiket az előre meghatározott közlemények (közlemény elemek) készletéből, egy szabad szöveges közleményből, vagy ezen elemek kombinációjából kell összeállítaniuk.

8.2.9.1.1 **PANS. -** *Amikor CPDLC összeköttetést használnak, és a célnak megfelelő közleményt a PANS-ATM 5. Függelékében található CPDLC szabványos közlemények készlete tartalmazza, akkor a kapcsolódó szabványos közleményt kell használni.*

8.2.9.1.2 **PANS. -** *A 8.2.12.1 pontban előírtak kivételével, ha egy légiforgalmi irányító, vagy egy légijárművezető CPDLC-n keresztül küld közleményt, akkor lehetőség szerint a válasznak is CPDLC-n keresztül kell érkeznie. Amikor a légiforgalmiirányító vagy a légijárművezető beszéd-üzemű összeköttetésben áll, akkor a választ beszéd-üzemű adásban kell leadnia.*

8.2.9.1.3 **PANS. -** *Ha egy üzemeltetési választ igénylő CPDLC-n keresztül történt közlemény módosítása szükséges, vagy a közlemény tartalma szorul magyarázatra, a légiforgalomirányító, vagy a légijárművezető a rendelkezésére álló megfelelő eszközöket használja a pontos részletek közlésével vagy az engedély megadásával*

Megjegyzés: a légiforgalmi irányító vagy a légijárművezető az alábbi eljárásokat alkalmazhatja egy korábbi közleményben szereplő engedélyek, utasítások vagy információk módosítására:

8.2.9.1.3.1 PANS. – *Ha egy CPDLC közlemény beszéd-üzemű adásban kerül módosításra, amely közleményre még nem érkezett üzemeltetési válasz, a légiforgalmi irányító, vagy a légijárművezető adását az alábbi kifejezés adásának kell megelőznie: „DISREGARD CPDLC („Ne vegye figyelembe") (közlemény típus) MESSAGE, BREAK, (közlemény, szünet) majd ezt követi a pontos engedély, utasítás, információ, vagy kérés.*

Megjegyzés: - Előfordulhat, hogy a beszédüzemben folytatott engedélyezés adásakor a CPDLC közlemény nem érte még el a címzettet, vagy elérte, de intézkedésre sor nem került, vagy már elérte és az intézkedésre is sor került.

8.2.9.1.3.2 **PANS.** – *a CPDLC közleményre való hivatkozásnál, annak azonosításánál, vagy figyelmen kívül hagyásánál figyelmet kell fordítani arra, hogy az engedélyek, kérések, vagy információkban történő módosítások egyértelműek és összetéveszthetetlenek legyenek.*

Megjegyzés.- Például, ha a SAS 445 számú járata FL290 magasságot tartva CPDLC közleményben utasítást kap FL 350-re történő emelkedésre és a légiforgalmi irányító beszédüzemben módosítani akarja az utasítást, az alábbi szöveget használhatja:

SAS445 DISREGARD CPDLC CLIMB CLEARANCE MESSAGE, BREAK, CLIMB TO FL310

(SAS445 NE VEGYE FIGYELEMBE A CPDLC KÖZLEMÉNYT, EMELKEDJEN FL310-RE)

8.2.9.1.3.3 **PANS**. - *Ha egy CPDLC közleménnyel kapcsolatban üzemelési válaszadás megadására van* *szükség, amelyre beszéd-üzemben kerül sor, egy megfelelő CPDLC befejező válasz-közlemény kerül elküldésre a CPDLC párbeszéd megfelelő szinkronizációjának biztosítása végett. Ez megoldható olyan formában, hogy vagy a közlemény fogadóját beszéd-üzemben utasítjuk a párbeszéd befejezésére, vagy a párbeszéd lezárását a rendszer automatikusan elvégzi.*

8.2.9.2 Egy CPDLC közlemény összeállításánál nem szabad ötnél több közlemény elemet felhasználni, és az elemek közül csak kettő tartalmazhat útvonal-engedély változókat.

8.2.9.2.1 **PANS. -** *Ahol ez lehetséges, kerülni kell a hosszú közlemények használatát, vagy az olyan közleményekét, amelyek összetett engedély elemeket, vagy engedélyek és információk kombinációját tartalmazzák.*

*Megjegyzés. - A helyi üzemeltetési eljárások kidolgozásával és a CPDLC hatékony, megfelelő üzemeltetési módszereivel foglalkozó tájékoztató anyag az "*Emberi Tényezővel Kapcsolatos Irányelvek az ATM Rendszerekben" című dokumentumban található (Human Factors Guidelines for Air Traffic Management (ATM) Systems - *Doc 9758*).

8.2.9.3 A CPDLC földi rendszereknek és a fedélzeti rendszereknek alkalmasnak kell lenniük a CPDLC közlemények sürgősségi és riasztási jellemző tulajdonságainak alkalmazására úgy, hogy a megjelenítés megváltoztatásával felhívják a felhasználók figyelmét a nagyobb elsőbbségű közleményekre.

Megjegyzés. - Egy közlemény vételekor a közlemény jellemzői a CPDLC használójától bizonyos közlemény-kezelési követelmények betartását követelik meg. Valamennyi CPDLC közlemény három jellemzővel rendelkezik: sürgősségi, riasztási és válasz-adási jellemzővel. Amikor egy közlemény összetett közlemény elemeket tartalmaz, akkor a legmagasabb elsőbbséggel rendelkező közlemény elem adott típusa válik az egész közlemény jellemző típusává.

8.2.9.3.1 A sürgősségi jellemzőnek (urgency attribute) kell leírnia a végfelhasználó számára megjelenített, vett közlemények besorolási követelményeit. A sürgősségi típusok a 8-1 Táblázatban találhatók.

8.2.9.3.2 A riasztási jellemzőnek (alert attribute) kell meghatároznia a közlemény vétele után a szükséges riasztás típusát. A riasztás típusait a 8-2 Táblázat tartalmazza.

8.2.9.3.3 A válaszadási jellemzőnek (response attribute) kell meghatároznia az érvényes válaszokat az adott közlemény elem számára. A választípusok a 8-3 Táblázatban találhatók az "uplink" (légijárműnek szóló) közleményekre és a 8-4 Táblázatban a "downlink" (légijárműről származó) közleményekre.

8.2.9.3.3.1 **PANS. -** *Amikor egy több elemből álló közleményre kell válaszolni, és a válasz formája egy közlemény elem, akkor a választ az összes közlemény elemre kell vonatkoztatni.*

Megjegyzés. - Például egy több elemből álló közlemény tartalma a: CLIMB TO FL310 MAINTAIN MACH.84. *Az erre érkező* WILCO *válasz mind a két közlemény elemre vonatkozik, és mindkét utasítás elem teljesítését jelenti.*

8.2.9.3.3.2 **PANS.- Ha** *a légijármű egy egyetlen közlemény elemből álló engedélyt, vagy egy több elemből álló engedély közlemény bármely részét nem képes végrehajtani, akkor a légijármű vezetőjének egy* UNABLE *választ kell küldenie az egész közleményre.*

8.2.9.3.3.3 **PANS. -** *A légiforgalmi irányítónak egy* UNABLE *közleménnyel kell válaszolnia, amely a kérés összes elemére vonatkozik, amennyiben egy egyetlen elemből, vagy egy több elemből álló engedélykérésnek nincs olyan eleme, amely jóváhagyható lenne. A folyamatban, érvényben lévő engedélyeket nem szabad* *megismételni.*

8.2.9.3.3.4 PANS. - Amikor egy több elemből álló engedély-kérés csak részben hagyható jóvá , akkor a légiforgalmi irányító egy UNABLE közleménnyel válaszol, amely a kérés összes elemére vonatkozik és ha szükséges a válasz kitér az egyes okokra,és/vagy információt ad arra vonatkozóan, hogy mikorra várható az engedély megadása.

Megjegyzés.

Külön közlemény(ek) ezt követően továbbítható(k) válaszként azokra az elemekre vonatkozóan, amelyek jóváhagyhatók.

8.2.9.3.3.5 PANS. – Ha egy egy-, vagy több elemből álló engedélykérés valamennyi eleme jóváhagyható a légiforgalmi irányító ebben az esetben a kérés valamennyi elemére vonatkozóan adja meg az engedélyt.Ez a válasz egy fedélzetre irányuló „uplink” közlemény legyen.

Megjegyzés. – Például, amíg a több elemet tartalmazó engedélykérő közlemények kerülendők a több elemből álló fedélzetről származó ("downlink") közlemény az alábbi bemutatott közlemény elemeket tartalmazza:

REQUEST CLEARANCE YQM YYG YYT YQX TRACK
X EINN EDDF
REQUEST CLIMB TO FL 350
REQUEST MACH .0.84

Az alábbiakat tartalmazó közleménnyel válaszolható meg:

CLEARED YQM YYG YYT YQX TRACK X EINN EDDF
CLIMB TO FL350
REPORT MAINTAINING
CROSS YYG AT OR AFTER 1150
NO SPEED RESTRICTION

8.2.9.3.3.6 **PANS. -** *Amikor egy CPDLC közlemény több mint egy közleményelemet tartalmaz és a közleményre a válasz jellemző Y, ha felhasználják, akkor az egyetlen válasz közleménynek a megfelelő számú válaszokat kell tartalmaznia, ugyanabban a sorrendben.*

Megjegyzés.- Például egy több elemből álló "uplink" (légijárműnek szóló) közlemény tartalma:

CONFIRM SQUAWK
WHEN CAN YOU ACCEPT FL410

Az alábbi közleménnyel válaszolható meg:

SQUAWKING 5525
WE CAN ACCEPT FL410 AT 1636Z

8-1. táblázat: Sürgősségi jellemző típusok (fedélzetre irányuló és a légijárműről származó)

Típusa	Leírás	Elsőbbség
D	Distress *(Vészhelyzet)*	1
U	Urgent (*Sűrgősség)*	2
N	Normal *(Normál)*	3
L	Low *(Alacsony)*	4

8-2. táblázat: Riasztási jellemző típusok (fedélzetre irányuló és légijárműről származó)

Típusa	Leírás	Elsőbbség

H	High (*Magas)*	1
M	Medium (*Közepes)*	2
L	Low *(Alacsony)*	3
N	Nincs szükség riasztásra	4

8-3. táblázat: Válaszadási jellemzők (fedélzetre irányuló)

Típusa	Válasz szükséges	Érvényes válaszok	Elsőbbség
W/U	Igen	WILCO, UNABLE, STANDBY, NOT CURRENT DATA AUTHORITY, NOT AUTHORIZED NEXT DATA AUTHORITY, LOGICAL ACKNOWLEDGEMENT (csak ha szükséges), ERROR	1
A/N	Igen	AFFIRM, NEGATIVE, STANDBY, NOT CURRENT DATA AUTHORTI'Y, NOT AUTHORIZED NEXT DATA AUTHORITY, LOGICAL ACKNOWLEDGEMENT (csak ha szükséges), ERROR	2
R	Igen	ROGER, UNABLE, STANDBY, NOT CURRENT DATA AUTHORITY, NOT AUTHORIZED NEXT DATA AUTHORITY, LOGICAL ACKNOWLEDGEMENT (csak ha szükséges), ERROR	3
Y	Igen	Bármely fedélzetről származó CPDLC közlemény, LOGICAL ACKNOWLEDGEMENT (csak ha szükséges)	4
N	Nem, kivéve ha logikai nyugtázásra van szükség	LOGICAL ACKNOWLEDGEMENT (csak ha szükséges), NOT CURRENT DATA AUTHORTI'Y, NOT AUTHORIZED NEXT DATA AUTHORITY, ERROR	5

8-4. táblázat Válaszadási jellemzők (légijárműtől származó)

Típusa	Válasz szükséges	Érvényes válaszok	Elsőbbség
Y	Igen	Bármely fedélzetre irányuló CPDLC közlemény, LOGICAL ACKNOWLEDGEMENT (csak ha szükséges)	1
N	Nem, kivéve ha logikai nyugtázásra van szükség	LOGICAL ACKNOWLEDGEMENT (csak ha szükséges), SERVICE UNAVAILABLE, FLIGHT PLAN NOT HELD, ERROR	2

8.2.9.4 Amikor egy földi, vagy fedélzeti rendszer "ERROR" (Hiba) CPDLC közleményt hoz létre, akkor a hiba okát is mellékelni kell a közleményben.

8.2.9.5 Az illetékes ATS hatóságnak ki kell választania azokat a PANS-ATM 5. Függelékében található közleményelemeket, melyek a saját légterében az üzemeltetést támogatják Amennyiben egy ATS hatóság úgy dönt, hogy ezeknek a közlemény-elemeknek csak egy részhalmazát választja, és a vett közlemény nem tartozik ezek közé, akkor az ATC egységnek a "SERVICE UNAVAILABLE" közlemény elem fedélzetre irányuló továbbításával kell válaszolnia.

Megjegyzés. - A vett közlemény további feldolgozására nincs szükség.

8.2.9.5.1 **Ajánlás. -** *Egy légiforgalmi irányító számára lehetőleg csak az adott irányító szektor tevékenységének megfelelő "uplink" közleményeket kell biztosítani.*

Megjegyzés. - A PANS-ATM 5. Függelékében található CPDLC közlemény készletet úgy fejlesztették ki, hogy az különböző ATM (Légiforgalmi Irányítás Szervezési) körülményeknek is megfeleljen.

8.2.9.5.2 Amennyiben az illetékes hatóság szükségesnek ítéli, további előre összeállított szabad szöveges közleményeket kell a légiforgalmi irányító rendelkezésére bocsátani azokra az esetekre, amikor a PANS-ATM által rendelkezésre álló szabványos (CPDLC) közlemények készlete nem alkalmazható bizonyos követelmények esetén. Ilyen esetekben az illetékes hatóságnak - az üzemeltetőkkel és más, esetleg érintett ATS hatóságokkal konzultálva - össze kell állítania egy listát az előre elkészített szabad szöveges közleményekből.

8.2.9.5.3 A CPDLC közleményelemek felhasznált részhalmazaival, és amennyiben van ilyen, bármely kiegészítő, előre összeállított, szabad szöveges közleménnyel kapcsolatos információt közzé kell tenni a Légiforgalmi Tájékoztató Kiadványban (AIP).

8.2.9.6 *A CPDLC átadása*

*Megjegyzés. - A CPDLC átadásával kapcsolatos részletes tájékoztató a "*Manual of Air Traffic Services Data Link Applications"-ban *(DOC 9694) dokumentumban található.*

8.2.9.6.1 **PANS. -** *Amikor a CPDLC átadásra került, akkor a beszéd-üzemű rádió-összeköttetés és a CPDLC kapcsolat párhuzamosan jön létre.*

8.2.9.6.2 **PANS.-** *Amikor egy légijárművet egy olyan ATC egységtől küldtek át, ahol rendelkezésre áll a CPDLC, egy olyan ATC egységnek, ahol a CPDLC nem használható, a CPDLC összeköttetés bezárását egyidőben kell elkezdeni a beszéd-üzemű rádió-összeköttetés átadásával.*

8.2.9.6.3 Amikor egy CPDLC átadása következtében az adatkapcsolat felett rendelkező egység megváltozik, és még mindig vannak olyan közlemények, amelyekre még nem érkezett lezáró válasz (azaz még közlemények várhatóak), akkor erről a CPDLC átadást végző légiforgalmi irányítót értesíteni kell.

8.2.9.6.3.1 Amennyiben egy légiforgalmi irányító át kell küldje a légijárművet anélkül, hogy válaszolna bármely, még elintézetlen, a fedélzetről származó ("downlink") közlemény(ek)re, a rendszernek képesnek kell lennie arra, hogy automatikusan megküldje a megfelelő lezáró, válaszközlemény(eke)t. Ilyen esetekben, bármely automatikusan elküldendő lezáró válasz közlemény(ek) tartalmát közzé kell tenni a helyi utasításokban.

8.2.9.6.3.2 Amikor a légiforgalmi irányító úgy dönt, hogy átküldi a légijárművet anélkül, hogy megvárná valamely függőben lévő uplink közleményére (közleményeire) a légijárművezető válaszát, a földi rendszernek képesnek kell lennie arra, hogy minden egyes közlemény tekintetében automatikusan lezárja a párbeszédet, mielőtt az átküldés megtörténne.

8.2.9.6.3.2.1 **PANS.-** *A légiforgalmi irányítónak vissza kell térnie a beszédüzemű rádió-összeköttetésre, hogy bármely bizonytalanságot tisztázzon, amely(ek) a függőben lévő közleménnyel(közleményekkel) lehet(nek) kapcsolatban.*

8.2.9.6.4 Amennyiben a CPDLC átadása nem jelenti az adatkapcsolat felett rendelkező egység megváltoztatását, és még további befejezetlen közlemények vannak folyamatban, ezeket a közleményeket vagy az illetékes légiforgalmi irányító számára kell eljuttatni, vagy le kell zárni azokat, a helyi utasításoknak, és ha szükséges, az együttműködési egyezményeknek megfelelő módon.

8.2.10 A CPDLC közlemények kijelzése

Ajánlás. - *Azok az ATC egységek, melyek a PANS-ATM-ben található CPDLC szabványos közleményeket használják, a kapcsolódó szöveget, mely az adott közleményhez társítható, lehetőleg úgy kell megjelenítsék, ahogy azt a PANS-ATM, 5. Függelékében bemutatásra került.*

8.2.11 Szabad szöveges közlemények

PANS. - *A légiforgalmi irányítók vagy légijárművezetők részére a 8.2.9.5.2 pontban bemutatott, előre összeállított, szabad szöveges közleményeken kívül, más szabad szöveges közlemény használatát lehetőleg el kell kerülni.*

Megjegyzés. - Jóllehet elismert, hogy a nem szokásos és a kényszerhelyzet okozta körülmények szükségessé tehetik a szabad, szöveges közlemények használatát, különösen ha a beszéd-üzemű rádió-összeköttetésben hiba lép fel, a szabad szöveges közlemények használatának elkerülése a tévedés és félreérthetőség lehetőségének csökkentését szolgálja.

8.2.12 Kényszerhelyzetek, vészhelyzetek és a berendezés meghibásodása során követendő eljárások

8.2.12.1 **PANS. -** *Amikor egy CPDLC kényszerhelyzeti közleményt vettek, a légiforgalmi irányítónak a lehető leghatékonyabb módon kell nyugtáznia a közlemény vételét.*

8.2.12.2 **PANS. -** *Amikor CPDLC-n keresztül egy olyan jelentésre válaszolnak, amely jogellenes beavatkozásra utal, a "ROGER 7500" fedélzetre irányuló közleményt kell használni.*

8.2.12.3 **PANS. -** *Amikor CPDLC-n keresztül bármely más kényszerhelyzeti közleményre válaszolnak, a "ROGER" fedélzetre irányuló közleményt kell használni.*

8.2.12.4 Amikor egy CPDLC közleményre logikai nyugtázás szükséges, és/vagy egy üzemeltetői válasz, és ez nem érkezik meg, a légijárművezetőt, vagy a légiforgalmi irányítót erre, értelemszerűen, figyelmeztetni kell.

8.2.12.5 *A CPDLC meghibásodása*

8.2.12.5.1 **Ajánlás. -** *A CPDLC hibáját lehetőleg kellő időben kell észlelni.*

8.2.12.5.2 A légiforgalmi irányítót és a légijárművezetőt azonnal figyelmeztetni kell a CPDLC hibás működésére, amint a hibát észlelték.

8.2.12.5.3 **PANS. -** *Amikor a légiforgalmi irányítót, vagy a légijárművezetőt figyelmeztették arra, hogy a CPDLC meghibásodott, és a CPDLC helyreállítása előtt valamelyiküknek összeköttetésbe kell lépnie, akkor vissza kell térniük a beszéd-üzemű kapcsolattartásra, ha ez lehetséges, és az információkat:*

"CPDLC FAILURE" - kifejezéssel kell bevezetni.

8.2.12.5.4 **PANS. –** *Azok a légiforgalmi irányítók, akiktől megkívánják, hogy a teljes CPDLC földi rendszer hibájáról információkat közvetítsenek valamennyi olyan állomásnak, amely valószínűleg hallhatja a közleményt, az ilyen általános hívással kiadott közleményt az "ALL STATIONS CPDLC FAILURE" ("MINDEN ÁLLOMÁSNAK, A CPDLC MEGHIBÁSODOTT") kifejezéssel kell bevezetniük, melyet a hívó állomás azonosítója kell, hogy kövessen.*

Megjegyzés. - Az ilyen általános hívásra nem várnak választ, kivéve, ha ezt követően az egyes állomásokat felkérik a vétel nyugtázására.

8.2.12.5.5 **PANS. -** *Amikor a CPDLC meghibásodik, és az összeköttetésekben visszatérnek a beszéd-üzemű rádió-kapcsolatra, az összes lezáratlan CPDLC közleményt úgy kell tekinteni, hogy nem jutott el a címzetthez, és a függőben lévő közleményekkel kapcsolatos teljes közlemény-váltást lehetőleg újra kell kezdeni a beszéd-üzemű rádió-kapcsolat felhasználásával.*

8.2.12.5.6 **PANS. -** *Amikor a CPDLC meghibásodott, de helyreállítják, mielőtt beszéd-üzemű összeköttetésre kellene áttérni, az összes függőben lévő befejezetlen közleményt úgy kell tekinteni, hogy nem jutott el a címzetthez, és a befejezetlen közleményeket illető teljes közlemény-váltást újra kell kezdeni a CPDLC-n keresztül.*

8.2.12.6 *A CPDLC szándékos kikapcsolása*

8.2.12.6.1 Amennyiben a kommunikációs hálózat, vagy a CPDLC földi rendszerének időleges üzemszüneteltetése előre tervezett, egy NOTAM-ot kell kiadni, amellyel az összes érintett felet előzetesen értesíteni kell az üzemszünet tervezett időtartamáról, és ha szükséges, a felhasználandó beszéd-üzemű rádió-kapcsolat frekvenciáinak részleteiről.

8.2.12.6.2 Az ATC-vel pillanatnyilag kapcsolatban lévő légijárműveket szóban, vagy a CPDLC-n keresztül értesíteni kell a CPDLC szolgáltatás küszöbön álló kieséséről.

8.2.12.6.3 A légiforgalmi irányítónak és a légijárművezetőnek biztosítani kell a CPDLC szolgáltatás azonnali leállításának lehetőségét.

8.2.12.7. *Szóló CPDLC közlemény meghibásodása*

PANS.- *Ha a légiforgalmi irányító vagy a légijárművezető figyelmeztetést kap, hogy egy szóló CPDLC közlemény meghibásodott, akkor a légiforgalmi irányító vagy a légijárművezető az alábbiak szerint jár el:*

a) beszédüzemben visszaigazolja azokat a műveleteket, amelyeket a vonatkozó párbeszéddel kapcsolatban elvégez és az információt az alábbi szöveggel vezeti be:

CPDLC MESSAGE FAILURE; (CPDLC közlemény meghibásodás)

b) CPDLC közlemény útján, újra kiadja a meghibásodott közleményt

8.2.12.8 A légijárművezetői CPDLC közlemény- kérések használatának leállítása

8.2.12.8.1. **PANS.** *Amennyiben a légiforgalmi irányító felkér valamennyi állomást, vagy egy adott járatot arra, hogy ne küldjön egy korlátozott időszakon belül CPDLC közleményeket, az alábbi formátumot használja:*

((call sign) or ALL STATIONS) STOP SENDING CPDLC REQUESTS (UNTIL ADVISED) (reason)

((Hívójel), vagy MINDEN ÁLLOMÁS RÉSZÉRE) NE KÜLDJENEK (TOVÁBBI ÉRTESÍTÉSIG) CPDCL KÖZLEMÉNYEKET (fennálló ok megnevezése)

Megjegyzés. – Ebben a helyzetben a CPDLC közlemények a légijárművezető részére elérhetők, szükség esetén válaszol a közleményekre, jelenti az információt és elrendeli, illetve megszünteti a vészhelyzetet

8.2.12.8.2. **PANS.**- *A CPDLC közlemények normál használatának visszaállása után az alábbi formátumban jelenik meg a közlés:*

((call sign) or ALL STATIONS) RESUME NORMAL CPDLC OPERATIONS

((hívójel) vagy MINDEN ÁLLOMÁS RÉSZÉRE) NORMÁL CPDLC ÜZEMMÓD HELYREÁLLÍTVA

8.2.13 Amennyiben egy légijárművel a CPDLC tesztelése kihatással lehet a légijármű számára nyújtott légiforgalmi szolgáltatásokra, akkor egyeztetés szükséges az ilyen ellenőrzést megelőzően.

8.2.14 A soron következő irányító egységtől származó engedély-továbbítási szolgáltatás /DCDS/

8.2.14.1 Az illetékes ATS hatóság dönti el, hogy egy ATC egységnél alátámasztják-e az útvonal soron következő légiforgalmi irányító egységétől származó engedély továbbítási szolgáltatást.

8.2.14.2 *A soron következő irányító szolgálati egységtől származó engedély-továbbítási szolgáltatás /DCDS/ létrehozása*

8.2.14.2.1 A DCDS szolgáltatását csak a fedélzeti rendszernek kell kezdeményeznie. A kezdeményezésnek jeleznie kell, hogy ez az összeköttetés csak a DCDS-től származó engedély vételére szolgál.

8.2.14.2.2 Amikor egy ATC egység visszautasítja a DCDS-t, megadja a légijárművezetőnek a visszautasítás okát is, a "SERVICE UNAVAILABLE" a légiforgalmi irányító és a légijárművezetők közötti digitális adat-kapcsolati /CPDLC/ közlemény használatával.

8.2.14.3 *A soron következő irányító szolgálati egységtől származó engedély-továbbítási szolgáltatás /DCDS/ üzemeltetése*

8.2.14.3.1 A légiforgalmi irányítót és a légijárművezetőt értesíteni kell, amikor a DCDS rendelkezésre áll az üzemeltetésre.

8.2.14.3.2 A légiforgalmi irányítót és a légijárművezetőt értesíteni kell arról, ha a DCDS meghibásodik.

8.2.14.3.3 Azokat a Légiforgalmi Irányítás - légijárművezetők közötti digitális adat-kapcsolati /CPDLC/ közlemény elemeket, amelyek a soron következő irányító szolgálati egységtől származó engedély-továbbítási szolgáltatásban /DCDS/ megengedett közlemények, körzeti léginavigációs megállapodásokban /Regional Air Navigation Agreement/ kerülnek meghatározásra.

8.2.14.3.4 A soron következő szolgálati egységtől származó engedély-továbbítási szolgáltatáson leadott engedély-kérésnek, mint olyannak, a légiforgalmi irányító számára egyértelműen azonosíthatónak kell lennie.

8.2.14.3.5 A soron következő szolgálati egységtől származó engedély-továbbítási szolgáltatásban leadott engedélynek, mint olyannak, a légijárművezető számára egyértelműen azonosíthatónak kell lennie.

8.2.14.4 *A soron következő szolgálati egységtől származó engedély-továbbítási szolgáltatás /DCDS/ befejezése*

8.2.14.4.1 A DCDS befejezését csak a légijármű fedélzeti rendszer kezdeményezheti.

8.2.14.4.2 A DCDS engedély-továbbítási szolgálat akkor fejeződik be az ATC egységgel, amikor az engedély-továbbítási szolgáltatás folyamatos adat-jogosultságú szolgálattá válik.

ANNEX 10/III.
Légiforgalmi távközlés:
(I. Rész – Digitális adatközlő rendszerek
II. Rész – Hangtávközlő rendszerek

III.kötet 2. kiadás – 2007. július
70-82. módosításokkal

NEMZETKÖZI SZABVÁNYOK ÉS AJÁNLOTT ELJÁRÁSOK
LÉGIFORGALMI TÁVKÖZLÉS
10. ANNEX
A NEMZETKÖZI POLGÁRI REPÜLÉSI EGYEZMÉNYHEZ

III. KÖTET - HÍRKÖZLÉSI RENDSZEREK

(I. RÉSZ – DIGITÁLIS ADAT-ÖSSZEKÖTTETÉSI RENDSZEREK;
II. RÉSZ – HANGTÁVKÖZLŐ RENDSZEREK)

Ebben a kiadásban valamennyi olyan módosítás szerepel, amelyet a Tanács 2007. február 27-ét megelőzően fogadott el, így az Annex 10, III. Kötetének valamennyi korábbi kiadásában foglaltak 2007. november 22-én hatályukat vesztik.

A szabványok és ajánlott eljárások alkalmazásával kapcsolatos információkat lásd az Előszó c. fejezetben.

A III. KÖTET MÁSODIK KIADÁSA – 2007. JÚLIUS

Értesítés: A NEMZETKÖZI POLGÁRI REPÜLÉSI EGYEZMÉNYHEZ KIADÁSRA KERÜLT ANNEX-EK ÚJABB KIADÁSÁVAL KAPCSOLATBAN

Tudomásunkra jutott, hogy egy újabb Annex megjelenésekor a felhasználók a korábbi kiadások függelékeit kiselejtezik. Ezúton hívjuk fel az érdekeltek figyelmét arra, hogy ezeket a jövőben szíveskedjenek megőrizni az új függelék megjelenésének időpontjáig.

TARTALOMJEGYZÉK

6. FEJEZET: VHF levegő-föld digitális adatkapcsolat (VDL)

6.1 Meghatározások és rendszer teljesítőképességek
6.2 A földi telepítésű rendszerelemek jellemzői
6.3 A légijármű fedélzetére telepített rendszerelemek jellemzői
6.4 Fizikai réteg protokolllok és szolgáltatások
6.5 Kapcsolat réteg protokollok és szolgáltatások
6.6 Alhálózati réteg protokollok és szolgáltatások
6.7 A VDL mozgó szolgálati alhálózat függő konvergencia funkció (SNDCF)
6.8 Hangfrekvenciás egység a 3-as üzemmódhoz
6.9 A VHF adatkapcsolat /VDL/ 4-es üzemmód
Táblázatok a 6. Fejezethez
Ábrák a 6. Fejezethez

Függelék a 6. FEJEZETHEZ

7. FEJEZET: Alhálózati rendszerek (kidolgozás alatt)

8. FEJEZET: AFTN Hálózat

8.1 Meghatározások

8.2. AZ AFTN-ben használatos távgépíró készülékekre és áramkörökre vonatkozó műszaki előírások
8.3 A 2,5-30 MHz-es sávban működő légiforgalmi rádió-távgépíró csatornákhoz kapcsolódó vég-berendezések
8.4 Az interregionális légiforgalmi állandó-helyű szolgálatok /AFS/ áramköreinek jellemzői
8.5 A légiforgalmi szolgálati /ATS/ közlemények átvitelére vonatkozó műszaki előírások
8.6 A közepes és magasabb jeladási sebességgel történő nemzetközi föld-föld közötti adatcserére vonatkozó műszaki előírások

Táblázatok a 8. Fejezethez

Ábrák a 8. Fejezethez

9. FEJEZET: Légijármű címzési rendszer

Függelék a 9. Fejezethez: Világméretű séma a légijármű címzések kiosztásához, kijelöléséhez és alkalmazásához

1. Általános rész
2. A séma leírása
3. A séma kezelése
4. Légijármű címzések kiosztása
5. Légijármű címzések kijelölése
6. Légijármű címzések alkalmazása
7. Az ideiglenes légijármű címzések kijelölésének intézése

9-1. táblázat: A légijármű címzések kiosztása az Államoknak

10. FEJEZET: Pontból-Több-pontba történő kommunikáció

10.1 Repülési információk műholdon keresztüli terjesztését végző szolgáltatás

MELLÉKLETEK

Melléklet a II. részhez: Útmutató a kapcsolati rendszerekhez

ELŐSZÓ

Történelmi háttér

A Légiforgalmi Távközlés Szabványait és Ajánlott Gyakorlatait a Tanács először 1949. május 30-án fogadta el a Nemzetközi Polgári Repülésről szóló Egyezmény 37. cikkelyében lévő előírásoknak megfelelően (Chicago, 1944) és az Egyezmény 10. Annex-eként jelölte ki, amely 1950. március 1-jén lépett hatályba. A Szabványok és Ajánlott Gyakorlatok a Hírközlési Osztály 1949. januárjában tartott Harmadik Ülésszaka ajánlásain alapulnak.

Egészen a hetedik kiadásig (ez utóbbit is beleértve), az Annex 10 egy kötetben került kiadásra, ami négy részt foglalt magába, a hozzájuk csatolt mellékletekkel együtt: az I. rész – Berendezések és Rendszerek, a II. rész – Rádiófrekvenciák, a III. rész – Eljárások és a IV. rész – Kódok és rövidítések.

A 42. Módosítással a IV. részt törölték az Annex-ből; és az ebben a részben található kódokat és rövidítéseket egy új dokumentumba, a Doc 8400-ba helyezték át.

A 44. Módosítás 1965. évi május 31-i elfogadásának eredményeként az Annex 10 hetedik kiadása két kötetbe került felosztásra: az I. kötetbe (első kiadás) - ami az I. részt, a "Berendezések és Rendszerek"-et és a II. részt, a "Rádiófrekvenciák"-at foglalja magába, valamint a II. kötetbe (első kiadás), ami a "Hírközlési Eljárások"-at tartalmazza.

A 70. Módosítás 1995. évi március 20-i elfogadásának eredményeként az Annex 10 átszerkesztésre került úgy, hogy öt kötetből áll: I. kötet – Rádiónavigációs Berendezések; II. kötet – Hírközlési eljárások; III. kötet – Hírközlési rendszerek; IV. kötet – Légtér-ellenőrző radar és Összeütközést Elkerülő Rendszerek; és az V. kötet – A Légiforgalmi Rádiófrekvencia Spektrum Felhasználása. A 70. Módosítással a III. és a IV. kötet 1995-ben került kiadásra és az V. kötet kiadását a 71. Módosítással tervezték.

Az “A” táblázat mutatja be az Annex 10 III. kötetének a 70. sz. Módosítást követő eredetét, a bennük lévő legfontosabb témák összefoglalásával, és azokkal az időpontokkal együtt, amikor a Tanács az Annex-et és a módosításokat elfogadta, amikor azok hatályba léptek, és végül, amikor alkalmazhatókká váltak.

A Szerződő Államok tevékenysége

Az eltérések bejelentése. A Szerződő Államok figyelmét felhívják az Egyezmény 38. cikkelye értelméből eredő azon kötelezettségükre, amely szerint a Szerződő Államokat felkérik arra, hogy jelentsenek be a Szervezetnek minden olyan eltérést, mely a nemzeti rendszabályaik és eljárásaik, valamint az ebben az Annex-ben lévő és ezt követően módosított Nemzetközi Szabványok között fennáll. Kérik a Szerződő Államokat, hogy ezt a bejelentést terjesszék ki az ezen Annex-ben lévő Ajánlott Gyakorlatoktól való eltérésekre is, amennyiben az ilyen eltérés lényeges jelentőséggel bír a léginavigáció szempontjából. Továbbá felkérik a Szerződő Államokat, hogy folyamatosan tájékoztassák a Szervezetet minden olyan eltérésről, amely ezt követően felmerül, vagy amennyiben bármely korábban bejelentett eltérés megszűnik. Egy, az eltérések bejelentésére vonatkozó külön felkérés kerül azonnali megküldésre a Szerződő Államok részére az egyes módosítások elfogadását követően.

Felhívják ezenkívül az Államok figyelmét az Annex 15 azon előírásaira, amelyek szerint a nemzeti rendszabályaik és gyakorlataik, valamint az ICAO Szabványok és Ajánlott Gyakorlatok között felmerülő eltéréseket a Légiforgalmi Tájékoztató Szolgálaton keresztül tegyék közzé, az Egyezmény 38. cikkelyében lefektetett, az Államokra vonatkozó kötelezettségen felül.

A tájékoztatás közzététele. Az Annex 10-ben meghatározott Szabványoknak, Ajánlott Gyakorlatoknak és Eljárásoknak megfelelően biztosított, a légijármű üzemeltetéseket érintő berendezések, szolgálatok és eljárások változásait, azok életbeléptetését és megszűntetését be kell jelenteni, és az Annex 15 előírásainak megfelelően kell hatályba léptetni.

Az Annex szövegének használata a nemzeti rendszabályokban. A Tanács 1948. április 13-án elfogadott egy határozatot, amelyben felhívta a Szerződő Államok figyelmét annak kívánatosságára, hogy saját nemzeti rendszabályaikban – a lehetőségek figyelembevétele mellett - használják azoknak az ICAO Szabványoknak a pontos nyelvi kifejezésmódjait, amelyek szabályozó jellegűek, hasonlóképpen a Szabványoktól való eltérések jelölésére is, minden olyan kiegészítő nemzeti rendszabállyal együtt amelyek a léginavigáció biztonsága vagy előírás szerűségi szempontokból fontosak. Ennek az Annex-nek a szövege szándékosan olyan módon került megfogalmazásra, hogy lehetőség nyíljon annak szövegáltoztatás nélküli, a nemzeti törvényalkotásba történő befoglalására.

Az Annex alkotóelemeinek jogi helyzete

Az Annex-ek az alábbiakban felsorolt alkotó elemekből állnak, de ezen elemek mindegyike nem feltétlenül szerepel valamennyi Annex-ben. és az alábbi jogi helyzetre utalnak:

1. – Az Annex-et alkotó anyagok a tulajdonképpeni:

a) *Szabványok és Ajánlott Gyakorlatok,* amelyeket a Tanács fogadott el az Egyezmény előírásainak megfelelően. Meghatározásuk a következő:

Szabvány: A fizikai jellemzőkre, összetételre, anyagra, teljesítőképességre, személyzetre vagy eljárásra vonatkozó minden olyan meghatározás, amelynek egységes alkalmazását a nemzetközi léginavigáció biztonsága szempontjából szükségesnek tekintenek, és amelynek a Szerződő Államok az Egyezmény értelmében eleget kell tegyenek; nem-megfelelés esetén annak bejelentése a Tanács részére a 38. Cikkely alapján kötelező.

Ajánlott Gyakorlat: Fizikai jellemzőkre, összetételre, anyagra, teljesítőképességre, személyzetre vagy eljárásra vonatkozó minden olyan meghatározás, amelynek egységes alkalmazását kívánatosnak tekinti a nemzetközi léginavigáció biztonsága, szabályszerűsége vagy hatékonysága érdekében, és amelynek teljesítésére a Szerződő Államoknak az Egyezmény értelmében törekedniük kell.

b) *Függelékek,* a kényelmi szempontból külön csoportosított anyagok, de ezek részét képezik a Tanács által elfogadott Szabványoknak és Ajánlott Gyakorlatoknak.

c) *Meghatározások,* a Szabványokban és Ajánlott Gyakorlatokban használt azon szakkifejezések értelmezése, amelyek nem magától értetődőek, mivel nincs elfogadott szótári jelentésük. Egy bizonyos meghatározásnak nincs önálló státusza, de minden egyes Szabványnak és Ajánlott Gyakorlatnak lényeges részét képezi, aszerint, hogy milyen szövegkörnyezetben használják, mivel a szakkifejezés jelentésének értelmi változása befolyásolná az előírás értelmezését.

d) A*Táblázatok* és *ábrák* kiegészítik vagy illusztrálják azokat a Szabványokat és Ajánlott Gyakorlatokat, amelyekre azokban utalnak, ezek a vonatkozó Szabványoknak és Ajánlott Gyakorlatoknak részét képezik, és ugyanazzal a jogi helyzettel rendelkeznek.

2. – A Tanács által a Szabványokhoz és Ajánlott Gyakorlatokhoz kapcsolódóan közzétételre elfogadott anyag:

a) *Előszavak*, a Tanács tevékenységén alapuló történeti és magyarázó anyagokat tartalmazzák, és magukba foglalják az Államoknak az Egyezményből és az Elfogadási Határozatból következő - a Szabványok és Ajánlott Gyakorlatok alkalmazására vonatkozó - kötelezettségeinek magyarázatát is, ami a Chicagói Egyezményen és annak Végrehajtási Határozatán alapszik;

b) *Bevezetések,* azok a magyarázó anyagok, amelyekkel az Annex részei, fejezetei vagy szakaszai kezdődnek, azért, hogy a szöveg alkalmazásának megértését segítsék;

c) A *Megjegyzések* a szövegbe beépítve - ahol szükséges - tárgyi információt vagy hivatkozást adnak a Szabványokkal vagy Ajánlott Gyakorlatokkal kapcsolatos kérdésekben, de nem képezik a Szabványok és Ajánlott Gyakorlatok részét;

d) A *Mellékletek* a Szabványokkal és Ajánlott Gyakorlatokkal kapcsolatos kiegészítő anyagokat tartalmazzák, vagy azok alkalmazásához útmutatóként kerültek beépítésre.

A szabadalmi felelősség elutasítása

Felhívjuk a figyelmet annak lehetőségére, hogy az ebben az Annex-ben lévő Szabványok és Ajánlott Gyakorlatok bizonyos elemei szabadalom vagy egyéb szellemi tulajdoni jog tárgyát képezhetik. Az ICAO nem vállal felelősséget vagy kötelezettséget bármilyen ilyen jellegű jog azonosításának elmulasztása miatt. Az ICAO nem foglal állást semmilyen találmánynak vagy egyéb vélt szellemi tulajdoni jog létezésével, érvényességével illetve annak alkalmazhatóságával kapcsolatban és nem ismeri el sem felelősségét, sem egyéb kötelezettségét az ilyen ügyekkel kapcsolatban.

A nyelv kiválasztása

Ez az Annex négy nyelven – angol, francia, orosz és spanyol - került elfogadásra. Minden egyes Szerződő Államot felkérnek, hogy ezeknek a különböző nyelvű szövegeknek egyikét válasszák ki hazai felhasználásra, valamint az Egyezményben meghatározott egyéb célokra, akár a közvetlen felhasználás, akár a saját nemzeti nyelvre történő fordítás útján, és ennek megfelelően értesítsék a Szervezetet.

Szerkesztési gyakorlat

A következő gyakorlat kerül következetesen alkalmazásra abból a célból, hogy az egyes állítások jogállása egyetlen pillantással megállapítható legyen: a *Szabványok* vékony antikva betűtípussal vannak nyomtatva; az Ajánlott Gyakorlatok vékony dőlt betűvel vannak szedve, jogállásukat az **Ajánlás** szó jelzi; a *Megjegyzések* vékony dőlt betűvel vannak szedve, jogi helyzetüket a Megjegyzés jelzi.
A következő szerkesztési gyakorlatot követtük az előírások megfogalmazásánál: a Szabványok esetében a "kell", az Ajánlott Gyakorlatok esetében pedig a „kellene" segédigét használtuk.
Az ebben a dokumentumban alkalmazott mértékegységek megegyeznek a Nemzetközi Mértékegység Rendszerrel (SI) úgy, ahogy az a Nemzetközi Polgári Repülési Egyezmény 5. Annex-ében meghatározásra került. Ott, ahol az Annex 5 megengedi a nem-SI mértékegységek alternatív használatát, azok zárójelben feltűntetve követik az alap mértékegységet. Ahol a két rendszer szerinti mértékegységek szerepelnek, nem szabad feltételezni , hogy az értékek egyenlők, illetve csereszabatosak. Megállapítható viszont, hogy a biztonság azonos szintje elérhető a két mértékegység bármelyikének kizárólagos használatakor.
Ennek a dokumentumnak bármely részére történő hivatkozás, amely egy számmal és/vagy címmel került azonosításra, magába foglalja annak a résznek valamennyi al-részét is.

“A” táblázat. Az Annex 10, III. Kötet módosításai

Módosítás	*Módosítás*	*Forrás(ok)*	*Témakör(ök)*	*Elfogadva Hatályos Alkalmazható*
70	70	Léginavigációs Bizottság; A Légiforgalmi Mozgó-Szolgálati Összeköttetések Szakcsoport (AMPC) Harmadik Ülése	Az új III. Kötet és a Légiforgalmi Mozgó-Műholdas Szolgálatokra (AMSS) vonatkozó Szabványok és Ajánlott Gyakorlatok bevezetése	1995. márc. 20. 1995. júl. 24. 1995. nov. 9.
71	71	Léginavigációs Bizottság; Speciális Hírközlési/Üzemeltetési Szekció (SP COM/OPS/95) ülés (1995); a Másodlagos Légtér-ellenőrző Radar Fejlesztési és Összeütközés Elkerülési Rendszerek Szakcsoport (SICASP) Ötödik Ülése; a Légiforgalmi Mozgó-Szolgálati Összeköttetések Szakcsoport (AMCP) harmadik ülése	Kiegészítő előírások a Légiforgalmi Távközlési Hálózat /ATN/ S-Módú alhálózatára vonatkozóan; kiegészítő anyag a 8,33 kHz-es csatorna elkülönítés bevezetéséhez kapcsolódóan; változások az ultra- rövidhullámú VHF sáv levegő-föld összeköttetések védelmére vonatkozó anyagban; kiegészítés a VHF digitális összeköttetés /VDL/ rádió-frekvenciás jellemzőire vonatkozó műszaki előírásaihoz.	1996. márc. 12. 1995. júl. 15. 1996. nov. 7.
72	72	Léginavigációs Bizottság; A Légiforgalmi Mozgó-Szolgálati Összeköttetések Szakcsoport (AMPC) Negyedik Ülése	Az ultra-rövidhullámú digitális összeköttetésre (VDL) vonatkozó Szabványok és Ajánlott Gyakorlatok /SARPs/ bevezetése és útmutató anyag; a VDL meghatá-rozása és a levegő-föld adatcsere elavult anyagának törlése.	1997. márc. 12. 1997. júl. 21. 1997. nov. 6.
73	73	Léginavigációs Bizottság; a LégiforgalmiTávközlési Hálózat Szakcsoport (ATNP) második ülése; a Másodlagos Légtér-ellenőrző Radar Fejlesztési és Összeütközés Elkerülési Rendszerek Szakcsoport (SICASP) Hatodik Ülése	Az ATN-re vonatkozó anyag bevezetése; változtatások az S-Módú alhálózat előírásaiban.	1998.márc 19. 1999. júl.19. 1999. nov. 4
74	74	A Légiforgalmi Mozgó-Szolgálati	Az alábbiak bevezetése:	1999. márc. 18.

	Összeköttetések Szakcsoport (AMCP) Ötödik Ülése; Léginavigációs Bizottság	a) rövid-hullámú adat-kapcsolatok előírásai; b) változások a kényszerhelyzeti helyjeladó adóberendezéseinek előírásaiban.	1999. júl. 19. 1999. nov. 4.
75.	75. A Légiforgalmi Mozgó-Szolgálati Összeköttetések Szakcsoport (AMCP) Hatodik Ülése; Léginavigációs Bizottság	Változtatások a Légiforgalmi Mozgó-Műholdas Szolgálat /AMSS/ Szabványok és Ajánlott Gyakorlatok-/SARPs/-ban; egy új antenna típus bevezetése; egy új beszéd-üzemű csatorna típus és kiemelt előírások az AMSS rendszerek közötti együttműködő-képességre; változtatások a VHF digitális összeköttetések /VDL/ Szabványok és Ajánlott gyakorlatok-/SARPs/-ban azzal a lehetséges interferencia csökkentéssel kapcsolatban, amelyet a jelenlegi Ultra-rövidhullámú /VHF/ beszéd-üzemű összeköttetési rendszereknél a VHF digitális összeköttetési adók okozhatnak; változtatások az Ultra-rövidhullámú /VHF/ beszéd-üzemű összeköttetési Szabványok és Ajánlott Gyakorlatok-/SARPs/-ban az ugyanazon légi-jármű fedélzetén lévő VDL adóktól eredő interferencia érzéketlenség növelésére.	2000. márc. 13. 2000. júl. 17. 2000. nov. 2.
76	76. A LégiforgalmiTávközlési Hálózat Szakcsoport (ATNP) harmadik ülése; a Légiforgalmi Mozgó-Szolgálati Összeköttetések Szakcsoport (AMCP) Hetedik Ülése; a Titkárság tevékenysége a Légiforgalmi	A Légiforgalmi Távközlési Hálózat (ATN) rendszer szervezési, biztonsági és igazgatási szolgálatai; a CIDIN-re vonatkozó részletes anyag eltávolítása;	2001. márc. 12. 2001. júl. 16. 2001. nov. 1.

	Szolgálatok /ATS/ Beszéd-üzemű Kapcsolás és Jelzés Vizsgáló Csoport (AVSSSG) segítségével	integrált beszéd-üzemű és adatkapcsolati rendszer (VDL Mode 3); az adatkapcsolatot kielégítő légtérellenőrzési alkalmazások (VDL Mode 4); az összes, a VDL 1-es üzemmódra vonatkozó előírás törlése; a VDL 2-es üzem- módra vonatkozó részletes műszaki előírások eltávolítása; a légiforgalmi élőszavas áramkörök; az ITU Rádió-rendszabályzatra való hivatkozások felfrissítése.	
77	77 A Másodlagos Légtér-ellenőrző Radar Fejlesztési és Összeütközés Elkerülési Rendszerek Szakcsoport (SICASP)	Az S-Módú alhálózat (I. rész), Légijármű címzési rendszer (I. rész).	2002. febr. 27. 2002. júl. 15. 2002. nov. 28.
78.	78 Léginavigációs Bizottság	A rádiófrekvenciás csatornákra vonatkozó műszaki előírások változásai; és kényszerhelyzeti helyjeladók (ELTs) lajstromozásának bevezetése; a VDL 3- és 4-es üzemmód beépítése a Légiforgalmi Távközlési Hálózat /ATN/ alhálózati prioritások táblázatába (3-3. táblázat); szerkesztői módosítások.	2003. márc. 5. 2003. júl. 14. 2003. nov. 27.
79.	79 Légiforgalmi Mozgó-Szolgálati Összeköttetések Szakcsoport (AMCP) Nyolcadik Ülése	Változások a Rövidhullámú adatkapcsolatokra (HFDL) vonatkozó műszaki előírásokban, azért, hogy összehangolásra kerüljenek a Nemzetközi Távközlési Unió /ITU/ Rádió-rendszabályzatának vonatkozó előírásaival; frekvencia-modulációs /FM/ érzéketlenségi jellemzők bevezetése a VDL Mode 4-re; annak a megjegyzésnek a törlése, amely közölte, hogy a VDL Mode 4 Szabványait és Ajánlott	2004. febr. 23. 2004. júl. 12. 2004. nov. 25.

80.Léginavigációs Bizottság	Gyakorlatait kell alkalmazni a légtérellenőrzési berendezésekre.	2005. feb. 25. 2007. júl. 11. 2007. nov. 24
	Rendelkezések a 406 MHz frekvencián működő ELT kényszerhelyzeti jeladók lajstromozásának bevezetésére	2007. feb. 25. 2007. júl. 11. 2007. nov. 24.
81.--------------------	Nincs változás	

82. Léginavigációs Bizottság Szakcsoport (ACP); az SCRSP szakcsoport ülése; OPLINKP Szakcsoport bevezetése;	Az ATN rendelkezések frissítése az AMHS hal kapcsolatban; az AMS(R) SARPs-ok áttekintése; az UAT az SSR Mode S adatkapcsolati anyagok frissítése, ADS-B adat formátumok a kézikönyvek elválasztáshoz

NEMZETKÖZI SZABVÁNYOK ÉS AJÁNLOTT ELJÁRÁSOK

I. RÉSZ – DIGITÁLIS ADAT-ÖSSZEKÖTTETÉSI RENDSZEREK

1. FEJEZET. MEGHATÁROZÁSOK

1. Megjegyzés. – A "Radio Regulations"-ra történő minden hivatkozás a Nemzetközi Távközlési Egyesület (ITU) által közzétett Nemzetközi Rádió-Rendszabályzatra vonatkozik. A Nemzetközi Rádió-Rendszabályzat újra és újra módosításra kerül az általában két vagy háromévenként megrendezésre kerülő Rádió-távközlési Világ-konferenciák (World Radiocommunication Conferences) záróközleményeiben kifejezett döntéseknek megfelelően. A Nemzetközi Távközlési Egyesület /ITU/ eljárásainak azon részeit, melyek a légiforgalmi rádiórendszerek frekvenciáinak a felhasználására vonatkozó további információkat tartalmazzák, a Polgári Légiközlekedés Rádiófrekvencia Spektrum Követelmények Kézikönyve (Handbook on Radio Frequency Spectrum Requirements for civil Aviation) *(Doc 9718) foglalja össze, amely egyúttal a jóváhagyott ICAO elvek ismertetését is tartalmazza.*

2. Megjegyzés. – Az Annex 10-nek ez a része az összeköttetési rendszerek meghatározott berendezéseire vonatkozó Szabványokat és Ajánlott Gyakorlatokat tartalmazza. Jóllehet, a Szerződő Államok fogják meghatározni a meghatározott berendezések telepítési szükségességének felülvizsgálatát, összhangban a vonatkozó Szabványokban vagy Ajánlott Gyakorlatokban leírt feltételekkel összhangban, Az érintett Szerződő Államokra vonatkozó ICAO véleményeket és az ajánlásokat a Tanács hajtja végre a szokásos módon, rendszeres időközönként, a Körzeti Léginavigációs Értekezletek ajánlásai alapján (Doc 8144, Körzeti Léginavigációs Értekezletek Irányelvei és azok Végrehajtási Eljárásainak Rendszabályai).

3. Megjegyzés. – Ez a fejezet az összeköttetési rendszerekre vonatkozó általános meghatározásokat foglalja magába. Az ebben a kötetben lévő egyes rendszerekre vonatkozó speciális meghatározások a megfelelő fejezetekben találhatók.

4. Megjegyzés. – Az összeköttetési rendszerek másodlagos energiaellátásra és a megbízhatóságukra, valamint a rendelkezésre állásukra vonatkozó útmutató anyagot az Annex 10, I. Kötet 2.9 pontja és az "F" Melléklet foglalja magába.

Aeronautical telecommunication network (ATN). Légiforgalmi Távközlési Hálózat (ATN). Egy belső hálózati kiépítés, amely lehetővé teszi a földi, levegő-föld és repülési adat alhálózatok számára az együttműködést egymás között, a Nemzetközi Szabványügyi Szervezet (ISO) Nyílt Rendszer Összekapcsolás (OSI) referencia modellen alapuló közös interfész szolgáltatás és protokolllok elfogadásával.
Aircraft address. Légijármű címzés. Huszonnégy bit egyedi kombinációja, amely egy légijármű számára kijelölésére rendelkezésre áll a levegő-föld összeköttetés, a navigáció és légtér-ellenőrzés céljára.
Aircraft earth station (AES). Légijármű fedélzeti földi állomás (AES). Mozgó földi állomás a repülési mozgó műholdas szolgáltatásban, amely egy légijármű fedélzetén van elhelyezve (lásd még ("GES").
Bit error rate (BER). Bit hiba-arány (BER). Egy mintavételben található bit hibák száma, osztva a mintavételben lévő összes bitek számával, általában sok ilyen mintavétellel átlagolva.
Carrier-to-multipath ratio (C/M). Direkt több-utas vivőfrekvenciás teljesítmény viszonyszám. A vivőfrekvencia teljesítmény közvetlenül vett, azaz visszaverődés nélküli viszonyszáma, a több-utas teljesítményhez, azaz a visszavert vivőfrekvencia teljesítményhez képest.
Carrier-to-noise density ratio (C/N_0). Vivőfrekvencia zajsűrűség viszonyszám (C/N_0). A teljes vivőfrekvencia teljesítmény viszonyszáma az 1 Hz sávszélességhez tartozó átlagos zajteljesítményhez képest, amelyet rendszerint dBHz-ben fejeznek ki.
Channel rate. Csatorna átviteli sebesség. Az a sebesség, amellyel biteket visznek át az RF csatornán keresztül. Ezek a bitek tartalmazzák azokat a biteket, amelyeket keretezésre és hiba-korrekcióhoz használnak, valamint az információt hordozó biteket. Kötegelt adatátvitel esetében az átviteli sebesség a kötegelés időtartama alatti pillanatnyi kötegelési sebességre vonatkozik.

Channel rate accuracy. Csatorna átviteli sebesség pontossága. Ez annak az órajelnek a relatív pontossága, amelyhez az átvitt csatorna-biteket szinkronizálják. Például, az 1,2 kbit/s csatorna átviteli sebességnél a 10^6 egy részének maximális hibája, amely magában foglalja a maximálisan megengedett órajel-hibát, ±1,2 x 10^{-3} Hz.
Circuit mode. Áramköri módozat. Olyan kialakítású kommunikációs hálózat, amely az alkalmazások szempontjából dedikált átviteli vonalnak tekinthető.
Doppler shift. Doppler-eltolódás. A vevő egységnél megfigyelt frekvencia-eltolódás, amely az adó egység és a vevő egység közötti relatív elmozdulás következménye.
End-to-end. Végponttól-végpontig. Teljes kommunikációs úthoz tartozó, vagy arra vonatkozó, tipikusan (1) az információ-forrás és a kommunikációs rendszer közötti, az átviteli végen lévő interfésztől (2) a kommunikációs rendszer és az információ-használó, vagy feldolgozó, vagy alkalmazó közötti, a vételi végen lévő interfészig tartó összeköttetési útvonal.
End-user. Végfelhasználó. Az információ végső forrása és/vagy felhasználója.
Energy per symbol to noise density ratio. (E_S/N_0) Jel-zaj teljesítmény viszony (E_s/N_0). A csatorna-szimbólumonként kisugárzott átlagos energia és az átlagos zaj teljesítmény viszonyszáma az
1 Hz sávszélességben, rendszerint dB-en kifejezve. Az A-BPSK és A-QPSK esetében egy csatorna-szimbólum egy csatorna-bitnek felel meg.
Equivalent isotropically radiated power (e.i.r.p.) Izotropikusan kisugárzott egyenértékű teljesítmény (e.i.r.p.) Az antennába táplált teljesítmény és az antenna egy megadott irányban az izotróp sugárzóhoz viszonyított nyereségének összege. *(abszolút vagy izotróp nyereség).*
Forward error correction (FEC). Adat-továbbítási hiba védelem (FEC). A továbbított jel redundáns információval oly módon történő kiegészítésének folyamata, amely lehetővé teszi a továbbításban jelentkező hibák kijavítását a vevőnél.
Gain-to-noise temperature ratio. Nyereség-zaj hőmérsékleti viszonyszám. Az antenna alrendszer vevő-oldali kimenetén az antenna-nyereség és zaj viszonyszáma rendszerint dB/K-ban kifejezve. A zajt annak a hőmérsékletnek az értékeként fejezik ki, amellyel egy 1 Ohm-os ellenállás hőmérsékletének emelkedni kell az ugyanakkora zaj teljesítmény-sűrűség előállításához.
Ground earth station(GES). Földi telepítésű földi állomás (GES) A műholdas állandóhelyű szolgálat, vagy néhány esetben a műholdas légiforgalmi mozgó-szolgálat földi állomása, amelyet egy meghatározott állandó földi helyre telepítenek a műholdas légiforgalmi mozgó-szolgálat részére távkapcsolat nyújtása céljából.

Megjegyzés. – Ezt a meghatározást az ITU Nemzetközi Rádió-Rendszabályzata a "repülési földi állomás" meghatározásaként használja. A Szabványok és Ajánlott Gyakorlatok-(SARPs)-ban alkalmazott "GES" meghatározásának az a célja, hogy egyértelműen megkülönböztesse ezt egy légijármű fedélzetén elhelyezett földi állomástól (AES), amely egy légijármű fedélzetén lévő mozgó állomás.

Mode S subnetwork. Mód S alhálózat. A másodlagos légtér-ellenőrző radar (SSR) Mode S kérdező és válaszadó egységek felhasználásával - meghatározott protokollok szerint végzett digitális adatcsere céljára szolgáló eszköz.
Packet. Adatcsomag. Hálózati szintű összeköttetési eszközök közötti adatcsere alapegysége.
Packet layer protocol (PLP). Adatcsomag réteg protokolll (PLP). Egyenrangú **egységek** közötti hálózati szintű összeköttetés létesítésére és fenntartására, valamint adatcsomagok átvitelére szolgáló protokoll. Ezen szabvány vonatkozásában a hivatkozott kifejezés arra a protokolllra vonatkozik, melyet az ISO 8208 szabványban határoztak meg.
Point-to-point. Ponttól-pontig. Két, főképpen végfelhasználói berendezés, egymással való kölcsönös összeköttetéséhez tartozó, vagy arra vonatkozó, két különálló végfelhasználót összekötő szolgáltatás kommunikációs útvonala, megkülönböztetésként a közvetítő- és a több-pontú szolgáltatástól.
Slotted aloha. Időosztásos távközlési csatorna használat. Véletlenszerű hozzáférhetőség stratégiája, ahol több felhasználó egymástól függetlenül férhet hozzá ugyanahhoz az adatátviteli csatornához, de minden összeköttetést egy rögzített résidőre kell korlátozni. Az összes felhasználó ismeri ugyanazon résidő szerkezetet, de egyéb koordináció nincs a felhasználók között.
Switched virtual circuit (SVC). Kapcsolt virtuális áramkör (SVC). Az ISO 8208 protokolllon belül szolgáltatott elsődleges áramkör vezérlő eljárás. A hálózati forrásokat dinamikusan kiosztják szükség esetén, és felszabadítják, ha már nincs erre igény.
Time division multiplex access (TDMA). Időosztásos multiplex hozzáférés (TDMA). Egy RF csatorna időmegosztásos használatán alapuló, többszörös hozzáférési eljárás, amely a következőket alkalmazza: (1) diszkrét, egymást követő idő-réseket, mint alapvető megosztott forrást; és (2) működő protokolllok egy halmazát, amely

lehetővé teszi a használók számára, hogy együttműködjenek egy vezérlő irányító állomással a csatorna elérés elősegítésére.
Time division multiplex (TDM). Időosztásos multiplex (TDM). Egy csatorna-megosztási stratégia, amelyben az azonos forrásból származó, de különböző rendeltetési helyű információ-csomagokat időrendben sorba rendezik ugyanazon a csatornán.
Transit delay. Átviteli késés. Az összeállított adatcsomag továbbítására irányuló kérés, valamint a vevő-oldali megfelelő csomag vételére és felhasználására vagy továbbítására való készségre vonatkozó jelzés között eltelt idő, kötegelt adat rendszerekben.
VHF digital link (VDL). VHF (ultrarövidhullámú) digitális összeköttetés. A repülési távközlési hálózat (ATN) alkotó részét képező mozgó alhálózat, amely a repülési mozgó VHF frekvencia-sávban üzemel. Ezenkívül, a VDL nem-ATN funkciókat is szolgáltat, mint például digitalizált hangot.

2. FEJEZET.

(Kidolgozás alatt.)

3. FEJEZET. LÉGIFORGALMI TÁVKÖZLÉSI HÁLÓZAT

3.1 MEGHATÁROZÁSOK

1. Megjegyzés. – A következő meghatározásokat az ISO/IEC 7498-1, Information technology – Open Systems Interconnection – Basic Reference Modell (Információs technológia – Nyílt rendszerek belső kapcsolás – Alap referencia modell) (*Reference: ITU-T Rec. X. 200 (1194) és az ICAO Doc 9705 –* Manual of Technical Provisions for the Aeronautical Telecommunication Network (ATN) (Légiforgalmi Távközlési Hálózat Műszaki Előírásai Kézikönyv) *meghatározásaiból vettük.*

2. Megjegyzés. – Az ICAO Doc 9705 több kiadást ért meg. Ennek a dokumentumnak mindegyik alkötete jelezte az előírások alakulását az egymást követő kiadások között.

3. Megjegyzés. – Az ICAO Doc 9705 I. alkötete egy kereszt-hivatkozási grafikont szolgáltat a változatok (azaz beépített szoftver képessége) és a kiadványok (azaz műszaki előírások) között.

Accounting management. Forgalmi kezelés**.** Egy olyan rendszerkezelési berendezés, amely a felhasználók hálózati erőforrás felhasználásait kezeli, ellenőrzi és korlátozza az erőforrások felhasználását.
ADS application. ADS alkalmazás. Egy olyan Légiforgalmi Távközlési Hálózati /ATN/ alkalmazás, amely a légijárművektől származó automatikus berendezés-függő légtérellenőrző /ADS/ adatokkal látja el a Légiforgalmi Szolgálati /ATS/ Egysége(ke)t, légtérellenőrzési célokra.
Aeronautical administrative communication (AAC). Légiforgalmi igazgatási közleményváltás. Repülésüzemeltető ügynökségek által használt, a repülési és szállítási szolgáltatásaikra vonatkozó üzleti közleményváltás. Ezt a közleményváltási formát széleskörűen alkalmazzák, mint például repülési és földi szállításokra, könyvelésre, személyzet és légijármű üzembe állítására, vagy más logisztikai célokra a teljes repülésüzemeltetés hatékonyságának fenntartása vagy növelése érdekében.
Aeronautical operational control (AOC). Repülésüzemi járatói felügyelet (AOC). A repülések indítása, folytatása, átirányítása vagy befejezése céljából, azok biztonsága, rendszeressége és hatékonysága érdekében végzett felügyelet ellátásához megkövetelt járatói kapcsolattartás.
Aeronautical passanger communication) (APC). Légiutasok távközlése (APC). Nem biztonsági jellegű beszéd- és adatszolgáltatási kapcsolattartás utasok és a légi hajózó személyzeti tagok részére személyes közlemény-váltáshoz.
AIDC application. ATS Egységek közötti automatikus adatcsere (AIDC) alkalmazás. Egy olyan Légiforgalmi Távközlési Hálózati /ATN/ alkalmazás, melynek rendeltetése a Légiforgalmi Irányítás (ATC) Légiforgalmi Szolgálati Egységei (ATSUs) közötti információ-cserére szolgál, a repülési értesítések, a repülés koordináció, az összeköttetés átadása, a légtérellenőrzési adatok továbbítása, valamint általános adatok továbbítása céljára.
Air traffic service. Légiforgalmi szolgálat. (ATS) Gyűjtőfogalom, ami jelenthet repülés-tájékoztató szolgálatot, repülőtéri repülés-tájékoztató szolgálatot, riasztó szolgálatot, légiforgalmi tanácsadó szolgálatot, légiforgalmi irányító szolgálatot (körzeti, bevezető, vagy repülőtéri).

Application. Alkalmazás. Egy információs rendszer végső felhasználása; magától a rendszertől való megkülönböztetésként.
Application entity (AE). Alkalmazási entitás (AE). Az alkalmazási folyamat azon része, amely a Nyílt Rendszerek Összekapcsolásának (OSI) környezetén belül az összeköttetéseket érinti. Egy alkalmazási folyamat szempontjait, amelyeket az OSI céljainál figyelembe kell venni, egy vagy több Alkalmazási Entitás (AE) képviseli.
Application information. Alkalmazási információ. Az alkalmazási nevekre utal (például: az AE /Alkalmazási entitás/ minősítők, mint az ADS /Automatikus berendezés-függő légtér-ellenőrző rendszer/ és a CPC), a típus száma és a címzése (a hosszú vagy rövid TSAP, szükség szerint), minden egyes alkalmazásnál.
ATIS application. ATIS alkalmazás. Egy olyan FIS /Repüléstájékoztató Szolgálati Alkalmazás/, amely támogatja a D-ATIS- /Digitális Automatikus Közelkörzeti Tájékoztató Szolgálat/-ot.
ATN directory services (DIR). ATN katalógus szolgáltatás (DIR) Szolgáltatás, amely biztosítja egy alkalmazási entitás vagy felhasználó részére, hogy az ATN közösségben egy elosztott katalógus adatbázisról lekérdezhessen és visszakereshessen címzési, biztonsági és műszaki képességi információkat az ATN közösségen belüli más felhasználókról és entitásokról.
ATN security services. ATN biztonsági szolgáltatás. A biztonság előírások információs készlete, amely lehetővé teszi a vevő 'végső' állomás vagy közbenső rendszer állomás részére a vett információk forrásának egyértelmű azonosítását (hitelesen), és ezen információk sértetlenségének ellenőrzését.
ATN systems management (SM). ATN rendszerkezelés (SM). Berendezések készlete azon források vezérlésére, koordinálására és ellenőrzésére, amely lehetővé teszi, hogy az összeköttetések az ATN rendszerben létrejöjjenek. Ezek a berendezések magukba foglalják a hibák, az elszámolás, a felépítés, valamint, a teljesítmény és a biztonsági kezelést.
ATSC class. ATSC osztály. Az ATSC osztály-paraméter lehetővé teszi az ATSC használója számára a felkínált adatoknál várható szolgáltatási minőség meghatározását. Az ATSC osztály értéke az ATN végtől-végig való átvitel 95 százalékos valószínűségű késése fogalmával van meghatározva.
ATS communications (ATSC). ATS összeköttetés (ATSC)**.** A légiforgalmi szolgáltatásokkal kapcsolatos összeköttetés, amely a légiforgalmi szolgáltatások, a légiforgalmi irányítás, a repülési és meteorológiai információk, a helyzet-jelentések és a repülés biztonságával, valamint rendszerességével kapcsolatos szolgáltatásokat tartalmazza. Ez az összeköttetés egy vagy több légiforgalmi szolgálati adminisztrációt foglal magában. Ezt a fogalmat címzésekkel kapcsolatos adminisztratív célokra használják.
ATS interfacility data communication (AICD). ATS egységek közötti automatikus adatcsere (AIDC). Automatizált adatcsere légiforgalmi szolgálati egységek között, különösen a repülések koordinációja és átadása vonatkozásában.
ATS message handling services (ATSMHS). ATS közlemény-továbbítási eljárások (ATSMHS). Az ATS közlemények ATN-en keresztüli cseréjéhez használt eljárások oly módon, hogy egy ATS közlemény továbbítása általában nem korrelál a szolgálatot nyújtó másik ATS közlemény továbbításával. Két ATS közlemény kezelési szolgálat van, az ATS közlemény-küldő szolgálat és az ATN átmenő szolgálat.
ATS message handling system (AMHS) ATS közlemény kezelési rendszere (AMHS). Az ATS küldemény szolgálat által biztosított küldemények továbbítási rendszere.
ATS unit (ATSU). ATS egység (ATSU). Gyűjtőfogalom, amely jelenthet légiforgalmi irányító egységet, repülés-tájékoztató egységet vagy légiforgalmi szolgálatok bejelentő irodáját.
Authentication. Hitelesítés. Egy személy/felhasználó/hálózati entitás azonosságának ellenőrzésére bevezetett eljárás.
Authorized path. Engedélyezett összeköttetési útvonal. Összeköttetési útvonal, amelyet az adott terület vezetője(i) egy adott forgalom típushoz és kategóriához előre meghatározott (meghatároztak) és alkalmasnak nyilvánított (nyilvánítottak).
Automatic dependent surveillance (ADS). Berendezés-függő automatikus légtérellenőrző rendszer (ADS). Légtérellenőrzési mód alatt az értendő, amikor egy légijármű adatátviteli csatornán keresztül automatikusan továbbítja a fedélzeti navigációs- és helyzet-jelentő rendszerektől származó adatokat, beleértve a légijármű hívójelét, a négy-dimenziós helyzet-tájékoztatást és szükség szerint, egyéb adatokat is.
Automatic terminal information service (ATIS). Automatikus közel-körzeti tájékoztató szolgálat (ATIS). Egész nap, vagy a nap meghatározott részében aktuális, rutin jellegű tájékoztatások biztosítása az érkező és az induló légijárművek részére.
Adatkapcsolat - Automatikus közel-körzeti tájékoztató szolgálat (D-ATIS). Adatkapcsolat útján történő ATIS biztosítása.
Beszéd-üzemű - Automatikus közel-körzeti tájékoztató szolgálat. (Beszéd-üzemű ATIS). Folyamatos és ismétlődő, általános adások útján történő ATIS biztosítása.
Configuration management. Konfigurációs kezelési eljárás. ATN rendszer kezelési berendezés a kezelők részére a távirányítású elemek konfigurációinak megváltoztatásához.

Context management (CM) application. Bejelentkezési eljárás. Olyan ATN alkalmazás, amely bejelentkezési szolgáltatást nyújtva, kezdeti légijármű beiktatást, továbbá a légijárműre vonatkozó összes többi adatkapcsolat alkalmazás jegyzéke beiktatását teszi lehetővé az ATN-be. Magában foglalja továbbá az ATS egységek közötti címzésküldő funkciót.
Megjegyzés. – A bejelentkezési eljárás egy elismert OSI bemutató réteg fogalom. Az OSI használatnak és az ATN használatnak egyébként nincs közös területe.
Context management (CM) server. Bejelentkezési eljárás szerver. Egy olyan Légiforgalmi Szolgálati /ATS/ berendezés, amely képes arra, hogy alkalmazási információt biztosítson más ATSU-kra vonatkozóan légijárműtől, vagy ATSU-tól kérve.
Controller-pilot data link communication (CPDLC). Légiforgalmi irányító és légijárművezető közötti digitális adatcsere. A légiforgalmi irányító és a légijárművezető közötti távközlési módszer, ahol az ATC közleményeket adatátviteli összeköttetés segítségével továbbítják.
CPDLC application. CPDLC alkalmazás. Olyan Légiforalmi Távközlési Hálózati /ATN/ alkalmazás, amely eszközt biztosít a légiforgalmi irányítói adatösszeköttetésben az irányító, a vevő vagy a soron következő Légiforgalmi Szolgálati /ATS/ egységek és a légijármű között, a levegő-föld és föld-föld alhálózatokat felhasználva, és ami összeegyeztethető az ICAO szakkifejezésekkel, a Légiforgalmi Irányítás jelenlegi élőszavas összeköttetéseivel.
Data integrity. Adat sértetlenség. Annak a valószínűsége, hogy egy adat nem változik, illetve nem sérül meg.
D-METAR. D-METAR. A Digitális Adatkapcsolaton keresztül biztosított repülési időjárás-jelentő szolgálat jelölésére használatos rövidítés.
End system (ES). Vég-rendszer (ES). Rendszer, amely tartalmazza az OSI hét rétegét és egy vagy több végső felhasználó alkalmazási folyamatot.
End to end. Végponttól-végpontig. Teljes kommunikációs úthoz tartozó vagy arra vonatkozó, tipikusan (1) az információforrás és a kommunikációs rendszer közötti, az átviteli végen lévő interfésztől (2) a kommunikációs rendszer és az információt használó vagy azt feldolgozó, illetve alkalmazó közötti, a vételi végen lévő interfészig tartó összeköttetési útvonal.
Entity. Entitás. Aktív elem bármely rétegben, amely lehet vagy egy szoftver entitás (mint például egy folyamat) vagy egy hardver entitás (mint például egy intelligens input-output chip).
Fault management. Meghibásodás kezelése. Egy olyan Légiforgalmi Távközlési Hálózati /ATN/ rendszerkezelő berendezés, amely érzékeli, elkülöníti és kijavítja a problémákat.
FIS application. Repüléstájékoztató Szolgálati /FIS/ alkalmazás. Egy olyan Légiforgalmi Távközlési Hálózati /ATN/ alkalmazás, amely a légijárművek részére tájékoztatást ad és hasznos tanácsokat nyújt a repülések biztonságos és eredményes lefolytatásához.
Flight information service. **(FIS)** Repüléstájékoztató Szolgálat (FIS). Olyan szolgálat, amelyet a repülések biztonságos és hatékony végrehajtásához hasznos tanácsok és tájékoz tatások adása céljából nyújtanak.
Inter-centre communications (ICC) Központok közötti digitális közleményváltás (ICC). Az ICC az ATS egységek közötti adatkapcsolati összeköttetést jelent az ATS támogatása érdekében olyan területeken, mint például repülésekről szóló előzetes tájékoztatás, koordinálás, irányítás-átadás, repüléstervezés, légtér-gazdálkodás és légiforgalmi áramlás-szervezés.
Intermediate system (IS). Közbenső rendszer. Rendszer, amely átviteli és útvonalazási funkciót lát el és az OSI referencia modell legalsó három rétegére szorítkozik.
Internet communications service. Hálózatok közötti távközlési szolgáltatás. A hálózatok közötti távközlési szolgáltatás egy hálózatközi felépítmény, amely lehetővé teszi földi, levegő-föld és repüléselektronikai alhálózatok együttműködését közös interfész szolgálatok és protokollok elfogadásával az ISO/OSI referencia modell alapján.
METAR application. METAR alkalmazás. Egy olyan Repüléstájékoztatási Szolgálati /FIS/ alkalmazás, amely támogatja a. D-METAR közlemények továbbítását.
Open systems interconnection (OSI) reference modell. Nyílt rendszerek (OSI) referencia modell. Modell, amely szabvány megközelítést nyújt a hálózat tervezéséhez, modularitást vezet be a funkciók komplex együttesének hét jobban kezelhető, önálló funkcionális rétegre történő osztásával. Ezeket egyezményesen általában függőlegesen rakott halmazként írják le.

Megjegyzés – Az OSI referencia modellt az ISO/IEC 7498-1 határozza meg. .

Performance management. Teljesítmény felügyelet. Egy Légiforgalmi Távközlési Hálózati /ATN/ rendszer felügyelő berendezés, amely ellenőrzi és kiértékeli a rendszer teljesítményét.
Subnetwork. Alhálózat. Az adathálózat tényleges megvalósítása, amely homogén protokolllt és címzés-tervet

alkalmaz és egyetlen hatóság irányítása alatt áll.
System level requirement. Rendszerszint követelmény. A rendszerszint követelmény magas szintű műszaki követelmény, amely üzemelési követelményekből, technológiai korlátozásokból és rendszabályozási korlátozásokból (adminisztratív és intézményi) kerül levezetésre. A rendszerszint követelmények szolgálnak alapul a funkcionális - és az alacsonyabb szintű követelményekhez.
Transit delay. Átviteli késés. Köteg adatrendszerekben egy összeállított adatköteg továbbítására irányuló kérés és a vevő oldal arra vonatkozó jelzése között eltelt idő, amely idő alatt a hozzá tartozó köteget vette és felhasználásra vagy továbbításra készen áll.
Upper layers (UL) communications service. Felső rétegű (UL) kommunikációs szolgáltatás. Az OSI referencia modell gyűjtő, bemutató és alkalmazó rétegeihez tartozó fogalom.

3.2 BEVEZETÉS

3.2.1 A Légiforgalmi Távközlési Hálózat (ATN) olyan alkalmazási entitásokat és összeköttetési szolgáltatásokat foglal magába, amelyek lehetővé teszik a földi, levegő-föld és repülési adat alhálózatok részére a Nemzetközi Szabványügyi Szervezet (ISO) Nyílt Rendszerek (OSI) összeköttetési referencia modelljén alapuló közös interfész szolgáltatásainak és protokollljainak együttműködését. Az ATN koncepcionális modelljét a 3-1.* ábra mutatja be.
* Az összes ábra ennek a fejezetnek a végén található.

3.2.2 A Légiforgalmi Távközlési Hálózat /ATN/ és a hozzá kapcsolódó alkalmazási folyamatokat úgy tervezték, hogy elősegítsék az összeköttetést, a navigációt, a légtérellenőrzést és légiforgalmi szolgáltatásszervezési (CNS/ATM) rendszereket. A Légiforgalmi Távközlési Hálózat /ATN/:

a) kifejezetten és kizárólagosan arra a célra szolgál, hogy összeköttetési szolgáltatást biztosítson a légiforgalmi szolgáltatásokat biztosító szervezeteknek és a légijármű üzemeltető cégeknek, az összeköttetési forgalom következő típusain keresztül:

1) a Légiforgalmi Szolgálatok összeköttetései (ATSC);
2) a Repülésüzemi járatói felügyelet (AOC);
3) a Légiforgalmi igazgatási közlemény-váltás (AAC); és
4) a légiutasok távközlése (APC);

b) a felhasználó számára átlátható módon biztosítja azt a megbízható végpontból-végpontig összeköttetési szolgáltatást, amely a légiforgalmi szolgálatok között a biztonságos és hatékony ellátás támogatásához szükséges, az alábbiak között:

1) a légijármű fedélzeti rendszerek és a földi rendszerek; valamint
2) az összetett földi rendszerek között;

c) olyan adat összeköttetési szolgáltatást nyújt, amely alkalmas a felhasználók biztonsági és biztonságossági követelményeinek teljesítésére;

d) nemzetközileg elismert adat-összeköttetési szabványokon alapul, amely megkönnyíti a jól alkalmazható rendszerek fejlesztését, és támogatja a versenyképes hálózati szolgáltatás biztosítását;

e) eltérő szolgáltatási típusokat/kategóriákat/osztályokat foglal magába (beleértve az előnyben részesített/kiválasztott levegő-föld alhálózatokat), olyanokat, amelyeket a különböző alkalmazások megkívánnak;

f) meghatároz egy olyan felépítést, ami lehetővé teszi a nyilvános és a magán alhálózatok integritását, mind a levegő-föld, mind a föld-föld összeköttetésekhez. Ez lehetővé teszi a meglévő/tervezett infrastruktúra és hálózati technológia felhasználását, valamint megadja a kivitelezőknek a hálózat méretének megvalósításához úgy, hogy a növekvő felhasználói igények kielégíthetőek; és

g) hatékonyan használja fel a sávszélesség által korlátozott levegő-föld alhálózatot és annak megfelelően csökkenti a költségeket.

3.2.3 A jelenleg meghatározott Légiforgalmi Távközlési Hálózati /ATN/ alkalmazások úgy kerültek kidolgozásra, hogy biztosítják a légiforgalmi összeköttetéseket, a légtérellenőrzést és a tájékoztató szolgálatokat. Ezek az alkalmazások a következő légiforgalmi szolgáltatás-szervezési feladatok alátámasztására szolgálnak:

a) Légiforgalmi szolgálatok (ATS);

1) Légiforgalmi irányító szolgálat (ATC);
2) Repüléstájékoztató szolgálat (FIS); és
3) Riasztó szolgálat;

b) Légiforgalmi áramlás-szervezés (ATFM); és

c) Légtér-szervezés.

3.2.4 Ez a fejezet a Légiforgalmi Távközlési Hálózat /ATN/ átfogó és általános előírásait tartalmazza. A részletes műszaki előírások a Doc 9705-ben találhatók. Ennek a fejezetnek a fennmaradó része a következő követelmények és funkciók ismertetéséhez került kialakításra:

a) általános;

b) rendszerszint követelmények;

c) ATN alkalmazási követelmények;

d) ATN összeköttetési szolgáltatási követelmények;

e) ATN elnevezés és címzés;

f) ATN rendszerkezelési követelmények; és

g) ATN biztonsági követelmények.

3.3 ÁLTALÁNOS RÉSZ

3.3.1 A Légiforgalmi Távközlési Hálózat (ATN) adat összeköttetési szolgáltatást és alkalmazási entitásokat biztosítja az alábbiak alátámasztására:

a) a Légiforgalmi szolgálatok (ATS) közvetítése a légijárművek részére;
b) ATS információk cseréje az ATS egységek között; és

c) egyéb alkalmazások, mint például repülésüzemi járatói felügyelet (AOC) és légiforgalmi igazgatási közleményváltás (AAC).

1. Megjegyzés. –Intézkedések történtek az információ-csere befogadásáról, mint például az időjárás, a repülési tervek, a NOTAM-ok és a tényleges valós-idejű légiforgalmi áramlás-szervezés a légijárműveket üzemeltető ügynökségek /járatók/ földi-bázisú rendszerei és az ATS egységek között.

2. Megjegyzés. – Intézkedések történtek a légiutasok összeköttetési (APC) rendszerének befogadásáról is.

3.3.2 Amikor az ATN-t a légiforgalmi szolgálatok munkájának segítésére használják, akkor az feleljen meg az ebben a fejezetben lévő előírásoknak.
3.3.3 A Légiforgalmi Távközlési Hálózat /ATN/ használatára vonatkozó követelményeket a körzeti léginavigációs egyezmények alapján kerül előírásra.

3.3.4 **Ajánlás.** – *A polgári repülési hatóságoknak együtt kell működnie a nemzeti hatóságokkal és a légiforgalmi* *berendezéseket gyártó iparággal különös tekintettel azokra a Légiforgalmi Távközlési Hálózati /ATN/ kivitelezési szempontokat, amelyek lehetővé teszik az ATN világméretű biztonságát, együttműködő-képességét és hatékony, megfelelő felhasználását.*

3.4 RENDSZERSZINT KÖVETELMÉNYEK

Megjegyzés. – A rendszerszint követelmények magas szintű műszaki követelmények, amelyek az üzemeltetési követelményekből, a technológiai korlátozásokból és rendszabályozási korlátozásokból (adminisztratív és intézményi) erednek. Ezek a rendszerszint követelmények képezik az alapját a funkcionális követelményeknek és az alacsonyabb szintű követelményeknek.

3.4.1 Az ATN-nél a Nemzetközi Szabványügyi Szervezetnek (ISO) a Nyílt rendszerek összekapcsolására (OSI) vonatkozó szabványait kell alkalmazni.
3.4.2 Az ATN-nek egy eszközt kell biztosítani az átmenet megkönnyítéséhez az alkalmazás entitások és/vagy az összeköttetési szolgáltatások jövőbeli változataihoz.

Megjegyzés. – Az a cél, hogy a jövőbeli változatok felé történő fejlődés a visszafelé való kompatibilitást az előző változatokkal biztosítsa.

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3.4.3 Az ATN-nek lehetővé kell tennie a jelenlegi AFTN/CIDIN felhasználók és rendszerek átmenetét az ATN felépítésbe.

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Megjegyzés. – Az AFTN-ről vagy a CIDIN-ből az átmenet a Légiforgalmi Távközlési Hálózatba /ATN/ azok az AFTN/AMHS és a CIDIN/AMHS kapuk kezelik /AMHS= Légiforgalmi Szolgálatok Közlemény-kezelő Szolgáltatás/ külön-külön, amelyek a Doc 9705, III. Al-kötetében vannak meghatározva.

3.4.4 Az ATN-nél olyan intézkedéseket kell hozni, amelyek által csak az irányító Légiforgalmi Szolgálati /ATS/ egység adhat Légiforgalmi irányítási /ATC/ utasításokat a légtérben üzemelő légijárművek részére.

Megjegyzés. – Ez a légiforgalmi irányító és a légijárművezető közötti digitális adatcsere (CPDLC) összeköttetés alkalmazási adatkapcsolat entitás folyamatos adat-jogosultságon és a soron következő egység adat-jogosultságon keresztül elérhető.

3.4.5 A Légiforgalmi Távközlési Hálózatnak /ATN/ előre meghatározott továbbítási útvonal listán alapuló továbbítási útvonalakat kell biztosítani.
3.4.6 Az ATN-nek eszközt kell biztosítania annak meghatározását,, hogy az adat összekötetést csak a felhasználó által meghatározott forgalom fajtához és kategóriához jogosított útvonalon keresztül lehessen végrehajtani.
3.4.7 Az ATN-nek ATSC osztályzatot kell felkínálnia a 3-1.* táblázatban lévő követelményekkel összhangban.
* Az összes táblázat a fejezet végén került elhelyezésre.

1. Megjegyzés. – Amikor egy Légiforgalmi Távközlési Hálózati /ATN/ alkalmazás meghatároz egy ATSC osztályzatot, akkor az adatcsomagot az ATN internet összeköttetési szolgálatba "a legjobb erőfeszítési alapon" kell elküldeni. A "legjobb erőfeszítési alap" azt jelenti, hogy amikor egy útvonal az ATSC osztály részére rendelkezésre áll, akkor az adatcsomagot azon az útvonalon kell továbbítani. Amikor az ilyen továbbítási útvonal nem áll rendelkezésre, akkor az adatcsomagot az első olyan ismert útvonalon kell továbbítani, amelynek az ATSC osztályzata magasabb a kért útvonalnál, vagy ha nincs ilyen útvonal, akkor az ATSC osztályzatnál a kértnél alacsonyabb első ismert útvonalon kell továbbítani.

2. Megjegyzés. – Az ATN összeköttetési szolgálat nem tájékoztatja az alkalmazási entitásokat akkor, ha a kért ATSC osztály nem volt elérhető. Az alkalmazási entitás felelőssége, hogy meghatározza azt a tényleges átviteli késedelmet, amelyet helyi eszközökkel, például idő-bélyegzéssel lehet megállapítani.

3.4.8 Az ATN-nek a 3-2. és 3-3. táblázatban meghatározott közlemény prioritásnak megfelelően kell működnie.
3.4.9 Az ATN-nek eleget kell tennie az alkalmazási információk cseréjének, amikor egy vagy több jogosult vonala

rendelkezésre áll.
3.4.10 Az ATN-nek értesítenie kell a megfelelő alkalmazási folyamatot, amikor nem áll rendelkezésre jogosult vonala.
3.4.11 Az ATN-nek eszközt kell biztosítania ahhoz, hogy egyértelműen megcímezze az összes ATN végponti és közbenső rendszert.
3.4.12 A Légiforgalmi Távközlési Hálózatnak lehetővé kell tennie a közlemény vevője részére azt, hogy azonosítsa a közlemény feladóját.
3.4.13 Az ATN címzési és elnevezési tervének lehetővé kell tennie az Államok vagy a szervezetek számára, hogy a saját közigazgatási területeiken belül címeket és elnevezéseket jelöljenek ki.
3.4.14 Az ATN-nek fenn kell tartania az adat összeköttetést az állandó helyű és a mozgó szolgálati rendszerekkel.
3.4.15 Az ATN-nek biztosítania kell az ATN mozgó szolgálati hálózatával a kapcsolatot úgy, ahogy az ebben az Annex-ben meghatározásra került.
3.4.16 Az ATN-nek gondoskodnia kell arról, hogy hatékonyan felhasználja a korlátozott sávszélességű alhálózatokat.
3.4.17 Az ATN-nek lehetővé kell tennie azt, hogy egy légijármű fedélzeti közbenső rendszer összekapcsolásra kerüljön egy földi közbenső rendszerrel az együtt-futó mozgó szolgálati alhálózatokon keresztül.
3.4.18 Az ATN-nek lehetővé kell tennie azt, hogy egy légijármű fedélzeti közbenső rendszer összekapcsolásra kerüljön az összetett földi közbenső rendszerekkel.
3.4.19 Az ATN-nek lehetővé kell tennie az alkalmazási entitások közötti címzés információk cseréjét.
3.4.20 A Légiforgalmi Távközlési Hálózatnak támogatnia kell a Bejelentkezési Eljárás (CM) kezelési alkalmazást akkor, ha más levegő-föld alkalmazásokat is segít.
3.4.21 Az ATN-nek képesnek kell lenni a társ-társ alkalmazás összekapcsolására, fenntartására, felszabadítására és megszüntetésére a bejelentkezési eljárás (CM) alkalmazásnál.
3.4.22 Az ATN-nek képesnek kell lenni pártól-párig alkalmazás együttesek létrehozására, fenntartására, felszabadítására és megszüntetésére az automatikus függő légtérellenőrzés (ADS) alkalmazásnál.
3.4.23 Az ATN-nek képesnek kell lenni a társ-társ alkalmazás összekapcsolására, fenntartására, felszabadítására és megszüntetésére az légiforgalmi irányító-légijárművezető közötti digitális adatcsere (CPDLC) alkalmazásnál.
3.4.24 Az ATN-nek képesnek kell lenni a társ-társ alkalmazás összekapcsolására, fenntartására, és megszüntetésére az automatikus közel-körzeti tájékoztató szolgálat (ATIS) alkalmazásnál.
3.4.25 Az ATN-nek képesnek kell lenni a társ-társ alkalmazás összekapcsolására, fenntartására, felszabadítására és megszüntetésére az légiforgalmi szolgálatok közleményeit kezelő szolgáltatás (ATSMHS) alkalmazással.
3.4.26 Az ATN-nek képesnek kell lenni a társ-társ alkalmazás összekapcsolására, fenntartására, felszabadítására és megszüntetésére az ATS egységek közötti adat-csere (AIDC) alkalmazásnál.
3.4.27 Ahol az ATN-en belül a napra a pontos időt használják, ott annak az Egyeztetett Világidőhöz (UTC) 1 másodpercen belüli pontosságúnak kell lenni.

Megjegyzés. – Az idő pontossági érték a meghatározott pontossági értéknek legfeljebb a kétszeresével egyenlő szinkronizációs hibát eredményezhet.

3.4.28 A végrendszernek gondoskodnia kell annak biztosításáról, hogy annak valószínűsége, hogy nem észlel egy 255 oktettes közleményt, amelyet a hálózatok közötti távközlési szolgáltatásban (internet) rossz helyre továbbított, nem továbbított, vagy elrontott, kisebb vagy egyenlő legyen 10^{-8}-al közleményenként.

Megjegyzés. – Elfogadott az, hogy a Légiforgalmi Távközlési Hálózat alhálózatai biztosítják az adatok azon sérthetetlenségét, amely a rendszerszint követelménnyel összeegyeztethető.

3.4.29 Az ATN védelmi szolgálata ATN vég-rendszerének képesnek kell lennie arra, hogy a társ-végrendszer azonosságot hitelesítse, az alkalmazási közlemények forrását azonosítsa, és az alkalmazási közlemények adat-sértetlenségét biztosítsa.

Megjegyzés. – Az alkalmazás közlemények ebben az összefüggésben a Légiforgalmi Szolgálatokra /ATS/, rendszerkezelésre és az igazgatási szolgálatokra vonatkozik.

3.4.30 ATN földi és levegő-föld határvonal közbenső rendszer ATN védelmi szolgálatának képesnek kell lennie a társ-közbenső rendszer azonosságának hitelesítésére, a továbbítási útvonal információs forrásának hitelesítésére, és a továbbítási útvonal információk adat integritásának biztosítására.
3.4.31 Az ATN-nek képesnek kell lennie a társ-társ alkalmazás összekapcsolására, fenntartására, felszabadítására az

igazgatási tájékoztatások közlemény-cseréjéhez kapcsolódóan.
3.4.32 Egy Légiforgalmi Távközlési Hálózat rendszerkezelést támogató ATN rendszernek elő kell segítenie az ATN üzemeltetés fokozott folyamatosságát, beleértve az összeköttetési szolgáltatás ellenőrzését és minőségének fenntartását.
3.4.33 Az ATN-nek képesnek kell lennie a Rendszerkezelés (SM) alkalmazás össze- kapcsolására, fenntartására, felszabadítására és megszűntetésére a társ-társ alkalmazásokhoz kapcsolódóan.
3.4.34 Az ATN-nek képesnek kell lennie a repülési rutin időjárás-jelentő szolgálat (METAR) alkalmazás összekapcsolására, fenntartására, felszabadítására és megszűntetésére a társ-társ alkalmazásokhoz kapcsolódóan.

3.5 A LÉGIFORGALMI TÁVKÖZLÉSI HÁLÓZAT /ATN/ ALKALMAZÁSI KÖVETELMÉNYEI

1. Megjegyzés. – ATN alkalmazás (ok) megvalósítása egy Államon vagy egy körzeten belül nem vonja maga után az összes, az alábbiakban meghatározott ATN alkalmazás megvalósítását.

2. Megjegyzés. – Az ATN alkalmazásnak egy előre-meghatározott részegysége műszaki előírásainak megvalósítása úgy megengedett, ahogyan az a Doc 9705-ben részletesen meghatározott.

3.5.1 Rendszeralkalmazások

Megjegyzés. – Rendszeralkalmazások olyan szolgáltatásokat biztosítanak, amelyek a Légiforgalmi Távközlési Hálózat /ATN/ levegő-föld alkalmazásainak, föld-föld alkalmazásainak és/vagy az ATN összeköttetési szolgálatok működéséhez szükségesek.

3.5.1.1 A BEJELENTKEZÉSI ELJÁRÁS (CM) ALKALMAZÁS
Megjegyzés. – A bejelentkezési eljárás /CM/ alkalmazás biztosítja egy légijármű részére azt a lehetőséget, hogy egy Légiforgalmi Szolgálati /ATS/ földi rendszerhez bejelentkezzen; bizonyos esetekben a földi rendszer fogja kérni a légijárműtől, hogy vegye fel az összeköttetést egy meghatározott földi rendszerrel. Miután a megfelelő kapcsolat létrejött, a bejelentkezési eljárás /CM/ biztosítja az információ-cserét minden egyes alátámasztott ATN alkalmazás részére, beleértve az egyes hálózati címzéseket is, ahogy megfelelő. A védelmi szolgálatot alátámasztó ATN rendszerekre a CM biztosítja az adatcsere kulcsot és a kulcs kezelési információt is. A CM biztosítja még a bejelentkezési információ felfrissítésének lehetőségét is, és egy ATS földi rendszer részére azt a képességet, hogy továbbítsa a bejelentkezési információt egy másik ATS földi rendszerhez. A CM bejegyeztetési funkciója teszi lehetővé az információknak a földön vagy a légijárművön lévő további alkalmazásaival való megosztási lehetőséget.

3.5.1.1.1 A Légifogalmi Távközlési Hálózatnak képesnek kell lennie a következő bejelentkezési eljárás /CM/ alkalmazási feladatok ellátására:
a) bejelentkezés;
b) kapcsolat felvétel;
c) adat-felfrissítés;
d) CM szerver lekérdezés;
e) CM szerver felfrissítés;
f) földi továbbítás; és
g) bejegyeztetés.

Megjegyzés. – A CM alkalmazásra vonatkozó műszaki előírások a Doc 9705, II. Al-kötetében vannak meghatározva
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3.5.1.2 LÉGIFORGALMI TÁVKÖZLÉSI HÁLÓZAT /ATN/ KATALÓGUS SZOLGÁLTATÁS (DIR)

3.5.1.2.1 Az ATN-nek képesnek kell lennie a következő DIR alkalmazás funkciók támogatására:
a) katalógus összeállítás;
b) a katalógus információ visszakeresése; és
c) a katalógus információ cseréje.

1. Megjegyzés. – Az ATN Katalógus Szolgáltatás lehetőséget biztosít egy alkalmazás vagy egy felhasználó részére, *hogy lekérdezze az elosztott katalógus adatbázist és, hogy visszakeresse a címzési, védelmi és műszaki lehetőségi tájékoztatásokat. A Katalógus Szolgáltatás (DIR) lehetőséget biztosít a meghatározott és jogosított felhasználók részére, hogy kiegészítsék, töröljék és módosítsák a katalógus adatbázis részeit, azokat, amelyekért felelősek. A Katalógus Szolgáltatás az ATN-en keresztül az összes olyan alkalmazás és felhasználó részére "felajánlott", aki eleget tesz a Doc 9705, VII. Al-kötet műszaki előírásainak.*

2. Megjegyzés. – A katalógus hozzárendelés feladata az, hogy társítást hozzon létre két olyan katalógus összetevő között, amelyek a további katalógus funkciókat támasztják alá. A katalógus hozzárendelés állítja fel az alkalmazási összefüggést és az egyéb katalógus funkciók használatának összeköttetési kapcsolata alapjául szolgál.

3.5.1.3 EGYÉB RENDSZERALKALMAZÁSOK
(Kidolgozás alatt)

3.5.2 Levegő-föld alkalmazások

Megjegyzés. – A levegő-föld alkalmazások földi összetevői foglalják magukba azokat a rendszereket, amelyek a levegő-föld közlemények tartalmát továbbítják a föld-föld összeköttetési vonalakon.

3.5.2.1 AZ AUTOMATIKUS BERENDEZÉS-FÜGGŐ LÉGTÉRELLENŐRZŐ RENDSZER (ADS) ALKALMAZÁSA
Megjegyzés. – Az ADS alkalmazást egy légijármű fedélzeti és egy földi rendszer alkotja. A légijármű fedélzeti ADS alkalmazási képes arra, hogy a Légiforgalmi Távközlési Hálózat /ATN/ összeköttetési szolgálatán keresztül automatikusan továbbítsa a földi rendszer részére az adatokat a fedélzeti navigációs rendszerekből. (pl. légijármű azonosítót, a négy-dimenziós helyzetet, a szándékot és kiegészítő adatokat, ahogy szükséges). Az ADS alkalmazás a szolgáltatást azokon a kapcsolatokon keresztül biztosítja, amelyek a rendszer levegőben lévő és földi egységei között létrejönnek (azaz igény kapcsolat, szakaszosan ismétlődő kapcsolat, esemény kapcsolat és kényszerhelyzeti kapcsolat) és a két ADS földi rendszer között (azaz a soron következő egységgel való kapcsolat).

3.5.2.1.1 A Légiforgalmi Távközlési Hálózat-/ATN/-nek képesnek kell lenni a következő ADS alkalmazások alátámasztására:
a) igény kapcsolatok;
b) szakaszosan ismétlődő kapcsolatok;
c) esemény kapcsolatok;
d) kényszerhelyzeti kapcsolatok; és
e) a soron következő egységgel való kapcsolatok

Megjegyzés. – A Berendezés-függő Automatikus Légtér-ellenőrző Rendszer /ADS/ alkalmazásra vonatkozó műszaki előírások a Doc 9705, II. Al-kötetében vannak meghatározva.

3.5.2.2 A LÉGIFORGALMI IRÁNYÍTÓ ÉS A LÉGIJÁRMŰVEZETŐ KÖZÖTTTI DIGITÁLIS ADATKAPCSOLAT (CPDLC) ALKALMAZÁSA

Megjegyzés. – A CPDLC alkalmazást egy légijármű fedélzeti és egy földi rendszer alkotja, és ezek lehetőséget biztosítanak az adatkapcsolati összeköttetésekre a Légiforgalmi Szolgálati /ATS/ egységek és az irányításuk alatt álló légijárművek között és/vagy azon légijárművekkel, amelyek az irányításuk alá kerülnek. A CPDLC alkalmazás rendelkezik azzal a képességgel, hogy létrehozza, kezelje és befejezze a CPDLC dialógusokat a légiforgalmi irányító - légijárművezető közlemény-váltásokban és a földi közlemények továbbításában.

3.5.2.2.1 A Légiforgalmi Távközlési Hálózat-/ATN/-nek képesnek kell lennie az alábbi CPDLC alkalmazási funkciók alátámasztására:
a) légiforgalmi irányító - légijárművezető közötti közlemény-váltás;
b) az adat jogosultság átadása;
c) a soron következő irányítási engedély kérése; és
d) adat-továbbítás a föld felé.

Megjegyzés. – A CPDLC alkalmazásra vonatkozó műszaki előírások a DOC 9880, az ATN részletes műszaki specifikációk kézikönyvben vannak meghatározva (kidolgozás alatt)

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3.5.2.3 REPÜLÉS-TÁJÉKOZTATÓ SZOLGÁLATI (FIS) ALKALMAZÁS

Megjegyzés. – A FIS alkalmazások repülés-tájékoztató szolgálatot biztosít a légtér felhasználók részére a földi FIS rendszerektől.

3.5.2.3.1 AUTOMATIKUS KÖZEL-KÖRZETI TÁJÉKOZTATÓ SZOLGÁLAT (ATIS) ALKALMAZÁS

3.5.2.3.1.1 A Légiforgalmi Távközlési Hálózat-/ATN/-nek képesnek kell lenni a következő ATIS alkalmazás funkciók alátámasztására:

a) légijármű által kezdeményezett FIS igény kapcsolatok;

b) légijármű által kezdeményezett FIS adat-felfrissítési kapcsolatok; és

c) mindkét irányú, mind a légijármű, mind a föld által kezdeményezett FIS kapcsolatok törlése.

Megjegyzés. – Az ATIS alkalmazásokra vonatkozó műszaki előírások a Doc 9705, II. al-kötetében vannak meghatározva.

3.5.2.3.2 REPÜLÉSI RUTIN IDŐJÁRÁS-JELENTÉSI SZOLGÁLAT (METAR) ALKALMAZÁS

3.5.2.3.2.1 A Légiforgalmi Távközlési Hálózat-/ATN/-nek képesnek kell lennie a légijármű által kezdeményezett FIS igény kapcsolat esetén a METAR alkalmazási funkció alátámasztására.

Megjegyzés. – A METAR alkalmazásra vonatkozó műszaki előírások a Doc 9705, II. al-kötetében vannak meghatározva.

3.5.2.3.3 EGYÉB FIS ALKALMAZÁSOK

(Kidolgozás alatt.)

3.5.2.4 EGYÉB LEVEGŐ-FÖLD ALKALMAZÁSOK

(Kidolgozás alatt.)

3.5.3 Föld-föld közötti alkalmazások

Megjegyzés. – A föld-föld közötti alkalmazások úgy vannak meghatározva, mint Légiforgalmi Távközlési Hálózati /ATN/ alkalmazások, az azokban a földi bázisú rendszerekben lévő azon alkalmazások, amelyek kizárólag csak azokkal a társ-alkalmazásokkal cserélnek információt, amelyek szintén a földi rendszerekben vannak

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3.5.3.1 KÖZPONTOK KÖZÖTTI DIGITÁLIS KÖZLEMÉNY-VÁLTÁS (IIC)

Megjegyzés. – A központok közötti digitális közlemény-váltás alkalmazások teszik lehetővé a légiforgalmi szolgálati egységek közötti információ-cserét.

3.5.3.1.1 LÉGIFORGALMI SZOLGÁLATI /ATS/ EGYSÉGEK KÖZÖTTI AUTOMATIKUS ADAT-CSERE (AIDC)

Megjegyzés. – Az AIDC egy olyan ATN alkalmazás, amely két légiforgalmi szolgálati egység között használatos a Légiforgalmi Szolgálati /ATS/ információk cseréjére: az aktív repülésre vonatkozó repülési jelentésekre, a repülés koordinációra, az irányítás átadására, a légtér-ellenőrzési adatokra és a szabad (szerkesztetlen) szöveg adatokra vonatkozóan.

3.5.3.1.1.1 A Légiforgalmi Távközlési Hálózat-/ATN/-nek képesnek kell lennie az alábbi AIDC alkalmazás funkciók alátámasztására:

a) repülési jelentések;

b) repülés koordináció;

c) az irányítás átadása;

d) az összeköttetés átadása;
e) a légtér-ellenőrzési adatok átadása; és
f) általános adatok átadása.

Megjegyzés. – Az AIDC alkalmazásra vonatkozó műszaki követelmények a Doc 9705. III. Al-kötetében vannak meghatározva.

3.5.3.2 A LÉGIFORGALMI SZOLGÁLATOK /ATS/ KÖZLEMÉNY TOVÁBBÍTÁSI ELJÁRÁSAI (ATSMHS) ALKALMAZÁSOK

Megjegyzés. – Az ATS közlemény továbbítási eljárások (ATSMHS) alkalmazások egy fő funkciót foglalnak magukba, név szerint az ATS közlemény szolgáltatás funkciót. Az ATS közlemény szolgáltatási funkció lehetővé teszi azt, hogy a közlemények cseréje a szolgáltatás felhasználók között megtörténjen az általános közlemény szolgáltatások által. Az ATSMHS alkalmazás magába foglalja az AFTN/ATN és CIDIN/ATN kapuk meghatározását.

3.5.3.2.1 Az ATN-nek képesnek kell lenni az ATS közlemény továbbítási eljárásainak (ATSMHS) alkalmazásában az ATS közlemény szolgáltatások támogatására.

Megjegyzés. – Az ATSMHS alkalmazásra vonatkozó műszaki követelmények a Doc 9705, III. Al-kötetében vannak meghatározva.

3.5.3.3 EGYÉB FÖLD-FÖLD ALKALMAZÁSOK
(Kidolgozás alatt.)

3.6 AZ ATN TÁVKÖZLÉSI SZOLGÁLTATÁS KÖVETELMÉNYEI

Megjegyzés. – Az ATN Távközlési Szolgáltatás követelményei meghatározzák a Nyílt Rendszerek /OSI/ referencia modell 3-tól 6-ig terjedő rétegei, valamint a 7. réteg egy része iránti követelményeket. Ezek a szolgálatok veszik át az egyes ATN alkalmazások által létrehozott információkat és hajtják végre a végponttól-végpontig összeköttetési szolgálat feladatát a szabvány protokolllok felhasználásával. Ezek az összeköttetési szolgáltatási követelmények két részre vannak osztva. A felső réteg összeköttetési szolgálatok határozzák meg a Szabványokat az 5-7 rétegre. Az 1. és 2. rétegekre vonatkozó követelmények az ATN Szabványok és Ajánlott Gyakorlatok /ATN SARPs/ tárgykörén kívül esnek.

3.6.1 Felső rétegű összeköttetési szolgáltatás

3.6.1.1 A felső réteg összeköttetési szolgáltatás magába foglalja:
a) a gyűjtő réteget;
b) a bemutató réteget;
c) az alkalmazási entitás szerkezetet;
d) az összekapcsolás irányító szolgálati elemet (ACSE);
e) a védelmi alkalmazás szolgáltatási célt (ASO) az ATN rendszert alátámasztó védelmi szolgáltatáshoz; és
f) vezérlő műveletet (CF).

1. Megjegyzés. – Az ATSMHS alkalmazás - az ATS közlemény szolgáltatási funkció kivételével - az összes ATN alkalmazás felső réteg összeköttetési szolgáltatásra vonatkozó műszaki előírások a Doc 9705, IV. al-kötetében vannak meghatározva
.
2. Megjegyzés. – Az ATSMHS alkalmazás ATS közlemény szolgáltatási funkcióra vonatkozó felső réteg összeköttetési szolgáltatás műszaki előírása a Doc 9705, III. Al- kötetében vannak meghatározva.

3.6.2 Légiforgalmi Távközlési Hálózat /ATN/ Hálózatok közötti távközlési szolgáltatás /Internet/

Megjegyzés. – Az ATN Internet szolgáltatási követelmények azokra a végponti rendszerekre és a közbenső rendszer funkcionális entitásaira alkalmazhatók, amelyek együtt az ATN Internet összeköttetési szolgáltatást biztosítják. Az ATN Inernet összeköttetési szolgáltatás a felhasználók részére (azaz a felső rétegekhez) a szállítási rétegszolgáltatás interfészen keresztül van biztosítva

.

3.6.2.1 Az ATN vég-rendszernek (ES) képesnek kell lennie az ATN Internet alátámasztására, beleértve a:
a) szállítási réteget; és
b) a hálózati réteget is.

3.6.2.2 Egy ATN közbenső rendszernek (IS) eleget kell tennie az ATN hálózati réteg előírásoknak úgy, ahogy az érintett ATN közbenső rendszer megfelelő osztályzatának megfelel.

Megjegyzés. – Az ATN közbenső rendszer különböző osztályzatainak száma, amelyre a hálózat réteg profilok meg vannak határozva, a Doc 9705, V. al-kötetében találhatók.

3.7 A LÉGIFORGALMI TÁVKÖZLÉSI HÁLÓZAT /ATN/ ELNEVEZÉSI ÉS CÍMZÉSI KÖVETELMÉNYEI

Megjegyzés. – Az ATN elnevezési és címzési vázlat-tervezése támasztja alá az információs célok félreérthetetlen azonosításának alapelvét és a teljes címzési szabványosítást.

3.7.1 Az ATN-nek előírásokat biztosít az alkalmazási réteg elnevezéséhez.
3.7.2 Az ATN-nek előírásokat biztosít a hálózati és szállítási réteg címzéséhez.

Megjegyzés. – Az ATN alkalmazási réteg elnevezésére vonatkozó előírások a Doc 9705, IV. Al-kötetében vannak meghatározva; a hálózati és szállítási címzésekre vonatkozó előírások az V. Al-kötetben vannak meghatározva és a jegyzékbe vételi szolgáltatás a IX. Al-kötetben került meghatározásra ugyanabban a dokumentumban.

3.8 A LÉGIFORGALMI TÁVKÖZLÉSI HÁLÓZAT /ATN/ RENDSZERKEZELÉSI KÖVETELMÉNYEK

1. Megjegyzés. – Az ATN rendszerkezelési (SM) alkalmazás biztosítja egy Rendszerkezelő /SM/ részére azt a lehetőséget, hogy információt cseréljen egy Rendszer kezelői /SM/ ügynökséggel és/vagy más rendszerkezelővel.

2. Megjegyzés. – Egy Légiforgalmi Távközlési Hálózat /ATN/ rendszerkezelési /SE/ szolgáltatások műszaki előírásainak alátámasztása egy Állami vagy körzeti alapon lehetséges.

3.8.1 Az ATN-nek képesnek kell lennie a következő rendszer kezelési alkalmazási funkciók támogatására:
a) Hibakezelés;
b) Konfiguráció kezelés;
c) Forgalmi kezelés;
d) Teljesítmény kezelés; és
e) Védelmi kezelés.

Megjegyzés. – Az ATN Rendszer kezelésre vonatkozó műszaki előírások a Doc 9705, VI. Al-kötetében kerültek meghatározásra.

3.8.1.1 Azoknak az ATN végponti rendszereknek és közbenső rendszereknek, amelyek az ATN rendszerkezelő alkalmazásokat támogatják és a rendszer kezelőknek /SM/ biztosítaniuk kell a kezelt adatokhoz való hozzáférést.

Megjegyzés. – A rendszerkezelési /SM/ alkalmazások kezelt céljainak meghatározását és a hozzáférési előírásokat a Doc 9705, VI. Al-kötete határozza meg.

3.9 A LÉGIFORGALMI TÁVKÖZLÉSI HÁLÓZAT /ATN/ BIZTONSÁGI KÖVETELMÉNYEI

3.9.1 Az ATN védelmét a műszaki előírások, a helyi fizikai biztonsági intézkedések és az eljárási biztonsági rendszabályok konfigurációjával kell elérni.

1. Megjegyzés. – Az ATN védelmére vonatkozó műszaki előírások a Doc 9705-ben, a fizikai, valamint az eljárási védelmi intézkedések az Annex 17-ben, illetve a Védelmi Kézikönyvben kerültek meghatározásra.

2. Megjegyzés. – Az ATN biztonsági szolgálatok műszaki előírásainak támogatására Állami vagy regionális alapon lehet szükség.

3.9.1.1 **Ajánlás.** – *Az alábbi fizikai és eljárási technikákat lehet felhasználni az ATN végponti rendszerek, a közbenső rendszerek, alhálózati kezelők, katalógus központi kiszolgáló egységek és az alhálózatok védelmének biztosításához:*
a) Korlátozott fizikai hozzáférés az ATN végponti rendszerekhez, közbenső rendszerekhez, SM munka- állomásokhoz,

a katalógus központi kiszolgáló egységekhez és az alhálózati kapcsolókhoz, hálózati kezelőkhöz és a további alapvető hálózati alrendszerekhez;
b) Korlátozott felhasználói hozzáférés - csak feljogosított személyek részére - az ATN végponti rendszerekhez, a közbenső rendszerekhez, a katalógus központi kiszolgáló egységekhez, valamint az /SM/ munkaállomásokhoz; és
c) az ATN földi végponti berendezések, a közbenső rendszerek és az SM munkaállomások táv-hozzáférésének megtiltása, vagy korlátozott hozzáférés biztosítása.

3.9.2 ATN biztonsági irányelvek

Megjegyzés. – Az összeköttetések ellenőrzése és a harmadik fél forgalmi elemzése nem jelent biztonsági veszélyt, és az ATS osztályzatra nem tekinthető biztonsági fenyegetésnek. Azonban néhány Légiforgalmi Szolgálati és/vagy nem-légiforgalmi szolgálati felhasználónak és alkalmazásnak lehetnek olyan helyi vagy szervezési irányelvei, amelyekben az összeköttetések ellenőrzését, valamint a harmadik fél forgalmazásának elemzését biztonsági fenyegetésnek tekinthetik egyéb vonatkozásokban, például gazdasági megfontolásokból.

3.9.2.1 A Légiforgalmi Szolgálatok /ATS/ közleményeit védeni kell a hibás megjelenítés, a módosítás és a visszajátszás ellen.

1. Megjegyzés. – Ez azt jelenti, hogy a Légiforgalmi Távközlési Hálózati /ATN/ entitások közötti adat-, közlemény-cseréknél magas szintű lesz annak a szavatossága, hogy a közlemény onnan jön, ahonnan azt igénylik, nem kerül meghamisításra és nem egy már elavult közlemény megismétlése.

2. Megjegyzés. – A védelem szintje a biztonság fenyegetésének típusa függvényében és a felhasználó vagy a felhasználói feldolgozás által kiválasztott ATN biztonsági szolgáltatási szint függvényében változó lehet.

3.9.2.2 Az ATS közlemények biztonságára vonatkozó kérést tiszteletben kell tartani.

Megjegyzés. – A biztonság mellőzése iránti kérés figyelembe vehető. Ez azt jelenti, hogyha a biztonság alkalmazása elmulasztásra kerül és a tárgyalás a mellőzésről a helyi irányelven alapszik.

3.9.2.3 Azokat az ATN szolgáltatásokat, amelyek légijárművekhez küldött és azoktól érkező közleményeket támasztanak alá, védeni kell a szolgáltatás visszautasítási támadásoktól olyan valószínűségi szintnek megfelelően, amely megegyezik a megkívánt alkalmazási szolgáltatás rendelkezésre állásának, ahogyan azt a helyi irányelvek meghatározzák.

1. Megjegyzés. – A "szolgáltatás visszautasítás" kifejezés azt a körülményt írja le, amikor az információkhoz és más ATN forrásokhoz való törvényes hozzáférés szándékosan akadályozva van.

2. Megjegyzés. – Ez azt is jelentheti, hogy egy alternatív összeköttetési útvonal rendelkezésre áll abban az esetben, ha az egyik útvonal szolgáltatási tilalomnak van alávetve.

TÁBLÁZATOK A 3. FEJEZETHEZ

3-1. táblázat. A Légiforgalmi Szolgálatokkal kapcsolatos összeköttetési osztályok átviteli késései

Maximális egy-utas ATN végberendezés-végberendezés átviteli késés 95 %-os valószínűséggel (másodperc)	*ATSC osztály*
Fenntartott	A
4,5	B
7,2	C
13,5	D
18	E
27	F
50	G
100	H
Nincs érték meghatározva	Nincs preferencia

1. Megjegyzés. - Az ATN végberendezéstől - végberendezésig átviteli késés körülbelül 90 %-át jelenti a rendszer végfelhasználói közötti végberendezéstől - végberendezésig tartó teljes késés értékének.

2. Megjegyzés. - A 95 %-os valószínűség a kért ATSC osztálynak megfelelő útvonal rendelkezésre állásán alapszik.

3-2. táblázat. A Légiforgalmi Távközlési Hálózat /ATN/ összeköttetési prioritási jegyzéke

Közlemény kategóriák	*ATN alkalmazás*	*A megfelelő protokoll prioritás*	
Szállítási réteg prioritás	*Hálózati réteg prioritás*		
Hálózat/rendszer kezelés	SM	0	14
Vészhelyzeti összeköttetések		1	13
Sürgősségi összeköttetések		2	12
Magas prioritású repülés-biztonsági közlemények	CPDLC, ADS	3	11
Szabvány prioritású repülés-biztonsági közlemények	AIDC, ATIS	4	10
Meteorológiai összeköttetések	METAR	5	9
Repülés menetrendszerűségi összeköttetések	CM, ATSMHS	6	8
Légiforgalmi tájékoztató szolgálati közlemények		7	7
Hálózati/rendszer adminisztráció	SM, DIR	8	6
Légiforgalmi igazgatási közlemények		9	5
<Kijelöletlen>		10	4
Sürgős prioritású adminisztratív és ENSZ különjárati összeköttetések		11	3

Magas prioritású adminisztratív és Állami/Kormányzati összeköttetések	12	2
Normál prioritású adminisztratív összeköttetések	13	1
Alacsony prioritású adminisztratív összeköttetések és a légiutasok közleményei	14	0

Megjegyzés. – A jegyzékben bemutatott hálózati rétegprioritásokat csak a kapcsolat-mentes hálózatra alkalmazzák, és nem alkalmazzák alhálózati prioritásokra.

3-3. táblázat: Az ATN hálózat prioritás jegyzéke a mozgó alhálózat prioritásra

Közlemény kategóriák	*ATN hálózat réteg-prioritás*	*A megfelelő mozgó alhálózat prioritás (lásd a 4. Megjegyzést)*					
		Légiforgalmi mozgó műholdas szolgálatok /AMSS/	*URH digitális adat-kapcsolat /VDL/ 2. Mód*	*URH digitális adat-kapcsolat /VDL/ 3. Mód*	*URH digitális adat-kapcsolat /VDL/ 4. Mód (lásd az 5.Megj.-t)*	*S-módú Másodlagos Légtér-ellenőrző Radar*	*Rövid-hullámú /HF/ adat-kapcsolat /HFDL/*
Hálózat/Rendszer kezelés	14	14	Lásd az 1.Megj.-t	3	Magas	Magas	14
Vészhelyzeti összeköttetések	13	14	Lásd az 1.Megj.-t	2	Magas	Magas	14
Sürgősségi összeköttetések	12	14	Lásd az 1.Megj.-t	2	Magas	Magas	14
Magas prioritású repülésbiztonsági közlemények	11	11	Lásd az 1.Megj.-t	2	Magas	Magas	11
Szabvány prioritású repülésbiztonsági közlemények	10	11	Lásd az 1.Megj.-t	2	Magas	Magas	11
Meteorológiai összeköttetések	9	8	Lásd az 1.Megj.-t	1	Közepes	Alacsony	8
Repülés menet-rendszerűségi összeköttetések	8	7	Lásd az 1.Megj.-t	1	Közepes	Alacsony	7
Légiforgalmi tájékoztató szolgálati közlemények	7	6	Lásd az 1.Megj.-t	0	Közepes	Alacsony	6

Hálózat/rendszer adminisztráció	6	5	Lásd az 1.Megj.-t	0	Közepes	Alacsony	5
Légiforgalmi igazgatási közlemények	5	5	Nem engedélyezett	Nem engedélyezett	Nem engedélyezett	Nem engedélyezett	Nem engedélyezett
<Kijelöletlen>	4	Kijelöletlen	Kijelöletlen	Kijelöletlen	Kijelöletlen	Kijelöletlen	Kijelöletlen
Sürgős prioritású kormányzati és Egyesült Nemzetek különjárati összeköttetések	3	3	Nem engedélyezett	Nem engedélyezett	Nem engedélyezett	Nem engedélyezett	Nem engedélyezett
Magas prioritású adminisztratív és Állami/Kormány összeköttetések	2	2	Nem engedélyezett	Nem engedélyezett	Nem engedélyezett	Nem engedélyezett	Nem engedélyezett
Szabályos prioritású igazgatási közlemények	1	1	Nem engedélyezett	Nem engedélyezett	Nem engedélyezett	Nem engedélyezett	Nem engedélyezett
Alacsony sürgős-ségű igazgatási közlemények és a légiutasok közleményei	0	0	Nem engedélyezett	Nem engedélyezett	Nem engedélyezett	Nem engedélyezett	Nem engedélyezett

1. Megjegyzés. – Az URH digitális adatkapcsolat /VDL/ 2. Módnak nincs speciális alhálózati prioritási mechanizmusa.

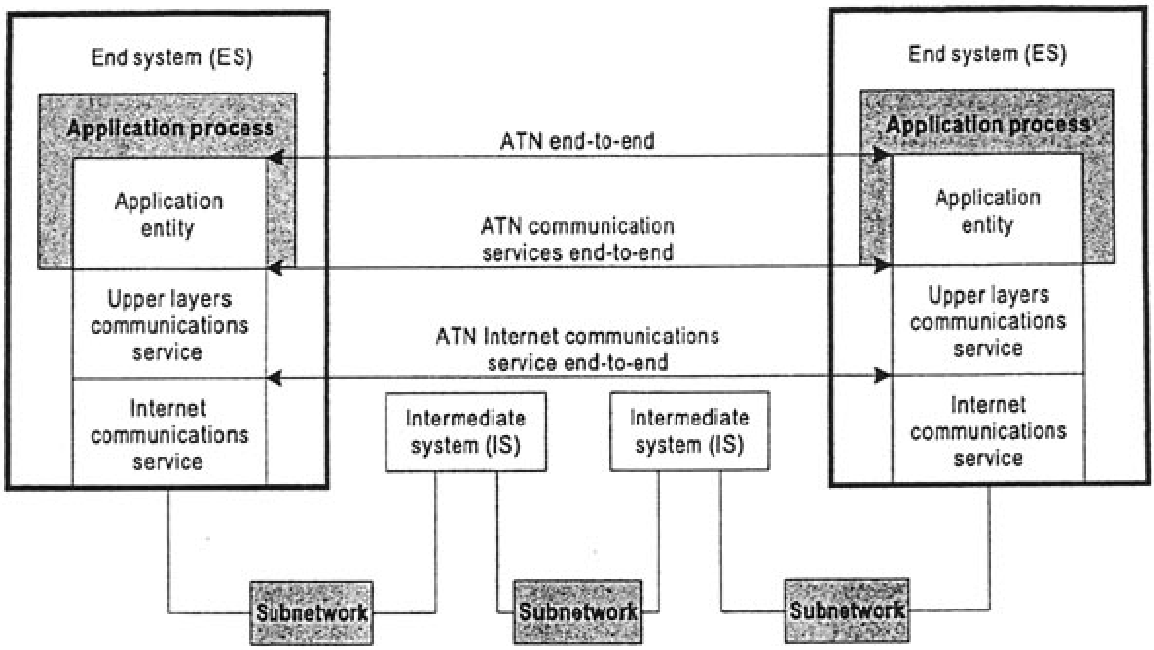
2. Megjegyzés. – A Légiforgalmi mozgó műholdas szolgálat /AMSS/ Szabványok és Ajánlott Gyakorlatok /SARPs/ anélkül határozzák meg az alhálózat- prioritásra a közlemény kategóriák jegyzékét, hogy határozottan utalnának az ATN hálózat réteg- prioritása.

3. Megjegyzés. – A „Nem engedélyezett” kifejezés azt jelenti, hogy csak a repülés biztonságára és rendszerességére vonatkozó közleményeknek a továbbítása engedélyezett ezen az alhálózaton, ahogy azt az alhálózat SARP-ja meghatározza.

4. Megjegyzés. – Csak azok a mozgó alhálózatok kerültek jegyzékbe vételre, amelyekre alhálózati SARP-ok vannak, és amelyekre határozott támogatást nyújtanak az ATN határvonal közbenső rendszer (BIS) műszaki előírásai.

5. Megjegyzés. - Az URH digitális adatkapcsolat /VDL/ 4. Módú alhálózat támogatást biztosít a légtér-ellenőrző alkalmazásokhoz (például Berendezés-függő Automatikus Légtér-ellenőrzés /ADS/).

ÁBRÁK A 3. FEJEZETHEZ



3-1. ábra:. A Légiforgalmi Távközlési Hálózat /ATN/ koncepcionális modellje

<u>Ábraszöveg a 3-1.sz. ábrához:</u>
End system (ES) = Vég-rendszer (ES)
Application process = Alkalmazási folyamat
ATN end-to-end = ATN vég-rendszertől - vég-rendszerig
Application entity = Alkalmazási entitás
ATN communication services end-to-end = ATN összeköttetési szolgáltatás vég-rendszertől - vég-rendszerig
Upper layers communications service = Felső réteg összeköttetési szolgáltatás
ATN Internet communications service end-to-end = ATN Internet összeköttetési szolgáltatás vég-rendszertől - vég-rendszerig
Internet communications service = Internet összeköttetési szolgáltatás
Internediate system (IS) = Közbenső rendszer (IS)
Subnetwork = Alhálózat

1. Megjegyzés. – Árnyékolás jelzi azokat az elemeket, amelyek ezeknek a Szabványoknak és Ajánlott Gyakorlatoknak /SARPs/ a tárgykörén kívül esnek. A felhasználói követelmény meghatározza az alkalmazás entitás és a felhasználó közötti kapcsolódást és biztosítja az ATN funkcionalitását és együttműködését.

2. Megjegyzés. – Az ábra az ATN-nek egy egyszerűsített modelljét mutatja be, de nem szemlélteti az összes képességét (pl. a tárolási és továbbítási képességet, amely az ATS közlemény kezelési szolgálata részére van biztosítva).

3. Megjegyzés. – Az ATN-en belül különböző vég-berendezéstől - vég-berendezésig pontok vannak meghatározva bizonyos vég-rendszertől - vég-rendszerig terjedő teljesítmény-követelmények meghatározására. Szükség lehet azonban ezektől eltérő vég- berendezéstől - vég-berendezésig terjedő pontok meghatározására ahhoz, hogy megkönnyítsék ezeknek a teljesítmény-követelményeknek megfelelési minősítését. Ezekben az esetekben a vég-berendezéstől - vég-berendezésig terjedő pontokat világosan meg kell határozni és összefüggésbe kell hozni az ábrán bemutatott vég-rendszertől - vég-rendszerig pontokkal.

4. Megjegyzés. – Egy IS a funkcionalitás fogalom megjelenítése amely nem tartozik pontosan egy továbbítási útvonalhoz. Egy olyan továbbítási útvonal rendszerkezelő alkalmazást valósít meg, ami igényli a vég-rendszer protokollljait, és a rendszerkezelő alkalmazást használva végrendszerként is működik.

4. FEJEZET: LÉGIFORGALMI MOZGÓ-MŰHOLDAS SZOLGÁLAT (AMS (R) S)

1.Megjegyzés – Ez a fejezet tartalmazza a légiforgalmi mozgó műholdas szolgálat használatával kapcsolatos szabványokat és ajánlott eljárásokat. Ezek a szabványok és ajánlott eljárások szolgáltatás- és teljesítmény orientáltak, és nem kapcsolhatók különleges technológiai vagy műszaki előírásokhoz.

2. Megjegyzés – Az AMS (R) S rendszerekre vonatkozó részletes műszaki leírások az AMS (R) S kézikönyvben találhatók. Ez a dokumentum részletes leírást tartalmaz az AMS (R) S rendszerrel kapcsolatban a szabványok és ajánlott eljárásokkal kapcsolatban is.

4.1. MEGHATÁROZÁSOK

Connection establishment delay. Kapcsolati késés létrehozása, az ISO 8348 meghatározása szerint egy olyan elem, amely a hívott alhálózati felhasználónak (SN)-nek tulajdonítható, az az idő amely az SN-CONNECT jelzés és az SN-CONNECT válaszadás között eltelik. Ez a felhasználói elem a műholdas alhálózatának határain kívül eső műveleteknek tudható, éppen ezért az AMS (R) S műszaki leírásban nem szerepel.

Data transit delay.(95th percentile). 95%-os adatátviteli késés. A késedelmes adatátvitel statisztikai megoszlásának 95%-os nagyságrendje, amely átlagosnak tekinthető.

Data transit delay. Adatátviteli késés. Az ISO 8348 szerint az adatátviteli késés statisztikai megoszlásának átlaga. Ez a késés az alhálózati késedelmet jelenti, és nem tartalmazza a kapcsolat létrehozási késedelmet.

Network (N) Hálózat (N) A „hálózat” szó és N rövidítése az ISO 8348 értelmezése szerint az „alhálózat” szóval helyettesítendő, és ennek megfelelően rövidítése „SN”alhálózati réteg adatcsomag teljesítmény szókörnyezetben.

Residual error rate Maradó hiba arány. A helytelen, elveszett és duplikát alhálózati szolgálati adategységek (SNSDU) aránya az összes elküldött SNSDU számához viszonyítva.

Spot beam. Spot-nyaláb, műholdas antenna irányíthatóság, amikor a fő spot-nyaláb lényegesen kevesebbet fog be a föld felszínénél a műhold látószögéhez képest. A rendszer forrásának hatékonyságának javítása céljából a tervezésénél figyelembe lehet venni a földi állomások földrajzi megosztását.

Subnetwork(SN) - lásd Network (N) címszó alatt.

Subnetwork service data unit (SNSDU) alhálózati adatszolgálati egység mennyisége, amely azonosítása az egyik alhálózat végétől a másik alhálózat kapcsolatig védett

Total voice transfer delay. Teljes hangátviteli késés. Az az idő, amely a beszéd AES, vagy GES-hez történő beérkezésétől a kapcsolati partner GES vagy AES-hez történő beérkezése között eltelik. Ez a késés magában foglalja a hangfelvételi eljárás idejét, a fizikai réteg késedelmét, az RF adás és egyéb más AMS (R) S-en belüli alhálózati késedelmet.

Megjegyzés – Az ebben a fejezetben használt szakkifejezések az Annex 10-ben az alábbiak szerint kerültek meghatározásra:

- Légiforgalmi távközlési hálózat (ATN): III. Kötet, I. Fejezet
- Légiforgalmi mozgó-műholdas szolgálat (AMS (R) S): II. Kötet, 1.1. Fejezet
- Légijármű fedélzeti földi állomás (AES): III. Kötet, I. Fejezet
- Alhálózati réteg: III. Kötet, 6.1. Fejezet

4.2. ÁLTALÁNOS RÉSZ

4. 2. 1 Bármely mozgó-műholdas rendszernek, amely AMS (R) S szolgáltatást nyújt, meg kell feleljen az e fejezetben foglalt követelményeknek.

4. 2. 1. 1 Az AMS (R) S rendszer támogatja az adatcsomag-szolgáltatást vagy a hang-szolgáltatást, vagy mindkettőt.

4. 2. 2 Az AMS (R) S rendszer berendezései számára kötelezően előírt vivőfrekvenciát, a rendszer képesség szintjéhez hasonlóan regionális léginavigációs szerződések alapján kell megállapítani, amely szerződések kijelölik a légtérben történő üzemeltetés és a berendezés vevőfrekvenciájának telepítési időbeosztását. A rendszer képességi szintje magában foglalja az AES, a műholdas és a GES teljesítményt.

4. 2. 3 A 4. 2. 2 pontban jelzett szerződéseknek legalább két éves kötelező jogosultságot kell, biztosítaniuk a rendszerek üzemeltetésére.

4. 2. 4 Ajánlás – A polgári repülési hatóságoknak egyeztetnie kell a nemzeti hatóságokkal és a szolgáltatásokat nyújtó szervezetekkel az AMS (R) S rendszerek telepítési szempontjairól, amely rendszerek lehetővé teszik azoknak a világ valamennyi országában történő optimális használhatóságát.

4.3 RF CSATORNA MŰSZAKI JELLEMZŐK

4.3.1 Frekvencia sávok

Megjegyzés az ITU Nemzetközi Rádió Rendszabályzata lehetővé teszi, hogy azok a rendszerek, amelyek mozgó-műholdas szolgáltatást nyújtanak, ugyanazt a spektrumot használhassák, mint az AMS (R) S, anélkül, hogy ezek a rendszerek biztonsági szolgáltatásokat nyújtanának. Ez a helyzet azért fontos, mivel csökkenti az AMS (R) S részére rendelkezésre álló spektrumot. Kritikus, hogy az Államok ezt a témát a frekvenciatervezésnél és a hazai, illetve a regionális spektrum követelmények megalkotásánál fontolóra veszik.

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4.3.1.1 AMS (R) S kapcsolat nyújtása esetén az AMS (R) S rendszernek csak azon a frekvencia tartományban szabad üzemelnie, amelyet az AMS (R) S számára megfelelő módon kijelöltek, és amelyeket az ITU Rendszabályzata védi.

4.3.2 Kisugárzott teljesítmény

4.3.2.1 A Légijármű fedélzetén elhelyezett földi állomás /AES/ által sugárzott teljesítmény tartományt ellenőrizni kell, hogy az egyéb, vagy ugyanazon légijárművön lévő rendszerekkel történő interferencia elkerülhető, és a léginavigáció biztonsága megfelelő módon biztosítva legyen.

1. Megjegyzés- Veszélyes interferencia származhat a sugárzó és/vagy vezetékes kisugárzásnál, amelyek lehetnek harmonikus frekvenciák, nem összefüggő, téves intermodulációs termék és zajkibocsátás, és ezek nem szükségszerűen korlátozódnak az „adó bekapcsolva" állapotra.

2. Megjegyzés – A GNSS számára szükséges védelmi követelmények az Annex 10. I. kötetében találhatók.

4.3.2.2 INTEREFERENCIA MÁS AMS (R) S BERENDEZÉSSEL

4.3.2.2.1 Egy légijármű fedélzeti földi állomásról (AES) származó AMS (R) S kisugárzás nem okozhat veszélyes interferenciát egy más légijármű fedélzeti állomásán AES szolgáltatást nyújtó berendezésben.

Megjegyzés – A 4.3.2.2.1 pontban foglaltak szerinti megfelelés egy másik módszere a kisugárzás korlátozása a másik AMS (R) S berendezés működési sávjában egy olyan egyenletes szintre a rendszerközti interferencia követelményekhez képest, amelyek megtalálhatók az RTCA DO-215 dokumentumban. Az RTCA és az EUROCAE megállapíthat új teljesítmény szabványokat a későbbi AMS (R) S rendszerekre, amelyek leírják azokat a módszereket, amelyek megfelelnek e követelményeknek.

4.3 3 Érzékenység

4.3.3.1 A légijármű fedélzeti földi állomási berendezései megfelelően működnek egy interferencia környezetben, amely halmozottan 25%-os relatív változást okoz ($\Delta T/T$) a vevő zaj hőmérsékletében

4.4 PRIORITÁS ÉS KEZDEMÉNYEZŐ HOZZÁFÉRÉS

4.4.1 Minden légijármű fedélzeti földi állomását, és a földi telepítésű földi állomást úgy kell kialakítani, hogy az Annex 10 II. Kötetének 5.1.8. pontjában foglalt közlemények továbbítása megfelelő prioritási sorrend alapján történjen, és e közlemények adása és/vagy vétele késedelmet ne szenvedjen. Szükség esetén, a követelmények betartása végett az olyan közlemény-típusok adását és vételét, amelyek nem szerepelnek az Annex 10, II. kötetének 5.1.8. pontjában, le kell állítani minden előzetes figyelmeztetés nélkül, és az olyan közlemények adását illetve vételét kell végezni, amelyek az Annex 10, II. Kötet 5.1.8. pontjában foglaltaknak megfelelnek.

4.4.2 Valamennyi AMS (R) S adatcsomagot és hanghívást megfelelő prioritás szerint kell azonosítani.

4.4.3 Ugyanazon közlemény-kategórián belül a rendszer biztosítja a hangkommunikációs prioritást az adatközlési kommunikációval szemben.

4.5. JELGYŰJTÉS ÉS JELKÖVETÉS

4.5.1 Az AES, a GES és a műholdak megfelelően gyűjtik és követik a kapcsolati jeleket, amíg a légijármű az 1500 km/óra (800 csomó) földhöz viszonyított sebességgel halad bármilyen irányszögben.

4.5.1.1 **Ajánlás** – *Az AES, GES és a műholdak megfelelő módon gyűjtik és követik a kapcsolati jeleket, amíg a légijármű el nem éri a 2800 km/óra (1500 csomó) földhöz viszonyított sebességet bármilyen irányszögben.*

4.5.2 Az AES, GES és a műholdak megfelelő módon gyűjtik és követik a kapcsolati jeleket, amíg a légijármű gyorsulási vektora a műhold pályájához viszonyítva legalább 0.6 g.

4.5.2.1 **Ajánlás -** *Az AES, GES és a műholdak megfelelő módon gyűjtik és követik a kapcsolati jeleket, amíg a légijármű gyorsulási vektora a műhold pályájához viszonyítva legalább 1.2 g.*

4.6 TELJESÍTMÉNY KÖVETELMÉNYEK

4.6.1 Kijelölt működési fedésterület

4.6.1.1 Az AMS (R) S rendszer kijelölt működési fedésterületén keresztül biztosítja a légiforgalmi mozgó-műholdas szolgálatot. (DOC)

4.6.2. Hibajelentés

4.6.2.1 Szolgáltatási hiba esetén az AMS (R) S kellő időben jelzi az üzemleállás idejét, helyét és közli a normál szolgáltatás visszaállásának várható idejét.

Megjegyzés – A szolgáltatás leállását okozhatja például a műhold meghibásodása, a spot nyaláb, vagy a GES. Az ilyen leállások előfordulhatnak adott földrajzi területeken, okozhatja továbbá – időszakonként változóan -, a műhold *pályája és rendszere.*

4.6.2.2. A rendszer az észleléstől számított 30 másodpercen belül kijelzi a veszteséget az összeköttetési képességben.

4.6.3 AES követelmények

4.6.3.1 Az AES kielégíti a 4.6.4 és 4.6.5 pontokban foglalt lényeges teljesítmény követelményeket a légijármű számára egyenes irányú és vízszintes repülésben a műholdas rendszer kijelölt működési fedésterületén keresztül.

4.6.3.1.1 **Ajánlás** – *A légijármű fedélzeti földi állomásának (AES) ki kell elégítenie a 4.6.4 és 4.6.5 pontokban foglalt lényeges teljesítmény követelményeket +20/-5 emelkedési fokos légijármű térbeli helyzetben és +/-25 dőlésszögben a műholdas rendszer kijelölt működési fedésterületén keresztül (DOC).*

4.6.4 Adatcsomag szolgálat teljesítmény

4.6.4.1 Ha a rendszer biztosít AMS (R) S adatcsomag szolgáltatást, annak meg kell felelnie a következő alfejezetekben szereplő szabványoknak

Megjegyzés – Az adatcsomag szolgáltatásra vonatkozó rendszer teljesítményi szabványok megtalálhatók a RTCA Document DO-270-ben.

4.6.4.1.1 Az adatcsomag szolgáltatás nyújtó AMS (R) S rendszer képes az ATN mozgó alhálózatkénti üzemelésre.

Megjegyzés – Ezen kívül az AMS (R) S szolgáltathat nem-ATN adatfunkciókat.

4.6.4.1.2. KÉSÉSI PARAMÉTEREK

Megjegyzés – A „legmagasabb prioritású szolgáltatás" olyan prioritást jelent, amely vészhelyzetre, sürgősségi és bizonyos nem gyakori, a hálózati rendszerirányítás részére szóló közleményekre van fenntartva. A „legalacsonyabb prioritású szolgáltatást" kifejezés normál járatközlemények fokozati jelzését jelenti. Valamennyi késési paraméter csúcsidős légiforgalmi viszonyok mellett használandó.

4.6.4.1.2.1 -*Kapcsolatlétesítési késés.* A kapcsolatlétesítési késés nem haladhatja meg a 70 másodpercet.

4.6.4.1.2.1.1 **Ajánlás.** – *A kapcsolatlétesítési késés ne legyen 50 másodpercnél több.*

4.6.4.1.2.2 Az ISO 8348 szabvány szerint az adatátviteli késés állandó egy 128 oktett hosszúságú alhálózati szolgáltatási adategységen alapul (SNSDU). Az adatátviteli késéseket átlagértéken kell meghatározni.

4.6.4.1.2.3 *Adatátviteli késés légijárműtől, legmagasabb prioritás*. A légijárműtől történő adatátviteli késés nem lehet több 40 másodpercnél a legmagasabb prioritású adatszolgáltatásnál.

4.6.4.1.2.3.1 **Ajánlás -** *Adatátviteli késés légijárműtől, legmagasabb prioritás*. A légijárműtől történő adatátviteli késés ne legyen több 23 másodpercnél a legmagasabb prioritású adatszolgáltatásnál.

4.6.4.1.2.3.2 **Ajánlás. -** *Adatátviteli késés légijárműtől, legalacsonyabb prioritás*. A légijárműtől történő adatátviteli késés ne legyen több 28 másodpercnél a legalacsonyabb prioritású adatszolgáltatásnál.

4.6.4.1.2.4 *Adatátviteli késés légijárműhöz, legmagasabb prioritás*. A légijárműhöz történő adatátviteli késés ne legyen több 12 másodpercnél a legmagasabb prioritású adatszolgáltatásnál.

4.6.4.1.2.4.1 **Ajánlás**. *Adatátviteli késés légijárműhöz, legalacsonyabb prioritás*. *A légijárműhöz történő adatátviteli* *késés ne legyen több 28 másodpercnél a legmagasabb prioritású adatszolgáltatásnál.*

4.6.4.1.2.5 *Adatátviteli késés (95. százalékos), légijárműtől, legmagasabb prioritás*. A légijárműtől történő adatátviteli késés ne legyen több 80 másodpercnél a legmagasabb prioritású adatszolgáltatásnál.

4.6.4.1.2.5.1 **Ajánlás.-** *Adatátviteli késés (95. százalékos), légijárműtől, legmagasabb prioritás. A légijárműtől történő adatátviteli késés (95 százalékos) ne legyen több 40 másodpercnél a legmagasabb prioritású adatszolgáltatásnál.*

4.6.4.1.2.5.2 **Ajánlás. -** *Adatátviteli késés (95. százalékos), légijárműtől, legalacsonyabb prioritás. A légijárműtől történő adatátviteli késés (95. százalékos) ne legyen több 60 másodpercnél a legalacsonyabb prioritású adatszolgáltatásnál.*

4.6.4.1.2.6 *Adatátviteli késés (95. százalékos), légijárműhöz, legmagasabb prioritás*. A légijárműhöz történő adatátviteli késés (95 százalékos) ne legyen több 15 másodpercnél a legmagasabb prioritású adatszolgáltatásnál.

4.6.4.1.2.6.1 **Ajánlás**.- *Adatátviteli késés (95. százalékos), légijárműhöz, legalacsonyabb prioritás. A légijárműhöz történő adatátviteli késés (95 százalékos) ne legyen több 30 másodpercnél a legalacsonyabb prioritású adatszolgáltatásnál.*

4.6.4.1.2.7 *Csatlakozás kioldó késés (95.százalékos).* A csatlakozás kioldó késés (95. százalékos) nem lehet több 25 másodpercnél mindkét irányban.

4.6.4.1.2.7.1 **Ajánlás**.- *A csatlakozás kioldó késés (95. százalékos) ne legyen több 25 másodpercnél mindkét irányban.*

4.6.4.1.3 INTEGRITÁS

4.6.4.1.3.1 *A légijárműről származó maradó hiba arány.* A légijármű irányából származó maradó hiba arány nem lehet nagyobb 10^{-2} értéknél SNSDU-ként.

4.6.4.1.3.1.1 **Ajánlás.-** *A légijármű irányából származó maradó hiba arány nem lehet nagyobb 10^{-2} értéknél SNSDU-ként.*

4.6.4.1.3.2 *Maradó hiba arány a légijármű irányára. A maradó hiba arány a légijármű irányához nem lehet nagyobb 10^{-2} értéknél SNSDU-ként.*

4.6.4.1.3.3. *Csatlakozás rugalmasság*. Az alhálózati kapcsolat (SNC) lehívott SNC kioldás nem lehet nagyobb *10^{-2}-nél bármilyen egy óra intervallumon túl.*

Megjegyzés.- a GES-GES közötti átadás miatti csatlakozás kioldás, AES kijelentkezés vagy virtuális áramköri kezdeményezés ebben a specifikációban nem szerepel.
4.6.4.1.3.4 Az SNC alaphelyzetbe állításának lehetősége nem lehet nagyobb 10^{-1}-nél bármilyen egy óra intervallumon túl.

4.6.5. Hangszolgáltatási teljesítmény

4.6.5.1 Ha a rendszer biztosít AMS (R) S hangszolgáltatást, e szolgáltatásnak meg kell felelnie a következő albekezdésekben foglalt követelményeknek.

Megjegyzés.- Az ICAO jelenleg új technológiai eljárások bevezetése miatt tanulmányozza ezeket a rendelkezéseket.

4.6.5.1.1 HÍVÁS FELDOLGOZÁSI KÉSÉS

4.6.5.1.1.1 AES feladás. A késések 95 százaléka a GES számára a hívás eredet eseményének megállapítására a földi hálózati interfészhez, annak az AES interfészhez való megérkezéséhez számítva nem lehet több 20 másodpercnél.

4.6.5.1.1.2 GES feladás A késések 95 százaléka az AES-hez a híváseredet eseményének megállapítására a légijármű interfészhez és annak a földi hálózati interfészhez való megérkezéséhez nem lehet több 20 másodpercnél.

4.6.5.1.2 HANGMINŐSÉG

4.6.5.1.2.1 A hangátvitel teljes érthetőségi teljesítményt kell nyújtson, amely alkalmas a megkívánt működési és környezeti zajkörnyezetnek.

4.6.5.1.2.2 A teljes megengedhető átviteli késés az AMS (R) S alhálózaton belül nem lehet több 0.485 másodpercnél.

4.6.5.1.2.3 **Ajánlás**.- *Figyelembe kell venni a kettős vokóder hatásokat és/vagy más analóg/digitális konverziót*.

4.6.5.1.3 HANGKAPACITÁS

4.6.5.1.3.1 A rendszer rendelkezik megfelelő hangforgalmi csatorna forrásokkal, mint például AES- vagy GES eredetű AMS (RE) S hanghívással a rendszer irányában, a blokkolás lehetősége nem lehet több 10^{-2}-nél.

Megjegyzés. – A rendelkezésre álló forgalmi-csatorna források magukban foglalják a kezdeményező forrásokat és a nem AMS (R) S kommunikációs forrásokat is.

4.6.6. Védelem

4.6.6.1 A rendszer biztosítja a közlemények védelmét az átvitel fázisában illetéktelen hozzáféréssel szemben

4.6.6.2 A rendszer védelmet nyújt a szolgáltatás megtagadása, alacsony teljesítményjellemzők, vagy a rendszer kapacitás csökkenése ellen intézett külső beavatkozás esetén.

Megjegyzés.- Ilyen jellegű beavatkozások lehetnek a szándékosan elkövetett értelmetlen hamis közlemény-áradat küldése, a rendszer szoftver vagy adatbázisának szándékos rongálása, illetve a támogató infrastruktúra fizikai tönkretétele.

4.6.6.3 A rendszer védelmet nyújt a nem engedélyezett belépéssel szemben.

Megjegyzés.- A rendszer védelmet nyújt csalási kísérlet és „ fantomvezérlés”-el szemben is.

4.7 RENDSZER INTERFÉSZ

4.7.1. Az AMS (R) S rendszer lehetővé teszi alhálózati felhasználók részére AMS (R) S közlemények légijárműhöz történő küldését ICAO 24-bit légijármű címre.

Megjegyzés.- Az ICAO 24-bit címjegyzékkel kapcsolatos rendelkezések a 10 Függelék 9. Fejezetében találhatók.

4.7.2 Adatcsomag szolgáltatási interfész

4.7.2.1 Ha a rendszer biztosít AMS (R) S adatcsomag szolgáltatást akkor biztosít interfészt az ATN-hez

Megjegyzés.- Az ATN alhálózati szolgáltatással kapcsolatos rendelkezésekről szóló részletes műszaki specifikációk a DOC 9880 - A Légiforgalmi Távközlési Hálózat (ATN) Részletes Műszaki Specifikációs Kézikönyv *(kidolgozás alatt)* 5.2.5 és 5.7.2. fejezeteiben találhatók.

4.7.2.2 Ha a rendszer AMS (R) S adatcsomag szolgáltatást nyújt, biztosítja a kapcsolati értesítési (CN) funkciót.

5. FEJEZET: S-MÓDÚ SSR LEVEGŐ-FÖLD ADATKAPCSOLAT

Megjegyzés. - Az S-módú SSR levegő-föld adatkapcsolatra, a Légiforgalmi Távközlési Hálózattal (ATN) összefüggésben, mint S-módú alhálózatra is hivatkoznak.

5.1 AZ S-MÓDÚ ALHÁLÓZATRA VONATKOZÓ MEGHATÁROZÁSOK

Légijármű *(Aircraft).* A légijármű kifejezést használhatják hivatkozásként az S-módú sugárzó adóberendezésre, készülékre (azaz légijármű/szállítóeszköz), ahol alkalmazható.
Légijármű Cím *(Aircraft address).* 24 bit egyedi kombinációja, amelyet egy légijárműhöz rendelhetnek, a levegő-föld kommunikáció, a navigáció és a radarfelderítés céljára.
Légijármű Hálózati Végponti Berendezés *(ADCE) (Aircraft data circuit-terminating equipment).* Egy, a légijármű fedélzetén található adott hálózati végponti berendezés, amely egy, a fedélzeten található adatkapcsolat vezérlő egységhez (ADLP) kapcsolódik. Ez egy, az S-módú adatkapcsolathoz tartozó egyedi protokollt működtet a légijármű és a föld közötti adattovábbítás számára.
Fedélzeti Adatkapcsolat Vezérlő Egység *(ADLP) (Airborne data link processor).* Egy, a légijárművön található vezérlő egység, amely egyedi az adott levegő-föld adatkapcsolatban (pl. az S-módú kapcsolatban), és amely a csatorna kezelését biztosítja, valamint a közleményeket továbbítás végett részekre bontja és/vagy ismét összeállítja azokat. Ez az egyik oldalán a légijármű olyan egységeihez kapcsolódik, amelyek valamennyi adatkapcsolati rendszerben közösek, a másik oldalán pedig magához a levegő-föld kapcsolathoz.
Légijármű/Közlekedési Eszköz *(Aircraft/vehicle).* Használhatják egy gép, vagy egy eszköz meghatározására, amely képes a légkörben repülni, vagy egy közlekedési eszköz a repülőtér mozgási területén található (azaz a futópályák és a gurulóutak).
Légi-kezdeményezésű Protokoll *(Air-initiated protocol).* Egy légijármű S-módú fedélzeti berendezése által kezdeményezett eljárás, egy szabvány hosszúságú vagy kiterjesztett hosszúságú, fedélzetről származó közlemény továbbítására a földi berendezés részére.
BDS B-adatátvitel Adat Kiválasztó *(BDS Comm-B Data Selector)* A 8-bites BDS kód meghatározza azt a regisztert, amelynek a tartalmát továbbítani kell a B-adatátvitel válasz MB mezőjében. Ezt két, egyenként 4-bites bitcsoportban ábrázolják, BDS1 (a legmagasabb helyi értékű 4 bit) és BDS2 (a legkisebb helyi értékű 4 bit).
Általános Adás *(Broadcast).* Az S-módú rendszeren belüli protokoll, amely lehetővé teszi, hogy a fedésterületen belül lévő összes légijármű számára a fedélzetre irányuló közleményt (uplink message) küldjenek, valamint hogy a fedélzetről leadott közlemény (downlink message) álljon rendelkezésre valamennyi lekérdező állomás (interrogator) számára, amelynek fedésterületén belül található az a légijármű, amely ilyen közleményt kíván küldeni.
Teljesítőképesség Jelentés *(Capability report).* Információ, amely jelzi, hogy a válasz-jeladónak van-e olyan adatkapcsolati teljesítőképessége, ahogy azt a minden állomást hívó adásra, vagy a lekérdezés nélküli válaszjeladásra adott teljesítőképesség mezőjében (CA) jelenti (lásd az "Adatkapcsolati Képesség Jelentés"-t).
Kizárás *(Close-out).* Az S-módú lekérdező állomásról származó utasítás, amely lezárja az S-módú adatkapcsolati réteg kommunikáció végrehajtását /tranzakciót/.
A Lekérdező Állomások Csoportja *(Cluster of interrogators).* Két vagy több lekérdező állomás (interrogator), ugyanazzal a lekérdező azonosító kóddal (II), melyek együttműködnek, hogy biztosítható legyen a felderítés interferencia-mentessége és valamennyi lekérdező állomás adatkapcsolati teljesítménye a közös fedésterületen belül.
A-Adatátviteli Csomag *(Comm-A).* Egy 112 bites lekérdezés, ami tartalmazza az 56 bit hosszúságú A-Közlemény mezőt /MA/. Ezt a mezőt a fedélzetre irányuló szabvány hosszúságú közlemények (SLM) és az általános adás protokollok használják.
B-Adatátviteli Csomag *(Comm-B).* Egy 112 bites válasz, ami tartalmazza az 56 bit hosszúságú B-Közlemény mezőt /MB/. Ezt a mezőt a fedélzetről származó szabvány hosszúságú közlemények (SLM) és a földről kezdeményezett, valamint az általános adás protokollok használják.
C-Adatátviteli Csomag *(Comm-C).* Egy 112 bit hosszúságú lekérdezés, amely tartalmazza a 80 bit hosszú C-Közlemény mezőt /MC/. Ezt a mezőt a fedélzetre irányuló kiterjesztett hosszúságú közlemény (ELM) protokoll használja.
D-Adatátviteli Csomag *(Comm-D).* Egy 112 bit hosszúságú válasz, amely tartalmazza a 80 bit hosszú D-Közlemény mezőt /MD/. Ezt a mezőt a fedélzetről származó kiterjesztett hosszúságú közlemény (ELM) protokoll használja.
Összeköttetés *(Connection).* Logikai kapcsolat egy kommunikációs rendszerben, az egyszintű entitások között.
Adatkapcsolat Teljesítőképesség Jelentés *(Data link capability report).* Egy B-Adatávitel válaszban megadott

információ, amely azonosítja a légijármű fedélzetén lévő berendezés teljes S-módú kommunikációs teljesítő-képességét.
A Fedélzetről Leadott Adattovábbítás *(Downlink).* A fogalom a légijármű fedélzetéről a föld felé továbbított adatokra vonatkozik. Az S-módú levegő-föld jeleket az 1090 MHz-es válasz frekvencia csatornán továbbítják.
Kiterjesztett Hosszúságú Közlemény (ELM) *(Extended length message (ELM)).* Egy sorozat C-adatátviteli /Comm-C/ lekérdezés (a fedélzetre irányuló /uplink/ ELM), melyet a közben érkező válaszok igénye nélkül továbbítanak, vagy egy sorozat D-adatátviteli /Comm-D/ válasz (fedélzetről leadott /downlink/ ELM), melyet a közben beérkező kérdezések igénye nélkül továbbítanak.
A Fedélzetre Irányuló ELM *(UELM) (Uplink ELM).* Ez a fogalom a 112 bit hosszúságú S-módú C-adatátviteli /Comm-C/ lekérdezésekkel megvalósított kiterjesztett hosszúságú, fedélzetre irányuló össze-köttetésre vonatkozik. Valamennyi lekérdezés tartalmazza a 80 bit hosszúságú C-adatátviteli /Comm-C/ közlemény mezőt (MC).
A Fedélzetről Leadott ELM *(DELM) (Downlink ELM).* Ez a fogalom a 112 bit hosszúságú S-módú D-adatátviteli /Comm-D/ válaszokkal megvalósított kiterjesztett hosszúságú, fedélzetről leadott összeköttetésre vonatkozik. Valamennyi válaszközlemény tartalmazza a 80 bit hosszúságú D-adatátviteli /Comm-D/ közlemény mezőt (MD).
Keret *(Frame).* Az adatkapcsolati szinten az adatátvitel alapegysége. Az S-módú alhálózat vonatkozásában egy-egy keret 1-től 4-ig terjedően tartalmazhat A-adatátviteli, illetve B-adatátviteli szegmenst, és 2-től 16-ig terjedően C-adatátviteli szegmenst, vagy 1-től 16-ig terjedően D-adatátviteli szegmenst.
Általános Formázó/Kezelő *(GFM) (General formatter/manager (GFM)).* A légijármű azon funkciója, amely a válaszjeladó regisztereibe kerülő közlemények összeállításáért felelős. Feladata még az olyan hibajelenségek felderítése és kezelése is, mint a bemenő adatok hiánya.
Földi Hálózati Végponti Berendezés *(GDCE) (Ground data circuit -terminating equipment (GDCE)).* Egy olyan sajátosan földi hálózati végponti berendezés, amely egy földi telepítési rendszerű adatkapcsolat vezérlő egységéhez (GDLP) kapcsolódik. Ez egy az S-módú adatkapcsolathoz tartozó egyedi protokollt működtet a légijármű és a föld közötti adat-továbbítás számára.
Földi Telepítési Rendszerű Adatkapcsolat Vezérlő Egység *(GDLP) (Ground data link processor (GDLP)).* Egy olyan földi telepítési rendszerű vezérlő egység, amely egyedi az adott levegő-föld adatkapcsolatban (pl. az S-módú kapcsolatban), és amely biztosítja a csatorna kezelését, valamint a közleményeket a továbbítás céljából részekre bontja, és/vagy ismét összeállítja. Ez az egyik oldalán (a hálózati végponti berendezés /DCE/ segítségével) a földi berendezés olyan egységeihez kapcsolódik, amelyek valamennyi adatkapcsolati rendszerben általánosak, a másik oldalon pedig magához a levegő-föld kapcsolathoz.
Földről Kezdeményezett B-adatátvitel *(GICB) (Ground-initiated Comm-B (GICB)).* A földről kezdeményezett B-adatátvitel protokoll lehetővé teszi a lekérdező állomás részére, hogy a meghatározott forrásból eredő B-közlemény /MB/ mezőben lévő válasz adatokat kiemelje.
Földről Kezdeményezett Protokoll *(Ground-initiated protocol).* Egy S-módú, a lekérdező állomás által kezdeményezett eljárás a szabvány hosszúságú, vagy kiterjesztett hosszúságú közleményeknek a légijármű S-módú berendezései részére történő továbbítására.
Légijármű Fedélzetéről Kezdeményezett S-módú B-adatátviteli (AICB) protokoll *(Mode S air-initiated Comm-B (AICB) protocol).* Egy S-módú válaszjeladó (transponder) által kezdeményezett eljárás egy egyszeri B-adatátviteli szegmensnek a légijármű fedélzetén található berendezéstől történő továbbítása céljára.
S-módú Általános Adás Protokollok *(Mode S broadcast protocols).* Olyan eljárások, melyek lehetővé teszik szabvány hosszúságú, fedélzetre irányuló, vagy a fedélzetről leadott közlemények vételét egynél több válaszjeladóval, illetve földi telepítésű lekérdező állomással külön-külön.
S-módú Földről Kezdeményezett B-adatátviteli (GICB) protokoll *(Mode S ground-initiated Comm-B (GICB) protocol).* Egy, a lekérdező állomás által kezdeményezett S-módú eljárás a fedélzeten elhelyezett S-módú berendezéstől származó egyetlen olyan B-adatátviteli szegmens kiemelésére, amely magába foglalja az S-módú válaszjeladón belüli 255 B-adatátviteli regiszter valamelyikének tartalmát.
S-módú Több Helyre Irányított Protokoll *(Mode S multisite-directed protocol).* Olyan eljárás, amely biztosítja, hogy egy fedélzetről leadott szabvány hosszúságú, vagy kiterjesztett hosszúságú közlemény feldolgozását és lezárását (extraction, close-out) csak a légijármű által kiválasztott egyedi S-módú lekérdező állomás befolyásolhassa.
S-módú Csomag *(Mode S packet).* Az S-módú alhálózati szabványnak megfelelő csomag, amely arra szolgál, hogy minimalizálja a levegő-föld kapcsolat által igényelt sávszélességet. Az ISO-8208 csomagokat (packets) S-módú csomagokba lehet transzformálni és viszont.
S-módú Specifikus Protokoll *(MSP) (Mode S specific protocol (MSP)).* Olyan protokoll, amely korlátozott adatcsomag (datagram) szolgáltatást biztosít az S-módú alhálózaton belül.
S-módú specifikus szolgáltatások *(Mode S specific services).* Az S-módú rendszer által biztosított kommunikációs

szolgáltatások olyan készlete, amelyek más levegő-föld alhálózatokból nem elérhetők, ezért együttműködésre nem képesek.
S-módú specifikus szolgáltatási entitás *(SSE) (Mode S specific services entity (SSE)).* Egy, a Fedélzeti/Földi Adatkapcsolat Vezérlő Egységen /XDLP/ belül, a rendszerben található entitás, amely lehetővé teszi az S-módú specifikus szolgáltatások elérését.
Csomag *(Packet).* A hálózati rétegen belüli összeköttetési berendezések közötti adattovábbítás alapegysége (például egy ISO 8208 csomag vagy egy S-módú csomag).
Szegmens *(Segment).* Egy közleménynek az a része, amelyet be lehet illesztetni egy egyedüli A-Közlemény/B-Közlemény /MA/MB/ mezőbe egy szabvány hosszúságú közlemény, vagy egy C-Közlemény/D-Közlemény /MC/MD/ mezőbe egy kiterjesztett hosszúságú közlemény esetében. Ez a kifejezés az ezeket a mezőket magába foglaló S-módú továbbításokra is alkalmazott.
Szabvány Hosszúságú Közlemény *(SLM) (Standard length message (SLM)).* Egy kiválasztottan címzett A-adatátviteli /Comm-A/ lekérdezéseket és/vagy B-adatátviteli /Comm-B/ válaszokat felhasználó digitális adatcsere közlemény (lásd a "Comm-A"-t és "Comm-B"-t).
Alhálózat *(Subnetwork).* Egy olyan ténylegesen megvalósított adathálózat, amely azonos protokollt és címzési tervet alkalmaz, és egy egyedüli hatóság ellenőrzése alatt áll.
Alhálózat Kezelési Entitás *(SNME) (Subnetwork management entity (SNME)).* Egy Földi telepítési rendszerű adatkapcsolat vezérlőegységen /GDLP-n/ belüli entitás, amely az alhálózat kezelését végzi, és összeköttetést tart a közbenső vagy végponti rendszerek egyenrangú entitásaival.
Idő-túllépés *(Timeout).* Egy tranzakció törlése az után, hogy a résztvevő entitások egyike egy előre meghatározott időtartamon belül nem biztosította az igényelt választ.
A Fedélzetre Irányuló Közlemény *(Uplink).* Az a fogalom, mely a földről egy légijármű fedélzetére irányuló adatok továbbítására vonatkozik. Az S-módú föld-levegő jeleket az 1 030 MHz-es lekérdező frekvencia-csatornán továbbítják.
XDCE *(XDCE).* Általános fogalom, amely egyaránt vonatkozik a légijármű hálózati végponti berendezésre /ADCE-re/ és a Földi hálózati végponti berendezésre /GDCE-re/.
XDLP *(XDLP).* Általános fogalom, amely egyaránt vonatkozik a Fedélzeti adatkapcsolat vezérlő egységére /ADLP-re/ és a Földi Telepítési rendszerű adatkapcsolat vezérlő egységére /GDLP-re/.

5.2 AZ S-MÓDÚ ALHÁLÓZAT JELLEMZŐI

5.2.1 Általános előírások

1. Megjegyzés. - ISO Referencia dokumentum. Amikor ebben a szabványban az "ISO 8208" dokumentumra hivatkoznak, akkor ez az alábbi ISO szabványt jelenti: "Information technology - Data communications - X.25 Packet Layer Protocol for Data Terminal Equipment, Reference Number ISO/IEC 8208: 1990 (E)" - Információtechnológia - Adatösszeköttetések - X.25 csomag réteg a Hálózati Végponti Berendezések számára, Referencia száma: ISO/IEC 8208: 1990 (E).

2. Megjegyzés. - Az S-módú alhálózat teljes felépítését a következő oldalon található ábrán mutatjuk be.

3. Megjegyzés. - A feldolgozás három különböző úton folyik. Az első a virtuális kapcsolt adathálózatok feldolgozását (SVC-k), a második az S-módú specifikus szolgáltatások feldolgozását, és a harmadik az alhálózat vezérlési információinak feldolgozását tartalmazza. Az SVC-k az újraformázási folyamatot és a légijármű hálózati végponti berendezések /ADCE/, vagy a földi hálózati végponti berendezések /GDCE/ funkcióit használják. Az S-módú specifikus szolgáltatások az S-módú specifikus szolgáltatási entitás (SSE) funkcióit használják fel.

5.2.1.1 *A közlemény kategóriák.* Az S-módú alhálózat csak olyan légiforgalmi távközlést szolgálhat, melyeket a repülésbiztonság és a repülés rendszerességének biztosítása kategóriába soroltak, ahogy azt az Annex 10, II. Kötet, 5. Fejezet, 5.1.8.4. és 5.1.8.6 pontjában meghatározták.
5.2.1.2 *Jelek a térben.* Az S-módú alhálózat térbeli-jel jellemzőinek meg kell felelniük az Annex 10, IV. Kötet, 3. Fejezet, 3.1.2 pontjában található előírásoknak.
5.2.1.3 *Kód és bájt függetlenség.* Az S-módú alhálózat képes a digitális adatok kód- és bájt-független továbbítására.
5.2.1.4 *Adatátvitel.* Az S-módú adatkapcsolaton keresztül az adatokat szegmentálva kell továbbítani, akár a szabvány hosszúságú közlemény (SLM) protokollok, akár a kiterjesztett hosszúságú közlemény (ELM) protokollok felhasználásával, ahogy azt az Annex 10, IV. kötetének, 3.1.2.6.11 és 3.1.2.7 pontjában meghatározták.

1. Megjegyzés. - Egy szabvány hosszúságú közlemény /SLM/ szegmensnek egy 56-bites A-Közlemény /MA/, vagy B-Közlemény /MB/ mező a tartalma. Egy kiterjesztett hosszúságú közlemény /ELM/ szegmensnek egy 80-bites C-Közlemény /MC/, vagy D-Közlemény /MD/ mező a tartalma.

2. Megjegyzés. - Egy szabvány hosszúságú közlemény /SLM/ keretnek maximálisan négy kapcsolt MA, vagy MB mező a tartalma. Egy ELM keretnek 2-től 16-ig terjedő MC, vagy 1-től 16-ig terjedő MD mező a tartalma.

5.2.1.5 *Bitek számozása.* Az adatátviteli mezők leírásában a biteket a továbbításuk sorrendjében kell számozni, az 1-es számú bittel kezdve. A bitek sorszámozását a többszegmensű keretek második és további szegmensein keresztül is folytatni kell. Hacsak nincs másképpen előírva, a bit-csoportokkal (mezőkkel) kódolt numerikus értékeket pozitív bináris számábrázolást használva kell kódolni, és az első továbbított bitnek a legmagasabb helyi értékű bitnek (MSB) kell lennie (az Annex 10, IV. kötet, 3.1.2.3.1.3 pont).
5.2.1.6 *Hozzárendelés nélküli bitek*. Amikor az adatok hossza nem elegendő ahhoz, hogy az a közlemény mezőn, vagy részmezőn belül az összes bitpozíciót elfoglalja, a hozzárendelés nélküli bit pozíciókat 0-ra kell állítani.

5.2.2 Keretek

5.2.2.1 A FEDÉLZETRE IRÁNYULÓ KERETEK

5.2.2.1.1 *Szabvány hosszúságú közlemény (SLM) keretek.* Egy SLM keretet maximálisan négy szelektív módon címzett A-adatátvitel /Comm-A/ szegmensből kell összeállítani.

Megjegyzés. - A Fedélzeti adatkapcsolat vezérlő egység /ADLP/ által vett valamennyi A-adatátvitel /Comm-A/ szegmenst (A-Közlemény /MA/ mező), a szegmenst biztosító lekérdezés első 32 bitje kíséri (Annex 10, IV. kötet 3.1.2.10.5.2.1.1 pont). Ezen a 32 biten belül található a 16-bites Speciális Jelölő (SD) mező (Annex 10, IV. kötet 3.1.2.6.1.4 pont).

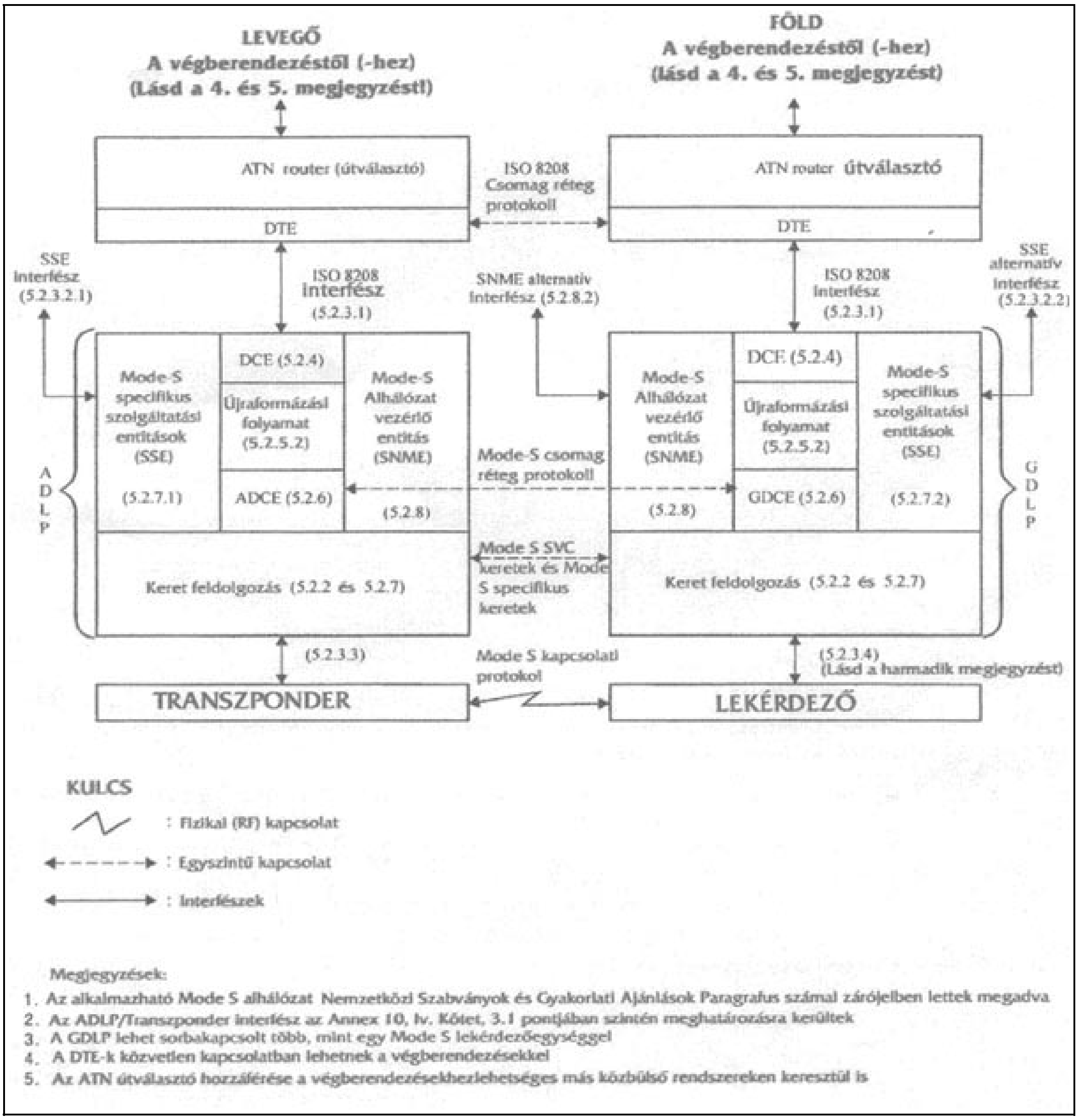
5.2.2.1.1.1 *Speciális jelölő /SD/ mező.* Amikor a Jelölő azonosító mező (DI) (14-16. bit) tartalma az 1-es, vagy a 7-es kód-érték, akkor az összes A-adatátvitel /Comm-A/ lekérdezés SD (Speciális jelölő) mezőjét (17-32. bit) kell felhasználni arra, hogy a Lekérdező azonosító részmezőt /Interrogator identifier subfield/ (IIS, 17-20. bit), valamint a Kapcsolt A-adatátvitel /Comm-A/ részmezőt /Linked Comm-A subfield/ (LAS, 30-32. bit) beszerezzék. A végrehajtandó művelet a kapott LAS értékétől függ. A LAS és az IIS tartalmát meg kell őrizni, és össze kell kapcsolni az A-adatátvitel /Comm-A/ közlemény szegmenssel, hogy a keret összeállításánál használják, az alábbiak szerint. A LAS mezőn kívül az összes többi mezőnek meg kell felelnie az Annex 10, IV. Kötet 3.1.2 pont előírásainak.

Megjegyzés. - A Speciális jelölő /SD/ mező felépítése az 5.1 ábrán látható.*

* Az összes táblázat és ábra ennek a fejezetnek a végén van elhelyezve.

5.2.2.1.1.2 *A Kapcsolt A-adatátvitel részmező /LAS/ kódolása.*
A 3-bites LAS részmezőt az alábbiak szerint kell kódolni:
LAS JELENTÉSE
0 egyetlen szegmens
1 kapcsolt, első szegmens
2 kapcsolt, második, de nem utolsó szegmens
3 kapcsolt, harmadik, de nem utolsó szegmens
4 kapcsolt, negyedik és utolsó szegmens
5 kapcsolt, ötödik és utolsó szegmens
6 kapcsolt, hatodik és utolsó szegmens
7 hozzárendelés nélküli

Az S-módú alhálózat funkcionális elemei



Kiegészítő ábraszöveg magyarázat:
DTE = Lekérdező adat végponti berendezés
DCE = Hálózati végponti berendezés
ADCE = Légijármű hálózati végponti berendezés
GDCE = Földi hálózati végponti berendezés
TRANSPONDER = Válaszjeladó
ADLP = Fedélzeti adatkapcsolat vezérlő egység
GDLP = Földi telepítési rendszerű adatkapcsolat vezérlő egység
ATN = Légiforgalmi távközlési hálózat

5.2.2.1.1.3 *Egyetlen Szabvány hosszúságú közlemény /SLM/ keret szegmens.* Ha a LAS = 0, akkor az A-közlemény /MA/ mezőben található adatot egy teljes keretnek kell tekinteni, és lehetővé kell tenni a további feldolgozását.
5.2.2.1.1.4 *Többszörös Szegmensű Szabvány hosszúságú közlemény /SLM/ keret.* A Fedélzeti adatkapcsolat vezérlő egységnek /ADLP/ vennie és össze kell állítania a kapcsolt 56-bites A-adatátvitel /Comm-A/ szegmenseket, amelyek kapcsolatban vannak mind a tizenhat lehetséges Lekérdező azonosító (II) kóddal. Az A-adatátvitel /Comm-A/ szegmensek helyes összekapcsolását annak megkövetelésével lehet biztosítani, hogy az összes A-adatátvitel /Comm-A/ szegmens egyforma Lekérdező azonosító részmező) /IIS/ értékkel rendelkezzen. Ha a Kapcsolt A-adatátvitel részmező /LAS/ értéke 1-től 6-ig terjed, a keretnek kettő - négy A-adatátvitel /Comm-A/ szegmensből

kell állnia a következő bekezdésekben leírtak szerint.
5.2.2.1.1.4.1 *Kezdeti szegmens.* Ha a Kapcsolt A-adatátvitel részmező /LAS/ = 1, akkor az A-közlemény /MA/ mezőt a Szabvány hosszúságú /SLM/ keret kezdeti szegmenseként kell összeállítani. A kezdeti szegmenset addig kell tárolni, amíg a keret összes szegmensét nem vették, vagy a keretet nem törölték.
5.2.2.1.1.4.2 *Átmeneti, közbenső szegmens.* Ha a LAS = 2 vagy 3, akkor az A-közlemény /MA/ mezőt szám szerinti sorrendben kell összeállítani, mint az SLM keret egy átmeneti, közbenső szegmensét. Össze kell kapcsolni az ugyanolyan értékű Lekérdező azonosító részmezőt /IIS/ tartalmazó előző szegmensekkel.
5.2.2.1.1.4.3 *Végső szegmens.* Ha a LAS = 4, 5 vagy 6, akkor az A-közlemény /MA/ mezőt az SLM keret végső szegmenseként kell összeállítani. Össze kell kapcsolni az ugyanolyan értékű Lekérdező azonosító részmezőt /IIS/ tartalmazó előző szegmensekkel.
5.2.2.1.1.4.4 *A Keret befejezése.* A keretet teljesnek kell tekinteni, és lehetővé kell tenni további feldolgozását, amint a keret összes szegmensét vették.
5.2.2.1.1.4.5 *A Keret törlése.* Egy nem teljes Szabvány hosszúságú közlemény /SLM/ keretet törölni, érvényteleníteni kell, ha az alábbi körülmények közül egy, vagy több fennáll:
a) Ugyanolyan Lekérdező azonosító részmező /IIS/ értékkel egy új kezdeti szegmenset (LAS = 1) vesznek. Ebben az esetben az új kezdeti szegmenset egy új Szabvány hosszúságú közlemény /SLM/ keret kezdeti szegmenseként kell megtartani;
b) A vett Kapcsolt A-adatátviteli /Comm-A/ /LAS/ részmező kódok sorrendje, (miután a több példányban előforduló kódokat törölték) nem egyezik meg az alábbi listában felsoroltakkal:
1) LAS = 0
2) LAS = 1,5
3) LAS = 1,2,6
4) LAS = 1,6,2
5) LAS = 1,2,3,4
6) LAS = 1,3,2,4
7) LAS = 1,2,4,3
8) LAS = 1,3,4,2
9) LAS = 1,4,2,3
10) LAS = 1,4,3,2

c) *Tc* másodperc eltelt azóta, hogy az utolsó A-adatátvitel /Comm-A/ szegmenset ugyanazzal a Lekérdező azonosító részmező /IIS/ értékkel vették (5-1. Táblázat).
5.2.2.1.1.4.6 *Szegmens törlése.* Egy Szabvány hosszúságú közlemény /SLM/ keret számára vett szegmenset érvénytelennek kell tekinteni, ha az egy közbenső vagy végső szegmens, és még nem vettek ugyanolyan IIS értékű kezdeti szegmenset.
5.2.2.1.1.4.7 *Szegmens ismétlése.* Ha a vett szegmens egy röviddel korábban vett azonos Lekérdező azonosító részmező /IIS/ értékű szegmens megismétlése, akkor az új szegmens le kell, hogy cserélje a korábban vett szegmenset.

Megjegyzés. - Az S-módú hálózati protokollok eljárása az A-adatátvitel /Comm-A/ szegmensek megismételt továbbítását eredményezheti.

5.2.2.1.2 *Kiterjesztett hosszúságú közlemény /ELM/ keret.* Egy uplink fedélzetre irányuló /uplink/ /ELM/ kiterjesztett hosszúságú közlemény /ELM/ keret 20-tól 160-ig terjedő bájtból kell felépülnie, és az Annex 10, IV. Kötet, 3.1.2.7 pontjában meghatározott protokoll felhasználásával kell továbbítani a lekérdező állomástól (interrogator) a válaszjeladó (transponder) felé. Valamennyi fedélzetre irányuló ELM szegmens első négy bitjének a C-közlemény /MC mező/ tartalmaznia kell az ELM-et továbbító S-módú lekérdező állomás lekérdező azonosító (II) kódját. A Fedélzeti adatkapcsolat vezérlő egységnek /ADLP/ ellenőriznie kell egy befejezett fedélzetre irányuló ELM összes szegmense lekérdező azonosító /II/ kódját. Ha az összes szegmens ugyanazt az II kódot tartalmazza, akkor az II kódot minden szegmensben törölni kell, és a további közlemény biteket meg kell őrizni, mint felhasználói adatokat, további feldolgozás céljára. Ha az összes szegmens nem ugyanazt az II kódot tartalmazza, akkor a teljes fedélzetre irányuló ELM-t érvénytelennek kell tekinteni.

Megjegyzés.- Egy fedélzetre irányuló ELM keret 2-től 16-ig terjedő kapcsolt C-adatátvitel /Comm-C/ szegmensből áll, valamennyi 4 bites II kódot tartalmaz. Ily módon a csomag továbbítás kapacitása a fedélzetre irányuló kiterjesztett hosszúságú /ELM/ keretenként 19 - 152 bájt.

5.2.2.2 A FEDÉLZETRŐL LEADOTT (DOWNLINK) KERETEK

5.2.2.2.1 *Szabvány hosszúságú /SLM/ keret.* Egy fedélzetről leadott SLM keret maximálisan 4 B-adatátviteli /Comm-B/ szegmensből állhat. A keret első B-adatátviteli szegmensének B-közlemény /MB/ mezője egy 2-bites kapcsolt B-adatátvitel részmezőt (az LBS, a B-közlemény /MB/ mező 1 és 2 bitje) tartalmaz. Ezt az részmezőt kell felhasználni a maximálisan négy B-adatátviteli /Comm-B/ szegmens összekapcsolásának vezérlésére.

Megjegyzés. - A kapcsolt B-adatátvitel részmező /LBS/ használja az első két-bit pozíciót egy többszörös vagy egyedüli fedélzetről leadott /downlink/ Szabvány hosszúságú /SLM/ keret első szegmensében. Ebből kifolyólag 54 bit áll rendelkezésre az S-módú adatcsomag részére a fedélzetről leadott SLM keret első szegmensében. A fedélzetről leadott SLM keret megmaradó szegmenseinek, ha léteznek, 56 bit áll rendelkezésükre.

5.2.2.2.1.1 *Kapcsolt B-adatátviteli részmező /LBS/ kódolás.* Az összekötést a Szabvány hosszúságú közlemény /SLM/ keret kezdő B-adatátvitel /Comm-B/ szegmensének B-közlemény /MB/ mezője LBS részmezőjének kódolásával jelzik.
A kapcsolt B-adatátvitel részmező /LBS/ kódolása a következő:
LBS JELENTÉSE
0 egyetlen szegmens
1 egy két-szegmenses SLM keret kezdő szegmense
2 egy három-szegmenses SLM keret kezdő szegmense
3 egy négy-szegmenses SLM keret kezdő szegmense

5.2.2.2.1.2 *Az összekapcsolási protokoll*
5.2.2.2.1.2.1 A B-adatátvitel /Comm-B/ protokollban a kezdő szegmenset a levegőből kezdeményezett, vagy több helyre irányított protokollok felhasználásával kell továbbítani. A kezdő szegmens LBS mezőjének jelezni kell a földnek a továbbításra kerülő további szegmensek számát (ha van ilyen). A kezdeti szegmensnek a válaszjeladóhoz (transponder) való továbbítását megelőzően az SLM keret megmaradó szegmenseit (ha vannak ilyenek) a válaszjeladóhoz kell továbbítani, a lekérdezőhöz (interrogator) való továbbítás céljából, a földi kezdeményezésű B-adatátviteli protokoll felhasználásával. Ezeket a szegmenseket vezérlő kódok kísérik, amelyek ezeknek a szegmenseknek a földi kezdeményezésű B-adatátvitel /Comm-B/ 2., 3., 4. regiszterébe való beillesztését végzik, ennek a számozásnak megfelelően a keret második, harmadik, vagy negyedik szegmenséhez kapcsolódóan.
5.2.2.2.1.2.2 Az olyan, levegőből kezdeményezett szegmens kizárása, amelyet a protokoll kezdeményezett, nem mehet végbe addig, amíg az összes szegmens nem került eredményesen továbbításra.

Megjegyzés. - A földi kezdeményezésű B-adatátvitel /Comm-B/ protokoll felhasználását magában foglaló összekapcsolási eljárást a Fedélzeti adatkapcsolat vezérlő egység /ADLP/ hajtja végre.

5.2.2.2.1.3 *A Szabvány hosszúságú közlemény /SLM/ keretek irányítása.* Ha az SLM keretnek több helyre irányítottnak kell lennie, akkor az ADLP-nek meg kell határoznia azon S-módú lekérdező, vagy lekérdező csoport lekérdező azonosító (II) kódját (5.2.8.1.3), amelyeknek az SLM keretet vennie kell.

5.2.2.2.2 *KITERJESZTETT HOSSZÚSÁGÚ KÖZLEMÉNY /ELM/ KERET*

Megjegyzés. - Egy fedélzetről leadott ELM egytől tizenhatig terjedő összekapcsolt szegmensből áll.

5.2.2.2.2.1 *Eljárás.* A fedélzetről leadott ELM kereteknek a közlemények továbbításához 28 bájttal egyenlő, vagy annál több bájtot kell felhasználni, és azokat az Annex 10, IV. kötet, 3.1.2.7 pontjában meghatározott protokoll felhasználásával kell megformázni.
5.2.2.2.2.2 *ELM keretek irányítása.* Ha az ELM keretnek több helyre irányítottnak kell lennie, akkor az ADLP-nek meg kell határoznia azon S-módú lekérdező vagy lekérdező csoport lekérdező azonosító /II/ kódját (5.2.8.1.3), amelynek az ELM keretet vennie kell.
5.2.2.3 *Fedélzeti/Földi adatkapcsolat vezérlő egység /XDLP/ keret feldolgozás.* Keret-feldolgozást minden S-módú csomagon el kell végezni (kivéve az MSP csomagot) az 5.2.2.3-tól az 5.2.2.5-ig terjedő pontokban meghatározottak szerint. Keret-feldolgozását S-módú specifikus szolgáltatásoknál az 5.2.7 pontban meghatározottak szerint kell

végezni.
5.2.2.3.1 *Csomag hosszúság.* Minden csomagot (beleértve az egy egyedüli keretbe multiplikált csomag csoportot is) egy olyan keretbe kell áthelyezni, amelyet a csomag befogadásához szükséges legkisebb számú szegmens képez. A felhasználói adat mezőnek hosszban a bájtok egy integrál többszörösének kell lenni. Egy 4-bites hossz paramétert (LV) kell biztosítani az S-módú ADAT, HÍVÁSKÉRÉS, HÍVÁS ELFOGADÁS, BONTÁS KÉRÉS és MEGSZAKÍTÁS csomag fej-részekben úgy, hogy a kicsomagolás alatt további bájtokat nem adnak a felhasználói adat mezőhöz. A felhasználói adat hosszúság /LV/ mezőnek kell meghatároznia a keret utolsó szegmensében használt teljes bitek számát. A felhasználói adat hosszúság /LV/ számítások során a 4-bites lekérdező azonosító /II/ kódot a fedélzetre irányuló kiterjesztett hosszúságú közlemény /ELM/ utolsó szegmensében (1) el kell hanyagolni azoknál a fedélzetre irányuló ELM kereteknél, amelyek páratlan számú C-adatátviteli /Comm-C/ szegmenssel rendelkeznek, és (2) számba kell venni a páros számú C-adatátviteli szegmenssel rendelkező fedélzetre irányuló ELM kereteknél. Az LV mezőben lévő értéket figyelmen kívül kell hagyni, ha a csomag multiplikált.

Megjegyzés. - Specifikus hossz mezőt használnak a multiplikált csomag egyes elemei hosszának meghatározására. Ezért a felhasználói adat hosszúság /LV/ mező értéket nem használják. Az LV mező hiba kezelése az 5-16. és 5-19. táblázatban került leírásra.

5.2.2.3.2 *Multiplikálás.* Amikor a multiplikált S-módú csomagokat egy egyedüli Szabvány hosszúságú közleménybe /SLM/ multiplikálják, akkor a Kiterjesztett hosszúságú közlemény /ELM/ keretben a következő eljárásokat kell alkalmazni. A csomagok multiplikálása a Fedélzeti adatkapcsolat vezérlő egységen /ADLP/ belül nem alkalmazható különböző prioritású kapcsolt virtuális áramkörökhöz /SVC-k/ kapcsolódó csomagokra.

Megjegyzés. - A multiplikálás nem hajtható végre S-módú specifikus protokollú csomagokon.
5.2.2.3.2.1 *A multiplikálás optimalizálása*

Ajánlás. - *Amikor a multiplikált csomagok ugyanahhoz a Fedélzeti/Földi adatkapcsolat vezérlő egységhez /XDLP/ való átvitelre várnak, akkor ezeket egy egyedüli keretbe kell multiplikálni azért, hogy optimalizálják az átmenő teljesítményt, feltéve, hogy a különböző prioritású kapcsolt virtuális áramkörökhöz kapcsolódó csomagok nincsenek egymással multiplikálva.*
5.2.2.3.2.2 *Szerkezet.* A multiplikált csomagok szerkezetének a következőnek kell lenni:

FEJ-RÉSZ: 6 vagy 8	HOSSZ: 8	1.CSOMAG: v	HOSSZ: 8	2.CSOMAG: v

Megjegyzés. - A mezőben a szám a mezőhosszt jelöli bitekben; a "v" azt jelöli, hogy a mező változó hosszúságú.

5.2.2.3.2.2.1 *Multiplikált fej-rész.* A multiplikált csomagok fej-része a következő:

DP: 1	MP: 1	SP: 2	ST: 2	FILL2: 0 vagy 2

Adat csomag S-módú specifikusprotokoll csomag Felügyelő csomag Felügyelő típus 2. Töltő
Ahol:
Adat csomag típus (DP) = 0
S-módú specifikus protokoll /MSP/ csomag típus (MP) = 1
Felügyelő csomag (SP) = 3
Felügyelő típus (ST) = 2

Megjegyzés. - A multiplikáló fej-részben használt mező szerkezet meghatározását lásd az 5-23. ábrán.

5.2.2.3.2.2.2 *Hossz*. Ez a mező foglalja magába a következő csomag hosszúságát bájtokban. Egy multiplikált ADAT csomagban lévő bármilyen hibajelzés, mint például a HOSSZ mezőben jelzett hossz és az ezt a csomagot befogadó keret hossza közötti ellentmondás a csomag kizárását eredményezi, hacsak a hibát nem lehet a HOSSZ mezőre korlátozni, amely esetben a várható Csomag sorrend /PS/ értékű VISSZAUTASÍTÁS csomag küldhető.

5.2.2.3.2.2.2.1 **Ajánlás. -** *A multiplikált csomagokra az az ajánlott, hogy ha a teljes csomagot nem lehet de-multiplikálni /lebontás/, akkor az első összetevő csomagot egy alaki hibaként kell kezelni, és a továbbiakat érvényteleníteni.*

5.2.2.3.2.3 *Lezárás.* A multiplikált csomagok egy sorozatát magába foglaló keret végét a következő események egyikével kell meghatározni:
a) a mező hosszúsága mindenhol nulla; vagy
b) kevesebb, mint nyolc bit maradt a keretben.

5.2.2.3.3 *S-MÓDÚ CSATORNA SORREND MEGŐRZÉSE*

5.2.2.3.3.1 *Alkalmazás.* Abban az esetben, amikor a multiplikált S-módú keretek ugyanabból a Kapcsolt virtuális áramkörből /SVC/ arra várakoznak, hogy ugyanahhoz a Fedélzeti/Földi adatkapcsolat vezérlő egységhez /XDLP/ továbbítsák őket, a következő eljárást kell alkalmazni.

5.2.2.3.3.2 *Eljárás*

1. Megjegyzés. - A Szabvány hosszúságú közlemény /SLM/ és a Kiterjesztett hosszúságú közlemény /ELM/ tranzakciók függetlenül történhetnek.

2. Megjegyzés. - A fedélzetre irányuló és a fedélzetről leadott tranzakciók függetlenül történhetnek.

5.2.2.3.3.2.1 *Szabvány hosszúságú közlemény /SLM/ keretek*. Az átvitelre váró SLM kereteket a vétel sorrendjében kell továbbítani.
5.2.2.3.3.2.2 *Kiterjesztett hosszúságú közlemény /ELM/ keretek.* Az átvitelre váró ELM kereteket a vétel sorrendjében kell továbbítani.

5.2.2.4 FÖLDI TELEPÍTÉSI RENDSZERŰ ADATKAPCSOLAT VEZÉRLŐ EGYSÉG /GDLP/ KERET FELDOLGOZÁS

5.2.2.4.1 *ÁLTALÁNOS RENDELKEZÉSEK*

5.2.2.4.1.1 A GDLP-nek meg kell állapítania a felszerelt Fedélzeti adatkapcsolat vezérlő egység /ADLP//válaszjeladó adatkapcsolat képességét az adatkapcsolat teljesítőképesség jelentésből (5.2.9), mielőtt azzal z ADLP-vel bármilyen adatkapcsolati tevékenységbe kezdene.
5.2.2.4.1.2 A GDLP keret feldolgozásnak a lekérdező számára biztosítania kell az összes olyan adatot a fedélzetre irányuló adat-továbbításhoz, amelyhez a lekérdező nem tud közvetlenül hozzájutni.
5.2.2.4.2 *Kézbesítési állapot.* A Földi telepítési rendszerű adatkapcsolat vezérlő egység /GDLP/ keret feldolgozásának egy jelzést kell kapnia a lekérdező funkciótól arról, hogy egy meghatározott fedélzetre irányuló keret, amelyet előzőleg a lekérdezőhöz továbbítottak, eredményesen befejezésre került a föld-levegő kapcsolaton keresztül.
5.2.2.4.3 *Légijármű címzés.* A Földi telepítési rendszerű adatkapcsolat vezérlő egység /GDLP/ keret feldolgozásnak a lekérdezőtől vennie kell az egyes fedélzetről leadott adat-továbbítású Szabvány hosszúságú közlemény /SLM/ vagy Kiterjesztett hosszúságú közlemény /ELM/ keretekben lévő adatokkal együtt annak a légijárműnek a 24-bites címét, amely a keretet továbbította. A GDLP keret feldolgozásnak képesnek kell lenni a 24-bites légijármű címzésnek a lekérdezőhöz való továbbítására, amelynek vennie kell egy fedélzetre irányuló SLM vagy ELM keretet.
5.2.2.4.4 *S-módú protokoll típusazonosítás.* A Földi telepítési rendszerű adatkapcsolat vezérlő egység /GDLP/ keret feldolgozásnak kell jeleznie a lekérdezőnek azt a protokollt, amelyet a keret átviteléhez használni kell: Szabvány hosszúságú közlemény protokoll, Kiterjesztett hosszúságú közlemény protokoll, vagy Általános adás protokoll.
5.2.2.4.5 *Keret meghatározás.* Egy S-módú csomagot (beleértve a multiplikált csomagokat, de kizárva az S-módú specifikus protokoll /MSP/ csomagokat), amelyet fedélzetre irányuló csomagként szánnak, és amely kisebb vagy egyenlő 28 bájttal, Szabvány hosszúságú közlemény /SLM/ keretként kell elküldeni. Egy S-módú csomagot, amely nagyobb, mint 28 bájt, fedélzetre irányuló Kiterjesztett hosszúságú közlemény /ELM/ keretként kell elküldeni az ELM képességű válaszjeladónak, M-bites feldolgozást használva, szükség szerint (5.2.5.1.4.1). Ha a transzponder nem rendelkezik ELM képességgel, akkor a 28 bájtnál nagyobb csomagokat M-bites vagy S-bites (5.2.5.1.4.2) összeállítási eljárást alkalmazva, valamint multiplikált SLM kereteket felhasználva kell elküldeni, ahogy szükséges.

Megjegyzés. - Csak az S-módú ADAT, HÍVÁSKÉRÉS, HÍVÁS FOGADÁS, BONTÁS KÉRÉS és MEGSZAKÍTÁS csomagok tartoznak azon S-módú csomagok közé, amelyek M-bites vagy S-bites sorrendet használnak.

5.2.2.5 FEDÉLZETI ADATKAPCSOLAT VEZÉRLŐ EGYSÉG /ADLP/ KERET FELDOLGOZÁS

5.2.2.5.1 *Általános rendelkezések.* Az utolsó 24 bit (címzés/paritás) lehetséges kivételével, az ADLP keret feldolgozásnak a válaszjeladótól mind az 56-bites, mind a 112-bites vett, fedélzetre irányuló továbbítások teljes tartalmát fogadnia kell - az általános hívás és Összeütközési veszélyt jelző fedélzeti rendszer /ACAS/ lekérdezések kivételével. Az ADLP keret feldolgozásnak biztosítania kell az összes olyan adatot is a válaszjeladónak a fedélzetről leadott adat-továbbításhoz, amelyet a válaszjeladó közvetlenül nem szolgáltat (5.2.3.3).
5.2.2.5.2 *Kézbesítési állapot.* A Fedélzeti adatkapcsolat vezérlő egység /ADLP/ keret feldolgozásának egy jelzést kell kapnia a válaszjeladótól arról, hogy egy meghatározott fedélzetről leadott keretnek, amelyet előzőleg a válaszjeladónak továbbítottak, befejezésre került.
5.2.2.5.3 *Lekérdező azonosító /II/.* Az ADLP keret feldolgozásnak a válaszjeladótól vennie kell az egyes fedélzetre irányuló adat-továbbítású Szabvány hosszúságú közleményben /SLM/ és Kiterjesztett hosszúságú közleményben /ELM/ lévő adatokkal együtt a keretet leadó lekérdezőnek a lekérdező azonosító (II) kódját. Az ADLP keret feldolgozásnak továbbítania kell a válaszjeladónak azon lekérdező, vagy lekérdező csoport II kódját, amelynek a több helyre irányított keretet vennie kell.
5.2.2.5.4 *S-módú protokoll típusazonosítás.* Az ADLP keret feldolgozásnak jeleznie kell a válaszjeladónak a keret továbbításához használandó protokollt: földi-kezdeményezésű, légi-kezdeményezésű, általános adás, több helyre irányított, szabvány hosszúságú vagy kiterjesztett hosszúságú közlemény.
5.2.2.5.5 *Keret törlés.* A Fedélzeti adatkapcsolat vezérlő egység /ADLP/ keret feldolgozásnak képesnek kell lennie arra, hogy törölje az olyan, fedélzetről leadott kereteket, amelyeket előzőleg a válaszjeladónak továbbításra átadott, de amelyekre befejezést nem jeleztek. Ha több mint egy keretet tárolnak a válaszjeladón belül, akkor a törlési eljárásnak szelektíven törölnie kell a tárolt kereteket.
5.2.2.5.6 *Keret meghatározás.* Az olyan S-módú csomagokat (beleértve a multiplikált csomagokat, de kizárva az MSP csomagokat), amelyek fedélzetről leadott adat-továbbításra szolgálnak, és 222 bitnél kisebbek, vagy azzal egyenlők, SLM keretként kell elküldeni. A 222 bitnél nagyobb S-módú csomagokat fedélzetről leadott kiterjesztett hosszúságú közlemény /ELM/ keretként kell elküldeni az ELM képességgel rendelkező transzpondereknek, M-bites feldolgozást használva, ahogyan szükséges (5.2.5.1.4). Amikor az M-bites feldolgozás használatos, akkor az összes M = 1-t magába foglaló kiterjesztett hosszúságú közlemény /ELM/ keretnek tartalmaznia kell az ELM szegmensek számát azért, hogy a válaszjeladó képes legyen a válaszában egy kérő lekérdezésre továbbítani azokat (UF = 24) (5.2.9.1). Ha a válaszjeladó nem rendelkezik ELM képességgel, akkor a 222 bitnél nagyobb csomagokat az M-bites vagy S-bites (5.2.5.1.4.2) összeállítási eljárások felhasználásával a multiplikált SLM keretek alkalmazásával kell elküldeni.

Megjegyzés. - A fedélzetről leadott SLM keret maximális hossza 222 bit. Ez egyenlő 28 bájttal (7 bájt a Comm-B szegmensnek), mínusz a 2-bites kapcsolt Comm-B részmező (5.2.2.2.1.1).

5.2.2.6 PRIORITÁS KEZELÉS

5.2.2.6.1 *Fedélzeti adatkapcsolat vezérlő egység /ADLP/ prioritás- kezelés.* A kereteket az ADLP-től a válaszjeladóhoz kell továbbítani a következő prioritási sorrendben (első a legmagasabb prioritású):
a) S-módú specifikus szolgáltatások;
b) Keresési kérések (5.2.8.1);
c) Csak magas prioritású kapcsolt virtuális áramkör /SVC/ csomagokat tartalmazó keretek; és
d) Csak alacsony prioritású SVC csomagokat tartalmazó keretek.

5.2.2.6.2 FÖLDI TELEPÍTÉSI RENDSZERŰ ADATKAPCSOLAT VEZÉRLŐ EGYSÉG /GDLP/ PRIORITÁS KEZELÉSE

Ajánlás. - *A fedélzetre irányuló kereteket a következő prioritási sorrendben ajánlatos továbbítani (legmagasabb prioritású az első):*
a) S-módú specifikus szolgáltatások;
b) Legalább egy S-módú ÚTVONAL csomagot tartalmazó keretek;
c) Legalább egy magas prioritású kapcsolt virtuális áramkör /SVC/ csomagot tartalmazó keretek; és
d) Csak alacsony prioritású SVC csomagokat tartalmazó keretek.

5.2.3 Adat-csere interfészek

5.2.3.1 A LEKÉRDEZŐ ADAT VÉGPONTI BERENDEZÉS /DTE/ISO 8208 INTERFÉSZ

5.2.3.1.1 *Általános követelmények.* A Fedélzeti/Földi adatkapcsolat vezérlő egység /XDLP/ és a Lekérdező adat végponti berendezések /DTE-k/ közötti csatoló egységnek meg kell felelnie az ISO 8208 csomag réteg protokollnak (PLP). Az XDLP-nek támogatnia kell a DTE eljárásokat úgy, ahogy az az ISO 8208-ban meg van határozva. Mint ilyen, az XDLP-nek tartalmaznia kell egy Hálózati végponti berendezést /DCE/. (5.2.4).

5.2.3.1.2 *A lekérdező adat végponti berendezés/Hálózati végponti berendezés /DTE/DCE/ csatoló egységgel szembeni fizikai és kapcsolati réteg követelmények.* A követelmények a következők:

a) A csatoló egységnek kód- és bájt-függetlennek kell lenni, és nem állapíthat meg korlátozásokat az egy csomagon belül továbbított bitek sorrendjére, utasításaira vagy alakzatára; és

b) A csatoló egységnek támogatnia kell a változó hosszúságú hálózati réteg csomagok átvitelét.

5.2.3.1.3 *A LEKÉRDEZŐ ADAT VÉGPONTI BERENDEZÉS /DTE/ CÍMZÉSE*

5.2.3.1.3.1 *Földi DTE címzés.* A földi DTE címzés 3, binárisan kódolt decimális (BCD) számjegy hosszúságú a következők szerint:

$X_0X_1X_2$

X_0 a legnagyobb értékű számjegy. Földi DTE címzéseknek decimális számoknak kell lenniük a 0-tól a 255-ig terjedő tartományból BCD-ben kódolva. A DTE címzés kijelölése helyi ügy. A Földi telepítési rendszerű adatkapcsolat vezérlő egységhez kapcsolt összes DTE, amely átfedő lefedéssel rendelkezik, egyedi címzéssel kell rendelkezzen. Azokat a GDLP-ket, amelyeknek a fedésterületeik közötti repülési idő kisebb, mint T_r (5-1. táblázat), átfedő lefedéssel rendelkezőnek kell tekinteni.

5.2.3.1.3.2 *Mozgó DTE címzés.* A mozgó DTE címzésnek 10 BCD számjegyű teljes hosszal kell rendelkeznie, a következők szerint:

$\mathrm{X_0X_1X_2X_3X_4X_5X_6X_7X_8X_9}$

X_0 a legnagyobb értékű számjegy. Az X_0 - X_7 számjegyek tartalmazzák a BCD-ben kódolt légijármű címzés nyolcjegyű felírását. Az X_8X_9 számjegyeknek egy alcímzést kell azonosítani, a légijármű fedélzetén lévő specifikus DTE-ket. Ennek az alcímzésnek egy decimális számnak kell lenni a 0-tól a 15-ig terjedő tartományban, BCD-ben kódolva. Az alábbi alcímzés kijelöléseket kell használni:

00 Légiforgalmi Távközlési Hálózat /ATN/ irányító

01 - 15 Kijelöletlen

5.2.3.1.3.3 Szabálytalan *DTE címzések*. A meghatározott tartományon kívül eső, vagy az 5.2.3.1.3.1 és 5.2.3.1.3.2 pontokban meghatározott földi és mozgó DTE címzések formátumainak nem megfelelő DTE címzéseket szabálytalan DTE címzésekként kell meghatározni. DTE címzés észlelése Egy HIVÁS KÉRÉS csomagban egy szabálytalan DTE címzés észlelése a hívás visszautasításához vezet, ahogyan ez az 5.2.5.1.5 pontban meghatározásra került.

5.2.3.1.4 *A LEKÉRDEZŐ ADAT VÉGPONTI BERENDEZÉS / HÁLÓZATI VÉGPONTI BERENDEZÉS /DTE/DCE/ CSATOLÓ EGYSÉG CSOMAG RÉTEG PROTOKOLL KÖVETELMÉNYEI*

5.2.3.1.4.1 *Teljesítőképességek*. A DTE és a DCE közötti illesztéseknek meg kell felelnie az ISO 8208-nak az alábbi teljesítőképességben:

a) gyorsított adat kézbesítés, azaz a maximálisan 32 bájtos felhasználói adatmezővel rendelkező MEGSZAKITÁS csomagok használata;

b) prioritás képesség (két szinttel, 5.2.5.2.1.1.6);

c) gyors kiválasztás (5.2.5.2.1.1.13, 5.2.5.2.1.1.16); és

d) hívott/hívás címzés bővítési lehetőség, ha a helyi körülmények szükségessé teszik (azaz a Fedélzeti/Földi adatkapcsolat vezérlő egység /XDLP/ a Lekérdező adat végponti berendezéshez /DTE/ van kapcsolva egy olyan hálózati protokollon keresztül, ami nem képes arra, hogy tartalmazza az S-módú címet, ahogy az meg van határozva). Egyéb ISO 8208 képességek és a D-bit és a Q-bit nem kerül az átvitel céljából lehívásra az S-módú csomag réteg protokollon át.

5.2.3.1.4.2 *Jellemző értékek.* Az időzítő és számoló jellemzőknek a DTE/DCE illesztéseknek összhangban kell lenniük az alapértelmezési ISO 8208 értékekkel.

5.2.3.2 S-MÓDÚ SPECIFIKUS SZOLGÁLTATÁSI ILLESZTÉS

Megjegyzés. - Az S-módú specifikus szolgáltatások a kisugárzott A-adatátvitel /Comm-A/ és B-adatátvitel /Comm-B/ adatcsomagokból és a Földről kezdeményezett B-adatátvitelből /GICB/, valamint az S-módú specifikus protokollokból

/MSP/ állnak.

5.2.3.2.1 *ADLP /Fedélzeti adatkapcsolat vezérlő egység/*
5.2.3.2.1.1 *Általános rendelkezések.* Az ADLP támogatja az S-módú specifikus szolgáltatásokhoz való hozzáférést az erre a célra szolgáló egy vagy több különálló ADLP interfész biztosításával.
5.2.3.2.1.2 *Működési teljesítőképesség.* Az ezen az illesztésen keresztüli közlemény és vezérlés kódolásnak az 5.2.7.1 pontban meghatározott összes teljesítőképességet támogatja.
5.2.3.2.2 *GDLP /Földi telepítési rendszerű adatkapcsolat vezérlő egység/*
5.2.3.2.2.1 *Általános követelmények.* A GDLP-nek támogatnia kell az S-módú specifikus szolgáltatások elérését erre a célra egy külön GDLP illesztés biztosításával, és/vagy ezekhez a szolgáltatásokhoz történő hozzáférés biztosításával a Lekérdező adat végponti berendezés/Hálózati végponti berendezés /DTE/DCE/ illesztő egységen keresztül.
5.2.3.2.2.2 *Működési teljesítőképesség.* Az ezen az illesztésen keresztüli közlemény és vezérlés kódolásnak az 5.2.7.2 pontban meghatározott összes teljesítőképességet támogatja.

5.2.3.3 FEDÉLZETI ADATKAPCSOLAT VEZÉRLŐ EGYSÉG /ADLP/ / VÁLASZJELADÓ ILLESZTÉS

5.2.3.3.1 *VÁLASZJELADÓ AZ ADLP-NEK*
5.2.3.3.1.1 Az ADLP-nek a válaszjeladótól egy, a protokoll típusát jelző jelzést kell venni, a válaszjeladótól az ADLP-hez továbbított adatokkal kapcsolatban. Ez a következő típusú protokollokat tartalmazza:
a) Légtérellenőrzési lekérdezés;
b) A-adatátvitel /Comm-A/ lekérdezés;
c) A-adatátvitel /Comm-A/ általános adású lekérdezés; és
d) Fedélzetre irányuló Kiterjesztett hosszúságú közlemény /ELM/.
Az ADLP-nek fogadnia kell a Lekérdező azonosító /II/ kódját is, amelyet a légtérellenőrzési A-adatátvitelnél /Comm-A/ vagy a fedélzetre irányuló ELM továbbításánál használ.

Megjegyzés. - A válaszjeladók nem adnak általános hívás és Összeütközési veszély jelző fedélzeti rendszer /ACAS/ információkat ezen az illesztésen.

5.2.3.3.1.2 Az ADLP-nek a válaszjeladótól olyan vezérlő információkat kell fogadnia, amelyek jelzik a fedélzetről leadott adat- továbbítások állapotát, ez magában foglalja:
a) B-adatátvitel /Comm-B/ befejezést;
b) B-adatátvitel /Comm-B/ sugárzási időhatárát; és
c) A fedélzetről leadott ELM befejezést.
5.2.3.3.1.3 Az ADLP hozzáféréssel rendelkezik azokhoz az aktuális információkhoz, amelyek meghatározzák az S-módú válaszjeladó kommunikáció teljesítőképességét, amellyel az működik. Ezt az információt az adatkapcsolat teljesítőképesség jelentés létrehozásához használják (5.2.9).
5.2.3.3.2 *FEDÉLZETI ADATKAPCSOLAT VEZÉRLŐ EGYSÉG /ADLP/ A VÁLASZJELADÓNAK*

5.2.3.3.2.1 Az ADLP egy, a protokoll típusa jelző jelzést ad a válaszjeladónak az ADLP-től a transzpondernek továbbított adatokhoz kapcsolódóan. Ez a következő protokoll típusokat foglalja magában:
a) földről kezdeményezett B-adatátvitel;
b) levegőből kezdeményezett B-adatátvitel;
c) több helyre irányított B-adatátvitel;
d) általános adású B-adatátvitel;
e) fedélzetről leadott kiterjesztett hosszúságú közlemény /ELM/; és
f) több helyre irányított fedélzetről leadott ELM.
Az ADLP biztosítja a Lekérdező azonosító /II/ kódot egy több helyre irányított B-adatátvitel, vagy fedélzetre irányuló ELM és a B-adatátvitel adat kiválasztó (BDS) kód továbbításához (Annex 10, IV. kötet, 3.1.2.6.11.2) a földi kezdeményezésű B-adatátvitelhez.
5.2.3.3.2.2 Az ADLP képes az 5.2.2.5.5 pontban meghatározottak szerinti keret-törlés végrehajtására.

5.2.3.4 FÖLDI TELEPÍTÉSI RENDSZERŰ ADATKAPCSOLAT VEZÉRLŐ EGYSÉG /GDLP/ S-MÓDÚ LEKÉRDEZŐ ILLESZTÉS

5.2.3.4.1 *LEKÉRDEZŐ A GDPL-NEK*
5.2.3.4.1.1 A GDLP-nek a lekérdezőtől egy protokoll típusú jelzést fogad, a lekérdezőtől a GDLP-hez továbbított adatokhoz kapcsolódóan. Ez a következő protokoll típusokat tartalmazza:
a) földi kezdeményezésű B-adaátvitel;
b) levegő kezdeményezésű B-adatátvitel;
c) levegő kezdeményezésű B-adatátvitel általános adás; és
d) fedélzetről leadott kiterjesztett hosszúságú közlemény /ELM/.
A GDLP-nek a B-adatátvitel adat kiválasztás /BDS/ kódot is fogadja, amelyet a földi kezdeményezésű B-adatátviteli szegmens azonosítására használ fel.
5.2.3.4.1.2 A GDLP-nek a lekérdezőtől vezérlő információkat fogadja, amelyek jelzik a fedélzetre irányuló adat átvitelének állapotát és a címzett légijármű S-módú állapotát.
5.2.3.4.2 *GDLP a lekérdezőnek*. A GDLP-nek egy protokoll típus jelzést biztosít a lekérdező részére a GDLP-től a lekérdezőhöz továbbított adatokkal kapcsolatban. Ez a következő protokoll típusokat tartalmazza:
a) A-adatátvitelű lekérdezés;
b) A-adatátvitelű általános adású lekérdezés;
c) Fedélzetre irányuló kiterjesztett hosszúságú közlemény /ELM/; és
d) Földi kezdeményezésű B-adatátviteli kérés.
A GDLP-nek a B-adatátvitel adat kiválasztó kódokat is biztosítania kell a földi kezdeményezésű B-adatátvitel protokollhoz.

5.2.4 A Hálózati végponti berendezés /DCE/ működése

Megjegyzés. - A DCE feldolgozási folyamata a Fedélzeti/Földi adatkapcsolat vezérlő egységen /XDLP/ belül mint társ-folyamat működik a lekérdező adat végponti berendezés /DTE/ adatainak feldolgozásában. A DCE támogatja a DTE működést azzal a teljesítőképességgel, amely az 5.2.3.1.4 pontban került meghatározásra. A következő követelmények nem határoznak meg formátum előírásokat és forgalom vezérlést a DTE/DCE illesztésen. Ezekre az esetekre az ISO 8208 előírásai és meghatározásai érvényesek.

5.2.4.1 *Állapot átvitelek.* A DCE állapotgépként működik. Egy állapotba kerülve, a DCE végrehajtja az 5-2. táblázatban ismertetett műveleteket. Az állapot átvitelek és kiegészítő művelet(ek) az 5-3.-tól az 5-12.-ig terjedő táblázatokban vannak leírva.
Megjegyzés. - A következő állapot átvitel (ha van ilyen) akkor következik be, amikor a Hálózati végponti berendezés /DCE/ egy csomagot fogad a Lekérdező adat végponti berendezéstől /DTE/, amely az 5-3.-tól az 5-8.-ig terjedő táblázatokban van meghatározva. Ezek a táblázatok az 5-2. ábrán bemutatott hierarchiának megfelelően vannak szervezve. Ugyanezek az átvitelek vannak meghatározva az 5-9.-től az 5-12.-ig terjedő táblázatokban, amikor a DCE egy csomagot fogad a Fedélzeti/Földi hálózati végponti berendezéstől /XDCE/ (az újraformátumozó folyamaton keresztül).

5.2.4.2 A CSOMAGOK KIOSZTÁSA

5.2.4.2.1 Egy csomagnak a Lekérdező adat végponti berendezéstől /DTE/ történő fogadása után a csomagot vagy kell, vagy nem kell továbbítani a Légijármű/Földi hálózati végponti berendezéshez /XDCE/ (az újra-formátumozó eljáráson keresztül) az 5-3.-tól az 5-8.-ig terjedő táblázatokban megadott zárójeles utasításoknak megfelelően. Ha a zárójeles utasítás nincs feltűntetve, vagy ha a zárójeles utasítás "ne továbbíts" utasítást mutat, akkor a csomagot érvényteleníteni kell.
5.2.4.2.2 Egy csomag fogadása után az XDCE-től az újra-formátumozó folyamaton keresztül a csomagot vagy kell, vagy nem kell továbbítani a Lekérdező adat végponti berendezéshez /DTE/ az 5-9.-től az 5-12.-ig terjedő táblázatokba foglalt zárójeles utasításoknak megfelelően. Ha zárójeles utasítás nincs feltűntetve, vagy a zárójeles utasítás "ne továbbíts" utasítást mutat, a csomagot érvényteleníteni kell.

5.2.5 S-módú csomag réteg feldolgozás

5.2.5.1 ÁLTALÁNOS KÖVETELMÉNYEK
5.2.5.1.1 *TÁROLÓ /PUFFER/ KÖVETELMÉNYEK*
5.2.5.1.1.1 *A Fedélzeti adatkapcsolat vezérlő egység /ADLP/ tároló követelményei*

5.2.5.1.1.1.1 A következő követelményeket kell alkalmazni a teljes ADLP-re, és úgy kell értelmezni ezeket, ahogyan az a fő feldolgozási folyamatok mindegyikénél. (Hálózat végponti berendezés /DCE/, újraformátumozás, Légijármű hálózati végponti berendezés /ADCE/, keret feldolgozás és S-módú szolgáltatás entitás /SSE/) szükséges.
5.2.5.1.1.1.2 Az ADLP képes elegendő tároló teret fenntartani tizenhat Kapcsolt virtuális áramkör /SVC/ részére:
a) Fenn kell tartania elegendő tároló teret tizenöt S-módú alhálózati, egyenként 152 bájtot tartalmazó csomag részére, mindegyik fedélzetre irányuló SVC-nként egy fedélzetre irányuló Kiterjesztett hosszúságú közlemény /ELM/ teljesítőképességű válaszjeladónál, vagy 28 bájtot más esetben;
b) Fenn kell tartania elegendő tároló teret tizenöt S-módú alhálózati, egyenként 160 bájtot tartalmazó csomag tartására, mindegyik fedélzetről leadott irányú közleményre SVC-nként, egy fedélzetről leadott ELM teljesítőképességű válaszjeladónál, vagy 28 bájtot más esetben;
c) Fenn kell tartania elegendő tároló teret két S-módú alhálózati, egyenként 35 bájtot tartalmazó MEGSZAKITÁS csomag számára (felhasználói adat mező plusz vezérlő információ) egyet mindkét irányban, minden egyes SVC-nél;
d) Fenn kell tartania elegendő, újra sorba-rendező tároló teret harmincegy, egyenként 152 bájtot tartalmazó S-módú alhálózati csomag tárolására a fedélzetre irányuló közleményekre SVC-ként egy fedélzetre irányuló ELM teljesítőképességgel rendelkező válaszjeladónál, vagy 28 bájtot ettől eltérő esetben; és
e) Fenn kell tartania elegendő tároló teret legalább egy olyan 160 bájtot tartalmazó S-módú csomag átmeneti tárolására, amely M-bit vagy S-bit feldolgozásra kerül, mindkét irányban SVC-ként.
5.2.5.1.1.1.3 A Fedélzeti adatkapcsolat vezérlőegység /ADLP/ képes egy 1600 bájtot tartalmazó tároló fenntartására az egyes irányokban megosztva az összes S-módú specifikus protokoll /MSP/ között.
5.2.5.1.1.2 A *Földi telepítési rendszerű adatkapcsolat vezérlő egység /GDLP/ tároló követelményei*

5.2.5.1.1.2.1 **Ajánlás. -** *A GDLP-nek képesnek kell lenni elegendő tároló tér fenntartására átlagosan 4 Kapcsolt virtuális áramkör /SVC/ részére mindegyik olyan S-módú légijárműre, amely a lekérdezők lefedési területén belül összeköttetésben ez utóbbival, feltéve, hogy valamennyi légijármű Kiterjesztett hosszúságú közlemény /ELM/ teljesítőképességgel rendelkezik.*

Megjegyzés. - További tároló tér követelhető meg abban az esetben, ha végrendszerekkel kapcsolódó Lekérdező adat végponti berendezéseket /DTE-k/ biztosítanak.

5.2.5.1.2 *CSATORNA- SZÁM ÖSSZESÍTÉSEK*

5.2.5.1.2.1 A Fedélzeti/Földi adatkapcsolat vezérlő egység /XDLP/ fenntart több SVC csatorna-szám összesítést; a DTE/DCE (ISO 8208) illesztés egy készletet használ fel. Ennek szervezésének, szerkezetének és felhasználásának az ISO 8208 szabványban meghatározottaknak kell megfelelnie. A többi csatorna összesítést a Légijármű hálózati végponti berendezés/Földi hálózati végponti berendezés /ADCE/GDCE/ illesztésnél kell felhasználni.
5.2.5.1.2.2 A Földi telepítési rendszerű adatkapcsolat vezérlőegység /GDLP/ átmeneti csatorna-szám összesítést kezel ott, ahol a számok az 1, 2 és 3 közül kerülnek ki, minden egyes földi Lekérdező adat végponti berendezés/Fedélzeti adatkapcsolat vezérlő egység-párnál. /DTE/ADLP/ A GDLP által generált S-módú HIVÁS KÉRÉS csomagok tartalmazzák a földi DTE címzést és egy olyan átmeneti csatorna-számot, amely ennek a földi DTE-nek az összesítéséből került kiosztásra. A GDLP nem használhat újra egy olyan átmeneti csatorna-számot, amelyet egy Kapcsolt virtuális áramkörnek /SVC/ kiosztottak, és amely még HÍVÁSKÉRÉS állapotban van.

1. Megjegyzés. - Az átmeneti csatorna-számok használata lehetővé teszi a GDLP számára azt, hogy maximálisan három feldolgozásban lévő híváskéréssel rendelkezzen egy időben, egyedi földi DTE és ADLP kombinációnál. Ez azt is lehetővé teszi a GDLP vagy az ADLP számára, hogy egy csatornát felszabadítson, mielőtt a folyamatos csatorna-szám kijelölésre kerülne.

2. Megjegyzés. - Az ADLP érintkezésben lehet multiplikált földi DTE-kkel bármely időszakban. Az összes földi DTE átmeneti csatorna-számot használ, amelyek az 1, 2, 3 számok közül kerülnek ki.

5.2.5.1.2.3 A Fedélzeti adatkapcsolat vezérlő egység /ADLP/ a földi Lekérdező adat végponti berendezés /DTE/ címzését használja megkülönböztetésül az átmeneti csatorna-számoktól, amelyeket a különböző földi DTE-k használnak. Az ADPL-nek végleges csatorna-számot kell kijelölni (a 0-tól a 15-ig terjedő tartományból) minden SVC számára és tájékoztatni kell a GDLP-t a kijelölt számról, belefoglalva azt az ADLP által adott S-módú HIVÁS KÉRÉS-be, vagy az ADLP csomagokban adott S-módú HIVÁS FOGADÁS-ba. Az átmeneti csatorna-számot az

ADLP által adott S-módú HIVÁS FOGADÁS foglalja magába végleges csatorna-számmal együtt, abból a célból, hogy meghatározásra kerüljön az ezen csatorna-számok között meglévő kapcsolat. Az ADLP folytatja az átmeneti csatorna-szám társítását egy Kapcsolt virtuális áramkör /SVC/ végleges csatorna-számával addig, amíg az SVC visszatér a KÉSZ (p1) állapotába, vagy másként, amíg az ADATÁTVITEL (p4) állapotban egy olyan, a GDLP csomag által adott S-módú HIVÁSKÉRÉS kerül vételre, amely ugyanazt az átmeneti csatorna-számot viseli. Egy, az ADLP által adott nem-nulla átmeneti csatorna-szám az S-módú BONTÁS KÉRÉS-ben, a GDLP által adott BONTÁS KÉRÉS-ben, az ADLP csomagban lévő BONTÁS MEGERŐSITÉS-ben jelzi, hogy a végleges csatorna-számot kell használni, és az átmeneti csatorna-számot nem kell figyelembe venni. Abban az esetben, ha egy XDLP-t felkérnek ezen csomagok valamelyikének elküldésére végleges csatorna-szám hiányában, a végleges csatorna-számot nullára kell állítani, amely azt jelzi a társfolyamatú XDLP-nek, hogy az átmeneti csatorna-számot kell használni.

Megjegyzés. –A nulla végleges csatorna-szám használata lehetővé teszi az ADLP-nek egy SVC törlését akkor, amikor végleges csatorna-szám nem áll rendelkezésre, és lehetővé teszi a GDLP-nek, hogy ugyanúgy járjon el, mielőtt a végleges csatorna-számról tájékoztatást kap.

5.2.5.1.2.4 A Lekérdező adat végponti berendezés/Hálózati végponti berendezés /DTE/DCE/ illesztés által használt csatorna-számokat és azokat, amelyek a Légijármű hálózati végponti berendezés/Földi hálózati végponti berendezés /ADCE/GDCE/ illesztésnél használatosak, függetlenül kell kijelölni. Az újra formázási folyamatnak egy, a DTE/DCE és az ADCE/GDCE csatorna-számok közötti összekapcsolási táblázatot kell fenntartani.
5.2.5.1.3 *Fogadásra kész és fogadásra nem kész állapotok.* Az ISO 8208 interfész és az ADCE/GDCE interfész kezelési eljárásoknak független üzemelésűeknek kell lenni, mivel az egyes rendszereknek képesnek kell lenniük válaszolni elkülönítetten a fogadásra kész és a fogadásra nem kész jelzésekre.

5.2.5.1.4 *M-BITES ÉS S-BITES SOROZATOK FELDOLGOZÁSA*

Megjegyzés. - M-bit feldolgozás az ADAT csomag sorba-rendezéséhez alkalmazott. S-bit feldolgozást S-módú HÍVÁSKÉRÉS, HÍVÁS FOGADÁS, BONTÁS KÉRÉS és MEGSZAKÍTÁS csomagok sorba-rendezéséhez alkalmazott.

5.2.5.1.4.1 Az M-bites feldolgozás

Megjegyzés. - A Lekérdező adat végponti berendezés/Hálózati végponti berendezés /DTE/DCE/ illesztésnél használt csomag méret eltérő lehet attól, ami a Légijármű hálózati végponti berendezés/Földi hálózati végponti berendezés /ADCE/GDCE/ illesztésnél használatos.

5.2.5.1.4.1.1 M-bit feldolgozást akkor kell használni, amikor az ADAT csomagokat újraformátumozzák (5.2.5.2). Az M-bit feldolgozásnak az ISO 8208 szabványban lévő előírásokat kell felhasználni. Az M-bit sorozat feldolgozásnak a csatornánkénti alapot kell alkalmazni. Az M-bitnek az 1-re történő beállítása azt jelzi, hogy felhasználói adat mező folytatódik a soron következő ADAT csomagban. Az ezt követő csomagoknak egy M-bit sorozatban ugyanazt a fej-rész formátumot kell felhasználni (azaz a csomag formátum kizárja a felhasználói adat mezőt).
5.2.5.1.4.1.2 Ha a csomag mérete a Légijármű hálózati végponti berendezés/Földi hálózati végponti berendezés /XDCE/ (5.2.6.4.2) illesztésnél nagyobb, mint a Lekérdező adat végponti berendezés/Hálózati végponti berendezés /DTE/DCE/ használatos illesztése, akkor a csomagokat össze kell tömöríteni az M-bit által megszabott lehetséges mértékig, egy S-módú ADAT csomag továbbításánál. Ha a csomag méret kisebb az XDCE illesztésen, mint ami a DTE/DCE illesztésnél meghatározott, akkor a csomagokat 'tördelni kell' azért, hogy beilleszkedjenek az M-bites összeállítást felhasználó kisebb S-módú csomagba.
5.2.5.1.4.1.3 A csomagot a rákövetkező kötegekkel össze kell tömöríteni, ha a csomag tele van és az M-bit sorozatban több csomag van (M-bit = 1). Az erre a Kapcsolt virtuális áramkörre /SVC/ meghatározott maximális csomag méretnél kisebb csomag (részleges csomag) csak akkor megengedhető, amikor az M-bit egy M-bit sorozat végét jelzi. Egy olyan vett csomagnak, ami a maximális csomag méretnél kisebb, és az M-bit egyenlő 1-el, egy visszaállítást kell létrehozni, az ISO 8208-ban meghatározottak szerint, és a sorozat további részét érvényteleníteni kell.

5.2.5.1.4.1.4 **Ajánlás. -** *A kézbesítési késés csökkentése érdekében egy M-bit sorozat részleges vételekor az újra-formátumozást kell elvégezni, nem pedig az újra-formátumozást addig késleltetni, amíg a teljes M-bit sorozat vételre nem kerül.*

5.2.5.1.4.2 *S-bit feldolgozás.* S-bit feldolgozást csak S-módú HÍVÁSKÉRÉS, HÍVÁSFOGADÁS, BONTÁSKÉRÉS és MEGSZAKÍTÁS csomagokhoz alkalmazandó. A feldolgozást az az M-bit feldolgozás eseténél meghatározott módon kell elvégezni (5.2.5.1.4.1), kivéve azokat az S-bit sorozathoz társított csomagokat, amelyeknek az újra-összeállítása nem fejeződik be Tq másodperc alatt (5-1. és 5-13. táblázat), ezeket érvényteleníteni kell (5.2.6.3.6, 5.2.6.4.5.2 és 5.2.6.9), és egy rövidebb csomag vételét kell létrehozni mint a maximális csomag méret az S = 1-el olyan módon hogy a teljes S-bit sorozat formátum hibaként legyen kezelve az 5-16. táblázatban foglaltaknak megfelelően.

5.2.5.1.5 *S-MÓDÚ ALHÁLÓZATI HIBA FELDOLGOZÁS AZ ISO 8208 CSOMAGOKNÁL*

5.2.5.1.5.1 *D-bit.* Ha a Fedélzeti/Földi adatkapcsolat vezérlő egység /XDLP/ ADAT csomagot vesz úgy, hogy a D-bit 1-re van állítva, akkor az XDLP-nek egy olyan VISSZAÁLLÍTÁS KÉRELEM csomagot kell elküldeni a csomagot létrehozó Lekérdező adat végponti berendezésnek /DTE/, amely egy okozó kódot (CC) = 133 és egy diagnosztikai kódot (DC) = 166 tartalmaz. Ha a D-bit egy HÍVÁSKÉRÉS csomagban 1-re van állítva, akkor ezt az XDLP-nek figyelmen kívül kell hagyni. A megfelelő HÍVÁS ELFOGADÁS csomag D-bitjét mindig 0-ra kell állítani. A 'CC' használata választható.
5.2.5.1.5.2 *Q-bit.* Ha az XDLP egy olyan ADAT csomagot vesz, amelynél a Q-bit 1-re van állítva, akkor az XDLP-nek egy olyan VISSZAÁLLÍTÁS KÉRÉS-t kell küldenie a csomagot létrehozó DTE-nek, amely magába foglalja a CC = 133-t és DC = 83-t. A 'CC' használata választható.
5.2.5.1.5.3 *Érvénytelen prioritás.* Ha az XDLP egy olyan híváskérést vesz, amelynek egy, a 2-től a 254-ig terjedő értéktartományban van az összekapcsolás prioritásértéke, akkor az XDLP-nek törölnie kell a virtuális áramkört a DC = 66 és CC = 131 felhasználásával. A 'CC' használata választható.
5.2.5.1.5.4 *Támogatás nélküli szolgáltatás.* Ha az XDLP egy híváskérést vesz egy olyan szolgáltatás iránti kéréssel, amelyet nem tud támogatni, akkor az XDLP-nek törölnie kell a virtuális áramkört a DC = 65 és CC = 131 felhasználásával. A 'CC' használata választható.
5.2.5.1.5.5 *Érvénytelen hívó DTE címzés.* Ha az XDLP érvénytelen hívó DTE címzésű híváskérést vesz (5.2.3.1.3.3), akkor az XDLP-nek törölnie kell a virtuális áramkört a DC = 68 és CC = 141 használatával. A 'CC' felhasználása választható.
5.2.5.1.5.6 *Érvénytelen hívott DTE címzés.* Ha a XDLP érvénytelen hívott DTE címzésű híváskérést vesz (5.2.3.1.3.3), akkor az XDLP-nek törölnie kell a virtuális áramkört DC = 67 és CC = 141 használatával. A 'CC' felhasználása választható.

5.2.5.2 ÚJRA-FORMÁTUMOZÓ FELDOLGOZÁS

Megjegyzés. - Az újra-formátumozó feldolgozás két részfolyamatra van osztva: a fedélzetre irányuló formátumozásra és a fedélzetről leadott formátumozásra. A Fedélzeti adatkapcsolat vezérlő egységnél /ADLP/ a fedélzetre irányuló kapcsolt feldolgozás az S-módú csomagokat ISO 8208 csomagokba formátumozza újra, és a fedélzetről leadott kapcsolati feldolgozás az ISO 8208 csomagokat S-módú csomagokba formátumozza újra. A Földi telepítési rendszerű adatkapcsolat vezérlő egységnél /GDLP/ a fedélzetre irányuló kapcsolati feldolgozás az ISO 8208 csomagokat S-módú csomagokba formátumozza újra, és a fedélzetről leadott kapcsolati feldolgozás az S-módú csomagokat ISO 8208 csomagokba formátumozza újra.

5.2.5.2.1 *A FEDÉLZETI ADATKAPCSOLAT VEZÉRLŐEGYSÉG /ADLP/ ÁLTAL ADOTT HÍVÁSKÉRÉS*

5.25.2.5.2.1.1 *Átfordítás S-módú csomagokba*
5.2.5.2.1.1.1 *Az átfordított csomag formátuma.* Az egy helyi Hálózati végponti berendezés /DCE/ által vett ISO 8208 HÍVÁSKÉRÉS csomag újra-formátumozási feldolgozása a megfelelő S-módú HÍVÁSKÉRÉS-nek a Fedélzeti adatkapcsolat vezérlő egység /ADLP/ csomag(ok) ban végzett létrehozását eredményezi (ahogyan az az S-bit feldolgozás által meghatározása került (5.2.5.1.4.2)) a következőképpen:

DP: 1	MP: 1	SP: 2	ST: 2	FILL2: 0 v. 2	P: 1	FILL: 1	SN: 6

Adat-csomag S-módú spec. protokoll Felügyelő csomag Felügyelőtípus Kitöltés Prioritás kitöltés
Sorozat- szám

CH: 4	AM: 4	AG: 8	S: 1	FS: 2	F: 1	LV: 4	UD: v

Csatorna-szám Mobil cím Földi cím Több csomagjelzés Gyors kiválasztás Első csomag jelzés Felhasználói adathossz

Felhasználói adatmező

5.2.5.2.1.1.2 *Adat csomag típus (DP).* Ezt a mezőt 0-ra kell állítani.
5.2.5.2.1.1.3 *S-módú specifikus protokoll sorozatszám /MSP/ csomag típus (MP).* Ezt a mezőt 1-re kell állítani.
5.2.5.2.1.1.4 *Felügyelő csomag (SP).* Ezt a mezőt 1-re kell állítani.
5.2.5.2.1.1.5 *Felügyelő típus (ST).* Ezt a mezőt 0-ra kell állítani.
5.2.5.2.1.1.6 *Prioritás (P).* Ezt a mezőt 0-ra kell állítani alacsony prioritású Kapcsolt virtuális áramkör /SVC/ esetén és 1-re magas prioritású SVC-nél. Ennek a mezőnek az értékét az ISO 8208 csomag prioritási szolgáltatás adatátviteli mezőjéből kell 'megszerezni', és 0-ra kell állítani akkor, ha az ISO 8208 csomag nem foglal magába prioritási szolgáltatást, vagy ha egy 255-ös prioritást határoznak meg. A többi prioritási szolgáltatás mezőt figyelmen kívül hagyandó.
5.2.5.2.1.1.7 *Sorozat-szám (SN).* Egy adott SVC-re minden egyes csomagot be kell számozni (5.2.6.9.4).
5.2.5.2.1.1.8 *Csatorna-szám (CH).* A csatorna-számot a Fedélzeti adatkapcsolat vezérlő egység /ADLP/ rendelkezésére álló Kapcsolt virtuális áramkör /SVC/ csatorna-szám készletből kell kiválasztani. A készlet 1-től 15-ig terjedő 15 értékből áll. A legnagyobb rendelkezésre álló csatorna-számot kell a készletből kiválasztani. Egy rendelkezésre álló csatornát úgy kell meghatározni, mint egy p1 állapotban lévő csatornát. Az S-módú alhálózat által használt csatorna-szám és a Lekérdező adat végponti berendezés/Hálózati végponti berendezés /DTE/DCE/ illesztés által használt szám közötti megegyezést mindaddig fenn kell tartani, amíg a csatorna aktív.

Megjegyzés. - A csatorna-készlet kezeléssel kapcsolatban lásd még az 5.2.5.1.2 pontot.

5.2.5.2.1.1.9 *Címzés, mozgó (AM).* Ennek a címzésnek a mozgó Hálózati végponti berendezés /DTE/ alcímzésnek kell lenni (5.2.3.1.3.2) a 0-tól 15-ig terjedő tartományban. A címzést a hívó DTE címzés azon két legkisebb értékű számjegyéből kell kiválasztani, amelyet az ISO 8208 csomag tartalmaz és binárissá kell átalakítani.

Megjegyzés. - A 24-bites légijármű címzés az S-módú adatkapcsolat rétegen kerül továbbításra.

5.2.5.2.1.1.10 *Címzés, földi (AG).* Ez a címzés a földi DTE címzésnek kell lenni (5.2.3.1.3.1) a 0-tól 255-ig terjedő tartományban. A címzést abból a hívott DTE címzésből kell kivonni, amelyet az ISO 8208 csomag tartalmaz és binárissá kell átalakítani.
5.2.5.2.1.1.11 *Kitöltő mező.* A kitöltő mezőt arra használják, hogy sorba- állítsák az egymást követő adatmezőket a bájt határokon. Amikor "KITÖLTÉS: „n"-ként jelzik, akkor a kitöltő mezőt "n" bit hosszúságúra kell állítani. Amikor a "KITÖLTÉS 1: 0 vagy 6"-ként van jelezve, akkor a kitöltés mezőt 6 bit hosszúságúra kell állítani a nem-multiplikált csomagban a Fedélzetről leadott szabvány hosszúságú közlemény /SLM/ keretnél és 0 bitre minden más egyéb esetben. Amikor a "KITÖLTÉS 2: 0 vagy 2"-ként van jelezve, a kitöltő mezőt 0 bit hosszúságúra kell állítani egy nem-multiplikált Fedélzetről leadott SLM keretnél vagy multiplikált fejrésszel és 2 bitre az összes többi esetben.
5.2.5.2.1.1.12 *S mező (S).* Az 1 érték azt mutatja, hogy a csomag része egy többcsomagos S-bit sorozatnak a következő sorozatban. A 0 értéknek azt kell jelezni, hogy a sorozat ezzel a csomaggal végződik. Ezt a mezőt úgy kell beállítani, ahogy az az 5.2.5.1.4.2 pontban meghatározásra került.
5.2.5.2.1.1.13 *FS mező (FS).* A 0 értéknek kell jeleznie, hogy a csomag nem foglal magába gyors kiválasztású adatokat. A 2 vagy 3 értéknek jelzi, hogy a csomag gyors kiválasztású adatokat tartalmaz. A 2 érték szabvány gyors kiválasztási műveletet jelez. A 3 értéknek a korlátozott válasszal rendelkező gyors kiválasztást jelzi Az 1 értékű FS nincs határozva.
5.2.5.2.1.1.14 *Első csomag jelző (F).* Ezt a mezőt 0-ra kell állítani egy S-bit sorozat első csomagjában és egy olyan csomagban, amely nem képezi egy S-bit sorozat részét. Más esetekben 1-re kell beállítani.
5.2.5.2.1.1.15 *Felhasználói adat hosszúság (LV).* Ennek a mezőnek azon teljes bájtok számát kell jeleznie, amelyeket az utolsó Szabvány hosszúságú közlemény /SLM/ vagy Kiterjesztett hosszúságú közlemény /ELM/ szegmensben alkalmazottak, ahogyan az az 5.2.2.3.1 pontban meg van határozva.
5.2.5.2.1.1.16 *Felhasználói adatmező (UD).* Ennek a mezőnek csak akkor van jelen, ha a választható HÍVÁSKÉRÉS felhasználói adatot (maximálisan 16 bájt) vagy a gyors kiválasztású felhasználói adatot (maximálisan 128 bájt) az ISO 8208 csomag tartalmazza. A felhasználói adat- mezőt az ISO 8208 csomagból változtatás nélkül kell átfordítani S-bit feldolgozás felhasználásával, ahogyan az 5.2.5.1.4.2 pontban meghatározásra került.

5.2.5.2.1.2 *Átfordítás az ISO 8208 csomagokba*

5.2.5.2.1.2.1 *Átfordítás.* A Földi telepítési rendszerű adatkapcsolat vezérlő egység /GDLP/ által vett, az S-módú HÍVÁSKÉRÉS-nek a Fedélzeti adatkapcsolat vezérlő egység /ADLP/ csomag (vagy egy, a csomagok S-bit sorrendje) általi újra-formátumozási folyamata a Földi hálózati végponti berendezéstől /GDCE/ egy, az annak megfelelő ISO 8208 HÍVÁSKÉRÉS csomag létrehozását eredményezi a helyi Hálózati végponti berendezéshez /DCE/. Az átfordítás az S-módú csomagból az ISO 8208 csomagba inverze az 5.2.5.2.1.1 pontban meghatározott folyamatnak, amely – bizonyos kivételekkel - a következő pontokban kerülnek leírásra.
5.2.5.2.1.2.2 *Hívott Lekérdező adat végponti berendezés /DTE/, hívó DTE címzés és hosszúság mezők.* A hívó DTE címzését a légijármű címzése és az S-módú köteg Mobil cím /AM/ mezőjében tartalmazott érték kell, hogy képezze, BCD-be alakítva (5.2.3.1.3.2). A hívott DTE címzésnek annak a földi DTE címzésnek kell lenni, amelyet az S-módú csomag Földi cím /AG/ mezője tartalmaz, BCD-be átalakítva. A hossz mezőnek az ISO 8208-ban meghatározottaknak megfelelőnek kell lennie.
5.2.5.2.2 *A FÖLDI TELEPÍTÉSI RENDSZERŰ ADATKAPCSOLAT VEZÉRLŐ EGYSÉG /GDLP/ ÁLTALI HÍVÁSKÉRÉS*
5.2.5.2.2.1 *Átfordítás S-módú csomagokba*
5.2.5.2.2.1.1 *Általános.* A helyi Hálózati végponti berendezéstől /DCE/ jövő ISO 8208 HÍVÁSKÉRÉS csomag GDLP általi újra-formátumozási folyamata a megfelelő S-módú HÍVÁSKÉRÉS csomag(ok) GDLP általi létrehozását eredményezi (ahogyan az S-bit feldolgozás (5.2.5.1.4.2) meghatározza) a következők szerint:

DP: 1	MP: 1	SP: 2	ST: 2	FILL: 2	P: 1	FILL: 1	SN: 6

Adat-csomag S-módú spec. protokoll Felügyelő csomag Felügyelőtípus Kitöltés Prioritás Kitöltés Sorozat szám

FILL: 2	TC: 2	AM: 4	AG: 8	S: 1	FS: 2	F: 1	LV: 4	UD: v

Kitöltés Ideiglenes csartornaszám Mobil cím Földi cím Több csomag jelzés Gyors kiválasztás Első csomag jelzés Felhasználói adathossz Felhasználói adatmező

A csomag formátumban bemutatott és a következő pontokban nem meghatározott mezőket úgy kell beállítani, ahogyan az az 5.2.5.2.1 pontban meghatározásra került.
5.2.5.2.2.1.2 *Adat csomag típus (DP).* Ezt a mezőt 0-ra kell állítani.
5.2.5.2.2.1.3 *MSP csomag típus (MP).* Ezt a mezőt 1-re kell állítani.
5.2.5.2.2.1.4 *Felügyelő csomag (SP).* Ezt a mezőt 1-re kell állítani.
5.2.5.2.2.1.5 *Felügyelő típus (ST).* Ezt a mezőt 0-ra kell állítani.
5.2.5.2.2.1.6 *Ideiglenes csatorna-szám mező (TC).* Ezt a mezőt arra használják fel, hogy a rendszer megkülönböztesse a Földi telepítési rendszerű adatkapcsolat vezérlőegységtől /GDLP/ jövő multiplikált híváskéréseket. A Fedélzeti adatkapcsolat vezérlő egység /ADLP/ újra-formátumozási folyamata, miután egy ideiglenes csatorna-számot kap, kijelöl egy csatorna-számot azokból, amelyek éppen a KÉSZ állapotban, p1, vannak.
5.2.5.2.2.1.7 *Címzés, földi (AG).* Ez a címzés a földi Lekérdező adat végponti berendezés /DTE/ címzés (5.2.3.1.3.1) a 0-tól 255-ig terjedő tartományban. A címzést az ISO 8208 csomag által tartalmazott hívó DTE címzésből kell venni és binárissá átalakítani.
5.2.5.2.2.1.8 *Címzés, mozgó (AM).* Ez a címzés a mozgó DTE alcímzése (5.2.3.1.3.2) a 0-tól 15-ig terjedő tartományban. A címzést a DTE azon két legkisebb értékű számjegyéből kell kiválasztani, amelyet az ISO 8208 csomag tartalmaz, és binárissá kell átalakítani.

5.2.5.2.2.2 *Átfordítás ISO 8208 csomagokba*

5.2.5.2.2.2.1 *Átfordítás.* A Fedélzeti adatkapcsolat vezérlő egység /ADLP/ által vett, az S-módú HÍVÁSKÉRÉS-eknek a Földi telepítési rendszerű adatkapcsolat vezérlő egység /GDLP/ csomag (vagy egy, a csomagok S-bit sorrendje) általi újra-formátumozási folyamata a Légijármű hálózati végponti berendezéstől /ADCE/ egy, az annak megfelelő ISO 8208 HÍVÁSKÉRÉS csomag létrehozást eredményez a helyi Hálózati végponti berendezéshez /DCE/. Az átfordítás az S-módú csomagból az ISO 8208 csomagba inverze az 5.2.5.2.2.1 pontban meghatározott folyamatnak, azokkal a kivételekkel, amelyek a következő pontokban kerülnek leírásra
5.2.5.2.2.2.2 *Hívott Lekérdező adat végponti berendezés /DTE/, hívó DTE címzés és hosszúság mezők.* A hívott DTE címzésnek a légijármű címzésből és az S-módú csomag Mobil cím /AM/ mezőjébe foglalt értékből kell összeállni BCD-be konvertálva (5.2.3.1.3.2). A hívó DTE címzés annak a földi DTE címzésnek felel meg, amelyet az S-módú csomag Földi cím /AG/ mezőjében szerepel BCD-re konvertálva. A hosszúság mező az ISO 8208-ban

meghatározottak szerint.

5.2.5.2.3 *A FEDÉLZETI ADATKAPCSOLAT VEZÉRLŐ EGYSÉG /ADLP/ ÁLTALI HÍVÁS FOGADÁS*

5.2.5.2.3.1 *Átfordítás S-módú csomagokba*
5.2.5.2.3.1.1 *Átfordított csomag formátum.* A helyi Hálózati végponti berendezéstől /DCE/ jövő ISO 8208 HÍVÁS FOGADÁS csomag újra-formátumozási folyamat Fedélzeti adatkapcsolat vezérlő egység /ADLP/ általi vétele a megfelelő S-módú HÍVÁS FOGADÁS csomagnak ADLP csomagok általi létrehozását eredményezi, (ahogyan az S-bit feldolgozás ezt meghatározza (5.2.5.1.4.2)) a következők szerint:

DP: 1	MP: 1	SP: 2	ST: 2	FILL2: 0 v. 2	TC: 2	SN: 6

Adat-csomag S-módú spec. protokoll Felügyelő csomag Felügyelőtípus Kitöltés Ideiglenes csatorna-szám Sorozat-szám

CH: 4	AM: 4	AG: 8	S: 1	FILL: 2	F: 1	LV: 4	UD: v

Csatorna-szám Mobil cím Földi cím Több csomagjelzés Kitöltés Első csomagjelzés Felhasználói adathossz Felhasználói adatmező

A csomag formátumban bemutatott, de a következő pontokban nem meghatározott mezőket úgy kell beállítani, ahogyan az az 5.2.5.2.1 pontban leírásra került.
5.2.5.2.3.1.2 *Adat csomag típus (DP)*. Ezt a mezőt 0-ra kell állítani.
5.2.5.2.3.1.3 *MSP csomag típus (MP).* Ezt a mezőt 1-re kell állítani.
5.2.5.2.3.1.4 *Felügyelő csomag (SP)*. Ezt a mezőt 1-re kell állítani.
5.2.5.2.3.1.5 *Felügyelő típus (ST)*. Ezt a mezőt 1-re kell állítani.
5.2.5.2.3.1.6 *Ideiglenes csatorna-szám (TC).* A TC érték a létrehozó S-módú HÍVÁSKÉRÉS-ben a Földi telepítési rendszerű adatkapcsolat vezérlő egység /GDLP/ csomaggal visszatér a GDLP-hez a Fedélzeti adatkapcsolat vezérlő egység /ADLP/ által kijelölt csatorna-számmal (CH) együtt.
5.2.5.2.3.1.7 *Csatorna-szám (CH)*. Ezt a mezőt az ADLP által kijelölt csatorna-számmal azonos értékre kell állítani, ahogy a HÍVÁSKÉRÉS eljárások során az S-módú kapcsolatnál meghatározásra kerültek.
5.2.5.2.3.1.8 *Címzés, mozgó és címzés, földi.* A Mobil cím /AM/ és Földi cím /AG/ értékek a létrehozó S-módú HÍVÁSKÉRÉS-ben GDLP csomaggal vissza kell térjenek ezekbe a mezőkbe. Ha jelen vannak, a Lekérdező adat végponti berendezés /DTE/ címzéseket az ISO 8208 HÍVÁS FOGADÁS csomagban figyelmen kívül kell hagyni.

5.2.5.2.3.2 *Átfordítás ISO 8208 csomagokba*

5.2.5.2.3.2.1 *Átfordítás.* A Földi telepítési rendszerű adatkapcsolat vezérlő egység /GDLP/ által vett, az S-módú HÍVÁS ELFOGADÁS-nak a Fedélzeti adatkapcsolat vezérlő egység /ADLP/ csomag általi (vagy egy, a csomagok S-bit sorrendje általi) újra-formátumozási folyamata a Földi hálózati végponti berendezéstől /GDCE/ egy, az annak megfelelő ISO 8208 HÍVÁS ELFOGADÁS csomag létrehozását eredményezi a helyi Hálózati végponti berendezéshez /DCE/. Az átfordítás az S-módú csomagból az ISO 8208 csomagba az inverze annak a folyamatnak, amely az 5.2.5.2.3.1 pontban került meghatározásra, azokkal a kivételekkel, amelyek a következő pontokban kerülnek leírásra.
5.2.5.2.3.2.2 *Hívott Lekérdező adat végponti berendezés /DTE/, hívó DTE címzés és hosszúság mezők.* Ahol ilyen van, ott a hívott DTE címzésnek a légijármű címzésből és az S-módú csomag Mobil cím /AM/ mezőjében lévő értékekből kerül összeállításra, BCD-be konvertálva (5.2.3.1.3.2). Ahol ilyen van, ott a hívó DTE címzés annak a földi DTE címzésnek felel meg, amelyet az S-módú csomag Földi cím /AG/ mezője foglal magába BCD-re konvertálva. A hosszúság mező megfelel az ISO 8208-ban meghatározottaknak.

Megjegyzés. - A hívott és hívó DTE címzések szabadon választhatók a hozzátartozó ISO 8208 csomagban és nem követelik meg az S-módú alhálózat pontos működését.

5.2.5.2.4 *A FÖLDI TELEPÍTÉSI RENDSZERŰ ADATKAPCSOLAT VEZÉRLŐ EGYSÉG /GDLP/ ÁLTALI HÍVÁS FOGADÁS*
5.2.5.2.4.1 *Átfordítás S-módú csomagokba*
5.2.5.2.4.1.1 *Az átfordított csomag formátuma.* A helyi Hálózati végponti berendezéstől /DCE/ jövő ISO 8208 HÍVÁS FOGADÁS csomag újra-formátumozási folyamat Földi telepítési rendszerű adatkapcsolat vezérlő egység /GDLP/

általi vétele az annak megfelelő S-módú HÍVÁSFOGADÁS csomagok GDLP csomagok általi létrehozását eredményezi (ahogy azt az S-bit feldolgozás meghatározza (5.2.5.1.4.2)) a következőképpen:

DP: 1	MP: 1	SP: 2	ST: 2	FILL: 2	FILL: 2	SN: 6	CH: 4

Adat-csomag S-módú spec. protokoll Felügyelő csomag Felügyelőtípus Kitöltés Kitöltés Sorozat-szám Csatorna-szám

AM: 4	AG: 8	S: 1	FILL: 2	F: 1	LV: 4	UD: v

Mobil cím Földi cím Több csomag jelzés Kitöltés Első csomag jelzés Felhasználói adathossz Felhasználói adatmező

A csomag formátumban bemutatott, de a következő pontokban nem meghatározott mezőket úgy kell beállítani, ahogyan az az 5.2.5.2.1 pontban meghatározásra került.

5.2.5.2.4.1.2 *Adat csomag típus (DP).* Ezt a mezőt 0-ra kell állítani.

5.2.5.2.4.1.3 MSP csomag típus (MP). Ezt a mezőt 1-re kell állítani.

5.2.5.2.4.1.4 *Felügyelő csomag (SP).* Ezt a mezőt 1-re kell állítani.

5.2.5.2.4.1.5 *Felügyelő típus (ST).* Ezt a mezőt 1-re kell állítani.

5.2.5.2.4.1.6 *Címzés, mozgó és címzés, földi.* A Mobil cím /AM/ és Földi cím /AG/ értékek a Fedélzeti adatkapcsolat vezérlő egység /ADLP/ csomag által létrehozott S-módú HÍVÁSKÉRÉS-ben visszatérnek ezekbe a mezőkbe. Ha jelen vannak, a Lekérdező adat végponti berendezés /DTE/ címzéseket az ISO 8208 HÍVÁS FOGADÁS csomagban figyelmen kívül hagyandók.

5.2.5.2.4.2 *Átfordítás ISO 8208 csomagokba*

5.2.5.2.4.2.1 *Átfordítás*. A Légijármű hálózati végponti berendezés /ADLP/ által vett, az S-módú HÍVÁS ELFOGADÁS-nak a Földi telepítési rendszerű adatkapcsolat vezérlő egység /GDLP/ csomag (vagy egy, a csomagok S-bit sorrendje) általi újra-formátumozási folyamata a Légijármű hálózati végponti berendezéstől /ADCE/ egy, az ennek megfelelő ISO 8208 HÍVÁS ELFOGADÁS csomag létrehozását eredményezi a helyi Hálózati végponti berendezéshez /DCE/. Az S-módú csomagból az ISO 8208 csomagba való átfordításnak az 5.2.5.2.4.1 pontban meghatározott folyamat inverze azokkal a kivételekkel, amelyek a következő pontokban kerültek meghatározásra.

5.2.5.2.4.2.2 *Hívott Lekérdező adat végponti berendezés /DTE/, hívó DTE címzés és hosszúság mezők.* Ahol ilyen van, ott a hívó DTE címzés légijármű címzésből és az S-módú csomag Mobil cím /AM/ mezőjében lévő értékekből kerül összeállításra, BCD-be konvertálva (5.2.3.1.3.2). Ebben az esetben a hívott DTE címzés megfelel annak a földi DTE címzésnek, amelyet az S-módú csomag Földi cím /AG/ mezőjében szerepel BCD-re konvertálva. A hosszúság mező az ISO 8208-ban szereplő meghatározás szerint.

Megjegyzés. - A hívott és hívó DTE címzések választhatók a megfelelő ISO 8208 csomagban és nem követelik meg az S-módú alhálózat helyes működését.

5.2.5.2.5 *A FEDÉLZETI ADATKAPCSOLAT VEZÉRLŐ EGYSÉG /ADLP/ ÁLTALI TÖRLÉSKÉRÉS*

5.2.5.2.5.1 *Átfordítás S-módú csomagokba*

5.2.5.2.5.1.1 *Átfordított csomag formátum.* A helyi Hálózati végponti berendezéstől /DCE/ jövő ISO 8208 TÖRLÉS KÉRÉS csomag újra-formátumozási folyamat Fedélzeti adatkapcsolat vezérlő egység /ADLP/ általi vétele az annak megfelelő S-módú TÖRLÉS KÉRÉS csomagok ADLP csomag(ok) általi létrehozását eredményezi (ahogy azt az S-bit feldolgozás meghatározza (5.2.5.1.4.2)) a következőképpen:

DP: 1	MP: 1	SP: 2	ST: 2	FILL2: 0 vagy 2	TC: 2	SN: 6	CH: 4 AM: 4

Adatcsomag S-módú spec. protokoll Felügyelő csomag Felügyelőtípus Kitöltés Ideiglenes csatorna-szám Sorozat-szám Csatorna-szám Mobil cím

AG: 8	CC: 8	DC: 8	S: 1	FILL: 2	F: 1	LV: 4	UD: v

Földi cím Törlést létrehozó Diagnosztika kód Több csomagjelzés Kitöltés Első csomagjelzés Felhasználói adathossz Felhasználói adatmező

A csomag formátumban bemutatott, de a következő pontokban nem meghatározott mezőket úgy kell beállítani, ahogyan az az 5.2.5.2.1 és 5.2.5.2.2 pontban leírásra került.

5.2.5.2.5.1.2 *Adat csomag típus (DP).* Ezt a mezőt 0-ra kell állítani.

5.2.5.2.5.1.3 *MSP csomag típus (MP).* Ezt a mezőt 1-re kell állítani.
5.2.5.2.5.1.4 *Felügyelő csomag (SP).* Ezt a mezőt 1-re kell állítani.
5.2.5.2.5.1.5 *Csatorna-szám (CH).* Ha a hívás elfogadási időszak során egy csatorna-szám kerül kijelölésre, akkor a csatorna-számot /CH/ arra az értékre kell beállítani, eltérő esetekben ezt nullára kell állítani.
5.2.5.2.5.1.6 *Ideiglenes csatorna (TC).* Ha a hívás elfogadási időszak során egy csatorna-szám kerül kijelölésre, akkor az Ideiglenes csatorna-számot /TC/ nullára kell beállítani, más esetben a Földi telepítési rendszerű adatkapcsolat vezérlő egység /GDLP/ által használt HÍVÁSKÉRÉS értékre kell beállítani.
5.2.5.2.5.1.7 *Felügyelő típus (ST).* Ezt a mezőt 2-re kell állítani.
5.2.5.2.5.1.8 *Címzés, földi és címzés, mozgó.* Az AM és AG értékek az ADLP által létrehozott S-módú HÍVÁSKÉRÉS, vagy a Földi telepítési rendszerű adatkapcsolat vezérlő egység /GDLP/ által létrehozott HÍVÁSKÉRÉS csomagoknál visszatérnek ezekbe a mezőkbe. Ha jelen vannak, akkor a DTE címzéseket az ISO 8208 TÖRLÉSKÉRÉS csomagban figyelmen kívül kell hagyni.
5.2.5.2.5.1.9 *Törlést létrehozó (CC) és diagnosztikai kód (DC) mezők.* Ezeket a mezőket módosítás nélkül kell átfordítani az ISO 8208 csomagból az S-módú csomagba, amikor a Lekérdező adat végponti berendezés /DTE/ kezdeményezte a törlési eljárást. Ha a Fedélzeti/Földi adatkapcsolat vezérlő egység /XDLP/ kezdeményezte a törlési eljárást, akkor a törlést létrehozó mezőnek és a diagnosztikai mezőnek a Hálózati végponti berendezés /DCE/ és a Fedélzeti/Földi hálózati végponti berendezés /XDCE/ állapot táblázatokban meghatározottak (lásd még az 5.2.6.3.3 pontot). Ezeknek a mezőknek a kódolása és meghatározása az ISO 8208-ban előírtaknak felelnek meg.
5.2.5.2.5.2 *Átfordítás ISO 8208 csomagokba*
5.2.5.2.5.2.1 *Átfordítás.* A Földi telepítési rendszerű adatkapcsolat vezérlő egységtől /GDLP/ vett, az S-módú TÖRLÉS KÉRÉS-nek a Fedélzeti adatkapcsolat vezérlő egység /ADLP/ csomag általi újra-formátumozási folyamata a helyi Földi hálózati végponti berendezéstől /GDCE/ az annak megfelelő ISO 8208 TÖRLÉS KÉRÉS csomag létrehozását eredményezi a helyi Hálózati végponti berendezéshez /DCE/. Az S-módú csomagnak az ISO 8208 csomagba történő átfordításának az 5.2.5.2.5.1 pontban meghatározott folyamat inverze, azokkal a kivételekkel, amelyek a következő pontokban kerülnek meghatározásra.
5.2.5.2.5.2.2 *Hívott Lekérdező adat végponti berendezés /DTE/, hívó DTE és hosszúság mezők*. Ezeket a mezőket az ISO 8208 TÖRLÉS KÉRÉS csomagban el kell hagyni.
5.2.5.2.5.2.3 *Törlést létrehozó mező*. Ezt a mezőt az 5.2.6.3.3. pont figyelembevételével kell felállítani.

5.2.5.2.6 *A FÖLDI TELEPÍTÉSI RENDSZERŰ ADATKAPCSOLAT VEZÉRLŐ EGYSÉG /GDLP/ ÁLTALI TÖRLÉSKÉRÉS*

5.2.5.2.6.1 *Átfordítás S-módú csomagokba*
5.2.5.2.6.1.1 Átfordított csomag formátum. A helyi Hálózati végponti berendezéstől /DCE/ jövő ISO 8208 TÖRLÉSKÉRÉS csomag GDLP újra-formátumozási folyamat megfelelő S-módú TÖRLÉSKÉRÉS csomag (ok) GDLP csomagok általi létrehozását eredményezi (ahogy azt az S-bit feldolgozás meghatározza (5.2.5.2.4.2)) a következők szerint:

DP: 1	MP: 1	SP: 2	ST: 2	FILL: 2	TC: 2	SN: 6	CH: 4AM: 4

Adatcsomag S-módú spec. protokoll Felügyelő csomag Felügyelőtípus Kitöltés Ideiglenes csatorna-szám Sorozat-szám Csatorna-szám Mobil cím

AG: 8	CC: 8	DC: 8	S: 1	FILL: 2	F: 1	LV: 4	UD: v

Földi cím Törlést létrehozó Diagnosz-tika kód Több csomagjelzés Kitöltés Első csomag jelzés Felhasználói adathossz Felhasználói adatmező

A csomag formátumban bemutatott és a következő pontokban nem meghatározott mezőket úgy kell beállítani, ahogyan az az 5.2.5.2.1, 5.2.5.2.2 és 5.2.5.2.5 pontokban azok leírásra kerültek.
5.2.5.2.6.1.2 *Ada csomag típus (DP).* Ezt a mezőt 0-ra kell állítani.
5.2.5.2.6.1.3 *MSP csomag típus (MP).* Ezt a mezőt 1-re kell állítani.
5.2.5.2.6.1.4 *Felügyelő csomag (SP).* Ezt a mezőt 1-re kell állítani.
5.2.5.2.6.1.5 *Csatorna-szám (CH).* Ha a hívás elfogadási időszak során egy csatorna-szám kerül kijelölésre, akkor a csatorna-számot /CH/ arra az értékre kell beállítani, más esetekben ezt nullára kell állítani.
5.2.5.2.6.1.6 *Ideiglenes csatorna (TC).* Ha a hívás elfogadási időszak során egy csatorna-szám kerül kijelölésre, akkor az Ideiglenes csatorna-számot /TC/ nullára kell beállítani, más esetben a Földi telepítési rendszerű adatkapcsolat vezérlő egység /GDLP/ által használt HÍVÁSKÉRÉS értékre kell beállítani.

5.2.5.2.6.1.7 *Felügyelő típus (ST).* Ezt a mezőt 2-re kell állítani.
5.2.5.2.6.2 *Átfordítás ISO 8208 csomagokba*
5.2.5.2.6.2.1 *Átfordítás.* A Fedélzeti adatkapcsolat vezérlő egységtől /ADLP/ vett, az S-módú TÖRLÉS KÉRÉS-nek a Földi telepítési rendszerű adatkapcsolat vezérlő egység /GDLP/ csomag általi (vagy egy, a csomagok S-bit sorrendje általi) újra-formátumozási folyamata a helyi Fedélzeti hálózati végponti berendezéstől /ADCE/ az annak megfelelő ISO 8208 TÖRLÉS KÉRÉS csomag létrehozását eredményezi a helyi Hálózati végponti berendezéshez /DCE/. Az S-módú csomagnak az ISO 8208 csomagba történő átfordításának az 5.2.5.2.6.1 pontban meghatározott folyamat inverze, azokkal a kivételekkel, amelyek a következő pontokban kerülnek meghatározásra.
5.2.5.2.6.2.2 *Hívott Lekérdező adat végponti berendezés /DTE/, hívó DTE és hosszúság mezők.* Ezeket a mezőket az ISO 8208 TÖRLÉS KÉRÉS csomagban el kell hagyni.
5.2.5.2.7 *ADAT*
5.2.5.2.7.1 *Átfordítás S-módú csomagokba*
5.2.5.2.7.1.1 *Átfordított csomag formátum.* A helyi Hálózati végponti berendezéstől /DCE/ vett ISO 8208 ADAT csomag(ok) újra-formátumozási folyamat Fedélzeti/Földi adatkapcsolat vezérlő egység /XDLP/ általi vétele a megfelelő S-módú ADAT csomag(ok) létrehozását eredményezi, ahogy azt az M-bit feldolgozás meghatározza (5.2.5.1.4.1 pont), a következők szerint:

DP: 1	M: 1	SN: 6	FILL1: 0 vagy 6	PS: 4

Adat-csomag M-bit sorozat része Sorozat- szám Kitöltés Csomag küldési sorrend

PR: 4	CH: 4	LV: 4	UD: v

Csomag vételi sorrend Csatorna-szám Felhasználói adathossz Felhasználói adatmező

5.2.5.2.7.1.2 *Adat csomag típus (DP).* Ezt a mezőt 1-re kell állítani.
5.2.5.2.7.1.3 *M Mező (M).* Az 1 értéknek kell jeleznie, hogy a csomag egy M-bit sorozat része, több csomaggal a sorozatban következőkben. A 0 érték azt mutatja, hogy a sorozat ezzel a csomaggal végződik. A megfelelő értéket az S-módú csomag M-bit mezőjében kell elhelyezni.

Megjegyzés. - A teljes magyarázatot lásd az 5.2.5.1.4 pontban és az ISO 8208-ban.

5.2.5.2.7.1.4 *Sorozatszám (SN).* A sorozatszám mezőt az 5.2.5.2.1.1.7 pontban foglaltak szerint került meghatározásra.
5.2.5.2.7.1.5 *Csomag küldési sorrend (PS).* A csomag küldési sorrend mezőt az 5.2.6.4.4 pontban foglaltak szerint kell beállítani
5.2.5.2.7.1.6 *Csomag vételi sorrend (PR).* A csomag vételi sorrend mezőt az 5.2.6.4.4 pont szerint kell beállítani.
5.2.5.2.7.1.7 *Csatorna-szám (CH).* A csatorna-szám mező tartalmazza azt az S-módú csatorna-számot, amely megfelel a bejövő ISO 8208 ADAT csomag csatorna-számának.
5.2.5.2.7.1.8 *Felhasználói adat hossz (LV).* Ennek a mező jelzi az utolsó Szabvány hosszúságú közlemény /SLM/ vagy Kiterjesztett hosszúságú közlemény /ELM/ szegmensben lévő összes bájtok számát, ahogyan az az 5.2.2.3.1 pontban foglaltak szerint.
5.2.5.2.7.1.9 *Kitöltés (FILL1).* Ezt a mezőt az 5.2.5.2.1.1.11 pontban meghatározottak szerint kell beállítani.
5.2.5.2.7.1.10 *Felhasználói adat (UD).* A felhasználói adatokat az ISO 8208 csomagból az S-módú csomagba kell átvinni, az M-bit csomag összeállítási folyamatot felhasználva az előírásoknak megfelelően.
5.2.5.2.7.2 *Átfordítás ISO 8208 csomagokba.* A helyi Fedélzeti/Földi hálózati végponti berendezéstől /XDCE/ a Fedélzeti/Földi adatkapcsolat vezérlő egység /XDLP/ által vett S-módú ADAT csomag (ok) újra-formátumozási folyamata a megfelelő ISO 8208 ADAT csomag(ok) létrehozását eredményezi a helyi Hálózati végponti berendezés /DCE/ részére. Az S-módú csomag(ok) nak az ISO 8208 csomag (ok)ba történő átfordítása az 5.2.5.2.7.1 pontban meghatározott feldolgozás inverze.

5.2.5.2.8 *MEGSZAKÍTÁS*

5.2.5.2.8.1 *Átfordítás az S-módú csomagokba*
5.2.5.2.8.1.1 *Átfordított csomag formátum.* A helyi DCE-től jövő ISO 8208 MEGSZAKÍTÁS átfordítási folyamatnak az XDLP általi vétele a megfelelő S-módú MEGSZAKÍTÁS csomag(ok) létrehozását eredményezi (ahogy azt az S-bit feldolgozás meghatározza (5.2.5.1.4.2 pont)) a következők szerint:

DP: 1	MP: 1	SP: 2	FILL2: 0 vagy 2	S: 1

Adatcsomag S-módú spec. protokoll Felügyelő csomag Kitöltés Több csomag jelzés

F: 1	SN: 6	CH: 4	LV: 4	UD: v

Első csomag jelzés Sorozat- szám Csatorna-szám Felhasználói adathossz Felhasználói adatmező

A csomag formátumban bemutatott és a következő pontokban nem meghatározott mezőket az 5.2.5.2.1 pontban szereplő meghatározások szerint kell beállítani.

5.2.5.2.8.1.2 *Adatcsomag típus (DP).* Ezt a mezőt 0-ra kell állítani.
5.2.5.2.8.1.3 *MSP csomag típus (MP).* Ezt a mezőt 1-re kell állítani.
5.2.5.2.8.1.4 *Felügyelő csomag (SP).* Ezt a mezőt 1-re kell állítani.
5.2.5.2.8.1.5 *Felügyelő típus (ST).* Ezt a mezőt 1-re kell állítani.
5.2.5.2.8.1.6 *Felhasználói adat hossz (LV).* Ezt a mezőt az 5.2.2.3.1 pontban foglaltak szerint kell beállítani.
5.2.5.2.8.1.7 *Felhasználói adat (UD).* A felhasználói adatokat az ISO 8208 csomagból az S-módú csomagba az S-bit csomag újra-összeállítási eljárását alkalmazva kell előírás szerint átvinni. A felhasználói adatmező maximális mérete egy MEGSZAKÍTÁS csomagra 32 bájt legyen.
5.2.5.2.8.2 *Átfordítás ISO 8208 csomagokba.* A helyi Fedélzeti/Földi hálózati végponti berendezéstől /XDCE/ a Fedélzeti/Földi adatkapcsolat vezérlő egység /XDLP/ által vett S-módú MEGSZAKÍTÁS csomag(ok) újra-formátumozási folyamata a megfelelő ISO 8208 MEGSZAKÍTÁS csomag létrehozását eredményezi a helyi Hálózati végponti berendezés /DCE/ részére. Az S-módú csomag(ok)nak az ISO 8208 csomag(ok)ba történő átfordítása az 5.2.5.2.8.1 pontban meghatározott feldolgozás inverze legyen.

5.2.5.2.9 *MEGSZAKÍTÁS MEGERŐSÍTÉS*

5.2.5.2.9.1 *Átfordítás S-módú csomagokba*
5.2.5.2.9.1.1 *Átfordított csomag formátum.* A helyi DCE-től jövő ISO 8208 MEGSZAKÍTÁS MEGERŐSÍTÉS átfordítási folyamatnak az XDLP általi vétele a megfelelő S-módú MEGSZAKÍTÁS MEGERŐSÍTÉS csomag létrehozását eredményezi a következők szerint:

DP: 1	MP: 1	SP: 2	ST: 1	SS: 2

Adatcsomag S-módú spec. protokoll Felügyelő csomag Felügyelő típus Felügyelő részhalmaz

FILL2 : 0 vagy 2	SN: 6	CH: 4	FILL: 4

Kitöltés Sorozat- szám Csatorna-szám Felhasználói adatmező

A csomag formátumban bemutatott és a következő pontokban nem meghatározott mezőket az 5.2.5.2.1 pontban meghatározottak szerint kell beállítani.
5.2.5.2.9.1.2 *Adat csomag típus (DP).* Ezt a mezőt 0-ra kell állítani.
5.2.5.2.9.1.3 *MSP csomag típus (MP).* Ezt a mezőt 1-re kell állítani.
5.2.5.2.9.1.4 *Felügyelő csomag (SP).* Ezt a mezőt 3-ra kell állítani.
5.2.5.2.9.1.5 *Felügyelő típus (ST).* Ezt a mezőt 3-ra kell állítani.
5.2.5.2.9.1.6 *Felügyelő részhalmaz (SS).* Ezt a mezőt 0-ra kell állítani.
5.2.5.2.9.2 *Átfordítás ISO 8208 csomagokba.* A helyi Fedélzeti/Földi hálózati végponti berendezéstől /XDCE/ a Fedélzeti/Földi adatkapcsolat vezérlő egység /XDLP/ által vett S-módú MEGSZAKÍTÁS MEGERŐSÍTÉS csomag újra-formátumozási folyamata a megfelelő ISO 8208 MEGSZAKÍTÁS MEGERŐSÍTÉS csomag létrehozását eredményezi a helyi Hálózati végponti berendezés /DCE/ részére. Az S-módú csomagnak az ISO 8208 csomagba történő átfordítása az 5.2.5.2.9.1 pontban meghatározott feldolgozás inverze legyen.

5.2.5.2.10 *VISSZAÁLLÍTÁS KÉRÉS*

5.2.5.2.10.1 *Átfordítás S-módú csomagokba*
5.2.5.2.10.1.1 *Átfordított csomag formátum.* A helyi Hálózati végponti berendezéstől /DCE/ jövő ISO 8208 VISSZAÁLLÍTÁS KÉRÉS csomag újra-formátumozási folyamat Fedélzeti/Földi adatkapcsolat vezérlő egység /XDLP/ általi vétele a megfelelő S-módú VISSZAÁLLÍTÁS KÉRÉS csomag létrehozását eredményezi a következők szerint:

DP: 1	MP: 1	SP: 2	ST: 2	FILL2: 0 vagy 2

Adat-csomag S-módú spec. protokoll Felügyelő csomag Felügyelő típus Kitöltés Kitöltés

SN: 6	CH: 4	FILL: 4	RC: 8	DC: 8

Sorozat- szám Csatorna-szám Kitöltés Visszaállítást előidéző kód Diagnosztikai kód

A csomag-formátumban bemutatott és a következő pontokban nem meghatározott mezőket az 5.2.5.2.1 pontban szereplő meghatározás szerint kell beállítani:

5.2.5.2.10.1.2 *Adat csomag típus (DP).* Ezt a mezőt 0-ra kell állítani.
5.2.5.2.10.1.3 *MSP csomag típus (MP)*. Ezt a mezőt 1-re kell állítani.
5.2.5.2.10.1.4 *Felügyelő csomag (SP).* Ezt a mezőt 2-re kell állítani.
5.2.5.2.10.1.5 *Felügyelő típus (ST).* Ezt a mezőt 2-re kell állítani.
5.2.5.2.10.1.6 *A visszaállítást előidéző kód (RC) és a diagnosztikai kód (DC).* A visszaállítást előidéző és diagnosztikai kódok, amelyek az S-módú VISSZAÁLLÍTÁS KÉRÉS csomagban alkalmazásra kerülnek, az ISO 8208 csomagban előírt megfelelő kódoknak kell lenni akkor, amikor a visszaállítási eljárást a Lekérdező adat végponti berendezés /DTE/ kezdeményezi. Ha a visszaállítási eljárás a Hálózati végponti berendezéstől /DCE/ indul, akkor a DCE állapot táblázatoknak határozzák meg a diagnosztikai mezők kódolását. Ebben az esetben a visszaállítást előidéző mező 8-as bitjét 0-ra kell állítani.
5.2.5.2.10.2 *Átfordítás ISO 8208 csomagokba.* A helyi Fedélzeti/Földi hálózati végponti berendezéstől /XDCE/ a Fedélzeti/Földi adatkapcsolat vezérlő egység /XDLP/ által vett S-módú VISSZAÁLLÍTÁS csomag újra-formátumozási folyamata a megfelelő ISO 8208 VISSZAÁLLÍTÁS csomag létrehozását eredményezi a helyi Hálózati végponti berendezés /DCE/ részére. Az S-módú csomagnak ISO 8208 csomagba történő átfordítása az 5.2.5.2.10.1 pontban meghatározott feldolgozás inverze legyen.
5.2.5.2.11 *ISO 8208 ÚJRAINDÍTÁS KÉRÉS az S-módú TÖRLÉS KÉRÉS-hez.* A helyi DCE-ből jövő ISO 8208 ÚJRAINDÍTÁS KÉRÉS vételének az újra-formátumozási folyamatban eredményeznie kell a Fedélzeti adatkapcsolat vezérlő egység /ADLP/ által létrehozott S-módú TÖRLÉS KÉRÉS-t, vagy a Földi telepítési rendszerű adatkapcsolat vezérlő egység /GDLP/ által létrehozott S-módú BONTÁS KÉRÉS-t a kérő Lekérdező adat végponti berendezéssel /DTE/ kapcsolódó összes Kapcsolt virtuális áramkörnél /SVC/. Az S-módú TÖRLÉSKÉRÉS csomagokat az 5.2.5.2.5 és 5.2.5.2.6 pontok szerint kell beállítani.

Megjegyzés. - Az S-módú csomag réteg protokollban nincsenek újraindítási állapotok.

5.2.5.3 CSOMAGOK, HELYI AZ S-MÓDÚ ALHÁLÓZATHOZ

Megjegyzés. - Az ebben a szakaszban meghatározott csomagok nem eredményeznek ISO 8208 csomag létrehozást.

5.2.5.3.1 *S-MÓDÚ FOGADÁSRA KÉSZ*
5.2.5.3.1.1 *Csomag formátum.* Egy Fedélzeti/Földi adatkapcsolat vezérlő egységtől /XDLP/ érkező S-módú FOGADÁSRA KÉSZ csomag nincs kapcsolatban a Lekérdező adat végponti berendezés/Hálózati végponti berendezés /DTE/DCE/ illesztés vezérléssel és nem eredményezi egy ISO 8208 csomag létrehozását. A csomag formátuma a következő:

DP: 1	MP: 1	SP: 2	ST: 2	FILL2: 0 vagy 2

Adatcsomag S-módú spec. protokoll
Felügyelő csomag Felügyelő típus Kitöltés

FILL: 2	SN: 6	CH: 4	PR: 4

Kitöltés Sorozat- szám Csatorna-szám Csomag vételi sorrend

A csomag formátumban bemutatott és a következő pontokban nem szereplő mezőket az 5.2.5.2.1 pontban meghatározottak szerint kell beállítani. A csomagot az 5.2.6.5 pontban meghatározottak szerint kell feldolgozni.
5.2.5.3.1.2 *Adat csomag típus (DP).* Ezt a mezőt 0-ra kell állítani.
5.2.5.3.1.3 *MSP csomag típus (MP).* Ezt a mezőt 1-re kell állítani.
5.2.5.3.1.4 *Felügyelő csomag (SP).* Ezt a mezőt 2-re kell állítani.
5.2.5.3.1.5 *Felügyelő típus (ST).* Ezt a mezőt 0-ra kell állítani.
5.2.5.3.1.6 *Csomag vételi sorrend (PR).* Ezt a mezőt az 5.2.6.4.4 pontban meghatározottak szerint kell beállítani.
5.2.5.3.2 S-*MÓDÚ FOGADÁSRA NEM KÉSZ*
5.2.5.3.2.1 *Csomag formátum.* Egy Fedélzeti/Földi adatkapcsolat vezérlő egységtől /XDLP/ érkező S-módú FOGADÁSRA NEM KÉSZ csomag nincs kapcsolatban a Lekérdező adat végponti berendezés/Hálózati végponti berendezés /DTE/DCE/ illesztés vezérléssel és nem eredményezi ISO 8208 csomag létrehozását. A csomag formátuma a következő:

DP: 1	MP: 1	SP: 2	ST: 2	FILL2: 0 vagy 2

Adat-csomag S-módú spec. protokoll Felügyelő csomag Felügyelő típus Kitöltés

FILL: 2	SN: 6	CH: 4	PR: 4

Kitöltés Sorozat- szám Csatorna-szám Csomag vételi sorrend

A csomag formátumban bemutatott és a következő pontokban nem szereplő mezőket az 5.2.5.2.1 pontban meghatározottak szerint kell beállítani. A csomagot az 5.2.6.5 pontban meghatározottak szerint kell feldolgozni.
5.2.5.3.2.2 *Adat csomag típus (DP).* Ezt a mezőt 0-ra kell állítani.
5.2.5.3.2.3 *MSP csomag típus (MP).* Ezt a mezőt 1-re kell állítani.
5.2.5.3.2.4 *Felügyelő csomag (SP).* Ezt a mezőt 2-re kell állítani.
5.2.5.3.2.5 *Felügyelő típus (ST).* Ezt a mezőt 1-re kell állítani.
5.2.5.3.2.6 *Csomag vételi sorrend (PR)*. Ezt a mezőt az 5.2.6.4.4 pontban meghatározottak szerint kell beállítani.
5.2.5.3.3 *S-MÓDÚ IRÁNYÍTÁS*
5.2.5.3.3.1 *Csomag formátum.* A csomag formátuma a következő:

DP: 1	MP: 1	SP: 2	ST: 2	OF: 1IN: 1

Adatcsomag S-módú spec. protokoll Felügyelő csomag Felügyelő típus Választható jelzés Indulási állapot beállítás

RTL: 8	RT: v	ODL: 0 vagy 8	OD: v

Irányítás táblázat hossz Irányítás táblázat Választható adat hossz Választható adat

A csomag formátumban bemutatott és a következő pontokban nem meghatározott mezőket az 5.2.5.2.1 pontban előírtak szerint kell beállítani. A csomag csak a Földi telepítési rendszerű adatkapcsolat vezérlő egység /GDLP/ által kerül létrehozásra. A csomagot a Fedélzeti adatkapcsolat vezérlő egység /ADLP/ dolgozza fel az 5.2.8.1.2 pontban meghatározottak szerint, és a csomag maximális méretének az 5.2.6.4.2.1 pontban foglaltaknak kell megfelelni.
5.2.5.3.3.2 *Adat csomag típus (DP).* Ezt a mezőt 0-ra kell állítani.
5.2.5.3.3.3 *MSP csomag típus (MP).* Ezt a mezőt 1-re kell állítani.
5.2.5.3.3.4 *Felügyelő csomag (SP).* Ezt a mezőt 3-ra kell állítani.
5.2.5.3.3.5 *Felügyelő típus (ST).* Ezt a mezőt 0-ra kell állítani.
5.2.5.3.3.6 *Választható jelzés (OF).* Ez a mező jelezi a választható adat hossz (ODL) és a választható adat (OD) jelenlétét. A választható jelzést (OF) 1-re kell beállítani akkor, amikor a Választható adat hossz (ODL) és a Választható adat (OD) mezők vannak. Egyéb esetekben 0-ra kell állítani.
5.2.5.3.3.7 *Indulási állapot beállító bit (IN).* Ennek a mező jelzi az alhálózat indulási állapot beállítása iránti igényt. Ezt a GDLP-nek az 5.2.8.1.2 d) pontban meghatározottaknak megfelelően kell beállítani.
Megjegyzés. - Az indulási állapotbeállítás az IRÁNYÍTÁS csomagban lévő Lekérdező adat végponti berendezés /DTE/

címzésekhez kapcsolódó bármely nyitott Kapcsolt virtuális áramkör /SVC/ törlését hozza létre. Ez annak biztosításához szükséges, hogy valamennyi csatorna zárva legyen az adatgyűjtésnél és egy GDLP meghibásodást követő helyreállítás indulási állapot beállításához.
5.2.5.3.3.8 *Irányítás táblázat hossz (RTL).* Ez a mező jelzi az irányítás táblázat méretét bájtokban kifejezve.
5.2.5.3.3.9 *Irányítás táblázat (RT)*
5.2.5.3.3.9.1 *Tartalom.* Ez a táblázat a változtatható számú belépési címekből áll, azokból, amelyek mindegyike olyan információt tartalmaz, amely meghatározza a belépési címek hozzáadását vagy törlését a Lekérdező azonosító /II/ kód Lekérdező adat végponti berendezés /DTE/ kereszt-hivatkozás táblázatban (5.2.8.1.1).
5.2.5.3.3.9.2 *Belépési címek.* Az irányítás táblázatban minden belépési cím az II kódból áll, maximálisan 8 földi DTE címzés felsorolásból és egy jelzésből, amely azt mutatja meg, hogy a származó II kód - DTE párokat hozzá kell-e adni vagy törölni kell-e az II kód - DTE kereszt-hivatkozási táblázatból. Az irányító táblázat bevitelét a következőképpen kell kódolni:

II: 4	AD: 1	ND: 3	DAL: v
Lekérdező azonosító	Hozzáadás/ /törlés jelzés	DTE címzések száma	DTE címzés jegyzék

5.2.5.3.3.9.3 *Lekérdező azonosító (II).* Ez a mező tartalmazza a 4-bites II kódot.
5.2.5.3.3.9.4 *Hozzáadás/törlés jelző (AD).* Ez a mező azt mutatja, hogy a II kód - DTE párokat hozzá kell adni (AD = 1) vagy törölni kell-e (AD = 0) az II kód - DTE kereszt-hivatkozás táblázatból.
5.2.5.3.3.9.5 *Lekérdező adat végponti berendezés /DTE/ címzések száma (ND).* Ezt a mezőt a 0-tól 7-ig terjedő tartományban binárisan kell kifejezni, és a DTE címzés jegyzékben /DAL/ jelenlévő DTE címzések számát mindig 1 levonással kell jelezni (azért, hogy lehetővé tegye az 1-től 8-ig terjedő DTE címzéseket).
5.2.5.3.3.9.6 *DTE címzés jegyzék (DAL).* Ennek a jegyzéknek maximálisan 8 DTE címzésből kell állnia 8-bites bináris adat feltűntetéssel.
5.2.5.3.3.10 *Választható adat hossz (ODL).* Ez a mező magába foglalja a következő Választható adat /OD/ mező bájtokban kifejezett hosszúságát.
5.2.5.3.3.11 *Választható adat (OD).* Ennek a változtatható hosszúságú mezőnek a választható adatokat tartalmazza.
5.2.5.3.4 *A FEDÉLZETI ADATKAPCSOLAT VEZÉRLŐ EGYSÉG /ADLP/ ÁLTALI S-MÓDÚ TÖRLÉS MEGERŐSÍTÉS*
5.2.5.3.4.1 *Csomag formátum.* A formátumnak ennél a csomagnál a következő:

DP: 1	MP: 1	SP: 2	ST: 2	FILL2: 0 vagy 2

Adat-csomag S-módú spec. protokoll Felügyelő csomag Felügyelő típus Kitöltés

TC: 2	SN: 6	CH: 4	AM: 4	AG: 8

Ideiglenes csatorna-szám Sorozat- szám Csatorna-szám Mobil cím Földi cím

A csomag formátumban bemutatott és a következő pontokban nem meghatározott mezőket az 5.2.5.2.1 és 5.2.5.2.5 pontokban foglaltak szerint. Ezt a csomagot az 5.2.6.3 pontban előírtaknak megfelelően kell feldolgozni.
5.2.5.3.4.2 *Adat csomag típus (DP).* Ezt a mezőt 0-ra kell állítani.
5.2.5.3.4.3 *MSP csomag típus (MP).* Ezt a mezőt 1-re kell állítani.
5.2.5.3.4.4 *Felügyelő csomag (SP).* Ezt a mezőt 3-ra kell állítani.
5.2.5.3.4.5 *Csatorna-szám (CH).* Ha a hívás elfogadási időszak során egy csatorna-szám kerül kijelölésre, akkor a csatorna-számot /CH/ arra az értékre kell beállítani, más esetekben ezt nullára kell állítani.
5.2.5.3.4.6 *Ideiglenes csatorna (TC).* Ha a hívás elfogadási időszak során egy csatorna-szám kerül kijelölésre, akkor az Ideiglenes csatorna-számot /TC/ nullára kell beállítani, más esetben a Földi telepítési rendszerű adatkapcsolat vezérlő egység /GDLP/ által használt HÍVÁSKÉRÉS értékre kell beállítani.
5.2.5.3.4.7 *Felügyelő típus (ST).* Ezt a mezőt 3-ra kell állítani.
5.2.5.3.5 *A FÖLDI TELEPÍTÉSI RENDSZERŰ ADATKAPCSOLAT VEZÉRLŐ EGYSÉG /GDLP/ ÁLTALI S-MÓDÚ TÖRLÉS MEGERŐSÍTÉS*
5.2.5.3.5.1 *Csomag formátum.* Ennek a csomagnak a formátuma a következő:

DP: 1	MP: 1	SP: 2	ST: 2	FILL: 2

Adat-csomag S-módú spec. protokoll Felügyelő csomag Felügyelő típus Kitöltés

TC: 2	SN: 6	CH: 4	AM: 4	AG: 8

Ideiglenes csatorna-szám Sorozat- szám Csatorna-szám Mobil cím Földi cím

A csomag formátumban bemutatott és a következő pontokban nem meghatározott mezőket az 5.2.5.2.1 és 5.2.5.2.6 pontokban foglaltak szerint kell beállítani. Ezt a csomagot az 5.2.6.3 pontban előírtaknak megfelelően kell feldolgozni.
5.2.5.3.5.2 *Adat csomag típus (DP)*. Ezt a mezőt 0-ra kell állítani.
5.2.5.3.5.3 *MSP csomag típus (MP)*. Ezt a mezőt 1-re kell állítani.
5.2.5.3.5.4 *Felügyelő csomag (SP)*. Ezt a mezőt 1-re kell állítani.
5.2.5.3.5.5 *Csatorna-szám (CH).* Ha a hívás elfogadási időszak során egy csatorna-szám kerül kijelölésre, akkor a csatorna-számot /CH/ arra az értékre kell beállítani, más esetekben ezt nullára kell állítani.
5.2.5.3.5.6 *Ideiglenes csatorna (TC)*. Ha a hívás elfogadási időszak során egy csatorna-szám kerül kijelölésre, akkor az Ideiglenes csatorna-számot /TC/ nullára kell beállítani, más esetben a Földi telepítési rendszerű adatkapcsolat vezérlő egység /GDLP/ által használt HÍVÁSKÉRÉS értékre kell beállítani.
5.2.5.3.4.7 *Felügyelő típus (ST)*. Ezt a mezőt 3-ra kell állítani.
5.2.5.3.6 *S-MÓDÚ VISSZAÁLLÍTÁS MEGERŐSÍTÉS*
5.2.5.3.6.1 *Csomag formátum.* Ennek a csomagnak a formátuma a következő:

DP: 1	MP: 1	SP: 2	ST: 2	FILL2: 0 v. 2

Adat-csomag S-módú spec. protokoll Felügyelő csomag Felügyelő típus Kitöltés

FILL: 2	SN: 6	CH: 4	FILL: 4

Kitöltés Sorozat- szám Csatorna-szám Kitöltés

A csomag formátumban bemutatott és a következő pontokban nem meghatározott mezőket az 5.2.5.2.1 pontban előírtak szerint kell beállítani. Ezt a csomagot az 5-14. táblázatban meghatározottak szerint kell feldolgozni.
5.2.5.3.6.2 *Adat csomag típus (DP)*. Ezt a mezőt 0-ra kell állítani.
5.2.5.3.6.3 *MSP csomag típus (MP)*. Ezt a mezőt 1-re kell állítani.
5.2.5.3.6.4 *Felügyelő csomag (SP)*. Ezt a mezőt 2-re kell állítani.
5.2.5.3.6.5 *Felügyelő típus (ST).* Ezt a mezőt 3-ra kell állítani.
5.2.5.3.7 *S-MÓDÚ VISSZAÁLLÍTÁS*
5.2.5.3.7.1 *Csomag formátum.* Ennek a csomagnak a formátuma a következő:

DP: 1	MP: 1	SP: 2	ST: 2	SS: 2

Adat-csomag S-módú spec. protokoll Felügyelő csomag Felügyelő típus Felügyelő részhalmaz

FILL2: 0 vagy 2	SN: 6	CH: 4	PR: 4

Kitöltés Sorozat- szám Csatorna-szám Csomag vételi sorrend

A csomag formátumban bemutatott és a következő pontokban nem meghatározott mezőket az 5.2.5.2.1 pontban foglaltak szerint kell beállítani. Ezt a csomagot az 5.2.6.8 pontban előírtaknak megfelelően kell feldolgozni.
5.2.5.3.7.2 *Adat csomag típus (DP).* Ezt a mezőt 0-ra kell állítani.
5.2.5.3.7.3 *MSP csomag típus (MP)*. Ezt a mezőt 1-re kell állítani.
5.2.5.3.7.4 *Felügyelő csomag (SP).* Ezt a mezőt 3-ra kell állítani.
5.2.5.3.7.5 *Felügyelő típus (ST).* Ezt a mezőt 3-ra kell állítani.
5.2.5.3.7.6 *Felügyelő részhalmaz (SS).* Ezt a mezőt 1-re kell állítani.
5.2.5.3.7.7 *Csomag vételi sorrend (PR)*. Ezt a mezőt az 5.2.6.4.4 pontban meghatározottak szerint kell beállítani.

5.2.6 Légijármű/Földi hálózati végponti berendezés /XDCE/ működése

Megjegyzés. - A Légijármű hálózati végponti berendezés /ADCE/ feldolgozás a Fedélzeti adatkapcsolat vezérlő egységen /ADLP/ belül úgy működik, mint a Földi hálózati végponti berendezés /GDCE/ feldolgozás a Földi telepítési rendszerű adatkapcsolat vezérlő egységen /GDLP/ belüli társ-folyamata.

5.2.6.1 *Állapot átvitelek.* Az XDCE állapotgépként működik. Egy állapotba kerülve, az XDCE végrehajtja az 5-14. táblázatban ismertetett műveleteket. Az állapot átvitelek és kiegészítő művelet(ek) az 5-15.-től az 5-22.-ig terjedő táblázatokban szerepelnek.

1. Megjegyzés. - A következő állapot átvitel (ha van ilyen) akkor következik be, amikor a Légijármű/Földi hálózati végponti berendezés /XDCE/ egy csomagot fogad a társ XDCE-től, ami az 5-15.-től az 5-19.-ig terjedő táblázatokban van meghatározva. Ugyanezek az átvitelek kerültek meghatározásra az 5-20.-tól az 5-22.-ig terjedő táblázatokban, amikor a XDCE vesz egy csomagot a Hálózati végponti berendezéstől /DCE/ (az újra-formátumozó folyamaton keresztül).

2. Megjegyzés. - Az XDCE állapot hierarchiája ugyanolyan, mint a DCE-jé, ahogyan azt az 5-2 ábra bemutatja, azzal a kivétellel, hogy az 'r2', ' r3' és 'p5' állapotokat el kell hagyni.

5.2.6.2 A CSOMAGOK KIOSZTÁSA

5.2.6.2.1 Egy csomagnak a társ Légijármű/Földi hálózati végponti berendezéstől /XDCE/ történő fogadása után a csomagot vagy kell, vagy nem kell továbbítani a Hálózati végponti berendezéshez /DCE/ (az újra formátumozó eljáráson keresztül) az 5-15.-től az 5-19.-ig terjedő táblázatokban megadott zárójeles utasításoknak megfelelően. Ha a zárójeles utasítás nincs feltűntetve, vagy ha a zárójeles utasítás "ne továbbíts" utasítást mutat, akkor a csomagot érvényteleníteni kell.
5.2.6.2.2 Egy csomag fogadása után a DCE-től (az újra-formátumozó folyamaton keresztül) a csomagot vagy kell, vagy nem kell továbbítani a társ XDCE-hez az 5-20.-tól az 5-22.-ig terjedő táblázatokba foglalt zárójeles utasításoknak megfelelően. Ha zárójeles utasítás nincs feltűntetve, vagy a zárójeles utasítás "ne továbbíts" utasítást mutat, a csomagot érvényteleníteni kell.

5.2.6.3 KAPCSOLT VIRTUÁLIS ÁRAMKÖR /SVC/ HÍVÁS BEÁLLÍTÁSI ÉS TÖRLÉSI ELJÁRÁS
5.2.6.3.1 *Beállítási eljárások.* A Hálózati végponti berendezéstől /DCE/ vagy a társ XDCE-től jövő HÍVÁSKÉRÉS fogadása után a Fedélzeti/Földi adatkapcsolat vezérlő egységnek /XDLP/ meg kell állapítania, hogy van-e elegendő erőforrás az SVC működtetéséhez. Ennek a következőket kell tartalmazni: elegendő tároló tér (a tárolási követelményeket illetően nézzék meg az 5.2.5.1.1 pontot) és egy rendelkezésre álló p1 állapotú SVC. A DCE-től (az újra-formátumozási folyamaton keresztül) érkező HÍVÁSKÉRÉS fogadása után az S-módú HÍVÁSKÉRÉS csomagot továbbítani kell keret feldolgozásra. A társ XDCE-től (a keret feldolgozáson keresztül) érkezett S-módú HÍVÁSKÉRÉS fogadása után az S-módú HÍVÁSKÉRÉS-t el kell küldeni az újra-formátumozó feldolgozáshoz.
5.2.6.3.2 *Egy híváskérés leállítása*. Ha a Lekérdező adat végponti berendezés /DTE/ és/vagy a társ Légijármű/Földi hálózati végponti berendezés /XDCE/ leállít egy hívást, mielőtt azok egy HÍVÁS ELFOGADÁS csomagot vettek, jelezniük kell ezt a feltételt egy TÖRLÉS KÉRÉS csomag kibocsátásával. Az ezeknek az eseteknek a kezelésére szolgáló eljárások az 5-16. és 5-20. táblázatokban találhatók.

5.2.6.3.3 *VIRTUÁLIS HÍVÁS TÖRLÉS*

5.2.6.3.3.1 Ha az XDCE egy olyan S-módú HÍVÁSKÉRÉS-t vesz az újra-formátumozó feldolgozástól, amelyet nem tud támogatni, akkor egy S-módú TÖRLÉS KÉRÉS csomagot indít, amelyet a DCE-hez továbbít (az újra-formátumozó feldolgozáson keresztül) a DTE-hez való továbbítás céljából (a DCE ilyen módon belép a DCE TÖRLÉS KÉRÉS-be a DTE állapotába, a p7-be).
5.2.6.3.3.2 Ha az XDCE egy olyan S-módú HÍVÁSKÉRÉS csomagot vesz a társ XDCE-től (keret feldolgozáson keresztül), amelyet ez nem támogat, akkor belép a p7 állapotba.
5.2.6.3.3.3 Módot kell biztosítani ahhoz, hogy a DTE értesítést kapjon arról, hogy egy SVC a társ DTE tevékenysége miatt, vagy magán az alhálózaton belüli probléma miatt került törlésre.

5.2.6.3.3.4 **Ajánlás. -** *Az 5.2.6.3.3.3 pont követelményét a törlést létrehozó mező 8-as bitjének 1-re állításával kell kielégíteni annak jelzésére, hogy a probléma az S-módú alhálózatból ered és nem a DTE-ben keletkezett. A diagnosztikai /DC/ és törlést létrehozó /CC/ kódokat a következőképpen kell beállítani:*

a) csatorna-szám nem áll rendelkezésre, DC = 1, CC = 133;
b) tároló tér nem áll rendelkezésre, DC = 71, CC = 133;
c) DTE nem működőképes, DC = 162, CC = 141; és
d) kapcsolat meghibásodás, DC = 225, CC = 137.

5.2.6.3.3.5 Ha a Fedélzeti adatkapcsolat vezérlő egység /ADLP/ egy olyan S-módú IRÁNYÍTÁS csomagot vesz, ahol az Indulási állapot /IN/ bit EGY-re van állítva, az ADLP-nek egy helyi indulási állapot beállítást kell végrehajtania az IRÁNYÍTÁS csomagban lévő DTE címzésekhez kapcsolódó S-módú SVC-k törlésével. Ha a Földi telepítési rendszerű adatkapcsolat vezérlő egység /GDLP/ egy keresés kérést (5-23 táblázat) vesz egy ADLP-től, akkor a GDLP-nek végre kell hajtania helyi indulási állapot beállítást az ahhoz az ADLP-hez kapcsolódó S-módú SVC-k törlésével. A helyi indulási állapot beállítást a következőkkel kell végrehajtani:
a) az összes, az ezekhez a Kapcsolt virtuális áramkörökhöz /SVC-k/ kapcsolódó lefoglalt hozzárendelt erőforrások leválasztásával (beleértve az újra sorba rendező tárolókat is);
b) ezeknek a SVC-knek a visszatérése a Légijármű hálózati végponti berendezés /ADCE/ kész állapotba (p1); és
c) S-módú TÖRLÉS KÉRÉS csomagok küldése ezekhez az SVC-khez a Hálózati végponti berendezésnél /DCE/ (az újra-formátumozási folyamaton keresztül) a Lekérdező adat végponti berendezéshez /DTE/ való továbbítás céljából.

Megjegyzés. - Ez a művelet lehetővé fogja tenni azt, hogy az S-módú SVC-khez tartozó összes ISO 8208 SVC-k törlésre kerüljenek, és visszatérjenek a kész állapotba (p1).

5.2.6.3.4 *A törlés megerősítése.* Amikor a Légijármű/Földi hálózati végponti berendezés /XDCE/ egy S-módú TÖRLÉS MEGERŐSÍTÉS csomagot vesz, az SVC kezelésére szolgáló, megmaradó hozzárendelt erőforrásokat le kell választania (beleértve az újra-sorba rendező tárolókat is) és az SVC-nek vissza kell térnie a p1 állapotba. S-módú TÖRLÉS MEGERŐSÍTÉS csomagot nem kell továbbítani az újra-formátumozó feldolgozáshoz.
5.2.6.3.5 *Törlés ütközés.* A törlés ütközés akkor fordul elő az XDCE-nél, amikor az egy S-módú TÖRLÉS KÉRÉS csomagot vesz a DCE-től (az újra-formátumozási feldolgozáson keresztül), és azután egy S-módú TÖRLÉS KÉRÉS csomagot vesz a társ XDCE-től (vagy fordítva). Ebben az eseményben az XDCE nem számít egy S-módú TÖRLÉS MEGERŐSÍTÉS csomag vételére, erre az SVC-re és a törlést teljesnek kell tekintenie.
5.2.6.3.6 *Csomag feldolgozás.* Az XDCE-nek az S-módú HÍVÁSKÉRÉS, HÍVÁS ELFOGADÁS és TÖRLÉS KÉRÉS csomagok S-bit sorozatát egyedi entitásként kell kezelnie.
5.2.6.4 ADATÁTVITELI ÉS MEGSZAKÍTÁSI ELJÁRÁSOK

5.2.6.4.1 *ÁLTALÁNOS ELŐÍRÁSOK*

5.2.6.4.1.1 Adatátviteli és megszakítási eljárásokat minden egyes SVC-hez függetlenül kell alkalmazni. A felhasználói adatmező tartalmát áttekinthető módon kell átadni a DCE-nek vagy a társ XDCE-nek. Az adatokat olyan sorrendben kell átvinni, amelyet az adat csomagok részére kijelölt sorozatszámok diktálnak.
5.2.6.4.1.2 Ahhoz, hogy csomagokat vigyen át, az SVC-nek FORGALOM VEZÉRLÉSRE KÉSZ állapotban (d1) kell lennie.

5.2.6.4.2 *S-MÓDÚ CSOMAG MÉRET*

5.2.6.4.2.1 Az S-módú csomagok maximális méretének 152 bájt-nak kell lenni a fedélzetre irányuló adattovábbítási irányban és 160 bájtnak a fedélzetről leadott adattovábbítási berendezéseknél, amelyek teljes fedélzetre irányuló vagy fedélzetről leadott adattovábbítási Kiterjesztett hosszúságú közlemény /ELM/ teljesítőképességgel rendelkeznek. A fedélzetről leadott maximális csomag méret négy válaszjeladós szintre kevesebb, mint 16 szegmens fedélzetről leadott ELM teljesítőképességgel, egyenlő lesz 10 bájt szorozva a fedélzetről leadott ELM szegmensek maximális számával, ahogy a válaszjeladó meghatározza az adatkapcsolati teljesítőképesség jelentésében. Ha nincs ELM teljesítőképesség, a maximális S-módú csomag méret 28 bájt.
5.2.6.4.2.2 Az S-módú alhálózat kisebb csomagokat tesz lehetővé, mint a továbbítandó maximális méret.
5.2.6.4.3 *FORGALOM VEZÉRLÉS ABLAK MÉRET*

5.2.6.4.3.1 Az S-módú alhálózat forgalom vezérlő ablak mérete független a DTE/DCE illesztésnél használt. Vezérlőablak méretétől. Az S-módú alhálózat ablak mérete 15 csomag a fedélzetre irányuló és a fedélzetről leadott adattovábbítás irányban.
5.2.6.4.4. *SVC FORGALOMVEZÉRLÉS*
5.2.6.4.4.1 A forgalomvezérlést egy, a vett csomagokra (PR) alkalmazott sorozatszám segítségével lehet irányítani, és egy másik sorozatszám (PS) segítségével olyan csomagoknál, amelyeket elküldenek. Minden egyes S-módú ADAT csomaghoz, amelyet a Fedélzeti/Földi adatkapcsolat vezérlő egység /XDLP/ hoz létre az egyes Kapcsolt virtuális áramkörre /SVC/, ki kell jelölni egy sorozatszámot (PS). Az első S-módú ADAT-csomag, amelyet a Légijármű/Földi hálózati végponti berendezés /XDCE/ a keret feldolgozáshoz továbbít, amikor az SVC éppen belépett a forgalom vezérlésre kész állapotba, a nulla számot kell kapja. Az első S-módú csomag, amelyet a társ XDCE-től vettek, miután egy SVC éppen belépett a forgalom vezérlésre kész állapotba, a nulla számot kell kapja. A következő csomagokat folyamatosan egymás után következő számokkal kell beszámozni.
5.2.6.4.4.2 Az S-módú ADAT-csomagok jelforrása (a Légijármű hálózati végponti berendezés /ADCE/ vagy a Földi hálózati végponti berendezés /GDCE/) nem fog küldeni (a vevőtől kapott engedély nélkül) több S-módú ADAT csomagot annál, mint ami megtöltené a forgalomvezérlési ablakot. A vevőnek kifejezett engedélyt kell adni a többi csomag küldéséhez.
5.2.6.4.4.3 Az engedély információnak a következő várt csomag sorozatszám formájában legyen és PR-nek kell jelölni. Ha a vevő fel kívánja frissíteni az ablakot, és van adata a küldőhöz történő továbbításra, S-módú ADAT-csomagot kell használnia az információ átadáshoz. Ha az ablakot fel kell frissíteni és nincs elküldendő adat, akkor az S-módú FOGADÁSRA KÉSZ (RR) vagy az S-módú FOGADÁSRA NEM KÉSZ (RNR) csomagot kell küldeni. Ennél a pontnál a "csúszó ablakot" el kell mozgatni ahhoz, hogy az új Csomag sorozatszám /PR/ értéknél kezdjen. Az XDCE most jogosult arra, hogy nyugtázás nélkül, az ablak korlátig további csomagokat továbbítson.
5.2.6.4.4.4 Amikor a továbbítandó következő S-módú ADAT csomag sorozatszáma (PS) a PR? PS ? RR + 14 (modulo 16) tartományban van, akkor a sorozatszámot "ablakban lévő"-ként kell meghatározni, és az XDCE-t fel kell jogosítani a csomag továbbítására. Az ettől eltérő esetekben a csomag sorozatszámát (PS) "ablakon kívüli"-ként kell meghatározni, és az XDCE nem továbbíthatja a csomagot a társ XDCE-nek.
5.2.6.4.4.5 Amikor a vett csomag sorozatszáma (PS) a sorban következő és ablakon belül van, akkor az XDCE-nek el kell fogadnia ezt a csomagot. Egy csomag fogadását olyan PS-el, amely:
a) az ablakon kívül van; vagy
b) a sorozatszámon kívül van; vagy
c) nem egyenlő 0-val a FORGALOM VEZÉRLÉSRE KÉSZ állapotba (d1) való belépés utáni első adat csomag esetén; hibának kell tekinteni.
5.2.6.4.4.6 Egy olyan S-módú ADAT-csomag fogadásának - amely érvényes PS számmal rendelkezik (azaz a sorrendben következő PS-el) - létre kell hoznia, hogy az ablak alacsonyabb csomag sorozatszám /PR/ értéke megváltoztatásra kerüljön, az adott PS érték plusz 1-re. A csomag vételi sorozatszámát (PR) továbbítani kell a létrehozó Fedélzeti/Földi adatkapcsolat vezérlőegységnek /XDLP/ az S-módú ADAT, FOGADÁSRA KÉSZ, FOGADÁSRA NEM KÉSZ vagy VISSZAUTASÍTÁS csomaggal. Egy érvényes PR értéket kell továbbítania az XDCE-nek a társ XDCE-hez 8 csomag fogadása után, feltéve, hogy 15 csomag tárolására elegendő tároló tér áll rendelkezésre. A PR és PS mezők növelését a modulo 16 aritmetika alkalmazásával kell végezni.

Megjegyzés. - A PR értéket magába foglaló csomag elvesztése az ADLP/GDLP üzemelés megszűnését okozhatja ennél az SVC-nél.

5.2.6.4.4.7 A csomagok másolatát meg kell őrizni addig, amíg a felhasználói adat eredményesen átvételre nem kerül. Az eredményes átvitelt követően a PS értéket fel kell frissíteni.
5.2.6.4.4.8 A felhasználói adat PR értékét azonnal fel kell frissíteni, amint az ablak részére szükséges tároló tér (a forgalom vezérlés kezelése által meghatározva) a DCE-n belül rendelkezésre áll.
5.2.6.4.4.9 A Hálózati végponti berendezés /DCE/ és a Légijármű/Földi hálózati végponti berendezés /XDCE/ között forgalom vezérlés kezelést kell biztosítani.

5.2.6.4.5 *MEGSZAKÍTÁS ELJÁRÁSOK A KAPCSOLT VIRTUÁLIS ÁRAMKÖRÖKNÉL*

5.2.6.4.5.1 Ha felhasználói adatot küldenek az S-módú alhálózaton keresztül az azt követő forgalom vezérlési eljárások nélkül, akkor a megszakító eljárásokat kell használni. A megszakítási eljárásnak nem lehet hatása a normál adatcsomag és a forgalom vezérlési eljárásokra. Egy megszakítás csomagot kell átadni a DTE-nek (vagy a válaszjeladó vagy lekérdező interfésznek) az adatáramlás azon pontjánál vagy pontja előtt, amelynél a megszakítás létrehozásra került. Az S-módú MEGSZAKÍTÁS csomag feldolgozásnak meg kell történnie azonnal, amint azt az XDCE vette.

Megjegyzés. - A törlés, visszaállítás és újraindítás eljárások a megszakítás adatok elvesztését hozhatják létre.

5.2.6.4.5.2 Az XDCE-nek az S-módú MEGSZAKÍTÁS csomagok S-bit sorozatát egyetlen entitásként kezeli.
5.2.6.4.5.3 A megszakítás feldolgozása prioritást élvez minden más feldolgozással szemben az SVC-nél a megszakítás folyamata idején.
5.2.6.4.5.4 Egy S-módú MEGSZAKÍTÁS csomag fogadását az előtt, hogy az SVC előző megszakítása megerősítést nyert volna (egy S-módú MEGSZAKÍTÁS MEGERŐSÍTÉS csomag fogadása által), hibaként kell meghatározni. A hiba egy visszaállítást eredményez (lásd az 5-18. táblázatot).

5.2.6.5 A FOGADÁSRA KÉSZ ELJÁRÁS

5.2.6.5.1 Az S-módú FOGADÁSRA KÉSZ csomagot kell elküldeni akkor, ha nem állnak S-módú ADAT csomagok (amelyek szabályszerűen a felfrissített PR értéket tartalmazzák) rendelkezésre állnak a továbbításra. Fontos, hogy a legutóbbi PR értéke kerüljön továbbításra. Ugyancsak ezt kell elküldeni egy vevő fogadásra nem kész állapot lezárásához is.
5.2.6.5.2 Egy S-módú FOGADÁSRA KÉSZ csomagnak az XDCE általi vétele az XDCE-nél létre kell, hogy hozza a PR érték felfrissítését a kimenő SVC részére. Ezt nem kell olyan csomagok újra átvitele iránti követelménynek venni, amelyek már átvitelre kerültek és még az ablakban vannak.
5.2.6.5.3 Az S-módú FOGADÁSRA KÉSZ csomag vétele után az XDCE-nek át kell lépni az ADLP (GDLP) FOGADÁSRA KÉSZ állapotba (g1).

5.2.6.6 A FOGADÁSRA NEM KÉSZ ELJÁRÁS

5.2.6.6.1 Az S-módú FOGADÁSRA NEM KÉSZ /RNR/ csomagot annak a jelzésére kell felhasználni, hogy a rendszer ideiglenesen nem képes további ADAT csomagokat fogadni egy adott SVC részére. Az S-módú RNR feltételt S-módú FOGADÁSRA KÉSZ /RR/ csomag vagy S-módú VISSZA-UTASÍTÁS csomag vételével kell törölni.
5.2.6.6.2 Amikor az XDCE S-módú FOGADÁSRA NEM KÉSZ csomagot vesz a társ XDCE-től, akkor fel kell frissítenie a csomag sorozatszám /PR/ értéket az SVC-re, és le kell állítania az S-módú ADAT csomagok továbbítását az SVC-n az XDLP-hez. Az XDCE-nek a Fedélzeti adatkapcsolat vezérlő egység /ADLP/ (Földi telepítési rendszerű adatkapcsolat vezérlő egység /GDLP/) FOGADÁSRA NEM KÉSZ állapotba kell átlépni (g2).
5.2.6.6.3 Az XDCE-nek egy S-módú FOGADÁSRA NEM KÉSZ csomagot kell leadni a társ XDCE-nek akkor, ha az képtelen már több S-módú ADAT csomagot venni a társ XDCE-től a jelzett SVC-n. Ilyen körülmények között az XDCE-nek a Légijármű hálózati végponti berendezés /ADCE/ (Földi hálózati végponti berendezés /GDCE/) FOGADÁSRA NEM KÉSZ állapotba (f2) kell átlépni.

5.2.6.7 ÚJRAÁLLÍTÁS ELJÁRÁS

5.2.6.7.1 Amikor az XDCE S-módú VISSZAÁLLÍTÁS KÉRÉS-t vesz, akár a társ XDCE-től, akár a DCE-től (az újra-formátumozási folyamaton keresztül), vagy egy hiba állapot miatt, akkor elvégzi a saját visszaállítását, a következő műveleteket kell végrehajtani:
a) azokat az S-módú ADAT- csomagokat, amelyeket továbbításra kerültek a társ XDCE-hez, el kell távolítani az ablakból;
b) azokat az S-módú ADAT- csomagokat, amelyek nem kerültek továbbításra a társ XDCE-hez, de amelyeket egy olyan M-bit sorozat foglal magába, amelynek részére néhány csomagot már továbbítottak, törölni kell az átvitelre várakozó ADAT- csomagok sorából;
c) azokat a társ XDCE-től vett S-módú ADAT- csomagokat, amelyek egy nem teljes M-bit sorozat részei, érvényteleníteni kell;
d) az ablak alsó szélét 0-ra kell állítani, és a következő elküldött csomagnak 0 sorozatszámot (PS) kell adni;
e) bármely visszatartott S-módú MEGSZAKÍTÁS csomagot, amely az XDCE-től jön vagy oda megy, megerősítetlenül kell hagyni; és
f) minden S-módú MEGSZAKÍTÁS csomagot, amely továbbításra vár, érvényteleníteni kell;
g) a továbbításra váró adat csomagokat nem kell érvényteleníteni (kivéve, ha azok egy részben továbbított M-bit

sorozat részét képezik); és
h) a $d1$-nek történő továbbításnak magába kell még foglalnia az $i1, j1, f1$ és $g1$-hez való továbbítást is.
5.2.6.7.2 A visszaállítás eljárást az ADAT ÁTVITEL állapotra (p4) kell alkalmazni. A hiba eljárásnál az 5-16. táblázatban megadottakat kell követni. Bármely más állapotban a visszaállítás eljárást el kell hagyni.
5.2.6.8 A VISSZAUTASÍTÁSI ELJÁRÁS
5.2.6.8.1 Amikor az XDCE egy nem pontos formátumú S-módú ADAT csomagot vesz a társ XDCE-től, vagy olyant, amelynek csomag sorozatszáma (PS) nincs a meghatározott ablakon belül (5-19. táblázat) vagy sorrenden kívüli, akkor a vett csomagot érvényteleníteni kell és S-módú VISSZA-UTASÍTÁS csomagot kell elküldeni a társ XDCE-nek a keret feldolgozáson keresztül. Az S-módú VISSZAUTASÍTÁS csomagnak egy csomag sorozatszám /PR/ értéket kell jeleznie, azt, amelynél az S-módú ADAT csomagok újratovábbítását el kell kezdeni. Az XDCE-nek érvényteleníti azokat a következő sorozaton kívüli S-módú ADAT- csomagokat, amelyek fogadása az alatt történik, amíg az S-módú VISSZAUTASÍTÁS csomag válasz még elintézetlen.
5.2.6.8.2 Amikor az XDCE S-módú VISSZAUTASÍTÁS csomagot vesz a társ XDCE-től, akkor felfrissíti az alsó ablak értékét az új csomag sorozatszám /PR/ értékkel, és elkezdi a PR sorozatszámmal rendelkező csomagok újra-továbbítását.
5.2.6.8.3 A visszautasítás jelzést nem kell a DCE-nek továbbítani. Ha az ISO 8208 illesztés alátámasztja a visszautasítás eljárást, akkor azok a visszautasítás jelzések, amelyek az ISO 8208 interfészen jelennek meg, nem kerülnek átvitelre a DCE és XDCE között.

5.2.6.9 A CSOMAG ÚJ LEFUTÁS-TERVEZÉSE /ÚJRA-SORBARENDEZÉSE/ ÉS A KÉTSZEREZÉS LETILTÁSA

1. Megjegyzés. - Ha egy Kapcsolt virtuális áramkörnél /SVC/ a keretek mindkét típust (Szabvány hosszúságú közlemény /SLM/ és Kiterjesztett hosszúságú közlemény /ELM/) magukba foglalják, az eltérő kézbesítési idők miatt a csomagok sorozata elveszhet. A sorrendiség akkor is elveszhet, ha multiplikált lekérdezőket használnak a keretek kézbesítésére ugyanazon SVC-re egy adott Fedélzeti/Földi adatkapcsolat vezérlő egységhez /XDLP/. A következő eljárás korlátozottan javítani fogja az új lefutás-tervezés /újra-sorbarendezés/ beállítását.

2. Megjegyzés. - Ez a feldolgozás illesztésként szolgál a keretfeldolgozás és a Légijármű/Földi hálózati végponti berendezés /XDCE/ funkció között.

5.2.6.9.1 *Új lefutás-tervezés /újra-sorbarendezés/.* Az új lefutás-tervezést függetlenül kell végrehajtani az S-módú, a fedélzetre irányuló és a fedélzetről leadott adattovábbításra minden egyes Kapcsolt virtuális áramkörre /SVC/. A következő változókat és paramétereket kell használni:
SNR /Vett adat-csomag sorozatszám/Egy 6-bites változó, amely egy meghatározott SVC vett csomag sorozatszámát mutatja. Ezt a csomag sorozatszám /SN/ mezője tartalmazza (5.2.5.2.1.1.7)
NESN /Következő várt sorozatszám/A következő sorozatszám az egymás után következő sorozatszámokat követő szám.
HSNR /A vett adatcsomag sorozatszám legmagasabb értéke/Az SNR legnagyobb értéke az új lefutás-tervező /újra-sorbarendező/ ablakban.
Tq /Új lefutás-tervező időzítők/Azok az új lefutás-tervező /újra-sorbarendező/ időzítők (lásd az 5-1. és 5-13. táblázatot), amelyek a meghatározott SVC-hez kapcsolódnak.
A sorozatszámot (SN) magába foglaló összes műveletet a modulo 64 szerint kell végrehajtani.
5.2.6.9.2 *Kétszerező ablak.* A Vett csomag sorozatszám /SNR/ tartomány értékeket a Következő várt sorozatszám, az NESN-32 és az NESN-1 között inkluzív diszjunkcióval vagy ki kell jelölni a kétszerező ablakban.
5.2.6.9.3 *Az új lefutás-tervező /újra-sorbarendező/ ablak.* A Vett csomag sorozatszám /SNR/ tartomány értékeket az NESN+1 és NESN+31 között inkluzív diszjunkcióval kell kijelölni az új lefutás-tervező ablakban. Az ebben a tartományban lévő sorozatszámmal rendelkező vett csomagokat az új lefutás-tervező ablakban kell tárolni a sorozatszámok sorrendjében.

5.2.6.9.4 *ADATÁTVITELI FUNKCIÓK*

5.2.6.9.4.1 Minden egyes SVC-nél az első csomagnak, amelyet a kapcsolat létrehozásához küldenek el (az első S-módú HÍVÁSKÉRÉS vagy az első S-módú HÍVÁS ELFOGADÁS csomag), a Sorozatszám /SN/ mező értékének nullával történő kezdését kell létrehoznia. Az SN mező értékét minden egyes csomag átvitel (vagy újra-átvitel) után

meg kell emelni.
5.2.6.9.4.2 A nyugtázatlan sorozatszámok maximális száma 32 egymást követő SN szám lehet. Amennyiben ez az állapot bekövetkezik, akkor azt egy hibaként kell kezelni, és a csatornát törölni kell.

Megjegyzés. - A nyugtázatlan csomagok számának korlátozása azért szükséges, mivel az SN mező hat bit hosszúságú, és ezért maximálisan 64 különböző értéke van, mielőtt az értékek ismétlődnek.

5.2.6.9.5 *VÉTEL FUNKCIÓK*

5.2.6.9.5.1 *Új lefutás-tervezés /újra-sorbarendezés/.* Az új lefutás-tervező algoritmus meg tartja a vett adat-csomag sorozatszám legmagasabb értéke /HSNR/ és a Következő várt sorozatszám /NESN/ változókat minden egyes SVC-re. Az NESN-t 0 kezdeti értékre kell állítani az összes SVC-nél és újra 0-ra kell állítani akkor, amikor az SVC újra belép a csatorna-szám poolba (5.2.5.1.2).
5.2.6.9.5.2 *A csomagok feldolgozása a kétszerező ablakon belül.* Ha egy csomagot a kétszerező ablakon belüli sorozatszám értékkel vesznek, akkor a csomagot érvényteleníteni kell.
5.2.6.9.5.3 *A csomagok feldolgozása az új lefutás-tervező /újra-sorbarendező/ ablakon belül.* Ha egy csomagot az új lefutás-tervező ablakon belüli sorozatszám értékkel vesznek, akkor ezt érvényteleníteni kell, mint duplikátot, ha egy ugyanolyan sorozatszámú csomagot már vettek és az újra-sorbarendezési ablakban már tárolták. Egyéb esetben a csomagot az új lefutás-tervezési /újra-sorbarendezési/ ablakban kell tárolni. Azután, ha nincs *Tq* futó óra-regiszter, akkor a *HSNR* értéket az *SNR* értékére kell állítani ennél a csomagnál, és egy *Tq* időzítőt kell indítani ezzel a kezdeti értékével (5-1. és 5-13. táblázat). Ha legalább egy *Tq* óra-regiszter fut, és az *SNR* nincs az *NESN* és *HSNR*+1 inkluzív diszjunkció között, akkor egy új *Tq* időzítőt kell indítani és a *HSNR* értékét fel kell frissíteni. Ha legalább egy *Tq* óra-regiszter működik, és az *SNR* ennél a csomagnál egyenlő *HSNR*+1-el, akkor a *HSNR* értékét kell frissíteni.
5.2.6.9.5.4 *A csomagok leválasztása az XDCE részére*. Ha egy csomagot az NESN-el egyenlő sorozatszámmal vesznek, akkor a következő eljárást kell alkalmazni:
a) a csomagot és minden, az újra-sorbarendezési ablakban már tárolt csomagokat egészen a következő hiányzó sorozatszámig, továbbítani kell az XDCE-nek;
b) az *NESN*-t 1+ értékre az XDCE-hez továbbított utolsó csomag sorozatszámának értékére kell állítani; és
c) a felszabadított csomagok mindegyikéhez tartozó *Tq* időzítőt le kell állítani.
5.2.6.9.6 *A Tq időzítő lejárati ideje.* Ha egy *Tq* időzítő lejár, akkor a következő eljárást kell alkalmazni:
a) a Következő várt sorozatszámot /*NESN*/ addig kell emelni, amíg a következő hiányzó sorozatszám nem észlelhető azután, hogy a *Tq* időzítőhöz kapcsolt csomag sorozatszáma lejárt;
b) minden olyan tárolt csomagot, amelynek a sorozatszáma már nincs az újra-sorbarendezési ablakban, továbbítani kell az XDCE-hez, kivéve azt, hogy a nem teljes S-bit sorozatot érvényteleníteni kell; és
c) a leválasztott csomaghoz tartozó *Tq* időzítőt le kell állítani.

5.2.7 S-módú specifikus szolgáltatás feldolgozás

Az S-módú specifikus szolgáltatásokon keresztül továbbított adat formátumoknak és protokolloknak azoknak kell lenniük, amelyek az ehhez a fejezethez kapcsolódó Függelékben meghatározásra kerültek. S-módú specifikus szolgáltatásokat az XDLP-ben lévő entitásnak kell feldolgoznia, amit S-módú specifikus szolgáltatási entitásnak (SSE) neveznek.

1. Megjegyzés. - Ez a szakasz az S-módú specifikus szolgáltatási illesztőtől vett vezérlés és közlemény adatfeldolgozásokat írja le.

2. Megjegyzés. - A vezérlő adatok olyan információkból állnak, amelyek lehetővé teszik például a közlemény hosszúság, az egy meghatározott tároló adat formátumához való hozzáféréshez használatos BDS kódot és a légijármű címzés meghatározását.

3.Megjegyzés.-Ez a szakasz leírja az S-módú specifikus szolgáltatási interfésztől kapott közlemény adatok feldolgozását.

4. Megjegyzés.- A kontroll adatok lehetővé teszik például a egy közlemény hosszúságának meghatározását, a felhasznált BDS kód pedig egy külön regiszterhez való hozzáférést nyújt, egy légijármű címéhez.

5.2.7.1 FEDÉLZETI ADATKAKPCSOLAT VEZÉRLŐ EGYSÉG /ADLP/ FELDOLGOZÁSA

5.2.7.1.1 *A FEDÉLZETRŐL LEADOTT ADAT FELDOLGOZÁSA*
5.2.7.1.1.1 *Specifikus szolgáltatási teljesítőképesség.* Az ADPL-nek képes vezérlő és közlemény adatok vételére az S-módú specifikus szolgáltatás illesztés(ek)től, és kézbesítési közlemények küldésére ezen interfész részére. A vezérlő adatokat fel kell dolgozni azért, hogy meghatározzák a protokoll típust és a közlemény adat hosszát. Amikor ennél az interfésznél a szolgáltatott közlemény vagy vezérlő adatok hibásak (azaz nem teljesek, érvénytelenek vagy ellentmondásosak), akkor az ADLP érvényteleníti a közleményt és hibajelzést kézbesít az interfésznél.

Megjegyzés. - A diagnosztika tartalom és hibajelzési mechanizmus helyi kérdés.

5.2.7.1.1.2 *Az általános adásfeldolgozás.* A vezérlő és közlemény adatokat kell felhasználni a B-közleményű /Comm-B/ általános adású közlemények formátumozására, ahogy az az 5.2.7.5 pontban meghatározásra került, és azt kell továbbítani a válaszjeladóhoz.
5.2.7.1.1.3 *A földről kezdeményezett B-adatátvitel /GICB/ feldolgozása.* A 8-bites B-adatátvitel kiválasztás /BDS/ kódot a vezérlő adatokból kell megállapítani. A 7-bites tároló tartalom a vett közlemény adatokból kerül kiválasztásra. A tárolótartalmat a válaszjeladónak kell továbbítani, ami a meghatározott tároló számának jelzésére szolgál. A légi-kezdeményezésű Comm-B tárolók egyikének, vagy az Összeütközési veszélyt jelző fedélzeti rendszer (ACAS) aktív megoldási tanácsadás tároló címzésére vonatkozó kérést érvényteleníteni kell. A tárolók kijelölése az 5-24. táblázatban meghatározottak szerint történjen.

Megjegyzés.- A válasz jeladó impulzustárolókban 40, 50 és 60 (HEX) hozzáférhető adatokkal kapcsolatban intézkedéseket írtak elő néhány ICAO régióban az ATM alkalmazások támogatására.

5.2.7.1.1.4 *Az S-módú specifikus protokoll / MSP/ feldolgozása*
5.2.7.1.1.4.1 Az MSP közlemény hosszát, a csatorna-számot (M/CH) (5.2.7.3.1.3) és választhatóan a lekérdező azonosító (II) kódot a vezérlő adatokból kell meghatározni. Az MSP közlemény tartalmat a vett közlemény adatokból kell kivonatolni. Ha a közlemény hossz 26 bájt vagy kevesebb, az S-módú szolgáltatás entitás /SSE/ egy légi kezdeményezésű B-adatátvitel /Comm-B/ közleményt formál (5.2.7.1.1.4.2) a válaszjeladóhoz történő továbbításra a rövid formájú S-módú specifikus protokoll /MSP/ csomag felhasználásával (5.2.7.3.1). Ha a közlemény hossza 27 - 159 bájt és a válasz-jeladó rendelkezik az elegendő fedélzetről továbbított Kiterjesztett hosszúságú közlemény /ELM/ adási teljesítőképességgel, akkor az SSE-nek egy ELM közleményt formál a válaszjeladóhoz történő továbbításra, a rövid formájú MSP csomagot használva. Ha a közlemény hossza 27 - 159 bájt és a válaszjeladónak korlátozott a fedélzetről leadott Kiterjesztett hosszúságú közlemény /ELM/ adási teljesítőképessége, akkor az SSE-nek multiplikált hossz formátumú MSP csomagokat formál (5.2.7.3.2) az ELM közlemények felhasználásával, ahogy szükséges, az L-bit és az M/SN mezőknek a csomagok társításához való felhasználásával. Ha a közlemény hossza 27 - 159 bájt és a válaszjeladó nem rendelkezik fedélzetről leadott Kiterjesztett hosszúságú közlemény /ELM/ adási teljesítőképességgel, akkor az SSE-nek multiplikált hossz formátumú MSP csomagokat formál (5.2.7.3.2), a légi kezdeményezésű B-adatátvitel közlemények /Comm-B/ felhasználásával, ahogy szükséges, az L-bit és az M/SN mezőknek a csomagok társításához való felhasználásával. Egymástól különböző keret típusokat sohasem lehet felhasználni az MSP közlemények kézbesítéséhez. A 159 bájtnál hosszabb közleményeket érvényteleníteni kell. A fedélzetről leadott MSP csatorna-számokat az 5-25. táblázatban meghatározottak szerint kell kijelölni.
5.2.7.1.1.4.2 Az S-módú specifikus protokollnál /MSP/ az egy csomag küldésére vonatkozó kérésnek létre kell hoznia a lekérdezőhöz való olyan több helyre irányított csomagját, amelynél a Lekérdező azonosító /II/ kód a vezérlés adatban van meghatározva. Ha nincs II kód meghatározva, akkor a csomagot fedélzetről leadott közleményként kell továbbítani a légi kezdeményezésű protokoll felhasználásával. Ehhez a csomaghoz egy közlemény kézbesítési figyelmeztetést kell biztosítani az S-módú specifikus interfész részére akkor, amikor a megfelelő lezárás (oka)t a válaszjeladótól vették. {} Ha a lezárást a válaszjeladótól nem vettek Tz másodpercen belül, ahogyan az az 5-1. táblázatban meg van határozva, akkor az MSP csomagot érvényteleníteni kell. Ez magába foglalja az ehhez a csomaghoz kapcsolódó bármely keret törlését a válaszjeladóban. Ehhez a közleményhez egy kézbesítési meghibásodás figyelmeztetést kell biztosítani az S-módú specifikus szolgáltatás illesztés részére.

5.2.7.1.2 *A FEDÉLZETRE IRÁNYULÓ ADAT FELDOLGOZÁSA*

Megjegyzés. - Ez a szakasz a válaszjeladótól vett S-módú specifikus szolgáltatási közlemények feldolgozását ismerteti.

5.2.7.1.2.1 *Specifikus szolgáltatási teljesítőképesség.* A Fedélzeti adatkapcsolat vezérlő egységnek /ADLP/ képesnek kell lenni a válaszjeladótól a keret feldolgozáson keresztül érkező S-módú specifikus szolgáltatási közlemények vételére. Az ADLP-nek képesnek kell lenni a közlemények és a hozzájuk tartozó vezérlési adatok kézbesítésére a specifikus szolgáltatás illesztésnél. Amikor az ennél az illesztésnél kiosztott erőforrás hozzárendelések elégtelenek a kimenő adatok befogadására, akkor az ADLP-nek a közleményt érvényteleníteni kell, és hibajelentést kézbesít ennél az illesztésnél.

Megjegyzés. - A diagnosztikai tartalom és a hiba jelentési mechanizmus helyi kérdés.

5.2.7.1.2.2 *Az általános adás feldolgozása.* Ha a vett közlemény egy általános adású A-adatátviteli /Comm-A/, ahogy azt a válaszjeladó/ADLP illesztésen keresztül érkezett vezérlési adatok jelzik, az általános adás azonosítóját /ID/ és a felhasználói adatokat (5.2.7.5) kell továbbítani az S-módú specifikus szolgáltatás illesztésnek (5.2.3.2.1) a vezérlési adatokkal együtt, amely azonosítja azt, hogy ez egy általános adású közlemény. A fedélzetre irányuló általános adás azonosító számai kijelölésének az 5-23. táblázatban meghatározottaknak megfelelőnek kell lenni.
5.2.7.1.2.3 *Az S-módú specifikus protokoll /MSP/ feldolgozása*. Ha a vett közlemény egy MSP, ahogy azt a csomag formátum fejrész jelezte (5.2.7.3), a vett MSP csomag felhasználói adat mezőjét továbbítani kell az S-módú specifikus szolgáltatás illesztéshez (5.2.3.2.1) az MSP csatorna-számmal (M/CH) együtt, valamint a Lekérdező azonosító részmezőt /IIS/ (5.2.2.1.1.1) a vezérlés adatokkal együtt, amelyek azt egy MSP közleménynek azonosítják. Az L-bit feldolgozást az 5.2.7.4 pontban foglaltak szerint kelll elvégezni, ahogy az. A fedélzetre irányuló MSP csatorna-számok kijelölése az 5-25. táblázatban megadottak szerint történjen.

5.2.7.2 A FÖLDI TELEPÍTÉSI RENDSZERŰ ADATKAPCSOLAT VEZÉRLŐ EGYSÉG /GDLP/ FELDOLGOZÁS

5.2.7.2.1 *A FEDÉLZETRE IRÁNYULÓ ADAT FELDOLGOZÁSA*
5.2.7.2.1.1 *Specifikus szolgáltatási teljesítőképesség.* A GDLP képes a vezérlési és a közlemény adatok vételére az S-módú specifikus szolgáltatás illesztés(ek)től (5.2.3.2.2) és kézbesítési értesítések küldésére az illesztés(ek) részére. A vezérlési adatokat fel kell dolgozni a protokoll típus és a közlemény adat hossz meghatározásához.
5.2.7.2.1.2 *Az általános adás feldolgozása.* A GDLP meghatározza a lekérdező(ke)t, az általános adás oldalszögeket és a letapogatási időket a vezérlési adatokból és az általános adás közlemény formátumából a lekérdezőhöz történő továbbítás céljából, az 5.2.7.5 pontban foglaltak szerint.
5.2.7.2.1.3 *A földről kezdeményezett B-adatátvitel /GICB/ feldolgozása.* A GDLP meg határozza a tároló számot és a légijármű címzést a vezérlési adatokból. A légijármű címzést és a B-adatátvitel adat-kiválasztás /BDS/ továbbítja a lekérdezőnek egy földi kezdeményezésű B-adatátvitel /Comm-B/ kéréseként.
5.2.7.2.1.4 *S-módú specifikus protokoll /MSP/ feldolgozás.* A Földi telepítési rendszerű adatkapcsolat vezérlőegységnek /GDLP/ a vezérlési adatokból kivonatolja a közlemény hosszt, az MSP csatorna-számot (M/CH) és a légijármű címzést, és a közlemény tartalmat a közlemény adatokból kapja meg. Ha a közlemény hossz 27 bájt vagy kevesebb, akkor az S-módú szolgáltatás entitásnak /SSE/ egy A-adatátvitel /Comm-A/ közleményt formál a lekérdezőhöz való továbbításra a rövid formájú MSP csomag felhasználásával (5.2.7.3.1). Ha a közlemény hosszúság 28 és 151 bájt közötti, és a válaszjeladó rendelkezik fedélzetre irányuló Kiterjesztett hosszúságú közlemény /ELM/ teljesítőképességgel, az SSE egy ELM közleményt formál a lekérdezőhöz való továbbítás céljából a rövid formájú MSP csomag felhasználásával. Ha a közlemény hosszúság 28 és 151 bájt közötti és a válaszjeladó nem rendelkezik fedélzetre irányuló ELM teljesítőképességgel, akkor az SSE multiplikált hosszú formájú MSP csomagokat formál (5.2.7.3.2), kihasználva az L-bit és az M/SN mezőket a csomagok összekapcsolásához. A 151 bájtnál hosszabb közleményeket érvényteleníteni kell. A lekérdező egy kézbesítési értesítést biztosít az S-módú specifikus szolgáltatási illesztés részére, ezzel jelezve az eredményes vagy eredménytelen kézbesítést minden egyes fedélzetre irányuló adatátviteli csomagnál.

5.2.7.2.2 *A FEDÉLZETRŐL LEADOTT ADAT-FELDOLGOZÁS*

5.2.7.2.2.1 *Specifikus szolgáltatás teljesítőképesség.* A Földi telepítési rendszerű adatkapcsolat vezérlő egység /GDLP/ képes az S-módú specifikus szolgáltatási közlemények vételére a lekérdezőtől a keret feldolgozáson keresztül.
5.2.7.2.2.2 *Az általános adás feldolgozása.* Ha a vett közlemény egy általános adású B-adatátvitel /Comm-B/, a

lekérdező/GDLP illesztése által jelezve, akkor a GDLP:
a) vezérlési adatokat hoz létre, amelyekkel jelzi az általános adású közlemény, valamint annak a légijárműnek a 24-bites légijármű címzése jelenlétét, amelytől a közlemény vételre került;
b) hozzáteszi a B-adatátvitelű általános adás 7-bájtos B-adatátvitelű közlemény /MB/ mezőjét; és
c) továbbítja ezeket az adatokat az S-módú specifikus szolgáltatás illesztés(ek)nek (5.2.3.2.2).
5.2.7.2.2.3 *A földről kezdeményezett B-adatátvitel /GICB/ feldolgozása*. Ha a vett közlemény egy GICB, ahogyan a lekérdező/GDLP illesztése azt jelzi, a GDLP-nek
a) vezérlési adatokat hoz létre, amellyel jelzi az általános adású közlemény jelenlétét, a tároló számát és annak a légijárműnek a 24-bites légijármű címzését, amelytől a közlemény vételre került;
b) hozzá teszi a GIBC 7-bájtos B-adat-átviteli közlemény /MB/ mezőjét; és
c) továbbítja ezeket az adatokat az S-módú specifikus szolgáltatás illesztés(ek)nek (5.2.3.2.2).
5.2.7.2.2.4 *Az S-módú specifikus protokoll /MSP/ feldolgozása*. Ha a vett közlemény egy MSP, ahogyan ezt a csomag formátum fejléce jelzi (5.2.7.3), akkor a GDLP
a) vezérlési adatokat hoz létre, amelyekkel jelzi az MSP adattovábbítást, a közlemény hosszát és az MSP csatorna-számot (M/CH), valamint annak a légijárműnek a 24-bites címét; amelyből a közlemény vételre került;
b) hozzá kell tennie a vett MSP köteg felhasználói adat mezőjét; és
c) továbbítja ezeket az adatokat az S-módú specifikus szolgáltatás illesztés(ek)nek (5.2.3.2.2).
Az L-bit feldolgozását az 5.2.7.4 pontban meghatározottak szerint kell végrehajtani.

5.2.7.3 S-MÓDÚ SPECIFIKUS PROTOKOLL /MSP/CSOMAG FORMÁTUMOK

5.2.7.3.1 *Rövid formátumú MSP csomag.* A formátumnak ennél a csomagnál a következőnek kell lennie:

DP: 1	MP: 1	M/CH: 6	FILL1: 0 v. 6	UD: v

Adat-csomag S-módú spec. protokoll MSP csatorna-szám Kitöltés Felhasználói adatmező

5.2.7.3.1.1 *Adat csomag típus (DP).* Ezt a mezőt 0-ra kell állítani.
5.2.7.3.1.2 *MSP csomag típus (MP).* Ezt a mezőt 0-ra kell állítani.
5.2.7.3.1.3 *MSP csatorna-szám (M/CH):* Ezt a mezőt az SSE vezérlési adatokból nyert csatorna-számra kell állítani.
5.2.7.3.1.4 *Kitöltés mező (FILL1: 0 vagy 6):* A töltés hossz 6 bit egy fedélzetről leadott Szabvány hosszúságú közlemény /SLM/ keret esetén. Más esetben a töltés hossz 0.
5.2.7.3.1.5 *Felhasználói adatmező (UD)*. A felhasználói adatmező az S-módú specifikus szolgáltatás illesztéstől vett közleményt foglalja magába (5.2.3.2.2).
5.2.7.3.2 *Hosszú formátumú MSP csomag*. A formátumnak ennél a csomagnál a következő:

DP: 1 MP: 1 SP: 2 L: 1 M/SN: 3 FILL2: 0 v.2 M/CH: 6 UD: v
Adat-csomag S-módú spec. protokoll Felügyelő csomag L-bitsorozat MSPsorozatszám Kitöltés MSP csatorna-szám Felhasználói adatmező
A csomag formátumban bemutatott és a következő pontokban nem meghatározott mezőket az 5.2.5.2.1 pontban előírtak szerint kerül beállításra.
5.2.7.3.3 *Adat csomag típus (DP).* Ezt a mezőt 0-ra kell állítani.
5.2.7.3.3.1 *S-módú specifikus protokoll sorozatszám (MP).* Ezt a mezőt 1-re kell állítani.
5.2.7.3.3.2 *Felügyelő csomag (SP)*. Ezt a mezőt 0-ra kell állítani.
5.2.7.3.3.3 *L mező (L).* Az 1 érték azt jelzi, hogy a csomag részét képezi egy olyan L-bit sorozatnak, amelynek több csomagja az ezután következő sorozatban van. A 0 érték azt jelzi, hogy a sorozat ezzel a csomaggal végződik.
5.2.7.3.3.4 *MSP sorozatszám mező (M/SN)*. Ez a mező az L-bit sorozatok kézbesítésében lévő megkettőződések észlelésére használatos. Az első csomag részére egy L-bit sorozatban a 0 sorozatszámot kell kiosztani. A reá következő csomagok számozása a megfelelő sorrendben történik. Egy olyan csomagot, melyet ugyanazon sorozatszámmal vesznek, mint az előzőleg vett csomagé, érvényteleníteni kell.
5.2.7.4 *L-bit feldolgozás.* L-bit feldolgozást csak a hosszú formátumú MSP csomagon kell elvégezni és az M-bit feldolgozásnál meghatározott módon végrehajtani (5.2.5.1.4.1), kivéve a következő pontokban meghatározott eseteket.
5.2.7.4.1 Egy hosszú formátumú MSP csomag fogadásakor a Fedélzeti/Földi adatkapcsolat vezérlő egység /XDLP/ létrehozza a felhasználói adatmezőt a következők szerint:

a) Igazolja, hogy a csomag sorrend helyes az M/SN mező felhasználásával (5.2.7.3.2);
b) Feltételezi, hogy a felhasználói adatmező az MSP csomagban az integráló bájtok közül a legnagyobb számú a keretben;
c) Összekapcsol minden egyes felhasználói adatmezőt egy MSP csomagban, amelyet egy előző felhasználói adatmezővel egy MSP olyan csomagban vettek, amelynek 1-es az L-bit értéke; és

Megjegyzés. - A felhasználói adatmező megcsonkítása nem megengedett, mivel azt egy hiba- állapotként kezelendő.

d) Ha egy MSP csomag feldolgozásnál hibát észlelnek, akkor a csomagot érvényteleníteni kell.

5.2.7.4.2 Egy L-bit sorozat feldolgozásánál az XDLP minden olyan MSP csomagot érvénytelenít, amelynek kétszerezett M/SN értéke van. Az XDLP a teljes L-bit sorozatot érvényteleníteni fogja, ha egy hosszú formátumú MSP csomag úgy kerül meghatározásra, hogy hiányzik az M/SN mező felhasználása.
5.2.7.4.3 Bármely L-bit sorozathoz kapcsolódó olyan csomagot, amelynek újra-összeállítása nem fejeződik be Tm másodpercen belül, (5-1. és 5-13. táblázat) érvényteleníteni kell.

5.2.7.5 *AZ ÁLTALÁNOS ADÁS FORMÁTUMA*

5.2.7.5.1 *A fedélzetre irányuló általános adás.* Az A-adat-átvitelű /Comm-A/ általános adás formátumának a következő: A 83-bites fedélzetre irányuló általános adást be kell iktatni egy fedélzetre irányuló A-adatátvitel keretbe. Az A-adatátvitel keret MA mezője magába foglalja az első 8 bitjében azt az általános adás azonosítót, ami az 5-23. táblázatban került meghatározásra, majd ezt követi az általános adású közlemény első 48 felhasználói adat bitje. Az általános adású közlemény utolsó 27 felhasználói adat bitjét közvetlenül az A-adatátvitel keret UF mezőjét követő 27 bitben kell elhelyezni.
5.2.7.5.2 *Fedélzetről leadott általános adás.* A B-adatátvitelű /Comm-B/ általános adás formátuma a következő: Az 56-bites fedélzetről leadott általános adás beiktatandó a B-adatátvitel MB mezőjébe. Az MB mező magába foglalja az első 8 bitjében azt az általános adás azonosítót, ami az 5-23. táblázatban került meghatározásra, majd ezt követi az első 48 felhasználói adat bit.

5.2.8. Az S-módú alhálózat irányítása

5.2.8.1 LEKÉRDEZŐ ADATKAPCSOLAT MEGHATÁROZÁSI FUNKCIÓ

Megjegyzés. - A Fedélzeti adatkapcsolat vezérlő egység /ADLP/ lekérdező adatkapcsolat meghatározási funkció kiválasztja az S-módú lekérdező lekérdező azonosító /II/ kódját, amelyen keresztül egy S-módú alhálózati csomagot a kívánt földi rendeltetési Lekérdező adat végponti berendezéshez /DTE/ lehet juttatni.

5.2.8.1.1 *Lekérdező azonosító /II/ kód - Lekérdező azonosító végponti berendezés /DTE/ címzés viszonosság.* A Fedélzeti adatkapcsolat vezérlő egységnek /ADLP/ kell összeállítani és kezelni egy S-módú Lekérdező adat végponti berendezés (DTE) kereszt-referencia táblázatot, amelynek bejegyzései: S-módú lekérdező azonosító (II) kódok és azok a földi DTE címzések, amelyek a földi Légiforgalmi távközlési hálózat /ATN/ útválasztó vagy más földi DTE-kkel kapcsolódnak. A II kód - DTE kereszt-referencia táblázatnak a 4-bites S-módú II kódból és a földi DTE 8-bites bináris beírásából kell állnia.

1. Megjegyzés. - A félreérthetetlen címzés követelménye miatt egy DTE címzés egy Földi telepítési rendszerű adatkapcsolat vezérlő egységet /GDLP/ is egyértelműen azonosít

.

2. Megjegyzés. - Egy ATN útválasztónak több földi DTE címzése is lehet.

5.2.8.1.2 *Protokoll.* A következő eljárásokat kell használni:
a) Amikor a Földi telepítési rendszerű adatkapcsolat vezérlő egység /GDLP/ légijármű jelenlétét először észleli, vagy kapcsolatot észlel egy éppen befogott légijárművel egy lekérdezőn keresztül egy új Lekérdező azonosító /II/ kóddal, akkor az ADATKAPCSOLAT TELJESÍTŐKÉPESSÉG jelentés megfelelő mezőitől kerül meghatározásra, hogy vajon a légijármű rendelkezik-e azzal a teljesítőképességgel, ami az adat-cserében való részvételéhez szükséges. Az adatkapcsolat teljesítőképesség pozitív meghatározása után GDLP-nek felküldi a fedélzetre egy vagy több S-módú

ÚTVÁLASZTÓ csomagot az 5.2.5.3.3 pontban foglaltak szerint. Ez az információ az S-módú Lekérdező azonosító /II/ kódra vonatkozik azokkal a földi DTE címzésekkel együtt, amelyek ezen a lekérdezőn keresztül érhetők el. A Fedélzeti adatkapcsolat vezérlő egységnek /ADLP/ frissíti az II kód - DTE kereszt-referencia táblázatot és azután érvényteleníteni az S-módú ÚTVÁLASZTÓ csomag(oka)t;
b) A Lekérdező azonosító /II/ kód - DTE kereszt-referencia táblázat bejegyzése törlendő akkor, amikor egy S-módú ÚTVÁLASZTÓ csomag erre parancsot ad, vagy amikor az ADLP felismeri, hogy a transzponder még nem került szelektív lekérdezésre egy S-módú lekérdező által egy adott II kóddal Ts másodperc alatt a Lekérdező azonosító almező /IIS/ általi ellenőrzéssel az S-módú légtér-ellenőrzésben, vagy az A-adatátviteli /Comm-A/ lekérdezésekben (5-1 táblázat);
c) Amikor a Földi telepítési rendszerű adatkapcsolat vezérlő egység /GDLP/ meghatározza, hogy módosítás szükséges az S-módú lekérdező kijelölésben, akkor egy vagy több S-módú ÚTVÁLASZTÓ csomagot továbbít a Fedélzeti adatkapcsolat vezérlő egységnek /ADLP/. Az S-módú ÚTVÁLASZTÓ csomagba foglalt felfrissített információt az ADLP a kereszt-referencia táblázat módosítására használja fel. A kiegészítéseket a törlések előtt fel kell dolgozni;
d) Amikor a GDLP az első ÚTVÁLASZTÓ csomagot küldi egy S-módú adatkapcsolattal ellátott légijármű lekérdezése után, az Induló állapot /IN/ bitet EGY-re kell állítani. Ez az érték az ADLP-nél végrehajtja az eljárásokat az 5.2.6.3.3.3 pontban foglaltak szerint. Más esetben az IN bitet NULLA-ra kell állítani;
e) Amikor az ADLP-nél egy alaphelyzet beállítás történik (pl. áramellátási eljárás után), akkor az ADLP egy keresés-kérést ad le egy B-adatátvitelű általános adás közlemény küldésével az általános adás azonosító 'egyenlő 255' segítségével, (FF16, az 5-23. táblázatban foglaltak szerint), és a megmaradó 6 bájt felhasználatlan. A keresés kérést fogadva, a GDLP egy vagy több S-módú ÚTVÁLASZTÓ csomaggal válaszol és törli az ADLP-hez kapcsolódó összes Kapcsolt virtuális áramkört /SVC/ az 5.2.6.3.3 pont értelmében és érvényteleníti a keresés kérést. Ily módon az ADLP alaphelyzetbe állítja az II kód - DTE kereszt-referencia táblázatot.
f) Egy frissítési kérés fogadásában (5-23. táblázat) egy GDLP egy vagy több S-módú ÚTVÁLASZTÓ csomaggal válaszol, és érvényteleníteni a frissítés kérést. Ez az ADLP-t az II kód - DTE kereszt-referencia táblázat felfrissítésére készteti.

Megjegyzés. - A felfrissítés kérést az ADLP kivételes körülmények között (pl. áttérés tartalék egységre) használhatja a Lekérdező azonosító /II/ kód - DTE kereszt-referencia táblázata tartalmának ellenőrzésére.

5.2.8.1.3 *A FEDÉLZETRŐL LEADOTT ELJÁRÁSOK S-MÓDÚ CSOMAGOK ELJÁRÁSAI*

5.2.8.1.3.1 Amikor a Fedélzeti adatkapcsolat vezérlő egységnek /ADLP/ egy, a fedélzetről leadandó csomagja van, akkor a következő eljárásokat kell alkalmazni:
a) *HÍVÁSKÉRÉS csomag.* Ha a továbbítandó csomag egy S-módú HÍVÁSKÉRÉS, akkor a földi Lekérdező adat végponti berendezés /DTE/ címzés mezőjét meg kell vizsgálni, és össze kell kapcsolni a kapcsolt S-módú lekérdezővel, a Lekérdező azonosító /II/ kód - DTE kereszt-referencia táblázatot felhasználva. A csomagot a fedélzetről továbbítandó a több helyre irányított protokoll felhasználásával. Egy kérés a csomagnak egy olyan DTE címzéshez történő továbbítására, amely nincs a kereszt-referencia táblázatban, az 5.2.6.3.3.1 pontban meghatározott tevékenységet végzi
b) *Egyéb Kapcsolt virtuális áramkör /SVC/ csomagok.Ahhoz, hogy e*gy SVC csomagot tudjon küldeni egy földi DTE számára, a csomagnak több helyre irányíthatónak kell lennie az utolsó S módú lekérdezőhöz, amelyet sikeresen továbbít akár fedélzetre irányuló, vagy fedélzetről leadott csomag esetében a DTE-hez, ha az S-módú lekérdező éppen a Lekérdező azonosító II kód-DTE kereszt-rederencia táblázatban van.. Egyéb esetekben az SVC csomagot le kell adni a fedélzetről a több helyre irányított protokoll felhasználásával bármely olyan más S-módú lekérdező részére, amely kapcsolódik a meghatározott földi DTE címzéshez.
Az 5. szintű válaszjeladók részére megengedett a további lekérdezők használata fedélzetről leadott közlemény átvitelre az II kód - DTE kereszt-referencia táblázatban jelzettek szerint.
5.2.8.1.3.2 Egy fedélzetről leadott keret továbbítás eredményesnek határozható meg akkor, ha a B-adatátvitele vagy ELM lezárása a válaszjeladótól Tz másodpercen vételre kerül, az5-1 táblázatban foglaltak szerint. Ha a kísérlet nem eredményes és egy SVC csomagot kell elküldeni, akkor az II kód - DTE kereszt-referencia táblázatot meg kell vizsgálni egy másik bejegyzésnél ugyanazzal a hívott földi DTE címzéssel és egy eltérő S-módú II kóddal. Az eljárást újra meg kell kísérelni több helyre irányított protokoll felhasználásával az új S-módú lekérdezővel. Ha nincsenek bejegyzések a kívánt hívott DTL-nél, vagy az összes bejegyzés sikertelen kísérletet eredményez, akkor kapcsolat hibát kell bejelenteni (5.2.8.3.1).

5.2.8.2 A LEKÉRDEZŐ ADAT VÉGPONTI BERENDEZÉS(EK) /DTE-k/ TÁMOGATÁSA

5.2.8.2.1 *A Földi telepítési rendszerű adatkapcsolat vezérlő egység /GDLP/ összekapcsolhatósági jelentése.* A GDLP-be jelenti a földi DTE-(k) részére az egy S-módú adatkapcsolattal ellátott légijármű elérhetőségét ("összekapcsolási eset"). A GDLP- továbbá arról is tájékoztatja a földi DTE-ket, amikor ilyen légijárművel már nem áll fenn a kapcsolat azon a GDLP-n keresztül ("elhagyás eset"). A GDLP-nek értesítést kell küldenie (kérésre) arról az összes S-módú adatkapcsolattal ellátott légijárműről, amelyik azzal a GDLP-vel kapcsolatban áll. Az értesítésekben meg kell adni a földi Légiforgalmi távközlési hálózat /ATN/ útválasztót a mozgó ATN útválasztó alhálózati csatlakozás pont (SNPA) címzést, a légijármű helyzetével együtt, és a szolgáltatás minőségét, mint választható paramétereket. A mozgó ATN útválasztó SNPA-jának a DTE címzésnek kell lenni, amelyet a légijármű címzés és a 0 alcím alkot (5.2.3.1.3.2).
5.2.8.2.2 *A Fedélzeti adatkapcsolat vezérlő egység /ADLP/ összekapcsolhatósági jelentése.* Az ADLP-bejelenti az összes légijármű DTE-t, amikor egy földi DTE utolsó megmaradó bemenete törlésre kerül a Lekérdező azonosító /II/ kód - DTE kereszt-referencia táblázatból (5.2.8.1.1). Ennek az értesítésnek magába kell foglalnia ennek a DTE-nek a címzését.
5.2.8.2.3 *Összeköttetési követelmények.* Az alrendszer össze-kapcsolhatósági változás összeköttetési mechanizmusának egy megerősített szolgáltatásnak kell lenni, például az összekapcsolási elhagyási eseteknél, amelyek engedélyezik az összekapcsolhatósági állapot bejelentését.
5.2.8.3 HIBA ELJÁRÁSOK

5.2.8.3.1 *Kapcsolat meghibásodás*. Egy csomagnak a vonatkozott XDLP-hez való kézbesítésében bekövetkezett hibát azután, hogy valamennyi rendelkezésre álló lekérdezőn keresztül kísérletet tettek ennek a csomagnak a kézbesítésére, kapcsolat szint hibaként kell bejelenteni. Egy Kapcsolt virtuális áramkörnél /SVC/ a Légijármű/Földi hálózati berendezésnek /XDCE/ a p1 állapotba kell belépni, és le kell választania az ehhez a csatornához kapcsolódó összes adatforrást. Ennek magába kell foglalnia az ehhez az SVC-hez kapcsolódó bármelyik válaszjeladójában lévő keret törlését. Egy S-módú TÖRLÉSKÉRÉS csomagot kell elküldeni a Hálózati végponti berendezésnek /DCE/ az újra-formátumozási folyamaton keresztül, és a DCE-nek úgy kell továbbítani azt, mint egy ISO 8208 csomagot a helyi Lekérdező adat végponti berendezés /DTE/ részére, ahogy az az 5.2.6.3.3 pontban leírásra került. A légijármű oldaláról a csatorna nem térhet vissza a Légijármű hálózati végponti berendezés /ADCE/ csatorna pool-ba, azaz nem térhet vissza a p1-be addig, amíg a kapcsolat hiba bejelentése utáni Tr másodperc el nem telik (5-1. táblázat).

5.2.8.3.2 *A FUTÓ CSATORNA MEGHATÁROZÁSA*

5.2.8.3.2.1 *Eljárás a d1 állapothoz*. Az XDLP figyeli az összes olyan SVC működését, amely nincs a KÉSZ állapotban (p1). Ha egy SVC több mint Tx másodpercig az (XDCE) FORGALOM VEZÉRLÉSRE KÉSZ (d1) állapotban van (a futó csatorna időzítő, 5-1. és 5-13. táblázat) anélkül, hogy S-módú FOGADÁSRA KÉSZ /RR/, FOGADÁSRA NEM KÉSZ /RNR/, ADAT vagy VISSZAUTASÍTÁS csomagot küldene, akkor:
a) ha az utolsó elküldött csomag S-módú VISSZAUTASÍTÁS csomag, amelyre válasz nem került vételre, az XDLP-nek ezt a csomagot vissza kell küldeni;
b) más esetben az XDLP-nek egy S-módú RR vagy RNR csomagot kell küldenie a társ XDLP-nek, amelyik a megfelelő.
5.2.8.3.2.2 *Eljárás egyéb állapotok esetén*. Ha egy XDCE SVC a p2, p3, p6, p7, d2 vagy d3 állapotban van több mint Tx másodpercen keresztül, akkor az 5.2.8.3.1 pont szerinti kapcsolat meghibásodási eljárást kell végrehajtania.
5.2.8.3.2.3 Kapcsolat hibát kell bejelenteni akkor, ha a 'maradjon készenlétben' csomagoknál egy késleltetési hiba vagy egy vételi hiba fordul elő. Az ilyen esetekben a csatornát törölni kell.

5.2.9 Az adatkapcsolat teljesítőképesség jelentés formátuma
Ezt a jelentést az Annex 10, IV. kötet, 3.1.2.6.10.2 pontjában meghatározottaknak megfelelően kell továbbítani.

5.2.10 Rendszer óra-regiszterek /időzítők/

5.2.10.1 Az óra-regiszterek /időzítők/ értékei meg kell, hogy feleljenek az 5-1. és 5-13. táblázatokban megadott értékeknek.
5.2.10.2 A tűrésnek minden időzítőnél plusz vagy mínusz egy százaléknak kell lenni.
5.2.10.3 A felbontóképességnek minden időzítőnél egy másod-percnek kell lenni.

5.2.11 R*e*ndszer követelmények

5.2.11.1 *Adat integritás.* A maximális bit hiba-arány az adatoknál, a Fedélzeti adatkapcsolat vezérlő egység /ADLP//válaszjeladó illesztésnél vagy a Földi telepítési rendszerű adatkapcsolat vezérlő egység /GDLP//lekérdező illesztésnél megjelenő adatokra, a helyi Lekérdező adat végponti berendezés /DTE//Fedélzeti/Földi adatkapcsolat vezérlő egység /XDLP/ illesztésnél mérve (és fordítva is), nem haladhatja meg a 10-9-t a felderítetlen hibáknál és 10-7-t az észlelt hibáknál.

Megjegyzés. – A maximális hiba-arány az összes olyan hibát tartalmazza, amelyek az illesztéseken keresztüli adatátvitelekből és az XDLP belső működéséből származnak.

5.2.11.2 IDŐZÍTÉS

5.2.11.2.1 *A Fedélzeti adatkapcsolat vezérlő egység /ADLP/ időzítése.* ADLP műveletek nem tartanak tovább 0,25 másodpercnél az egyenletes forgalomra és 0,125 másodpercnél a megszakított forgalomra. Ezt az intervallumot a következők szerint kell meghatározni:
a) *Válaszjeladók Fedélzetről leadott Kiterjesztett hosszúságú közlemény /ELM/ képességgel*. Az az idő, ami eltelik attól, amikor egy 128 bájtos adat csomag utolsó bitje a Hálózati végponti berendezés /DCE/ részére fedélzetről leadandóként megjelenik, és addig az időpontig tart, amíg az első keretbe zárt végső bit a válasz-jeladóhoz történő továbbításra rendelkezésre áll.

b) Válaszjeladók B-adatátviteli /Comm-B/ képességgel. Az az idő, ami eltelik attól, amikor egy 24 bájtos felhasználói adatmező utolsó bitjét átadják a DCE-nek fedélzetről leadandó továbbításra, és addig az időpontig tart, amíg a felhasználói adatokat magába foglaló keretnek a négy B-adatátviteli utolsó szegmensének utolsó bitje a válaszjeladóhoz történő kézbesítésre rendelkezésre áll.
c) Válaszjeladók Fedélzetre irányuló Kiterjesztett hosszúságú közlemény /ELM/ képességgel. Az az idő, ami eltelik attól, amikor egy felhasználói adatmezőt magába foglaló 128 bájtos, 14 C-közlemény szegmensű ELM utolsó szegmense befejező bitjének a Fedélzeti adatkapcsolat vezérlő egység /ADLP/ általi vételétől addig az ideig tart, amikor a megfelelő csomag végső bitje a Lekérdező adat végponti berendezéshez /DTE/ történő kézbesítésre rendelkezésre áll.
d) Válaszjeladók A-adatátviteli képességgel. Az az idő, ami eltelik attól, amikor a felhasználói adatmezőt magába foglaló 25 bájtos, négy kapcsolt A-adatátviteli szegmens utolsó szegmensének befejező bitjét a Fedélzeti adatkapcsolat vezérlő egység /ADLP/

5.2.11.2.2 *Földi telepítési rendszerű adatkapcsolat vezérlő egység /GDLP/ IDŐZÍTÉS*

Ajánlás. - *A teljes késési idő a GDLP-n keresztül, az átviteli késést kizárva, nem lehet nagyobb, mint 0,125 másodperc.*

5.2.11.3 *Illesztő egység átviteli teljesítmény.* A Fedélzeti adatkapcsolat vezérlő egység /ADLP/ és a válaszjeladó közötti illesztő egységnek minimálisan másodpercenkénti 100 kilobit átviteli teljesítménnyel kell rendelkezni.

5.3 HÁLÓZATI VÉGPONTI BERENDEZÉS /DCE/ ÉS LÉGIJÁRMŰ/FÖLDI HÁLÓZATI BERENDEZÉS /XDCE/ ÁLLAPOT TÁBLÁZATOK

5.3.1 *Állapot táblázat követelmények.* A DCE és az XDCE funkciók az 5-3.-tól az 5-22.-ig terjedő állapot táblázatokban foglaltak szerint működnek.. Az 5-15.-től az 5-22.-ig terjedő állapot táblázatokat a következőkre kell alkalmazni:
a) Fedélzeti adatkapcsolat vezérlő egység /ADLP/ állapot átmenetek azok, amikor az XDCE vagy Fedélzeti/Földi adatkapcsolat vezérlő egység /XDLP/ zárójelekben lévő tagok elhagyásra kerülnek; és
b) Földi telepítési rendszerű adatkapcsolat vezérlő egység /GDLP/ állapot átmenetek azok, amikor a zárójelekben lévő tagokat használják fel, és az ezeket megelőző XDCE vagy XDLP tagok elhagyásra kerülnek.

5.3.2 *Diagnosztikai és létrehozó kódok.* A táblázat bejegyzések bizonyos körülményeknél egy diagnosztikai kódot jeleznek, amelyeket a létrehozott csomag tartalmaz, amikor belép a jelzett állapotba. A "D =" kifejezés a diagnosztikai kódot határozza meg. Amikor az "A = DIAG" jelenik meg, akkor a végrehajtandó műveletnek egy ISO 8208 DIAGNOSZTIKA csomagot hoz létre, és ezt kell továbbítania a DTE-hez; a jelzett diagnosztikai kód határozza meg a csomag diagnosztikai mezőjének beírását. A létrehozó mezőt az 5.2.6.3.3 pontban foglaltak szerint kell beállítani. A visszaállítást létrehozó kódot ISO 8208-ban foglaltak szerint kell beállítani.

1. Megjegyzés. - Az alábbiakban megadott táblázatok az állapot követelményeket határozzák meg a következő sorrendben
:
5-3 Hálózati végponti berendezés /DCE/ speciális esetek
5-4 A Lekérdező adat végponti berendezés /DTE/ hatása a DCE újraindítási állapotokra
5-5 DTE hatása a DCE hívás beállítási és törlési állapotokra
5-6 DTE hatása a DCE visszaállítási állapotokra
5-7 DTE hatása a DCE megszakítás átviteli állapotokra
5-8 DTE hatása a DCE forgalomvezérlés átvitel állapotokra
5-9 Légijármű/Földi hálózati végponti berendezés /XDCE/ hatása a DCE újraindítási állapotokra
5-10 XDCE hatása a DCE hívás beállítási és törlési állapotokra
5-11 XDCE hatása a DCE visszaállítási állapotokra
5-12 XDCE hatása a DCE megszakítás átviteli állapotokra
5-15 A Földi telepítési rendszerű adatkapcsolat vezérlő egység /GDLP/ (Fedélzeti adatkapcsolat vezérlő egység /ADLP/) hatása a Légijármű hálózati végponti berendezés /ADCE/ (Földi hálózati végponti berendezés /GDCE/) csomag réteg 'kész' állapotokra
5-16 GDLP (ADLP) hatása az ADCE (GDCE) hívás beállítási és törlési állapotokra
5-17 GDLP (ADLP) hatása az ADCE (GDCE) visszaállítási állapotokra
5-18 GDLP (ADLP) hatása az ADCE (GDCE) megszakítás átviteli állapotokra
5-19 GDLP (ADLP) hatása az ADCE (GDCE) forgalom vezérlés átviteli állapotokra
5-20 A Hálózati végponti berendezés /DCE/ hatása az ADCE (GDCE) hívás beállítási és törlési állapotokra
5.21 DCE hatása az ADCE (GDCE) visszaállítási állapotokra

5-22 DCE hatása az ADCE (GDCE) megszakítás átviteli állapotokra
2. Megjegyzés. - Mindegyik táblázatban mind az ADLP, mind a GDLP műveletek meghatározásra kerültek.
3. Megjegyzés. - Az S-módú alhálózaton belül a p6 és d2 állapotok átmeneti állapotok.
4. Megjegyzés. - A "megjegyzések"-re történő hivatkozások az állapot táblázatokban azokra a táblázat-specifikus megjegyzésekre vonatkoznak, amelyek az egyes állapot táblázatokat követik.

5. Megjegyzés. - Az összes diagnosztikai és létrehozó kód decimális számként van értelmezve.

6. Megjegyzés. - Egy ADCE és egy GDCE közötti SVC-t egy ideiglenes és/vagy állandó csatorna-számmal lehet azonosítani, ahogyan az az 5.2.5.1.2 pontban meghatározásra került.

5.4 S-MÓDÚ CSOMAG FORMÁTUMOK

5.4.1 *Formátumok*. Az S-módú csomag formátumok az 5-3.-tól az 5-22.-ig terjedő ábrák szerint kerültek meghatározásra.
5.4.2 *A vezérlő mezők jelentősége.* Az S-módú csomagokban használt formátum vezérlő mezők szerkezete az 5-23. ábrában meghatározottaknak kell megfelelnie. Az ezekben a csomag formátumokban használt vezérlő mezők jelentése a következő:
Mező
szimbólum *Meghatározás*
AG Címzés, Földi; a földi Lekérdező adat végponti berendezés /DTE/ címzés 8-bites bináris adat-feltűntetése (5.2.3.1.3.1)
AM Címzés, Mozgó; a mobil DTE címzés utolsó két binárisan kódolt decimális /BDC/ számjegyének 4-bites adat-feltűntetése (5.2.3.1.3.2)
CC Törlés létrehozás az ISO 8208-ban meghatározottak szerint
CH Csatorna-szám (0 - 15)
DC Diagnosztikai kód az ISO 8208-ban meghatározottak szerint
DP Adat csomag típus (5-23. ábra)
F S-bit sorozat, első csomag jelző
FILL Kitöltő mező
FILL1 6 bit hosszúságú egy nem-multiplikált csomagra a fedélzetről leadott Szabvány hosszúságú közlemény /SLM/ keretekben;
egyébként 0 bit
FILL2 0 bit hosszúságú egy nem-multiplikált csomagra a fedélzetről leadott Szabvány hosszúságú közlemény /SLM/ keretekben és
a multiplikáló fej-részekre; egyébként 2 bit
ELSŐ CSOMAG A multiplikált csomagok közül az első csomag tartalma
FS Gyors kiválasztás jelenléte
IN Az alaphelyzet beállító bit
L "Több bit" a hosszú formátumú MSP csomagokra az 5.2.7.4 pontban meghatározottak szerint
LAST PACKET A multiplikált csomagokból az utolsó csomag tartalma
LENGTH Egy multiplikált csomag hossza bájtokban egy előjel nélküli bináris számként kifejezve
LV A felhasználói adatmező hossza, a felhasznált bitek száma, ahogy az az 5.2.2.3.1 pontban meghatározásra került
M "Több bit" az SVC ADAT csomagokra, ahogy az az 5.2.5.1.4.1 pontban meghatározásra került
M/CH S-módú specifikus protokoll /MSP/ csatorna-szám
MP MSP csomag típus (5-23. ábra)
M/SN Sorozatszám; a hosszú formátumú MSP csomag sorozatszáma
OD Választható adat
ODL A választható adat hossza
OF A választhatóság jelzése
P Prioritás mező
PR Csomag vételi sorozatszám
PS Csomag küldési sorozatszám
RC Visszaállítást létrehozó kód az ISO 8208-ban meghatározottak szerint

RT Irányítási út táblázat az 5.2.5.3.3.8 pontban meghatározottak szerint
RTL Irányítási út táblázat hosszúság bájtokban kifejezve
S "Több bit" HÍVÁSKÉRÉS, HÍVÁS ELFOGADÁS, TÖRLÉS KÉRÉS és MEGSZAKÍTÁS csomagokhoz, az 5.2.5.1.4.2
pontban meghatározottak szerint
SN Sorozatszám; a sorozatszám ehhez a csomag típushoz
SP Felügyelő csomag (5-23. ábra)
SS Felügyelő részhalmaz szám (5-23. ábra)
ST Felügyelő típus (5-23. ábra)
TC Ideiglenes csatorna-szám
UD Felhasználói adatmező

TÁBLÁZATOK AZ 5. FEJEZETHEZ

5-1. táblázat: Fedélzeti adatkapcsolat vezérlő egység /ADLP/ S-módú alhálózati időzítők

Az időzítő neve	*Az időzítő ideje*	*Névleges érték*	*Referencia*
Csatorna visszavonás	*Tr*	*600 s*	*5.2.8.3.1*
Futó csatorna – ADLP	*Tx*	*420 s*	*5.2.8.3.2*
Lekérdező lekérdezés	*Ts*	*60 s*	*5.2.8.1.2*
Lekérdező kapcsolat	*Tz*	*30 s*	*5.2.7.1.1.4.2, 5.2.8.1.3.2*
Kapcsolat keret törlés	*Tc*	*60 s*	*5.2.2.1.1.4.5*
L-bit kézbesítés – ADLP	*Tm*	*120 s*	*5.2.7.4.3*
Csomag újra-sorbarendezés és 8-bit kézbesítés	*Tq*	*60 s*	*5.2.6.9*

5-2. táblázat: Hálózati végponti berendezés /DCE/ tevékenység állapot átmenetnél

DCE állapot	*Állapot meghatározás*	*Tevékenység, amelyet az állapotba való belépésnél el kell végezni*
*r*1	CSOMAG SZINT KÉSZ	Az összes Kapcsolt virtuális áramkör /SVCs/ visszatér a *p*1 állapotba (lásd a *p*1 állapot magyarázatot).
*r*2	LEKÉRDEZŐ ADAT VÉGPONTI BERENDEZÉS /DTE/ ÚJRAINDÍTÁS KÉRÉS	Mindegyik SVC visszatér a *p*1 állapotba (lásd a *p*1 állapot magyarázatot). ÚJRAINDÍTÁS MEGERŐSÍTÉS-t kiadni DTE-nek.
*r*3	HÁLÓZATI VÉGPPONTI BERENDEZÉS /DCE/ ÚJRAINDÍTÁS KÉRÉS	ÚJRAINDÍTÁS KÉRÉS-t kiadni a DTE-nek. Hacsak nem az *r*2 állapoton keresztül lépett be, egy ÚJRAINDÍTÁS KÉRÉS-t küldeni az újra-formátumozó feldolgozásnak.
*p*1	KÉSZ	Feloldani az SVC számára kijelölt összes adatforrást. Megszakítani a kapcsolatot a DTE/DCE SVC és a Légijármű hálózati végponti berendezés /ADCE/ / Földi hálózati végponti berendezés /GDCE/ SVC között. (Az ADCE/GDCE SVC még nem lehet *p*1 állapotban.)

*p*2	DTE HÍVÁSKÉRÉS	Meghatározni azt, hogy elegendő „erőforrás” áll-e rendelkezésre a kérés támogatására; ha igen, akkor kijelölni az erőforrást és HÍVÁSKÉRÉS csomagot küldeni az újra-formátumozó feldolgozásnak; ha nem, akkor DCE TÖRLÉS KÉRÉS a DTE-hez a (*p*7) állapotba történő lépéshez. Az erőforrások meghatározása és elosztása az ISO 8208-ban meghatározottak szerint történik.
*p*3	DCE HÍVÁSKÉRÉS	Meghatározni azt, hogy elegendő erőforrás áll-e rendelkezésre a kérés támogatására ; ha igen, akkor kijelölni az erőforrásokat és HÍVÁSKÉRÉS csomagot küldeni a DTE-nek; ha nem, akkor TÖRLÉS KÉRÉS csomagot küldeni az újra-formátumozó feldolgozásnak. Az erőforrások meghatározása és elosztása az ISO 8208-ban meghatározottak szerint történik.
*p*4	ADAT-TOVÁBBÍTÁS	Nincs művelet.
*p*5	HÍVÁS ÜTKÖZÉS	Újra kijelölni a kimenő hívást egy másik SVC-hez (a DTE a hívás ütközés állapotában nem veszi figyelembe a bejövő hívást) és belépni a DCE HÍVÁSKÉRÉS állapotba (*p*3) ennél az új SVC-nél. Belépni a *p*2 állapotba a DTE-től jövő HÍVÁSKÉRÉS feldolgozáshoz.
*p*6	DTE TÖRLÉS KÉRÉS	Feloldani az SVC számára kijelölt összes adatforrást, TÖRLÉS MEGERŐSÍTÉS csomagot küldeni a DTE-nek, és belépni a *p*1 állapotba.
*p*7	DCE TÖRLÉS KÉRÉS A DTE-HEZ	TÖRLÉS KÉRÉS csomagot küldeni a DTE-hez.
*d*1	FORGALOM VEZÉRLÉS KÉSZ	Nincs tevékenység.
*d*2	DTE VISSZAÁLLÍTÁS KÉRÉS	Eltávolítani az ablakból a DTE-hez továbbított ADAT-csomagokat; érvényteleníteni azokat az ADAT- csomagokat, amelyek a részben átvitt M-bit sorozatokat képviselik, és érvényteleníteni azokat a MEGSZAKÍTÁS csomagokat, amelyek a DTE-hez való továbbításra várnak; az összes ablak számlálót visszaállítani 0-ra; az ADAT és MEGSZAKÍTÁS átvitelre vonatkozó időzítési és újra-továbbítási paramétert az alaphelyzeti értékükre állítani. VISSZAÁLLÍTÁS MEGERŐSÍTÉS csomagot küldeni a DTE-nek. SVC-t visszaállítani a *d*1 állapotba.

*d*3	DCE VISSZAÁLLÍTÁS KÉRÉS A DTE-HEZ	Eltávolítani az ablakból a DTE-hez továbbított ADAT-csomagokat; érvényteleníteni minden olyan ADAT csomagot, amelyek a részben átvitt M-bit sorozatokat képviselik és érvényteleníteni azokat a MEGSZAKÍTÁS csomagokat, amelyek a DTE-hez való továbbításra várnak; az összes ablak számlálót visszaállítani 0-ra; az ADAT és MEGSZAKÍTÁS átvitelre vonatkozó időzítési és újra-továbbítási paramétereket az alaphelyzeti értékükre állítani. VISSZAÁLLÍTÁS KÉRÉS csomagot továbbítani a DTE-nek.
*i*1	DTE MEGSZAKÍTÁS KÉSZ	Nincs tevékenység.
*i*2	DTE MEGSZAKÍTÁS KÜLDÉS	A DTE-től vett MEGSZAKÍTÁS csomagot továbbítani az újra-formátumozási feldolgozáshoz.
*j*1	DCE MEGSZAKÍTÁS KÉSZ	Nincs tevékenység.
*j*2	DCE MEGSZAKÍTÁS KÜLDÉS	Az újra-formátumozási folyamatból vett MEGSZAKÍTÁS csomagot továbbítani a DTE-hez.
*f*1	DCE VÉTELRE KÉSZ	Nincs tevékenység.
*f*2	DCE VÉTELRE NEM KÉSZ	Nincs tevékenység.
*g*1	DTE VÉTELRE KÉSZ	Nincs tevékenység.
*g*2	DTE VÉTELRE NEM KÉSZ	Nincs tevékenység.

5-3. táblázat: Hálózati végponti berendezés /DCE/ speciális esetek

A Lekérdező adat végponti berendezéstől vett	*DCE speciális esetek* *Bármely állapot*
Bármely olyan csomagnál, amely kisebb, mint 2 bájt hosszúságban (beleértve az érvényes adat kapcsolat szint keretet, amely nem tartalmaz csomagot)	A = DIAG D = 38
Bármely olyan csomagnál, amely egy érvénytelen általános formátum azonosítóval érkezett	A = DIAG D = 40
Bármely olyan csomagnál, amely egy érvényes általános formátum azonosítóval és egy kijelölt logikai csatorna azonosítóval (beleértve egy ’0’ logikai csatorna azonosítót) érkezett	Lásd az 5-4. táblázatot.

5-4. táblázat: A lekérdező adat végponti berendezés /DTE/ hatása a hálózati végponti berendezés /DCE/

újra-indítási állapotokra

DTE-től vett csomag	DCE újra-indítási állapot (lásd az 5.Megj.-t)		
	CSOMAG SZINT KÉSZ (lásd 1.Megj.-t) $r1$	DTE ÚJRA-INDÍTÁS KÉRÉS $r2$	DCE ÚJRA-INDÍTÁS KÉRÉS $r3$
Csomagok, amelyek 1 bájtnál rövidebb csomag típus azonosítóval rendelkeznek, és a logikai csatorna azonosítójuk nem egyenlő 0-val	Lásd az 5-5. táblázatot	A = *HIBA* $S = r3$ $D = 38$ (lásd a 4. Megjegyzést)	A = *ÉRVÉNYTELENÍTÉS*
Bármely olyan csomag, kivéve az ÚJRA-INDÍTÁS-t és a JELTÁROLÁS-t, amely 0 logikai csatorna azonosítóval érkezett	A = *DIAG* $D = 36$	A = *DIAG* $D = 36$	A = *DIAG* $D = 36$
Csomag, olyan csomag típus azonosítóval, amely nincs meghatározva, vagy a DCE nem támasztja alá	Lásd az 5-5. táblázatot	A = *HIBA* $S = r3$ $D = 33$ (lásd a 4. Megjegyzést)	A = *ÉRVÉNYTELENÍTÉS*
ÚJRA-INDÍTÁS KÉRÉS, ÚJRA-INDÍTÁS MEGERŐSÍTÉS vagy JELTÁROLÁS (ha ilyen van) csomag olyan logikai csatorna azonosítóval, amely nem egyenlő 0-val	Lásd az 5-5. táblázatot	A = *HIBA* $S = r3$ $D = 41$ (lásd a 4. Megjegyzést)	A = *ÉRVÉNYTELENÍTÉS*
<u>ÚJRA-INDÍTÁS KÉRÉS</u>	A = *SZABÁLYOS* (továbbítás) $S = r2$	A = *ÉRVÉNYTELENÍTÉS*	A = *SZABÁLYOS* $S = p1$ v. $d1$ (lásd a 2. Megjegyzést)
ÚJRA-INDÍTÁS MEGERŐSÍTÉS	A = *HIBA* $S = r3$ $D = 17$ (lásd a 6. Megjegyzést)	A = *HIBA* $S = r3$ $D = 18$ (lásd a 4. Megjegyzést)	A = *SZABÁLYOS* $S = p1$ v. $d1$ (lásd a 2. Megjegyzést)

ÚJRA-INDÍTÁS KÉRÉS vagy ÚJRA-INDÍTÁS MEGERŐSÍTÉS csomag formátum hibával	*A = DIAG* *D* = 38, 39, 81 vagy 82	*A = ÉRVÉNY-TELENÍTÉS*	*A = HIBA* *D* = 38, 39, 81 vagy 82
JELTÁROLÁS KÉRÉS vagy JEL-TÁROLÁS MEGERŐSÍTÉS csomagok (lásd a 3.Megjegyzést)	*A = SZABÁ-LYOS*	*A = SZABÁ-LYOS*	*A = SZABÁ-LYOS*
JELTÁROLÁS KÉRÉS vagy JEL-TÁROLÁS MEGERŐSÍTÉS csomagok formátum hibával (lásd a 3.Megjegyzést)	*A = DIAG* *D* = 38, 39, 81 vagy 82	*A = HIBA* *S* = *r*3 *D* = 38, 39, 81 vagy 82 (lásd a 4. Meg-jegyzést)	*A = HIBA* *D* = 38, 39, 81 vagy 82
Hívás beállítás, hívás törlés, ADAT, megszakítás, forgalom vezérlés, vagy visszaállítás csomag	Lásd az 5-5. táblázatot	*A = HIBA* *S* = *r*3 *D* = 18	*A = ÉRVÉNY-TELENÍTÉS*

MEGJEGYZÉSEK:
1. Az S-módú alhálózatnak nincsenek újra-indítási állapotai. Egy ÚJRA-INDÍTÁS KÉRÉS vétele a DCE-nél azt idézi elő, hogy egy ÚJRA-INDÍTÁS MEGERŐSÍTÉS-sel válaszoljon. Az ÚJRA-INDÍTÁS KÉRÉS csomag az újra-formátumozó feldolgozáshoz kerül továbbításra, amely törlés kéréseket továbbít a DTE-hez kapcsolódó összes SVC-nek. A DCE csak akkor lép be az *r*3 állapotba, ha hibát észlel a DTE/DCE illesztésen.
2. Az SVC csatornák visszatérnek a *p*1 állapotba, az Állandó virtuális áramkör (PVC) csatornák pedig visszalépnek a *d*1 állapotba.
3. A jeltárolási berendezés felhasználása választható a DTE/DCE illesztésen.
4. Nem hajtanak végre tevékenységet az S-módú alhálózaton belül.
5. A táblázat bejegyzései a következőképpen kerültek meghatározásra: *A* = végrehajtandó tevékenység, *S* = az az állapot, amelybe be kell lépni, *D* = a diagnosztikai kód, amelyet az ennek a tevékenységnek a következtében létrehozott csomagokon alkalmazni kell, az *ÉRVÉNYTELENÍTÉS* azt jelzi, hogy a vett csomagot törölni kell az XDLP tárolókból és az ÉRVÉNYTELEN azt jelzi, hogy a csomag/állapot kombináció nem fordulhat elő.
6. A hiba eljárás az *r*3 állapotba lépésből és az ÚJRA-INDÍTÁS KÉRÉS-nek az újra-formátumozó feldolgozáshoz történő küldéséből áll.

5-5. táblázat: A lekérdező adat végponti berendezés /DTE/ hatása a hálózati végponti berendezés /DCE/ hívás beállítás és törlés állapotokra

DTE-től vett csomag	DCE hívás beállítás és törlés állapotok (lásd az 5.Megj.-t)					
KÉSZ *p*1	DTE HÍVÁSKÉRÉS *p*2	DCE HÍVÁSKÉRÉS *p*3	ADAT ÁT-VITEL *p*4	HÍVÁS ÜTKÖZÉS *p*5 (Lásd az 1. és 4.Megjegyzést)	DTE TÖRLÉS KÉRÉS *p*6	DCE TÖRLÉS KÉRÉS A DTE-hez *p*7

Csomagok, amelyek 1 bájtnál rövidebb csomag típus azonosítóval rendelkeznek	*A=HIBA* $S = p7$ $D = 38$	*A=HIBA* $S = p7$ $D = 38$ (lásd a 2.Megjegyz.-t)	*A=HIBA* $S = p7$ $D = 38$ (lásd a 2.Megjegyz.-t)	Lásd az 5-6. táblázatot	*A=HIBA* $S = p7$ $D = 38$ (lásd a 2.Megjegyz.-t)	*A=HIBA* $S = p7$ $D = 38$ (lásd a 2.Megjegyz.-t)	*A=*
Csomag, olyan csomag típus azonosítóval, amely nincs meghatározva, vagy a DCE nem támasztja alá	*A=HIBA* $S = p7$ $D = 33$	*A=HIBA* $S = p7$ $D = 33$ (lásd a 2.Megjegyz.-t)	*A=HIBA* $S = p7$ $D = 33$ (lásd a 2.Megjegyz.-t)	Lásd az 5-6. táblázatot	*A=HIBA* $S = p7$ $D = 33$ (lásd a 2.Megjegyz.-t)	*A=HIBA* $S = p7$ $D = 33$ (lásd a 2.Megjegyz.-t)	*A=*
ÚJRA-INDÍTÁS KÉRÉS, ÚJRA-INDÍTÁS MEGERŐSÍTÉS vagy JELTÁROLÁS csomag olyan logikai csatorna azonosítóval, amely nem egyenlő 0-val	*A=HIBA* $S = p7$ $D = 41$	*A=HIBA* $S = p7$ $D = 41$ (lásd a 2.Megjegyz.-t)	*A=HIBA* $S = p7$ $D = 41$ (lásd a 2.Megjegyz.-t)	Lásd az 5-6. táblázatot	*A=HIBA* $S = p7$ $D = 41$ (lásd a 2.Megjegyz.-t)	*A=HIBA* $S = p7$ $D = 41$ (lásd a 2.Megjegyz.-t)	*A=*
HÍVÁSKÉRÉS	*A=SZABÁLYOS* $S = p2$ (továbbítás)	*A=HIBA* $S = p7$ $D = 21$ (lásd a 2.Megjegyz.-t)	*A=SZABÁLYOS* $S = p5$	*A=HIBA* $S = p7$ $D = 23$ (lásd a 2.Megjegyz.-t	*A=HIBA* $S = p7$ $D = 24$ (lásd a 2.Megjegyz.-t)	*A=HIBA* $S = p7$ $D = 25$ (lásd a 2.Megjegyz.-t	*A=*
HÍVÁS ELFOGADÁS	*A=HIBA* $S = p7$ $D = 20$	*A=HIBA* $S = p7$ $D = 21$ (lásd a 2.Megjegyz.-t)	*A=SZABÁLYOS* $S = p4$ (továbbítás) $S = p7$ $D = 42$ (lásd a 2. és 3.Megjegyz.-t)	*A=HIBA* $S = p7$ $D = 23$ (lásd a 2.Megjegyz.-t)	*A=HIBA* $S = p7$ $D = 24$ (lásd a 2. és 4.Megjegyz.-t)	*A=HIBA* $S = p7$ $D = 25$ (lásd a 2.Megjegyz.-t)	*A=* *A=ÉR*
TÖRLÉS KÉRÉS	*A=SZABÁLYOS* $S = p6$	*A=SZABÁLYOS* $S = p6$ (továbbítás)	*A=SZABÁLYOS* $S = p6$ (továbbítás)	*A=SZABÁLYOS* $S = p6$ (továbbítás)	*A=SZABÁLYOS* $S = p6$ (továbbítás)	*A=ÉRVÉNYTELENÍTÉS*	*A=RI* (nem

TÖRLÉS MEG-ERŐSÍTÉS	*A*=*HIBA* $S = p7$ $D = 20$	*A*=*HIBA* $S = p7$ $D = 21$ (lásd a 2.Megjegyz.-t)	*A*=*HIBA* $S = p7$ $D = 22$ (lásd a 2.Megjegyz.-t)	*A*=*HIBA* $S = p7$ $D = 23$ (lásd a 2.Megjegyz.-t	*A*=*HIBA* $S = p7$ $D = 24$ (lásd a 2.Megjegyz.-t)	*A*=*HIBA* $S = p7$ $D = 25$ (lásd a 2.Megjegyz.-t)	(nem
ADAT, megszakítás, forgalom vezérlés vagy visszaállítás csomagok	*A*=*HIBA* $S = p7$ $D = 20$	*A*=*HIBA* $S = p7$ $D = 21$ (lásd a 2.Megjegyz.-t)	*A*=*HIBA* $S = p7$ $D = 22$ (lásd a 2.Megjegyz.-t)	Lásd az 5-6. táblázatot	*A*=*HIBA* $S = p7$ $D = 24$ (lásd a 2.Megjegyz.-t)	*A*=*HIBA* $S = p7$ $D = 25$ (lásd a 2.Megjegyz.-t)	*A*

MEGJEGYZÉSEK:

1. A $p5$ állapotba belépve a DCE újrajelöli a kimenő hívást a DTE-hez egy másik csatornához (TÖRLÉS KÉRÉS nincs kiadva) és válaszol a bejövő DTE hívásra, ahogy megfelelő TÖRLÉS KÉRÉS vagy TÖRLÉS ELFOGADÁS csomaggal.
2. A hiba eljárást meghatározott tevékenységek végrehajtása képezi a $p7$ állapotba való belépésnél (beleértve egy TÖRLÉS KÉRÉS csomag küldését a DTE-nek) és kiegészítőleg egy TÖRLÉS KÉRÉS csomag elküldését az XDCE-nek (az újra-formátumozó folyamaton keresztül).
3. A gyors kiválasztás eszköz alkalmazása egy válasz korlátozással együtt megtiltja a DTE-nek azt, hogy HÍVÁS ELFOGADÁS csomagot küldjön.
4. A DTE-nek egy hívás ütközés esetén érvényteleníteni kell azt a HÍVÁSKÉRÉS csomagot, amelyet a DCE-től vett.
5. A táblázat bejegyzései a következőképpen kerültek meghatározásra: A = végrehajtandó tevékenység, S = az az állapot, amelybe be kell lépni, D = a diagnosztikai kód, amelyet az ennek a tevékenységnek a következtében létrehozott csomagokon alkalmazni kell, az *ÉRVÉNYTELENÍTÉS* azt jelzi, hogy a vett csomagot törölni kell az XDLP tárolókból és az ÉRVÉNYTELEN azt jelzi, hogy a csomag/állapot kombináció nem fordulhat elő.

5-6. táblázat: A lekérdező adat végponti berendezés /DTE/ hatása a hálózati végponti berendezés /DCE/ visszaállítás állapotokra

DTE-től vett csomag	DCE visszaállítási állapotok (lásd a 2.Megjegyzést)	
FORGALOM VEZÉRLÉSRE KÉSZ $d1$	VISSZAÁLLÍTÁS KÉRÉS DTE ÁLTAL $d2$	DCE VISSZAÁLLÍTÁS KÉRÉS A DTE-hez $d3$

Csomag 1 bájtnál rövidebb csomag típus azonosítóval	A = *HIBA* $S = d3$ $D = 38$ (lásd az 1. Megjegyzést)	A = *HIBA* $S = d3$ $D = 38$ (lásd az 1. Megjegyzést)	A = *ÉRVÉNYTELENÍTÉS*
Csomag, olyan csomag típus azonosítóval, amely nincs meghatározva, vagy a DCE nem támasztja alá	A = *HIBA* $S = d3$ $D = 33$ (lásd az 1. Megjegyzést)	A = *HIBA* $S = d3$ $D = 33$ (lásd az 1. Megjegyzést)	A = *ÉRVÉNYTELENÍTÉS*
ÚJRA-INDÍTÁS KÉRÉS, ÚJRA-INDÍTÁS MEGERŐ- SÍTÉS vagy JELTÁROLÁS (ha ilyen van) csomag, nem 0-val egyenlő logikai csatorna azonosítóval	A = *HIBA* $S = d3$ $D = 41$ (lásd az 1. Megjegyzést)	A = *HIBA* $S = d3$ $D = 41$ (lásd az 1. Megjegyzést)	A = *ÉRVÉNYTELENÍTÉS*
VISSZAÁLLÍTÁS KÉRÉS	A = *SZABÁLYOS* $S = d2$ (továbbítás)	A = *ÉRVÉNYTELENÍTÉS*	A = *SZABÁLYOS* $S = d1$ (nem továbbítható)
VISSZAÁLLÍTÁS MEG- ERŐSÍTÉS	A = *HIBA* $S = d3$ $D = 27$ (lásd az 1. Megjegyzést)	A = *HIBA* $S = d3$ $D = 28$ (lásd az 1. Megjegyzést)	A = *SZABÁLYOS* $S = d1$ (nem továbbítható)
MEGSZAKÍTÁS csomag	Lásd az 5-7. táblázatot	A = *HIBA* $S = d3$ $D = 28$ (lásd az 1. Megjegyzést)	A = *ÉRVÉNYTELENÍTÉS*
MEGSZAKÍTÁS MEG- ERŐSÍTÉS csomag	Lásd az 5-7. táblázatot	A = *HIBA* $S = d3$ $D = 28$ (lásd az 1. Megjegyzést)	A = *ÉRVÉNYTELENÍTÉS*
ADAT vagy forgalom vezérlési csomag	Lásd az 5-8. táblázatot	A = *HIBA* $S = d3$ $D = 28$ (lásd az 1. Megjegyzést)	A = *ÉRVÉNYTELENÍTÉS*

VISSZAUTASÍTÁS alátámasztott, de nem 'előfizetett'	*A* = *HIBA* *S* = *d*3 *D* = 37 (lásd az 1. Megjegyzést)	*A* = *HIBA* *S* = *d*3 *D* = 37 (lásd az 1. Megjegyzést)	*A* = *ÉRVÉNYTELENÍTÉS*

MEGJEGYZÉSEK:

1. A hibaeljárást meghatározott tevékenységek végrehajtása képezi a *d*3 állapotba való belépésnél (amely magába foglalja egy VISSZAÁLLÍTÁS KÉRÉS csomag küldését a DTE-hez) és egy VISSZAÁLLÍTÁS KÉRÉS csomag küldését az XDCE-nek (a formátumozó feldolgozáson keresztül).
2. A táblázat bejegyzései a következőképpen kerültek meghatározásra: *A* = végrehajtandó tevékenység, *S* = az az állapot, amelybe be kell lépni, *D* = a diagnosztikai kód, amelyet az ennek a tevékenységnek a következtében létrehozott csomagokon alkalmazni kell, az *ÉRVÉNYTELENÍTÉS* azt jelzi, hogy a vett csomagot törölni kell az XDLP tárolókból és az ÉRVÉNYTELEN azt jelzi, hogy a csomag/állapot kombináció nem fordulhat elő.

5-7 táblázat: A Lekérdező adat végponti berendezés /DTE/ hatása a Hálózati végponti berendezés /DCE/ megszakítás továbbítási állapotokra

DTE-től vett csomag	DTE/DCE megszakítás továbbítási állapotok (lásd a 2. Megjegyzést)	
	DTE MEGSZAKÍTÁSRA KÉSZ *i*1	DTE MEGSZAKÍTÁS KÜLDÉS *i*2
MEGSZAKÍTÁS (lásd az 1. Megjegyzést)	*A* = *SZABÁLYOS* *S* = *i*2 (továbbítás)	*A* = *HIBA* *S* = *d*3 *D* = 44 (lásd a 3. Megjegyzést)

DTE-től vett csomag	DTE/DCE megszakítás továbbítási állapotok (lásd a 2. Megjegyzést)	
	DCE MEGSZAKÍTÁSRA KÉSZ *j*1	DCE MEGSZAKÍTÁS KÜLDÉS *j*2
MEGSZAKÍTÁS MEG-ERŐSÍTÉS (lásd az 1. Megjegyzést)	*A* = *HIBA* *S* = *d*3 *D* = 43 (lásd a 3. Megjegyzést)	*A* = *SZABÁLYOS* *S* = *j*1 (továbbítás)

MEGJEGYZÉSEK:

1. Ha a csomagnak formátum hibája van, akkor a hiba eljárást kell alkalmazni (lásd 3. Megjegyzést). Az olyan megszakítás csomagokat, amelyeknek a felhasználási adata 32 bájtnál több, formátum hibaként kell kezelni.
2. A táblázat bejegyzései a következőképpen kerültek meghatározásra: *A* = végrehajtandó tevékenység, *S* = az az állapot, amelybe be kell lépni, *D* = a diagnosztikai kód, amelyet az ennek a tevékenységnek a következtében létrehozott csomagokon alkalmazni kell, az *ÉRVÉNYTELENÍTÉS* azt jelzi, hogy a vett csomagot törölni kell az XDLP tárolókból és az ÉRVÉNYTELEN azt jelzi, hogy a csomag/állapot kombináció nem fordulhat elő.
3. A hiba eljárást meghatározott tevékenységek végrehajtása képezi a *d*3 állapotba való belépésnél (amely magába foglalja egy VISSZAÁLLÍTÁS KÉRÉS csomag továbbítását a DTE-nek) és egy VISSZAÁLLÍTÁS KÉRÉS csomag küldését az XDCE-nek (az újra-formátumozó feldolgozáson keresztül).

5-8. táblázat: A lekérdező adat végponti berendezés /DTE/ hatása a Hálózati végponti berendezés /DCE/ forgalom vezérlés továbbítási állapotokra

DTE-től vett csomag	DCE forgalom vezérlés továbbítási állapotok (lásd a 2. és 3. Megjegyzést)	
	DCE VÉTELRE KÉSZ *f*1	DCE VÉTELRE NEM KÉSZ *f*2
A 4 bájtnál kisebb ADAT csomag, amikor modulo 128 számozást alkalmaznak	*A* = *HIBA* *S* = *d*3 *D* = 38 (lásd a 4. Megjegyzést)	*A* = *ÉRVÉNY-TELENÍTÉS*
ADAT csomag érvénytelen csomag vételi sorrenddel /PR/	*A* = *HIBA* *S* = *d*3 *D* = 2 (lásd a 4. Megjegyzést)	*A* = *HIBA* *S* = *d*3 *D* = 2 (lásd a 4. Megjegyzést)
ADAT csomag érvényes PR-el, de érvénytelen csomag küldési sorrenddel /PS/ vagy helytelen formátumú felhasználói adat-mezővel	*A* = *HIBA* *S* = *d*3 *D* = 1 (érvénytelen PS) *D* = 39 (UD > max. tárgyalt hossz) *D* = 82 (UD kijelöletlen) (lásd a 4. Megjegyzést)	*A* = *ÉRVÉNY-TELENÍTÉS* (a PR adatok feldolgozása)
ADAT csomag érvényes PR-el, M-bit 1-re állítással, amikor a felhasználói adatmező részben kitöltött	*A* = *HIBA* *S* = *d*3 *D* = 165 (lásd a 4. Megjegyzést)	*A* = *ÉRVÉNY-TELENÍTÉS* (a PR adatok feldolgozása)
ADAT csomag érvényes PR-el, PS-el és felhasználói adat-mező formátummal	*A* = *SZABÁLYOS* (továbbítás)	*A* = *ÉRVÉNY-TELENÍTÉS* (a PR adatok feldolgozása)
DTE-től vett csomag	DCE forgalom vezérlés továbbítási állapotok (lásd a 2. és 3. Megjegyzést) DCE VÉTELRE KÉSZ *g*1	DCE forgalom vezérlés továbbítási állapotok (lásd a 2. és 3. Megjegyzést) DCE VÉTELRE NEM KÉSZ *g*2
A Vételre kész /RR/, a Vételre nem kész /RNR/, vagy a VISSZAUTASÍTÁS csomag 3 bájtnál kisebb, amikor modulo 128 számozást alkalmaznak (lásd az 1. Megjegyzést)	*A* = *ÉRVÉNYTELENÍTÉS*	*A* = *ÉRVÉNY-TELENÍTÉS*
RR, RNR vagy VISSZA-UTASÍTÁS csomag érvény-telen csomag vételi sorrend-del /PR/	*A* = *HIBA* *S* = *d*3 *D* = 2 (lásd a 4. Megjegyzést)	*A* = *HIBA* *S* = *d*3 *D* = 2 (lásd a 4. Megjegyzést)

RR csomag érvényes PR-el	*A* = *SZABÁLYOS*	*A* = *SZABÁLYOS* *S* = *g*1
RNR csomag érvényes PR-el	*A* = *SZABÁLYOS* *S* = *g*2	*A* = *SZABÁLYOS*
VISSZAUTASÍTÁS csomag érvényes PR-el	*A* = *SZABÁLYOS*	*A* = *SZABÁLYOS* *S* = *g*1

MEGJEGYZÉSEK:

1. A Visszautasítási eljárások nem szükségesek.
2. Az RR, RNR és VISSZAUTASÍTÁS eljárások egy helyi DTE/DCE esetén és a megfelelõ csomagok nem kerülnek az XDCE-hez továbbításra.
3. A táblázat bejegyzései a következőképpen kerültek meghatározásra: *A* = végrehajtandó tevékenység, *S* = az az állapot, amelybe be kell lépni, *D* = a diagnosztikai kód, amelyet az ennek a tevékenységnek a következtében létrehozott csomagokon alkalmazni kell, az *ÉRVÉNYTELENÍTÉS* azt jelzi, hogy a vett csomagot törölni kell az XDLP tárolókból és az ÉRVÉNYTELEN azt jelzi, hogy a csomag/állapot kombináció nem fordulhat elő.
4. A hiba eljárást meghatározott tevékenységek végrehajtása képezi a *d*3 állapotba való belépésnél (amely magába foglalja egy VISSZAÁLLÍTÁS KÉRÉS csomag továbbítását a DTE-nek) és egy VISSZAÁLLÍTÁS KÉRÉS csomag küldését az XDCE-nek (az újra-formátumozó feldolgozáson keresztül.

5-9 táblázat: Az XDCE hatása a DCE újraindítási állapotokra

XDCE-től vett csomag	DCE újraindítási állapotok (lásd a Megjegyzést)		
	CSOMAG SZINT KÉSZ *r*1	DTE ÚJRA-INDÍTÁS KÉRÉS *r*2	DCE ÚJRA-INDÍTÁS KÉRÉS *r*3
HÍVÁSKÉRÉS	Lásd az 5-10. táblázatot	TÖRLÉS KÉRÉS küldés az újra-formátumozó feldolgozásnak a *D* = 244-el	TÖRLÉS KÉRÉS küldés az újra-formátumozó feldolgozásnak a *D* = 244-el
HÍVÁS ELFOGADÁS, TÖRLÉS KÉRÉS, ADAT, MEGSZAKÍTÁS, MEGSZAKÍTÁS MEGERŐSÍTÉS, VISSZAÁLLÍTÁS KÉRÉS	Lásd az 5-10. táblázatot	*A* = *ÉRVÉNYTELENÍTÉS*	*A* = *ÉRVÉNYTELENÍTÉS*

Megjegyzés. – A táblázat bejegyzései a következőképpen kerültek meghatározásra: A = *végrehajtandó tevékenység,* S = *az az állapot, amelybe be kell lépni,* D = *a diagnosztikai kód, amelyet az ennek a tevékenységnek a következtében létrehozott csomagokon alkalmazni kell, az* ÉRVÉNYTELENÍTÉS *azt jelzi, hogy a vett csomagot törölni kell az XDLP tárolókból és az ÉRVÉNYTELEN azt jelzi, hogy a csomag/állapot kombináció nem fordulhat elő.*

5-10 táblázat: XDCE hatása a DCE hívás beállítás és törlés állapotokra

XDCE-től vett csomag	DCE hívás beállítás és törlés állapotok (lásd a Megjegyzést)						
	KÉSZ *p*1	DTE HÍVÁSKÉRÉS *p*2	DCE HÍVÁSKÉRÉS *p*3	ADAT ÁT-VITEL *p*4	HÍVÁS ÜTKÖZÉS *p*5	DTE TÖRLÉS KÉRÉS *p*6	DCE TÖRLÉS KÉRÉS A DTE-hez *p*7

HÍVÁSKÉRÉS	*A = SZABÁLYOS* *S = p*3 (továbbítás)	ÉR-VÉNY-TELEN	ÉR-VÉNY-TELEN	ÉR-VÉNY-TELEN	ÉR-VÉNY-TELEN	ÉR-VÉNY-TELEN	ÉR-VÉNY-TELEN
HÍVÁS ELFOGADÁS	*A=ÉRVÉNY-TELENÍTÉS*	*A=SZABÁLYOS* *S = p*4 (továbbítás)	ÉR-VÉNY-TELEN	ÉR-VÉNY-TELEN	ÉR-VÉNY-TELEN	*A=ÉRVÉNY-TELENÍTÉS*	*A=ÉRVÉN TELENÍT*
TÖRLÉS KÉRÉS	*A=ÉRVÉNY-TELENÍTÉS*	*A=SZABÁLYOS* *S = p*7 (továbbítás)	*A=SZABÁLYOS* *S = p*7 (továbbítás)	*A=SZABÁLYOS* *S = p*7 (továbbítás)	ÉR-VÉNY-TELEN	*A=ÉRVÉNY-TELENÍTÉS*	*A=ÉRVÉN TELENÍT*
ADAT, MEGSZAKÍTÁS, MEGSZAKÍTÁS MEGERŐ-SÍTÉS, vagy VISSZAÁLLÍTÁS KÉRÉS	*A=ÉRVÉNY-TELENÍTÉS*	ÉR-VÉNY-TELEN	ÉR-VÉNY-TELEN	Lásd az 5-11. táblázatot.	ÉR-VÉNY-TELEN	*A=ÉRVÉNY-TELENÍTÉS*	*A=ÉRVÉN TELENÍT*

Megjegyzés. – A táblázat bejegyzései a következőképpen kerültek meghatározásra: A = *végrehajtandó tevékenység,* S = *az az állapot, amelybe be kell lépni,* D = *a diagnosztikai kód, amelyet az ennek a tevékenységnek a következtében létrehozott csomagokon alkalmazni kell, az* ÉRVÉNYTELENÍTÉS *azt jelzi, hogy a vett csomagot törölni kell az XDLP tárolókból és az ÉRVÉNYTELEN azt jelzi, hogy a csomag/állapot kombináció nem fordulhat elő.*

5-11. táblázat: XDCE hatása a DCE visszaállítás állapotokra

XDCE-től vett csomag	DCE visszaállítási állapotok (lásd a Megjegyzést)		
FORGALOM VEZÉRLÉSRE KÉSZ *d*1	DTE VISSZAÁLLÍTÁS KÉRÉS *d*2	DCE VISSZAÁLLÍTÁS KÉRÉS *d*3	
VISSZAÁLLÍTÁS KÉRÉS	*A = SZABÁLYOS* *S = d*3 (továbbítás)	*A = SZABÁLYOS* *S = d*1 (továbbítás)	*A = ÉRVÉNY-TELENÍTÉS*
MEGSZAKÍTÁS	Lásd az 5-12. táblázatot	*A = ÉRVÉNY-TELENÍTÉS*	*A = ÉRVÉNY-TELENÍTÉS*
MEGSZAKÍTÁS MEGERŐSÍTÉS	Lásd az 5-12. táblázatot	*A = ÉRVÉNY-TELENÍTÉS*	ÉRVÉNYTELEN
ADAT	*A = SZABÁLYOS* (továbbítás)	*A = ÉRVÉNY-TELENÍTÉS*	*A = ÉRVÉNY-TELENÍTÉS*

Megjegyzés. – A táblázat bejegyzései a következőképpen kerültek meghatározásra: A = *végrehajtandó tevékenység,* S = *az az állapot, amelybe be kell lépni,* D = *a diagnosztikai kód, amelyet az ennek a tevékenységnek a következtében létrehozott csomagokon alkalmazni kell, az* ÉRVÉNYTELENÍTÉS *azt jelzi, hogy a vett csomagot törölni kell az XDLP tárolókból és az ÉRVÉNYTELEN azt jelzi, hogy a csomag/állapot kombináció nem fordulhat elő.*

5-12. táblázat: XDCE hatása a DCE megszakítás továbbítás állapotokra

XDCE-től vett csomag	DCE megszakítás továbbítási állapotok (lásd a Megjegyzést)	
	DTE MEGSZAKÍTÁSRA KÉSZ $i1$	DTE MEGSZAKÍTÁS KÜLDÉS $i2$
MEGSZAKÍTÁS MEGERŐSÍTÉS	ÉRVÉNYTELEN	*A = Szabályos* $S = i1$ (továbbítás)

XDCE-től vett csomag	DCE megszakítás továbbítási állapotok (lásd a Megjegyzést)	
	DCE MEGSZAKÍTÁSRA KÉSZ $j1$	DCE MEGSZAKÍTÁS KÜLDÉS $j2$
MEGSZAKÍTÁS	*A = Szabályos* $S = j2$ (továbbítás)	ÉRVÉNYTELEN

Megjegyzés. – A táblázat bejegyzései a következőképpen kerültek meghatározásra: A = *végrehajtandó tevékenység,* S = *az az állapot, amelybe be kell lépni,* D = *a diagnosztikai kód, amelyet az ennek a tevékenységnek a következtében létrehozott csomagokon alkalmazni kell, az* ÉRVÉNYTELENÍTÉS *azt jelzi, hogy a vett csomagot törölni kell az XDLP tárolókból és az ÉRVÉNYTELEN azt jelzi, hogy a csomag/állapot kombináció nem fordulhat elő.*

5-13. táblázat: A földi telepítési rendszerű adatkapcsolat vezérlő egység /GDLP/ S-módú alhálózat időzítők

Idõzítõ neve	*Idõzítõ címke*	*Névl. érték*	*Hivatkozás*
Aktív csatorna – GDLP	*Tx*	300 s	5.2.8.3.2
L-bit kézbesítés – GDLP	*Tm*	120 s	5.2.7.4.3
Csomag újra-sorbarendezés és S-bit kézbesítés	*Tq*	60 s	5.2.6.9

5-14. táblázat: Légijármű/Földi hálózati végponti berendezés /XDCE/ tevékenységek állapot átmenetnél

XDCE állapot	*Állapot meghatározás*	*Tevékenység, amelyet az állapotba való belépésnél el kell végezni*
$r1$	CSOMAG SZINT KÉSZ	Az összes Kapcsolt virtuális áramkör /SVC/ visszatér a $p1$ állapotba.
$p1$	KÉSZ	Feloldani az SVC számára kijelölt összes adatforrást. Megszakítani a kapcsolatot a Légijármű hálózati végponti berendezés /ADCE/ / /Földi hálózati végponti berendezés /GDCE/ SVC és a Lekérdező adat végponti berendezés /DTE/ /Hálózati végponti berendezés /DCE/ SVC között (a DTE/DCE SVC még nem lehet $p1$ állapotban).

*p*2	GDLP(ADLP) HÍVÁSKÉRÉS	Meghatározni azt, hogy elegendő „erőforrás” áll-e rendelkezésre a kérés alátámasztására; ha igen, akkor kijelölni az erőforrásokat és S-módú HÍVÁSKÉRÉS csomagot küldeni az újra- formátumozó feldolgozásnak; ha nem, akkor ADCE(GDCE) TÖRLÉS KÉRÉS a GDLP(ADLP)-hez a (*p*7) állapotba történő lépéshez.
*p*3	ADCE(GDCE) HÍVÁSKÉRÉS	Meghatározni azt, hogy elegendő erőforrás áll-e rendelkezésre a kérés alátámasztására; ha igen, akkor kijelölni az erőforrásokat és egy S-módú HÍVÁSKÉRÉS csomagot továbbítani a keret feldolgozásnak; ha nem, akkor S-módú TÖRLÉS KÉRÉS-t küldeni az újra-formátumozó feldolgozásnak és belépni a *p*1 állapotba. Nem kell S-módú HÍVÁSKÉRÉS-t továbbítani a társ XDCE-nek.
*p*4	ADAT-TOVÁBBÍTÁS	Nincs tevékenység.
*p*6	GDLP(ADLP) TÖRLÉS KÉRÉS	Feloldani az összes erőforrást, egy S-módú TÖRLÉS MEGERŐSÍTÉS csomagot küldeni a társ XDCE-nek, és belépni a *p*1 állapotba.
*p*7	ADCE(GDCE) TÖRLÉS KÉRÉS A GDLP(ADLP)-hez	S-módú TÖRLÉS KÉRÉS csomag továbbítása a társ XDCE-hez a keret feldolgozáson keresztül.
*d*1	FORGALOM VEZÉRLÉSRE KÉSZ	Nincs tevékenység.
*d*2	GDLP(ADLP) VISSZA-ÁLLÍTÁS KÉRÉS	Eltávolítani az ablakból a társ XDCE-nek továbbított S-módú ADAT csomagokat; érvényteleníteni minden olyan ADAT cso-magot, amelyek a részben továbbított M-bit sorozatokat képviselik, és érvényteleníteni azokat az S-módú MEGSZAKÍTÁS csomagokat, amelyek a társ XDCE-hez történő továbbításra várnak; visszaállítani az összes forgalom vezérlő ablak számlálót 0-ra (5.2.6.7.1). S-módú VISSZAÁLLÍTÁS MEGERŐSÍTÉS csomagot küldeni a társ XDCE-nek. SVC-t visszatéríteni *d*1 állapotba. S-módú VISSZAÁLLÍTÁS KÉRÉS csomagot küldeni az újra-formátumozó feldolgozás részére.

*d*3	ADCE(GDCE) VISSZAÁLLÍTÁS KÉRÉS A GDLP(ADLP)-hez	Eltávolítani az ablakból a társ XDCE-nek továbbított S-módú ADAT csomagokat; érvényteleníteni minden olyan ADAT csomagot, amelyek a részben továbbított M-bit sorozatokat képviselik, és érvényteleníteni azokat az S-módú MEGSZAKÍTÁS csomagokat, amelyek a társ XDCE-hez történő továbbításra várnak; visszaállítani az összes forgalom vezérlő ablak számlálót 0-ra (5.2.6.7.1). S-módú VISSZA- ÁLLÍTÁS KÉRÉS csomagot küldeni a társ XDCE-hez a keret feldolgozáson keresztül.
*i*1	GDLP(ADLP) MEGSZAKÍTÁSRA KÉSZ	Nincs tevékenység.
*i*2	GDLP(ADLP) MEG-SZAKÍTÁS KÜLDÉS	Továbbítani a társ XDCE-től vett S-módú MEGSZAKÍTÁS csomagot az újra-formátumozási feldolgozásnak.
*j*1	ADCE(GDCE) MEG-SZAKÍTÁSRA KÉSZ	Nincs tevékenység.
*j*2	ADCE(GDCE) MEG-SZAKÍTÁS KÜLDÉS	Az újra-formátumozási feldolgozástól vett S-módú MEGSZAKÍTÁS csomag továbbítása.
*f*1	ADCE (GDCE) VÉTELRE KÉSZ	Nincs tevékenység.
*f*2	ADCE(GDCE) VÉTELRE NEM KÉSZ	Nincs tevékenység.
*g*1	GDLP(ADLP) VÉTELRE KÉSZ	Nincs tevékenység.
*g*2	GDLP(ADLP) VÉTELRE NEM KÉSZ	Nincs tevékenység.

5-15. táblázat: A földi telepítési rendszerű adatkapcsolat vezérlő egység /GDLP/ (fedélzeti adatkapcsolat vezérlő egység /ADLP/) hatása a légijármű hálózati végponti berendezés /ADCE/ (földi hálózati végponti berendezés /GDCE/) csomag réteg kész állapotokra

GDLP(ADLP)-től vett csomag (lásd a 2. Megjegyzést)	ADCE(GDCE) állapotok (lásd az 1. és 3. Megjegyzést)
CSOMAG SZINT KÉSZ *r*1	
Csatorna-szám /CH/ = 0, nincs ideiglenes csatorna-szám /TC/ (lásd a 4. Megjegyzést) vagy CH = 0, egy HÍVÁS ELFOGADÁS az ADLP csomag által	*A = ÉRVÉNYTELENÍTÉS*

Kijelöletlen csomag fejrész	*A = ÉRVÉNYTELENÍTÉS*
Hívás beállítás, hívás törlés, ADAT, megszakítás, forgalom vezérlés vagy visszaállítás	Lásd az 5-16. táblázatot

MEGJEGYZÉSEK:

1. Az XDCE állapot nem szükségszerűen ugyanaz az állapot, mint a DTE/DCE illesztés.
2. A társ XDLP-től jövő összes csomag ellenőrzésre kerül a megkettőződés szempontjából, mielőtt az ebben a táblázatban bemutatottaknak megfelelően kiértékelésre kerülne.
3. A táblázat bejegyzései a következőképpen kerültek meghatározásra: *A* = végrehajtandó tevékenység, *S* = az az állapot, amelybe be kell lépni, *D* = a diagnosztikai kód, amelyet az ennek a tevékenységnek a következtében létrehozott csomagokon alkalmazni kell, az *ÉRVÉNYTELENÍTÉS* azt jelzi, hogy a vett csomagot törölni kell az XDLP tárolókból és az ÉRVÉNYTELEN azt jelzi, hogy a csomag/állapot kombináció nem fordulhat elő.
4. Ahol a Csatorna-szám /CH/ = 0 és egy érvényes ideiglenes csatorna-szám /TC/ van az ADLP vagy a GDLP csomag által adott TÖRLÉS KÉRÉS-ben, illetve az ADLP vagy a GDLP csomag által adott TÖRLÉS MGERŐSÍTÉS-ben, ott azt úgy kell kezelni, ahogy az az 5.2.5.1.2.3 pontban és az 5-16. táblázatban leírásra került.

5-16. táblázat: A földi telepítési rendszerű adatkapcsolat vezérlő egység /GDLP/ (fedélzeti adatkapcsolat vezérlő egység /ADLP/) hatása a légijármű hálózati végponti berendezés /ADCE/ (földi hálózati végponti berendezés /GDCE/) hívás beállítási és törlési állapotaira

GDLP (ADLP)-től vett csomag	ADCE (GDCE) hívás beállítás és törlés állapotok (lásd az 1., 7. és 8. Megjegyzést)					
KÉSZ *p*1	GDLP (ADLP) HÍVÁSKÉRÉS *p*2	ADCE (GDCE) HÍVÁSKÉRÉS *p*3	ADAT ÁT-VITEL *p*4	GDLP (ADLP) TÖRLÉS KÉRÉS *p*6	ADCE (GDCE) TÖRLÉS KÉRÉS a GDLP (ADLP)-hez *p*7	
Formátum hiba (lásd a 3. Megjegyzést)	*A = HIBA* (lásd a 10.Megjegyzést) *S* = *p*7 *D* = 33 (lásd a 9. Megjegyzést)	*A = HIBA* *S* = *p*7 *D* = 33 (lásd a 6. Megjegyzést)	*A = HIBA* *S* = *p*7 *D* = 33 (lásd a 6. és 9. Megjegyzést)	Lásd az 5-17. táblázatot	*A = HIBA* *S* = *p*7 *D* = 25 (lásd a 6. Megjegyzést)	*A = ÉR-VÉNYTE-LENÍTÉS*
HÍVÁSKÉRÉS	*A=SZABÁLYOS* (5.2.6.3.1) *S* = *p*2 (a kérés továbbítása a DCE-nek)	*A = HIBA* *S* = *p*7 *D* = 21 (lásd a 6. Megjegyzést)	Nem alkalmazható (lásd a 4. Megjegyzést)	Nem alkalmazható (lásd a 4. Megjegyzést)	*A=HIBA* *S* = *p*7 *D* = 25 (lásd a 6. Megjegyzést)	*A = ÉR-VÉNYTE-LENÍTÉS*

HÍVÁS ELFOGADÁS	*A = HIBA* $S = p7$ $D = 20$ (lásd a 10. Megjegyzést)	*A = HIBA* $S = p7$ $D = 21$ (lásd a 6. Megjegyzést)	*A=SZABÁLYOS* (5.2.6.3.1) $S = p4$ (továbbítás a DCE-hez) *A = HIBA* $S = p7$ $D = 42$ (lásd a 6. Megjegyzést)	*A=HIBA* $S = p7$ $D = 23$ (lásd a 6. Megjegyzést)	*A=HIBA* $S = p7$ $D = 25$ (lásd a 6. Megjegyzést)	*A = ÉR-VÉNYTE-LENÍTÉS*
TÖRLÉS KÉRÉS	*A=SZABÁLYOS* (5.2.6.3.3) $S = p6$ (Nem továbbítható)	*A=SZABÁLYOS* (5.2.6.3.3) $S = p6$ (Továbbítani a DCE-hez)	*A=SZABÁLYOS* (5.2.6.3.3) $S = p6$ (Továbbítani a DCE-hez)	*A=SZABÁLYOS* (5.2.6.3.3) $S = p6$ (Továbbítani a DCE-hez)	*A = ÉRVÉNYTE-LENÍTÉS*	*A=SZABÁLYOS* (5.2.6.3.1) $S = p1$ (Nem továbbítható)
TÖRLÉS MEGERŐSÍTÉS	*A = HIBA* $S = p7$ $D = 20$ (lásd a 10. Megjegyzést)	*A = HIBA* $S = p7$ $D = 21$ (lásd a 6. Megjegyzést)	*A = HIBA* $S = p7$ $D = 22$ (lásd a 6. Megjegyzést)	*A = HIBA* $S = p7$ $D = 23$ (lásd a 6. Megjegyzést)	*A = HIBA* $S = p7$ $D = 25$ (lásd a 6. Megjegyzést)	*A=SZABÁLYOS* (5.2.6.3.1) $S = p1$ (Nem továbbítható)
ADAT, megszakítás, forgalom vezérlés, vagy visszaállítási csomag	*A = HIBA* $S = p7$ $D = 20$ (lásd a 10. Megjegyzést)	*A = HIBA* $S = p7$ $D = 21$ (lásd a 6. és 9. Megjegyzést)	*A = HIBA* $S = p7$ $D = 22$ (lásd az 5. és 6. Megjegyzést)	Lásd az 5-17. táblázatot	*A = HIBA* $S = p7$ $D = 25$ (lásd a 6. Megjegyzést)	*A = ÉR-VÉNYTE-LENÍTÉS*

MEGJEGYZÉSEK:

1. Az XDCE állapot nem szükségszerűen ugyanaz az állapot, mint a DTE/DCE illesztés.
2. A társ XDLP-től jövő összes csomag ellenőrzésre kerül a megkettőződés szempontjából, mielőtt az ebben a táblázatban bemutatottaknak megfelelően kiértékelésre kerülne.
3. Formátum hiba egy olyan S-bit sorozatból keletkezhet, amelynek rövidebb az első vagy közbenső csomagja a maximális hossznál, továbbá egy érvénytelen LV mezőből egy HÍVÁSKÉRÉS, HÍVÁS ELFOGADÁS, TÖRLÉS KÉRÉS vagy MEGSZAKÍTÁS csomagban. Más észlelhető S-módú formátum hiba nincs.
4. Az ADCE minden – az ADLP és GDLP között használatos – csatorna-számot kijelöl, ennek következtében hívás ütközés nem lehetséges. Amikor egy GDLP csomag általi olyan HÍVÁSKÉRÉS kerül vételre, amely egy, a *p*4 állapotban lévő SVC-vel kapcsolatos ideiglenes csatorna-számot visel, akkor az ideiglenes és állandó csatorna-szám közötti kapcsolat megszakad (5.2.5.1.2.3).
5. GDLP-hez nem alkalmazható.
6. A hiba eljárást meghatározott tevékenységek végrehajtása képezi a *p*7 állapotba való belépésnél (amely magába foglalja egy TÖRLÉS KÉRÉS csomag továbbítását a társ XDLP-nek) és egy további TÖRLÉS KÉRÉS csomag küldését a DCE-nek (az újra-formátumozó feldolgozáson keresztül).
7. A táblázat bejegyzései a következőképpen kerültek meghatározásra: *A* = végrehajtandó tevékenység, *S* = az az állapot, amelybe be kell lépni, *D* = a diagnosztikai kód, amelyet az ennek a tevékenységnek a következtében létrehozott csomagokon alkalmazni kell, az *ÉRVÉNYTELENÍTÉS* azt jelzi, hogy a vett csomagot törölni kell az XDLP tárolókból és az ÉRVÉNYTELEN azt jelzi, hogy a csomag/állapot kombináció nem fordulhat elő.
8. A zárójelekben lévő – az *„A = SZABÁLYOS”* táblázati bejegyzés alatti – szám az ebben a dokumentumban lévő

pontszámát jelenti, azt, amely azt a műveletet határozza meg, amelyet el kell végezni a vett csomagon a normál feldolgozás végrehajtásához. Ha nincs hivatkozott pontszám, akkor a szabályos eljárás a táblázat szövegében van megadva.

9. Hiba állapot bejelentése és a *p*7 állapotba történő átugrás csak akkor lehetséges, ha a földi DTE címzés egyértelműen ismert. Más esetben a műveletnek a csomagot érvényteleníteni kell.

10. A hiba eljárást meghatározott tevékenységek végrehajtása képezi a *p*7 állapotba való belépésnél (amely magába foglalja egy TÖRLÉS KÉRÉS csomag továbbítását az XDLP-nek), de egy TÖRLÉS KÉRÉS csomagnak a helyi DCE-hez történő elküldése nélkül.

5-17. táblázat: GDLP (ADLP) hatása az ADCE (GDCE) visszaállítási állapotokra

GDLP (ADLP)-től vett csomag (lásd a 2. Megjegyzést)	ADCE (GDCE) visszaállítási állapotok (lásd az 1., 4. és 5. Megjegyzést)		
FORGALOM VEZÉRLÉSRE KÉSZ *d*1	GDLP (ADLP) VISSZAÁLLÍTÁS KÉRÉS *d*2	ADCE (GDCE) VISSZAÁLLÍTÁS KÉRÉS a GDLP(ADLP)-hez *d*3	
VISSZAÁLLÍTÁS KÉRÉS	*A = SZABÁLYOS* (5.2.6.7) *S* = *d*2 (Továbbítás a DCE-hez)	*A = ÉRVÉNY-TELENÍTÉS*	*A = SZABÁLYOS* (5.2.6.7) *S* = *d*1 (Nem továbbítandó)
VISSZAÁLLÍTÁS MEGERŐSÍTÉS	*A = HIBA* *S* = *d*3 *D* = 27 (lásd a 3. Megjegyzést)	*A = HIBA* *S* = *d*3 *D* = 28 (lásd a 3. Megjegyzést)	*A = ÉRVÉNY-TELENÍTÉS*
MEGSZAKÍTÁS	Lásd az 5-18. táblázatot.	*A = HIBA* *S* = *d*3 *D* = 28 (lásd a 3. Megjegyzést)	*A = ÉRVÉNY-TELENÍTÉS*
MEGSZAKÍTÁS MEGERŐSÍTÉS	Lásd az 5-18. táblázatot.	*A = HIBA* *S* = *d*3 *D* = 28 (lásd a 3. Megjegyzést)	*A = ÉRVÉNY-TELENÍTÉS*
ADAT vagy forgalom vezérlés csomag	Lásd az 5-19. táblázatot.	*A = HIBA* *S* = *d*3 *D* = 28 (lásd a 3. Megjegyzést)	*A = ÉRVÉNY-TELENÍTÉS*

Formátum hiba (lásd a 6. Megjegyzést)	*A = HIBA* *S* = *d*3 *D* = 33 (lásd a 3. Megjegyzést)	*A = HIBA* *S* = *d*3 *D* = 33 (lásd a 3. Megjegyzést)	*A = ÉRVÉNY-TELENÍTÉS*

MEGJEGYZÉSEK:

1. Az XDCE állapot nem szükségszerűen ugyanaz az állapot, mint a DTE/DCE illesztés.
2. A társ XDLP-től jövő összes csomag ellenőrzésre kerül a megkettőződés szempontjából, mielőtt az ebben a táblázatban bemutatottaknak megfelelően kiértékelésre kerülne.
3. A hiba eljárást meghatározott tevékenységek végrehajtása képezi a *d*3 állapotba való belépésnél (amely magába foglalja egy VISSZAÁLLÍTÁS KÉRÉS csomag továbbítását a társ XDLP-nek) és egy VISSZAÁLLÍTÁS KÉRÉS csomag küldését a DCE-nek (az újra-formátumozó feldolgozáson keresztül).
4. A táblázat bejegyzései a következőképpen kerültek meghatározásra: *A* = végrehajtandó tevékenység, *S* = az az állapot, amelybe be kell lépni, *D* = a diagnosztikai kód, amelyet az ennek a tevékenységnek a következtében létrehozott csomagokon alkalmazni kell, az *ÉRVÉNYTELENÍTÉS* azt jelzi, hogy a vett csomagot törölni kell az XDLP tárolókból és az ÉRVÉNYTELEN azt jelzi, hogy a csomag/állapot kombináció nem fordulhat elő.
5. A zárójelekben lévő – az *„A =SZABÁLYOS”* táblázati bejegyzés alatti – szám az ebben a dokumentumban lévő pontszámát jelenti, azt, amely azt a műveletet határozza meg, amelyet el kell végezni a vett csomagon a normál feldolgozás végrehajtásához. Ha nincs hivatkozott pontszám, akkor a szabályos eljárás a táblázat szövegében van megadva.
6. Formátum hiba egy olyan S-bit sorozatból keletkezhet, amelynek rövidebb az első vagy közbenső csomagja a maximális hossznál, továbbá egy érvénytelen LV mezőből egy HÍVÁSKÉRÉS, HÍVÁS ELFOGADÁS, TÖRLÉS KÉRÉS vagy MEGSZAKÍTÁS csomagban. Más észlelhető S-módú formátum hiba nincs.

5-18. táblázat: GDLP (ADLP) hatása az ADCE (GDCE) megszakítás továbbítási állapotokra

GDLP (ADLP)-től vett csomag (lásd a 2. Megjegyzést)	ADCE (GDCE) megszakítás továbbítási állapotok (lásd az 1., 3. és 4. Megjegyzést)	
	GDLP (ADLP) MEGSZAKÍTÁSRA KÉSZ *i*1	GDLP (ADLP) MEGSZAKÍTÁS KÜLDÉS *i*2
MEGSZAKÍTÁS (lásd a 6. Megjegyzést)	*A = SZABÁLYOS* (5.2.6.4.5) *S* = *i*2 (továbbítás a DCE-hez)	*A = HIBA* *S* = *d*3 *D* = 44 (lásd az 5. Megjegyzést)

GDLP (ADLP)-től vett csomag (lásd a 2. Megjegyzést)	ADCE (GDCE) megszakítás továbbítási állapotok (lásd az 1., 3. és 4. Megjegyzést)	
	ADCE (GDCE) MEGSZAKÍTÁSRA KÉSZ *j*1	ADCE (GDCE) MEGSZAKÍTÁS KÜLDÉS *j*2
MEGSZAKÍTÁS MEGERŐSÍTÉS	*A = HIBA* *S* = *d*3 *D* = 43 (lásd az 5. Megjegyzést)	*A = SZABÁLYOS* (5.2.6.4.5) *S* = *j*2 (továbbítás megerősítés a DCE-hez)

MEGJEGYZÉSEK:

1. Az XDCE állapot nem szükségszerűen ugyanaz az állapot, mint a DTE/DCE illesztés.

2. A társ XDLP-től jövő összes csomag ellenőrzésre kerül a megkettőződés szempontjából, mielőtt az ebben a táblázatban bemutatottaknak megfelelően kiértékelésre kerülne.

3. A táblázat bejegyzései a következőképpen kerültek meghatározásra: *A* = végrehajtandó tevékenység, *S* = az az állapot, amelybe be kell lépni, *D* = a diagnosztikai kód, amelyet az ennek a tevékenységnek a következtében létrehozott csomagokon alkalmazni kell, az *ÉRVÉNYTELENÍTÉS* azt jelzi, hogy a vett csomagot törölni kell az XDLP tárolókból és az ÉRVÉNYTELEN azt jelzi, hogy a csomag/állapot kombináció nem fordulhat elő.

4. A zárójelekben lévő – az *„A = SZABÁLYOS”* táblázati bejegyzés alatti – szám az ebben a dokumentumban lévő pontszámát jelenti, azt, amely azt a műveletet határozza meg, amelyet el kell végezni a vett csomagon a normál feldolgozás végrehajtásához. Ha nincs hivatkozott pontszám, akkor a szabályos eljárás a táblázat szövegében van megadva.

5. A hiba eljárást meghatározott tevékenységek végrehajtása képezi a *d*3 állapotba való belépésnél (amely magába foglalja egy VISSZAÁLLÍTÁS KÉRÉS csomag továbbítását a társ XDLP-nek) és egy VISSZAÁLLÍTÁS KÉRÉS csomag küldése a DCE-hez (az újra-formátumozó feldolgozáson keresztül).

6. A felhasználási adat hossznak a 32 bájtnál nagyobb MEGSZAKÍTÁS csomagokat, vagy egy, a sorrenden kívüli MEGSZAKÍTÁS csomagot hibának kell tekinteni.

5-19. táblázat: GDLP (ADLP) hatása az ADCE (GDCE) forgalom vezérlés átvitel állapotokra

GDLP (ADLP)-től vett csomag (lásd a 2. Megjegyzést)	ADCE (GDCE) forgalom vezérlés átvitel állapotok (lásd az 1., 6. és 7. Megjegyzést)	
	ADCE (GDCE) VÉTELRE KÉSZ *f*1	ADCE (GDCE) VÉTELRE NEM KÉSZ *f*2
ADAT csomag érvénytelen csomag vételi sorrenddel /PR/ (lásd a 3. Megjegyzést)	*A = HIBA* *S = d*3 *D* = 2 (lásd a 8. Megjegyzést)	*A = HIBA* *S = d*3 *D* = 2 (lásd a 8. Megjegyzést)
ADAT csomag érvényes PR-el, érvénytelen csomag küldési sorrenddel /PS/ vagy felhasználói adathossz /LV/ almezővel (lásd a 4. és 5. Megjegyzést)	*A = ÉRVÉNYTELENÍTÉS,* de a PR érték feldolgozása és a várható PS értéket magába foglaló VISSZAUTASÍTÁS csomag elküldése (lásd az 5. Megjegyzést)	*A = ÉRVÉNYTELENÍTÉS,* de a PR érték feldolgozása és a várható PS értéket magába foglaló VISSZAUTASÍTÁS csomag elküldése, amikor a foglalt állapot véget ér
ADAT csomag érvényes PR, PS és LV almezővel	*A = SZABÁLYOS* (5.2.6.4.4) (továbbítás)	*A=FELDOLGOZÁS,* ha lehetséges; vagy *A=ÉRVÉNYTELENÍTÉS,* de a PR érték feldolgozása és a várható PS értéket magába foglaló VISSZAUTASÍTÁS elküldése, amikor a foglalt állapot véget ér

GDLP (ADLP)-től vett csomag (lásd a 2. Megjegyzést)	ADCE (GDCE) forgalom vezérlés átvitel állapotok (lásd az 1., 6. és 7. Megjegyzést)	
	GDLP (ADLP) VÉTELRE KÉSZ *g*1	GDLP (ADLP) VÉTELRE NEM KÉSZ *g*2

Fogadásra kész /RR/, Fogadásra nem kész /RNR/, VISSZAUTASÍTÁS csomag érvénytelen csomag vételi sorrenddel /PR/ (lásd a 3. Megjegyzést)	*A = HIBA* *S* = *d*3 *D* = 2 (lásd a 8. Megjegyzést)	*A = HIBA* *S* = *d*3 *D* = 2 (lásd a 8. Megjegyzést)
RR érvényes PR mezővel (lásd a 9. Megjegyzést)	*A = SZABÁLYOS* (5.2.6.5)	*A = SZABÁLYOS* (5.2.6.6) *S* = *g*1
RNR érvényes PR értékkel (lásd a 9. Megjegyzést)	*A = SZABÁLYOS* (5.2.6.5) *S* = *g*2	*A = SZABÁLYOS* (5.2.6.6)
VISSZAUTASÍTÁS érvényes PR értékkel (lásd a 9. Megjegyzést)	*A = SZABÁLYOS* (5.2.6.5)	*A = SZABÁLYOS* (5.2.6.6) *S* = *g*1

MEGJEGYZÉSEK:

1. Az XDCE állapot nem szükségszerűen ugyanaz az állapot, mint a DTE/DCE illesztés.
2. A társ XDLP-től jövő összes csomag ellenőrzésre kerül a megkettőződés szempontjából, mielőtt az ebben a táblázatban bemutatottaknak megfelelően kiértékelésre kerülne.
3. Egy érvénytelen PR érték az, amely kisebb, mint a társ XDLP által küldött utolsó csomag PR értéke (modulo 16), vagy nagyobb, mint az XDLP által továbbításra kerülő következő adat csomag PS értéke.
4. Egy érvénytelen PS érték az, amelyik a PS-re várható következő értéktől eltérő.
5. Egy érvénytelen LV almező az, amely olyan értéket tűntet fel, ami túl nagy a vett szegmens méretéhez. Egy olyan LV mező hiba esetében, amely a csomagban lévő többi mező helyességében való bizalom elvesztéséig növekedhet, a csomagot minden további nélkül érvényteleníteni kell.
6. A táblázat bejegyzései a következőképpen kerültek meghatározásra: *A* = végrehajtandó tevékenység, *S* = az az állapot, amelybe be kell lépni, *D* = a diagnosztikai kód, amelyet az ennek a tevékenységnek a következtében létrehozott csomagokon alkalmazni kell, az *ÉRVÉNYTELENÍTÉS* azt jelzi, hogy a vett csomagot törölni kell az XDLP tárolókból és az ÉRVÉNYTELEN azt jelzi, hogy a csomag/állapot kombináció nem fordulhat elő.
7. A zárójelekben lévő – az *„A = SZABÁLYOS”* táblázati bejegyzés alatti – szám az ebben a dokumentumban lévő pontszámát jelenti, azt, amely azt a műveletet határozza meg, amelyet el kell végezni a vett csomagon a normál feldolgozás végrehajtásához. Ha nincs hivatkozott pontszám, akkor a szabályos eljárás a táblázat szövegében van megadva.
8. A hiba eljárást meghatározott tevékenységek végrehajtása képezi a *d*3 állapotba való belépésnél (amely magába foglalja egy VISSZAÁLLÍTÁS KÉRÉS csomag továbbítását a társ XDLP-nek) és egy VISSZAÁLLÍTÁS KÉRÉS csomag küldése a DCE-hez (az újra-formátumozó feldolgozáson keresztül).
9. Az RR, RNR és VISSZAUTASÍTÁS csomagok nem rendelkeznek végtől-végig jelentőséggel, és nem kerülnek továbbításra a DCE-hez.
10. Egy olyan csomag vételének, amelynél az M-bit = 1-nél kisebb, mint a maximális csomag méret, elő kell idéznie azt, hogy egy visszaállítás kerüljön létrehozásra, és a sorozat fennmaradó részét érvényteleníteni kell.

5-20. táblázat: A hálózati végponti berendezés /DCE/ hatása a légijármű hálózati végponti berendezés /ADCE/ (földi hálózati végponti berendezés /GDCE/) hívás beállítás és törlési állapotokra

GDLP (ADLP)-től vett csomag (lásd a 2. és 4. Megjegyzést)	ADCE (GDCE) hívás beállítás és törlés állapotok (lásd az 1., 7. és 8. Megjegyzést)					
	KÉSZ *p*1	GDLP (ADLP) HÍVÁSKÉRÉS *p*2	ADCE (GDCE) HÍVÁSKÉRÉS *p*3	ADAT ÁT-VITEL *p*4	GDLP (ADLP) TÖRLÉS KÉRÉS *p*6	ADCE (GDCE) TÖRLÉS KÉRÉS a GDLP (ADLP)-hez *p*7
HÍVÁSKÉRÉS (lásd a 6. Megjegyzést)	*A=SZABÁ-LYOS* (5.2.6.3.1) *S* = *p*3 (továbbítás)	ÉRVÉNY-TELEN (lásd az 5. Meg-jegyzést)	ÉRVÉNY-TELEN (lásd a 3 Meg-jegyzést)	ÉRVÉNY-TELEN (lásd a 3 Meg-jegyzést)	ÉRVÉNY-TELEN (lásd a 3 Meg-jegyzést)	ÉRVÉNY-TELEN (lásd a 3 Meg-jegyzést)
HÍVÁS ELFOGADÁS (lásd a 4. Megjegy-zést)	*A = ÉR-VÉNYTE-LENÍTÉS*	*A=SZABÁ-LYOS* *S* = *p*4 (továbbítás)	ÉRVÉNY-TELEN (lásd a 3 Megj-egyzést)	ÉRVÉNY-TELEN (lásd a 3. Meg-jegyzést)	*A = ÉR-VÉNYTE-LENÍTÉS*	*A = ÉR-VÉNYTE-LENÍTÉS*
TÖRLÉS KÉRÉS (lásd a 4. Megjegy-zést)	*A = ÉR-VÉNYTE-LENÍTÉS*	*A=SZABÁ-LYOS* (5.2.6.3.3) *S* = *p*7 (továbbítás)	*A=SZABÁ-LYOS* (5.2.6.3.3) *S* = *p*7 (továbbítás)	*A=SZABÁ-LYOS* (5.2.6.3.3) *S* = *p*7 (továbbítás)	*A = ÉR-VÉNYTE-LENÍTÉS*	*A = ÉR-VÉNYTE-LENÍTÉS*
ADAT, MEGSZA-KÍTÁS vagy VISZ-SZAÁLLÍTÁS csomagok (lásd a 4. Megjegy-zést)	*A = ÉR-VÉNYTE-LENÍTÉS*	ÉRVÉNY-TELEN (lásd a 3 Megjegyzést)	ÉRVÉNY-TELEN (lásd a 3 Megjegyzést)	Lásd az 5-21. táblázatot	*A = ÉR-VÉNYTE-LENÍTÉS*	*A = ÉR-VÉNYTE-LENÍTÉS*

MEGJEGYZÉSEK:

1. Az XDCE állapot nem szükségszerűen ugyanaz az állapot, mint a DTE/DCE illesztés.

2. Ez az a DTE csomag, amelyet a DCE-n keresztül vesznek, azután, hogy az összes DTE/DCE feldolgozás megtörtént. Eljárások a DTE/DCE illesztésen belül (mint például a Vételre kész /RR/, Vételre nem kész /RNR/ és VISSZAUTASÍTÁS, ha érvényben van) nem hatnak közvetlenül az XDCE-re. Az összes hiba eljárás, ahogyan az az ISO 8208-ban dokumentálva van, végrehajtásra került. Ebből eredően bizonyos csomagokat az illesztés elutasít, és ezek nincsenek ebben a táblázatban feltűntetve.

3. A DCE a protokoll műveletében a DTE-vel észleli ezt a hiba körülményt és ennek megfelelően a hibás csomagra azt lehet mondani, hogy sohasem éri el az XDCE-t; lásd még a 2. megjegyzést.

4. A DTE/DCE csatorna-számának nem kell szükségszerűen ugyanazon csatorna-számnak lennie, mint amely az ADCE/GDCE-nél kerül felhasználásra; egy csomag a DTE-től, amely egy csatorna-számot foglal magába, összekapcsolódik egy levegő/föld csatornával a korábban létrehozott kereszt-referencia táblázat által. Ha egyik sincs, akkor a DTE/DCE csatorna meghatározás hivatkozása egy levegő/föld csatornára vonatkozik a *p*1 állapotban.

5. Az ADCE az ADLP és GDLP között használt összes csatorna-számot kijelöli; ennek folytán hívás ütközés (*p*5 ISO 8208 jelölés) nem lehetséges; lásd a 4. megjegyzést is.
6. A DTE-től jövő HÍVÁSKÉRÉS sohasem lehet összekapcsolva egy olyan XDCE csatorna-számmal, amely nincs *p*1 állapotban.
7. A táblázat bejegyzései a következőképpen kerültek meghatározásra: *A* = végrehajtandó tevékenység, *S* = az az állapot, amelybe be kell lépni, *D* = a diagnosztikai kód, amelyet az ennek a tevékenységnek a következtében létrehozott csomagokon alkalmazni kell, az *ÉRVÉNYTELENÍTÉS* azt jelzi, hogy a vett csomagot törölni kell az XDLP tárolókból és az ÉRVÉNYTELEN azt jelzi, hogy a csomag/állapot kombináció nem fordulhat elő.
8. A zárójelekben lévő – az *„A = SZABÁLYOS”* táblázati bejegyzés alatti – szám az ebben a dokumentumban lévő pontszámát jelenti, azt, amely azt a műveletet határozza meg, amelyet el kell végezni a vett csomagon a normál feldolgozás végrehajtásához. Ha nincs hivatkozott pontszám, akkor a szabályos eljárás a táblázat szövegében van megadva.

5-21. táblázat: A DCE hatása az ADCE (GDCE) visszaállítás állapotokra

DCE-től vett csomag	ADCE (GDCE) visszaállítási állapotok (lásd az 1., 4. és 5. Megjegyzést)		
FORGALOM VEZÉRLÉSRE KÉSZ *d*1	GDLP (ADLP) VISSZAÁLLÍTÁS KÉRÉS *d*2	ADCE (GDCE) VISSZAÁLLÍTÁS KÉRÉS a GDLP(ADLP)-hez *d*3	
VISSZAÁLLÍTÁS KÉRÉS	*A = SZABÁLYOS* (5.2.6.7) *S = d*3 (Továbbítás)	*A = SZABÁLYOS* (5.2.6.7) *S = d*1 (Továbbítás)	*A = ÉRVÉNY-TELENÍTÉS*
VISSZAÁLLÍTÁS MEGERŐSÍTÉS	ÉRVÉNYTELEN (lásd a 3. Megjegyzést)	ÉRVÉNYTELEN (lásd a 3. Megjegyzést)	ÉRVÉNYTELEN (lásd a 3. Megjegyzést)
MEGSZAKÍTÁS	Lásd az 5-22. táblázatot	*A = ÉRVÉNY-TELENÍTÉS*	A megszakítás visszatartása addig, amíg az S-módú visszaállítás befejezõdik
MEGSZAKÍTÁS MEGERŐSÍTÉS	Lásd az 5-22. táblázatot	*A = ÉRVÉNY-TELENÍTÉS*	ÉRVÉNYTELEN (lásd a 3. Megjegyzést)

ADAT (lásd a 2. Megjegyzést)	*A = SZABÁLYOS* (5.2.6.4) (Továbbítás)	*A = ÉRVÉNY-TELENÍTÉS*	Az adat visszatartása addig, amíg az S-módú visszaállítás befejezõdik

MEGJEGYZÉSEK:

1. Az XDCE állapot nem szükségszerűen ugyanaz az állapot, mint a DTE/DCE illesztés.

2. Ez az a DTE csomag, amelyet a DCE-n keresztül vesznek, azután, hogy az összes DTE/DCE feldolgozás megtörtént. Eljárások a DTE/DCE illesztésen belül (mint például a Vételre kész /RR/, Vételre nem kész /RNR/ és VISSZAUTASÍTÁS, ha érvényben van) nem hatnak közvetlenül az XDCE-re. Az összes hiba eljárás, ahogyan az az ISO 8208-ban dokumentálva van, végrehajtásra került. Ebből eredően bizonyos csomagokat az illesztés elutasít, és ezek nincsenek ebben a táblázatban feltűntetve.

3. A DCE a protokoll mûveletében a DTE-vel észleli ezt a hiba körülményt és ennek megfelelõen a hibás csomagra azt lehet mondani, hogy sohasem „éri el” az XDCE-t; lásd még a 2. megjegyzést.

4. A táblázat bejegyzései a következőképpen kerültek meghatározásra: *A* = végrehajtandó tevékenység, *S* = az az állapot, amelybe be kell lépni, *D* = a diagnosztikai kód, amelyet az ennek a tevékenységnek a következtében létrehozott csomagokon alkalmazni kell, az *ÉRVÉNYTELENÍTÉS* azt jelzi, hogy a vett csomagot törölni kell az XDLP tárolókból és az ÉRVÉNYTELEN azt jelzi, hogy a csomag/állapot kombináció nem fordulhat elő.

5. A zárójelekben lévő – az *„A = SZABÁLYOS”* táblázati bejegyzés alatti – szám az ebben a dokumentumban lévő pontszámát jelenti, azt, amely azt a műveletet határozza meg, amelyet el kell végezni a vett csomagon a normál feldolgozás végrehajtásához. Ha nincs hivatkozott pontszám, akkor a szabályos eljárás a táblázat szövegében van megadva.

5-22. táblázat: DCE hatása az ADCE (GDCE) megszakítás átvitel állapotokra

DCE-től vett csomag (lásd a 2. Megjegyzést)	ADCE (GDCE) megszakítás átvitel állapot (lásd az 1., 4. és 5. Megjegyzést)	
	GDLP (ADLP) MEGSZAKÍTÁSRA KÉSZ *i*1	GDLP (ADLP) MEGSZAKÍTÁS KÜLDÉS *i*2
MEGSZAKÍTÁS (lásd a 6. Megjegyzést)	ÉRVÉNYTELEN (Lásd a 3. Megjegyzést)	*A = SZABÁLYOS* (5.2.6.4.5) *S* = *i*1 (továbbítás)

DCE-től vett csomag (lásd a 2. Megjegyzést)	ADCE (GDCE) megszakítás átvitel állapot (lásd az 1., 4. és 5. Megjegyzést)	
	ADCE (GDCE) MEGSZAKÍTÁSRA KÉSZ *j*1	ADCE (GDCE) MEGSZAKÍTÁS KÜLDÉS *j*2
MEGSZAKÍTÁS	*A = SZABÁLYOS* (5.2.6.4.5) *S* = *j*2 (továbbítás)	ÉRVÉNYTELEN (Lásd a 3. Megjegyzést)

MEGJEGYZÉSEK:

1. Az XDCE állapot nem szükségszerűen ugyanaz az állapot, mint a DTE/DCE illesztés.

2. Ez az a DTE csomag, amelyet a DCE-n keresztül vesznek, azután, hogy az összes DTE/DCE feldolgozás megtörtént. Eljárások a DTE/DCE illesztésen belül (mint például a Vételre kész /RR/, Vételre nem kész /RNR/ és VISSZAUTASÍTÁS, ha érvényben van) nem hatnak közvetlenül az XDCE-re. Az összes hiba eljárás, ahogyan az az

ISO 8208-ban dokumentálva van, végrehajtásra került. Ebből eredően bizonyos csomagokat az illesztés elutasít, és ezek nincsenek ebben a táblázatban feltűntetve.

3. A DCE a protokoll mûveletében a DTE-vel észleli ezt a hiba körülményt és ennek megfelelõen a hibás csomagra azt lehet mondani, hogy sohasem „éri el” az XDCE-t; lásd még a 2. megjegyzést.

4. A táblázat bejegyzései a következőképpen kerültek meghatározásra: *A* = végrehajtandó tevékenység, *S* = az az állapot, amelybe be kell lépni, *D* = a diagnosztikai kód, amelyet az ennek a tevékenységnek a következtében létrehozott csomagokon alkalmazni kell, az *ÉRVÉNYTELENÍTÉS* azt jelzi, hogy a vett csomagot törölni kell az XDLP tárolókból és az ÉRVÉNYTELEN azt jelzi, hogy a csomag/állapot kombináció nem fordulhat elő.

5. A zárójelekben lévő – az *„A = SZABÁLYOS”* táblázati bejegyzés alatti – szám az ebben a dokumentumban lévő pontszámát jelenti, azt, amely azt a műveletet határozza meg, amelyet el kell végezni a vett csomagon a normál feldolgozás végrehajtásához. Ha nincs hivatkozott pontszám, akkor a szabályos eljárás a táblázat szövegében van megadva.

5-23. táblázat: Általános adás azonosító szám kijelölések

Fedélzetre irányuló általános adás azonosító	*Kijelölés*
00_{16}	Nem érvényes
01_{16}	Fenntartott (differenciál GNSS korrekció)
30_{16}	Nem érvényes
31_{16}	Fenntartva az ACAS (RA általános adás) (1) részére
32_{16}	Fenntartva az ACAS (ACAS általános adás) részére
Továbbiak	Kijelöletlen
Fedélzetről leadott általános adás azonosító	*Kijelölés*
00_{16}	Nem érvényes
02_{16}	Fenntartott (forgalmi tájékoztató szolgálat)
10_{16}	Adatkapcsolat teljesítőképesség jelentés
20_{16}	Légijármű azonosítás
FE_{16}	Felfrissítés kérés
FF_{16}	Keresés kérés
Továbbiak	Kijelöletlen

(1) ACAS = Összeütközési veszélyt jelző fedélzeti rendszer;
RA = Megoldási tanácsadás

5-24. táblázat: Tároló szám kijelölések

Tároló szám	*Kijelölés*
00_{16}	Nem érvényes
01_{16}	Kijelöletlen
02_{16}	Kapcsolt B-adatátvitel, 2-es szegmens
03_{16}	Kapcsolt B-adatátvitel, 3-as szegmens
04_{16}	Kapcsolt B-adatátvitel, 4-es szegmens
05_{16}	Kiterjesztett szkvitter repülési helyzet
06_{16}	Kiterjesztett szkvitter földfelszíni helyzet
07_{16}	Kiterjesztett szkvitter állapot
08_{16}	Kiterjesztett szkvitter azonosító és típus

09_{16}	Kiterjesztett szkvitter tényleges önsebesség
$0A_{16}$	Kiterjesztett szkvitter esemény-vezérelt információ
$0B_{16}$	Levegő/levegő információ 1. (légijármű állapot)
$0C_{16}$	Levegő/levegő információ 2. (légijármű szándék)
$0D_{16}$-$0E_{16}$	Fenntartott (egyéb levegő/levegő információ)
$0F_{16}$	Fenntartott (ACAS) /ACAS = Összeütközési veszélyt jelző fedélzeti rendszer/
10_{16}	Adatkapcsolat teljesítőképesség jelentés
11_{16} –16_{16}	Kiterjesztés az adatkapcsolat teljesítőképesség jelentéshez
17_{16}	Általános kezelésű GIBC /Földről kezdeményezett B-adat-átvitel/ teljesítőképesség jelentés
18_{16} –$1F_{16}$	S-módú specifikus szolgáltatás teljesítőképesség jelentések
20_{16}	Légijármű azonosító
21_{16}	Légijármű lajstrom szám
22_{16}	Antenna pozíciók
23_{16}	Fenntartott (antenna pozíciók)
24_{16}	Fenntartott (statikus légijármű paraméter)
25_{16}	Légijármű típus
26_{16} –$2F_{16}$	Kijelöletlen
30_{16}	ACAS aktív megoldási tanácsadás (RA)
31_{16} –$3F_{16}$	Kijelöletlen
40_{16}	Légijármű szándék
41_{16}	Következő útvonal-pont azonosító
42_{16}	Következő útvonal-pont helyzet
43_{16}	Következő útvonal-pont tájékoztatás
44_{16}	Meteorológiai rutin légi jelentés
45_{16}	Meteorológiai veszély jelentés
46_{16}	1.módú repülés vezérlő rendszer
47_{16}	2.módú repülés vezérlő rendszer
48_{16}	VHF csatorna jelentés
49_{16} – $4F_{16}$	Kijelöletlen
50_{16}	Útirány és forduló jelentés
51_{16}	Helyzet jelentés, durva
52_{16}	Helyzet jelentés, pontos
53_{16}	Levegő vonatkoztatású állapot-vektor
54_{16}	1. útvonal-pont
55_{16}	2. útvonal-pont
56_{16}	3. útvonal-pont
57_{16} – $5E_{16}$	Kijelöletlen
$5F_{16}$	Kvázi-statikus paraméter figyelés
60_{16}	Mágneses irány és sebesség jelentés
61_{16}	Kiterjesztett szkvitter kényszerhelyzeti/prioritás állapot
62_{16}	Jelenlegi pályagörbe váltási pont

63_{16}	Következő pályagörbe váltási pont
64_{16}	Légijármű üzemeltetési koordinációs közlemény
65_{16}	Légijármű üzemeltetési állapot
$66_{16} – 6F_{16}$	Fenntartva a kiterjesztett szkvitter részére
$70_{16} – 75_{16}$	Fenntartva későbbi, fedélzetről leadott paraméterek részére
$76_{16} – E0_{16}$	Kijelöletlen
$E1_{16} – E2_{16}$	Fenntartva az S-módú bájt részére
$E3_{16} – F0_{16}$	Kijelöletlen
$F1_{16} – F2_{16}$	Katonai alkalmazások
$F3_{16} – FF_{16}$	Kijelöletlen

5-25. táblázat: S-módú specifikus protokoll /MSP/ csatorna-szám kijelölések

Fedélzetre irányuló adás csatorna-szám	*Kijelölés*
0	ÉRVÉNYTELEN
1	FENNTARTOTT (SPECIFIKUS SZOLGÁLTATÁS KEZELÉS)
2	FENNTARTOTT (FORGALMI TÁJÉKOZTATÁS SZOLGÁLAT)
3	FENNTARTOTT (FÖLD-LEVEGŐ RIASZTÁS)
4	FENNTARTOTT (FÖLDI SZÁRMAZTATÁSÚ HELYZET)
5	ACAS ÉRZÉKENYSÉGI SZINTSZABÁLYOZÁS
6	FENNTARTOTT (FÖLD-LEVEGŐ SZOLGÁLTATÁS KÉRÉS)
7	FENNTARTOTT (FÖLD-LEVEGŐ SZOLGÁLTATÁS VÁLASZ)
8 – 63	KIJELÖLETLEN
Fedélzetről leadott adás csatorna-szám	*Kijelölés*
0	ÉRVÉNYTELEN
1	FENNTARTOTT (SPECIFIKUS SZOLGÁLTATÁS KEZELÉS)
2	KIJELÖLETLEN
3	FENNTARTOTT (ADAT JELZÉS)
4	FENNTARTOTT (HELYZET KÉRÉS)
5	KIJELÖLETLEN
6	FENNTARTOTT (FÖLD-LEVEGŐ SZOLGÁLTATÁS VÁLASZ)
7	FENNTARTOTT (LEVEGŐ-FÖLD SZOLGÁLTATÁS KÉRÉS)
8 – 63	KIJELÖLETLEN

Az 5. FEJEZET ÁBRÁI

Kijelölõ azonosító /DI/ = 1

					TMS	
17	21	23	26	27	29	30
IIS	MBS	MES	LOS	RSS	SPARE	LAS
20	22	25		28		32
Lekérdező azonosító részmező					Tartalék	Kapcsolt A-adatátvitel részmező

Kijelölõ azonosító /DI/ = 7

					TMS	
17	21	25	26	27	29	30

IIS	RRS	SPARE	LOS	SPARE	SPARE	LAS
20	24			28		32
Lekérdező azonosító részmező		Tartalék		Tartalék	Tartalék	Kapcsolt A-adatátvitel részmező

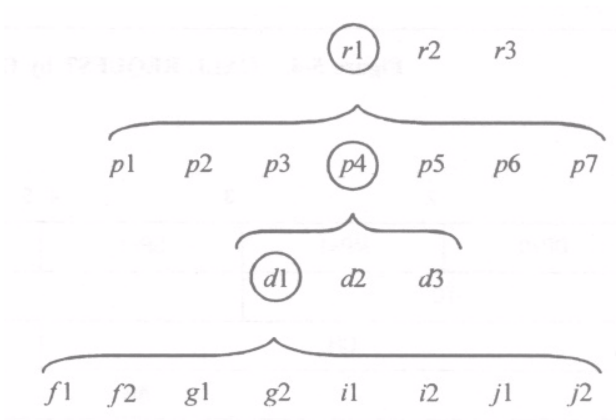
5-1. ábra: A speciális jelölés /SD/ mező szerkezete

Kész és újraindítás állapotok

Hívás beállítás és törlés állapotok

Adatátviteli állapotok

Megszakítás és vezérlés állapotok



Megjegyzés. – Az r1, p4 és d1 állapotok (bekarikázva) azok az állapotok, amelyek hozzáférést biztosítanak a Hálózati végponti berendezés /DCE/ alállapot hierarchia alacsonyabb szintjeihez.

5-2. ábra: Hálózati végponti berendezés /DCE/ alállapot hierarchia

1 2 3 4 6 7 8

<table>
<tr><td>DP=0
Adatcsomag</td><td>MP=1
S-módú spec.protokoll</td><td>SP=1
Felügyelő csomag</td><td>ST=0
Felügyelő típus</td><td>FILL2
Kitöltés</td></tr>
<tr><td>P
Prioritás</td><td>FILL
Kitöltés</td><td colspan="3">SN
Sorozat-szám</td></tr>
<tr><td colspan="3">CH
Csatorna-szám</td><td colspan="2">AM
Mobil cím</td></tr>
<tr><td colspan="5">AG
Földi cím</td></tr>
<tr><td>S
Több csomag</td><td>FS
Gyors kiválasztás</td><td>F
Első csomag</td><td colspan="2">LV
Felhasználói adat hossz</td></tr>
<tr><td colspan="5">UD
Felhasználói adatmező</td></tr>
</table>

5-3. ábra: A fedélzeti adatkapcsolat vezérlő egység /ADLP/ által adott HÍVÁSKÉRÉS csomag

1 2 3 6 7 8
4

<table>
<tr><td>DP=0
Adatcsomag</td><td>MP=1
S-módú spec.protokoll</td><td>SP=1
Felügyelő csomag</td><td>ST=0
Felügyelő típus</td><td>FILL
Kitöltés</td></tr>
<tr><td>P
Prioritás</td><td>FILL
Kitöltés</td><td colspan="3">SN
Sorozat-szám</td></tr>
<tr><td colspan="2">FILL
Kitöltés</td><td>TC
Ideiglenes csatorna-szám</td><td colspan="2">AM
Mobil cím</td></tr>
<tr><td colspan="5">AG
Földi cím</td></tr>
<tr><td>S
Több csomag</td><td>FS
Gyors kiválasztás</td><td>F
Első csomag</td><td colspan="2">LV
Felhasználói adat hossz</td></tr>
<tr><td colspan="5">UD
Felhasználói adatmező</td></tr>
</table>

5-4. ábra: A földi telepítési rendszerű adatkapcsolat vezérlő egység /GDLP/ által adott HÍVÁSKÉRÉS csomag

1 2 3 6 7 8
4

<table>
<tr><td>DP=0
Adatcsomag</td><td>MP=1
S-módú spec.protokoll</td><td>SP=1
Felügyelő csomag</td><td>ST=1
Felügyelő típus</td><td>FILL2
Kitöltés</td></tr>
<tr><td colspan="2">TC
Ideiglenes csatorna-szám</td><td colspan="3">SN
Sorozat-szám</td></tr>
<tr><td colspan="3">CH
Csatorna-szám</td><td colspan="2">AM
Mobil cím</td></tr>
<tr><td colspan="5">AG
Földi cím</td></tr>
<tr><td>S
Több csomag</td><td>FILL
Kitöltés</td><td>F
Első csomag</td><td colspan="2">LV
Felhasználói adat hossz</td></tr>
<tr><td colspan="5">UD
Felhasználói adatmező</td></tr>
</table>

5-5. ábra: A fedélzeti adatkapcsolat vezérlő egység /ADLP/ által adott HÍVÁS ELFOGADÁS csomag

1 2 3 6 7 8
4

<table>
<tr><td>DP=0
Adatcsomag</td><td>MP=1
S-módú spec.protokoll</td><td>SP=1
Felügyelő csomag</td><td>ST=1
Felügyelő típus</td><td>FILL
Kitöltés</td></tr>
<tr><td colspan="2">FILL
Kitöltés</td><td colspan="3">SN
Sorozat-szám</td></tr>
<tr><td colspan="3">CH</td><td colspan="2">AM</td></tr>
</table>

Csatorna-szám			Mobil cím	
AG Földi cím				
S Több csomag	FILL Kitöltés	F Első csomag	LV Felhasználói adat hossz	
UD Felhasználói adatmező				

5-6. ábra: A földi telepítési rendszerű adatkapcsolat vezérlő egység /GDLP/ által adott HÍVÁS ELFOGADÁS csomag

1 2 3 6 7 8
4

DP=0 Adatcsomag	MP=1 S-módú spec.protokoll	SP=1 Felügyelő csomag	ST=2 Felügyelő típus	FILL2 Kitöltés
TC Ideiglenes csatorna-szám		SN Sorozat-szám		
CH Csatorna-szám			AM Mobil cím	
AG Földi cím				
CC Törlést létrehozó				
DC Diagnosztikai kód				
S Több csomag	FILL Kitöltés	F Első csomag	LV Felhasználói adat hossz	
UD Felhasználói adatmező				

5-7. ábra: A fedélzeti adatkapcsolat vezérlő egység /ADLP/ által adott TÖRLÉS KÉRÉS csomag

1 2 3 6 7 8
4

DP=0 Adatcsomag	MP=1 S-módú spec.protokoll	SP=1 Felügyelő csomag	ST=2 Felügyelő típus	FILL Kitöltés
TC Ideiglenes csatorna-szám		SN Sorozat-szám		
CH Csatorna-szám			AM Mobil cím	
AG Földi cím				
CC Törlést létrehozó				
DC Diagnosztikai kód				

<table>
<tr><td>S
Több csomag</td><td>FILL
Kitöltés</td><td>F
Első csomag</td><td>LV
Felhasználói adat hossz</td></tr>
<tr><td colspan="4">UD
Felhasználói adatmező</td></tr>
</table>

5-8. ábra: A földi telepítési rendszerű adatkapcsolat vezérlő egység /GDLP/ által adott TÖRLÉS KÉRÉS csomag

<table>
<tr><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th><th>6</th><th>7</th><th>8</th></tr>
<tr><td>DP=0
Adatcsomag</td><td>MP=1
S-módú spec.protokoll</td><td colspan="2">SP=1
Felügyelő csomag</td><td colspan="2">ST=3
Felügyelő típus</td><td colspan="2">FILL2
Kitöltés</td></tr>
<tr><td colspan="2">TC
Ideiglenes csatorna-szám</td><td colspan="6">SN
Sorozat-szám</td></tr>
<tr><td colspan="4">CH
Csatorna-szám</td><td colspan="4">AM
Mobil cím</td></tr>
<tr><td colspan="8">AG
Földi cím</td></tr>
</table>

5-9. ábra: A fedélzeti adatkapcsolat vezérlő egység /ADLP/ által adott TÖRLÉS MEGERŐSÍTÉS csomag

<table>
<tr><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th><th>6</th><th>7</th><th>8</th></tr>
<tr><td>DP=0
Adatcsomag</td><td>MP=1
S-módú spec.protokoll</td><td colspan="2">SP=1
Felügyelő csomag</td><td colspan="2">ST=3
Felügyelő típus</td><td colspan="2">FILL
Kitöltés</td></tr>
<tr><td colspan="2">TC
Ideiglenes csatorna-szám</td><td colspan="6">SN
Sorozat-szám</td></tr>
<tr><td colspan="4">CH
Csatorna-szám</td><td colspan="4">AM
Mobil cím</td></tr>
<tr><td colspan="8">AG
Földi cím</td></tr>
</table>

5-10. ábra: A földi telepítési rendszerű adatkapcsolat vezérlő egység /GDLP/ által adott TÖRLÉS MEGERŐSÍTÉS csomag

<table>
<tr><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th><th>6</th><th>7</th><th>8</th></tr>
<tr><td>DP=1
Adatcsomag</td><td>M
Több csomagban</td><td colspan="6">SN
Sorozat-szám</td></tr>
<tr><td colspan="6" rowspan="2">FILL1
Kitöltés</td><td colspan="2"></td></tr>
<tr><td colspan="2"></td></tr>
<tr><td colspan="4">PS
Csomag küldési sorrend</td><td colspan="4">PR
Csomag vételi sorrend</td></tr>
<tr><td colspan="4">CH
Csatorna-szám</td><td colspan="4">LV
Felhasználói adat hossz</td></tr>
<tr><td colspan="8">UD
Felhasználói adatmező</td></tr>
</table>

5-11. ábra: Adat csomag

1	2	3	4	5	6	7	8
DP=0 Adatcsomag	MP=1 S-módú spec.protokoll	SP=3 Felügyelő csomag		ST=1 Felügyelő típus		FILL2 Kitöltés	
S Több csomag	F Első csomag	SN Sorozat-szám					
CH Csatorna-szám				LV Felhasználói adat hossz			
UD Felhasználói adatmező							

5-12. ábra: MEGSZAKÍTÁS csomag

1	2	3	4	5	6	7	8
DP=0 Adatcsomag	MP=1 S-módú spec.protokoll	SP=3 Felügyelő csomag		ST=3 Felügyelő típus		SS=0 Felügyelő részhalmaz	
FILL2 Kitöltés		SN Sorozat-szám					
CH Csatorna-szám				FILL Kitöltés			

5-13. ábra: MEGSZAKÍTÁS MEGERŐSÍTÉS csomag

1	2	3	4	5	6	7	8
DP=0 Adatcsomag	MP=1 S-módú spec.protokoll	SP=3 Felügyelő csomag		ST=3 Felügyelő típus		SS=1 Felügyelő részhalmaz	
FILL2 Kitöltés		SN Sorozat-szám					
CH Csatorna-szám				PR Csomag vételi sorrend			

5-14. ábra: VISSZAUTASÍTÁS csomag

1	2	3	4	5	6	7	8
DP=0 Adatcsomag	MP=1 S-módú spec.protokoll	SP=2 Felügyelő csomag		ST=0 Felügyelő típus		FILL2 Kitöltés	
FILL Kitöltés		SN Sorozat-szám					
CH Csatorna-szám				PR Csomag vételi sorrend			

5-15. ábra: VÉTELRE KÉSZ csomag

1 2 3 4 5 6 7 8

<table>
<tr><td>DP=0
Adatcsomag</td><td>MP=1
S-módú
spec.protokoll</td><td>SP=2
Felügyelő csomag</td><td>ST=1
Felügyelő típus</td><td>FILL2
Kitöltés</td></tr>
<tr><td colspan="2">FILL
Kitöltés</td><td colspan="3">SN
Sorozat-szám</td></tr>
<tr><td colspan="3">CH
Csatorna-szám</td><td colspan="2">PR
Csomag vételi sorrend</td></tr>
</table>

5-16. ábra: VÉTELRE NEM KÉSZ csomag

1 2 3 4 5 6 7 8

<table>
<tr><td>DP=0
Adatcsomag</td><td>MP=1
S-módú
spec.protokoll</td><td>SP=2
Felügyelő csomag</td><td>ST=2
Felügyelő típus</td><td>FILL2
Kitöltés</td></tr>
<tr><td colspan="2">FILL
Kitöltés</td><td colspan="3">SN
Sorozat-szám</td></tr>
<tr><td colspan="3">CH
Csatorna-szám</td><td colspan="2">FILL
Kitöltés</td></tr>
<tr><td colspan="5">RC
Visszaállítást létrehozó kód</td></tr>
<tr><td colspan="5">DC
Diagnosztikai kód</td></tr>
</table>

5-17. ábra: VISSZAÁLLÍTÁS KÉRÉS csomag

1 2 3 4 5 6 7 8

<table>
<tr><td>DP=0
Adatcsomag</td><td>MP=1
S-módú
spec.protokoll</td><td>SP=2
Felügyelő csomag</td><td>ST=3
Felügyelő típus</td><td>FILL2
Kitöltés</td></tr>
<tr><td colspan="2">FILL
Kitöltés</td><td colspan="3">SN
Sorozat-szám</td></tr>
<tr><td colspan="3">CH
Csatorna-szám</td><td colspan="2">FILL
Kitöltés</td></tr>
</table>

5-18. ábra: VISSZAÁLLÍTÁS MEGERŐSÍTÉS csomag

1 2 3 4 5 6 7 8

<table>
<tr><td>DP=0
Adatcsomag</td><td>MP=1
S-módú
spec.protokoll</td><td>SP=3
Felügyelő
csomag</td><td>ST=0
Felügyelő típus</td><td>OF
A választhatóság
jelzése</td><td>IN
Az alaphelyzet
beállító bit</td></tr>
<tr><td colspan="6">RTL
Irányítási út táblázat hossz</td></tr>
<tr><td colspan="6">RT
Irányítási út</td></tr>
<tr><td colspan="6">ODL
Választható adat hossz</td></tr>
<tr><td colspan="6">OD
Választható adat</td></tr>
</table>

5-19. ábra: ÚTVONAL csomag

1 2 3 4 5 6 7 8

DP=0 Adatcsomag	MP=1 S-módú spec. protokoll	SP=3 Felügyelő csomag	ST=2 Felügyelő típus	FILL2 Kitöltés
LENGTH Hossz				
FIRST PACKET Első csomag				
LENGTH Hossz				
LAST PACKET Utolsó csomag				
LENGTH = 0 Hossz				

5-20. ábra: MULTIPLEX csomag

1 2 3 4 5 6 7 8

DP=0 Adatcsomag	MP=0 S-módú spec. protokoll	M/CH MSP csatorna-szám	
FILL1 Kitöltés			
UD Felhasználói adatmező			

5-21. ábra: RÖVID FORMÁTUMÚ S-módú specifikus protokoll /MSP/ csomag

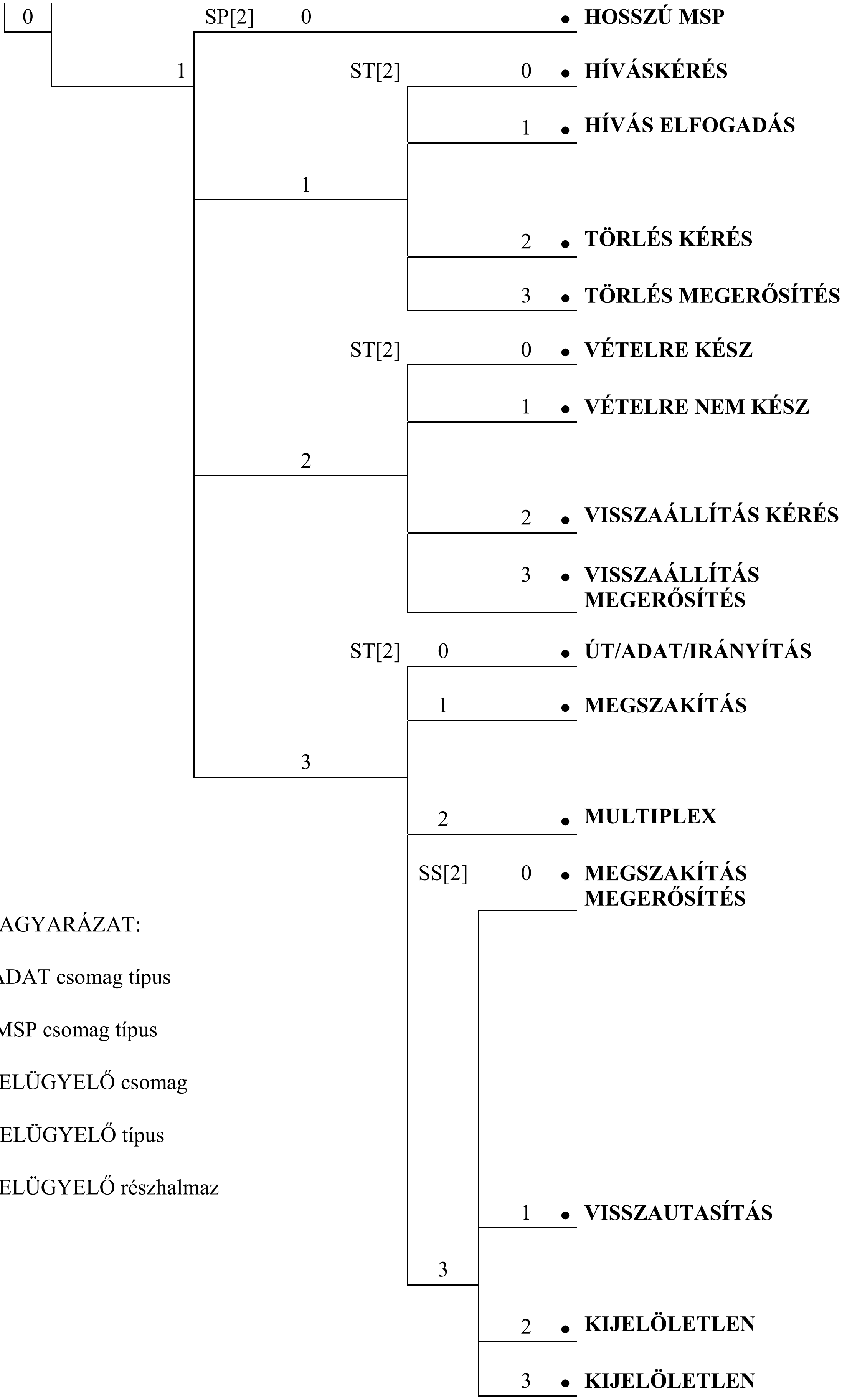
1 2 3 4 5 6 7 8

DP=0 Adatcsomag	MP=1 S-módú spec. protokoll	SP=0 Felügyelő csomag	L Hossz	M/SN MSP sorozatszám
FILL2 Kitöltés		M/CH MSP csatorna-szám		
UD Felhasználói adatmező				

5-22. ábra: HOSSZÚ FORMÁTUMÚ S-módú specifikus protokoll /MSP/ csomag

DP[1] 1 • **ADATCSOMAG**

MP[1] 0 • **RÖVID MSP**



JELMAGYARÁZAT:

DP= ADAT csomag típus

MP= MSP csomag típus

SP= FELÜGYELŐ csomag

ST= FELÜGYELŐ típus

SS= FELÜGYELŐ részhalmaz

5-23. ábra: Az S-MÓDÚ csomagokban használt vezérlő mezők

6. FEJEZET: VHF LEVEGŐ-FÖLD DIGITÁLIS ADATKAPCSOLAT (VDL)

6.1 MEGHATÁROZÁSOK ÉS RENDSZER MŰSZAKI JELLEMZŐK

1. Megjegyzés. – Az ultrarövidhullámú (VHF) digitális adatkapcsolat (VDL) 2. üzemmódja adatszolgáltatási képesség jelet biztosít. A VDL 3. üzemmód két – mind az előszavas, mind az adatszolgáltatási – képességgel rendelkezik. Az adatátviteli képesség a Légiforgalmi Távközlési Hálózatnak (ATN) egy alhálózati mozgó alkotó-része. Ezenkívül a VHF adatkapcsolat egy nem-ATN funkciót is képes biztosítani. A VHF digitális adatkapcsolat /VDL/ Szabványok és Ajánlott Gyakorlatok (SARPs) meghatározásai és hivatkozásai az alábbiakban találhatók.

2. Megjegyzés. – A VHF digitális adatkapcsolatra /VDL/ vonatkozó kiegészítő információkat foglal magába a VDL 2. üzemmód, a VDL 3. üzemmód és a VDL 4. üzemmód Műszaki Előírásainak kiadványa.

3. Megjegyzés. – A 6.1.2-től a 6.8.2-ig terjedő szakaszok foglalják magukba a VHF adatkapcsolat 2. és 3. üzemmódjaira vonatkozó Szabványokat és Ajánlott Gyakorlatokat. A 6.9 szakasz tartalmazza a VHF adatkapcsolat 4. üzemmód Szabványait és Ajánlott Gyakorlatait.

6.1.1 Meghatározások

Automatikus berendezés-függő légtér-ellenőrző általános adás (ADS-B) *(Automatic dependent surveillance-broadcast (ADS-B)).* Egy olyan légtér-ellenőrző technika, amelyben a légijármű automatikusan biztosítja – az általános adás módú adatkapcsolaton keresztül – a fedélzeti navigációs helymeghatározási *rendszeréből* származtatott adatokat, a légijármű azonosítóját, a négy-dimenziós helyzetet, és – ahogy szükséges – a kiegészítő adatokat is biztosítja.
Általános adás *(Broadcast).* A léginavigációra vonatkozó információk olyan továbbítása, amely nem egy meghatározott állomásnak vagy állomásoknak címzett adás.
Impulzus köteg *(Burst).* Egy vagy több idő által meghatározott, egymással összefüggésben álló elemi jel csatlakozó sorozata, amely felhasználói információt, jelzés-átvitelt és bármilyen szükséges bekezdő jelszakaszt tud továbbítani.
Adatáramlási rés *(Current slot).* Az a rés, amelyben a vett adás megkezdődik.
Hálózati végponti berendezés (DCE) *(Data circuit-terminating equipment (DCE).* A DCE egy hálózat biztosító berendezés, amely a felhasználói végberendezések /DTE-k/ közötti összeköttetés lehetővé tételére használatos.
Adatkapcsolat entitás (DLE) *(Data link entity (DLE)).* Protokoll állapotú berendezés, amely képes egyedül álló adatkapcsolat létesítésére és kezelésére.
Adatkapcsolat szolgáltatás (DLS) al-réteg *(Data link service (DLS) sublayer).* Az az alréteg, amely az adathordozó hozzáférés vezérlő /MAC/ alréteg felett helyezkedik el. A VHF adatkapcsolat /VDL/ 4. üzemmódnak a DLS alréteg az UHF specifikus szolgáltatás /VSS/ alréteg felett helyezkedik el. Az adatkapcsolat szolgáltatás /DLS/ al-réteg kezeli az adatátvitel sorba-állítást, létrehozza és megsemmisíti az adatkapcsolat entitásokat /DLE-k/ a kapcsolat-orientált

összeköttetéseknél, és lehetővé teszi a kapcsolat-kezelő entitás /LME/ részére az adatkapcsolat szolgáltatás /DLS/ kezelését, és lehetőséget biztosít a kapcsolat nélküli adatátvitelre.
Felhasználói végberendezés (DTE) *(Data terminal equipment (DTE)).* A DTE egy alhálózati összeköttetés végpontja.
Kiterjesztett Golay kód *(Extended Golay Code).* Többszörös bit-hiba javítására képes hibajavító kód.
Keret *(Frame).* A címek egy sorozatából, a vezérlésből, az állomány-kezelő rendszerből /FCS/ és az információs mezőkből tevődik össze. A VHF adatkapcsolat /VDL/ 2. üzemmódjánál ezek a mezők vannak összekapcsolva a nyitó és záró jelzés sorrenddel, és a keret magába foglalhat, vagy nem foglalhat magába egy változó hosszúságú információs mezőt.
Gauss szűrésű frekvencia-billentyűzés (GFSK) *(Gaussian filtered frequency shift keying (GFSK)).* Egy folyamatos fázisú, frekvencia-billentyűzési technika, amely két hangot és egy Gauss impulzus-formáló szűrőt használ fel.
Globális jel csatorna (GSC) *(Global signalling channel (GSC)).* Egy világméretű alapon rendelkezésre álló csatorna, amely adatátvitel vezérlést biztosít.
Kapcsolat *(Link).* Egy kapcsolat, amely összeköti a légijármű fedélzeti adatkapcsolat entitást /DLE/ valamint a földi DLE-t, és amelyet egyértelműen meghatároz a légijármű fedélzeti adatkapcsolat szolgáltatás /DLS/ címének és a földi DLS címének kombinációja. Különböző alhálózati entitások vannak jelen az egyes kapcsolat végpontok felett.
Kapcsolat réteg *(Link layer).* Az a réteg, ami közvetlenül a fizikai réteg felett található a Nyílt Rendszerek Összekapcsolása protokoll modellben. A kapcsolat réteg biztosítja az információk megbízható átvitelét a fizikai adathordozók között. Ez két részre van osztva: az adatkapcsolat al-rétegre és az adathordozó hozzáférés-vezérlő al-rétegre.
Kapcsolat kezelő entitás (LME) *(Link management entity (LME)).* Egy protokoll állapot gépi kód, amely képes egy egyedülálló egyenrangú rendszerrel a kapcsolatot ’megszerezni’, létrehozni és fenntartani. Egy LME létrehozza az adatkapcsolatot, és az alhálózati összeköttetéseket, „kézbesíti” ezeket a kapcsolatokat, és kezeli az adathordozó hozzáférés vezérlő al-réteget és a fizikai réteget. Egy légijármű kapcsolat kezelő entitás /LME/ nyomon követi azt, hogy milyen jól tud kommunikálni az egyedi földi rendszer földi állomásaival. Egy légijármű VHF adatkapcsolat kezelő entitás /VME/ ’bemutat’ egy LME-t minden egye olyan földi állomásnak, amelyet ellenőriz. Hasonlóképpen, a földi VME ’bemutat’ egy LME-t minden egyes légijárműnek, amit ellenőriz. Egy LME akkor kerül törlésre, amikor az összeköttetés a társ rendszerre a későbbiekben nem megvalósítható.
M impulzus-köteg *(M burst).* A VHF adatkapcsolat 3. üzemmódjában használatos bitekből álló kezelő csatorna adat-blokk. Ez az impulzus-köteg magába foglalja azokat a jelzési információkat, amelyek az adathordozóhoz való hozzáféréshez és a kapcsolat állapot ellenőrzéshez szükségesek.
Adathordozó hozzáférés vezérlés (MAC) *(Media access control (MAC)).* Az az al-réteg, amely befogja az adat-utat és vezérli a bitek mozgását az adat-úton keresztül.
2-es üzemmód – *(Mode 2).* Csak-adat VDL üzemmód, amely D8PSK modulációt és vivőfrekvencia érzékelő többszörös hozzáférés (CSMA) vezérlési sémát használ.
3-as üzemmód – *(Mode 3).* Hang és adat VDL üzemmód, amely D8PSK modulációt és TDMA közeg hozzáférés vezérlési sémát használ.
4-es üzemmód – *(Mode 4).* Csak adat VDL üzemmód, amely GFSK modulációs sémát és önszervező időosztásos többszörös hozzáférést használ.
Fizikai réteg – *(Physical layer).* A legalsó szintű réteg a Nyílt Rendszerek Összekapcsolása protokoll modellben. A fizikai réteg információ fizikai közegen való továbbítását végzi (pl.: VHF rádió).
Szolgáltatás minősége – *(Quality of service).* Az adat átviteli jellemzőkre vonatkozó információ, amelyet különböző kommunikáció protokollok használnak különböző teljesítményszintek elérésére a hálózat használói részére.
Reed-Solomon kód – *(Reed-Solomon code).* Szimbólum hibák javítására alkalmas hibajavító kód. Mivel a szimbólum-hibák bitek gyűjteményei, ezek a kódok jó impulzusköteg hiba javító képességet szolgáltatnak.
Önszervező idő-osztásos többszörös hozzáférés (STDMA) – *(Self-organizing time division multiple access).* Rádiófrekvenciás (RF) csatorna időosztásos használatán alapuló többszörös hozzáférés séma, amely a következőket alkalmazza: (1) diszkrét szomszédos idősések, mint alapvető felosztás-forrás; és (2) működő protokollok egy készlete, amely lehetővé teszi a felhasználók számára a közvetett hozzáférést ezekhez az időrésekhez vezér-állomás igénybevétele nélkül.
Rés – *(Slot).* Egyenlő időtartamú egymást követő időintervallumok sorozatának egyik tagja. Minden impulzusköteg átvitel egy rés kezdeténél indul.
Alhálózat összeköttetés – *(Subnetwork connection).* Hosszútávú összeköttetés egy légijármű DTE és egy földi DTE között egymást követő virtuális hívások felhasználásával az összeköttetés fenntartására kapcsolat levételen keresztül.
Alhálózat függő konvergencia funkció (SNDCF) – *(Subnetwork dependent convergence facility (SNDCF)).* Egy olyan adottság, amely egy adott alhálózat jellemzőit és szolgáltatásait hozzáilleszti a belső hálózati adottság által

megkövetelt jellemzőkhöz és szolgáltatásokhoz.
Alhálózat entitás – *(Subnetwork entity).* Ebben a dokumentumban a „földi DCE" fogalmát egy légijárművel kommunikáló, földi állomáson lévő alhálózat entitásnál fogjuk használni; a „földi DTE" fogalmát egy légijármű fedélzeti állomással kommunikáló földi útvonalazóban lévő alhálózat entitásnál használjuk, és a „légijármű DTE" fogalmát a földdel kommunikáló, egy légijárművön elhelyezett alhálózat entitásnál használjuk. Egy alhálózat entitás egy köteg réteg entitás, ahogyan az az ISO 8208-ban definiálva van.
Alhálózat réteg – *(Subnetwork layer).* Az a réteg, amely létrehoz, menedzsel és befejez összekapcsolásokat egy alhálózaton keresztül.
Rendszer – *(System).* Egy VDL-képességű entitás. Egy rendszer egy vagy több állomásból és a hozzátartozó VDL management entitásból áll. Egy rendszer lehet egy légijármú rendszer vagy egy földi rendszer.
Idő-osztásos többszörös hozzáférés (TDMA) – *(Time division multiple access (TDMA)).* RF csatorna idő-osztásos használatán alapuló többszörös hozzáérés séma, amely a következőket alkalmazza: (1) diszkrét szomszédos időrések, mint alapvető felosztás-forrás; és (2) működő protokollok egy készlete, amely lehetővé teszi a felhasználók számára az interaktív együttműködést a vezér-állomással a csatorna közvetett eléréséhez.
Felhasználói csoport – *(User group).* Földi és/vagy légijármű fedélzeti telepítésű állomások egy csoportja, amely csoportok hang és/vagy adat összeköttetést osztanak meg. Beszéd-kommunikációnál a felhasználói csoport minden tagja minden kommunikációhoz hozzáférhet. Adatok esetében a kommunikáció pont-pont összeköttetést foglal magában levegő-föld közleményeknél, és pont-pont és rádió összeköttetést föld-levegő közleményeknél.
VDL management entitás – *(VDL management entity).* VDL-specifikus entitás, amely az ATN-meghatározású SN-SME által megkívánt szolgáltatás minőségét biztosítja. A VME az LME-ket használja (amelyeket ez létrehoz és szétrombol) a pár rendszerektől rendelkezésre álló szolgáltatás minőség megvizsgálására.
VDL 4-es üzemmódú impulzusköteg – *(VDL Mode 4 burst).* Egy VHF digitális kapcsolat (VDL) 4-es üzemmódú impulzusköteg forráscímek sorozatából, impulzusköteg ID-ből, információkból, rés rezerválásból és keretellenőrzési sorozat (FCS) mezőkből áll össze, amelyet nyitó és záró jelzés sorozat fog össze.
Megjegyzés. – Egy impulzusköteg indítása csak kvantált időintervallumoknál jelenhet meg, és ez a korlátozás lehetővé teszi, hogy a továbbítás és a vétel közötti terjedés eltolódást le lehessen vezetni.
VDL 4-es üzemmód DLS rendszer – *(VDL Mode 4 DLS system).* VLL rendszer, amely megvalósítja a VDL 4-es üzemmód DLS és az alhálózati protokollok ATN kötegek és más kötegek hordozását.
VDL 4-es üzemmód specifikus szolgáltatási (VSS) al-réteg – *(VDL Mode 4 specific services (VSS) sublayer).* Az az al-réteg, amely a MAC al-réteg felett helyezkedik el, és VDL 4-es üzemmód specifikus hozzáférés protokollokat szolgáltat, amelyek fenntartott, véletlen és rögzített protokollokat foglalnak magukban.
VDL állomás – *(VDL station).* Légijármű-alapú vagy földi-alapú fizikai entitás, VDL 2-es, 3-as vagy 4-es képességgel.
Megjegyzés. – Ennek a fejezetnek a szövegében a VDL állomás „állomás"-ként is szerepel.
Vokóder – *(Vocoder).* Kis bit-sebességű hang-kódoló/dekódoló.
Hang egység – *(Voice unit).* Berendezés, amely szimplex hang- és jelzés összekapcsolást szolgáltat a felhasználó és a VDL között.
VSS felhasználó – *(VSS user).* A VDL 4-es üzemmód speciális szolgáltatásának felhasználója. A VSS felhasználó lehet magasabb réteg a VDL 4-es üzemmód SARP-okban, vagy VDL 4-es módot használó külső alkalmazás.

6.1.2 Rádió csatornák és funkcionális csatornák

6.1.2.1 *Légijármű fedélzeti állomás rádió frekvencia intervallum.* A légijármű állomás képes a 6.1.4.1 pontban meghatározott tartományon belüli bármelyik csatorna lehangolására egy önműködő lehangolási utasítás vétele utáni 100 milliszekundumon belül. Ezenkívül egy VDL 3. üzemmódú légijármű fedélzeti állomás képes a 6.1.4.1 pontban meghatározott tartományon belüli bármely frekvencia lehangolására egy hangolási parancs vétele utáni 100 milliszekundumon belül.
6.1.2.2 *Földi állomás rádiófrekvencia tartomány.* A földi állomás képes a kijelölt csatornáján való üzemelésre a 6.1.2.1 pontban részletezett rádiófrekvencia tartományán belül.
6.1.2.3 *Közös jelzés csatorna*. A 136,975 MHz-es csatornát fenn kell tartani egy világméretű közös jelzés csatornaként (CSC) VDL 2-es üzemmód részére.

6.1.3 Rendszer képességek

6.1.3.1 *Adat átláthatóság.* A VDL rendszer kódtól független, bájttól független adatátvitelt biztosít.
6.1.3.2 *Rádióadás.* A VDL rendszer kapcsolat réteg adat rádióadás szolgáltatást (2-es üzemmód) és/vagy hang és adat rádióadás szolgáltatást (3-as üzemmód) nyújt. VDL 3-as üzemmódnál az adat rádióadás szolgáltatásnak a földtől

származó hálózat többszörözés képességet támogat.
6.1.3.3 *Kapcsolat kezelés.* A VDL rendszer megbízható kommunikációs útvonalat létesít és fenntart a légijármű fedélzeti és földi rendszer között, megengedve, de nem megkövetelve kézi beavatkozást.

Megjegyzés. – Ebben a szöveg-összefüggésben a „megbízható" fogalmát a 6.3.5.1 pontban specifikált BER követelmény határozza meg.

6.1.3.4 *Földi hálózat átvitel.* Egy VDL-el felszerelt légijárműnek - ha a körülmények így kívánják - egy földi állomástól egy másik földi állomáshoz továbbítást kell végeznie.
6.1.3.5 *Beszéd-üzem képesség.* A VDL 3-as üzemmód rendszer egy „Hallgass be, mielőtt a beszédhez indítasz" csatorna hozzáférésen alapuló, átlátható szimplex beszéd-üzemű üzemelést tart fenn.

6.1.4 Levegő-föld VHF digitális adatkapcsolati összeköttetési rendszerjellemzők

6.1.4.1 A felhasznált rádiófrekvenciákat a 117,975-137 MHz sávban lévő frekvenciák közül kell kiválasztani. A legalacsonyabb kijelölhető frekvencia 118,000 MHz és a legmagasabb kijelölhető frekvencia 136,975 MHz. A kijelölt frekvenciák közötti szétválasztás (csatorna elkülönítés) 25 kHz.

Megjegyzés. – Az V. kötet határozza meg azt, hogy a 136,9-136,975 MHz-es frekvencia-blokk - ahol a határoló értékek a blokkhoz tartoznak - a VHF levegő-föld digitális kommunikáció részére van fenntartva.

6.1.4.2 A sugárzás tervezési polarizációjának függőlegesnek kell lennie.

6.2 A FÖLDI TELEPÍTÉS RENDSZER JELLEMZŐI

6.2.1 Földi állomás átviteli funkciója

6.2.1.1 *Frekvencia stabilitás.* A VDL földi állomás berendezés működési rádiófrekvenciája a kijelölt frekvenciától nem térhet el a plusz vagy mínusz 0,0002 százaléknál (2 rész per millió) nagyobb mértékben.

Megjegyzés. – A DSB-AM modulációt használó VDL földi állomások frekvencia stabilitása a III. kötet, II. rész, 2. Fejezetben van meghatározva 25 kHz-es csatorna elosztásra.

6.2.2 Teljesítmény

Ajánlás. – *A kisugárzott teljesítménynek olyannak kell lenni, hogy egy legalább 75 mikrovolt per méter (mínusz 109 dBW/m^2) térerősséget szolgáltasson az üzemeltetési fedésterületen belül a szabadtéri terjedés alapján.*

6.2.3 A zavaró sugárzások

6.2.3.1 A zavaró sugárzásokat a technika jelenlegi állapota és a szolgáltatás jellege által lehetővé tett legkisebb értéken kell tartani.

Megjegyzés. – A Rádió-Rendszabályzat S3. Függeléke tartalmazza azokat a zavaró sugárzási szinteket, amelyeknek az adóberendezéseknek meg kell felelniük.

6.2.4 Szomszéd csatorna sugárzások

6.2.4.1 A VDL földi adótól jövő teljesítmény nagysága minden üzemeltetési körülmény esetén - amikor az első szomszéd csatorna 25 kHz-es csatorna sávszélessége felett mérik - nem haladhatja meg a 0 dBm-t.
6.2.4.1.1. A 2002. január 1. után újonnan felszerelt VDL földi adótól jövő teljesítmény minden üzemeltetési körülmény esetén - az első szomszéd csatorna 25 kHz-es csatorna sávszélessége fölött mérve - nem haladhatja meg a 2 dBm-et.
6.2.4.2 A VDL földi adóberendezéstől jövő teljesítmény nagyságának minden üzemeltetési körülmény esetén, amikor a második szomszéd csatorna 25 kHz-es csatorna sávszélessége felett mérik, kevesebbnek kell lennie mínusz 25 dBm-nél, és innen 5 dB per oktáv minimális mértékkel monotonan csökkenni kell a mínusz 52 dBm maximális értékig.
6.2.4.2.1 2002. január 1. után újonnan felszerelt VDL földi adótól jövő teljesítménynek bármilyen üzemeltetési

körülmény esetén - a második szomszéd csatorna 25 kHz-es csatorna sávszélessége fölött mérve - kevesebbnek kell lennie mínusz 28 dBm.-nél
6.2.4.2.2 2002. január 1. után újonnan felszerelt VDL földi adótól jövő teljesítménynek bármilyen üzemeltetési körülmény esetén - a negyedik szomszéd csatorna 25 kHz-es csatorna sávszélessége fölött mérve - kevesebbnek kell lenni, mint mínusz 38 dBm, és innen monoton csökkennie kell 5 dB per oktáv minimális ütemben egy mínusz 53 dBm-es maximális értékre.
6.2.4.3 A VDL földi adótól jövő teljesítmény nagysága bármilyen üzemeltetési körülmény esetén - amikor az első szomszéd csatornán központosuló 16 kHz-es csatorna sávszélesség felett mérik - nem haladhatja meg a mínusz 20 dBm-et.
6.2.4.3.1 2002. január 1. után újonnan felszerelt VDL földi adótól jövő teljesítmény bármilyen üzemeltetési körülmény esetén - az első szomszédos csatornán központosuló 16 kHz-es csatorna sávszélesség fölött mérve - nem haladhatja meg a mínusz 18 dBm-et.
6.2.4.4 2005. január 1. után az összes VDL földi adónak ki kell elégítenie a 6.2.4.1.1, 6.2.4.2.1, 6.2.4.2.2 és 6.2.4.3.1 pont előírásait, a 6.2.4.5 pont feltételei szerint.
6.2.4.5 A 6.2.4.4 pont előírásai kötelező kielégítésének követelményeit olyan körzeti léginavigációs egyezmények alapján kell meghatározni, amelyek előírják az üzemelés légterét és a megvalósítás ütemtervezését. Az egyezményeknek tartalmazniuk kell a földi rendszereknek való kötelező megfelelés legalább két évre szóló előzetes értesítését is.

6.3 A LÉGIJÁRMŰ FEDÉLZETI TELEPÍTÉS RENDSZER JELLEMZŐI

6.3.1 *Frekvencia stabilitás.* A VDL légijármű fedélzeti berendezés rádiófrekvenciája a kijelölt frekvenciától nem térhet el plusz vagy mínusz 0,0005 százaléknál (5 rész per millió) nagyobb értékkel.
6.3.2 *Teljesítmény.* A kisugárzott teljesítménynek olyannak kell lenni, hogy egy legalább 20 mikro- volt per méter (mínusz 120 dBW/m^2) mínusz 87 dBm térerősséget biztosítson a szabadtéri terjedés alapján, olyan távolságokon és magasságokon, amelyek megfelelnek azoknak az üzemelési feltételeknek, amelyek azokhoz a területekhez tartoznak, amelyek felett a légijármű üzemel.

6.3.3 Zavaró sugárzások

6.3.3.1 A zavaró sugárzásokat a technika jelenlegi állapota és a szolgáltatás jellege által lehetővé tett legkisebb értéken kell tartani.

Megjegyzés. – A Rádió-Rendszabályzat S3 Függeléke határozza meg a zavaró sugárzások azon szintjeit, amelyeknek az adóknak meg kell felelniük.

6.3.4 Szomszédos csatorna kibocsátások

6.3.4.1 A VDL légijármű fedélzeti adóberendezéséből jövő teljesítmény nagysága bármilyen üzemeltetési körülmény esetén - amikor az első szomszéd csatorna 25 kHz-es csatorna sáv- szélessége felett mérik - nem haladhatja meg a 0 dBm-et.
6.3.4.1.1 2002. január 1. után minden új felszerelésű VDL fedélzeti adóberendezéstől jövő teljesítmény - minden üzemeltetési körülmény esetén - az első szomszédos csatorna 25 kHz-es csatorna sávszélessége felett mérve, nem haladhatja meg a 2 dBm-et.
6.3.4.2 A VDL légijármű fedélzeti adóberendezésétől jövő teljesítmény nagyságának - minden üzemeltetési körülmény esetén - amikor a második szomszédos csatorna 25 kHz-es csatorna sávszélessége felett mérik, kevesebbnek kell lennie mínusz 25 dBm-nél, és innen 5 dB per oktáv minimális mértékkel monoton csökkenie kell a mínusz 52 dBm maximális értékig.
6.3.4.2.1 2002. január 1. után újonnan felszerelt VDL légijármű fedélzeti adótól jövő teljesítménynek - minden üzemeltetési körülmény esetén - a második szomszédos csatorna 25 kHz-es csatorna sávszélessége fölött mérve, kevesebbnek kell lenni, mint mínusz 28 dBm.
6.3.4.2.2 2002. január 1. után újonnan felszerelt VDL légijármű fedélzeti adótól jövő teljesítménynek - minden üzemeltetési körülmény esetén - a negyedik szomszédos csatorna 25 kHz-es csatorna sávszélessége fölött mérve, kevesebbnek kell lenni, mint mínusz 38 dBm, és innen monoton csökkennie kell 5 dB per oktáv minimális ütemben egy mínusz 53 dBm-es maximális értékre.
6.3.4.3 A VDL légijármű fedélzeti adóberendezéstől jövő teljesítmény nagysága - minden üzemeltetési körülmény esetén - amikor az első szomszédos csatornán lévő központosuló 16 kHz-es csatorna felett mérik, nem haladhatja meg

a mínusz 20 dBm-t.
6.3.4.3.1 2002. január 1. után újonnan felszerelt VDL légijármű fedélzeti adótól jövő teljesítmény - minden üzemeltetési körülmény esetén - az első szomszédos csatornán központosuló 16 kHz-es csatorna sávszélesség fölött mérve, nem haladhatja meg a mínusz 18 dBm-et.
6.3.4.4 2005. január 1. után az összes VDL légijármű fedélzeti adónak ki kell elégíteni a 6.3.4.1.1, 6.3.4.2.1, 6.3.4.2.2 és 6.3.4.3.1 pont előírásait, a 6.3.4.5 pont feltételei szerint.
6.3.4.5 A 6.3.4.4 pont előírásai kötelező kielégítésének követelményeit olyan körzeti léginavigációs egyezmények alapján kell megalkotni, amelyek meghatározzák az üzemelés légterét és a megvalósítás ütemtervét. Az egyezményeknek tartalmazniuk kell a légijármű fedélzeti rendszereknek való kötelező megfelelés legalább két évre szóló előzetes értesítését is.
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6.3.5 Vételi funkció

6.3.5.1 *A meghatározott hiba-arány*. A meghatározott hiba-aránynak 2-es üzemmódnál az 1 a 10^4-hez maximális helyesbített bit hiba-aránynak (BER) kell lennie. A meghatározott hiba-aránynak 3-as üzemmódnál az 1 a 10^3-hoz maximális helyesbítetlen BER-nek kell lennie. A meghatározott hiba-aránynak 4-es üzemmódnál az 1 a 10^4-hez maximális helyesbítetlen BER-nek kell lennie.
Megjegyzés. – A fenti fizikai réteg BER követelmények az ATN által az alhálózat interfésznél a BER-re meghatározott követelményekből erednek.
6.3.5.2 *Érzékenység.* – A vételi funkciónak ki kell elégítenie a meghatározott hiba-arányt egy nem nagyobb, mint 20 mikrovolt per méter (mínusz 120 dBW/m^2) megkívánt jel-erősséggel.

Megjegyzés. – A megkívánt jel-erősség a szolgáltatási terület határán figyelembe veszi a rendszeren belüli rendszer- és jel-veszteségek követelményeit és beszámítja a környezeti zajforrásokat is.

6.3.5.3 *Sávon kívüli érzéketlenségi teljesítmény*. A vételi funkció ki kell elégítse a meghatározott hiba-arányt egy nem nagyobb, mint 40 mikrovolt per méter (mínusz 114 dBW/m^2) megkívánt jel térerősséggel és egy nem-kívánt DSB-AM D8PSK vagy GFSK jellel a szomszédos vagy bármely más olyan kijelölhető csatornán, amely legalább 40 dB-el magasabb, mint a megkívánt jel.
6.3.5.3.1 2002. január 1-je után a vételi funkciónak ki kell elégítenie a meghatározott hiba-arányt is egy nem nagyobb, mint 40 mikrovolt per méter (-114 dBW/m^2) megkívánt jel térerősséggel és egy nem-kívánt VHF DSB-AM, D8PSK vagy GFSK jellel bármely más kijelölhető csatornán, amely legalább 60 dB-el erősebb, mint a megkívánt jel bármely kijelölhető csatornán, amely 100 kHz-re vagy távolabbra van a kívánt jel kijelölt csatornájától.

Megjegyzés. – Az interferencia érzéketlenségi teljesítménynek ez a szintje a VDL RF spektrum maszk hatásával konzisztens vevő teljesítményt biztosít, ahogyan a III. Kötet, I. Rész, 6.3.4 szakaszában egy 69 dB-es adó/vevő elkülönítés effektív elkülönítésével meg van határozva. A mérési eljárásra vonatkozó útmutató anyagot az Annex 10, V. Kötet, "A"- Melléklet, 7. szakasza tartalmazza.

6.3.5.3.2 2005. január 1. után az összes VDL telepítés vételi funkciójának ki kell elégíteni a 6.3.5.3.1 pont előírásait, a 6.3.5.3.3 pont feltételeinek megfelelően.
6.3.5.3.3 A 6.3.5.3.2 pont előírásai kötelező kielégítésének követelményeit olyan körzeti léginavigációs egyezmények alapján kell meghatározni, amelyek előírják az üzemelés légterét és a megvalósítás ütemtervezését. Az egyezményeknek tartalmazniuk kell a légijármű fedélzeti rendszereknek való kötelező megfelelés legalább két évre szóló előzetes értesítését is.

6.3.5.4 INTERFERENCIA ÉRZÉKETLENSÉGI TELJESÍTMÉNY

6.3.5.4.1 A vételi funkciónak ki kell elégítenie az előírt hiba-arányt egy nem nagyobb, mint 40 mikrovolt per méteres megkívánt térerősséggel és egy vagy több sávon kívüli jellel, kivéve az olyan VHF FM rádióadás jeleket, amelyek teljes szinttel rendelkeznek a vevő bemeneténél mínusz 33 dBm-el.
Megjegyzés. – Azokon a területeken, ahol szomszédos erősebb sáv jel interferencia meghaladja ezt a specifikációt, erősebb immunitási követelményt alkalmaznak.
6.3.5.4.2 A vételi funkciónak ki kell elégítenie a meghatározott hiba-arányt egy nem nagyobb, mint 40 mikrovolt per méteres megkívánt térerősséggel és egy vagy több VHF FM rádióadás jelekkel, amelyek teljes szinttel rendelkeznek a vevő bemeneténél mínusz 5 dBm-el.

6.4 FIZIKAI RÉTEG PROTOKOLLOK ÉS SZOLGÁLTATÁSOK

A légijármű fedélzeti és földi állomásoknak hozzá kell férniük a fizikai adathordozókhoz szimplex üzemmódban működve.

6.4.1 Funkciók

6.4.1.1 A fizikai rétegnek a következő funkciókat kell biztosítani:
a) adó és vevő frekvencia szabályozás;
b) digitális vétel a vevővel;
c) digitális továbbítás az adóval; és
d) értesítési szolgáltatás.
6.4.1.1.1 *Adó/vevő frekvencia szabályozás*. A VDL fizikai réteg az adó vagy vevő frekvenciát a kapcsolat kezelési entitás (LME) utasítása szerint állítja be.

Megjegyzés. – Az LME egy kapcsolat réteg entitás a VDL 2-es üzemmód, VDL 3-as üzemmód műszaki specifikáció kézikönyvben tartalmazottak szerint.

6.4.1.1.2 *Digitális vétel a vevővel*. A vevőnek dekódolni kell a bejövő jeleket, és feldolgozásra továbbítani kell azokat a magasabb rétegeknek.
6.4.1.1.3 *Digitális adat-átvitel*. A VDL fizikai rétegnek megfelelően kódolnia kell az adatkapcsolat rétegtől vett adatokat és továbbítania kell azokat a RF csatornán.

6.4.2 A 2-es és 3-as üzemmódú közös fizikai réteg

6.4.2.1 *Modulációs séma*. A 2-es és 3-as üzemmódoknak differenciálisan kódolt 8 fázis- billentyűzést (D8PSK) kell használnia, felhasználva egy $\alpha = 0,6$ (névleges értékű) emelt cosinus szűrőt. Az átviendő információt eltérően kell kódolni 3 bit per szimbólummal (baud), amelyet inkább fázis-változásként, mint abszolút fázisként visznek át. Az átviendő adat-folyamot 3, egymást követő adat-bitek csoportjára kell szétosztani, a legkisebb értékű bit az első. Nullákkal kell kitölteni az átvitel végét, amennyiben ez a befejező csatorna szimbólum számára szükséges.
6.4.2.1.1 *Adat kódolás*. Egy differenciál adat kódolóba belépő bináris adat folyamot X, Y és Z, három külön-választott bináris folyamba kell konvertálni úgy, hogy a 3n bitek képezik az X-et, a 3n+1 bitek képezik az Y-t és a 3n + 2 bitek képezik a Z-t. A tripletet $k(x_k Y_k Z_k)$ időpontnál egy fázis- változásra konvertálják, ahogyan azt a 6-1.* táblázat mutatja, és az abszolút fázis, a φ_k, a $\Delta\varphi_k$ összegzett sorozata, ami:

$$\phi_k = \phi_{k-1} + \Delta\phi_k$$

* Minden táblázat ennek a fejezetnek a végén van elhelyezve.

6.4.2.1.2 *Átvitt jelforma.* A fázismodulált alapsáv jelnek, ahogyan a 6.4.2.1.1 pontban az meg van határozva, az impulzus alak szűrőt kell gerjeszteni.

$$S(t) = \sum_{k=-\infty}^{+\infty} h\ (\Phi_k),\ t - kT_S)$$

Ahol:
h az impulzus alak szűrő komplex impulzus válasza;
k a 6.4.2.1.1 pontban van meghatározva;
ϕ a 6.4.2.1.1 pontban lévő egyenlet által definiált;
t az idő;
T_S az egyes szimbólumok időtartama.
Az impulzus alak szűrő kimenetének (az idő függvénye) és az impulzus-formáló szűrőnek (s(t)) kell a vivőfrekvenciát modulálnia. Az impulzus alak szűrőnek egy névleges $\alpha = 0,6$-es emelt-cosinus összegzett frekvencia jelleggörbéjének kell lennie.

6.4.2.2 *Moduláció sebesség*. A szimbólum sebesség 10500 szimbólum/másodperc, amely 31500 bit/s névleges bit-sebességet eredményez. A 2-es és 3-as üzemmódokra vonatkozó moduláció stabilitási előírások a 6-2. táblázatban vannak feltüntetve.

6.4.3 A 2-es üzemmódú specifikus fizikai réteg

Megjegyzés. – A 2-es üzemmódú specifikus réteg előírásai magukba foglalják a 2-es üzemmód szabályzó sorozatát, a vevő-oldali hibajavítást (FEC), a jelsorozat szétbontás-összeállítás műveletét, bit rejtjelezést, csatorna érzékelési és fizikai réteg rendszer-paraméterek ismertetését.

6.4.3.1 A keretek egy sorozatának a továbbításához egy állomásnak be kell illesztenie a bit számokat és jelzéseket (a 2-es üzemmód adatkapcsolat szolgáltatás leírása szerint, ahogyan azt a VDL 2-es Üzemmód Műszaki Előírásai Kézikönyv tartalmazza), ki kell számítania a FEC-t (6.4.3.1.2 pont szerint), össze kell rendeznie (6.4.3.1.3 pont szerint), elkészíteni az előkészítő jel-sorozatot (6.4.3.1.1 pont szerint), elvégezni a bit rejtjelezést (6.4.3.1.4 pont szerint), és végül kódolni és modulálni az RF jelet (6.4.2.1 pont szerint).
6.4.3.1.1 *Előkészítő jel-sorozat.* Az adat-továbbítás egy demodulátor előkészítő jelsorozattal kezdődik, amely öt szegmensből áll:
a) adó felfutás és teljesítmény stabilizáció;
b) szinkronizáció és hibás beolvasásos felbontás;
c) fenntartott szimbólum;
d) átviteli hossz; és
e) fej-rész FEC.

Megjegyzés. – Közvetlenül ezeket a szegmenseket követően egy, a VDL 2-es üzemmód műszaki előírások kézikönyvben lévő adatkapcsolat szolgáltatás leírásban meghatározott formátum szerinti AVLC keret követi.

6.4.3.1.1.1 *Adó felfutás és teljesítmény stabilizáció.* Az előkészítő jel-sorozat első szegmensének, amit a felfutásnak neveznek, az a célja, hogy egy adó teljesítmény stabilizációt és egy vevő automatikus erősítés-szabályozás /AGC/ befejezést biztosítson, és ennek közvetlenül meg kell előznie az egyedi szó első jelét. A felfutás idejének öt szimbólum időtartamúnk kell lenni. Az idő referencia pont (t) a következő előírásban az első egyedi szó szimbólumainak közepe, az a pont, ami egy fél-szimbólum időtartammal a felfutás vége után következik be. Kölcsönösen megállapítva. a felfutás kezdete t = -5,5 szimbólum időtartamnál kezdődik. A kisugárzott teljesítménynek -40 dBc-nél kevesebbnek kell lenni a t = -5,5 szimbólum időtartamot megelőzően. A felfutásnak biztosítania kell azt, hogy a t = -3,0 szimbólum időtartam időpontjában a kisugárzott teljesítmény a gyártó által meghatározott teljesítménynek 90 százaléka, vagy annál nagyobb legyen (lásd a 6-1.* ábrát). Az emelt-cosinus szűrő (vagy a levágás) alkalmazott módszerétől függetlenül az adó kimenetén a t = -3,0 és a t = -0,5 közötti időben ez úgy fog jelentkezni, mintha '000' szimbólum került volna kisugárzásra a felfutási idő időtartama alatt.

1. Megjegyzés. - A 3-as üzemmódnál az időzítési referencia pont megegyezik a teljesítmény referencia ponttal.

2. Megjegyzés. - Kívánatos az, hogy maximalizálják az automatikus erősítés-szabályozás /AGC/ beállítási idő megengedett időtartamát. "Erőfeszítéseket kell tenni" arra, hogy a teljesítmény a névleges kimeneti teljesítmény 90 százaléka felett legyen a t - 3,5 szimbólum időtartam időpontjában.

* Minden ábra ennek a fejezetnek a végén van elhelyezve

6.4.3.1.1.2 *Szinkronizáció és hibás beolvasás felbontás*. Az előkészítő jelsorozat második szegmense az egyedi szóból áll:
000 010 011 110 000 001 101 110 001 100 011 111 101 111 100 010
és balról jobbra haladva kell leadni.
6.4.3.1.1.3 *Fenntartott szimbólum*. Az előkészítő jelsorozat harmadik szegmense egyetlen szimbólumból áll, amelyet a 000 képvisel.

Megjegyzés. – Ez a mező jövőbeli meghatározás részére van fenntartva.

6.4.3.1.1.4 *Átviteli hossz*. Azért, hogy lehetővé váljon a vevő számára a végső Reed-Solomon blokk hosszának meghatározása, az adónak egy 17-bites szót kell elküldeni - a legkisebb értékű bittel (lsb) kezdve, a legmagasabb értékű bitig (msb) - jelezve az adat-bitek teljes számát, amelyek a fej-rész FEC-t követik.

Megjegyzés. – A hossz nem tartalmazza azokat a biteket, amelyeket a következők miatt kell továbbítani: a Reed-Solomon FEC-hez, beillesztett extra bitek annak biztosítására, hogy az összerendező 8-bites szavak integrál számát generálja, vagy extra hely-kitöltő bitek kerülnek beillesztésre, annak biztosítására, hogy az adat kódoló 3-bites szimbólumok integrál számát hozza létre.

6.4.3.1.1.5 *Fej-rész FEC*. A fej-részben lévő bit-hibák helyesbítéséhez egy (25, 20) blokk kódot kell számítani a fenntartott szimbólum és az átvitel hosszúság szegmensek felett. A blokk kódot ötödik szegmensként kell leadni. A kódolónak kell fogadnia a fej-részt a bit sorozatban, amely éppen átvitelre kerül. Az öt paritás bitet az átvitelhez a következő egyenlet felhasználásával kell generálni:

$[P_1,...,P_5] = [R_1,...,R_3, TL_1,...,TL_{17}]\ H^T$

ahol:
P a paritás szimbólum (P_l-et kell először leadni);
R a fenntartott szimbólum;
TL az átviteli hosszúság szimbólum;
T a mátrix transzponáló funkció; és
H az alább definiált paritás mátrix:

H =
00000000111111111111
00111111000011111111
11000111001100001111
11011011010100110011
01101001111001010101

6.4.3.1.1.6 *Bit átviteli sorrend*. Az eredő vektor termék öt paritás bitjét az első baloldali bitjével kezdve kell leadni.
6.4.3.1.2 *Vevő-oldali hibajavítás*. A tényleges csatorna áteresztőképesség javítása céljából a megkívánt újra-átvitelek számának csökkentéséhez FEC-t kell alkalmazni az előkészítő jelsorozat után, tekintet nélkül a keret határokra.
6.4.3.1.2.1 *A vevő-oldali hibajavítás (FEC) számítása*. A FEC kódolást egy szisztematikus rögzített hosszúságú Reed-Solomon (RS) (255,249)2^8-as kóddal kell végezni.

1. Megjegyzés. – Ez a kód maximálisan három oktett korrigálására képes 249 oktettes (1992 bit) adat blokknál. Hosszabb átviteleket 1992 bites átvitelekre kell felosztani, a rövidebb átviteleket virtuális, nullát képviselő kitöltőkkel kell kiterjeszteni. Hat RS-ellenőrzés oktettet kell használni egy 255 oktettes teljes blokkhoz.

A mező, amely a kód primitív polinomját meghatározza a következők szerint:
$p(x) = (x^8 + x^7 + x^2 + x + 1)$
A generáló polinom a következő:

$$\prod_{i=120}^{125} (x - \alpha^i)$$

ahol:
α a GF(256) primitív eleme;
GF(256) a 256-os méretű Galois mező (GF).

2. Megjegyzés. – A Reed-Solomon kódokat az Űr-technológiai Adat-átviteli Rendszer Szabványok: Távmérési Csatorna Kódolás tartalmazza, amelyet az Űr-technológiai Adat-átviteli Rendszerek Konzultatív Bizottsága adott ki (lásd Függelék)

.

6.4.3.1.2.2 *Blokk hosszúságok*. A hat RS-ellenőrzés oktettet 249 oktettes blokkra kell számolni. Hosszabb átvitelt 249 oktettes blokkokra kell felosztani a 6.4.3.1.3 pont szerint. A rövidebb blokkokat 249 oktettre kell kiegészíteni nullát

jelző virtuális kitöltésű előkészítő jelsorozattal. A virtuális kitöltést nem kell továbbítani. A blokkokat a 6.4.3.1.2.3 – 6.4.3.1.2.3.3 pontoknak megfelelően kell kódolni.
6.4.3.1.2.3 *Nincs hiba korrekció*. 2 vagy ennél kisebb nem-kitöltés oktettekkel rendelkező blokkoknál nem kell hibajavítást végezni.
6.4.3.1.2.3.1 *Egy-bájtos hiba korrekció*. 3-tól 30-ig terjedő nem-kitöltő oktettel rendelkező blokkoknál mind a hat RS-ellenőrzési oktettet generálni kell, de csak az első kettőt kell továbbítani. Az utolsó négy RS-ellenőrzés oktettet érvényteleníteni kell a dekódolónál.
6.4.3.1.2.3.2 *Két-bájtos hiba korrekció*. A 31-től a 67-ig terjedő nem-kitöltő oktettel rendelkező blokkoknál mind a hat RS-ellenőrzési oktettet generálni kell, de csak az első négyet kell továbbítani. Az utolsó két RS ellenőrzés oktettet érvényteleníteni kell a dekódolónál.
6.4.3.1.2.3.3 *Három-bájtos hiba korrekció*. A 68 vagy annál több nem-kitöltő oktettel rendelkező blokkoknál mind a hat RS-ellenőrzés oktettet generálni és továbbítani kell .
6.4.3.1.3 *Összerendezés*. A FEC teljesítmények javítása érdekében egy oktett alapú táblázat-indíttatású összerendezőt kell használni. Az összerendező egy olyan táblázatot hoz létre, amelynek soronként 255 oktettje és C-sorai vannak, ahol

c = átviteli
hosszúság (bit) /
1992 bit

ahol:

a) az átviteli hosszúság, ahogy az a 6.4.3.1.5 pontban meghatározásra került; és
b) c = a legkisebb egész szám, amely a tört értéknél nagyobb vagy azzal egyenlő.
Az adatoknak az 1992 bit páros-számú többszörösére való kiterjesztése után az összerendezőnek kell beírnia az átviteli folyamatot az egyes sorok első 249 oktettjébe, minden egymás utáni 8-bites csoportot véve, és tárolva őket az első oszloptól a 249-edikig. A 8-bites csoportok mindegyikében az első bitet a nyolcadik bit pozícióban kell tárolni; az első 1992-bites csoportot az első sorban kell tárolni, a második 1992-bites csoportot a második sorban, stb. Miután a FEC-et minden sorra kiszámították, a FEC adatok (vagy törlések) tárolásra kerülnek a 250-255. oszlopokban. Az összerendezőnek ezután továbbítania kell az adatokat a rejtjelzőhöz oszlopról-oszlopra történő kiolvasással, kihagyva minden olyan oktettet, amely érvénytelenítést tartalmaz, vagy az teljes egészében töltő biteket foglal magában. Az egy oktettben lévő összes bitet le kell adni a 8-as bittől az egyesig.
A vételnél a kibontó kiszámítja a sorok számát az utolsó (potenciálisan parciális) sor méretét a fej-részben lévő hosszúság mezőtől. Csak érvényes adat bájtokat továbbít a magasabb rétegnek.
6.4.3.1.4 *Bit rejtjelzés*. Az óra-jel helyreállítás segítésére és az átvitt spektrum alakjának stabilizálására bit rejtjelzést kell alkalmazni. A pseudo zaj (PN) jelsorozat egy 15-fokozatú generátor (lásd 6-2.ábra), a következő karakterisztikus polinommal:

$$X^{15} + X + 1$$

A PN jelsorozatnak a keret szinkronzációs jel után kell indulni a 1101 0010 1011 001 kezdeti értékkel a bal szélső bittel a regiszter első fokozatában, a 6-2. ábra szerint. Az egyes bitek feldolgozása után a regisztert egy bittel jobbra kell tolni. A lehetséges rejtjelzéshez a jövőben ezt a kezdeti értéket programozni fogják. A sorozatot hozzáadják (modulo 2) az adatokhoz az átviteli oldalon (rejtjelzés), és a rejtjelzett adatokhoz a vételi oldalon (rejtjel feloldás) a 6-3. táblázat szerint.

Megjegyzés. – A PN rejtjelző koncepció magyarázata az ITU-R Recommendation S. 446-4, I. Függelék 4.3.1 Szakasz I. Módszer alatt található (lásd ennek a Fejezetnek a Függelékét).

6.4.3.2 A 2-ES ÜZEMMÓDÚ CSATORNA ÉRZÉKELÉS

6.4.3.2.1 *Csatorna foglaltság-inaktív állapot érzékelése.* Amikor egy állomás legalább 5 milli- szekundumon keresztül legalább -87 dBm-es csatorna teljesítményt vesz, akkor:
a) 0,9 valószínűséggel a csatornát továbbra is foglaltnak kell tekinteni, ha a jelszint -92 dBm alá csillapodik 1 milliszekundumnál rövidebb idő alatt; és
b) 0,9 valószínűséggel a csatornát nem-foglaltnak kell tekinteni, ha a jelszint -92 dBm alá csillapodik legalább 1,5 milliszekundum alatt.

Megjegyzés. – A maximális kapcsolat áteresztőképesség, amely az összes felhasználó részére rendelkezésre áll, igen érzékeny az RF csatorna érzékelés-késésre (attól az időponttól, amikor a csatorna ténylegesen állapotot vált addig az időpontig, amíg egy állomás érzékeli és válaszol erre a változásra) és az RF csatorna foglaltság-késésre (attól az időponttól, amikor az állomás elhatározza a továbbítást addig az időpontig, amikor az adó elegendően felfut ahhoz, hogy kizárja a többi állomást). Ennek megfelelően nagyfontosságú az, hogy minden erőfeszítést megtegyenek ezeknek az időknek a csökkentésére, amennyire ezt a technika jelenlegi állása lehetővé teszi.

6.4.3.2.2 *Csatorna inaktív-foglaltság állapot érzékelése*. Legalább 0,9 valószínűséggel egy állomásnak a csatornát foglaltnak kell tekinteni 1 milliszekundumon belül azután, hogy a csatornán a teljesítmény legalább -90 dBm-re emelkedik.
6.4.3.2.3 **Ajánlás. –** *Egy foglalt csatorna észlelésének 0,5 milliszekundumon belül kell megjelenni.*

Megjegyzés. – Nagyobb valószínűségű hamis riasztás fogadható el a foglaltság-inaktív állapot érzékelése esetén, mint a csatorna inaktív-foglaltság állapot érzékelése esetén a két különböző hibahatás miatt.

6.4.3.3 A 2-ES ÜZEMMÓDÚ VEVŐ/ADÓ KÖLCSÖNHATÁS

6.4.3.3.1 *Vevő-adó átfutási idő*. Egy állomásnak az előkészítő jelsorozatot úgy kell leadni, hogy az egyedi szó első szimbólumának a közepét 1,25 milliszekundumon belül vigye át attól számítva, hogy a hozzáférési kísérlet sikerrel jár (Lásd 6-3 ábra). Az egyedi szó átvitele során a teljes frekvencia- változásnak 10 Hz-nél kisebbnek kell lenni. Az egyedi szó átvitele után a fázis- gyorsulásnak 500 Hz per másodpercnél kisebbnek kell lenni.
6.4.3.3.2 *Adótól-vevőig átfutási idő*. Az adó teljesítménynek -20 dBc-nek kell lennie az impulzus- köteg végső szimbóluma közepének 2,5 szimbólum periódusain belül. Az adó teljesítmény szivárgásnak, amikor az adó „ki" állapotban van, kevesebbnek kell lennie, mint -83 dBm. Az állomásnak képesnek kell lennie venni és demodulálni névleges teljesítménnyel egy bejövő jelet a végső információs szimbólum továbbítása után 1,5 milliszekundumon belül.

Megjegyzés. – Hivatkozás DO-160D 21. Szakasz, H kategória antenna sugárzású jelekre.

6.4.3.4 2-ES ÜZEMMÓDÚ FIZIKAI RÉTEG RENDSZER PARAMÉTEREK

6.4.3.4.1 A fizikai rétegnek a 6-4. táblázatban meghatározottak szerint kell megvalósítania a rendszer paramétereket.
6.4.3.4.1.1 *P1 paraméter (minimális átviteli hossz).* A P1 paraméter azt a minimális átviteli hosszt definiálja, melyet egy vevő demodulálni képes a BER leromlása nélkül.

6.4.4 A 3-as üzemmódú speciális fizikai réteg

Megjegyzés. – A 3-as módozatú speciális fizikai réteg műszaki leírása magába foglalja a 3-as üzemmód kezelés (M) impulzus-köteg és a levétel ellenőrzés közlemény (H) impulzus-köteg felfelé kapcsolatot, az M impulzus-köteg lefelé kapcsolatot, a hang/adat (V/D) impulzus- köteget és a bit rejtjelezést.

6.4.4.1 *Kezelés (M) impulzus-köteg és levétel ellenőrzés közlemény (H) impulzus-köteg felfelé kapcsolat*. Az M felfelé kapcsolat impulzus-kötegnek (ahogyan az a VDL 3-as Üzemmód Műszaki Előírások Kézikönyvben ismertetésre kerül) három szegmensből kell állnia, az előkészítő jelsorozatból, amelyet a rendszer adatok és az adó lefutás követ. A H felfelé kapcsolat impulzus-kötegnek (ahogyan azt a VDL 3-as Üzemmód Műszaki Előírások Kézikönyve ismerteti) három szegmensből kell állnia, az előkészítő jelsorozatból, amelyet a levétel ellenőrzés közlemény és az adó lefutás követ.
6.4.4.1.1 *Előkészítő jelsorozat*. A felfelé M impulzus-köteg és a H impulzus-köteg előkészítő jelsorozatoknak két összetevőből kell állniuk, a következők szerint:
a) adó felfutás és teljesítmény stabilizáció; és
b) szinkronizáció és félreérthetőség feloldás.
6.4.4.1.1.1 *Adó felfutás és teljesítmény stabilizáció*. Ennek a 6.4.3.1.1.1 szakaszban meghatározottal megegyezőnek kell lennie.
6.4.4.1.1.2 *Szinkronizáció és félreérthetőség feloldás.* Az előkészítő jelsorozat második össze- tevőjének az S_2*-ként ismert szinkronizációs sorozatból kell állnia, a következők szerint:

000 001 101 100 110 010 111 100 010 011 101 000 111 000 011 001
és balról jobbra haladva kell továbbítani.

Megjegyzés. – Az S_2 jelsorozat nagyon közeli kapcsolatban van az S_2 jelsorozattal (6.4.4.3.1.2 szakasz). Az S_2* 16 szimbóluma közötti 15 fázis-változás mindegyike pontosan 180°-on kívül van az S_2-höz kapcsolódó 15 fázis-változáshoz viszonyítva. Ez a kapcsolat felhasználható a két sorozat egyidejű keresési folyamatának egyszerűsítéséhez.*

6.4.4.1.2 *Rendszer adat és levétel ellenőrzés közlemény.* A nem-3T konfiguráció (ahogyan azt a VDL 3-as Üzemmód Műszaki Előírások Kézikönyv tartalmazza) rendszer adatának 32 továbbított szimbólumból kell állniuk. A 96 továbbított bitnek 4 Golay (24, 12) kód-szóként generált, 48 információ bitet és 48 paritás bitet kell tartalmaznia. A 3T konfigurációnak, ahogyan az a VDL 3-as Üzemmód Műszaki Előírások Kézikönyvben le van írva, 128 továbbított szimbólumból kell állnia. A 384 továbbított bitnek 16 Golay (24, 12) kód-szóként generált, 192 információ bitet és 192 paritás bitet kell tartalmaznia. A 3T konfiguráció levétel ellenőrzés közleménynek 40 átvitt szimbólumból kell állnia. A 120 továbbított bitnek 5 Golay (24, 12) kód-szóként generált, 60 információ bitet és 60 paritás bitet kell tartalmaznia.
A Golay kódoló speciális definíciójának a következők szerintinek kell lennie:
Ha a 12 bites input bit sorozatot **x** sor-vektorként írják fel, akkor a 24 bites output sorozat **y** sor- vektorként írható fel, ahol **y = x** és a **G** mátrixot a következőképpen kell megadni:

G =
110101110001100000000000
011111001001010000000000
111010010101001000000000
011000111011000100000000
111001101100000010000000
101100110110000001000000
100110011011000000100000
010110111100000000010000
001011011110000000001000
000101101111000000000100
110111000110000000000010
101011100011000000000001

Megjegyzés. – A kiterjesztett Golay kód lehetővé teszi bármilyen 3 vagy ennél kevesebb bit-hibából álló együttes korrekcióját, és bármely 4 bit-hibás együttes detektálását.

6.4.4.1.3 *Adó lefutás.* Az adó teljesítménynek -20 dBc-nek kell lennie az impulzus-köteg végső szimbóluma közepének 2,5 szimbólum periódusain belül. Az adó teljesítmény-szivárgásnak az adó „ki" állapotában -83dBm-nél kisebbnek kell lennie.

Megjegyzés. – Hivatkozás: RTCA/DO -160D 21 szakasz, H kategória antennasugárzású jeleknél.

6.4.4.2 *Kezelés (M) impulzus-köteg lefutás*. Az M lefutás impulzus-kötegnek (ahogyan azt a VDL 3-as Üzemmód Műszaki Előírások Kézikönyv tartalmazza) három szegmensből kell állnia, az előkészítő jelsorozatból, amelyet a rendszer adat és az adó lefutás követ.
6.4.4.2.1 *Az előkészítő jelsorozat*. A lefelé menő M impulzus-köteg bevezető sorozatoknak két összetevőből kell állniuk, a következők szerint:
a) adó felfutás és teljesítmény stabilizáció; és
b) szinkronizáció és félreérthetőség feloldás.
6.4.4.2.1.1 *Adó felfutás és teljesítmény stabilizáció*. Ennek meg kell felelni a 6.4.3.1.1.1 szakaszban meghatározottaknak.
6.4.4.2.1.2 *Szinkronizáció és félreérthetőség megoldás*. Ennél az impulzus-köteg típusnál három külön szinkronizáció sorozatot kell használni. Az S_1-ként ismert szabvány sorozatnak a következőnek kell lennie:
000 111 001 001 010 110 000 011 100 110 011 111 010 101 100 101
és balról jobbra haladva kell továbbítani. A speciális sorozatnak, amelyet a válaszok azonosítására használnak, a

6.4.4.1.1.2 szakaszban leírtaknak megfelelőnek kell lennie.
A hálózatba lépés kérések (S_1*) azonosítására használt speciális sorozatnak a következő sorozatot kell használni:
000 001 111 111 100 000 110 101 010 000 101 001 100 011 010 011
és balról jobbra haladva kell továbbítani.

Megjegyzés. – Az S_1 sorozat nagyon közeli kapcsolatban van az S_1 sorozattal (6.4.4.3.1.2 szakasz). Az S_1* 16 szimbóluma közötti 15 fázis-változás mindegyike pontosan 180° van kívül az S_1-hez kapcsolódó 15 fázis-változástól. Ez a kapcsolat felhasználható a két sorozat egyidejű keresési folyamatának egyszerűsítéséhez.*

6.4.4.2.2 *Rendszer adat*. Rendszer adat szegmensnek 16 átvitt szimbólumból kell állnia. A 48 átvitt bitet 24 rendszer adatként és 24 paritás bitként kell, kódolni amely két egymást követő (24, 12) Golay kód szóként van generálva. A (24, 12) Golay kód szavaknak a 6.4.4.1.2 szakaszban meghatározottak szerintinek kell lenniük.
6.4.4.2.3 *Adó lefutás*. Ennek a 6.4.4.1.3 pontban meghatározottaknak megfelelőnek kell lennie.
6.4.4.3 *Hang vagy adat (V/D) impulzus-köteg*. A V/D impulzus-kötegnek (ahogyan azt a VDL 3-as Üzemmód Műszaki Előírások Kézikönyv tartalmazza) négy szegmensből kell állnia: az előkészítő jelsorozatból, amelyet a fej-rész, a felhasználói információ szegmens és az adó lefutás követ. Ugyanazt a V/D impulzus-köteg formátumot kell használni mind a felfelé kapcsolatnál, mind a lefelé kapcsolatnál.
6.4.4.3.1 *Előkészítő jelsorozat.* A V/D impulzusköteg előkészítő jelsorozatoknak két összetevőből kell állniuk, a következők szerint:
a) adó felfutás és teljesítmény stabilizáció; és
b) szinkronizáció és félreérthetőség feloldás.
6.4.4.3.1.1 *Adó felfutás és teljesítmény stabilizáció*. Ennek a 6.4.4.1.1.1 szakaszban meghatározottaknak megfelelőnek kell lennie.
6.4.4.3.1.2 *Szinkronizáció és félreérthetőség feloldás*. Ennél az impulzus-köteg típusnál három külön szinkronizáció sorozatot kell használni. Az S_2-ként ismert szabvány sorozatnak a következőnek kell lennie:
000 111 011 010 000 100 001 010 100 101 011 110 001 110 101 111
és balról jobbra haladva kell továbbítani.
6.4.4.3.2 *Fej-rész*. A fej-rész szegmensnek 8 átvitt szimbólumból kell állnia. A 24 átvitt bitet 12 rendszer adatként és 12 paritás bitként kell kódolni, amely két egymást követő (24, 12) Golay kód szóként van generálva. A (24, 12) Golay kód szavaknak a 6.4.4.1.2 szakaszban meghatározottaknak megfelelőnek kell lenniük.
6.4.4.3.3 *Felhasználói információ*. A felhasználói információ szegmensnek 192 3-bites szimbólumból kell állnia. Hangátvitelnél a FEC-t kell alkalmazni a 6.8 szakaszban meghatározott vokódoló output analíziséhez. A vokódolónak kielégítően kell működnie 10^{-3}BER környezetben (10^{-2} tervezési célkitűzéssel). A *FEC-t tartalmazó* vokodoló teljes bit sebessége 4800 bit/s (kivéve a csonkolt módban, amikor a bit-sebesség 4000 bit/s).
6.4.4.3.3.1 Amikor felhasználói adatot visznek át, az 576 bitet egyetlen Reed-Solomon (72, 62) 2^8-rendű kód-szóként kell kódolni. A 496 bitnél kisebb hosszúságú Reed-Solomon kódoló felhasználói input adatánál ezt zérusokkal kell kitölteni a végénél, amíg el nem éri a 496 bit hosszúságot. A mezőnek, amelyet a kód primitív polinomja definiál, a 6.4.3.1.2.1 szakaszban leírtnak kell lennie. A generátor polinomnak a következőnek kell lenni:

$$\prod_{i=120}^{129} (x - \alpha^i)$$

Megjegyzés. – A Reed-Solomon (72, 62) kód képes maximum öt 2^8-rendű (kód-szó) szimbólum hiba javítására a vett szóban
.
6.4.4.3.4 *Adó lefutás.* Ennek a 6.4.4.1.3 szakaszban meghatározottnak megfelelőnek kell lennie.
6.4.4.4 *Összerendezés.* Nem lehet összerendezés a 3-as üzemmódú üzemelésben.
6.4.4.5 *Bit rejtjelezés*. A 3-as üzemmódú működés alatt a bit rejtjelezést - ahogyan az a 6.4.3.1.4 szakaszban az meg van határozva - az előkészítő jelsorozat után kezdve minden impulzus-kötegen el kell végezni. A rejtjelező sorozatot újra kell inicializálni minden impulzus-kötegen, hatékonyan állandó lefedést biztosítva a 3-as üzemmódú rögzített hosszúságú impulzus-kötegek mindegyikének.
6.4.4.6 *Adó/vevő kölcsönhatás*. A kapcsolási időt ebben az al-szakaszban, az egyik impulzus-köteg utolsó információ szimbólumának közepe és a következő impulzus-köteg szinkronizációs sorozata első szimbólumának közepe közötti időként határozták meg.

Megjegyzés. – Ezt a névleges időt lerövidítik olyan meggondolások alapján, mint például az egyes szimbólumok Nyquist szűrése miatti véges szélesség és a felfutás és teljesítmény stabilizáció. Az ilyen alternatív definíciók a kapcsolási időket maximálisan 8 szimbólum periódussal rövidíthetik le.

6.4.4.6.1 *Vevő-adó átkapcsolási idő*. Egy légijármű rádiónak képesnek kell lennie 17 szimbólum perióduson belül vételről adásra átkapcsolni. Ez az idő 33 szimbólum periódusra növekedhet az olyan légijármű adóknál, amelyek nem teljesítenek diszkrét címzést kívánó funkciókat.

1. Megjegyzés. – A legrövidebb vevő/adó átkapcsolási idő akkor fordul elő, amikor egy felfelé kapcsolati M-csatorna adás-vételét egy V/D átvitel követi ugyanabban az időrésben. Bizonyos esetekben, amikor a légijármű rádiók nem teljesítenek diszkrét címzést kívánó funkciókat, a vevő/adó átkapcsolási idő megnövelhető, mivel a felfelé kapcsolati M-csatorna adás utolsó két Golay szavát nem kell leolvasni
.
2. Megjegyzés. – A minimális átfutási idő feltételezi, hogy a 3V1D, 2V1D és 3T konfigurációjú (ahogyan azt a VDL 3-as Üzemmód Műszaki Előírásai Kézikönyv tartalmazza) légijárművek olyan szoftverrel vannak ellátva, amelyek megvédik őket egy lefelé kapcsolati M-csatorna közlés továbbításától egy olyan időrésben, amely egy másik légijárműtől hosszú időkéséssel érkező hangközlés vételét követi.

6.4.4.6.2 *Adó-vevő átkapcsolási idő*. Egy légijármű rádiónak képesnek kell lennie 32 szimbólum perióduson belül adásról vételre átkapcsolni.

Megjegyzés. – Az adó/vevő átkapcsolási idő legrosszabb esete egy légijármű rádió számára akkor jelenik meg, amikor egy lefelé kapcsolati M-csatorna közlést továbbít, és egy V/D közleményt vesz ugyanabban a időrésben.
6.4.4.7 *Fedésterület határ jelzés.*
6.4.4.7.1 **Ajánlás.** *– A VDL 3-as üzemmódú légijárművek részére ajánlott a fedésterületi határ közelség jelzés szolgáltatása.*

6.5 KAPCSOLAT RÉTEG PROTOKOLLOK ÉS SZOLGÁLTATÁSOK

6.5.1 Általános információk

6.5.1.1. *Funkcionalitás*. A VDL kapcsolat rétegnek a következő al-réteg funkciókat kell szolgáltatnia:
a) adathordozó elérési irányítás (MAC) al-réteg, amely megkívánja a vivőhullám érzékelő többszörös hozzáférés (CSMA) algoritmus használatát a 2-es üzemmódnál vagy a TDMA használatát a 3-as üzemmódnál;
b) adatkapcsolat szolgáltatás (DLS) al-réteg:
1) a 2-es üzemmódnál a DLS al-réteg összekapcsolás-orientált pont-pont kapcsolatokat szolgáltat az adatkapcsolat entitások (DLE) felhasználásával, és összekapcsolás-mentes rádiókapcsolatot a MAC al-réteg felett; és
2) a 3-as üzemmódnál a DLS al-réteg nyugtázott, összekapcsolás-mentes pont-pont és pont-több-pont kapcsolatokat szolgáltat egy MAC al-réteg felett, amely szekvenciálást garantál; és
c) a VDL kezelés entitás (VME), amely DLE-ket létesít és fenntartja a légijárművek és a földi telepítésű rendszerek közötti kapcsolat kezelési entitásokat (LME).

6.5.1.2 SZOLGÁLTATÁS

6.5.1.2.1 *Kapcsolat-orientált.* A VDL kapcsolat réteg megbízható ponttól-pontig szolgáltatást nyújt kapcsolat-orientált DLS al-réteg felhasználásával.
6.5.1.2.2 *Kapcsolat-nélküli.* A 2-es és a 3-as üzemmódú VDL kapcsolat réteg nem-nyugtázott rádió-adás szolgáltatást nyújt kapcsolat-nélküli DLS al-réteg felhasználásával.
6.5.1.2.3 *Nyugtázott kapcsolat-nélküli eljárás.* A 3-as üzemmódú kapcsolat rétegnek biztosítania kell egy pont-pont szolgáltatást egy olyan kapcsolat-nélküli DLS al-réteg felhasználásával, amely a sorrendiség garantálására a MAC al-rétegen alapszik.

6.5.2 MAC al-réteg

6.5.2.1 Az Adathordozó Hozzáférés Vezérlés /MAC/ al-rétegnek a megosztott kommunikációs útvonalon átlátható adatgyűjtést kell szolgáltatni. Ez láthatatlanná teszi azt a módot a DLS al-réteg számára, amelyben eléréséhez fenntartó kommunikációs forrásokat használnak ennek eléréséhez.

Megjegyzés. – A speciális MAC szolgáltatásokat és eljárásokat a VDL 2-es és 3-as üzemmódhoz a VDL 2-es üzemmód *és VDL 3-as üzemmód Műszaki Előírások Kézikönyv tartalmazza.*

6.5.3 Adatkapcsolat szolgáltatás al-réteg

6.5.3.1 A 2-es üzemmódnál az adatkapcsolat szolgáltatás al-rétegnek támogatnia kell a bit- orientált szimplex levegő-föld összeköttetéseket a légiforgalmi VHF kapcsolat vezérlési (AVLC) protokollt felhasználva.

Megjegyzés. - A VDL 2-es üzemmód speciális adatkapcsolati szolgáltatásait, paramétereit és protokoll meghatározásait a VDL 2-es Üzemmód Műszaki Előírások Kézikönyve foglalja magába.

6.5.3.2 A 3-as üzemmódnál a DLS támogatja a bit-oritentált prioritás alapú szimplex levegő-föld összeköttetéseket a nyugtázott kapcsolat-nélküli adatkapcsolat (A-CLDL) protokollt felhasználva.

Megjegyzés. - A VDL 3-as üzemmód speciális adatkapcsolati szolgáltatásait, paramétereit és protokoll meghatározásait a VDL -as Üzemmód Műszaki Előírások Kézikönyve foglalja magába.

6.5.4 VDL kezelési entitás (VME)

6.5.4.1 *Szolgáltatások.* A VDL kezelési entitásnak biztosítania kell a kapcsolat létrehozását, fenntartását és a szolgáltatás megszűntetését, valamint a paraméter módosítások alátámasztását. A speciális VME paraméter formátumok és eljárások a 2-es és 3-as üzemmódú szolgáltatások a VDL 2-es üzemmód és 3-as üzemmód Műszaki Előírásai Kézikönyvben találhatók.

6.6 ALHÁLÓZAT RÉTEG PROTOKOLLOK ÉS SZOLGÁLTATÁSOK

6.6.1 A 2-es üzemmód felépítése

6.6.1.1 Az alhálózat réteg protokollt, amelyet a VHF levegő-föld alhálózaton keresztül használnak a VDL 2-es üzemmódhoz, és amit formálisan alhálózat hozzáférés protokollnak (SNAcP) neveznek, meg kell, hogy feleljen az ISO 8208 szabványnak, kivéve azokat, ami A VDL 2-es Üzemmód Műszaki Előírások Kézikönyvben találhatók. Az SNAcP, ami A VDL 2-es Üzemmód Műszaki Előírások Kézikönyvben található, az alhálózati protokoll. Ha A VDL 2-es Üzemmód Műszaki Előírások Kézikönyve és az idézett előírások között különbségek vannak, akkor A VDL 2-es Üzemmód Műszaki Előírásoknak van prioritása. A levegő-föld interfészen a légijármű alrendszer entitás DTE-ként működik, a földi alhálózat entitásnak pedig DCE-ként kell működnie.

Megjegyzés. – A speciális al-réteg protokoll hozzáférési pontokat, szolgáltatásokat, paramétereket és eljárásokat a VDL 2-es üzemmódhoz A VDL 2-es Üzemmód Műszaki Előírások Kézikönyve foglalja magába.

6.6.2 A 3-as üzemmód felépítése

6.6.2.1 A VHF levegő-föld alhálózaton keresztül használt alhálózatnak a VDL 3-as üzemmód biztosítja a flexibilitást a többszörös alhálózati protokollok egyidejű fenntartásához. A jelenleg meghatározott opciók: az ISO 8473 kapcsolás-nélküli hálózat protokoll fenntartása és az ISO 8208 fenntartása, mindkettőnél úgy, ahogyan azok a VDL 3-as Üzemmód Műszaki Előírások Kézikönyvben találhatók. A VDL 3-as Üzemmód Műszaki Előírások Kézikönyvnek prioritást kell kapnia az idézett előírásoktól való bármely eltérés esetén. Az ISO 8208 interfésznél a légi és a földi alhálózat entitások egyaránt DCE-ként működnek.

Megjegyzés. – A speciális al-réteg protokoll hozzáférési pontokat, szolgáltatásokat. paramétereket és eljárásokat a VDL 3-as üzemmódhoz A VDL 3-as Üzemmód Műszaki Előírások Kézikönyve foglalja magába.

6.7. A VDL MOZGÓ SZOLGÁLATI ALHÁLÓZAT-FÜGGŐ KONVERGENCIA FUNKCIÓ (SNDCF)

6.7.1 A VDL 2-es üzemmódú SNDCF

6.7.1.1 *Bevezetés.* A szabvány mozgó szolgálati SNDCF szerepét a VDL 2-es üzemmódú mozgó szolgálati SNDCF-

nek kell betöltenie.
6.7.1.2 *Új funkció.* A VDL 2-es üzemmódú mozgó szolgálati SNDCF-nek kell alátámasztani az összefüggés fenntartását (pl. tömörítés táblázatok) az alhálózati hívásokon keresztül. Az SNDCF-nek ugyanazon szöveg-összefüggést (pl. tömörítés táblázatok) kell használnia az összes vele kapcsolatban lévő SVC-n keresztül a DTE szöveg-összefüggéssel, amikor ugyanazokkal a paraméterekkel tartják a kapcsolatot. Az SNDCF-nek legalább két, egy szöveg-összefüggést megosztó SVC-t kell alátámasztania.

1. Megjegyzés. – Mivel a vételek várhatóan átrendezik a kötegeket, bizonyos tömörítési algoritmusok nem alkalmasak a VDL 2-es üzemmódban való használatra. Továbbá az operandus-táblázat tömörítési algoritmusok szerkesztőinek kell kényesen vigyázniuk a vagy a régi, vagy az újonnan létesített híváson érkező felfrissítések problémájával szemben.

2. Megjegyzés. – A Hívás Felhasználói Adatmező kódolása a Doc 9705-ben van leírva, kivéve a VDL 2-es Üzemmód Műszaki Előírások Kézikönyvben található módosításokat.

6.7.2 A VHF adatkapcsolat /VDL/ 3-as üzemmód alhálózat berendezés-függő konvergencia szolgáltatása /SNDCF/

6.7.2.1 A VDL 3-as üzemmódnak alá kell támasztania a meghatározott SNDCF egyikét, vagy azokból többet. Az első a szabvány ISO 8208 SNCF, ahogy az a Doc 9705-ben meghatározásra került. Ez egy kapcsolat-irányított SNDCF. A VDL 3-as üzemmóddal alátámasztott SNDCF második típusa keret-alapú SNDCF-ként került megjelölésre. Ennek a kapcsolat-nélküli irányítottságú SNDCF-nek a részletezését a VHF adatkapcsolat 3-as Üzemmód Műszaki Előírása Kézikönyv foglalja magába, ami tartalmazza még a hálózati réteg interfészt, alátámasztja az általános adású és irányított adású hálózati csomagokat, és a Légiforgalmi Távközlési Hálózat /ATN/ közlemény továbbítás biztosítását.
Megjegyzés. – A keret-alapú SNDCF azért van így megnevezve, mivel a VDL 3. üzemmódú kereteket használja anélkül, hogy szüksége lenne egy kiegészítő protokollra (úgymint az ISO 208 SNDCF) a hálózati csomagok továbbításához. A keret-alapú SNDCF a hálózati protokolltól való függetlenséget azzal éri el, hogy azonosítja az egyes keretek 'hasznos terhelését'. Egy keret vételekor a hasznos terhelés kerül megvizsgálásra, és a vezérlés az azonosított protokollhoz kerül átadásra.

6.8 HANGFREKVENCIÁS EGYSÉG A 3-AS ÜZEMMÓDHOZ

6.8.1 Szolgáltatások

6.8.1.1 A hangfrekvenciás egység biztosít egy egyszerű „nyomó-gombos – beszéd-indítású" funkciót és jelzés átviteli interfészt a felhasználó és a VHF adatkapcsolat /VDL/ között. Két különálló, egymást kölcsönösen kizáró beszéd-üzemű csatorna áramkör típust támogat:
a) Célra rendelt áramköröket: Ennek egy speciális felhasználói csoport részére kell szolgáltatást biztosítani – kizárásos alapon – az áramkört a csoporton kívülálló más felhasználókkal nem megosztottan. A hozzáférést a „hallgasson be" figyelemmel biztosítva, mielőtt a nyomógombbal indítana.
b) Igény szerinti kijelölésű áramköröket: Ennek egy olyan beszéd-üzemű csatorna áramkör hozzáférést kell biztosítani, amelyet a földi állomás dönt el a légijármű fedélzeti állomástól vett hozzáférési kérésre válaszolva. Az üzemeltetés ilyen típusának meg kell engedni a csatorna forrás növekvő hatékonyságú dinamikus megosztását.
6.8.1.2 *Elsőbbég hozzáférés.* A hangfrekvenciás egység működésének biztosítania kell az elsőbbség megszakításos hozzáférést az arra feljogosított földi felhasználó részére.
6.8.1.3 *Közlemény forrás azonosítás.* A hangfrekvenciás egység működésének biztosítania kell azt, hogy egy vett közlemény forrásáról értesítse a felhasználót (azaz azt, hogy a közlemény a levegőből vagy egy földi állomástól ered-e).
6.8.1.4 *Kódolt zajzár.* A hangfrekvenciás egység működésének biztosítania kell egy kódolt zajzár működést, amely bizonyos értékű csillapítást ad a nem-kívánt közös csatornájú hangfrekvenciás közleményekre a beérkezési impulzus idejében.

6.8.2 Élőszavas kódolás, paraméterek és eljárások

6.8.2.1 A VHF adatkapcsolat 3-as üzemmódjának a korszerű több-soros aktiválású (AMBE) 4,8 kbit/s kódolási/dekódolási algoritmust kell használni, a változat száma: AMBE-ATC-10, amit a Digitális Beszéd Rendszerek Részvénytársaság (DVSI) fejlesztett ki a beszéd-üzemű átvitelhez.

1. Megjegyzés. – A 4,8 kbit/s AMBE algoritmusok műszaki jellemzőire vonatkozó tájékoztatásokat az AMBE-ATC-10

Alacsony Jelszintű Leírása foglalja magába, és a DVSI-től szerezhető be.

2. Megjegyzés. – A dokumentumban leírt 4,8 kbit/s AMBE kódolás/dekódolás technológia a DVSI szabadalmi joga és szerzői joga alatt áll. A gyártóknak egy licencmegállapodást kell kötniük a DVSI-vel azt megelőzően, hogy az algoritmusról egy részletes leírást kapjanak, mielőtt beépítenék azt a VDL 3-as üzemmódú szolgáltatást nyújtóan működő berendezéseikbe. Az ICAO-nak címzett 1999. október 29-i keltezésű levélben a DVSI megerősítette azon kötelezettség-vállalását, hogy engedélyezi a gyártóknak a technológia felhasználását, és a légiforgalmi berendezésekben való eladását diszkrimináció nélküli alapon megtárgyalt kikötések és feltételek mellett.

6.8.2.2 Az élőszavas kódolás meghatározását, a hangfrekvenciás egység paramétereinek és eljárásainak leírását a VDL 3-as üzemmódú beszéd-üzemű üzemeltetéséhez a VDL 3-as Üzemmódú Műszaki Előírások Kézikönyve foglalja magába.

6.9 A VHF ADATKAPCSOLAT /VDL/ 4-ES ÜZEMMÓD

6.9.1 Egy 4-es üzemmódú állomás meg kell, hogy feleljen a 6.1.2.3, 6.1.4.2, 6.2.1.1, 6.2.3.1, 6.2.4, 6.3.1, 6.3.3.1, 6.3.4, 6.3.5.1, 6.3.5.2, 6.3.5.3, 6.3.5.4.1 és 6.9 szakaszokban meghatározott követelményeknek.

6.9.2 A VHF adatkapcsolat 4-es üzemmódjának rádió csatornái

6.9.2.1 A VHF ADATKAPCSOLAT /VDL/ 4-es ÜZEMMÓDÚ ÁLLOMÁSAINAK FREKVENCIA TARTOMÁNYA

6.9.2.1.1 *Az adó/vevő hangolási tartomány.* Egy VHF adatkapcsolat 4. üzemmódú adó/vevőnek képesnek kell lennie arra, hogy a 117,975 MHz-től a 137 MHz-ig terjedő tartományban bármelyik 25 kHz-es csatornára lehangolható legyen. Az adónak a lehangolási tartományra rendelkeznie kell egy olyan eszközzel, ami korlátozza a szűkebb sávra történő hangolást.

Megjegyzés. – Az üzemeltetési körülmények vagy bizonyos alkalmazások szükségessé tehetik azt, hogy a berendezés szűkebb frekvencia tartományban kerüljön üzemeltetésre.

6.9.2.1.2 **Ajánlás. -** *Egy VHF adatkapcsolat 4-es üzemmódú adó/vevőnek képesnek kell lennie arra, hogy a108 MHz-től a 117,975 MHz-ig terjedő tartományban bármelyik 25 kHz-es csatornára lehangolható legyen.*

Megjegyzés. – A 108 – 117,975 MHz-es sávot a Nemzetközi Távközlési Unió /ITU/ Nemzetközi Rádió-Rendszabályzatának vonatkozó előírásaival összhangban lehet felhasználni.

6.9.2.1.3 *Szimultán vétel*. Egy 4-es üzemmódú állomásnak képesnek kell lennie két csatorna egyidejű vételére.
6.9.2.1.4 **Ajánlás.** – *Egy VDL 4-es üzemmódú állomás legyen képes további csatornák egyidejű vételére, amennyiben ezt az üzemeltetési szolgáltatás megkívánja.*

6.9.2.2 GLOBÁLIS JELZŐ CSATORNA

6.9.2.2.1 Egy 4-es üzemmódú állomásnak két kijelölt frekvenciát kell használni globális jelző csatornaként (GSC), a felhasználói kommunikáció és kapcsolat kezelés funkciók fenntartására.

Megjegyzés. – Kiegészítő csatornákat meg lehet határozni egy helyi tartományban és rádión értesíteni a mobil felhasználókat a földi állomásoktól a fent definiált GSC-kről.

6.9.3 Rendszer képességek

6.9.3.1 *ATN kompatibilitás.* A VDL 4-es üzemmódú rendszernek alá kell támasztania az ATN-kiszolgáló alhálózati szolgáltatást a légtér-ellenőrzési alkalmazásokhoz.
6.9.3.2 *Adat átláthatóság*. A VDL 4-es üzemmódú rendszernek kód-független és bájt-független adat-átvitelt kell biztosítania.
6.9.3.3 *Sugárzás*. A VDL 4-es üzemmódú rendszernek kapcsolat rétegsugárzási szolgáltatást kell nyújtania.
6.9.3.4 *Ponttól-pontig*. A VDL 4-es üzemmódú rendszernek ponttól-pontig szolgáltatást kell nyújtania.
6.9.3.5 *Levegő-levegő összeköttetések*. A VDL 4-es üzemmódú rendszernek levegő-levegő összeköttetést kell biztositania, földi támogatás nélkül, valamint biztosítania kell a levegő-föld kommunikációt is.
6.9.3.6 *Kapcsolatkezelés.* A levegő-föld üzemelés alátámasztásánál a VDL 4-es üzemmódú rendszernek megbízható összeköttetési útvonalat kell létesítenie és fenntartani a légijármű és a föld között, megengedve, de nem megkövetelve,

a kézi beavatkozást.
6.9.3.7 *Földi hálózati átvitel*. Egy mozgó VDL 4-es üzemmódú DLS állomásnak az egyik VDL 4-es módozatú DLS földi állomástól egy másikra szükség esetén át kell térnie.
6.9.3.8 *Származtatott idő-képesség.* VDL 4-es üzemmódnak a vett VDL 4-es üzemmódú átvitelek érkezési idejének méréséből való idő-leszármaztatás képességét kell biztosítani, amikor kívülről leszármaztatott időbecslések nem állnak rendelkezésre.
6.9.3.9 *Szimplex üzemeltetés*. A mozgó és földi VDL 4-es üzemmódú állomásoknak hozzá kell férniük a szimplex módban működő fizikai adathordozóhoz.

6.9.4 Csatorna használat koordinálása

6.9.4.1 Körzeti alapon az átviteleket UTC szerint kell ütemezni a megosztott csatornák hatékony felhasználása és nem-szándékos idősrés újra-felhasználás elkerülése érdekében.

6.9.5 Fizikai rétegprotokollok és szolgáltatások

Megjegyzés. – Ha nincs másképpen meghatározva, az ebben a szakaszban meghatározott előírások mind a mozgó, mind a földi állomásokon érvényesek.

6.9.5.1 FUNKCIÓK

6.9.5.1.1 ÁTVITT TELJESÍTMÉNY
6.9.5.1.1.1 *Légijármű fedélzeti telepítés*. A kisugárzott teljesítménynek olyannak kell lenni, hogy egy legalább 35 mikrovolt per méter (mínusz 114,5 dBW/m^2) térerősséget szolgáltasson a szabad-térbeli terjedés alapján, olyan távolságokban és magasságokon, amelyek megfelelnek az azon területekhez tartozó feltételeknek, amelyek felett a légijármű üzemelést végez.
6.9.5.1.1.2 *Földi telepítés*.
Ajánlás. – *A kisugárzott teljesítmény olyan legyen, hogy egy legalább 75 mikrovolt per méter (mínusz 109 dBW/m^2) térerősséget szolgáltasson a létesítmény meghatározott üzemelési fedésterületén belül a szabad-térbeli terjedés alapján.*
6.9.5.1.2 AZ ADÓ ÉS VEVŐ FREKVENCIA SZABÁLYOZÁSA
6.9.5.1.2.1 A VDL 4-es üzemmód fizikai rétegnek az adó vagy vevő frekvenciát a kapcsolat kezelő entitás (LME) utasításának megfelelően kell beállítania. A csatorna kiválasztási időnek kisebbnek kell lenni, mint 13 ms, egy VSS felhasználótól jövő utasítást követően.
6.9.5.1.3 A VEVŐ ÁLTALI ADAT-VÉTEL
6.9.5.1.3.1 A vevőnek a bemenő jelet dekódolnia és továbbítania kell a magasabb rétegekhez feldolgozás céljából.
6.9.5.1.4 AZ ADÓ ÁLTALI ADAT-TOVÁBBÍTÁS
6.9.5.1.4.1 *Adat kódolás és átvitel*. A fizikai rétegnek az adatkapcsolati rétegtől vett adatokat kódolnia és továbbítania kell az RF csatornán. Az RF-továbbítás csak akkor mehet végbe, ha az adathordozó hozzáférés vezérlés /MAC/ engedélyezte.
6.9.5.1.4.2 *Továbbítási sorrend*. A továbbításnak a következő fokozatokból, a következő sorrendben kell állnia:
a) adó teljesítmény stabilizálás;
b) bit szinkronizáció;
c) félreérthetőség feloldása és adat-továbbítás; és
d) adó csillapítás.

Megjegyzés. – A fokozatok meghatározásait a 6.9.5.2.3.1-től a 6.9.5.2.3.4-ig terjedő szakaszok tartalmazzák.

6.9.5.1.4.3 *Automatikus adó kikapcsolás*. A VDL 4-es üzemmódú állomásnak le kell kapcsolnia a végfokozat erősítőhöz menő teljesítményt abban az esetben, ha az ettől a végfokozat erősítőtől jövő kimenet több mint egy másodpercig meghaladja a -30 dBm-et. Az érintett erősítő üzemelési módba történő visszaállítását kézi művelettel kell végezni.

Megjegyzés. – Ennek az a célja, hogy megvédje az elosztott csatornaforrást az úgynevezett „beragadt adóktól”.

6.9.5.1.5 ÉRTESÍTÉS SZOLGÁLTATÁS

6.9.5.1.5.1 *Jelminőség*. A berendezések működési paramétereit a fizikai rétegnél kell ellenőrizni. A jelminőség elemzést a demodulációs folyamatban és a vételi folyamatban kell végezni.

Megjegyzés. – A demodulátorban értékelhető folyamatokat a bit hiba-arány (BER), a jel/zaj arány (SNR) és az időzítő vibrálás képezik. A vevőben értékelhető folyamatok vett jelszintet és a csoport késést tartalmazzák.

6.9.5.1.5.2 *Érkezési idő*. Minden vett átvitel érkezési idejét 5 mikroszekundumos két-szigma hibával kell mérni.

6.9.5.1.5.3 **Ajánlás.** *– A vevő legyen képes az érkezési idő 1 mikroszekundomos két-szigma hibán belüli mérésre*.

6.9.5.2 A GAUSS SZŰRÉSŰ FREKVENCIA-BILLENTYŰZÉS /GFSK/ PROTOKOLL MEGHATÁROZÁSA

6.9.5.2.1 *Modulációs séma*. A modulációs sémának a GFSK-nak kell lennie. Az első átvitt bitnek (az előkészítő jelsorozatban) magas hangnak kell lennie, és a továbbított hangot billentyűzni kell, mielőtt a 0 továbbításra kerülne (azaz nullára nem-visszatérő, invertált kódolás).

6.9.5.2.2 *Modulációs sebesség*. Bináris egyeseket és bináris nullákat kell generálni 0,25 ± 0,03 BT indexszel és 0,28 ± 0,03 BT termékkel, amely 19200 bit/s ± 50 ppm sebességű adatátvitelt biztosít.

6.9.5.2.3 AZ ÁTVITEL FOKOZATAI

6.9.5.2.3.1 *Adó teljesítmény stabilizáció*. Az előkészítő jelsorozat első szegmense az adó teljesítmény stabilizáció, amelynek 16 szimbólum időtartamának kell lennie. Az adó teljesítmény-szint az állandó állapotú teljesítmény-szint 90 százalékánál kisebb nem lehet az adó teljesítmény stabilizációs szakasz végénél.

6.9.5.2.3.2 *Bit szinkronizálás*. Az előkészítő jelsorozat második szegmensének a 24-bites 0101 0101 0101 0101 0101 0101 sorozatnak kell lennie, amelyet balról jobbra haladva, közvetlenül az adat-szegmens kezdete előtt kell továbbítani.

6.9.5.2.3.3 *Félreérthetőség feloldás és adat-átvitel*. Az adatok első bitjének továbbítását 40-bites intervallumokkal (közelítőleg 2083,3 mikroszekundum ±1 mikroszekundum) az átvitel névleges megkezdése után kell elkezdeni.

1. Megjegyzés. – Ez az antenna kimenetén lévő sugárzásra vonatkozik.

2. Megjegyzés. – A félreérthetőség feloldását a kapcsolat réteg hajtja végre.

6.9.5.2.3.4 *Adó csillapítás*. Az átvitt teljesítménynek legalább 20 dB-el kell csillapodni 300 mikroszekundumon belül az átvitel befejezése után. Az adó teljesítmény-szintnek az átvitel befejezése után 832 mikroszekundumon belül kisebbnek kell lennie, mint -90 dBm.

6.9.5.3 CSATORNA ÉRZÉKENYSÉG

6.9.5.3.1 *Zaj alapszint becslés*. Egy VDL 4-es üzemmódú állomásnak meg kell becsülnie a zaj alapszintet, a csatorna teljesítmény mérésének alapján, amikor érvényes bevezető sorozatot nem észlel.

6.9.5.3.2 A zaj alapszint kiszámításához használt algoritmusnak olyannak kell lenni, hogy a kiszámított zaj alapszint alacsonyabb legyen annál a maximum teljesítmény-szintnél, amelyet a csatornán az elmúlt azon percben mértek, amikor a csatornát inaktívként vették figyelembe.

Megjegyzés. – A VHF adatkapcsolat /VDL/ 4. üzemmódú vevő egy energia-érzékelő algoritmust használ fel a csatorna állapotának (inaktív vagy aktív) meghatározási eszközeként. Egy algoritmus, amit fel lehet használni a zaj alapszint kiszámításához, a VDL 4-es Üzemmód Műszaki Előírásai Kézikönyvben került leírásra.

6.9.5.3.3 *A csatorna inaktív – aktív állapotának meghatározása.* A VHF adatkapcsolat /VDL/ 4. üzemmódú állomásnak a következő eszközöket kell alkalmazni a csatornának a fizikai rétegnél történő inaktív – aktív átmenetének meghatározásához.

6.9.5.3.3.1 *Előkészítő jelsorozatok észlelése.* A csatornát akkor kell aktívnak nyilvánítani, amikor egy VDL 4. üzemmódú állomás egy érvényes előkészítő jelsorozatot és egy azt követő keretjelzést észlel.

6.9.5.3.3.2 *A csatorna teljesítmény mérése.* A demodulátor azon képességétől függetlenül, hogy képes egy érvényes

előkészítő jelsorozat észlelésére, a VDL 4-es üzemmódú állomásnak tekintetbe kell venni egy csatorna foglaltságot 95 százalékos valószínűséggel – 1 ms-on belül azután, hogy a csatornán belüli teljesítmény a számított zaj alapszintnek legalább a négyszeresére emelkedik – legalább 0,5 milliszekundumon keresztül.
6.9.5.3.4 *A csatorna aktív – inaktív átmenetének észlelése*
6.9.5.3.4.1 Egy VHF adatkapcsolat /VDL/ 4. üzemmódú állomásnak a következő eszközöket kell alkalmazni a csatorna aktív – inaktív átmenetének észleléséhez.
6.9.5.3.4.2 *Az adás hosszának mérése.* Amikor az előkészítő jelsorozat észlelésre kerül, a csatorna aktív állapotot fenn kell tartani azon időtartamon keresztül, ami legalább 5 milliszekundumig tart, és ezt követően engedélyezett a csatorna teljesítmény mérésen alapuló inaktív állapotba történő átmenet.
6.9.5.3.4.3 *A csatorna teljesítmény mérése.* Amikor a csatorna aktív állapot nem másképpen kerül fenntartásra, akkor a VDL -es. üzemmódú állomásnak a csatornát inaktívnak kell tekinteni legalább 95 százalékos valószínűséggel – ha a csatornán belüli teljesítmény a számított zaj alapszintnek a kétszeresével egyenlő, legalább 0,9 milliszekundumon keresztül.

6.9.5.4 VEVŐ/ADÓ KÖLCSÖNHATÁS

6.9.5.4.1 *Vevő – adó átfutási idő.* Egy VHF adatkapcsolat /VDL/ 4-es üzemmódú állomásnak képesnek kell lennie az adó teljesítmény stabilizáló jelsorozat adásának megkezdésére, a vevő funkció befejezése utáni 16 mikroszekundumon belül.
6.9.5.4.2 *Frekvencia-váltás az adás során.* A vivőhullám fázis felgyorsulási idejének a szinkronizáló jelsorozat kezdetétől az adat vége jelzésig másodpercenként 300 Hz-nél kevesebbnek kell lenni.
6.9.5.4.3 *Adó – vevő átfutási idő.* Egy VHF adatkapcsolat /VDL/ 4-es üzemmódú állomásnak képesnek kell lennie egy bejövő jel névleges teljesítménnyel való vételére és demodulására egy adás befejezése után 1 ms-on belül.

Megjegyzés. – A névleges teljesítmény egy 10^{-4} *értékű bit hiba-gyakoriságként (BER) van meghatározva.*

6.9.5.5 FIZIKAI RÉTEG RENDSZER PARAMÉTEREK

6.9.5.5.1 *P1 paraméter (minimális átviteli hossz)*
6.9.5.5.1.1 A vevőnek képesnek kell lenni a P1 minimális hosszúságú átvitelnek a bit hibagyakoriság /BER/ csökkenése nélküli demodulálására.
6.9.5.5.1.2 A P1 értékének 19 200 bit-nek kell lenni.
6.9.5.5.2 *P2 paraméter (névleges közös-csatornájú interferencia teljesítmény)*
6.9.5.5.2.1 A P2 paraméternek annak a névleges közös-csatornájú interferencia értéknek kell lenni, amelynél a vevő bit hiba-gyakoriság /BER/ csökkenése nélkül képes a demodulálásra.
6.9.5.5.2.2 A P2 értékének 12 dB-nek kell lennie.

6.9.5.6 A FREKVENCIA-MODULÁCIÓS /FM/ ÁLTALÁNOS-ADÁS INTERFERENCIA VÉDETTSÉGI TELJESÍTMÉNY A VHF ADATKAPCSOLAT /VDL/ 4-es ÜZEMMÓDÚ VEVŐ RENDSZEREKRE

6.9.5.6.1 Egy VDL 4-es üzemmódú állomásnak – amikor az a 117,975 – 137 MHz-es sávban üzemel – meg kell felelnie a 6.3.5.4 pontban meghatározott követelményeknek.
6.9.5.6.2 Egy VDL 4-es üzemmódú állomásnak – amikor az a 108 – 117,975 MHz-es sávban üzemel – meg kell felelnie az alábbiakban meghatározott követelményeknek.
6.9.5.6.2.1 Egy VDL 4-es üzemmódú vevő rendszernek meg kell felelni a 6.3.5.1 pontban meghatározott követelményeknek, amikor az olyan két-jel, harmadrendű kereszt-modulációs termékek jelenlétében üzemel, amelyeket azok az ultrarövidhullámú /VHF/ frekvencia-modulált /FM/ általános-adások jelei okoznak, melyeknek a jel szintjei a következőknek felelnek meg:

$$2N_1 + N_2 + 72 \leq 0$$

a VHF FM hangfrekvenciás általános-adású jelekre a 107,7 – 108,0 MHz-es tartományban, és

$$2N_1 + N_2 + 3\left\{24 - 20\log\frac{\Delta f}{0{,}4}\right\} \leq 0$$

a VHF FM hangfrekvenciás általános-adású jelekre a 107,7 MHz alatt, ahol a két VHF FM hangfrekveciás általános-adású jelek frekvenciája létrehozza a vevőn belül a két-jel, harmadrendű kereszt-modulációs terméket a

megkívánt VDL 4-es üzemmódú frekvencián.
Az N_1 és az N_2 a jel szintjei (dBm) a két VHF FM hangfrekvenciás általános-adású jelnek a VDL 4-es üzemmódú vevő bemenetén. Egyik szint sem haladhatja meg a 6.9.5.6.2.2 pontban lefektetett érzékenység-csökkentési követelményt.
$\Delta f = 108{,}1 - f1$, ahol az f1 az *N1* frekvenciája, a 108,1 MHz-hez közelebbi VHF FM hangfrekvenciás általános-adású jel.

Megjegyzés. – A frekvencia-moduláció /FM/ kereszt-modulációs védettségi követelmények nincsenek alkalmazva a 108,1 MHz alatt üzemelő VDL 4-es üzemmódú csatornára, és ennélfogva a 108,1 MHz alatti frekvenciák általános kijelölése nincs tervezve.

6.9.5.6.2.2 A VDL 4-es üzemmódú vevő rendszernél nem kell az érzékenység csökkentést alkalmazni a 6-5. és 6-6. táblázatoknak megfelelő szintű VHF FM általános-adású jelek jelenlétében.

6.9.6 Kapcsolati réteg

Megjegyzés. – A kapcsolati réteg funkciókról a VHF adatkapcsolat /VDL/ 4-es Üzemmód Műszaki Előírásai Kézikönyv foglal magába részletes leírást.

6.9.7 Alhálózati réteg és az Alhálózat Berendezés-függő Konvergencia Szolgáltatás /SNDCF/

Megjegyzés. – Az alhálózati réteg funkciókról és az SNDCF-ről részleteket a VHF adatkapcsolat /VDL/ 4. Üzemmód Műszaki Előírási Kézikönyv tartalmaz.

6.9.8 Automatikus Berendezés-függő Légtér-ellenőrző Általános-adás /ADS-B/ alkalmazások

Megjegyzés. – Az ADS-B alkalmazási funkciókról a VHF adatkapcsolat /VDL/ 4-es Üzemmód Műszaki Előírásai Kézikönyv tartalmaz részletes leírást.

A 6. FEJEZET TÁBLÁZATAI

6-1. táblázat: A 2-es és 3-as üzemmód adatok kódolása

X_k	Y_k	Z_k	$\Delta\phi_k$
0	0	0	$0\,\pi / 4$
0	0	1	$1\,\pi / 4$
0	1	1	$2\,\pi / 4$
0	1	0	$3\,\pi / 4$
1	1	0	$4\,\pi / 4$
1	1	1	$5\,\pi / 4$
1	0	1	$6\,\pi / 4$
1	0	0	$7\,\pi / 4$

6-2. táblázat: 2. és 3. üzemmód stabilitás

VDL üzemmód	Légijármű moduláció	Földi moduláció

	stabilitás	stabilitás
2-es üzemmód	± 0,0050 százalék	± 0,0050 százalék
3-as üzemmód	± 0,0005 százalék	± 0,0002 százalék

6-3. táblázat: Rejtjelező funkciók

Funkció	Bemenő adat	Kimenő adat
Rejtjelezés	"Tiszta adat"	Rejtjelezett adat
Rejtjel feloldás	Rejtjelezett adat	"Tiszta adat"

6-4. táblázat: Fizikai szolgáltatások rendszer paraméterei

Szimbólum	Paraméter neve	2-es üzemmód érték
P1	Minimális átvitel hossz	131 071 bit

6-5. táblázat: A 108,0 – 111,975 MHz közötti frekvencián üzemelő VHF adatkapcsolat /VDL/ 4-es üzemmódú rendszerek

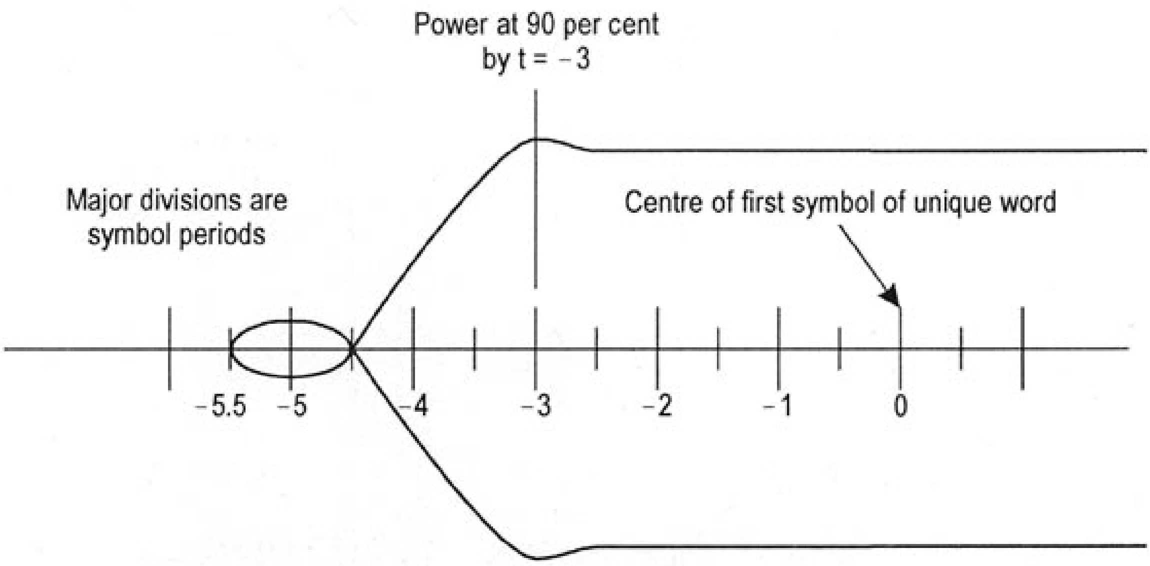
Frekvencia (MHz)	A nem-kívánt jel maximális szintje a vevő bemeneten (dBm)
88 – 102	+ 15
104	+ 10
106	+ 5
107,9	- 10

6-6. táblázat: A 112,0 – 117,975 MHz közötti frekvencián üzemelő VHF adatkapcsolat /VDL/ 4-es üzemmódú rendszerek

Frekvencia (MHz)	A nem-kívánt jel maximális szintje a vevő bemeneten (dBm)
88 – 104	+ 15
106	+ 10
107	+ 5
107,9	0

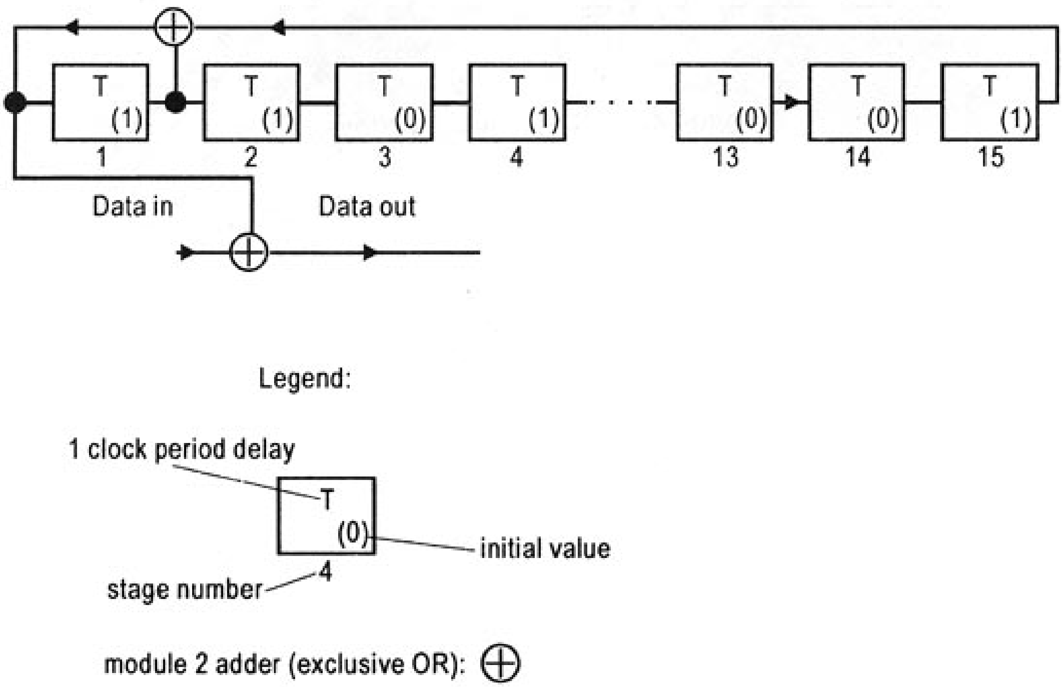
Megjegyzés. – A fenti frekvenciák által kijelölt szomszédos pontok között az összefüggés lineáris.

ÁBRÁK A 6. FEJEZETHEZ



6-1. ábra: Adó teljesítmény stabilizálás

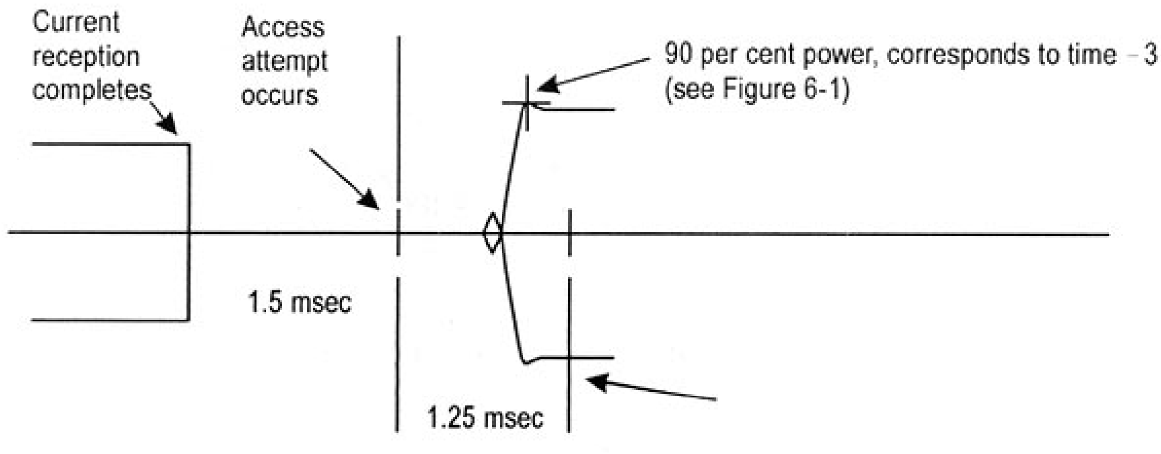
A 6-1.ábra szövegei:
1 - A teljesítmény 90 százaléknál t = -3-ig
2 - A fő felosztások a jel-periódusok
3 - Az egyedi szó jelének közepe



6-2. ábra: PN generátor a r bit rejtjelező jelsorozathoz

A 6-2. ábra szövegei:
1 - Adat be
2 - Adat ki
3 - Jelmagyarázat
4 - 1 órajel időszak késés
5 - Kezdeti érték

6 - Fokozat szám
7 - Modulo 2-es összeadás (kizáró VAGY) : ⊕



6-3. ábra: Vétel – Adás átfutási idő

A 6-3. ábra szövegei:
1 - Aktuális vétel befejeződik
2 - Hozzáférés kísérlet megjelenik
3 - 90 százalékos teljesítmény, megfelel a -3 időnek (lásd a 6-1. ábrát)

Függelék a 6. Fejezethez
HIVATKOZÁSOK

1. HIVATKOZÁSOK

A Nemzetközi Szabványügyi Szervezet (ISO) szabványaira való hivatkozások az alábbiakban felsorolt szabványok (a kiadás dátumát is magába foglalóan). Ezek az ISO szabványok a Szabványok és Ajánlott Gyakorlatokban /SARPs/ meghatározott mértékben alkalmazandók.

2. IRÁNYADÓ HIVATKOZÁSOK

Ezek a Szabványok és Ajánlott Gyakorlatok /SARPs/ a Nemzetközi Szabványügyi Szervezet /ISO/ következő dokumentumaira hivatkoznak:

ISO	*Cím*	*Kiadás dátuma*
646	*Információ technológia – az ISO 7-bites kódolású információ-csere karakter készlete*	12/91
3309	*Magas szintű adatkapcsolat vezérlési /HLDC/ eljárások – Keret szerkezet,* 3. Módosított kiadvány	12/93
4335	*HLDC eljárás elemek,* 3. Módosított kiadvány	12/93
7498	*A Nyílt Rendszerek Összekapcsolásának /OSI/ alap hivatkozási modellje,* 1. Kiadvány	11/94
7809	*HLDC eljárások – Az eljárások osztályozásának megerősítése,* 1. Kiadvány	12/93
8208	*Információ Feldolgozó Rendszerek – Adat-összeköttetés – X. 25 Csomag Szint Protokoll az Adat-felhasználói Végberendezésekhez*	3/90 2.Kiadás

8885	*HDLC Eljárások – Az Általános Célú XID Keret Információs Mező Tartalma és Formátuma,* [1] Kiadvány	12/93
8886.3	*Az OSI Adatkapcsolat Szolgáltatás Meghatározása,* 3. Kiadvány	6/92
10039	*Helyi Területi Hálózat – az Adathordozó Hozzáférés Vezérlési /MAC/ Szolgáltatás Meghatározása,* 1. Kiadvány	6/91

3. HÁTTÉR HIVATKOZÁSOK

Szerző	*Cím*	*Kiadás dátuma*
Nemzetközi Távközlési Unió /ITU-R/	S.446.4 Ajánlás az 1. Függelékhez	
Műholdas Adat-átviteli Rendszerek Konzultatív Bizottsága /CCSDS/	*Távolságmérési Csatorna Kódolás, Ajánlás a Műholdas Adat-átviteli Rendszer Szabványokhoz,* Műholdas Adat-átviteli Rendszerek Konzultatív Bizottsága /CCSDS/ 101.0-B-3, Kék Könyv	5/92

7. FEJEZET. ALHÁLÓZATOK ÖSSZEKAPCSOLÁSA

(Kidolgozás alatt)

8. FEJEZET. AFTN HÁLÓZAT

8.1 MEGHATÁROZÁSOK

Data signalling rate. Adat jeladási sebesség. Az adat jeladási sebesség az idő- egység alatt átmenő információ egységekre vonatkozik és bit/másodperc-ben kerül kifejezésre. Az adat jeladási sebességet a következő képlet adja meg:

$$\sum_{i=1}^{i=m} \frac{1}{T_i} \log_2 n_i$$

ahol m a párhuzamos csatornák száma, T_i a minimális időtartam az i-edik csatornánál másodpercben kifejezve, az n_i a moduláció jellemző állapota, az i-edik csatornában.

1. Megjegyzés. –

a) Az egy csatornánál (soros átvitel) ez (1/T) log2n-re csökken; a két-állapotú modulációval (n=2) ez 1/T lesz.

b) A párhuzamos átvitelnél egyenlő minimális intervallumokkal és mindegyik csatornánál azonos jellemző állapottal ez m (1/T) log2n (m (1/T) két-állapotú moduláció esetén).

2. Megjegyzés. – A fenti meghatározásban a "párhuzamos csatorna" fogalmat a következő módon kell értelmezni: csatornák, amelyek mindegyike egy információs egység egy részét viszi át, például az egy karaktert képező bitek párhuzamos átvitele. Az olyan áramkör esetén, amelyek több olyan csatornából állnak, amelyek mindegyike "függetlenül" viszi az információt, egyedül a forgalom kezelési kapacitás növelésének céljával, ezek a csatornák nem

tekinthetők párhuzamos csatornáknak, ennek a meghatározásnak az értelmében.
Degree of standardized test distortion. Szabványosított torzítási ellenőrzési mérték. A torzítási helyreállítás mértéke, amelyet meghatározott időtartam alatt mérnek, akkor, amikor a moduláció tökéletes és megfelel egy speciális szövegnek.
Effective margin. Üzemi vétel határ. Egy egyedi berendezés teljesítőképesség határa, amelyet tényleges üzemelési körülmények között mérnek.
Low modulation rates. Alacsony modulációs sebességek. Modulációs sebességek maximálisan 300 baud értékig, azt is magába foglalóan.
Margin. Eltérési érték. Az áramkör maximális mértékű torzítása azon a végen, ahol az a berendezés elhelyezkedik, amely kompatíbilis az összes olyan jel átvitelével, amelynek vételére képes lehet.
Medium modulation rates. Közepes modulációs sebességek. Modulációs sebességek 300 baudnál nagyobb és maximálisan 3000 baud értékig, azt is magába foglalóan.
Modulation rate. Modulációs sebesség. Az elemi időköz másodpercekben mért reciproka. Ezt a sebességet baudokban fejezik ki.
Megjegyzés. – A távirati jeleket olyan időintervallumokkal jellemzik, amelyek hossza egyenlő vagy nagyobb, mint a legrövidebb elemi időköz. A modulációs sebességet (azelőtt telegrafikus sebesség) ezért ennek az egység időtartamnak az inverzeként fejezik ki. Ha például az elemi időköz 20 milliszekundum, akkor a modulációs sebesség 50 baud.
Synchronous operation. Szinkron működés. Olyan működés, amelyben a kód- egységek közötti időintervallum állandó.

8.2 AZ AFTN-BEN HASZNÁLATOS TÁVGÉPÍRÓ KÉSZÜLÉKEKRE ÉS ÁRAMKÖRÖKRE VONATKOZÓ MŰSZAKI ELŐÍRÁSOK

8.2.1. Az AFTN nemzetközi távgépíró áramkörökben használt 5-egységes kódot, a 2.számú Nemzetközi Távíró ABC-t (International Telegraph Alphabet No.2) (lásd a 8-1. táblázatot) csak a II. kötet, 4.1.2 pontjában leírt mértékig kell használni.
8.2.2 **Ajánlás.** – *A modulációs sebességet az illetékes szervek közötti kétoldalú vagy többoldalú egyezmény alapján kell meghatározni, elsődlegesen a forgalom nagyságának figyelembevételével.*
8.2.3 **Ajánlás.** – *Az átviteli ciklus névleges időtartamának legalább 7,4 egységnek kell lenni (ajánlatos érték 7,5), a stop elem legalább 1,4 egységen át tartson (ajánlott érték 1,5).*
8.2.3.1 **Ajánlás.** – *A vevőnek képesnek kell lenni üzem közben helyesen továbbítani az adótól jövő jeleket 7-egységes névleges átviteli ciklus mellett.*
8.2.4 **Ajánlás.** – *Üzemben lévő készüléket úgy kell karbantartani és beállítani, hogy a használatos üzemi vétel határa soha ne legyen 35 százaléknál kevesebb.*
8.2.5 **Ajánlás.** – *Az oldal-nyomtató készülék egy szövegsora által tartalmazható karakterek számát 69-ben kell rögzíteni.*
8.2.6. **Ajánlás.** – *Az automatikus idő-késleltető kapcsolóval felszerelt start-stop készülékekben a motor áramellátását csak az utolsó jel vétele után eltelt legalább 45 másodperces kihagyás után szabad megszakítani.*
8.2.7 **Ajánlás.** – *Lépéseket kell tenni annak érdekében, hogy elkerülésre kerüljön a jel-lyukvesztés a továbbított közlemények fej-részénél és a start-stop vételénél az újra-lyukasztó berendezéseknél.*
8.2.7.1 Ha az újra-lyukasztó készülék el van látva helyi eszközökkel a papír-tápláláshoz, akkor egynél több csonkolt üzenetet nem tolerálhat.
8.2.8 **Ajánlás.** – *A teljes áramköröket úgy kell műszakilag kezelni és karbantartani, hogy a szabványosított torzítási ellenőrzési mérték torzulása ne haladja meg a szabványosított szövegben a 28 százalékot:*
THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG* /Magyar jelentése: A gyors barna róka átugorja a lusta kutyát./
vagy
VOYEZ LE BRICK GEANT QUE JEXAMINE PRES DU WHARF
8.2.9 **Ajánlás.** – *Az izochron torzulás mértéke egy teljes áramkör részei mindegyikének szabványosított szövegében a lehető legkisebb legyen és semmi esetre sem haladhatja meg a 10 százalékot.*
8.2.10 **Ajánlás.** – *A teljes torzítás a távgépíró csatornákban használt átviteli berendezésekben nem haladhatja meg az 5 százalékot.*
8.2.11 **Ajánlás.** – *Az AFTN áramköröket a csatorna állapotot folytonosan ellenőrző rendszerrel kell felszerelni. Ezenkívül ellenőrzött áramköri protokollokat kell alkalmazni.*

8.3 A 2,5 – 30 MHz-es SÁVBAN MŰKÖDŐ LÉGIFORGALMI RÁDIÓ-TÁVGÉPÍRÓ CSATORNÁKHOZ KAPCSOLÓDÓ VÉG-BERENDEZÉSEK

8.3.1 Moduláció és kód típus kiválasztása

8.3.1.1 **Ajánlás.** – *A frekvencia-eltolás modulációt (FIB) kell alkalmazni a légiforgalmi állandó-helyű szolgálatokban (AFS) használt rádió-távgépíró rendszerekben, kivéve ott, ahol a független oldalsáv (ISB) operációs módszer jellemzői előnyöket jelentenek.*

Megjegyzés. – A FIB típusú modulációt a rádiófrekvenciás vivőhullámnak a két frekvenciája közötti eltolásával valósítják meg, a start-stop 5-egységes távíró kóddal, az "A helyzet"-et jelentő (start jel) polaritással és a "Z helyzet"-et jelentő (stop jel) polaritással.

8.3.2 Rendszer jellemzők

8.3.2.1 **Ajánlás.** – *Az FIB modulációt használó rádió-távgépíró adótól jövő jelek jellemzői a következők:*

a Frekvencia-eltolás: *a legkisebb lehetséges érték*

b) Frekvencia-eltolás tűrés: *a frekvencia eltolás névleges értékének plusz vagy mínusz 3 százalékán belül.*

c) Polaritás: egy-csatornás áramkörök: *a magasabb frekvencia felel meg az "A helyzet"-nek (start jel polaritás).*

8.3.2.2 **Ajánlás.** – *Az "A helyzet"-et és "Z helyzet"-et reprezentáló rádió frekvenciák közötti középérték változása semmilyen két-órás periódus alatt sem haladhatja meg a 100 Hz-et.*

8.3.2.3 **Ajánlás.** – *A távgépíró jel teljes torzulása, ahogyan a rádió adó kimeneténél vagy közvetlen szomszédságában ellenőzik, nem haladhatja meg a 10 százalékot.*

Megjegyzés. – Az ilyen torzulás az elemek közötti átmenetek idejében a helyes pozíciójuktól való elmozdulásokat jelenti az egység elem-idő százalékában kifejezve.

8.3.2.4 **Ajánlás.** – *FIB modulációs rádió-távgépíró vevőknek képeseknek kell lenniük olyan jelekkel való kielégítő működésre, amelyek a korábbi 8.3.2.1 és 8.3.2.2 pontokban ismertetett jellemzőkkel rendelkeznek.*

8.3.2.5 **Ajánlás.** – *Távgépíró jelek rádió áramkörön keresztüli több-csatornás átviteli jellemzőit az érintett hivatalos szerveknek egyezmények alapján kell meghatározniuk.*

8.4 AZ INTERREGIONÁLIS LÉGIFORGALMI ÁLLANDÓ-HELYŰ SZOLGÁLATOK /AFS/ ÁRAMKÖREINEK JELLEMZŐI

8.4.1 Ajánlás. – *A megvalósításra vagy tökéletesítésre kerülő interregionális AFS áramköröknek kiváló minőségű távközlési szolgáltatást kell alkalmazniuk. A modulációs sebességnél figyelembe kell venni a szabályos és a kitérő útvonal feltételek között várható forgalom nagyságát.*

8.5 A LÉGIFORGALMI SZOLGÁLATI /ATS/ KÖZLEMÉNYEK ÁTVITELÉRE VONATKOZÓ MŰSZAKI ELŐÍRÁSOK

8.5.1. Közvetlen vagy gyűjtő csatornák – alacsony modulációs sebességek – 5-egységű kódok.

Megjegyzés. – Lásd az alábbi 8.6 pontban a közepes modulációs sebességeket.

8.5.1.1 **Ajánlás.** – *Az AFTN eljárásokat (lásd a fenti 8.2 pontot) kell használni.*

8.6 A KÖZEPES ÉS MAGASABB JELADÁSI SEBESSÉGGEL TÖRTÉNŐ NEMZETKÖZI FÖLD-FÖLD KÖZÖTTI ADATCSERÉRE VONATKOZÓ MŰSZAKI ELŐÍRÁSOK

Megjegyzés. – Ebben a szakaszban a kódolt karakter készletekre vonatkozó szövegekben az "egység" fogalom a szelektív információs egységet jelenti, és lényegében egyenlő a "bit" fogalmával.

8.6.1 Általános rész

8.6.1.1 **Ajánlás.** – *A karakterek nemzetközi adatcseréjénél a 128-karakteres repertoárt szolgáló 7-egységes kódolású karakter- készletet kell használni, amelyet Nemzetközi Távíró ABC 5. számú (IA-5) (International Telegraph Alphabet*

No.5) (IA-5) jelzéssel jelöltek. A Nemzetközi Távíró ABC 2. sz. (ITA-2) (International Telegraph Alphabet No.2 (ITA-2)) 5-egységes kódolású karakter- készletével való kompatibilitást - ahol megvalósítható - biztosítani kell.
8.6.1.2 Amikor a fenti 8.6.1.1 pont előírásait alkalmazzák, akkor a 8-2. táblázatban lévő *Nemzetközi Távíró ABC 5. számú* (International Alphabet No.5) (IA-5)-öt kell használni.
8.6.1.2.1 Az IA-5 egy egyedi karakterére szorítkozó egységek soros átvitelénél a jobb szélső egység (b_1) átvitelét kell elsőnek végrehajtani.
8.6.1.2.2 **Ajánlás.** – *Az IA-5 használata esetén mindegyik karakternek egy, a paritásra vonatkozó további egységet kell tartalmaznia a nyolcadik szint helyzetben.*
8.6.1.2.3 Amikor a fenti 8.6.1.2.2 pont előírásait alkalmazzák, akkor a karakter paritás bitnek páros paritást kell adnia azokban a kapcsolatokban, amelyek a start-stop alapelven működnek, és páratlan paritást azoknál a kapcsolatoknál, amelyek végponttól-végpontig szinkronüzemelést alkalmaznak.
8.6.1.2.4 A karakter-karakter átalakítás meg kell, hogy feleljen a 8-3. és a 8-4. táblázatban megadottaknak az összes karakterre, amely az AFTN formátumban az AFS átvitelre elő van írva az IA-5-ben és az ITA-2-ben egyaránt.
8.6.1.2.5 Azok a karakterek, amelyek csak egy kód-készletben jelennek meg, vagy amelyek nincsenek átvitelre engedélyezve az AFS-n, a kód átalakítási táblázatoknak megfelelően megrajzoltaknak kell lenniük.

8.6.2 Adat átviteli jellemzők

8.6.2.1 **Ajánlás. -** *Az adat jeladási sebességet az alábbiak közül kell kiválasztani:*
600 bit/s
1200 bit/s
2400 bit/s
4800 bit/s
9600 bit/s
8.6.2.2 **Ajánlás.** – *Az átvitel típusát az egyes adat jelzési sebességekhez a következők szerint kell kiválasztani:*

Adat jeladási sebesség	Az átvitel típusa
600 bit/s	*Szinkron vagy aszinkron soros átvitel*
1200 bit/s	*Szinkron vagy aszinkron soros átvitel*
2400 bit/s	*Szinkron soros átvitel*
4800 bit/s	*Szinkron soros átvitel*
9600 bit/s	*Szinkron soros átvitel*

8.6.2.3 **Ajánlás.** – *A moduláció típusát az egyes adatjeladási sebességekhez a következők szerint kell kiválasztani:*

Adat jeladási sebesség	A moduláció típusa
600 bit/s	*Frekvencia*
1200 bit/s	*Frekvencia*
2400 bit/s	*Fázis*
4800 bit/s	*Fázis*
9600 bit/s	*Fázis-amplitúdó*

Megjegyzés. – Ez az ajánlás nem feltétlen érvényes a kizárólag levegő-föld adatok átvitelére használt levegő-föld kapcsolatok föld-föld kierjesztésére, mivel az ilyen áramkörök a levegő-föld kapcsolat részének tekinthetők.

8.6.2.4 AZ ADATKAPCSOLATOK KARAKTER SZERKEZETE

8.6.2.4.1 Karakter paritást hibaellenőrzésre a CIDIN kapcsolatokon nem használnak. Az IA-5 kódolt karakterekbe illesztett paritást, a fentebbi 8.6.1.2.2 pont szerint a CIDIN-be való bevitel előtt figyelmen kívül kell hagyni. A CIDIN-ből kilépő közleményeknél a paritást a 8.6.1.2.3 pontnak megfelelően kell létrehozni.
8.6.2.4.2 A hosszúságban nyolc bitnél kisebb karaktereket nyolc bit hosszúságra kell kiegészíteni, mielőtt valamilyen oktett bázisú vagy bit-orientált kommunikációs hálózaton keresztül továbbítanák őket. A kitöltő bitek az oktett magasabb értékű végét foglalják el, azaz a 8-as bitet, 7-es bitet, ahogyan szükséges és 0 bináris értékkel rendelkeznek.
8.6.2.5 Amikor a CIDIN kapcsolatokon az adatok cseréjéhez bit-orientált eljárásokat használnak, a belépési központ címzés a kilépési központ címzések és a rendeltetési hely címzések a "Transport and CIDIN Packet Headers"-ben a 8-2. táblázatban lévő IA-5 karakter-készletben találhatóknak megfelelők kell, hogy legyenek.
8.6.2.6 **Ajánlás.** – *Amikor CIDIN kapcsolatokon keresztül AFTN formátumban bit-orientált eljárást használva továbbítanak közleményeket, akkor a közleményeknek a 8-2. táblázatban található IA-5 karakter-készletben lévő karaktereknek kell megfelelniük.*

8.6.3 Föld-föld karakter-orientált adatkapcsolat vezérlő eljárások

Megjegyzés. – Ennek a szakasznak az előírásai a föld-föld adat-csere alkalmazásokhoz tartoznak, amelyek a fentebbi 8.6.1 pont által leírt IA-5 konvertálást használják, és amely a tíz átviteli szabályozási karaktert (SOH, STX, ETX, EOT, ENQ, ACK, DLE, NAK, SYN és ETB) alkalmazza az adatkapcsolat szabályozásra, szinkron vagy aszinkron adatátviteli berendezés felett.

8.6.3.1 *Meghatározások.* A következő meghatározásokat kell használni az ebben a szakaszban szereplő adatkapcsolat alkalmazásokhoz:
a) Vezér-állomás az az állomás, amely adott pillanatban adatkapcsolati vezérléssel rendelkezik.
b) Mellék-állomás az, amely arra került kiválasztásra, hogy vegye a vezér-állomástól jövő továbbítást.
c) Vezérlő állomás az az egyedüli állomás egy többpontos kapcsolatban, amelynek megengedett a vezérlő állomás helyzet felvétele és a közlemények továbbítása egy vagy több egyedileg kiválasztott (nem-vezérlő) alárendelt állomásnak, vagy megengedett részére az, hogy vezér-állomás állapotot jelöljön ki azi alárendelt állomás bármelyikének.

8.6.3.2 KÖZLEMÉNY ÖSSZEÁLLÍTÁSA

a) Az adat-átvitelnek az IA-5 karakterekből kell állni, amelyeket a korábbi 8.6.1.2.2 pontnak megfelelően továbbítanak, és az vagy egy információs közlemény vagy egy ellenőrző jelsorozat.
b) Egy információs közlemény, amelyet adatcseréhez használnak, a következő formák egyikét veszi fel:

	S				E	B	(STX = a szöveg indulása)			
1)	T	- - -	SZÖVEG	- - -	T	C	(ETX = a szöveg vége)			
	X				X	C	(BCC = blokk ellenőrző karakter)			
							(ETB = az átviteli blokk vége)			
	S				E	B	(SOH = a fejrész kezdete)			
2)	T	- - -	SZÖVEG	- - -	T	C				
	X				B	C				
	S				S				E	B
3)	O	- - -	FEJ-RÉSZ	- - -	T	- - -	SZÖVEG	- - -	T	C
	H				X				X	C
	S				S				E	B
4)	O	- - -	FEJ-RÉSZ	- - -	T	- - -	SZÖVEG	- - -	T	C
	H				X				B	C
	S				E	B				
5)	O	- - -	FEJ-RÉSZ	- - -	T	C				
	H				B	C				

B
1. Megjegyzés. – A C egy blokk ellenőrző karakter (BCC).
C

2. Megjegyzés. – A fenti 2), 4) és 5) formátumokban, amelyek ETB-vel végződnek, bizonyos folytatás szükséges.

c) Az ellenőrző sorozatot vagy egyedi átviteli vezérlő karakterekből kell összeállítani (EOT, ENQ, ACK vagy NAK), vagy egy egyedül álló átvitel vezérlő képezi (ENQ), amelyet egy maximum 15 nem-vezérlő karakterből álló előtag előz meg, vagy a DLE karakter, amelyet más grafikus vagy vezérlő karakterrel együttesen használnak, és vezérlő karakterek, amelyek kiegészítő adatátvitel vezérlő funkciókat látnak el.

8.6.3.3 Három rendszer kategóriát határoztak meg a megoldandó feladataiknak megfelelően, áramköri jellemzőik, végberendezés konfigurációik és közlemény átviteli eljárásaik szerint, mégpedig a következőket:
"A" rendszer kategória: két-irányú több-pontos, amely lehetővé tesz akár centralizált, akár nem-centralizált üzemelést és egyedüli vagy többszörös, közlemény- orientált információ átviteleket válasz nélkül (de kézbesítési megerősítéssel).
"B" rendszer kategória: két-irányú egyidejű áramkörű, ponttól-pontig alkalmazású közlemény-összerendelésű blokkolással és modulo 8 blokk számozással és nyugtázással.
"C" rendszer kategória: két-irányú alternatív, több pont közötti, amely csak centralizált (számítógép-terminál)

üzemelést, egyedi vagy többszörös közlemény- továbbításokat válasszal tesz lehetővé.
8.6.3.3.1 Azokon a jellemzőkön kívül, amelyek mindkét, az "A" és "B" rendszer kategóriákat követő pontokban vannak előírva, más paraméterek is vannak, amelyeket figyelembe kell venni ahhoz, hogy biztosítsák a használható, megbízhatóan üzemelő összeköttetést, ezek a következők:
a) A szinkronizáció létrehozásához és fenntartásához szükséges SYN karakterek száma;

Megjegyzés. – Általában a továbbító állomás három egymást követő SYN karaktert küld és a vevő állomás legalább kettőt vesz, mielőtt bármilyen tevékenységet végrehajtana.

b) A rendszer szünetelések értékei olyan funkcióknál, mint a “szabad vonal” és a “nincs válasz”, valamint az automatikus újra-keresések száma, ahányszor ezt meg kell kísérelni a manuális beavatkozás jelzése előtt;
c) Az előtagok kompozíciója maximum 15 karakteren belül.

Megjegyzés. – Az illetékes hatóságok közötti megegyezés alapján megengedhető az ellenőrző jeleknél az, hogy állomásazonosító előtagot foglaljanak magukba az IA-5-nek a 4-7. oszlopaiból választott karakterek felhasználásával.

8.6.3.3.2 **Ajánlás.** – *A több-pont alkalmazásoknál, amelyeknél csak a centralizált (számítógép-terminál) üzemelés a megengedett, a 8.6.3.7 pont rendelkezéseit kell alkalmazni.*

8.6.3.4 BLOKK ELLENŐRZŐ KARAKTER

8.6.3.4.1 Mind az "A", mind a "B" rendszer kategóriának blokk ellenőrző karaktert kell használni egy átvitel érvényességének a meghatározásához.
8.6.3.4.2 A blokk ellenőrzésű karaktert 7 bit plusz egy paritás bit együttese alkotja.
8.6.3.4.3 A blokk ellenőrzésű karakter első 7 bitjének mindegyike modulo 2 bináris összege az átvitt blokk egymást követő karakterei ugyanazon 1-es bit-től 7-es bitig terjedő oszlopában lévő elemeknek.
8.6.3.4.4 A blokk egyes oszlopai hosszirányú paritás ellenőrzésének, beleértve a blokk ellenőrző karaktert is, párosnak kell lenni.
8.6.3.4.5 A blokk ellenőrzésű karakter paritás bitjének ugyanaz az értelme, mint ami az információs karaktereknél van (lásd a korábbi 8.6.1.2.3. pontot).
8.6.3.4.6 *ÖSSZEGEZÉS*
8.6.3.4.6.1 A blokk ellenőrzésű karakter megkapását célzó összegezés vagy a SOH (a fej-rész elkezdése) vagy a STX (a szöveg elkezdése) első megjelenésénél kezdődik.
8.6.3.4.6.2 Az indulási karaktert az összegezés nem tartalmazhatja.
8.6.3.4.6.3 Ha egy STX karakter azután jelenik meg, hogy az összegezést a SOH elindította, akkor az STX karaktert az összegezésnek úgy kell tartalmaznia, mintha szöveg-karakter lenne.
8.6.3.4.6.4 A SYN (szinkronizáló karakter) kivételével az összes karaktert, amelyet a blokk ellenőrzés összegezés után továbbítottak, az összegezésnek tartalmazna kell, beleértve az ETB (átvitel/blokk vége) vagy az ETX (szöveg vége) vezérlő karaktert is, amelyek jelzik, hogy a következő karakter a blokk ellenőrző karaktere lesz.
8.6.3.4.7 Semmilyen karaktert, SYN-t vagy mást, nem lehet az ETB vagy ETX karakter és a blokk ellenőrző karakter közé beilleszteni.

8.6.3.5 *Az "A" rendszer kategória leírása.*

Az "A” rendszer kategória olyan rendszer kategória, amelyben számos állomás egy több-pont kapcsolással van összekötve és egy állomás folyamatos vezérlő állomásnak van kijelölve, amely a kapcsolatot figyeli azért, hogy a rendszerüzemelést biztosítsa.

8.6.3.5.1 *KAPCSOLAT LÉTREHOZÁSI ELJÁRÁS*

8.6.3.5.1.1 Ahhoz, hogy a kapcsolatot az átvitelhez létrehozzák, a vezérlő állomás vagy
a) kiválasztja az alárendelt állomások egyikét ahhoz, hogy vezér-állomásként jelölje ki azt; vagy
b) felveszi a vezérlő állomás szerepét, és kiválaszt egy vagy több alárendelt állomást (mellék-állomás) az átvitel vételére.
8.6.3.5.1.2 A lekérdezést úgy kell elvégezni a vezérlő állomásnak, hogy egy lekérdező ellenőrző jelsorozatot küld, amely az egyedi mellékállomást azonosító előtagból áll és ENQ-ban végződik.

8.6.3.5.1.3 Az alárendelt állomásnak, amely észleli a lekérdező ellenőrző jelsorozatot, fel kell vennie a vezér-állomás állapotot, és a az alábbi két mód egyikével kell válaszolnia:
a) ha az állomásnak közleménye van továbbítás céljára, akkor kiválasztási ellenőrző jelsorozatot kezdeményez, ahogyan az a 8.6.3.5.1.5 pontban az alábbiakban leírásra kerül;
b) ha az állomásnak nincs közleménye továbbítás céljára, akkor egy EOT-t (adatátvitel vége) küld, és a vezér-állomás helyzet visszaáll a vezérlő állomásra.
8.6.3.5.1.4 Ha a vezérlő állomás érvénytelen választ észlel, vagy nem észlel választ a lekérdezésére, akkor egy EOT küldésével zár, mielőtt a lekérdezésre vagy a kiválasztásra visszatérne.
8.6.3.5.1.5 A kiválasztást a kijelölt vezér-állomásnak kell végrehajtania egy kiválasztási ellenőrző jelsorozat küldésével, amely egy egyedi állomás azonosítójából és az ENQ-ból áll.
8.6.3.5.1.6 Egy állomás, amely kijelölő kiválasztó ellenőrző jelsorozatát észlel, mellék-állomás állapotot vesz fel és az alábbi két válasz egyikét küldi:
a) ha az állomás vételre kész, egy előtagot küld, amelyet az ACK követ. E válasz észlelése utána a vezér állomásnak vagy egy másik állomás kell kiválasztania, vagy a közlemény továbbításával folytatnia.
b) ha az állomás vételre nem kész, egy előtagot küld, amelyet a NAK követ és ezáltal feladja a mellék-állomás kiszolgáló helyzetét. Ha a vezér-állomás veszi a NAK-ot, vagy ha nincs válasz, akkor vagy egy másik állomást vagy ugyanazt az "A" alárendelt állomást választja ki, vagy lezár.
c) N-újra-próbálkozás $(N \geq 0)$ engedélyezhető egy állomás részére, hogy egy olyan állomást válasszon, amelytől NAK /negatív nyugtázás/ érvénytelen válasz vétele történt, vagy semmilyen választ nem vettek.
8.6.3.5.1.7 Ha egy vagy több állomást választottak ki, és helyesen választottak az ACK-val, akkor a vezér-állomás a közlemény átvitellel folytatja.

8.6.3.5.2 *KÖZLEMÉNY ÁTVITELI ELJÁRÁS*
8.6.3.5.2.1 A vezér-állomás közleményt vagy közlemény-sorozatot küld fej-résszel vagy anélkül a kiválasztott mellék- állomás (ok) nak.
8.6.3.5.2.2 A közlemény átvitele:
a) kezdődik:
- SOH-el, ha a közlemény fej-résszel rendelkezik;
- STX-el, ha a közlemény nem rendelkezik fej-résszel;
b) folytatódik, és ETX-el végződik, amelyet közvetlenül egy blokk ellenőrző karakter (BCC) követ.
8.6.3.5.2.3 Egy vagy több közlemény továbbítása után a vezér-állomásnak ellenőriznie kell a sikeres kézbesítést mindegyik kiválasztott mellék-állomásnál.

8.6.3.5.3 *KÉZBESÍTÉSI ELLENŐRZÉSI ELJÁRÁS*

8.6.3.5.3.1 A vezér-állomásnak egy kézbesítési ellenőrzési jelsorozatot kell küldenie, amely az egyedi mellék-állomás azonosító jeléből és az ENQ-ból áll.
8.6.3.5.3.2 Egy mellék-állomás, amely észleli a kézbesítési ellenőrzési jelsorozatot, az alábbi két válasz közül az egyiket küldi:
a) ha a mellék-állomás helyesen vette az összes átvitelt, egy tetszőlegesen választott előtagot küld, amelyet az ACK követ;
b) ha a mellék-állomás nem vette helyesen az összes átvitelt, egy tetszőlegesen választott előtagot küld, amelyet a NAK követ.
8.6.3.5.3.3 Ha a vezér-állomás nem vesz választ, vagy érvénytelen választ vesz, ismétlést kell kérnie ugyanattól vagy egy másik mellék-állomástól addig, amíg az összes kiválasztott állomás helyesen "összeszámolásra nem kerül".
8.6.3.5.3.4 Ha a vezér-állomás negatív választ (NAK) vesz, vagy $(N \geq 0)$ ismételt kísérlet után nincs válasz, akkor ezt a lekérdezést a megfelelő mellék- állomásoktól egy későbbi alkalommal meg kell ismételnie.
8.6.3.5.3.5 Azután, hogy az összes közleményt elküldték, és a kézbesítést igazolták, a vezér-állomásnak le kell zárnia a kapcsolatot.

8.6.3.5.4 *KAPCSOLAT LEZÁRÁS ELJÁRÁS*

8.6.3.5.4.1 A lezárás funkciót, tagadva az összes állomás vezér- vagy mellék-állomás helyzetét, visszaadva a vezér helyzetet a vezérlő állomásnak, a vezér- állomás végzi el az EOT továbbításával.

8.6.3.6 *A "B" rendszer kategória leírása.* A "B" rendszer kategória olyan kategória, amelyben két állomás ponttól-pontig duplex kapcsolatban van, és mindegyik állomásnak megvan a képessége, hogy párhuzamosan fenntartson vezér- és mellék-állomás állapotot, azaz vezér helyzetet a továbbító oldalán és mellék állapotot a vevő oldalán, és mindkét állomás egy időben tud továbbítani.

8.6.3.6.1 *KAPCSOLAT LÉTREHOZÁSI ELJÁRÁS*

8.6.3.6.1.1 A kapcsolat létrehozása közlemény továbbításokhoz (a hívó állomástól a hívott állomáshoz), a hívó állomásnak kérni kell a hívott állomás azonosítását egy azonosító ellenőrző jelsorozat küldésével, amely egy DLE-ből, egy kettőspont karakterből, egy tetszőlegesen választható előtagból és az ENQ-ból áll.
8.6.3.6.1.2 A hívott állomásnak, miután az ENQ-t észlelt, az alábbi két válasz egyikét kell elküldenie:
a) ha vételre kész, akkor egy jelsorozatot küld, amely egy DLE-ből, egy azt követő kettőspontból, egy előtagból, amely az azonosítást végzi és az ACK0-ból áll (lásd az alábbi 8.6.3.6.2.5 pontot). Ez létrehozza a kapcsolatot a közleménynek a hívó állomástól a hívott állomáshoz történő átviteléhez;
b) ha vételre nem kész, a fenti sorozatot küldi az ACK0-t helyettesítő NAK-al.
8.6.3.6.1.3 A kapcsolat létrehozását a közlemény átvitelekhez az ellenkező irányban, az áramköri kapcsolást követő bármely időpontban, hasonló módon kell kezdeményezni, mint ahogy az a fentiekben le van írva.

8.6.3.6.2 *KÖZLEMÉNY ÁTVITELI ELJÁRÁS*

8.6.3.6.2.1 A "B" rendszer kategória közlemény-továbbítás hosszúsági ellenőrzéssel összekapcsolt blokkolást és modulo 8 számozású nyugtázásokat szolgáltat a közlemény részére.
8.6.3.6.2.2 Az átviteli blokk egy teljes üzenet, vagy egy üzenet-rész is lehet. A küldő állomásnak az átvitelt az SOTB N-el kell kezdeményezni, amelyet az alábbiak követnek:
a) SOH, ha ez egy olyan közlemény kezdete, amely fej-részt tartalmaz;
b) STX, ha ez egy olyan közlemény kezdete, amelynek nincs fej-része;
c) SOH, ha ez egy közbenső blokk, amely egy fej-részt folytat;
d) STX, ha ez egy közbenső blokk, amely szöveget folytat.

Megjegyzés. – Az SOTB N a két-karakteres átviteli vezérlési sorozat DLE = (1/0 és 3/13 karakterek), amelyet az N blokkszám követ, ahol N az IA-5 karakterek egyike 0,1 . . ., 7 (3/0, 3/1, … 3/7 karakterek) .

8.6.3.6.2.3 Egy olyan blokkot, amely egy közleményen belüli közbenső pontban végződik, ETB-vel kell befejezni; egy blokkot, amely a közlemény végénél fejeződik be, ETX-el kell befejezni.
8.6.3.6.2.4 Minden állomásnak megengedett hogy kezdeményezze vagy folytassa a közlemény küldését a másiknak, párhuzamosan, a következő sorrendnek megfelelően:
a) A küldő állomás részére (vezér-állomás) megengedett az, hogy közleményeket vagy közlemény-részeket blokkok formájában folyamatosan küldje a vevő állomásnak (mellék-állomás) anélkül, hogy válaszra várna.
b) A válaszok részére megengedett az, hogy mellék-állomás válaszok formájában továbbítson vevő-állomás, miközben a küldő állomás küldi az egymás után következő blokkokat.

Megjegyzés. – A blokkok és válaszok modulo 8 számozásának használatával megengedhető a küldő állomásnak még hét blokk küldése is a vett válaszok előtt, mielőtt megkövetelnék a továbbítás leállítását addig, amíg hat vagy kevesebb blokk marad meg.

c) Ha negatív választ vesznek, akkor a küldő állomásnak (vezér-állomás) meg kell kezdenie az utolsó blokkot követő blokkal az újra-átvitelt, attól a blokktól kezdődően, amelynél a helyes pozitív nyugtázást vette.
8.6.3.6.2.5 A mellék-állomás válaszoknak a következők valamelyikének kell lenni:
a) ha az átviteli blokkot hiba nélkül veszik és az állomás egy másik blokk vételére kész, akkor egy DLE-t kell küldenie, egy kettőspontot, egy tetszőleges előtagot és a megfelelő ACKN nyugtázást (hivatkozva az SOTB N-el kezdődő vett blokkra, pl. ACK0-t, amelyet DLE0-ként visznek át, a SOTB0, DLE1 számozású blokkra adott pozitív válaszként használnak az SOTB1-nél stb.);
b) ha egy átviteli blokk nem elfogadható, akkor a vevő állomás DLE-t, kettőspontot, tetszőleges előtagot és a NAK-ot fogja elküldeni.

8.6.3.6.2.6 **Ajánlás.** – *A mellék-állomás válaszokat a közlemény blokkok közé kell beiktatni és a lehető legkorábbi időben továbbítani.*

8.6.3.6.3 *KAPCSOLAT BEFEJEZÉSI ELJÁRÁS*

8.6.3.6.3.1 Ha a kapcsolatot létrehozták a közlemény átvitelekhez az egyik vagy mindkét irányban, az EOT egy állomás általi küldése a közlemény továbbítások befejezését jelzi abban az irányban. Az EOT elküldése után a közlemény továbbítás folytatásához a kapcsolatot abban az irányban újra létre kell hozni.
8.6.3.6.3.2 Az EOT-t egy állomás csak az összes hátralévő mellék-állomási válaszok vétele, vagy más módú figyelembevétele után továbbítja.

8.6.3.6.4 *AZ ÁRAMKÖR SZÉTKAPCSOLÁSA*

8.6.3.6.4.1 A kapcsolt összeköttetéseknél az adatkapcsolatokat mindkét irányban be kell fejezni, mielőtt az összeköttetés szétkapcsolásra kerülne. Ezenkívül az összeköttetés törlését kezdeményező állomás jelenti be először ilyen irányú szándékát a két-karakteres DLE EOT sorozat átvitelével, amelyet bármilyen más, az összeköttetés törlést igénylő jelzés követ.
8.6.3.7 *A "C" (központosított) rendszer kategória leírása.* "C" (központosított) rendszer kategória olyan kategória (hasonlóan az "A" rendszer kategóriához), amelyben bizonyos számú állomás több-pontos kapcsolaton keresztül össze van kötve, és az egyik állomásvezérlő állomásnak van kijelölve, de (eltérően az "A" rendszer kategóriától) csak központosított (számítógéptől-terminálhoz) üzemelést szolgáltat, ahol a közlemény-cserét (válaszokkal) csak a vezérlő és a kiválasztott mellék-állomás közötti esetre korlátozzák.
8.6.3.7.1 *KAPCSOLAT LÉTREHOZÁSI ELJÁRÁS*

8.6.3.7.1.1 Az adat-átviteli kapcsolat létrehozásához a vezérlő állomás vagy:
a) kiválasztja az egyik mellék-állomást vezér állomás helyzettel való felhatalmazásra, vagy
b) felveszi a vezér-állomás helyzetet és kiválaszt egy mellék-állomást mellék-állomás helyzet felvételére, és az alább előírt két kiválasztási eljárás valamelyikének megfelelően vesz egy közleményt.
1) Kiválasztás válasszal (lásd az alábbi 8.6.3.7.1.5 pontot); vagy
2) gyors-kiválasztással (lásd az alábbi 8.6.3.7.1.7 pontot).
8.6.3.7.1.2 A lekérdezést a vezérlő állomás végzi egy lekérdező ellenőrző jelsorozat küldésével, amely az egyedi alárendelt állomásazonosító jeléből és az ENQ előtagból áll.
8.6.3.7.1.3 Az az alárendelt állomás, amelyik észleli a kijelölt lekérdező ellenőrző jelsorozatot, felveszi a vezér-állomás helyzetet, és az alábbi két mód egyikével válaszol:
a) ha az állomásnak van továbbítandó közleménye, akkor a közlemény továbbítását kezdeményezi. A vezérlő állomás mellék-állomás állapotot vesz fel;
b) ha az állomásnak nincs továbbítandó közleménye, egy EOT-t küld, és a vezér-állomás visszatér a vezérlő- állomás állapotba.
8.6.3.7.1.4 Ha a vezérlő állomás a lekérdezésből eredően érvénytelen választ észlel, vagy nem észlel választ, akkor az EOT küldésével lezárást hajt végre, mielőtt folytatná a lekérdezést vagy a kiválasztást.
8.6.3.7.1.5 A kiválasztás válasszal-t a vezérlő állomás hajtja végre a vezér-állomás helyzetet felvéve és ezt egy kiválasztást ellenőrző jelsorozatot küldve hajtja végre, amely az ellenőrző jelsorozat egy olyan előtagot tartalmaz, amely az egyedi alárendelt állomást azonosítja és ENQ-val végződik.
8.6.3.7.1.6 Egy alárendelt állomásnak, amely a kijelölt kiválasztási ellenőrző jelsorozatot észleli, mellék-állomás helyzetet kell felvennie, és az alábbi két válasz egyikét elküldenie:
a) ha az állomás vételre kész, egy tetszőleges előtagot küld, amelyet az ACK követ. Ennek a válasznak a vétele után, a vezér-állomásnak a közlemény továbbítással kell folytatnia;
b) ha az állomás vételre nem kész, egy tetszőleges előtagot küld, amelyet a NAK követ. A NAK észlelése után a vezér-állomásnak megengedhető, hogy újra megkísérelje ugyanazon alárendelt állomás kiválasztását, vagy a lezárás kezdeményezését az EOT küldésével.

Megjegyzés. – Ha a vezérlő állomás érvénytelen választ vesz, vagy egyáltalán nem vesz választ, megengedett az, hogy újra megkísérelje ugyanazon alárendelt állomás kiválasztását, vagy N próbálkozás után $(N \geq 0)$ *vagy kilép egy visszaállítási eljáráshoz, vagy befejezést kezdeményez az EOT küldésével*

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8.6.3.7.1.7 A gyors kiválasztás végrehajtását a vezérlő állomás vezér-állomás helyzetet felvéve és a kiválasztási ellenőrző jelsorozatot elküldve végzi, és ennek az átvitelnek az ENQ-val való befejezése nélkül vagy anélkül, hogy várna arra, hogy a kiválasztott alárendelt állomás válaszoljon, közvetlenül a közlemény továbbításával folytatja a tevékenységét.

8.6.3.7.2 *KÖZLEMÉNY ÁTVITELI ELJÁRÁS*

8.6.3.7.2.1 A vezér-állomás egy egyedi közleményt küld a mellék-állomásnak és várja a választ.
8.6.3.7.2.2 A közlemény átvitel
a) kezdődik:
- SOH-val, ha a közleménynek van fej-része;
- STX-szel, ha a közleménynek nincs fej-része;
és
b) folytatódik az ETX-szel végződve, amelyet közvetlenül a BCC követ.
8.6.3.7.2.3 A mellék-állomásnak, miután észlelte az ETX-et, amelyet a BCC követ, el kell az alábbi két válasz egyikét kell elküldenie:
a) ha a közleményt fogadták, és a mellék-állomás kész egy másik közlemény fogadására, akkor egy tetszőleges előtagot küld, amelyet egy ACK követ. A vezér-állomásnak, miután észlelte az ACK-t, részére megengedetté válik a következő közlemény elküldése, vagy a lezárás kezdeményezése;
b) ha közleményt nem vettek és a mellék-állomás kész egy másik közlemény vételére, egy tetszőleges előtagot küld, amelyet a NAK követ. A vezér-állomás, miután észlelte a NAK-t, vagy továbbít egy másik közleményt, vagy lezárást kezdeményez. A NAK választ követően a következő átvitt közleménynek nem szükséges egy olyan közlemény újra-átvitelének lennie, amelyet nem fogadtak.
8.6.3.7.2.4 Ha a vezér-állomás érvénytelen közleményt vesz, vagy egyáltalán nem vesz közleményt, akkor megengedett számára egy továbbítási ellenőrző jelsorozat küldése, amely egy tetszőleges előtagból és az azt követő ENQ-ból áll. A továbbítási ellenőrző jelsorozat vétele után a mellék-állomás megismétli az utolsó válaszát.
8.6.3.7.2.5 A vezér-állomás N újra-próbálkozást végezhet $(N \geq 0)$, hogy érvényes mellék-állomás választ kapjon. Ha az N újra-próbálkozás után válasz nem érkezik, a vezér-állomás kilép egy visszaállítási folyamathoz.

8.6.3.7.3 *KAPCSOLAT BEFEJEZÉSI ELJÁRÁS*

8.6.3.7.3.1 A vezér-állomásnak egy EOT-t kell küldenie annak jelzésére, hogy nincs több továbbítandó közleménye. Az EOT-nek kell negálnia mindkét állomás vezér-/mellék-állomás állapotát, és visszakapja a vezérlő állomás helyzetet.

8.6.4 Föld-föld bit-orientált adat kapcsolat vezérlés eljárás

Megjegyzés. – Ennek a szakasznak az előírásai a föld-föld adatcsere alkalmazásokhoz tartoznak, amelyek bit-orientált adatkapcsolat eljárásokat használnak átlátható, szinkron átvitelt téve lehetővé, amely bármilyen kódolástól független; az adatkapcsolat irányítás funkciókat a keretben kijelölt bit-pozíciók értelmezésével hajtják végre.

8.6.4.1 A következő leírásokat fogjuk alkalmazni az ebben a szakaszban tartalmazott adatkapcsolat alkalmazásokhoz:
a) A bit-orientált adatkapcsolat vezérlési eljárások átlátható átvitelt tesznek lehetővé, amelyek bármilyen kódolástól függetlenek.
b) Az adatkapcsolat két egymással összekötött állomás logikai összekapcsolása, beleértve az össze-kapcsolt állomások összeköttetés vezérlési képességét is.
c) Egy állomás logikai elemek konfigurációja, amelytől, vagy amelyhez az adatkapcsolaton keresztül közleményeket továbbítanak, beleértve azokat az elemeket is, amelyek a közlemények áramlását a kapcsolaton, az összeköttetés vezérlési eljárásokon keresztül szabályozzák.
d) Egy kombinált állomás mind utasításokat, mind válaszokat küld és vesz, és felelős az adatkapcsolat szabályozásáért.
e) Az adatátviteli összeköttetési vezérlő eljárások képezik azokat az eszközöket, amelyeket az állomások között az adatkapcsolaton lebonyolódó szabályos információ-csere irányítására és védelmére használnak.
f) Egy összetevőt úgy határoztak meg, mint egy sorozaton belül előírt sorrendben lévő bitek számát az adatkapcsolat vezérlésére és felügyeletére.
g) Egy oktett nyolc egymás utáni bitből álló csoport.

h) Egy sorozat egy vagy több összetevő előírt sorrendben, amely az oktettek integrál számát tartalmazza.
i) Egy mező meghatározott számú bit, vagy meghatározott maximális számú bit sorozata, amely adatkapcsolati vagy összeköttetés vezérlési funkciót lát el, vagy az átvitelhez adatokat képez.
j) Egy keret az adatkapcsolaton továbbításra kerülő adatok egy egysége, amely egy vagy több mezőt foglal magába előírt sorrendben.
k) A közös ICAO adat-csere hálózat (CIDIN) kapcsoló-központ egy automatikus AFTN kapcsoló- központnak az a része, amely belépési, közvetítési és kilépési funkciókat lát el bit-orientált kapcsolati és CIDIN hálózati eljárásokat használva, amelyek ebben a szakaszban kerültek meghatározásra, és magába foglalja a megfelelő interfész(eke)t az AFTN más részeivel és más hálózatokkal is.

8.6.4.2 BIT-ORIENTÁLT ADATKAPCSOLAT ELJÁRÁSOK A SZINKRON ÁTVITELI BERENDEZÉSEKET ALKALMAZÓ PONTTÓL-PONTIG, FÖLD-FÖLD ADATCSERÉHEZ

Megjegyzés. – A következő adatkapcsolati szint eljárások ugyanazok, mint azok LAPB adatkapcsolati eljárások, amelyek az ITU CCITT X.25 Ajánlás, 2. szakasz, Sárga Könyv-ben /ITU CCITT Recommendation X.25 Section 2, Yellow Book/ (1981-es kiadás) találhatók. Az X.25 Ajánlások későbbi változatai akkor kerülnek figyelembevételre, amikor tisztázódik, hogy elfogadásra kerül, vagy sem.
8.6.4.2.1 *Keret formátum.* A keretek nem tartalmazhatnak 32-nél kevesebb bitet, kivéve a nyitó és záró jelző biteket, és a következő formátumnak kell megfelelniük:

JELZŐ BITEK F	CÍMZÉS A	VEZÉRLÉS C	INFORMÁCIÓ I	FCS	JELZŐ BITEK F

8.6.4.2.1.1 Egy keretnek tartalmaznia kell: a nyitó jelző biteket (F), egy címzés mezőt (A), egy vezérlési mezőt (C), egy választható információs mezőt (I), egy keret ellenőrző sorozatot (FCS) és a záró jelző biteket (F), és a keretet ebben a sorrendben kell átvinni.
Megjegyzés. – A CIDIN vonatkozásában a nyitó jelző bitek, az A és a C mező, az FCS és a záró jelző bitek (F) együttesen alkotják az Adatkapcsolat Vezérlő Mezőt (DLCF). Az I mezőt Adatkapcsolati Mezőként (LDF) jelölik.

8.6.4.2.1.1.1 A jelző biteknek (F) a 8-bites 01111110 sorozatnak kell lenniük, amelyek mindegyik keret elejét és végét határolják. Megengedett az, hogy a keretet lezáró jelző bitek a következő keretnyitó jelző bitjeiként is szolgáljanak.
8.6.4.2.1.1.2 A címzés (A) mezőnek egy oktettből kell állnia, kivéve a 0 biteket, amelyeket azért adnak hozzá, hogy átlátható átvitelt érjenek el, amelynek tartalmaznia kell a kombinált állomás kapcsolati címzést.
8.6.4.2.1.1.3 A vezérlési (C) mezőnek egy oktettből kell állnia, kivéve a 0 biteket, amelyeket azért adnak hozzá, hogy átlátható átvitelt érjenek el, és az adatkapcsolat szabályozáshoz tartalmazniuk kell az utasításokat, a válaszokat és keret sorszám összetevőket az adatkapcsolat vezérléséhez.
8.6.4.2.1.1.4 Az információs (I) mezőnek kell magába foglalnia a digitális adatokat, amelyek bármely kódban vagy sorozatban jelen lehetnek, de nem haladhatják meg a 259 oktettes maximális értéket, kivéve a 0 biteket, amelyeket azért adnak hozzá, hogy átlátható átvitelt érjenek el. Az I mező hosszban mindig a 8 bit többszöröse.
8.6.4.2.1.1.5 A keret ellenőrző sorozatnak (FCS) két oktettből kell állnia, kivéve a 0 biteket, amelyeket azért adnak hozzá, hogy átlátható átvitelt érjenek el, és tartalmazzák a hiba-észlelő biteket is.
8.6.4.2.2 Egy keret ellenőrzési sorozatot (FCS) mindegyik keretbe be kell építeni a hiba ellenőrzése céljából.
8.6.4.2.2.1 A hiba ellenőrző algoritmus egy ciklikus redundancia ellenőrzés (CRC).
8.6.4.2.2.2 A CRC polinom (P(x)) a következő:
$x^{16} + x^{12} + x^5 + 1$

8.6.4.2.2.3 Az FCS egy 16-bites sorozat. Ez az FCS az R(x) maradék kiegészítője, amely maradékot az
$x^{16}\,[G(x)] + x^K\,(x^{15} + x^{14} + x^{13} + \ldots + x^2 + x^1 + 1)$-nek

a P(x) CRC polinommal való modulo 2 osztásával nyerjük.
A G(x)-nek a keret tartalmának kell lenni, de nem foglalja magába a nyitó jelző bit utolsó bitjét, sem az FCS első bitjét, és kizárja azokat a biteket, amelyeket az átlátható átvitel kedvéért illesztettek be.
K-nak a G(x) hosszának kell lenni (bitek száma).

8.6.4.2.2.4 Az FCS összegyűjtésének és ellenőrzésének generálása a következőkből áll:

a) az átvivő állomás kezdeményezi az FCS össszegyűjtést a címzés (A) mező első (legkisebb helyi értékű) bitjével és magába kell, hogy foglalja az összes bitet az FCS sorozatot megelőző utolsó bitig, ezt is tartalmazva, de az összes 0 bitje (ha van) kivételével, amelyeket az átlátható átvitel érdekében illesztettek be;

b) az összegyűjtés elvégzése után az FCS továbbításra kerül a b1 bittel (a legmagasabb helyi értékű együttható) kezdve és a sorozatban továbbhaladva a b16 bittel (legalacsonyabb helyi értékű együttható), ahogyan az alább bemutatásra kerül:

Az első átvitt bit

b16	b15	b14	- - - -	b3	b2	b1
x^0	x^1	x^2		x^{13}	x^{14}	x^{15}

c) a vevő állomás hajtja végre a ciklikus redundancia ellenőrzést (CRC) a keret tartalmán, kezdve az első bittel, amelyet a nyitó jelző biteket követően vettek, és beleértve az összes bitet a záró jelző bitet megelőző utolsó bitig, azt is magába foglalva, de kizárva az összes 0 bitet (ha van), amelyeket az átlátszóság elérési szabályainak megfelelően töröltek;

d) az FCS összegyűjtésének elvégzése után a vevő állomásnak meg kell vizsgálnia a maradékot. Ha átviteli hiba nincs, a maradék 1111000010111000 lesz (x^0-tól – x^{15}-ig külön-külön).

8.6.4.2.3 *Az átláthatóság elérése.* A keret formátumnak (A, C, kapcsolati adat mező és FCS) képesnek kell lenni bármely bit konfiguráció magába foglalására.

8.6.4.2.3.1 A következő szabályokat kell alkalmazni az összes keret tartalomhoz, kivéve a jelző bit sorozatokat:

a) a továbbító állomásnak kell megvizsgálnia a keret tartalmat az átvitel előtt, és beilleszteni egy 0 bitet, közvetlenül minden 5 egymást követő 1-es bitből álló sorozat után;

b) a vevő állomásnak kell megvizsgálnia a vett keretek tartalmát az 5 egymást követő 1-bitből és az azt közvetlenül követő egy (vagy több) 0 bit (ek)ből álló sémák szerint, és el kell távolítani azokat a 0 biteket, amelyek az 5 egymás utáni 1-es biteket közvetlenül követik.

8.6.4.2.4 *Speciális átviteli sorozatok és vonatkozó kapcsolati állapotok.* Az adatcsere és vezérlő információk irányítását szolgáló utasítások és válaszok repertoárján kívül az állomások a következő hagyományos eljárásokat alkalmazzák az közölt körülmények jelzésére:

a) *Megszakítás* az az eljárás, amellyel az állomás egy keret küldésének folyamatánál a keretet nem a szokásos módon fejezi be úgy, hogy a keretet vevő állomásnak figyelmen kívül kell hagyni azt. A hagyományos eljárások egy keret megszakításához a következők:

1) legalább hét, de tizenötnél kevesebb egyes bit továbbítása (közbeiktatott nullák nélkül);

2) hét egyes bit vétele;

b) *Aktív kapcsolat állapot.* Egy kapcsolat aktív állapotban van akkor, amikor egy keretet, egy megszakítás sorozatot, vagy keretközi idő-kitöltést továbbít. Amikor a kapcsolat aktív állapotban van, a továbbító állomás részére fenn kell tartani a továbbítás folytatásának jogát.

c) *Keretközi idő-kitöltés.* Keretközi idő-kitöltést a keretek közötti folyamatos jelző bitek továbbításával kell végrehajtani. Nincs időkitöltés a kereten belül.

d) *Inaktív kapcsolat állapot.* A kapcsolat inaktív állapotban van akkor, amikor olyan folyamatos egyes helyzetet észlelnek, amely 15 bit vagy ennél hosszabb időn át tart. Az inaktív állapot időkitöltésnek egy folyamatos egyes állapotnak kell lenni a kapcsolaton.

e) *Érvénytelen keret.* Az érvénytelen keret egy olyan keret, amelyet nem megfelelően határol két jelző bit, vagy olyan keret, amelynél a jelző bitek közötti bitek száma kevesebb, mint 32.

8.6.4.2.5 *ÜZEMMÓDOK*

8.6.4.2.5.1 *Működési üzemmód*. A működési üzemmódnak aszinkron szimmetrikus üzemmódnak (ABM) kell lenni.

8.6.4.2.5.1.1 Aszinkron szimmetrikus üzemmódban lévő kombinált állomás részére megengedett kell, hogy legyen az átvitel, a hozzátartozó állomástól jövő meghívás nélkül.

8.6.4.2.5.1.2 Az ABM üzemmódban lévő kombinált állomás részére megengedett kell, hogy legyen, hogy bármilyen

utasítás vagy válasz típusú keretet továbbítson a DM kivételével.
8.6.4.2.5.2 *Működésen kívüli üzemmód.* A működésen kívüli üzemmód az aszinkron szétkapcsolt üzemmód (ADM), amelyben egy kombinált állomás logikailag le van kapcsolva az adatkapcsolatról.
8.6.4.2.5.2.1 Az ADM üzemmódban lévő kombinált állomás részére megengedhető kell, hogy legyen az átvitel, a hozzátartozó állomástól jövő meghívás nélkül.
8.6.4.2.5.2.2 Az ADM üzemmódban lévő kombinált állomás csak SABM, DISC, UA és DM kereteket továbbíthat. (Lásd az alábbiakban a 8.6.4.2.7 pontban azoknak az utasításoknak és válaszoknak a leírását, amelyek ezekre a keret típusokra vonatkoznak.)
8.6.4.2.5.2.3 Az ADM üzemmódban lévő kombinált állomásnak DM-et kell továbbítania, ha DISC-t vesz, és minden más vett utasítás keretet érvényteleníteni kell az SABM kivételével. Ha egy érvénytelenített utasítás keret a P-bitet “1”-re állította, akkor a kombinált állomásnak “1”-re állított F-bites DM-et kell továbbítania.

8.6.4.2.6 *Vezérlő mező funkciók és paraméterek.* A vezérlő mezők utasítást vagy választ és sorszámokat tartalmaznak, ahol alkalmazható. Három típusú vezérlő mezőt kell használni a következők végrehajtásához:

a) számozott információ átadás (I-keretek);

b) számozott ellenőrző funkciók (S-keretek); és

c) számozatlan vezérlő funkciók (U-keretek).

A vezérlő mező formátumok a 8-5. táblázatban megadottaknak kell lenniük. A funkcionális keret kijelölés, amely az egyes típusú vezérlő mezőkkel, valamint az ezeknek a funkcióknak az ellátásában alkalmazott vezérlő mező paraméterekkel kapcsolatosak, a következő pontokban kerülnek leírásra.
8.6.4.2.6.1 Az I-keret típust az információ továbbítások teljesítésére használják. Néhány speciális eset kivételével ez az egyetlen formátum, amelynek részére engedélyezett, hogy egy információs mezőt tartalmazzon.
8.6.4.2.6.2 Az S-keret típust ellenőrző utasításokhoz és válaszokhoz használják, azokhoz, amelyek olyan kapcsolat ellenőrző szabályozási funkciókat teljesítenek, mint az információ keretek nyugtázása, az információs keretek átvitelének és újra-átvitelének kérése, valamint az I-keretek átvitelének az ideiglenes felfüggesztési kérésre. Az S-keret nem tartalmazhat információs mezőt.
8.6.4.2.6.3 Az U-keret típust számozatlan utasítások és válaszok esetében használják, azokban, amelyek kiegészítő kapcsolat vezérlési funkciókat látnak el. Az U-keret válaszok egyike, a keret visszautasítás (FRMR) válasz információs mezőt tartalmaz; az U-keret típus összes többi kerete információs mezőt nem tartalmazhat.
8.6.4.2.6.4 A három vezérlő mező típushoz kapcsolódó állomás paraméterek a következők:

a) *Tényező.* Mindegyik I-keretet sorszámmal látnak el N (S) sorszám küldésével, ami 0 értékkel bír a mínusz egy tényezőn keresztül (ahol a tényező a sorszám tényezője). A tényezőnek 8-nak kell lenni. A sorrend szerint számozott azon I-keretek maximális száma, amellyel egy állomás bármely adott időpontban elintézetlenül (azaz visszaigazolatlanul) rendelkezik, soha nem haladhatja meg egynél kevesebbel a sorszámok tényezőjét. Az elintézetlen keretek számának ez a korlátozása azért szükséges, hogy megakadályozzon bármely félreérthetőséget az átviteli kereteknek a sorszámokhoz való kapcsolódásánál a normál működés és/vagy a hiba kijavítása során.

b) A küldés állapot változó V(S) jelöli ki a soron következő, átvitelre kerülő I-keret sorszámát.

1) A küldés állapot változó felveszi a 0 értéket a modulusz mínusz egy tényezőn keresztül (a tényező a sorszámozás és a teljes intervallumon keresztüli számciklusok tényezője).

2) A V(S) értéke minden egymást követő sorrendi I-keret átvitellel eggyel növekszik, de nem haladhatja meg többel, az N(R) értéket, mint az elintézetlen I-keretek maximálisan megengedett száma (k), amelyet az utolsó vett keret tartalmaz. Lásd a k meghatározását az alábbi i) pontban.

c) A sorra következő I-keret átvitelét megelőzően az N(S) értékét fel kell frissíteni, hogy egyenlő legyen V(S) értékével.

d) A vételi állapot változó, V(R) jelöli ki a vételre sorban következő I-keret sorszámát.

1) A V(R)-nek fel kell venni a 0 értéket a modulusz mínusz egyen keresztül.

2) A V(R) értéket eggyel növelik egy hibamentes, sorozatban lévő I-keret vétele után, ahol az I-keret N(S) küldési sorszáma V(R)-el egyenlő.

e) Az összes I-keretnek és S-keretnek tartalmaznia kell az N(R)-t, a soron következő vett keret várható sorszámát. Egy I vagy S típusú keret továbbítása előtt az N(R) értéket fel kell frissíteni úgy, hogy egyenlő legyen a vételi állapot változó aktuális értékével. Az N(R) jelzi azt, hogy az N(R)-t átvivő állomás megfelelően vette az összes I-keretet, amely (N(R)-1)-ig van számozva, beleértve az N(R)-1 számút is.

f) Mindegyik állomás fenntart egy független küldés állapot változót V(S) és egy vétel állapot változót V(R) az I-kereten, amelyen küld és vesz. Azaz mindegyik kombinált állomásnak egy V(S) számot kell fenntartani az

I-kereteken, amelyeket továbbít, és egy V(R) számot az I-kereteken, amelyeket megfelelően vett a távoli kombinált állomástól.

g) A lekérdező (P/F) bitet a kombinált állomás használja egy válasz, vagy egy válasz-sorozat kérésére (nyomatékosan kér) a távoli kombinált állomástól.

h) A záró (P/F) bitet a távoli kombinált állomás használja egy lekérés (lehívás) utasítás eredményeként továbbított válasz keret jelzésére.

i) Azon sorszámozott I-keretek maximális száma (k), amelyeket egy állomás elintézetlenül (nyugtázatlanul) birtokolhat egy adott, tetszőleges időpontban, egy állomás paraméter, amely a tényezőt soha sem haladhatja meg.

Megjegyzés. – A k-t az állomás tárolási korlátai határozzák meg, és az áramkör létrehozása idején kötött kétoldalú egyezmények tárgyát kell, hogy képezze.

8.6.4.2.7 *Utasítások és válaszok.* A kombinált állomás részére megengedett kell, hogy legyen az, hogy akár utasításokat, akár válaszokat hozzon létre. Az utasításnak a távoli állomás címzését, míg a válasznak a küldő állomás címzését kell tartalmaznia. Az összes utasítással és válasszal kapcsolatos emlékeztető az, amely a három keret típus (I, S és U) mindegyikére elő van írva és a vezérlési mező hozzátartozó kódolásának a 8-6. táblázatban megadottnak kell lenni.

8.6.4.2.7.1 Az I-keret utasítás szolgáltatja az eszközt a sorszámmal ellátott keretek átviteléhez, amelyek mindegyikének megengedett kell, hogy legyen az, hogy egy információ mezőt tartalmazzon.

8.6.4.2.7.2 Az S-keret utasításokat és válaszokat a számozott ellenőrző funkciók teljesítésére kell használni (mint például nyugtázás, lekérdezés, az információ továbbítás átmeneti felfüggesztése, vagy hibajavítás).

8.6.4.2.7.2.1 A vételre kész utasítást vagy választ (RR) az állomás a következőkre használja:

a) jelzi, hogy kész egy I-keret vételére;

b) visszaigazolja az előzőleg vett, számozott I-kereteket N(R)-1-ig, ez utóbbit is beleértve;

c) törli a foglalt állapotot, amelyet az RNR átvitele kezdeményezett.

Megjegyzés. – Egy kombinált állomás részére megengedett az RR utasítás használata egy olyan távoli kombinált állomástól való válasz kérésére, amelynek a lekérdező bitje "1"-re van beállítva.

8.6.4.2.7.2.2 Megengedettnek kell lenni egy visszautasító parancs vagy válasz (REJ) utasítás kiadására az N(R) számozású I-kerettel kezdődő keretek újra-továbbítás kérésére, ahol:

a) N(R)-1 és az ez alatti számozású I-kereteket nyugtázták;

b) a további kezdeti átvitelre váró I-kereteket az újra átvitt I-keret(ek)et követően kell továbbítani;

c) csak egy REJ mentességi feltétel állapotot lehet létrehozni egyik adott állomástól egy másik állomáshoz, bármely adott időpontban; másik REJ nem adható ki addig, amíg az első REJ mentességi feltételt nem szabadították fel;

d) a REJ mentességi állapotot törlik (visszaállítják) egy olyan I-keret fogadása után, amelynek száma egyenlő a REJ utasítás/válasz N(R)-jével.

8-6. táblázat. Utasítások és válaszok

Típus	Utasítások		Válaszok		C-mezőkódolás							
1	2	3	4	5	6	7	8					
Információ átvitel	I	(információ)			0		N(S)		P		N(R)	
Ellenőrzés	RR	(vételre kész)	RR	(vételre kész)	1	0	0	0	P/F		N(R)	
	RNR	(vételre nem kész)	RNR	(vételre nem kész)	1	0	1	0	P/F		N(R)	
	REJ	(visszautasítás)	REJ	(visszautasítás)	1	0	0	1	P/F		N(R)	
Számozatlan			DM	(szétkapcsolt mód)	1	1	1	1	P/F	0	0	0

	SABM	(beállítás aszinkron szimmetrikus mód)			1	1	1	1	P	1	0	0
	DISC	(szétkapcsolás)			1	1	0	0	P	0	1	0
			UA	(számozatlan nyugtázás)	1	1	0	0	F	1	1	0
			FRMR	(keret visszautasítás)	1	1	1	0	F	0	0	1

8.6.4.2.7.2.3 A vételre nem kész utasítást vagy választ (RNR) egy foglalt állapot jelzésére használják, azaz további bejövő I-keretek átmeneti fogadásképtelenségének jelzésére ott, ahol:
a) a kereteket, amelyek N(R)-1-ig, az utóbbit is beleszámítva, vannak számozva, nyugtázták;
b) az N(R) keret és bármely azt követő vett I-keret, ha van ilyen, nem került nyugtázásra (ezeknek a kereteknek a fogadási helyzetét a következő összekötetésekben kell jelezni);
c) a foglalt állapot törlését egy RR-, REJ-, SABM- vagy UA "I"-re állított P/F bittel vagy anélkül történő továbbítása jelzi.
8.6.4.2.7.2.3.1 **Ajánlás.** –
a) Egy RNR keretet az átviteli folyamatban vevő állomásnak az I-keretek továbbítását a lehető leghamarabb le kell állítania.
b) Bármely REJ utasítást vagy választ, amelyet az RNR előtt vettek, be kell indítani az átvitel befejezése előtt.
c) Kombinált állomás számára megengedett az "I"-re állított lekérdező bites RNR utasítás használata azért, hogy "I"-re állított záró bites ellenőrző keretet kapjanak a távoli kombinált állomástól.
8.6.4.2.7.2.4 Megengedhetőnek kell lenni annak, hogy a szelektív elutasítás parancs vagy válasz (SREJ) felhasználható legyen egy N(R) számozású egyedüli I-keret újra-továbbítási kérésére akkor, amikor:
a) az N(R-1)-ig számozott keretek nyugtázottak; N(R) keretet nem fogadtak; csak azokat az I-kereteket fogadják el, amelyeket megfelelően vettek és sorrendben a kért I-keretet követik; a továbbításra kerülő specifikus I-keretet az N(R) jelzi a SREJ utasítás/válaszban;
b) az SREJ kivétel állapotot törlik (újra-állítják), amint olyan I-keretet vesznek, amelynél egy N(S) szám egyenlő az SREJ N(R)-jével;
c) azután, hogy az állomás egy SREJ-t továbbít, nem megengedett az SREJ vagy az REJ továbbítása egy további sorozat hibánál addig, amíg az első SREJ hiba körülmény nem került törlésre;
d) azok az I-keretek, amelyeket az SREJ által jelzett I-keretet követően továbbításra engedélyeztek, nem kerülnek újra-továbbításra egy SREJ vétele eredményeként; és
e) megengedett további I-kereteknek a kezdeti átvitel alatt az, hogy az SREJ által kért specifikus I-keret újra-átvitelét követően továbbításra kerüljenek.
8.6.4.2.7.3 Az U-keret utasításokat és válaszokat a vezérlő funkciók számának kiterjesztésére használják. A továbbított U-keretek nem növelik a sorszámot sem a leadó, sem a vételi állomáson.
a) Az U-keret a mód-beállító utasításokat (SABM és DISC) a címzett állomásnak a megfelelő válaszmódba való (ABM vagy ADM) beállítására kell használni, ahol:
1) az utasítás elfogadása után a vevő-állomás elküld egy vételi állapot változót, V(S) és V(R), amelyek nullára vannak állítva;
2) a címzett állomás megerősíti az elfogadást a lehető leghamarabbi időpontban egyetlen, számozatlan UA nyugtázás küldésével;
3) az előzőleg továbbított keretek, amelyek az utasítás elküldése idején nyugtázatlanok, megmaradnak nyugtázatlanoknak;
4) a DISC utasítást egy logikai szétkapcsolás végrehajtására használják, azaz a címzett kombinált állomás informálására arról, hogy a továbbító kombinált állomás szünetelteti a működését. A DISC utasításhoz kapcsolódó információs mező nincs megengedve.
b) A számozatlan nyugtázási választ (UA) a kombinált állomásnak kell felhasználnia egy számozatlan utasítás vételének és elfogadásának visszaigazolására. A vett számozatlan utasítások nem aktivizálódnak addig, amíg az UA választ nem továbbítják. Az UA válaszhoz kapcsolódóan információ nem megengedett.
c) A keret visszautasító választ (FRMR), amely az alábbiakban ismertetett információs mezőt alkalmazza, egy kombinált állomás üzemelési módban (ABM) kell alkalmazni, hogy egy FCS hiba nélküli keret vételéből az alábbi

körülmények egyike következett be:
1) utasítás/válasz, amely érvénytelen vagy nem megvalósított;
2) keret információs mezővel, amely meghaladja a rendelkezésre álló tároló méretét;
3) érvénytelen N(R) számmal rendelkező keret.

Megjegyzés. – Az érvénytelen N(R) egy olyan szám, amely olyan I-keretre utal, amelyet előzőleg már továbbítottak és visszaigazoltak, vagy olyan I-keretre, amelyet még nem továbbítottak és nem az a következő átvitelre kerülő I-keret.

d) A szétkapcsolt módú választ (DM) egy nem-üzemelő státusz jelentésére kell használni akkor, amikor az állomás logikailag szét van kapcsolva az összeköttetéstől. A DM válaszhoz kapcsolódóan információs mező nem engedélyezett.

Megjegyzés. – A DM választ azért küldik, hogy kérjék a távoli kombinált állomást, hogy adjon ki egy mód-beállítás utasítást, vagy ha küldött egy mód-beállítás utasítás vételére adott választ, akkor a távoli kombinált állomás tájékoztatására arról, hogy az átvivő állomás még mindig ADM-ben van, és nem tudja a mód-beállítás utasítást aktivizálni.

8.6.4.3 KIHAGYÁSI HELYZETJELENTÉS ÉS HELYREÁLLÍTÁS

Ez a szakasz azokat az eljárásokat határozza meg, amelyeket egy kihagyási helyzet észlelését vagy megjelenését követő helyreállítás végrehajtásához alkalmaznak a kapcsolat szinten. A kihagyási helyzetek azok a szituációk, amelyek átviteli hibák, állomás meghibásodás vagy üzemelési helyzetek eredményeként lépnek fel.

8.6.4.3.1 *Foglaltság állapot.* A foglaltság állapot akkor lép fel, amikor egy állomás átmenetileg nem tud I-kereteket venni, vagy nem tudja folytatni a vételüket belső kényszer, pl. tárolási korlátok miatt. A foglaltság állapotot a távoli kombinált állomásnak a következőnek várt I-keret N(R) számával rendelkező RNR keret továbbításával kell jelezni. Megengedhető az, hogy a foglalt állomás egy forgalom felfüggesztési adást továbbítson az RNR-t megelőzően vagy azt követően.

Megjegyzés. – A foglaltság állapot folytatódó fennállását jelenteni kell az RNR ismételt leadásával mindegyik P/F keret cserénél.

8.6.4.3.1.1 Egy RNR fogadása után egy kombinált állomásnak ABM-ben a lehető legrövidebb időn belül meg kell szünteti az I-keretek továbbítását a folyamatban lévő keretet befejezve vagy leállítva. Egy RNR-t vevő kombinált állomásnak végre kell hajtania az idő-túllépési üzemeltetést, mielőtt folytatja az I-keretek aszinkron átvitelét, kivéve, ha a foglaltság állapotot nem jelenti töröltként a távoli kombinált állomás. Ha az RNR-t "1"-re állított P-bites utasításként vették, akkor a vevő állomásnak egy "1"-re állított F bites S-kerettel kell válaszolnia.
8.6.4.3.1.2 A foglaltság állapotot törölni kell annál az állomásnál, amelyik az RNR-t továbbította, amikor a belső kényszer megszünik. A foglalt állapot törlését egy RR, REJ, SABM vagy UA keret ("1"-re állított P/F bittel vagy anélküli) továbbításával kell jelenteni.

FRMR INFORMÁCIÓS MEZŐ BITEK ALAP (SABM) ÜZEMELÉSNÉL

Az első
továbbí-
tott bit

1 8	9	10 12	13	14 16	17	18	19	20	21 24
Visszautasított alap vezérlési mező	0	V(S)	v	V(R)	w	x	y	z	Beállítás nullára

ahol:
a visszautasított alap vezérlési mező annak annak a vett keretnek a vezérlési mezője, amely a keret elutasítását hozta

létre;
a *V(S)* a küldés állapot változó aktuális értéke annál a távoli kombinált állomásnál, amely a hiba állapotot jelenti (10-es bit = legkisebb helyiértékű bit);
a *V(R)* a vétel állapot változó aktuális értéke annál atávoli kombinált állomásnál, amely a hiba állapotot jelenti (14-es bit = legkisebb bit);
az "1"-re állított *v* azt jelzi, hogy a vett keret, amely a visszautasítást okozta, egy válasz volt;
az "1"-re állított *w* azt jelzi, hogy a vett és visszaküldött vezérlési mező az 1-től 8-ig terjedő bitjei érvénytelenek vagy nem feltöltöttek voltak;
az "1"-re állított *x* azt jelzi, hogy a vett és visszaküldött vezérlési mezőt az 1-től 8-ig terjedő biteknél érvénytelennek tekintették, mert a keret egy információs mezőt tartalmazott, amely ezzel az utasítással nem megengedett. A *w* bitet ezzel összekapcsoltan "1"-re kell beállítani;
az "1"-re állított *y* az jelzi, hogy a vett információs mező meghaladta azt a maximális információs mező hosszt, amelyet a hiba körülményt jelentő állomás még be tud fogadni. Ez a bit a fenti *w* és *x* bitekkel kölcsönösen kizárják egymást;
az "1"-re állított *z* azt jelzi, hogy a vett és visszaküldött vezérlés mező az 1–8 intervallumban lévő biteknél érvénytelen N(R) számot tartalmaz. Ez a bit a *w* bittel kölcsönösen kizárják egymást.

8.6.4.3.2 *N(S) sorszám hiba.* Egy N(S) sorszám elhagyás jön létre a vevő állomáson akkor, ha egy I-keret, amelyet hibamentesen vettek (nincs FCS hiba), egy olyan N(S) sorszámot tartalmaz, amely nem egyenlő a V(R) vételi változóval a vevő állomáson. A vevő állomás nem nyugtázza le a keretet (nem növelheti a V(R) vételi változóját), amely a sorszám hibát okozza, vagy semelyik I-keretet sem, amely követheti, amíg egy helyes N(S) számú I-keretet nem vesz. Egy állomásnak- amely egy vagy több olyan I-keretet vesz, amely sorszám hibával rendelkezik, de amelyek egyébként hibamentesek- el kell, hogy fogadja az N(R) mezőben és a P/F bitben lévő információkat, hogy teljesítse a kapcsolat vezérlési funkciókat, azaz, hogy vegye az előzőleg továbbított I-keretek nyugtását, az N(R)-en keresztül, hogy válaszra késztesse az állomást (p bit "1"-re állítva).
8.6.4.3.2.1 Az alábbi 8.6.4.3.2.1.1 és 8.6.4.3.2.1.2 pontokban meghatározott körülmények egy sorszám hiba előfordulást követő, elveszett vagy elhibázott I-keretek újra-továbbításának kezdeményezésére szolgálnak.
8.6.4.3.2.1.1 Ahol a REJ utasítás/válasz-t használják egy kihagyási helyreállítás kezdeményezésére egy sorszám hiba észlelését követően, ott csak egy "küldött REJ" kihagyási állapot jöhet létre egyidőben az egyik állomástól a másik állomáshoz. Egy "küldött REJ" kihagyás akkor szabadul fel, amikor a kért I-keretet veszik. A REJ-t vevő állomás az I-keretek egymás utáni (újra) továbbítását kezdeményezi a REJ keret által tartalmazott N(R) által jelölt I-kerettel indulva.
8.6.4.3.2.1.2 Abban az esetben, ha a vevő állomás átviteli hiba miatt nem fogad (vagy fogad és érvénytelenít) egy egyedülálló I-keretet, vagy az utolsó I-keret (ek) et az I-keretek egy sorozatában, nem kell, hogy egy sorozaton kívüli kihagyást észleljen, és ennek folytán nem kell REJ-t továbbítania. Az állomás, amely a nyugtázatlan I-keret(ek)et továbbította, egy rendszer-specifikus szünetelés befejezését követően megfelelő helyreállítási műveletet végez, hogy meghatározza a sorszámot, amelynél az újra-továbbítást meg kell kezdeni.
8.6.4.3.2.1.3 **Ajánlás.** *– Egy szünetelő kombinált állomás, amely válaszra vár, nem továbbíthatja újra az összes nyugtázatlan keretet azonnal. Az állomás érdeklődhet az állapot felől az ellenőrző kerettel.*

1. Megjegyzés. – Ha egy állomás újra továbbítja az összes nyugtázatlan I-keretet egy szünet után, akkor az állomásnak elő kell készülnie egy utána következő olyan REJ keret vételére, amelynél az N(R) nagyobb, mint a V(S) küldési változó.

2. Megjegyzés. – Mivel verseny léphet fel a kétféle alternatív kommunikáció esetében - az ABM-ben vagy ADM-ben, -az egyik kombinált állomás által alkalmazott szünet időtartamnak nagyobbnak kell lennie, mint a másik kombinált állomás által alkalmazottének, ezáltal a verseny megoldása lehetségessé válik.

8.6.4.3.3 *FCS hiba.* Semmilyen FCS hibás keretet nem fogadhat el a vevő állomás és az ilyeneket érvényteleníteniekell. A vevő állomás ilyen keret hatására semmilyen műveletet nem végez.
8.6.4.3.4 *Keret visszautasítás kihagyás állapot.* A keret visszautasítás kihagyás állapot egy hibamentes keret elfogadásánál lép fel, amely keret egy érvénytelen vagy nem megvalósított vezérlési mezőt, érvénytelen N(R)-t, vagy egy olyan információs mezőt tartalmaz, amely meghaladja a létrehozott tároló kapacitás maximumát. Ha keret visszautasítás kihagyás állapot lép fel egy kombinált állomáson, akkor az állomásnak vagy:
a) visszaállítási műveletet kell végeznie anélkül, hogy jelentené az állapotot a távoli kombinált állomásnak; vagy

b) jelenti az állapotot a távoli kombinált állomásnak egy FRMR válasszal. A távoli állomástól ekkor elvárják, hogy végezze el a helyreállítási műveletet, ha bizonyos idő kivárása után nem jelenik meg a helyreállítási művelet végrehajtása, akkor a kombinált állomás, amely jelenti a keret visszautasítás kihagyási állapotot, végrehajtja a helyreállítási műveletet.
A helyreállítási művelet a szimmetrikus üzemelésnél magába foglalja egy megvalósított mód-beállítási utasítás átvitelét. Magasabb szintű funkciók ugyancsak részt vehetnek a helyreállításban.
8.6.4.3.5 *Mód-beállítási verseny.* Egy mód-beállítási verseny szituáció akkor lép fel, amikor egy kombinált állomás egy mód-beállítási utasítást ad ki és a megfelelő válasz (UA vagy DM) vétele előtt egy mód-beállítás utasítást vesz a távoli kombinált állomástól. A verseny helyzeteket a következő módon kell megoldani:
a) amikor a küldés és vétel mód-beállítás utasítások ugyanazok, mindegyik kombinált állomásnak egy UA választ kell küldenie a válaszküldésre adódó legelső alkalomkor. Az egyes kombinált állomások vagy belépnek a jelzett módba azonnal, vagy késleltetik a belépést a jelzett módba addig, amíg egy UA választ nem vesznek. Ez utóbbi esetben, ha az UA válasz nem kerül vételre:
1) a módot beléptetik akkor, amikor a válasz időzítés lejár; vagy
2) a mód-beállítás utasítást újra kiadják;
b) ha a mód-beállítási utasítások különbözőek, mindegyik kombinált állomásnak be kell lépnie az ADM-be és egy DM választ kell kiadnia a válasz küldésére adódó legelső alkalomkor. DISC verseny esetében egy eltérő mód-beállítási utasítással további műveletre nincs szükség.
8.6.4.3.6 *Idő-túllépés funkciók.* Az idő-túllépés funkciókat annak észlelésére használják, amikor egy kívánt vagy elvárt visszaigazolási műveletet vagy választ egy előzőleg továbbított keretre még nem vettek. Az idő-túllépési funkció lejártának megfelelő műveleteket el kell indítani, pl. a hibaelhárítás a P bit újra-kiadására. A következő idő-túllépési funkciók ideje rendszer-függő és kétoldalú egyezmény tárgyát képezi:
a) kombinált állomásoknak idő-túllépési funkciót kell biztosítani annak megállapítására, hogy egy “1”-re állított P-bites utasítás keret részére adott “1”-re állított F-bites válasz keret nem került-e vételre. Az idő-túllépési funkció automatikusan megszűnik az “1”-re állított F-bites érvényes keret vétele után;
b) egy kombinált állomás, amelynek nincs elintézetlen P-bitje és amely egy vagy több keretet továbbított, amelyre válasz várható, idő-túllépés funkciót indít ahhoz, hogy észlelje a válasz nélküli állapotot. Az idő-túllépési funkció megszűnik, amikor egy I- vagy S-keret kerül vételre, ahol az N(R) nagyobb, mint az utoljára vett N(R) (ténylegesen egy vagy több I-keret nyugtázás).

8.6.5 Közös ICAO adatcsere hálózat (CIDIN)

8.6.5.1 BEVEZETÉS

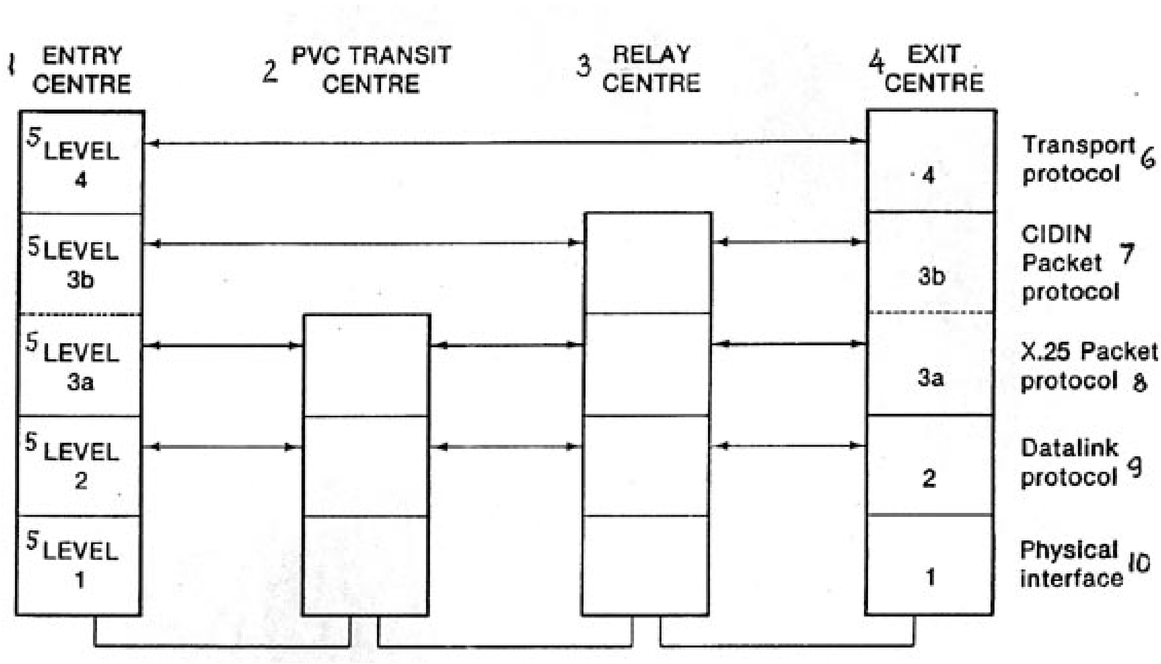
1. Megjegyzés. - A közös ICAO adatcsere hálózat (CIDIN) A Légiforgalmi Állandóhelyű Szolgálat (AFS) egy eleme, amely bit-orientált eljárásokat, tárolási és továbbítási technikákat és csomag kapcsolatú technikát használ és a CCITT X.25. Ajánlásán alapulóan továbbítja a közleményeket az AFS meghatározott alkalmazásaihoz, mint például az AFTN részére és a repülés-üzemi meteorológiai tájékoztatásokhoz (OPMET).

2. Megjegyzés. - A CIDIN egy megbízható közös hálózati szolgáltatást biztosít a felhasználói közlemények továbbításához, a légiforgalmi szolgálatokat biztosítók és a légijármű üzemeltető ügynökségek /vállalatok/ részére.

8.6.5.1.1 CIDIN belépési és kilépési központokat vagy állomásokat kell biztosítani a CIDIN alkalmazási entitásokhoz történő csatlakozásokhoz.

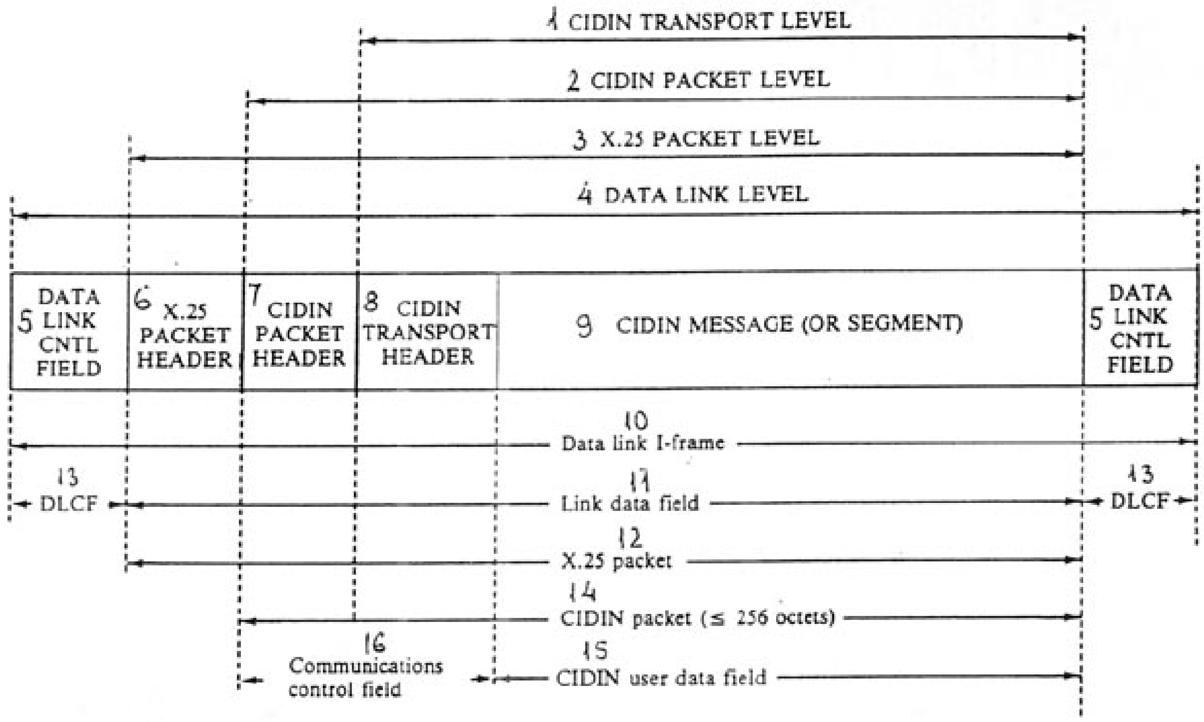
Megjegyzés. - A CIDIN és az alkalmazási entitások közötti interfész helyi kivitelezések tárgyát képezi.

8.6.5.1.2 A CIDIN közvetítő központokat az olyan CIDIN belépési és kilépési központok közötti csomagok továbbítására kell használni, amelyek nincsenek közvetlenül kapcsolva.



8-1. ábra. CIDIN protokoll szintek

8-1 ábra szövege:
1 Belépési központ
2 PVC átmenő központ
3 Átviteli központ
4 Kilépési központ
5 Szint
6 Átviteli protokoll
7 CIDIN csomag protokoll
8 X. 25 csomag protokoll
9 Kapcsolat protokoll
10 Fizikai interfész



8-2 ábra. CIDIN terminológia

8-2 .ábra szövege:
1 CIDIN átviteli szint
2 CIDIN csomag szint
3 X. 25 csomag szint
4 Adatkapcsolat szint
5 Adatkapcsolat CNTL mező
6 X. 25 csomag fej-rész
7 CIDINcsomag fej-rész
8 CIDIN átviteli fej-rész
9 CIDIN közlemény (vagy szegmens)
10 Adatkapcsolat I-keret
11 Adatkapcsolat mező
12 X. 25 csomag
13 Adatkapcsolat vezérlő mező
14 CIDIN csomag (≤ 256 oktett)
15 CIDIN felhasználói adat mező
16 Kommunikációs szabályozás mező

8.6.5.2 ÁLTALÁNOS

8.6.5.2.1 Négy protokoll szintet kell meghatározni a CIDIN kapcsoló-központok közötti adatátvitel vezérléséhez.
- Az adatkapcsolat protokoll szintet,
- az X.25 csomag protokoll szintet,
- a CIDIN csomag protokoll szintet,
- a CIDIN átviteli protokoll szintet.

1. Megjegyzés. - Az alkalmazott szakkifejezések közötti összefüggéseket a 8-1. és 8-2. ábra mutatja be.

2. Megjegyzés. - A CIDIN összeköttetési eljárások és rendszer előírások részletes leírása - ahogy az Európában megvalósításra került - az EUR CIDIN Kézikönyvben került megadásra (EUR Doc 005).

8.6.5.2.2 *AZ ADATKAPCSOLATI PROTOKOLL SZINT*

8.6.5.2.2.1 Az X.25 csomagot, amely továbbításra kerül két CIDIN kapcsoló-központ vagy egy CIDIN kapcsoló-központ és egy csomag-kapcsolt adatátviteli hálózat között, adatkapcsolati keretekbe kell formattálni.

8.6.5.2.2.2 Az egyes adatkapcsolati kereteknek magukba kell foglalni egy adatkapcsolat vezérlő mezőt, esetlegesen egy kapcsolat adatmezővel folytatva és jelző bitekkel kell befejezni azokat (ezek a DLCF második részét képezik). Ha van kapcsolat adatmező, akkor a keretet információs keretként kell megjelölni.
8.6.5.2.2.3 Az X.25 csomagokat az információs mezők kapcsolat adatmezőin belül kell továbbítani. A kapcsolat adatmező csak egy csomagot foglalhat magába.
8.6.5.2.3 *AZ X.25 CSOMAG PROTOKOLL SZINT*
8.6.5.2.3.1 Minden egyes, a CIDIN kapcsoló-központok között, a CIDIN-áramkörökön továbbított CIDIN csomagnak egy X.25 csomagba formattált csomagnak kell lenni. Amikor egy csomag-kapcsolt adatátviteli hálózat használatos, akkor megengedhetőnek kell lenni annak, hogy a CIDIN keret egynél több csomagba kerüljön formattálásra.
8.6.5.2.3.2 Az egyes CIDIN csomagok integritását a CIDIN csomagnak kell megőriznie az egyes CIDIN csomagoknak egy teljes X.25 keret sorozatba való leképezésével, ahogy azt a CCITT X.25 Ajánlása meghatározza.
8.6.5.2.3.3 Az egyes X.25 csomagoknak magukba kell foglalniuk az X.25 csomag fej-részt, amit esetlegesen a felhasználói adatmező (UDF) követ.
8.6.5.2.3.4 Az X.25 csomag protokoll a virtuális áramköri eljárások alkalmazásán alapszik. Egy virtuális áramkört úgy kell meghatározni, hogy az egy logikai út két CIDIN kapcsoló-központ között. Ha csomag- kapcsolt adatátviteli hálózatot használnak, a CIDIN kapcsoló-központok közötti összekapcslódáshoz, akkor biztosítani kell a teljes kompatibilitást azokkal az eljárásokkal, amit a CCITT X.25 Ajánlása szerint a virtuális áramkörök megkövetelnek.
8.6.5.2.4 *A CIDIN CSOMAG PROTOKOLL SZINT*
8.6.5.2.4.1 Minden egyes átviteli fej-részt és a hozzá kapcsolódó szegmensét egy CIDIN csomag fej- résznek kell megelőzni. A CIDIN közlemény semmilyen további szegmentálására nincs szükség az átviteli protokoll szint és a CIDIN csomag protokoll szint között. Ennek megfelelően mindkét fej-részt összekapcsolva fel kell használni. Együtt ezeket összeköttetési vezérlő mezőnek (CCF) nevezik. A közlemény szegmenssel együtt ezek képezik azokat a CIDIN csomagokat, amelyeket a belépési központtól a kilépési központ (ok) ig továbbítani kell, amikor szükséges, egy vagy több közvetítő központon keresztül egy entitásként.
8.6.5.2.4.2 Egy CIDIN közlemény CIDIN csomagjait önállóan kell továbbítani a hálózat előre kijelölt útvonalain keresztül, ami ezáltal lehetővé teszi az alternatív továbbítási útvonalakat a CIDIN csomag alapján, ahogy szükséges.
8.6.5.2.4.3 A CIDIN csomag fej-résznek tartalmaznia kell azt az információt, ami lehetővé teszi a közvetítő központoknak a CIDIN csomagok prioritás szerinti kezelését, a CIDIN csomagoknak a megfelelő kimeneti áramkör(ök)ön való továbbítását és a CIDIN csomagok duplikálását, vagy megtöbbszörözését, amikor ez a többszörös elosztás céljából szükséges. Az információnak kielégítőnek kell lenni ahhoz, hogy a kilépő címzettnél alkalmazzák a címzés szerinti leválasztást, valamint az AFTN-formátumnál a közlemények a címzett indikátorának meghatározását.
8.6.5.2.5 *ÁTVITELI PROTOKOLL SZINT*
8.6.5.2.5.1 A CIDIN /hálózaton/ cserélt információkat CIDIN-közleményekként kell továbbítani.
8.6.5.2.5.2 A CIDIN közlemény hosszát a CIDIN csomag sorozatszám (CPSN) határozza meg. A maximális megengedhető hossz 2^{15} csomag, ami valójában nem eredményez gyakorlati korlátozást.
8.6.5.2.5.3 Ha a CIDIN közlemény és annak átviteli és csomag fej-részeinek a hossza (ahogy az az alábbiakban meghatározásra kerül) meghaladja a 256 oktettet, akkor a közleményt szegmensekre kell osztani, és a CIDIN csomagokat a CIDIN felhasználói adatmezőjébe kell behelyezni. Minden egyes szegmenset meg kell, hogy előzzön egy olyan átviteli fej-rész, amely elegendő információt tartalmaz ahhoz, hogy a kilépő állomás (ok) az egyedileg vett szegmensekből újra összeállítsák a CIDIN közleményt, és meghatározzák a vett teljes CIDIN közlemény további kezelését.
8.6.5.2.5.4 A CIDIN közlemény összes szegmensének a továbbítási fej-részben ugyanazon közlemény azonosító információval ellátottnak kell lenni. Csak a CSPN és az utolsó CIDIN csomag (FCP) jelzése lehet eltérő.
8.6.5.2.5.5 A közlemények helyreállítását az átviteli szinten kell elvégezni.

9. FEJEZET. LÉGIJÁRMŰ CÍMZÉSI RENDSZER

9.1 A légijármű címzéseknek a 16777214 huszonnégy-bites légijármű címzések egyikének kell lenni, amelyet az ICAO osztott ki a lajstromozó Államoknak vagy az Európai Gazdasági Közösség lajstromozó hatóságainak, és az ehhez a fejezethez tartozó Függelékben leírtaknak megfelelően van kijelölve.

FÜGGELÉK A 9. FEJEZETHEZ. VILÁGMÉRETŰ SÉMA A LÉGIJÁRMŰ CÍMZÉSEK KIOSZTÁSÁHOZ, KIJELÖLÉSÉHEZ ÉS ALKALMAZÁSÁHOZ

1. Általános

1.1 Világméretű kommunikációs, navigációs és légtér-ellenőrzési rendszerek 24 bitből álló egyedi légijármű címzést használnak. Egy címzést egy időben csak egy légijárműnek jelölhetnek ki. A légijármű címzések kijelölése átfogó sémát igényel, amely világméretekben alkalmazható, kiegyensúlyozott és kiterjeszthető légijármű címzés elosztást szolgáltat.

2. A séma leírása

2.1 A 9-1 táblázat tartalmazza az Államok részére a légijármű kijelöléshez rendelkezésre álló, egymásután következő címzések blokkjait. Mindegyik blokkot a 24-bites címzés első 4, 6, 9, 12 vagy 14 bitjének rögzített sémája definiálja. Így különböző méretű blokkok (1048576, 262144, 32768, 4096 és 1024 egymást követő címzések) állnak rendelkezésre.

3. A séma kezelése

3.1 A Nemzetközi Polgári Repülési Szervezetnek (ICAO) a sémát úgy kell adminisztrálnia, hogy a légijármű címzések megfelelő nemzetközi elosztása fenntartható legyen.

4. Légijármű címzések kiosztása

4.1 A légijármű címzés blokkokat az ICAO kiosztja a Lajstromozó Államnak vagy az Európai Gazdasági Közösség lajstromozó hatóságainak. A címzések kiosztását az Államok között a 9-1 táblázat mutatja be.
4.2 A Lajstromozó Államnak vagy az Európai Gazdasági Közösség lajstromozó hatóságainak közölnie kell az ICAO-val, ha a címzések egy további blokkjának kiosztása válik szükségessé részére, a légijárműveknek való kijelölése céljából.
4.3 A séma jövőbeni kezelésében előnyben kell részesíteni azokat a légijármű címzés blokkokat, amelyek még nem kerültek kiosztásra. Ezeket a tartalék blokkokat a vonatkozó ICAO régiók bázisán kell szétosztani.
00100 bit kombinációval kezdődő címzések: AFI régió
00101 bit kombinációval kezdődő címzések: SAM régió
0101 bit kombinációval kezdődő címzések: EUR és NAT régió
01100 bit kombinációval kezdődő címzések: MID régió
01101 bit kombinációval kezdődő címzések: SEA régió
1001 bit kombinációval kezdődő címzések: NAM és PAC régió
111011 bit kombinációval kezdődő címzések: CAR régió
Ezeken kívül a 1011, 1101 és 1111 bit kombinációkkal kezdődő légijármű címzéseket jövőbeni alkalmazásokra tartják fenn.
4.4 További légijármű címzésre vonatkozó bármely jövőbeli igényt az ICAO és lajstromozó államok vagy az Európai Gazdasági Közösség regisztráló hatóságai közötti együttműködés keretében kell benyújtani. További légijármű címzések iránti kérést a lajstromozó hatóság csak akkor nyújthat be, ha e lajstromozó hatóság részére kiosztott címzések számának legalább 75 százalékát már kijelölték légijárművek részére.
4.5 Az ICAO kérésükre légijármű címzés blokkokat a nem-tagállamok részére is kioszt.

5. Légijármű címzések kijelölése

5.1 Ha megfelelően felszerelt nemzeti vagy nemzetközi regiszterbe felvett légijármű használatra igényelte, a lajstromozó állam vagy az Európai Gazdasági Közösség regisztráló hatósága az egyes blokkokból egyéni légijármű címzést jelöl ki a légijármű részére.
5.2 A légijármű címzéseket a következő alapelveknek megfelelően kell a légijárművek részére kijelölni:
a) egyidőben egy címzés csak egy légijármű részére jelölhető ki;

b) egy légijármű számára csak egy címzés jelölhető ki, tekintet nélkül a légijármű fedélzeten lévő berendezés kompozíciókra;
c) a címzést változtatni nem lehet, különleges körülményektől eltekintve, és repülés alatt nem változtatható;
d) amikor egy légijármű megváltoztatja lajstromozó államát, az előzőleg kijelölt címzést le kell adni és az új lajstromozó hatóságnak egy új címzést kell részére kijelölni;
e) a címzés kizárólag technikai szerepet tölt be a légijármű címzésében és azonosításában, és semmilyen specifikus információ továbbítására nem használható; és
f) a 24 NULLA-ból vagy 24 EGY-esből összeállított címzéseket nem lehet légijárművek részére kijelölni.

6. Légijármű címzések alkalmazása

6.1 A légijármű címzéseket olyan alkalmazásokban lehet felhasználni, amelyek információ irányítást igényelnek az egyes, alkalmasan felszerelt légijárművek részére vagy részéről.
1. Megjegyzés. - Ilyen alkalmazásokra példák a légiforgalmi távközlési hálózat (ATN), S-módú másodlagos légtérellenőrző radar és az összeütközési veszélyt jelző fedélzeti rendszer (ACAS).
2. Megjegyzés. - Ez a Szabvány nem zárja ki légijármű címzések kijelölését az olyan speciális alkalmazásokra, amelyek az általános alkalmazásokhoz kapcsolódnak, és abban meghatározottak. Példák az ilyen alkalmazásokra a 24-bites címzés felhasználása a pszeudo-légiforgalmi földi állomásnál a légiforgalmi mozgó-műholdas szolgálat földi telepítésű földi állomásának ellenőrzésére, és az állandó-helyű S-módú válaszjeladóknál való alkalmazás (a "földön" állapot jelzésére, ahogy az az Annex 10, IV. Kötete 3.1.2.6.10.1.2 pontjában meghatározásra került) az S-módú földi állomás működésének ellenőrzésére. A speciális alkalmazások címzés kijelölését az Állam által a 24-bites légijármű címzések kijelölésére meghatározott eljárásnak megfelelően kell elvégezni.
6.2 A 24 NULLA-ból álló címzés semmilyen alkalmazásnál nem használható fel.

7. Az ideiglenes légijármű címzések kijelölésének intézése

7.1 Egy légijármű részére ideiglenes cím kivételes körülmények esetén kerül kijelölésre, mint például akkor, ha az üzemeltetők nem képesek a címzést beszerezni a saját Államuk Lajstromozó Hatóságától, vagy az Európai Gazdasági Közösség lajstromozó hatóságától a kellő időben történő módon. Az ICAO-nak az ideiglenes címzést a 9-1. táblázatban bemutatott ICAO blokkból kell kijelölni.
7.2 Az ideiglenes címzés kérésekor a légijármű üzemeltetőjének meg kell adni az ICAO-nak: a légijármű azonosító jelét, a típusát és a légijármű gyártóját, az üzemeltető nevét és címét, valamint a kérés okának magyarázatát.
7.2.1 Az ideiglenes címzésnek a légijármű járatói részére történő kiadásakor az ICAO tájékoztatni fogja a Lajstromozó Államot az ideiglenes címzés kiadásáról, az okáról és érvényességi idejéről.
7.3 A légijármű üzemeltetője:
a) Tájékoztatni fogja a Lajstromozó Államot az ideiglenes kijelölésről és megismétli az állandó címzés iránti kérését; és
b) Tájékoztatja a légijármű gyártóját.
7.4 Amikor a légijármű a Lajstromozó Hatóságától az állandó címzést megkapja, akkor az üzemeltetőnek:
a) Késés nélkül tájékoztatnia kell az ICAO-t;
b) Le kell mondania az ideiglenes címzésről; és
c) Elrendeznie az érvényes egyedi címzésnek a bekódolását 180 naptári napon belül.
7.5 Ha az állandó címet egy éven belül nem kapja meg, akkor a légijármű üzemeltetőjének újra kérnie kell egy új ideiglenes légijármű címzést. Semmilyen esetben sem használhat egy ideiglenes légijármű címzést a légijármű üzemeltetője egy évnél tovább.

9-1. táblázat. Légijármű címzések kiosztása az Államoknak

Megjegyzés. – A 24 bites címzés sémák baloldali oszlopa a címzés legmagasabb helyiértékű bitjét (MSB) reprezentálja.

Állam	Címzések száma a blokkban					A címzés blokkok kiosztása (egy vonás egy 0-val vagy 1-gyel egyenlő bit értéket képvisel)					
	1024	4096	32768	262144	1048576						
Afganisztán			+			0111	00	000	000	- -	- - - - - - - - - -
Albánia		+				0101	00	000	001	00	- - - - - - - - - -

Algéria			+		0000	10	100	- - -	- -	- - - - - - - - - -
Angola		+			0000	10	010	000	- -	- - - - - - - - - -
Antigua és Barbuda	+				0000	11	001	010	00	- - - - - - - - - -
Argentína				+	1110	00	- - -	- - -	- -	- - - - - - - - - -
Örményország	+				0110	00	000	000	00	- - - - - - - - - -
Ausztrália				+	0111	11	- - -	- - -	- -	- - - - - - - - - -
Ausztria			+		0100	01	000	- - -	- -	- - - - - - - - - -
Azerbajdzsán	+				0110	00	000	000	10	- - - - - - - - - -
Bahamas		+			0000	10	101	000	- -	- - - - - - - - - -
Bahrain		+			1000	10	010	100	- -	- - - - - - - - - -
Banglades		+			0111	00	000	010	- -	- - - - - - - - - -
Barbados	+				0000	10	101	010	00	- - - - - - - - - -
Belorusszia	+				0101	00	010	000	00	- - - - - - - - - -
Belgium			+		0100	01	001	- - -	- -	- - - - - - - - - -
Belize	+				0000	10	101	011	00	- - - - - - - - - -
Benin	+				0000	10	010	100	00	- - - - - - - - - -
Bhutan	+				0110	10	000	000	00	- - - - - - - - - -
Bolívia		+			1110	10	010	100	- -	- - - - - - - - - -
Bosznia-Hercegovina	+				0101	00	010	011	00	- - - - - - - - - -
Botswana	+				0000	00	110	000	00	- - - - - - - - - -
Brazília				+	1110	01	- - -	- - -	- -	- - - - - - - - - -
Brunei Darussalam	+				1000	10	010	101	00	- - - - - - - - - -
Bulgária		+			0100	01	010	- - -	- -	- - - - - - - - - -
Burkina Faso		+			0000	10	011	100	- -	- - - - - - - - - -

Burundi		+			0000	00	110	010	- -	- - - - - - - - - -
Kambodzsa		+			0111	00	001	110	- -	- - - - - - - - - -
Kamerun		+			0000	00	110	100	- -	- - - - - - - - - -
Kanada				+	1100	00	- - -	- - -	- -	- - - - - - - - - -
Cape Verde	+				0000	10	010	110	00	- - - - - - - - - -
Közép-Afrikai Köztársaság		+			0000	01	101	100	- -	- - - - - - - - - -
Csád		+			0000	10	000	100	- -	- - - - - - - - - -
Chile		+			1110	10	000	000	- -	- - - - - - - - - -
Kína				+	0111	10	- - -	- - -	- -	- - - - - - - - - -
Kolumbia		+			0000	10	101	100	- -	- - - - - - - - - -
Comoros	+				0000	00	110	101	00	- - - - - - - - - -
Kongó		+			0000	00	110	110	- -	- - - - - - - - - -
Cook-szigetek	+				1001	00	000	001	00	- - - - - - - - - -
Costa Rica		+			0000	10	101	110	- -	- - - - - - - - - -
Cote D’Ivoire		+			0000	00	111	000	- -	- - - - - - - - - -
Horvátország	+				0101	00	000	001	11	- - - - - - - - - -
Kuba		+			0000	10	110	000	- -	- - - - - - - - - -
Ciprus	+				0100	11	001	000	00	- - - - - - - - - -
Cseh Köztársaság			+		0100	10	0011	- - -	- -	- - - - - - - - - -
Koreai NDK			+		0111	00	100	- - -	- -	- - - - - - - - - -
Kongói Demokratikus Köztársaság		+			0000	10	001	100	- -	- - - - - - - - - -
Dánia			+		0100	01	011	- - -	- -	- - - - - - - - - -
Diibouti	+				0000	10	011	000	00	- - - - - - - - - -
Dominikai Köztársaság		+			0000	11	000	100	- -	- - - - - - - - - -

Ecuador		+			1110	10	000	100	- -	- - - - - - - - - -
Egyiptom			+		0000	00	010	- - -	- -	- - - - - - - - - -
El Salvador		+			0000	10	110	010	- -	- - - - - - - - - -
Egyenlítői Guinea		+			0000	01	000	010	- -	- - - - - - - - - -
Eritrea	+				0010	00	000	010	00	- - - - - - - - - -
Észtország	+				0101	00	010	001	00	- - - - - - - - - -
Etiópia		+			0000	01	000	000	- -	- - - - - - - - - -
Fizsi szigetek		+			1100	10	001	000	- -	- - - - - - - - - -
Finnország			+		0100	01	100	- - -	- -	- - - - - - - - - -
Franciaország				+	0011	10	- - -	- - -	- -	- - - - - - - - - -
Gabon		+			0000	00	111	110	- -	- - - - - - - - - -
Gambia		+			0000	10	011	010	- -	- - - - - - - - - -
Grúzia	+				0101	00	010	100	00	- - - - - - - - - -
Németország				+	0011	11	- - -	- - -	- -	- - - - - - - - - -
Ghana		+			0000	01	000	100	- -	- - - - - - - - - -
Görögország			+		0100	01	101	- - -	- -	- - - - - - - - - -
Grenada	+				0000	11	001	100	00	- - - - - - - - - -
Guatemala		+			0000	10	110	100	- -	- - - - - - - - - -
Guinea		+			0000	01	000	110	- -	- - - - - - - - - -
Guinea-Bissau	+				0000	010	001	000	00	- - - - - - - - - -
Guyana		+			0000	10	110	110	- -	- - - - - - - - - -
Haiti		+			0000	10	111	000	- -	- - - - - - - - - -
Honduras		+			0000	10	111	010	- -	- - - - - - - - - -
Magyarország			+		0100	01	110	- - -	- -	- - - - - - - - - -
Izland		+			0100	11	001	100	- -	- - - - - - - - - -

India				+	1000	00	- - -	- - -	- -	- - - - - - - - - -
Indonézia			+		1000	10	100	- - -	- -	- - - - - - - - - -
Irán, Iszlám Köztársaság			+		0111	00	110	- - -	- -	- - - - - - - - - -
Irak			+		0111	00	101	- - -	- -	- - - - - - - - - -
Írország		+			0100	11	001	010	- -	- - - - - - - - - -
Izrael			+		0111	00	111	- - -	- -	- - - - - - - - - -
Olaszország				+	0011	00	- - -	- - -	- -	- - - - - - - - - -
Jamaica		+			0000	10	111	110	- -	- - - - - - - - - -
Japán				+	1000	01	- - -	- - -	- -	- - - - - - - - - -
Jordánia			+		0111	01	000	- - -	- -	- - - - - - - - - -
Kazahsztán	+				0110	10	000	011	00	- - - - - - - - - -
Kenya		+			0000	01	001	100	- -	- - - - - - - - - -
Kiribati	+				1100	10	001	110	00	- - - - - - - - - -
Kuwait		+			0111	00	000	110	- -	- - - - - - - - - -
Kirgízia	+				0110	00	000	001	00	- - - - - - - - - -
Laosz Népi Demokratikus Köztársaság		+			0111	00	001	000	- -	- - - - - - - - - -
Lettország	+				0101	00	000	010	11	- - - - - - - - - -
Libanon			+		0111	01	001	- - -	- -	- - - - - - - - - -
Lesotho	+				0000	01	001	010	00	- - - - - - - - - -
Liberia		+			0000	01	010	000	- -	- - - - - - - - - -
Líbia			+		0000	00	011	- - -	- -	- - - - - - - - - -
Litvánia	+				0101	00	000	011	11	- - - - - - - - - -
Luxemburg	+				0100	11	010	000	00	- - - - - - - - - -
Madagaskar		+			0000	01	010	100	- -	- - - - - - - - - -

Malawi		+		0000	01	011	000	- -	- - - - - - - - - -
Malaysia			+	0111	01	010	- - -	- -	- - - - - - - - - -
Maldiv szigetek	+			0000	01	011	010	00	- - - - - - - - - -
Mali		+		0000	01	011	100	- -	- - - - - - - - - -
Malta	+			0100	11	010	010	00	- - - - - - - - - -
Marshall szigetek	+			0110	00	000	000	00	- - - - - - - - - -
Mauritania	+			0000	01	011	110	00	- - - - - - - - - -
Mauritius	+			0000	01	100	000	00	- - - - - - - - - -
Mexico		+		0000	11	010	- - -	- -	- - - - - - - - - -
Micronesia	+			0110	10	000	001	00	- - - - - - - - - -
Monaco	+			0100	11	010	100	00	- - - - - - - - - -
Mongólia	+			0110	10	000	010	00	- - - - - - - - - -
Marokkó			+	0000	00	100	- - -	- -	- - - - - - - - - -
Mozambik		+		0000	00	000	110	- -	- - - - - - - - - -
Myanmar		+		0111	00	000	100	- -	- - - - - - - - - -
Namíbia	+			0010	00	000	001	00	- - - - - - - - - -
Nauru	+			1100	10	001	010	00	- - - - - - - - - -
Nepal		+		0111	00	001	010	- -	- - - - - - - - - -
Hollandia			+	0100	10	000	- - -	- -	- - - - - - - - - -
Új-Zéland			+	1100	10	000	- - -	- -	- - - - - - - - - -
Nicaragua			+	0000	11	000	000	- -	- - - - - - - - - -
Niger		+		0000	01	100	010	- -	- - - - - - - - - -
Nigéria		+		0000	01	100	100	- -	- - - - - - - - - -
Norvégia			+	0100	01	111	- - -	- -	- - - - - - - - - -

Oman	+				0111	00	001	100	00	- - - - - - - - - -
Pakisztán			+		0111	01	100	- - -	- -	- - - - - - - - - -
Palau	+				0110	10	000	100	00	- - - - - - - - - -
Panama		+			0000	11	000	010	- -	- - - - - - - - - -
Pápua Új-Guinea		+			1000	10	011	000	- -	- - - - - - - - - -
Paraguay		+			1110	10	001	000	- -	- - - - - - - - - -
Peru		+			1110	10	001	100	- -	- - - - - - - - - -
Fülöp-szigetek			+		0111	01	011	- - -	- -	- - - - - - - - - -
Lengyelország			+		0100	10	001	- - -	- -	- - - - - - - - - -
Portugália			+		0100	10	010	- - -	- -	- - - - - - - - - -
Qatar	+				0000	01	101	010	00	- - - - - - - - - -
Koreai Köztársaság			+		0111	00	011	- - -	- -	- - - - - - - - - -
Moldova	+				0101	00	000	100	11	- - - - - - - - - -
Románia			+		0100	10	100	- - -	- -	- - - - - - - - - -
Oroszország				+	0001	- -	- - -	- - -	- -	- - - - - - - - - -
Ruanda		+			0000	01	101	110	- -	- - - - - - - - - -
Saint Lucia	+				1100	10	001	100	00	- - - - - - - - - -
Saint Vincent és Grenadines	+				0000	10	111	100	00	- - - - - - - - - -
Samoa	+				1001	00	000	010	00	- - - - - - - - - -
San Marino	+				0101	00	000	000	00	- - - - - - - - - -
Sao Tome és Principe	+				0000	10	011	110	00	- - - - - - - - - -
Szaud Arábia			+		0111	00	010	- - -	- -	- - - - - - - - - -
Szenegál		+			0000	01	110	000	- -	- - - - - - - - - -
Seychelles	+				0000	01	110	100	00	- - - - - - - - - -

Sierra Leone	+				0000	01	110	110	00	- - - - - - - - - -
Szingapur			+		0111	01	101	- - -	- -	- - - - - - - - - -
Szlovákia	+				0101	00	000	101	11	- - - - - - - - - -
Szlovénia	+				0101	00	000	110	11	- - - - - - - - - -
Salamon szigetek	+				1000	10	010	111	00	- - - - - - - - - -
Románia		+			0000	01	111	000	- -	- - - - - - - - - -
Dél-Afrika			+		0000	00	001	- - -	- -	- - - - - - - - - -
Spanyolország				+	0011	01	- - -	- - -	- -	- - - - - - - - - -
Sri Lanka			+		0111	01	110	- - -	- -	- - - - - - - - - -
Szudán		+			0000	01	111	100	- -	- - - - - - - - - -
Suriname		+			0000	11	001	000	- -	- - - - - - - - - -
Swaziland	+				0000	01	111	010	00	- - - - - - - - - -
Svédország			+		0100	10	101	- - -	- -	- - - - - - - - - -
Svájc			+		0100	10	110	- - -	- -	- - - - - - - - - -
Szíriai Köztársaság			+		0111	01	111	- - -	- -	- - - - - - - - - -
Tadzsikisztán	+				0101	00	010	101	00	- - - - - - - - - -
Thaiföld			+		1000	10	000	- - -	- -	- - - - - - - - - -
Előző Jugoszlávia Macedónia	+				0101	00	010	010	00	- - - - - - - - - -
Togó		+			0000	10	001	000	- -	- - - - - - - - - -
Tonga	+				1100	10	001	101	00	- - - - - - - - - -
Trinidad és Tobago		+			0000	11	000	110	- -	- - - - - - - - - -
Tunézia			+		0000	00	101	- - -	- -	- - - - - - - - - -
Törökország			+		0100	10	111	- - -	- -	- - - - - - - - - -
Türkménia	+				0110	00	000	001	10	- - - - - - - - - -

Uganda		+				0000	01	101	000	--	----------
Ukrajna			+			0101	00	001	---	--	----------
Egyesült Arab Emirátusok		+				1000	10	010	110	--	----------
Egyesült Királyság				+		0100	00	---	---	--	----------
Tanzánia		+				0000	10	000	000	--	----------
Egyesült Államok					+	1010	--	---	---	--	----------
Uruguay		+				1110	10	010	000	--	----------
Üzbegisztán	+					0101	00	000	111	11	----------
Vanuatu	+					1100	10	010	000	00	----------
Venezuela			+			0000	11	011	---	--	----------
Vietnam			+			1000	10	001	---	--	----------
Jemen		+				1000	10	010	000	--	----------
Zambia		+				0000	10	001	010	--	----------
Zimbabwe	+					0000	00	000	100	00	----------
Nem szerződő államok											----------
Jugoszlávia			+			0100	11	000	---	--	----------
ICAO[1]			+			1111	00	000	---	--	----------
ICAO[2]	+					1000	10	011	001	00	----------
ICAO[2]	+					1111	00	001	001	00	----------

1. Ezt a blokkot az ICAO kezeli az ideiglenes légijármű címzések kijelölésére, ahogy az a 7. részben leírásra került.
2. Repülésbiztonság érdekében speciális felhasználásra kiosztott blokk.

10. FEJEZET. PONTBÓL-TÖBB-PONTBA KOMMUNIKÁCIÓ

10.1 REPÜLÉSI INFORMÁCIÓK MŰHOLDON KERESZTÜLI TERJESZTÉSÉT VÉGZŐ SZOLGÁLTATÁS

10.1.1 A Pontból-Több-pontba műholdon keresztüli távközlési szolgáltatás a repülési információk terjesztésének elősegítésére szünet nélküli, nem előre lefoglalható, védett szolgáltatáson alapszik a vonatkozó CCITT Ajánlásokban definiáltaknak megfelelően.

10.2 A TERÜLETI ELŐREJELZŐ VILÁGRENDSZER /WAFS/ ELŐREJELZÉSEK MŰHOLDON KERESZTÜLI TERJESZTÉSÉT VÉGZŐ SZOLGÁLTATÁS

10.2.1 **Ajánlás.** – *Rendszerjellemzők a következőket foglalják magukba:*
a) frekvencia – C-sáv, földtől-műholdhoz, 6 GHz-es sáv, műholdtól-földre, 4 GHz-es sáv;
b) kapacitás nem kisebb, mint 9600 bit/s tényleges jelsebességgel;
c) bit hiba-arány – jobb, mint 1 a 10^7 esetben;
d) vevő-oldali hibajavítás; és
e) 99,95 százalékos rendelkezésre állás.

11. FEJEZET. RÖVIDHULLÁMÚ /HF/ ADATKAPCSOLAT

11.1 MEGHATÁROZÁSOK ÉS RENDSZER TELJESÍTŐKÉPESSÉGEK

Megjegyzés. – A következő Szabványok és Ajánlott Gyakorlatok a Rövidhullámú adatkapcsolatra (HFDL) jellemzőek, és kiegészítésként szolgálnak a Nemzetközi Távközlési Unió /ITU/ Nemzetközi Rádió-Rendszabályzatban (27. Függelék) meghatározott követelményekhez. A Rövidhullámú adatkapcsolat /HFDL/ a Légiforgalmi Távközlési Hálózat (ATN) egy lényeges mozgó alhálózata és a légiforgalmi mozgó szolgálat (R) rövidhullámú frekvenciasávjaiban működik. Ezenkívül még a HFDL nem-légiforgalmi távközlési hálózati ATN funkciókat is tud biztosítani, például a közvetlen kapcsolat szolgáltatást (DLS). A HFDL rendszernek lehetővé kell tenni a légijármű adat-cseréjét a földi bázisú felhasználókkal.

11.1.1 Meghatározások

Kódolt chip *(Coded chip).* Az ½ vagy ¼ mértékű konvolúciós kód kódolónak az „1” vagy a „0” kimenete.
A kijelölt üzemeltetési fedésterület (DOC) területe *(Designated operational coverage (DOC) area).* Az a terület, amelyen belül egy adott szolgáltatást biztosítanak, és amelyen belül a szolgáltatásra frekvencia védelem biztosított.
Megjegyzés. – Ez a terület a megfelelő koordinációjú frekvencia védelem biztosítása után kiterjedhet a Nemzetközi Rádió-Rendszabályzat 27. Függelékében található kijelölési területen túlra.
Közvetlen kapcsolat szolgáltatás (DLS) *(Direct link service (DLS).* Adatátviteli mód, amely nem próbálja automatikusan kijavítani az észlelt vagy nem-észlelt hibákat, a levegő-föld adatátviteli irányú kapcsolat rétegénél. (A hiba ellenőrzést a vég-felhasználói rendszerek hajtják végre.)
Rövidhullámú hálózati protokoll adat egység (HFNPDU) *High frequency network protocol data unit (HFNPDU).* A felhasználói adat csomag.
Kapcsolat protokoll adat egység (LPDU) *(Link protocol data unit (LPDU)).* Adat egység, amely a HFNPDU egy szegmensét zárja magába.
Adathordozó hozzáférési protokoll adat egység (MPDU) *(Media access protocol data unit (MPDU).* Adat egység, amely egy vagy több kapcsolat protokoll adat egységet zár magába.
M-együtthatójú digitális fázis-billentyűzéses (M-PSK) moduláció *(M-ary phase shift keying (M-PSK) modulation).* Digitális fázis-moduláció, amely létrehozza azt, hogy a vivőhullám hullám-formájának fázisa az M-érték-sorozat valamelyikét felvegye.
M-PSK jel *(M-PSK symbol).* Az M-PSK modulációs vivőhullám lehetséges ’M’ fázis-eltolásának egyike, ami a $\log_2$ M kódolt chip-ek csoportját jelképezi.
Modulációs csúcs-teljesítmény (PEP) *(Peak envelope power (PEP)).* Az adó által az antenna tápvonalába betáplált modulált jel csúcs-teljesítménye.
Fizikai réteg protokoll adat egység (PPDU) *(Physical layer protocol data unit (PPDU)).* A fizikai réteghez leadásra továbbított vagy a vétel után a fizikai réteg által dekódolt adat egység.
A szolgáltatás minősége (QOS) *(Quality of service (QOS)).* Az adatátviteli jellemzőkre vonatkozó azon információ,

amelyet a különféle összeköttetési protokollok által a hálózat felhasználók részére biztosított teljesítmény különböző szintjének eléréséhez használnak.
Megbízható kapcsolat szolgáltatás (RLS) *(Reliable link service (RLS)).* Az alhálózat által nyújtott olyan adat-csere szolgáltatás, amely az összeköttetéseire automatikusan biztosítja a hiba-ellenőrzést, a hiba érzékelésével és a hibásnak talált elemi jelek kért adás-ismétlésével.
Szkvitter protokoll adat egység (SPDU) *(Squitter protocol data unit (SPDU)).* A rövidhullámú adatkapcsolat (HFDL) földi állomásai által minden egyes üzemelési frekvenciájukon 32 másodpercenként kisugárzott azon adat egység, amely a kapcsolat kezelési információkat foglalja magába.

11.2 A RÖVDHULLÁMÚ /HF/ ADATKAPCSOLAT RENDSZER

11.2.1 A rendszer felépítése

A rövidhullámú adatkapcsolat /HFDL/ rendszernek egy vagy több olyan földi és légijármű fedélzeti alrendszerből kell állni, amelyek rendelkeznek a HFDL protokollal (lásd a 11.3 pontot). A HFDL rendszernek magába kell foglalnia egy földi kezelő alrendszert is (lásd a 11.4 pontot).

11.2.1.1 A LÉGIJÁRMŰ FEDÉLZETI ÉS FÖLDI ÁLLOMÁSOK ALRENDSZEREI
A rövidhullámú adatkapcsolat /HFDL/ légijármű fedélzeti állomások alrendszereinek és a HFDL földi állomások alrendszereinek a következő funkciókat kell magukba foglalniuk:
a) Rövidhullámú /HF/ adás és vétel;
b) Adat moduláció és demoduláció; és
c) A HFDL protokollal és a frekvencia választással való rendelkezés.

11.2.2 Üzemeltetési fedésterület

A rövidhullámú adatkapcsolat /HFDL/ frekvencia kijelöléseknek a kijelölt üzemeltetési fedésterületek /DOC/ teljes egészében védettnek kell lenni.
1. Megjegyzés. – A kijelölt üzemeltetési fedésterületek (DOC) területei eltérőek lehetnek az ITU Nemzetközi Rádió-Rendszabályzatának S27 Függelékében meghatározott jelenlegi MWARA /a Világ Fő Légiútvonalainak Területe/ vagy RDARA /Körzeti és Belföldi Légiútvonalak Területe/ kijelölt területektől.
2. Megjegyzés. – Kiegészítő koordinációra van szükség az ITU-val az olyan esetekben, amikor a DOC területek nincsenek összhangban az ITU Nemzetközi Rádió-Rendszabályzatának meghatározottan felosztott területekkel.

11.2.3 A rövidhullámú adatkapcsolat /HFDL/ berendezésekkel való felszereltségi követelmény

A rövidhullámú adatkapcsolati /HFDL/ berendezésekkel való kötelező felszereltség követelményt a körzeti léginavigációs egyezmények alapján kell előírni, amelyek meghatározzák az üzemeltetés légterét és a bevezetés idő-rendjét.

11.2.3.1 ÉRTESÍTÉS
A fenti egyezményeknek legkevesebb két éves előzetes értesítést kell biztosítani a légijármű fedélzeti rendszerek kötelező felszereléséhez.

11.2.4 A földi állomások hálózatba szervezése

11.2.4.1 **Ajánlás. –** *A rövidhullámú adatkapcsolat /HFDL/ földi állomások alrendszereit egy közös földi kezelő alrendszeren keresztül össze lehet kapcsolni.*

Megjegyzés. – Ez egy elosztott alhálózatot biztosít egy alhálózat csatlakozási ponttal (SNPA) a megvalósítás módjától függően, ami lehetővé teszi a virtuális áramköri kapcsolatoknak légijármű állomásokként való fenntartását a kijelölt *üzemeltetési fedésterületek közötti átmenetnél. Az elosztás lehet körzetek közötti vagy világméretű.*

11.2.5 A földi állomások szinkronizálása

A rövidhullámú adatkapcsolat /HFDL/ földi állomás alrendszerek szinkronizálásának az UTC-hez viszonyítottan ±25 ms-on belül kell lenni. Bármely olyan állomásról, amely nem az UTC-hez viszonyított ±25 ms-on belül működik, a megfelelő figyelmeztetést kell kiadni az összes légijármű és földi állomás alrendszer részére, hogy a folyamatos rendszer működés lehetséges legyen.

11.2.6 A szolgáltatás minősége

11.2.6.1 CSOMAG MARADÉK-HIBA ARÁNY

A felderítetlen hiba aránynak egy olyan hálózati felhasználói csomagnál, amely a felhasználói adat 1. és 128. közötti oktettjét foglalja magába, az 1 a 10^6-nál kevesebbnek vagy azzal egyenlőnek kell lenni.

11.2.6.2 A SZOLGÁLATÁS SEBESSÉGE

A hálózati felhasználói csomagoknál (128 oktett) az átviteli és továbbítási késések az I. Kötet, 4. Fejezetének 4-26. táblázatában a 7.-től a 14.-ig terjedő közlemény elsőbbségekre meghatározott prioritás nem haladhatja meg a 11-1. táblázatban megadott értékeket.

11-1. táblázat. Továbbítási késések

	Irány	*Prioritás*	*Késés*
Átviteli késés	A légijárműhöz	7-től 14-ig	45 s
	A légijárműtől	7 -től 14-ig	60 s
Továbbítási késés (95 százalékos)	A légijárműhöz	11-től 14-ig 7-től 10-ig	90 s 120 s
	A légijárműtől	11-től 14-ig 7 -től 10-ig	150 s 250 s

11.3 RÖVIDHULLÁMÚ ADATKAPCSOLAT /HFDL/ PROTOKOLL

A rövidhullámú adatkapcsolat /HFDL/ protokollnak egy fizikai rétegből, egy kapcsolat rétegből és egy alhálózat rétegből kell állnia az alábbiak szerint.

Megjegyzés. – A rövidhullámú adatkapcsolat /HFDL/ protokoll egy rétegelt protokoll, és kompatibilis a nyílt rendszerek összekapcsolása (OSI) referencia modellel. Ez lehetővé teszi a HFDL részére azt, hogy a légiforgalmi távközlési hálózat (ATN) kompatibilis alhálózataként működjön. A protokoll részletes leírását a Rövidhullámú /HF/ Adatkapcsolat Kézikönyv *(Doc 9741) tartalmazza.*

11.3.1 A fizikai réteg rádiófrekvenciás /RF/ jellemzői

A légijármű fedélzeti és a földi állomások a fizikai adathordozó működéséhez szimplex módon férnek hozzá.

11.3.1.1 FREKVENCIA SÁVOK

A rövidhullámú adatkapcsolati /HFDL/ berendezéseknek képeseknek kell lenniük arra, hogy bármelyik olyan Egy-oldalsávos (SSB) vivőhullám (referencia) frekvencián működjenek, amely a légiforgalmi mozgó (R) szolgálat részére áll rendelkezésre a 2,8-tól a 22 MHz-ig terjedő sávcsoportban, és megfelel a Nemzetközi Rádió-Rendszabályzat vonatkozó előírásainak.

11.3.1.2 CSATORNÁK

A csatorna felhasználásnak összhangban kell lenni az ITU Nemzetközi Rádió-Rendszabályzat S27 Függelékében lévő vivőhullám /referencia/ frekvencia táblázattal.

11.3.1.3 HANGOLÁS

A berendezéseknek képesnek kell lenniük arra, hogy az 1 kHz egészszámú többszörösén működjenek.

11.3.1.4 OLDALSÁV

Az átvitelre használt oldalsávnak a vivőhullám (referencia) frekvencia magasabb oldalán kell lenni.

11.3.1.5 MODULÁCIÓ

A rövidhullámú adatkapcsolatnak /HFDL/ az M-együtthatójú digitális fázis-eltolásos módot (M-PSK) kell alkalmazni a kijelölt frekvencia rádiófrekvenciás vivőhullámának modulálására. A jel-sebességnek másodpercenként 1800 jelnek kell lenni ± 10 rész per millió résszel /ppm/ (azaz 0,018 jel másodpercenként). Az M értéke és az információs adat sebessége a 11-2. táblázatban meghatározott lesz.

11-2. táblázat. M értéke és az információs adat sebesség

M	*Információs adat-sebesség (bit másodpercenként)*
2	300 vagy 600
4	1 200
8	1 800

Megjegyzés. – Ha az M egyenlő a 2 értékkel, akkor az adat-sebesség másodpercenként 300 vagy 600 bit lehet, ahogy azt a csatorna kódolási sebessége meghatározza. Az M értéke az egyik adat-átvitelről a másikra megváltozhat a kiválasztott adat-sebességtől függően. A csatorna kódolási sebesség a Rövidhullámú /HF/ Adatkapcsolat Kézikönyv*-ben (Doc 9741) került leírásra.*

11.3.1.5.1 *M-PSK VIVŐHULLÁM*

Az M-PSK vivőhullámot matematikailag kifejezve a következők szerint kell meghatározni:

$s(t) = A\Sigma(p(t-kT)\cos[2\pi f_0 t + \varphi(k)])$, $k = 0, 1 \ldots, N-1$

ahol:

N = Az M-PSK jelek száma a továbbított fizikai réteg protokoll adat egységben (PPDU)

s (t) = Az analóg hullámforma vagy jel a 't' időben

A = Csúcs amplitúdó

f_0 = Az SSB vivőhullám (referencia) + 1 440 Hz

T = M-PSK jel periódus (1/1 800 s)

φ (k) = A k-ik M-PSK jel fázisa

p (t-kT) = A k-ik M-PSK jel impulzus alakja a 't' időben

Megjegyzés. – Az elküldött jelek száma, az N, határozza meg a fizikai réteg protokoll adat egység /PPDU/ hosszát (időtartam = NT másodperc). Ezek a paraméterek a Rövidhullámú /HF/ Adatkapcsolat Kézikönyv*-ben (Doc 9741) kerültek meghatározásra.*

11.3.1.5.2 *IMPULZUS ALAK*

Az impulzus alak, p(t), fogja meghatározni a kisugárzott jel spektrális eloszlását. Az impulzus alak Fourier transzformáltját, a P(f)-t, a következők szerint kell meghatározni:

$P(f) = 1$,   ha $0 < |f| < (1 - b)/2T$

$P(f) = \cos\{\pi(2|f|T - 1 + b)/4b\}$,   ha $(1 - b)/2T < |f| < (1 + b)/2T$

$P(f) = 0$,   ha $|f| > (1 + b)/2T$

Ahol a spektrális határ paraméter, a b = 0,31, úgy került kiválasztásra, hogy a jel -20 dB-es pontjai az SSB vivőhullám (referencia) +290 Hz-es és az SSB vivőhullám (referencia) +2590 Hz-es értékeinél vannak, és a hullámforma csúcs - átlagos teljesítmény viszonya kisebb, mint 5 dB.

11.3.1.6 ADÓ STABILITÁS

Az adási funkció alap frekvenciája stabilitásának jobbnak kell lenni, mint:

a) ±20 Hz a rövidhullámú adatkapcsolat /HFDL/ légijármű fedélzeti állomás alrendszereknél; és

b) ±10 Hz a HFDL földi állomás alrendszereknél.

11.3.1.7 VEVŐ STABILITÁS

A vevő funkció alap frekvencia stabilitásának olyannak kell lenni, hogy a 11.3.1.6 pontban meghatározott adási funkció stabilitással együtt a földi és a légijármű fedélzeti funkciók között elért teljes frekvencia-különbség a szolgáltatásban ne haladja meg a 70 Hz-et.

11.3.1.8 VÉDELEM

A rövidhullámú adatkapcsolatnál /HFDL/ az azonos csatorna védelemre 15 dB-es megkívánt – nem-kívánt (D/U) jel-arányt kell alkalmazni a következők szerint:

a) Adat adat ellen;

b) Adat hang ellen; és

c) Hang adat ellen.

11.3.1.9 EMISSZIÓ OSZTÁLY

Az emisszió osztálynak a 2K80J2DEN-nek kell lenni.

11.3.1.10 KIJELÖLT FREKVENCIA

A HFDL-nél a kijelölt frekvenciának 1 400 Hz-el magasabbnak kell lennie az SSB vivőhullám (referencia) frekvenciánál.

Megjegyzés. – Egyezményesen a rövidhullámú adatkapcsolat /HFDL/ kijelölt frekvenciája 1 400 Hz-el el van tolva az SSB vivőhullám (referencia) frekvenciától. A HFDL M-PSK digitális modulációs vivőhulláma 1 440 Hz-el van eltolva az SSB vivőhullám (referencia) frekvenciától. A digitális modulációt teljes egészében magába foglalja az azonos teljes csatorna sávszélesség ugyanúgy, mint a hang jelet, és kielégíti az ITU Nemzetközi Rádió-Rendszabályzatok S27 Függelékének előírásait.

11.3.1.11 EMISSZIÓ HATÁRÉRTÉKEK

A Rövidhullámú adatkapcsolat /HFDL/ légijármű fedélzeti és földi állomások adói modulációs csúcsteljesítményének (Pp) bármely emisszióra és bármely diszkrét frekvenciára kevesebbnek kell lenni, mint az adó modulációs csúcs-teljesítményének (Pp), a következőknek megfelelően (lásd a 11-1. ábrát):
a) Bármilyen frekvencián a kijelölt HFDL frekvenciától az 1,5 kHz és a 4,5 kHz közötti tartománnyal alacsonyabb, és bármely frekvencián a kijelölt HFDL frekvenciától az 1,5 kHz és a 4,5 kHz közötti tartománnyal magasabb frekvencián: legalább 30 dB-el;
b) Bármilyen frekvencián a kijelölt HFDL frekvenciától a 4,5 kHz és a 7,5 kHz közötti tartománnyal alacsonyabb, és bármely frekvencián a kijelölt HFDL frekvenciától a 4,5 kHz és a 7,5 kHz közötti tartománnyal magasabb frekvencián: legalább 38 dB-el;
c) Bármely olyan frekvencián, ami a HFDL kijelölt frekvencia alatt 7,5 kHz-nél alacsonyabb frekvencia, és bármely olyan frekvencián, ami a HFDL kijelölt frekvencia felett 7,5 kHz-nél magasabb frekvencia:
1) A HFDL légijármű fedélzeti állomás adóira: 43 dB;
2) A HFDL földi állomás adóira az 50 W-ig, azt is beleértve:
$[43 + 10 \log_{10} P_p \text{ (W)}]$ dB; és
3) A HFDL földi állomás adóira, amelyek 50 W-nál nagyobb teljesítményűek: 60 dB.

11.3.1.12 TELJESÍTMÉNY

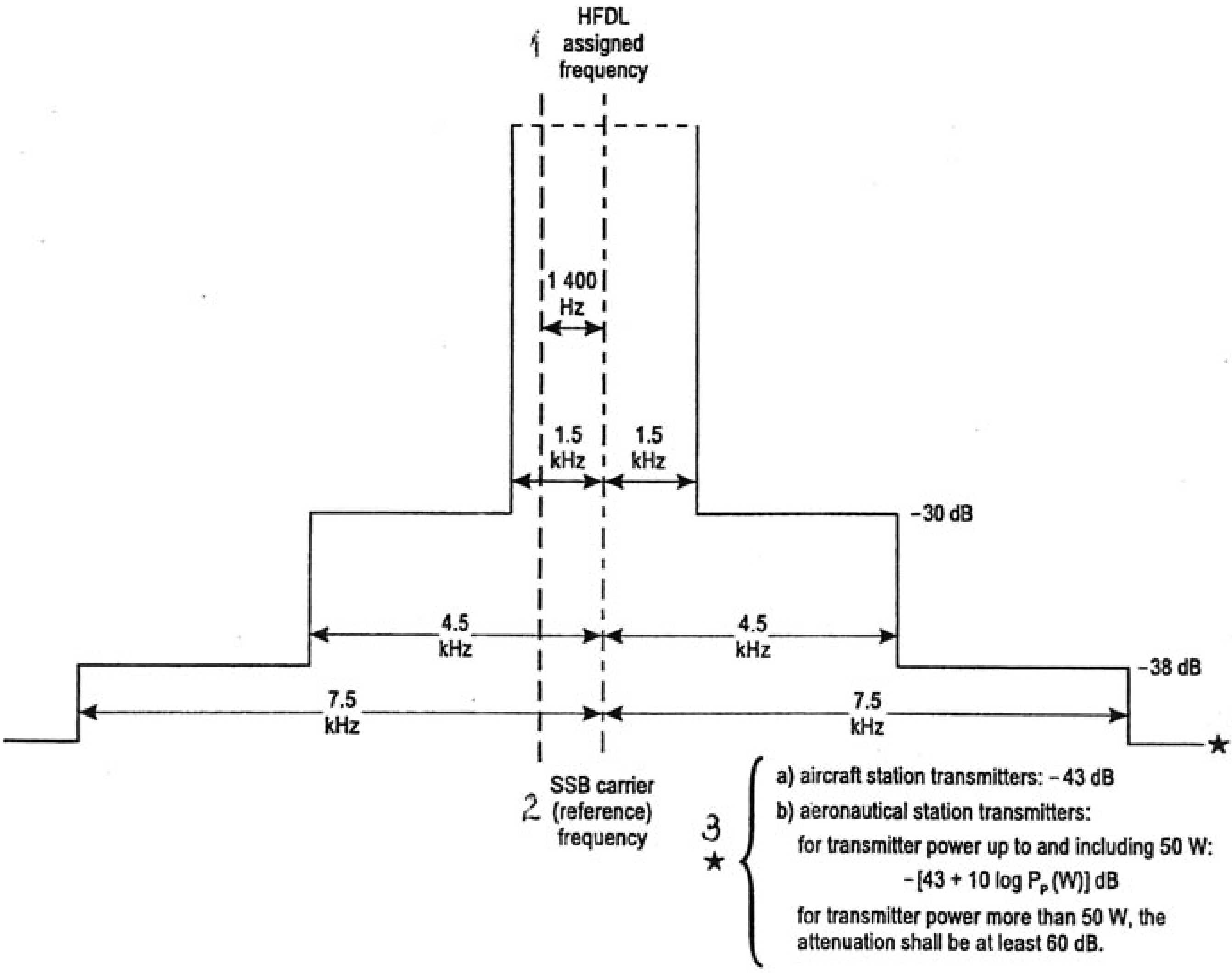
11.3.1.12.1 *A Földi állomás berendezései.* Az antenna tápvonalába betáplált modulációs csúcs-teljesítmény (Pp) nem haladhatja meg a 6 kW-os maximális értéket a Nemzetközi Rádió-Rendszabályzat S27 Függelékében megadottaknak megfelelően.
11.3.1.12.2 *Légijármű fedélzeti állomás berendezések.* Az antenna tápvonalába betáplált modulációs csúcs-teljesítmény (Pp) nem haladhatja meg a 400 W-os maximális értéket, kivéve azt, ami a Nemzetközi Rádió-Rendszabályzat S27/62 Függelékében megadásra került.

11.3.1.13 A NEM-KÍVÁNT JEL KISZŰRÉSE

A Rövidhullámú adatkapcsolat /HFDL/ légijármű fedélzeti és földi állomásainak vevőinél, a nem-kívánt bemenő jeleket a következőknek megfelelően kell csillapítani:
a) Az f_c és (f_c - 300 Hz) közötti, vagy az (f_c + 2 900 Hz) és az (f_c+3300 Hz) közötti bármely frekvencián: legalább 35 dB-el a kívánt jelszint csúcs alá; és
b) Bármely frekvencián az (f_c - 300 Hz) alatt, vagy az (f_c+3300 Hz) felett: legalább 60 dB-el a kívánt jelszint csúcs alá, ahol az f_c a vivőhullám (referencia) frekvencia.

11.3.1.14 A VEVŐ ÉRZÉKENYSÉGE A TRANZIENSEKRE

Ajánlás. – *A vételi funkciónak egy, az antenna végpontjánál fellépő 60 dB-es pillanatnyi rádiófrekvenciás teljesítmény növekedésből 10 milliszekundumon belül fel kell éledni. A vételi funkciónak egy, az antenna végpontjánál fellépő 60 dB-es pillanatnyi rádiófrekvenciás teljesítmény csökkenésből 25 milliszekundumon belül fel kell éledni.*



11-1. ábra: A Rövidhullámú adatkapcsolat /HFDL/ légijármű fedélzeti és földi állomásai adóira megkívánt spektrum határértékek (csúcs-teljesítményben kifejezve).

1 - Rövidhullámú adatkapcsolat /HFDL/ kijelölt frekvencia
2 - Egy-oldalsávos átvitel vivőhullám (referencia) frekvencia
3 - a) légijármű fedélzeti állomás adók: -43 dB
3 - b) légiforgalmi állomás adók:
Az 50 W-os és az alatti teljesítményű adóknál:
- [43+10 log P_P(W)] dB
az 50 W-nál nagyobb teljesítményű adóknál,
a csillapításnak legalább 60 dB-nek kell lenni.

11.3.2 Fizikai réteg funkciók

11.3.2.1 FUNKCIÓK

A fizikai réteg által biztosított funkcióknak a következőket kell magukba foglalni:

a) Adó és vevő vezérlés;

b) Adat-továbbítás; és
c) Adat vétel.

11.3.2.2 ADÓ ÉS VEVŐ VEZÉRLÉS

A Rövidhullámú adatkapcsolat /HFDL/ fizikai rétegének kell elvégezni az adó/vevő kapcsolást és a frekvencia hangolást úgy, ahogy azt a kapcsolat réteg utasítja. A fizikai rétegnek kell végrehajtania a kapcsolat rétegből eredő kérésre az adó billentyűzését a csomag továbbításához.

11.3.2.2.1 *ADÓ - VEVŐ ÁTFUTÁSI IDŐ*

A továbbítási teljesítmény szintnek az adás befejezése után 100 milliszekundumon belül legalább 10 dB-el le kell csengenie. Egy HFDL állomás alrendszernek képesnek kell lenni a névleges teljesítményével venni és demodulálni egy bejövő jelet a következő vételi rés megkezdése előtti 200 milliszekundumon belül.

11.3.2.2.2 *VEVŐ - ADÓ ÁTFUTÁSI IDŐ*

Egy HFDL állomás alrendszernek plusz vagy mínusz 1 dB-en belül biztosítania kell a névleges kimenő teljesítményét az antenna tápvonalába, az adási rés kezdetétől 200 milliszekundumon belül.

11.3.2.3 ADAT-ÁTVITEL

Az adat-átvitelt Időosztásos többszörös elérésű (TDMA) technikával kell végrehajtani. A HFDL adatkapcsolat földi állomás alrendszereinek fenn kell tartaniuk a TDMA keret és rés szinkronizálást a HFDL rendszer részére. Annak biztosítására, hogy a szinkronizálás fennmaradjon, az egyes HF adatkapcsolat modulátoroknak az adatok adását egy elő-billentyűző szegmenssel kell megkezdeni a rés-idő kezdeténél plusz vagy mínusz 10 milliszekundumon belül.

11.3.2.3.1 *A TDMA SZERKEZETE*

Minden egyes TDMA keretnek 32 másodpercesnek kell lenni. Az egyes TDMA kereteket tizenhárom egyenlő időtartamú résre kell felosztani, a következők szerint:
a) Az egyes TDMA keretek első rését fenn kell tartani a HFDL földi állomás alrendszerek általi, a Szkvitter protokoll adat egység /SPDU/ csomagokban lévő kapcsolat kezelési adatok sugárzása részére; és
b) A fennmaradó réseket ki kell jelölni egyrészt, mint fedélzetre irányuló adás réseket, másrészt, mint meghatározott HFDL légijármű fedélzeti állomások részére fenntartott, fedélzetről továbbított adat réseket, vagy mint fedélzetről leadott közvetlen hozzáférésű adat réseket az összes HFDL légijármű fedélzeti állomás alrendszerek általi felhasználásra, versenyhelyzeti alapon. Ezeket a TDMA réseket dinamikus alapon kell kijelölni a fenntartás, a lekérdezés és a tetszőleges hozzáférés kijelölési kombinációval.

11.3.2.3.2 *ADÁS*

A HFDL földi állomás alrendszerének egy Szkvitter protokoll adat egységet /SPDU/ kell sugározni 32 másodpercenként minden egyes üzemelési frekvenciáján.

Megjegyzés. – A TDMA keret és rés szerkezetének, az elő-billentyűző szegmensének, továbbá az adat szerkezetének – az SPDU-t is beleértve – a részletezését a Rövidhullámú Adatkapcsolat (HFDL) Kézikönyv *(Doc 9741) tartalmazza.*

11.3.2.4 AZ ADATOK VÉTELE

11.3.2.4.1 *FREKVENCIA KERESÉS*

Minden egyes HFDL légijármű fedélzeti állomásnak automatikusan keresnie kell a kijelölt frekvenciákat addig, amíg egy működési frekvenciát nem talál.

11.3.2.4.2 *A FIZIKAI RÉTEG PROTOKOLL ADAT EGYSÉGEK /PPDU-k/ VÉTELE*

A HF adatkapcsolat vevőnek kell biztosítania azoknak a PPDU-knak a detektálását, szinkronizálását, demodulálását és dekódolását, amelyek a 11.3.1.5 pontban meghatározott hullámforma szerint moduláltak, a következő torzításokon belül:
a) Az 1440 Hz-es hangfrekvenciás vivőhullám eltolásnál plusz vagy mínusz 70 Hz-el;
b) A nem folytonos és/vagy szórt több-utas torzításnál 5 ms-os több-utas szóródásig;
c) A több-utas amplitúdó elhalkulásnál /fading/ maximum 2 Hz-es két-oldalú RMS Doppler szóródásig és Rayleigh statisztikai szóródásig; és
d) Összetevődő Gauss eloszlású és széles-sávú gerjesztő zajt változó amplitúdóval és véletlenszerű érkezési idővel.

Megjegyzés. - Referencia a CCIR 549-2 Jelentés.

11.3.2.4.3 *A FIZIKAI RÉTEG PROTOKOLL ADAT EGYSÉGEK /PPDU-k/ DEKÓDOLÁSA*
A bevezető szegmens vétele után a vevőnek kell:
a) Meghatározni az adat-sorozat kezdetét;
b) Megmérni és helyesbíteni az adó és a vevő közötti Doppler eltolódást és az adó/vevő frekvencia-eltolódásokat;
c) Meghatározni az adat sebességet és az adat demoduláció során használatos összesorolási beállításokat,
d) Végrehajtani az M-PSK jel szinkronizációt; és
e) Irányítani a kiegyenlítő kört.
11.3.2.4.4 *SZINKRONIZÁCIÓ*
Minden egyes HFDL légijármű fedélzeti állomás alrendszernek szinkronizálnia kell a rés időzítését a megfelelő földi állomás rés-idejéhez az utolsó vett SPDU vételi idejéhez vonatkoztatva.
11.3.2.4.5 *A MEGHATÁROZOTT CSOMAG HIBA GYAKORISÁGI TELJESÍTMÉNY*
Azoknak a HFDL adathordozó hozzáférési protokoll adat egységeknek (MPDU) a száma, amelyek egy vagy több bit hibával kerülnek vételre, nem haladhatja meg az összes vett MPDU számának 5 százalékát akkor, ha az 1,8 másodperces összesorolás használatos, és a térbeli-jel körülmények megfelelnek a 11-3. táblázatban bemutatottaknak.

Ajánlás. – *Azoknak a HFDL adathordozó hozzáférési protokoll adat egységeknek (MPDU) a száma, amelyek egy vagy több bit hibával kerülnek vételre, nem haladhatja meg az összes vett MPDU számának 5 százalékát akkor, ha az 1,8 másodperces összesorolás használatos, és a térbeli-jel körülmények megfelelnek a 11-3a. táblázatban bemutatottaknak.*

11.3.3 Kapcsolat réteg

Megjegyzés. - A kapcsolat réteg funkcióinak részleteit a Rövidhullámú /HF/ Adatkapcsolat Kézikönyv *(Doc 9741) tartalmazza.*

A kapcsolat réteg biztosítj a fizikai réteg, a kapcsolat kezelés és az adat szolgáltatási protokoll részére a vezérlő funkciókat.

11.3.3.1 VEZÉRLŐ FUNKCIÓK

A kapcsolat réteg továbbítja a frekvencia hangolási, az adó billentyűzési és az adó/vevő kapcsolási parancsokat a fizikai réteg részére.

11.3.3.2 KAPCSOLAT KEZELÉS

A kapcsolat réteg kezeli a TDMA rés kijelöléseket, a bejelentkezési és kijelentkezési eljárásokat, a földi állomás és a légijármű fedélzeti állomás TDMA szinkronizálást és az egyéb szükséges funkciókat, figyelembe véve a közlemény prioritásokat az összeköttetés létrehozásához és fenntartásához.

11.3.3.3 ADAT SZOLGÁLTATÁSI PROTOKOLLOK

A kapcsolat réteg támogat egy megbízható kapcsolat szolgáltatás (RLS) protokollt és egy közvetlen kapcsolat szolgáltatás (DLS) protokollt.
11.3.3.3.1 *Megbízható kapcsolat szolgáltatás /RLS/*
Az RLS protokollt kell felhasználni a nyugtázott felhasználói adat csomagoknak a légijármű és a földi társ-kapcsolat rétegek közötti adatcserére.
11.3.3.3.2 *Közvetlen kapcsolat szolgáltatás /DLS/*
A DLS protokollt kell felhasználni a nem-szegmentált fedélzetre irányuló rövidhullámú hálózati protokoll adat egységek (HFNPDU-k) sugárzására és a többi olyan HFNPDU-k továbbítására, amelyek nem igénylik a kapcsolat réteg automatikus adás-ismétlését.

11.3.4 Alhálózat réteg

Megjegyzés. - Az alhálózat réteg protokollok és szolgáltatások részletes leírását a Rövidhullámú /HF/ Adatkapcsolat Kézikönyv *(Doc 9741) foglalja magába.*

11.3.4.1 ADAT CSOMAG

A rövidhullámú adatkapcsolat /HFDL/ légijármű fedélzeti állomás alrendszerében és a HFDL földi állomás alrendszereiben a HFDL alhálózat réteg biztosítja az alhálózati szolgáltatás felhasználók közötti alhálózati kapcsolat létrehozásával az összeköttetés-irányított adatcsomag szolgáltatást.

11.3.4.2 ÖSSZEKAPCSOLHATÓSÁGI ÉRTESÍTÉS SZOLGÁLTATÁS

A HFDL légijármű fedélzeti alrendszerben lévő HFDL alhálózat réteg biztosítja a kiegészítő összekapcsolhatósági értesítés szolgáltatást, azáltal, hogy elküldi az összekapcsolhatósági értesítés esemény közleményt a kapcsolt Légiforgalmi távközlési hálózat /ATN/ útvonal kijelölés részére.

11.3.4.2.1 *ÖSSZEKAPCSOLHATÓSÁGI ÉRTESÍTÉS ESEMÉNY KÖZLEMÉNYEK*

Az összekapcsolhatósági értesítés szolgáltatás küldi el az összekapcsolhatósági értesítés esemény közleményt a kapcsolt ATN útvonal kijelölés részére, az alhálózati hozzáférési funkción keresztül.

11.3.4.3 HFDL ALHÁLÓZAT RÉTEG FUNKCIÓK

A rövidhullámú adatkapcsolat /HFDL/ alhálózati rétegnek mind a HFDL légijármű fedélzeti állomás alrendszerben, mind a HFDL földi állomás alrendszerben a következő három funkciót foglalja magába:

a) A HFDL alhálózat-függő (HFSND) funkciót;

b) Az alhálózat hozzáférési funkciót; és

c) Az összedolgozói funkciót.

11.3.4.3.1 *RÖVIDHULLÁMÚ ADATKAPCSOLAT ALHÁLÓZAT-FÜGGŐ FUNKCIÓ /HFSND/*

A HFSND funkció hajtja végre a HFSND protokollt a HFDL adat egységek cseréjével, az egyes HFDL légijármű állomás alrendszerek és a HFDL földi állomás alrendszerpárok között. Ez fogja végrehajtani a HFSND protokoll légijármű fedélzeti funkciót a HFDL légijármű fedélzeti állomás alrendszerben és a HFSND protokoll földi funkciót a HFDL földi állomás alrendszerben.

11.3.4.3.2 *ALHÁLÓZAT HOZZÁFÉRÉSI FUNKCIÓ*

Az alhálózat hozzáférési funkciót az ISO 8208 protokoll hajtja végre a HFDL légijármű fedélzeti állomás alrendszer vagy a HFDL földi állomás alrendszer és a kapcsolt útvonal kijelölések között az ISO 8208 csomagok cseréjével. Ennek kell elvégezni az ISO 8208 Hálózati végponti berendezés /DCE/ funkciót a HFDL légijármű fedélzeti állomás alrendszerben és a HFDL födi állomás alrendszerben.

11.3.4.3.3 *EGYÜTTMŰKÖDÉSI FUNKCIÓ*

Az együttműködési funkció biztosítja a HFSND, az alhálózat hozzáférés és az összekapcsolhatósági értesítés funkciók között szükséges harmonizációt.

11.4 A FÖLDI KEZELŐ ALRENDSZER

Megjegyzés. - A földi kezelő alrendszer funkcióiról és illesztéseiről a Rövidhullámú /HF/ Adatkapcsolat Kézikönyv *(Doc 9741) tartalmaz részletes leírást.*

11.4.1 Kezelési funkciók

A földi kezelő alrendszernek kell végrehajtania azokat a funkciókat, amelyek a HFDL földi és légijármű fedélzeti alrendszerei közötti összeköttetési csatornák létrehozásához és fenntartásához szükségesek.

11.4.2 Kezelési/vezérlési információ csere

A földi kezelő alrendszernek kell az illesztést biztosítani a földi állomás alrendszerrel abból a célból, hogy a frekvencia kezeléshez, a rendszer táblázat kezeléshez, a napló állapot kezeléshez, a csatorna kezeléshez és az adatgyűjtési szolgáltatás minőségéhez (QOS) szükséges vezérlő információk cseréje megtörténjen.

11-3. táblázat. HF térbeli-jel feltételek

Adatsebesség (bit per mperc)	Csatorna utak száma	Több-utas terjedés (milliszekundum)	Elhalkulási sávszélesség (Hz) a CCIR 549-2 jelentés szerint	Frekvencia-eltolás (Hz)	Jel/zaj arány (dB) a 3 kHz-es sávszélességben	MPDU méret (oktett)
1200	1 állandó	–	–	40	4	256
1800	2 elhalkuló	2	1	40	16	400
1200	2 elhalkuló	2	1	40	11	256
600	2 elhalkuló	2	1	40	8	128
300	2 elhalkuló	2	1	40	5	64

11-3a .táblázat. HF jel-térközben feltételek

Adatsebesség (bit per mperc)	Csatorna utak száma	Több-utas terjedés (milliszekundum)	Elhalkulási sávszélesség (Hz) a CCIR 549-2 jelentés szerint	Frekvencia-eltolás (Hz)	Jel/zaj arány (dB) a 3 kHz-es sávszélességben	MPDU méret (oktett)
1200	2 elhalkuló	4	1	40	13,0	256
1200	2 elhalkuló	2	2	40	11,5	256

12. FEJEZET: Univerzális adó-vevő készülék – Universal Access Transceiver (UAT)

12.1. MEGHATÁROZÁSOK ÉS ÁLTALÁNOS RENDSZERJELLEMZŐK

12.1.1 Meghatározások

Nagyteljesítményű adó (High performance receiver). Az UAT kiterjesztett szelektivitású adóberendezés, amely jelentősen javítja a szomszéd frekvenciaszűrés DME interferenciát (további részleteket lásd 12.3.2.2 pontban).

Optimális mintavételi pont (Optimum sampling point) Egy fogadott UAT bit-sáv optimális mintavételi pontja az egyes bit-periódus névleges centruma, amikor is a frekvencia eltérés vagy plusz, vagy mínusz 312.5 kHz.

Teljesítménymérési pont (Power measurement point (PMP). Kábel köti az antennát az UAT berendezéshez. A PMP annak a kábelnek a vége, amelyik az antennához csatlakozik. Minden teljesítmény mérést a PMP-nél ajánlott elvégezni, ha nincs egyéb rendelkezés. A kábel, amelyik az UAT berendezést az antennához köti feltehetően 3dB veszteségű.

Ál véletlen közlemény adatblokk (Pseudorandom message data block.) Számos UAT követelmény szerint a teljesítmény ál véletlennek tűnő közlemény adatblokkok segítségével ellenőrizhető. Az ál véletlennek tűnő közlemény adatblokkok statisztikai tulajdonságokkal rendelkezhetnek, amelyeket szinte nem lehet megkülönböztetni az igazi bitek véletlenszerű kiválasztásától. Például minden egyes bit hasonló valószínűséggel EGY, vagy NULLA, függetlenül a szomszédos bit-ektől. Minden egyes közlemény típusnak megfelelően léteznie kell számos ilyen ál véletlennek tűnő közlemény adatblokknak (Basic ADS-B, Long ADS-B, vagy Ground Uplink) ahhoz, hogy elegendő független adatokat szolgáltasson statisztikai teljesítmény mérésére. Lásd az Univerzális Adó-vevőkészülék (UAT) Kézikönyv I. rész 2.3. fejezetét (Doc 9861) annak illusztrálására, hogyan kell szolgáltatni megfelelő véletlennek tűnő közlemény adatblokkokat.

A szolgáltatás volumene (Service volume). Egy szolgáltatási komplexum része, amely a fontos SARP-okkal összhangban különleges szolgáltatásokat biztosít, és amely szolgáltatások frekvenciavédelmet nyújtanak.

Szabvány UAT vevő (Standard UAT receiver). Többcélú UAT adóberendezés, amely kielégíti a minimális interferencia -szűrési követelményeket a szomszéd frekvencia távolságmérő berendezéstől (DME) (további részleteket lásd 12.3.2.2 pontban).

Sikeres közlemény vétel (Successful message reception (SMR). Az UAT adó-vevő készülék funkciója, amellyel a készülék igazolja a közlemény érvényes továbbításra történő vételét az UAT közlemények vételére vonatkozó alkalmazási eljárás szerint. Lásd az Univerzális Adó-vevőkészülék (UAT) (Doc9861) Kézikönyv I. rész 4. fejezetét az eljárás részletes leírására vonatkozóan, az UAT adó-vevő készülék sikeres közlemény-vételével kapcsolatban.

UAT ADS-B közlemény (UAT ADS-B message). Minden légijármű által másodpercenként egyszer leadott közlemény a légijármű vektor helyzetével és egyéb információk adásával kapcsolatban. Az UAT ADS-B közlemények egy- vagy két formában léteznek az adott információ mennyiségtől függően, amelyeket egy adott másodperc alatt továbbítanak: *a Basic UAT ADS-B közlemény*, vagy a *Long UAT ADS-B közlemények* (lásd 12.4.4.1 az egyes meghatározásokra).

Az UAT földi állomások támogatják a forgalmi információs szolgáltatási adást (TIS-B) egyéni ADS-B közlemények továbbítása révén az UAT keret ADS-B szegmensben.

UAT földről fedélzetre küldött közlemény (UAT ground uplink message). A földi állomások által továbbított közlemények, az UAT keret földi szegmensén belül, tartalmaznak járatinformációkat, mint például szöveges és grafikai meteorológiai adatokat, tájékoztatást és egyéb léginavigációval kapcsolatos információkat továbbítanak a légijármű részére, amely szolgáltatások a földi állomás illetékességébe tartoznak. (további részleteket lásd 12.4.4.2 pontban)

UAT Univerzális adó-vevő készülék (Universal access transceiver (UAT). A rádióadás-adatkapcsolat, amely a 978 MHz állományban üzemel 1.041667 Mbps modulációval.

12.1.2 Az UAT földi- és fedélzeti állomások átfogó rendszereinek jellemzői

Megjegyzés.- Az UAT SARP-ok telepítésére vonatkozó műszaki követelmények részletei az Univerzális Adó-vevőkészülék (UAT) (Doc9861) Kézikönyv 1. részében találhatók. Az Univerzális Adó-vevőkészülék (UAT) (Doc9861). *II. Rész (kidolgozás alatt) tartalmazni fog egyéb útmutatásra szolgáló anyagokat).*

12.1.2.1 ÁTVITELI
FREKVENCIA

Az átviteli frekvencia 978 MHz legyen.

12.1.2.2 FREKVENCIA
STABILITÁS

Az UAT berendezés rádió frekvenciája nem térhet el több mint ±0.002 százalékkel (20 ppm) a kijelölt frekvenciától.

12.1.2.3 TELJESÍTMÉNY
ÁTVITEL

12.1.2.3.1 *TELJESÍTMÉNY ÁTVITELI SZINTEK*

Az UAT berendezés a 12-1* táblázatban feltüntetett egyik teljesítmény szinten üzemeljen.

12.1.2.3.2 *MAXIMÁLIS TELJESÍTMÉNY*

Az UAT földi és fedélzeti állomások maximálisan egyenértékű izotropikusan sugárzott teljesítménye (EIRP) nem haladhatja meg a +58 dBm értéket.

Megjegyzés.- például a fent említett EIRP maximum származhat a légijármű maximálisan megengedett átviteli teljesítményéből (lásd 12-1 táblázat) maximum 4dBi antenna erősítéssel.

12.1.2.3.3 *ÁTVITELI MASZK*

Az UAT ADS-B közlemény spektruma, amely ál véletlennek tűnő közlemény adatblokk átvitellel modulált (MDB), a 12-2 számú táblázat szerinti korlátozások alá esik, ha 100kHz sávszélességben kerül mérésre.

Megjegyzés -12-1 sz. ábra a 12-2 sz. táblázat grafikai ábrázolása.*

12.1.2.4 ZAVARÓ SUGÁRZÁSOK

A zavaró sugárzásokat a lehető legalacsonyabb értéken kell tartani, amelyet a technika és a szolgáltatás természete megenged.

Megjegyzés- Az ITU Rádió Rendszabályzat 3. sz. Függeléke előírja, hogy az átviteli állomások meg feleljenek a zavaró sugárzásokkal szembeni maximálisan megengedett teljesítmény szinteknek, illetve a zavaró tartományban lévő nem kívánt sugárzásnak.

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* Valamennyi ábra és táblázat e fejezet végén található.

12.1.2.5 POLARIZÁCIÓ

A sugárzások polarizáció konstrukciója függőleges legyen.

12.1.2.6 AZ UAT KÖZLEMÉNY ÁTVITELI IDŐ/AMPLITÚDÓ PROFILJA

Az UAT közlemény átviteli idő/amplitúdó profilja meg kell feleljen azon követelményeknek, amelyekben a *referencia idő* a szinkronizációs sorrend első bit-jeként van meghatározva (lásd a 12.4.4.1.1 és 12.4.4.2.1 pontokat), és amely megjelenik a berendezés kimeneti portjánál.

Megjegyzések.—

1. Az „a”-tól „f”-ig terjedő al-fejezetekben szereplő valamennyi teljesítmény követelmény a PMP-re vonatkoznak. A telepítéseknél, amelyek támogatják az adó diverzitását, az RF kimeneti teljesítménynek a nem kiválasztott antenna portálon legalább 20dB-el kell a kiválasztott port szintje alatt lennie.

2. Az „a”-tól „f”-ig terjedő al-fejezetekben szereplő valamennyi teljesítmény követelmény 300 kHz sávszélesség mérést feltételez. A „b”, „c”, „d” és „e” al-fejezetekben szereplő valamennyi teljesítmény követelmény 2MHz sávszélesség mérést feltételez.

3. A bit kezdete egy ½ bit-es periódus az optimális mintavételi pont előtt.

4. Ezeket a követelményeket grafikusan a 12-2 ábra szemlélteti.

a) A referencia időt megelőző 8 bit periódus előtt az RF kimeneti teljesítménye a PMP-nél nem haladhatja meg a 80 dBm értéket.

Megjegyzés.- Ez a nem kívánt kisugárzott teljesítménykorlátozás szükséges annak biztosítására, hogy az UAT adó alrendszere ne akadályozza meg a szorosan mellette elhelyezett UAT vevő-berendezés működését, a követelményeknek való megfelelését ugyanazon a légijárművön. Az adó és vevő berendezések közötti leválasztás a PMP-nél haladja meg a 20dB értéket.

b) A referencia időt megelőző 8 és 6 bit közötti periódusoknál, az RF kimeneti teljesítménye a PMP-nél legalább 20 dB érték alatt maradjon az UAT berendezés osztályának megfelelő minimális teljesítmény követelményhez képest.

Megjegyzés.— Az UAT berendezések osztályainak meghatározására vonatkozó tájékoztató anyagok az UAT adó-vevő készülékek Kézikönyv II. részében lesznek találhatók (Doc 9861) (kidolgozás alatt).

c) Az aktív állapot időtartama alatt, amely a referencia idő kezdetekor határozható meg, és amely tart a közlemény teljes időtartamáig, az RF kimenő teljesítménye nagyobbnak, vagy legalább azzal egyenlőnek kell lennie, figyelemmel az UAT vonatkozó osztályának megfelelő minimális teljesítményi előírásoknak.

d) Az RF kimeneti teljesítmény a PMP-nél nem lépheti túl az UAT berendezés osztályára vonatkozóan előírt maximális teljesítmény értéket az aktív állapot ideje alatt.

e) 6 bit perióduson belül az aktív állapot befejezése után az RF kimeneti teljesítménye a PMP-nél legalább 20dB értékkel a vonatkozó UAT berendezés osztályának megfelelő teljesítményi követelmények alatt legyen.

f) Az aktív állapot vége után 8 bit perióduson belül az RF kimeneti teljesítménye olyan szintre essen vissza, amely nem haladja meg a 80 dBm értéket.

Megjegyzés.- Ez a nem kívánt kisugárzott teljesítménykorlátozás szükséges annak biztosítására, hogy az UAT adó alrendszere ne akadályozza meg a szorosan mellette elhelyezett UAT vevő-berendezés működését, a követelményeknek való megfelelését ugyanazon a légijárművön. Az adó és vevő berendezések közötti leválasztás a PMP-nél haladja meg a 20dB értéket.

12.1.3 Előírt üzemeltetési követelmények

Az UAT berendezésekre előírt üzemeltetési követelményeket regionális léginavigációs megállapodások határozzák meg, amelyek feltüntetik az üzemelési légteret, az időbeosztás létrehozását a berendezés üzemeltetésére vonatkozóan, beleértve a megfelelő időtartamok kijelölését.

Megjegyzés.-Nincs változásokra szükség olyan fedélzeti, vagy a földi rendszerekben, amelyek kizárólag olyan régiókban üzemelnek, amelyekben nem használnak UAT-t.

12.2 A FÖLDI TELEPÍTÉSI RENDSZER JELLEMZŐ TULAJDONSÁGAI

12.2.1 A földi adóállomás funkciója

12.2.1.1 FÖLDI ADÓ-ÁLLOMÁS TELJESÍTMÉNYE

12.2.1.1.1 **Ajánlás.**— *A hasznos kisugárzott teljesítménynek olyannak kell lennie, hogy a szolgáltatási volumenen belül biztosítható legyen legalább 280 mikrovolt/méter (mínusz 97 dbW/m²) térerő szabad térben való terjedése.*

Megjegyzés.- Ezt egy -91 dBm (200 mikrovolt/méternek megfelelő) jel szinttel határozzák meg a PMP-nél (körsugárzó antenna esetén). A 280 µV/m ajánlás megfelel egy -88 dBm jel szintnek a vevő berendezés PMP-jénél. A 3 dB különbség a –88 dBm és a –91 dBm között határzónát képez a túlzott pályavesztésre a szabad térben való terjedésnél.

12.2.2 A földi vevőállomás funkciója

Megjegyzés.- Egy földi vevőállomásra vonatkozó példa kerül megtárgyalásra az UAT Kézikönyv II. részének 2.5. számú fejezetében) (Doc 9861), az UAT levegő-föld teljesítmény becslésekkel a rendelkezésre álló vevő készülék használatával, amely a kézikönyv B függelékében található.

12.3 A FEDÉLZETI TELEPÍTÉSI RENDSZER JELLEMZŐ TULAJDONSÁGAI

12.3.1 A fedélzeti adó funkciója

12.3.1.1 FEDÉLZETI
ADÓTELJESÍTMÉNY

A hasznos kisugárzott teljesítménynek olyannak kell lennie, hogy biztosítható legyen egy legalább 225 mikrovolt/méter (mínusz 99 dbW/m²) térerő szabad térben való terjedéssel, olyan hatótávolságnál és magasságnál, amely megfelel azoknak az üzemelési feltételeknek, amelyek azon területekre jellemzőek, amelyek fölött a légijármű üzemel. Az adó teljesítménye nem lépheti túl az 54 dBm értéket a PMP-nél.

1. Megjegyzés.- A fenti térerőt egy -93 dBm (160 mikrovolt/méternek megfelelő) jel szinttel határozzák meg a PMP-nél (körsugárzó antenna esetén). A 3 dB különbség a 225 V/m és a 160 µV/m között határzónát képez a túlzott pályavesztésre a szabad térben való terjedésnél, amikor egy hosszú UAT ADS-B közleményt vesz. Egy 4dB határzóna szükséges alap az UAT ADS-B közlemények vételére.
A 280 µV/m ajánlás megfelel egy -88 dBm jel szintnek a vevő berendezés PMP-jénél.

2. Megjegyzés.- Különböző légijárművek üzemelése során adódhatnak különböző levegő-levegő tartománnyal kapcsolatos követelmények, amelyek az UAT berendezés ADS-B funkciójától függenek. Ezért különböző telepítésű telepítési berendezések másképpen működhetnek eltérő teljesítmény szintek mellett. (lásd 12.1.2.3.1 alatt).

12.3.2 Vételi funkció

12.3.2.1 A VEVŐBERENDEZÉS ÉRZÉKENYSÉGE

12.3.2.1.1 *A HOSSZÚ UAT ADS-B KÖZLEMÉNY, MINT SZÜKSÉGES JEL*

A- 93 dBm PMP alkalmazású szükséges jel-színt sikeres számban produkálja a sikeres, 90 százalékos, sőt még kedvezőbb számú közlemény vételét a következő feltételek esetében:

a) Ha a szükséges jel névleges modulációjú (vagyis az FM eltérés 625kHz értékű) maximális jelfrekvencia eltolódásnál, és függ a Doppler eltolódástól ±1 200 csomónál;

b) Ha a szükséges jel maximális moduláció-torzulású, amely a 12.4.3 pontban megengedett névleges átviteli frekvencián ±1 parts/millió (ppm), és függ a Doppler eltolódástól ±1200 csomónál;

Megjegyzés.-Az UAT ADS-B közlemények sikeres vételének szempontjai az Univerzális Adó-vevőkészülék (UAT) (Doc9861) Kézikönyv *1. részének 4. fejezetében találhatók.*

12.3.2.1.2 *AZ* ALAP *UAT ADS-B KÖZLEMÉNY, MINT SZÜKSÉGES JEL*

A PMP-nél alkalmazott -94 dBm szükséges jel szint 90%-os, vagy annál kedvezőbb arányú SMR-t nyújt, az alábbi feltétetlek esetében:

a) Ha a szükséges jel névleges modulációjú (vagyis az FM eltérés 625kHz értékű) maximális jelfrekvencia eltolódásnál, és függ a Doppler eltolódástól ±1 200 csomónál;

b) Ha a szükséges jel maximális moduláció-torzulású, amely a 12.4.3 pontban megengedett névleges átviteli frekvencián ±1 parts/millió (ppm), és függ a Doppler eltolódástól ±1200 csomónál;

Megjegyzés.-Az UAT ADS-B közlemények sikeres vételének szempontjai az Univerzális Adó-vevőkészülék (UAT) (Doc9861) Kézikönyv *1. részének 4. fejezetében találhatók.*

12.3.2.1.3 *UAT FÖLDI KÖZLEMÉNYEK LÉGIJÁRMŰRE TÖRTÉNŐ TOVÁBBÍTÁSA SZÜKSÉGES JELKÉNT*

A PMP-nél alkalmazott -94 dBm szükséges jel szint 90%-os, vagy annál kedvezőbb arányú SMR-t nyújt, az alábbi feltétetlek esetében:

a) Ha a szükséges jel névleges modulációjú (vagyis az FM eltérés 625kHz értékű) maximális jelfrekvencia eltolódásnál, és függ a Doppler eltolódástól ±850;

b) Ha a szükséges jel maximális moduláció-torzulású, amely a 12.4.3 pontban megengedett névleges átviteli frekvencián ±1 parts/millió (ppm), és függ a Doppler eltolódástól ±850 csomónál

Megjegyzések -

1. Megjegyzés.-Az UAT földi közlemények légijárművön történő sikeres vételével kapcsolatban az Univerzális Adó-vevőkészülék (UAT) (Doc9861) Kézikönyv *1. részének 4. fejezetében találhatók (kidolgozás alatt).*

2. Ez a követelmény biztosítja a demodulációt támogató bit-arány pontosságát az UAT berendezésben, hogy az megfeleljen a hosszabb UAT földi közleményeknek a légijárműveken történő pontos vételére.

12.3.2.2 A VEVŐ KÉSZÜLÉK SZELEKTIVITÁSA

Megjegyzések.-

1. A szükségtelen jel modulálatlan hordozó vivőhullámú rendszerre alkalmazva.

2. Ez a követelmény hozza létre az adóberendezés szűrését a csatornán kívüli energiától.

3. Feltételezhető, hogy az előírt eltérések közötti eltolódási arányok az interpolált értékhez közel esnek.

4. A szükséges jel UAT ADS-B hosszú közleményként használható 90 dBm-en a PMP-nél, amely 90%-ban biztosítja a közlemény sikeres vételét.

5. A tolerálható mellék-csatorna folyamatos hullám interferencia teljesítmény szintje a fedélzeti UAT vevő-berendezésre lehet 101 dBm vagy ennél kisebb a PMP-nél.

6. Az Univerzális Adó-vevő készülék (UAT) Kézikönyv (Doc 9861) II. rész 2.4.2. fejezetében kerül tárgyalásra, hogy mikor van szükség egy nagyteljesítményű vevő-berendezésre.

a) A szabvány UAT vevő-berendezéseknek meg kell felelniük a 12-3 táblázatban szereplő szelektivitási jellemzőknek.

b) A nagyteljesítményű vevő-készülékeknek még szorosabb szelektivitási jellemzőknek kell megfelelniük a 12-4 táblázatban foglaltak szerint.

Megjegyzés.- Az Univerzális Adó-vevő készülék (UAT) Kézikönyv (Doc 9861) II. rész 2.4.2. fejezetében útmutató anyagok találhatók a nagyteljesítményű vevő-berendezések telepítésével kapcsolatban.

12.3.2.3 SZÜKSÉGES VEVŐ BERENDEZÉSI JEL DINAMIKUS TARTOMÁNY

A vevő berendezés a hosszú ADS-B közlemények 99%-át meghaladó mértékben sikeresen veszi, ha a szükséges jel szint –90 dBm és –10 dBm között van a PMP-nél, ha nincs egyáltalán jel-interferencia.

Megjegyzés.- A –10 dBm érték 120 láb elválasztást jelent a fedélzeti adóberendezéstől maximális megengedett teljesítmény mellett.

12.3.2.4 A VEVŐBERENDEZÉS IMPULZUSOS INTERFERENCIA TŰRÉSE

Megjegyzés – Ebben a fejezetben valamennyi teljesítmény szint követelmény a PMP-re vonatkozik

a) A szabvány- és nagyteljesítményű vevő-berendezésekre az alábbi követelmények alkalmazandók:

1) A vevő-berendezésnek fogadnia kell a hosszú UAT ADS-B közlemények 99 százalékát, ha a szükséges jel-szint –90 dBm és –10 dBm között van a DME interferencia függvényében, az alábbi feltételek esetén: a DME impulzuspárok másodpercenkénti névleges 3600 impulzus-páron vagy 12, illetve 30 mikro szekundum impulzustávolságon -36 dBm szinten vannak bármely 1 MHz csatorna frekvencián 980 MHz és 1212 MHZ között.

2) Követve a 21 mikro szekundum impulzust ZERO (0) dBm-en és 10090 MHz-en, a vevő-berendezés visszatér a dB értéken belül meghatározott érzékenységi szintre (lásd a12.3.2.1 pontot) 12 mikro szekundumon belül.

b) A szabvány UAT vevő-berendezésre az alábbi külön követelmények alkalmazandók:

1) A vevő-berendezésnek fogadnia kell a hosszú UAT ADS-B közlemények 90 SMR százalékát, ha a szükséges jel-szint –87 dBm és –10 dBm között van a DME interferencia függvényében, az alábbi feltételek esetén: a DME impulzuspárok névleges másodpercenkénti 3600 impulzus-páron 12 mikro szekundum impulzustávolságon -56 dBm szinten vannak 979 MHZ frekvencián.

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2) A vevő-berendezésnek fogadnia kell a hosszú UAT ADS-B közlemények 90 SMR százalékát, ha a szükséges jel-szint –87 dBm és –10 dBm között van a DME interferencia függvényében, az alábbi feltételek esetén: a DME impulzuspárok névleges másodpercenkénti 3600 impulzus-páron 12 mikro szekundum impulzustávolságon -70 dBm szinten vannak 978 MHZ frekvencián.

c) a nagyteljesítményű vevő-berendezésre az alábbi külön követelmények alkalmazandók:

1) A vevő-berendezésnek fogadnia kell a hosszú ADS-B közlemények 90 SMR százalékát, ha a szükséges jel szint -87 dBm és -10dBm között van a DME interferencia függvényében, az alábbi feltételek esetén: A DME impulzuspárok névleges másodpercenkénti 3600 impulzus-páron 12 mikro szekundum impulzustávolságon -43dBm szinten vannak 979 MHz frekvencián.

2) A vevő-berendezésnek fogadnia kell a hosszú ADS-B közlemények 90 SMR százalékát, ha a szükséges jel szint -87 dBm és -10dBm között van a DME interferencia függvényében, az alábbi feltételek esetén: A DME impulzuspárok névleges másodpercenkénti 3600 impulzus-páron 12 mikro szekundum impulzustávolságon -43dBm szinten vannak 978 MHz frekvencián.

12.4 FIZIKAI RÉTEG JELLEMZŐK

12.4.1 Moduláció- arány

A moduláció arány 1.041 667 Mbps, fedélzeti adóberendezési tolerancia ±20 ppm és a földi adóberendezések esetében ±2 ppm.

Megjegyzés.-A moduláció arány tolerancia megegyezik a moduláció torzulási követelményekkel (lásd a 12.4.3. pontot).

12.4.2 Moduláció típus

a) Az adatokat modulálni kell a rendszerben bináris folyamatos fázis frekvencia emelő billentyűzéssel. A modulációs index h nem lehet 0.6 értéknél kisebb;

b) A bináris ONE (1) frekvenciát billentyűemeléssel kell jelezni és a bináris ZERO (0) billentyű visszaváltással a névleges frekvenciáról.

Megjegyzések.-

1. *A továbbított jel szűrése (alap sávon és/vagy frekvencia moduláció után) meg kell feleljen a spektrum-szigetelés követelményeinek a 12.1.2.3.3 szerint Ez a szűrés eltérést okozhat ezeknek az értékeknek a túllépésével az optimális mintavételi pontokon kívüli egyéb pontoknál.*

2. A kisugárzott jel szűrése következtében folyamatosan változik a fogadott frekvencia eltolódás névleges ±312.5 kHz (és azon túli) érték között és az optimális mintavételi hely nem könnyen azonosítható. Ez a pont a fogadott jel úgynevezett „szemábra" segítségével határozható meg. Az ideális „szemábra" nem torzult, utólag érzékelt minták egymásra illesztéséből eredő hullámforma, amelyet 0.96 mikro szekundos bit periódusok sokasága hozott létre. Az optimális mintavételi pont az a pont a bit periódus alatt, amelynél a" szemábra" nyílása (vagyis amikor a pozitív és a negatív frekvencia kiegyenlítés nagyon magas zajszint arányt képvisel) maximális értéket jelez. A „szemábra" bemutatása a 12-3 számú ábrán látható. Azoknak a pontoknak az időzítése, ahol a vonalak összetartanak, ott határozható meg az „optimális mintavételi pont". A 12. ábra bemutat egy szem mintát, amelyet modulációs torzulás részlegesen lezárt.

12.4.3 Modulációs torzulás

a) A fedélzeti adóknál a továbbított jel (amelyet az optimális mintavételi ponton mértek) szemábrájának minimális vertikális nyílása legalább 560kHz legyen, ha olyan hosszú UAT ADS-B közleményen végezték a mérést, amely számos ál-véletlen közlemény adatblokkokat tartalmazott.

b) Földi adóknál a továbbított jel (amelyet az optimális mintavételi ponton mértek) szemábrájának minimális vertikális nyílása legalább 560kHz legyen, ha olyan hosszú UAT ADS-B földi állomásról fedélzeti állomásra továbbított közleményen végezték a mérést, amely számos ál-véletlen közlemény adatblokkokat tartalmazott.

c) Fedélzeti adóknál a továbbított jel szemábrájának minimális vízszintes nyílása (978 MHz-en mérve) nem lehet kisebb 0.624 mikro szekundumnál (0.65 szimbólum periódusok), ha olyan hosszú UAT ADS-B földi állomásról fedélzeti állomásra továbbított közleményen végezték a mérést, amely számos ál-véletlen közlemény adatblokkokat tartalmazott.

d) Földi adóknál a továbbított jel (amelyet 978 MHz-en mértek) szemábrájának minimális horizontális nyílása legalább 0.624 mikro szekundum legyen, (0.65 szimbólum periódusok), ha olyan hosszú UAT ADS-B földi állomásról fedélzeti állomásra továbbított közleményen végezték a mérést, amely számos ál-véletlen közlemény adatblokkokat tartalmazott

Megjegyzések.-

1. *A 12.4.4 részben kerülnek meghatározásra az UAT ADS-B közlemény típusok.*

2. *Az ideális „szemábra" nem torzult, utólag érzékelt minták egymásra illesztéséből eredő hullámforma, amely (0.96 mikro szekundos) bit periódusok sokasága hozott létre.*

12.4.4 Rádióközlemény jellemzők

Az UAT rendszer két különböző típusú közlemény-típust támogat: az UAT ADS-B közleményeket és az UTA földi állomásról fedélzetre küldött közleményeket.

12.4.4.1 AZ UAT ADS-B KÖZLEMÉNY

Az UAT ADS-B közlemény aktív része (lásd 12.1.2.6) az alábbi elemeket az alábbi sorrendben tartalmazza:

— Bit szinkronizáció
— Közlemény adatblokk
— FEC paritás.

12.4.4.1.1 *BIT SZINKRONIZÁCIÓ*

Az UAT ADS-B közlemény aktív részének első eleme egy 36-bit szinkronizációs sorrend. Az UAT ADS –B közleményeknél ez a következőképpen alakul:

111010101100110111011010010011100010

A bal legszélső bit kerül először átvitelre.

12.4.4.1.2 A KÖZLEMÉNY ADATBLOKK

Az UAT ADS-B közlemény aktív részének második eleme a közleményadat blokkja. Két UAT ADS-B hosszúságú adatblokk kap támogatást. Az alap UAT ADS-B közlemény egy 144 bit közlemény adatblokkal, a hosszú UAT ADS-B közlemény pedig egy 272 bit közlemény adatblokkal kell rendelkezzen.

Megjegyzés.-A közlemény adatblokk elemének átviteli sorrendje, kódolása és formátuma az Univerzális Adó-vevőkészülék (UAT) *(Doc 9861) kézikönyv I. rész 2.1. fejezetében található*

12.4.4.1.3 *FEC PARITÁS*

Az UAT ADS-B közlemények aktív részének harmadik és utolsó eleme a FEC paritás.

12.4.4.1.3.1 *Kód típus*

A FEC paritásfejlesztés egy szisztematikus Reed-Solomon (RS) rendszeren alapul, 256 rendű kód 8 bites kód szó szimbólummal. A FEC paritásfejlesztés a következő kódokra kerül alkalmazásra

a) **Alap UAT ADS-B közlemény**: Paritás RS (30, 18) kód.

Megjegyzés.-Ez 12 bájt szimbólum hibák javítására alkalmas hibajavító kód, amely blokkonként 6 szimbólum hiba kijavítására képes.

b) Hosszú **UAT ADS-B közlemény**: Paritás RS (48,34) kódnak kell lennie.

Megjegyzés.-Ez 14 bájt szimbólum hibák javítására alkalmas hibajavító kód, amely blokkonként 7 szimbólum hiba kijavítására képes.

Mindkét közlemény hosszúságra az egyszerű többtagú kód az alábbi:

$$p(x) = x^8 + x^7 + x^2 + x + 1$$

A generátor polinom az alábbi:

$$\prod_{i=120}^{P}(x-\alpha^{i})$$

ahol:

P = 131 az RS (30, 18) kódra,

P = 133 az RS (48, 34) kódra, és

α egy egyszerű eleme a 256 méretű (azaz GF(256) Galois mezőnek).

12.4.4.1.3.2 *A FEC paritás átviteli sorrendje*

FEC paritás bájtokat a legjelentősebbtől a legkevésbé jelentősig kell rendelni az általuk képviselt polinom együtthatók szerint. A bitek hozzárendelése az egyes bájtokon belül a legfontosabbtól a legkevésbé fontosig kell történnie. A FEC paritás bájtoknak követniük kell a közlemény adatblokkot.

12.4.4.2 UAT FÖLDRŐL A FEDÉLZETRE TOVÁBBÍTOTT KÖZLEMÉNY

Az UAT földi állomásról a fedélzetre továbbított közlemény aktív részének a következő elemeket kell tartalmaznia a következő sorrendben:

— Bit szinkronizáció
— Összerendező közlemény adatblokk és FEC paritás.

12.4.4.2.1 *BIT SZINKRONIZÁCIÓ*

Az UAT ADS-B közlemény földi állomásról a fedélzetre továbbított közlemény aktív részének első eleme egy 36-bit szinkronizáció sorrend. Az UAT ADS –B közleményeknél ez a következőképpen alakul:

000101010011001000100101101100011101

A bal legszélső bit kerül először átvitelre.

12.4.4.2.2 *ÖSSZERENDEZŐ KÖZLEMÉNY ADATBLOKK ÉS FEC PARITÁS*

12.4.4.2.2.1 *Közlemény adatblokk (összerendezés előtt és kibontás után)*

Az UAT földi állomásról a fedélzetre továbbított közlemény 3456 bit közlemény adatblokkal rendelkezik. Ezek a bit-ek 6 db 576 bit-es csoportra vannak osztva. Az egyes csoportokra történő FEC alkalmazás a 12.44.222. pont alatt szerepel.

Megjegyzés.- További részletek az UAT földi állomásról a fedélzetre továbbított közlemények formátumával, kódolásával és adatblokk átviteli sorrendjével kapcsolatban az Univerzális Adó-vevőkészülék (UAT) *(Doc 9861) kézikönyv I. rész 2.2. fejezetében találhatók*

12.4.4.2.2.2 FEC paritás *((összerendezés előtt és kibontás után)*

12.4.4.2.2.2.1 *Kód típus*

A FEC paritásfejlesztés egy Reed-Solomon szisztematikus (RS) rendszeren alapul, 256-rendű kód, 8 bit kód szó szimbólummal. A FEC paritásfejlesztés a hat blokk mindegyikére RS (92,72) kód érték kell legyen.

Megjegyzés.-

1. *A 12.4.4.2.2.3részben az összerendező eljárással kapcsolatos részletek találhatók.*

2. *Ez 20 bájt paritási szimbólumot eredményez, amely blokkonként képes 10 szimbólum kijavítására. Az összerendezés egyéb használata az UAT földről a fedélzetre történő események továbbítására külön hibatűrő képességet nyújt impulzus kötegek hibái ellen.*

A kód egyszerű polinom az alábbi:

$$p(x) = x^8 + x^7 + x^2 + x + 1$$

A generátor polinom az alábbi:

$$\prod_{i=120}^{P}(x-\alpha^{i})$$

ahol is:

P = 139, és

α egy egyszerű eleme a 256 méretű (azaz GF(256) Galois mezőnek).

12.4.4.2.2.2.2 *A FEC paritás átviteli sorrendje*

FEC paritás bájtokat a legjelentősebbtől a legkevésbé jelentősig kell rendelni az általuk képviselt polinom együtthatók szerint. A bitek hozzárendelése az egyes bájtokon belül a legfontosabbtól a legkevésbé fontosig kell történnie. A FEC paritás bájtoknak követniük kell a közlemény adatblokkot.

12.4.4.2.2.3 *Összerendező eljárás*

Az UAT földről a fedélzetre továbbított eseményeket, amelyeket a földi állomás továbbít, az alábbiak szerint kell összerendezni:

a) **Összerendező eljárás**: Az összerendező közlemény adatblokk és a FEC paritás 6 összerendező Reed-Solomon blokkból áll. Az összerendezőt egy 6x92 mátrix képviseli, ahol minden egyes bevitel egy RS 8-bit szimbólum. Minden sor tartalmaz egy RS (92,72) blokkot, amint az a 12-5 sz. táblázatban megtekinthető. Ebben a táblázatban az összerendezést megelőzően a blokk számokat „A”-tól „F”-ig terjedő betűkkel ábrázolják. Az információ átviteli sorrendje hasábról hasábra történik a mátrix bal felső sarkától kezdődően.

b) **Az átvitel sorrendje:** A bájtok ezután az alábbi sorrendben kerülnek átvitelre:

1,73,145,217,289,361,2,74,146,218,290,362,3,. . .,C/20,D/20,E/20,F/20.

Megjegyzés.- Vételkor ezeket a bájtokat úgy kell kibontani, hogy az RS blokkok összeállíthatók legyenek a hiba kijavítások dekódolása előtt.

12.5 ÚTMUTATÓ ANYAG

Megjegyzések.-

1. Az UAT Univerzális Adó-vevő készülék kézikönyv (*Doc 9861), I rész részletes műszaki információkkal szolgál az UAT-vel kapcsolatban, beleértve az ADS-B küldemény adatblokkokról és* *formátumokról, az UAT átviteli alrendszerek üzemelési eljárásairól és a repüléselektronikari interfész követelményekről más légijármű rendszerekkel.*

2. Az UAT Univerzális Adó-vevő készülék kézikönyv (*Doc 9861) II. információkat nyújt az UAT rendszer működéséről, leírást ad számos példákkal a repüléselektronikai berendezések osztályairól és azok alkalmazásáról, útmutatást ad az UAT légijárművekről és a földi állomások telepítési szempontjairól, valamint részletes útmutatással szolgál az UAT rendszer teljesítmény-szimulációról.*

A 12. FEJEZET TÁBLÁZATAI

12-1 Táblázat
. Átviteli teljesítmény szintek

Adóberendezés-típus	*Minimális teljesítmény aPMP-nél*	*Maximális teljesítmény A PMP-nél*	Tervezett minimális Levegő-levegő tartományok
Légijármű (kisméretű)	7 watts (+38.5 dBm)	18 watts (+42.5 dBm)	20 NM
Légijármű (közepes)	16 watts (+42 dBm)	40 watts (+46 dBm)	40 NM
Légijármű (nagy)	100 watts (+50 dBm)	250 watts (+54 dBm)	120 NM
Földi állomás	A szolgáltatást nyújtó előrása alapján, a helyi követelmények szerint, figyelembe véve a 12.1.2.3.2 pontban szereplőkorlátozásokat		

Megjegyzések:

1. A repüléselektronika számára listán szereplő készülékek mind a három szinten rendelkezésre állnak különféle hatósugarú alkalmazási követelmények kielégítésére. Lásd az UAT légijármű felszerelési tárgyakról szóló értekezést az UAT Univerzális Adó-vevő készülékek (Doc 9861) Kézikönyv II. rész 2.4.2 pontját (kidolgozás alatt)

2. A tervezett minimális levegő-levegő tartományok nagy sűrűségű légiforgalmi környezetre kerültek kialakításra. Ettől nagyobb sűrűségű levegő-levegő tartományok csak alacsony sűrűségi légiforgalmi környezetben érhetők el.

12-2 Táblázat UAT átvitel spektrum

Frekvencia eltérés a központtól	*A maximális teljesítmény szinttől való kívánt csillapítás (dB mérés a PMP-nél) 1*
Minden frekvencia 0 – 0.5 MHz között	0
Minden frekvencia 0.5 – 1.0 MHz között	Lineáris interpolációra* alapozva e pontok közt
1.0 MHz	18
Minden frekvencia 1.0 – 2.25 MHzközött	Lineáris interpolációra* alapozva e pontok közt
2.25 MHz	50
Minden frekvencia2.25 – 3.25 MHz között	Lineáris interpolációra* alapozva e pontok közt

3.25 MHz	60

* csillapítás dB-ben és lineáris frekvenciaskálán

12-3. TÁBLÁZAT Szabvány UAT vevő szűrésarányai

Frekvencia eltérés a központtól	*Minimális szűrésarány (Szükségtelen/szükséges szint dB-ben)*
–1.0 MHz	10
+1.0 MHz	15
(±) 2.0 MHz	50
(±) 10.0 MHz	60

Megjegyzés.-Feltételezve, hogy az arányok a megadott eltérések között az interpolált érték közelébe esik.

12-4 TÁBLÁZAT Nagyteljesítményű vevőszűrési arányok

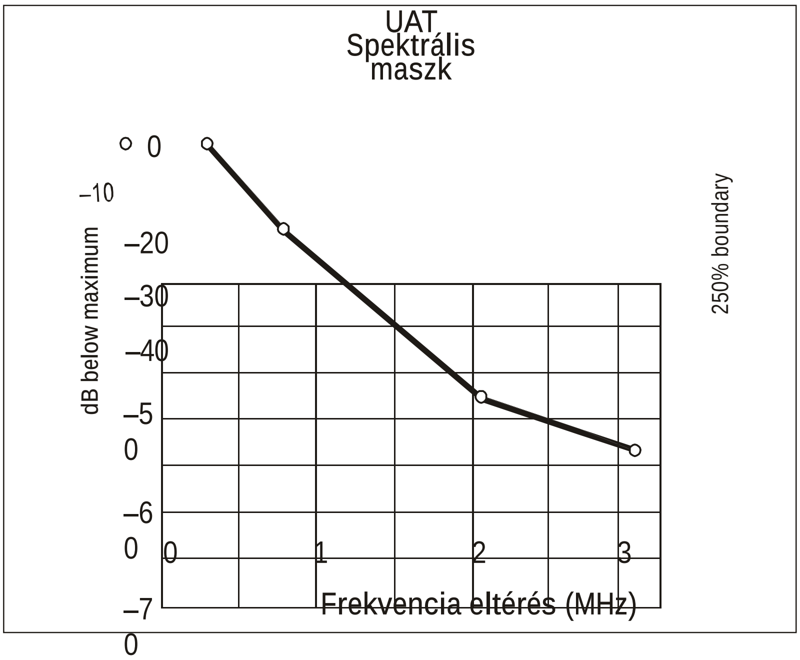
Frekvencia eltérés a központtól	*Minimális szűrési arány (nem-szükséges/szükséges szint dB-ben)*
–1.0 MHz	30
+1.0 MHz	40
(±) 2.0 MHz	50
(±) 10.0 MHz	60

12-5.TÁBLÁZAT Földi-adó összerendező mátrix

RS Blokk	*MDB Byte #*						*FEC Parity (Block/Byte #)*			
A	1	2	3	...	71	72	A/1	...	A/19	A/20
B	73	74	75	...	143	144	B/1	...	B/19	B/20
C	145	146	147	...	215	216	C/1	...	C/19	C/20
D	217	218	219	...	287	288	D/1	...	D/19	D/20
E	289	290	291	...	359	360	E/1	...	E/19	E/20
F	361	362	363	...	431	432	F/1	...	F/19	F/20

Megjegyzés.- A 12-5 táblázatban a közlemény adatblokk Byte #1-tól #72-ig a közlemény adatblokk 72 bájtja (egyenként 8 bit) információ kerül az első RS (92,72) blokkba. A FEC paritás A/1-től A/20-ig az a bizonyos 20 bájtja a FEC paritásnak, amely az (A) blokkal kapcsolódik.

A 12FEJEZET ÁBRÁI



(ábrában baloldalon függőlegesen:" dB maximum alatt" – jobb oldalon: 250% határvonal)

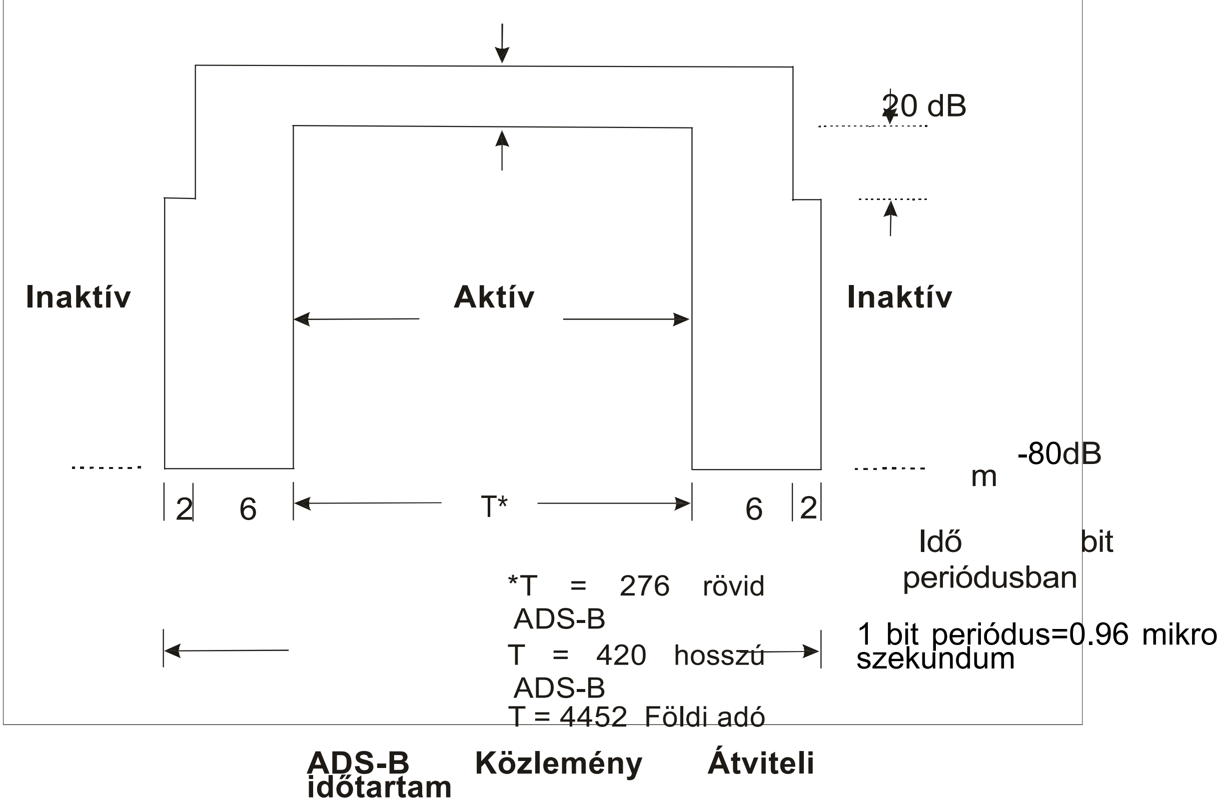
Megjegyzések

1. *Az UAT spektrum teljesítményének 99 százaléka a 1.3 MHz (±0.65 MHz) tartományban van. Ez nagyjából a 2dB sávszélességgel egyenértékű.*

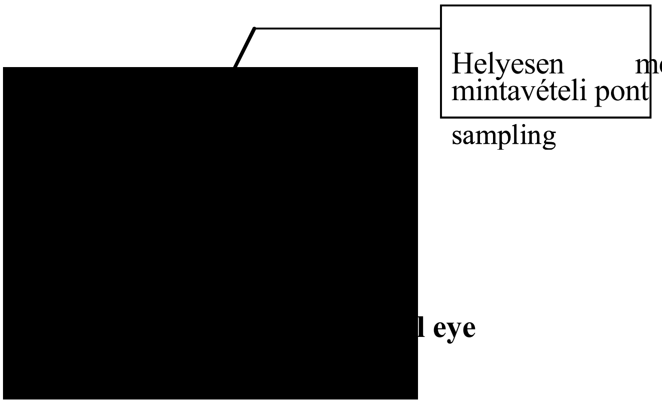
2. *A hamis sugárzási követelmények az 1.3 MHz érték ±250 százalékánál kezdődnek ezért az átviteli maszk követelmény ±3.25 MHz-re terjed.*

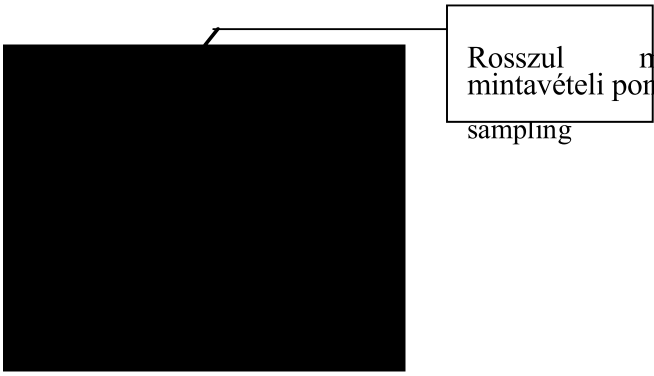
12-1 ábra UAT átviteli spektrum

A berendezés osztályának megengedett teljesítmény-tartománya



12-2.ábra Az UAT közlemény átvitel idő/amplitúdó profilja





12-4 Ábra A torzított szemábra

II. RÉSZ – HANG TÁVKÖZLŐ RENDSZEREK

1. FEJEZET. DEFINÍCIÓK

Megjegyzés. – A másodlagos energiaellátásról szóló anyag és az összeköttetési rendszerek megbízhatóságával és rendelkezésre állásával foglalkozó útmutató anyag a 10. Annex, I. kötet 2.9 szakaszban és az I. kötet F mellékletben találhatók.

2. FEJEZET. LÉGIFORGALMI MOZGÓ SZOLGÁLAT

2.1 A LEVEGŐ-FÖLD VHF ÖSSZEKÖTTETÉSI RENDSZER JELLEMZŐK

Megjegyzés. – Az itt következő szövegben a 8,33 kHz-es csatorna kijelölések csatorna távolságai úgy vannak meghatározva, mint 25 kHz osztva 3-mal, amely 8,3333...-al egyenlő.

2.1.1 A nemzetközi légiforgalmi mozgó szolgálatban használt levegő-föld VHF összeköttetési rendszer jellemzőinek meg kell felelniük a következő előírásoknak:
2.1.1.1 A rádiótelefon sugárzásoknak két-oldalsávos (DSB) amplitúdó-modulált (AM) vivőhullámnak kell lenniük. A sugárzás jelölése az ITU Rádió-Rendszabályzat szerinti jelölése A3E.
2.1.1.2 A hamis sugárzást a műszaki fejlődés jelenlegi állapota és a szolgáltatás jellege által lehetővé tett legalacsonyabb értéken kell tartani.
Megjegyzés. – Az ITU Rádió-Rendszabályzat S3 Függeléke tartalmazza a hamis sugárzások szintjeire vonatkozó tűréseket, azokat, amelyeknek az adók meg kell, hogy feleljenek.
2.1.1.3 A felhasznált rádiófrekvenciákat a 117,975–137 MHz-es sávokból kell kiválasztani. A kijelölhető frekvenciák közötti távolságoknak (csatorna-távolság) a rendszer elemekre alkalmazható frekvenciatűréseknek az V. kötetben meghatározottaknak kell lenniük.

Megjegyzés. - A 117,975 - 137 MHz-es sávot a Légiforgalmi Mozgó (R) Szolgálatnak az ITU Rádió-Rendszabályzat 1947-ben osztotta ki. Az ITU adminisztratív Rádió Világ-Konferenciák egymást követő sorozatos módosításai a 132 - 136 MHz-es sávot is hozzáadták az R-kiosztásokhoz, olyan feltételek mellett, amelyek különböznek az ITU régióktól, illetve meghatározott országoknak, ország-csoportoknak (lásd RRs S5.203-at, S5.203A-t, S5.203B-t, mint a 136 - 137 MHz-es sáv kiegészítő kijelölését, és S5.201-et a 132 - 136 MHz-es sávra).

2.1.1.4 A sugárzások tervezési polarizációjának függőlegesnek kell lenni.

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2.2 A FÖLDI BERENDEZÉS RENDSZER JELLEMZŐI

2.2.1 Adás funkció

2.2.1.1 *Frekvencia stabilitás.* Az üzemi rádiófrekvencia nem térhet el a kijelölt frekvenciától plusz vagy mínusz 0,005 százaléknál nagyobb mértékben. Ahol az V. Kötet előírásainak megfelelően 25 kHz-es csatorna-távolságot alkalmaznak, ott az üzemi rádiófrekvencia nem térhet el a kijelölt frekvenciától plusz vagy mínusz 0,002 százaléknál nagyobb mértékben. Ahol az V.Kötet előírásainak megfelelően 8,33 kHz-es csatorna-távolságot vezetnek be, ott az üzemi rádiófrekvencia nem térhet el a kijelölt frekvenciától plusz vagy mínusz 0,0001 százaléknál nagyobb mértékben.

Megjegyzés. – A fenti tűrések nem lesznek megfelelők az eltolt vivőhullámú rendszerekre.

2.2.1.1.1 Eltolt vivőhullámú rendszerek 25 kHz-es, 50 kHz-es és 100 kHz-es csatorna-távolságú környezetben. Az eltolt vivőhullámú rendszerekben az egyes vivők stabilitásának olyannak kell lenni, hogy megakadályozza a 4 kHz-nél kisebb elsőrendű heterodin frekvenciákat, és ezenkívül a külső vivőhullám frekvenciák maximális frekvencia eltérése a kijelölt vivő frekvenciától ne haladja meg a 8 kHz-et. Az eltolt vivőhullámú rendszerek a 8,33 kHz-es csatorna-távolságú frekvenciákon nem használhatók.

Megjegyzés. – Az eltolt vivőhullámú rendszerek egyes vivőinek megkívánt stabilitására a II. rész "A" Mellékletében találhatók példák.

2.2.1.2. TELJESÍTMÉNY

Ajánlás. – *Az esetek magas százalékában a kisugárzott teljesítménynek olyannak kell lenni, hogy legalább 75 mikrovolt per méter (mínusz 109 dBW/m^2) térerősséget szolgáltasson a létesítmény meghatározott működési fedésterületén belül szabad térbeli terjedés alapján.*

2.2.1.3 *Moduláció.* A kivezérlési csúcsoknál a modulációs tényezőnek legalább a 0,85-öt elérőnek kell lenni.

2.2.1.4 **Ajánlás. –** *Kiegészítő áramköri elemeket kell biztosítani ahhoz, hogy az átlagos modulációs tényezőt a gyakorlatilag lehetséges legnagyobb értéken tartsák túlmodulálás nélkül.*

2.2.2 Vételi funkció

2.2.2.1 *Frekvencia stabilitás.* Ahol az V.Kötet előírásainak megfelelően 8,33 kHz-es csatorna-távolságot vezettek be, ott az üzemi rádiófrekvencia nem térhet el a kijelölt frekvenciától plusz vagy mínusz 0,0001 százaléknál nagyobb mértékben.

2.2.2.2 *Érzékenység.* A tápvonal veszteségét és az antenna iránykarakterisztikáját is figyelembe véve, a vevő érzékenységének olyannak kell lennie, hogy az esetek nagy százalékában egy 15 dB megkívánt/nem-kívánt arányú audio kimenő jelet szolgáltasson 50 százalékos amplitúdó-modulált (A3E) rádiójellel, amely 20 mikrovolt per méter (mínusz 120 dBW/m^2) vagy nagyobb térerősséggel rendelkezik.

2.2.2.3 *Effektív vételi sávszélesség.* 25 kHz-es, 50 kHz-es vagy 100 kHz-es sávszélességű csatornára hangolva, a vevő rendszernek kielégítő szintű és érthető hangfrekvenciás jelet kell szolgáltatnia, amikor a fenti 2.2.2.2 pontban meghatározott rádiófrekvenciás jelnek a kijelölt vételi frekvencia értékekkel plusz vagy mínusz 0,005 százalékon belül megegyező vivőfrekvenciája van. 8,33 kHz-es szélességű csatornára hangolva a vevő rendszernek kielégítő szintű és érthető hangfrekvenciás jelet kell szolgáltatnia, amikor a fenti 2.2.2.2 pontban meghatározott rádiófrekvenciás jelnek a kijelölt vételi frekvencia értékkel plusz vagy mínusz 0,0005 százalékon belül megegyező vivőfrekvenciája van. Az effektív vételi sávszélességről további információkat a II. Rész "A" Melléklete tartalmaz.

Megjegyzés. – Az effektív vételi sávszélesség a Doppler eltolódást is magában foglalja.

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2.2.2.4 *Szomszédos csatorna elnyomás.* A vevő rendszernek biztosítani kell 60 dB-es vagy annál nagyobb tényleges elnyomást a szomszédos kijelölhető csatorna jeleire vonatkozóan.
Megjegyzés. – A szomszédos kijelölhető frekvencia általában plusz vagy mínusz 50 kHz. Ahol ez a csatorna-távolság nem kielégítő, ott a szomszédos kijelölhető frekvencia plusz vagy mínusz 25 kHz vagy plusz, vagy mínusz 8,33 kHz az V. Kötetben lévő előírásoknak megfelelően. Megengedett az, hogy a föld néhány területén a 25 kHz-es, 50 kHz-es vagy 100 kHz-es csatorna-távolságra tervezett vevők továbbra is használatban maradjanak.

2.3 A FEDÉLZETI BERENDEZÉS RENDSZER JELLEMZŐI

2.3.1 Adás funkció

2.3.1.1 *Frekvencia stabilitás.* Az üzemelési rádiófrekvencia a kijelölt frekvenciától nem térhet el plusz vagy mínusz 0,005 százalékértéknél nagyobb mértékben. Ahol 25 kHz-es csatorna-távolságot alkalmaznak, ott az üzemelési rádiófrekvencia a kijelölt frekvenciától nem térhet el plusz vagy mínusz 0,003 százaléknál nagyobb mértékben. Ahol 8,33 kHz-es csatorna-távolságot alkalmaznak, ott az üzemelési rádiófrekvencia a kijelölt frekvenciától nem térhet el 0,0005 százaléknál nagyobb mértékben.
2.3.1.2 *Teljesítmény.* Az esetek nagy százalékában a kisugárzott teljesítménynek olyannak kell lenni, hogy legalább 20 mikrovolt per méter (mínusz 120 dBW/m^2) térerősséget szolgáltasson a szabad térbeli terjedés alapján, olyan távolságokon és magasságokon, amelyek megfelelnek azoknak az üzemelési feltételeknek, amelyeket azokra a területekre engedélyezettek, amelyek felett a légijármű üzemel.
2.3.1.3 *Szomszéd csatorna teljesítmény.* Egy 8,33 kHz-es fedélzeti adótól bármely üzemelési feltételek esetén a kisugárzott teljesítmény, az első 8,33 kHz-es szomszédos csatorna középvonalától szimmetrikusan elhelyezkedő 7 kHz-es sávszélesség felett mérve, nem lépheti túl az adó vivő-teljesítménye alatti -45 dB-es szintet. A fenti szomszéd csatorna teljesítménynek számításba kell venni a jellemző beszéd-üzemi spektrumot.

Megjegyzés. – A beszéd-üzemi spektrumot állandó szintűnek feltételezik 300 és 800 Hz között és oktávonként 10 dB-lel csillapítottnak a 800 Hz felett.

2.3.1.4 *Moduláció.* A legalább 0,85-ös csúcs modulációs tényezőnek elérhetőnek kell lenni.
2.3.1.5 **Ajánlás.** – *Kielégítő áramköri elemeket kell biztosítani ahhoz, hogy az átlagos modulációs tényezőt a gyakorlatilag lehetséges legnagyobb értéken tartsák túlmodulálás nélkül.*

2.3.2 Vételi funkció

2.3.2.1 *Frekvencia stabilitás.* Ahol 8,33 kHz-es csatorna-távolságot vezettek be az V. Kötetnek megfelelően, ott az üzemi frekvencia nem térhet el a kijelölt frekvenciától plusz vagy mínusz 0,0005 százaléknál nagyobb értékkel

2.3.2.2 ÉRZÉKENYSÉG

2.3.2.2.1 **Ajánlás.** – *Figyelembe véve a légijármű tápvonal illesztési hibáit, a csillapítási veszteséget és az antenna iránykarakterisztikáját, a vevő érzékenységének olyannak kell lenni, hogy az esetek nagy százalékában egy 15 dB megkívánt/nem-kívánt arányú audió kimenet jelet szolgáltasson 50 százalékos amplitúdó-modulált (A3E) rádió jellel, amely 75 mikrovolt per méter (mínusz 105 dBW/m^2) térerőséggel rendelkezik.*

Megjegyzés. – Kiterjesztett hatótávolságú VHF berendezések tervezésénél 30 mikrovolt per méter fedélzeti vételi érzékenység feltételezhető.

2.3.2.3 *Effektív vételi sávszélesség a 100 kHz, 50 kHz és 25 kHz-es csatorna-távolságú vevő berendezéseknél.* Az V. Kötetben kijelölt 25 kHz, 50 kHz vagy 100 kHz-es csatorna-távolságú rendszerben a vevőnek tényleges vételi

sávszélességet kell biztosítani a következők szerint:
a) azokon a területeken, ahol eltolt vivő rendszereket alkalmaznak, a vevőnek kielégítő audio-kimenetet kell szolgáltatnia akkor, amikor a fenti 2.3.2.2 pontban meghatározott vivő frekvencia eltérése a kijelölt frekvenciától 8 kHz-en belül van;
b) azokon a területeken, ahol eltolt vivő rendszereket nem alkalmaznak, a vevőnek kielégítő hangfrekvenciás kimenetet kell szolgáltatnia akkor, amikor a fenti 2.3.2.2 pontban meghatározott jel vivőfrekvenciájának eltérése a kijelölt frekvenciától plusz vagy mínusz 0,005 százalék.
2.3.2.4 *Effektív vételi sávszélesség a 8,33 kHz-es csatorna-távolságú vevő berendezéseknél.* Amikor a vevő az V.Kötetben kijelölt 8,33 kHz-es sávszélességű csatornára van hangolva, a vételi funkciónak egy kielégítő hangfrekvenciás kimenetet kell szolgáltatnia akkor, amikor a fenti 2.3.2.2 pontban meghatározott jel vivőfrekvenciájának eltérése a kijelölt frekvenciától plusz vagy mínusz 0,0005 százalék. Az effektív vételi sávszélességről bővebb információt a II. Rész "A" Melléklete tartalmaz.

Megjegyzés. – Az effektív vételi sávszélesség a Doppler eltolódást is magában foglalja.

2.3.2.5 *Szomszédos csatorna elnyomás.* A vételi funkció tényleges szomszédos csatorna elnyomást biztosít a következők szerint:
a) *8,33 kHz-es csatornák:* 60 dB vagy több a plusz vagy mínusz 8,33 kHz-nél a kijelölt frekvenciára vonatkoztatva, és 40 dB vagy több a plusz vagy mínusz 6,5 kHz-nél:

Megjegyzés. – A vevő helyi oszcillátora fázis-zajának elegendően kicsinek kell lenni ahhoz, hogy elkerüljék a vevő teljesítőképességének leromlását a vivőhullám jelek leválasztására. Egy mínusz 99 dBc/Hz-nél jobb fázis zajszint szükséges a 8,33 kHz-es távolságoknál ahhoz, hogy kielégítsék a 45 dB-es szomszédos csatorna elnyomás követelményét az összes üzemelési feltétel mellett.

b) A *25 kHz-es csatorna-távolságú környezetnél:* 50 dB vagy több a plusz vagy mínusz 25 kHz-nél a kijelölt frekvenciára vonatkoztatva, és 40 dB vagy több a plusz vagy mínusz 17 kHz-nél;
c) *Az 50 kHz-es csatorna-távolságú környezetnél:* 50 dB vagy több a plusz vagy mínusz 50 kHz-nél a kijelölt frekvenciára vonatkoztatva, és 40 dB vagy több a plusz vagy mínusz 35 kHz-nél;
d) *A 100 kHz-es csatorna-távolságú környezetnél:* 50 dB vagy több a plusz vagy mínusz 100 kHz-nél a kijelölt frekvenciára vonatkoztatva..
2.3.2.6 **Ajánlás.** – *A 25 kHz-es, 50 kHz-es vagy 100 kHz-es csatorna-távolságú környezetben alkalmazandó vevő rendszernek lehetőleg 60 dB-es vagy több effektív szomszédos csatorna elnyomási jellemzőt kell biztosítani a kijelölt vételi frekvenciához viszonyítva plusz vagy mínusz 25 kHz-nél, 50 kHz-nél vagy 100 kHz-né ltalálható csatornákra vonatkozóan.*

Megjegyzés. – A frekvenciatervezés általában azon az alapfeltételen nyugszik, hogy a 60 dB-es vagy több tényleges szomszédos csatorna elnyomási jellemző biztosítva van a 25 kHz-re, 50 kHz-re vagy 100 kHz-re kijelölt frekvenciáktól, ahogy az megfelelő a csatorna-távolsági környezetnek.

2.3.2.7 **Ajánlás.** – *A 2.3.2.3 pontnak megfelelő vevők eltolt vivőjű rendszerekkel ellátott területeken történő használaakor a vevő jellemzőknek a következők szerintieknek kell lenniük:*
a) a hangfrekvenciás átviteli karakterisztika kizárja a két vagy több eltolt vivőfrekvencia vételéből eredő audio heterodinek káros szintjeit;
b) a vevő zajzár áramkörei, ha ilyeneket alkalmaznak, kielégítően működnek a két- vagy több eltolt vivőfrekvencia vételéből eredő audio heterodinek jelenléte esetén.

2.3.2.8 *VDL-INTERFERENCIA ÉRZÉKETLENSÉGI TELJESÍTMÉNY*

2.3.2.8.1 Ugyanazon légijármű fedélzetén DSB-AM és VDL technológiát alkalmazó független üzemeltetésű használatra szánt berendezések esetében a vevőnek kielégítő és jól érthető hangkimenetet kell szolgáltatnia nem

több, mint 150 mikrovolt per méter (mínusz 102 dBW/m^2) hasznos rádiófrekvenciás térerővel a hasznos jel szintjét legalább 50 dB értékkel meghaladó nem-kívánt VDL jel térerősség mellett. A feltételnek bármely kijelölhető csatornán attól legalább 100 kHz-re található VDL zavarjel esetében teljesülnie kell.
Megjegyzés. – Ez a VDL interferencia érzéketlenség a III. Kötet I. Rész 6.3.4. pontjában ismertetett VDL RF spektrum maszk és 68 dB-es adó/vevő elválasztás melletti követelmény. Jobb adó és vevő paraméterek kisebb megkívánt elkülönítést eredményezhetnek.

2.3.2.8.2 Minden 2002. január 1. után újonnan felszerelt ugyanazon légijármű fedélzetén lévő DSB-AM és VDL technológiát alkalmazó szolgáltatások független üzemeltetésénél való felhasználására szánt berendezés vétel funkciójának ki kell elégítenie a 2.3.2.8.1 pont előírásait.
2.3.2.8.3 Minden 2005. január 1. után felszerelt, ugyanazon légijármű fedélzetén DSB-AM és VDL technológiát alkalmazó szolgáltatások független üzemeltetésénél való felhasználására szánt berendezés vétel funkciójának ki kell elégítenie a 2.3.2.8.1 pont előírásait a 2.3.2.8.4 pont feltételei mellett.
2.3.2.8.4 A 2.3.2.8.3 pont előírásainak kötelező teljesítésére vonatkozó követelményeket az olyan körzeti léginavigációs egyezmények alapján kell megszabni, amelyek az üzemelési légteret és a megvalósítási időrendjét határozzák meg.
2.3.2.8.4.1 A 2.3.2.8.4 pontban jelzett egyezménynek a fedélzeti rendszerek kötelező teljesítésére legalább kétéves előzetes bejelentést kell biztosítania.

2.3.3 Interferencia érzéketlenségi teljesítmény

2.3.3.1 1998. január 1-je után a VHF kommunikációs vételi rendszereknek kielégítően kell működniük két bemeneti jel esetén is akkor, ha a harmadrendű intermodulációt létrehozó VHF FM műsorszóró jel szintje a bemeneten mínusz 5 dBm.
2.3.3.2 1998. január 1-je után a VHF kommunikációs vételi rendszerekben nem szabad fellépnie érzéketlenítési jelenségnek mínusz 5 dBm-es szintű VHF FM rádióadás jelek vevőbemenetre kerülése esetén.

Megjegyzés. – A fenti 2.3.3.1 és 2.3.3.2 pontokban idézett érzéketlenítési kritériumokra vonatkozó útmutató anyagot a II. Rész "A" Mellékletének 1.3 pontja tartalmazza.

2.3.3.3 1995. január 1-je utána a fedélzeti VHF kommunikációs vételi rendszerek minden új felszerelésű berendezésének ki kell elégítenie a fenti 2.3.3.1 és 2.3.3.2 pontok előírásait.
2.3.3.4 **Ajánlás.** – *A fenti 2.3.3.1 és 2.3.3.2 alatti érzéketlenségi előírásokat kielégítő fedélzeti VHF kommunikációs vételi rendszereket a lehető legrövidebb időn belül üzembe kell helyezni.*

2.4 EGY-OLDALSÁVOS (SSB) HF ÖSSZEKÖTTETÉSI RENDSZERJELLEMZŐK A LÉGIFORGALMI MOZGÓ SZOLGÁLATOKNÁL TÖRTÉNŐ FELHASZNÁLÁSNÁL

2.4.1 A levegő-föld HF SSB rendszer jellemzőinek, ahol a légiforgalmi mozgó szolgálatoknál felhasználásra kerülnek, a következő előírásoknak kell megfelelniük.

2.4.1.1 FREKVENCIA TARTOMÁNY

2.4.1.1.1 A HF SSB berendezéseknek alkalmazhatónak kell lenniük bármely SSB vivő (referencia) frekvenciánál, amely a légiforgalmi mozgó (R) szolgáltatás részére rendelkezésre áll a 2,8 MHz-től a 22 MHz-ig terjedő sávban, és szükségszerű az, hogy kielégítsék a körzet (ek) részére jóváhagyott kijelölési tervet, valamint összhangban legyenek a Rádió-Rendszabályzat vonatkozó előírásaival.

1. Megjegyzés. – Lásd a Bevezetést az V. Kötet 3.Fejezetéhez és a 2-1. és 2-2. ábrákat.

2. Megjegyzés. – Az ITU Világ Adminisztrációs Rádió Konferencia, Légiforgalmi Mozgó (R) Szolgálat, Genf, 1978.

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(ITU World Administrative Radio Conference, Aeronautical Mobile (R) Service, Geneva, 1978.) egy új kiosztási tervet hozott létre (Allotment Plan) az Aer Rádió-Rendszabályzatok 27. Függelékéhez (Appendix 27, Aer to the Radio Regulations), amely az egy-oldalsávos üzemelésre van alapozva, a korábbi két-oldalsávos kijelöléssel szemben. A Világ Rádió-Összeköttetési Konferencia (World Radiocommunication Conference) 1995-ben ezt S.27 Függelékként jelölte ki újra. Kisebb szerkesztői változtatásokat hajtott végre a Világ Rádió-Összeköttetési Konferencia 1997-ben.

2.4.1.1.2 A berendezéseknek alkalmasnak kell lenniük az 1 kHz egész számú többszörösein való üzemelésre.

2.4.1.2 OLDALSÁV KIVÁLASZTÁS

2.4.1.2.1 Az átvitt oldalsávnak a vivő- (referencia) frekvencia nagyobb frekvenciájú oldalán lévőnek kell lennie.

2.4.1.3. VIVŐ (REFERENCIA) FREKVENCIA

2.4.1.3.1 A csatorna felhasználásnak összhangban kell lenni az S27 Függelék 27/16-os és a Kijelölési Terv 27/186-tól 27/207-ig terjedő, azt is magában foglaló vivőhullám (referencia) frekvencia táblázatokkal (vagy a 27/21 alapján megállapított frekvenciákkal).

Megjegyzés. - Az a cél, hogy csak a vivő- (referencia) frekvencia kerüljön közzétételre a Körzeti Tervekben, vagy a Légiforgalmi Tájékoztató Kiadványokban.

2.4.1.4 SUGÁRZÁSI OSZTÁLYOK ÉS VIVŐFREKVENCIA ELNYOMÁS

2.4.1.4.1 A rendszernek J3E elnyomott vivőfrekvenciájú modulációval kell működnie. (J7B és J9B is használható). SELCAL II. Rész 3. Fejezet által ismertetett előírások szerinti alkalmazásakor a berendezésnek a H2B sugárzással kell üzemelnie.

2.4.1.4.2 1982. február 1-jéig a légiforgalmi állomásoknak és a légijármű fedélzeti állomásoknak be kell vezetniük a fenti 2.4.1.4.1 pontban előírt megfelelő sugárzási osztály (oka) t. Ettől a dátumtól kezdve az A3E sugárzási osztályt meg kell szűntetni, kivéve az alábbi 2.4.1.4.4 pontban megadott előírásokat.

2.4.1.4.3 1982. február 1-jéig az egy-oldalsávos működéshez felszerelt légiforgalmi állomásokat és légijármű fedélzeti állomásokat is el kell látni a H3E sugárzási osztályú adáshoz szükséges elemekkel, ahol megkövetelt, hogy kompatibilis legyen a két-oldalsávos vevőberendezésekkel. Ettől a dátumtól kezdve a H3E sugárzási osztályt meg kell szűntetni, kivéve az alábbi 2.4.1.4.4 pontban szereplő előírásokat.

2.4.1.4.4 **Ajánlás.** – *A koordinált kutatási és mentési műveletekben közvetlenül résztvevő állomások, amelyek a 3023 kHz-es és az 5680 kHz-es frekvenciákat használják, a J3E sugárzási osztályt használják; azonban mivel a tengeri mozgó szolgálat és szárazföldi mozgó szolgálat is részt vehet a tevékenységben, az A3E és H3E sugárzási osztályok is használhatók.*

2.4.1.4.5 1981. április 1-je után új DSB berendezések nem szerelhetők fel.

2.4.1.4.6 A légijármű fedélzeti állomási adóberendezéseknek képeseknek kell lenni legalább 26 dB-es vivő-elnyomásra a modulációs csúcs-teljesítményre (P_p) vonatkoztatva a J3E, J7B vagy J9B sugárzási osztályoknál.

2.4.1.4.7 A légiforgalmi állomások adóinak képeseknek kell lenni 40 dB-es vivő-elnyomásra a modulációs csúcs-teljesítményre (P_p) vonatkoztatva a J3E, J7B vagy J9B sugárzási osztályoknál.

2.4.1.5 HANGFREKVENCIÁS SÁVSZÉLESSÉG

2.4.1.5.1 A rádiótelefon sugárzásoknál a hangfrekvenciákat 300 és 2700 Hz közé kell korlátozni és a más, szabályozott sugárzások által elfoglalt sávszélesség nem haladhatja meg a J3E sugárzások felső határát. Ezeknek a határértékeknek a meghatározásánál azonban kiterjedésükben nem lehet korlátozásokat alkalmazni a J3E sugárzástól eltérő sugárzás esetében, feltéve, hogy a nem-kívánt sugárzásokra vonatkozó korlátozások teljesülnek (lásd az alábbi 2.4.1.7 pontot).

Megjegyzés. – Azokra a légijármű fedélzeti és légiforgalmi állomási adó típusokra, amelyeket először 1983. február 1-je előtttelepítettek,, a hangfrekvenciás sáv 3000 Hz-re lesz korlátozva.

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2.4.1.5.2 Más engedélyezett sugárzási osztályoknál a modulációs frekvenciáknak olyannak kell lenniük, hogy az alábbi 2.4.1.7 pontban ismertetett, megkövetelt spektrum korlátozásokat kielégítsék.

2.4.1.6 FREKVENCIA TŰRÉS

2.4.1.6.1 Az adási funkció alapfrekvencia stabilitásának a J3E, J7B vagy J9B sugárzási osztályoknál olyannak kell lenni, hogy az adás tényleges vivő- frekvenciája és a vivő- (referencia) frekvencia közötti különbség ne haladja meg:
- a 20 Hz-et a fedélzeti telepítéseknél; és
- a 10 Hz-et a földi telepítéseknél.

2.4.1.6.2 A vételi funkció frekvencia stabilitásának olyannak kell lenni, hogy a fenti 2.4.1.6.1 pontban meghatározott sugárzási funkció stabilitásokkal, a szolgáltatásban elért és a Doppler-eltolódást is tartalmazó földi és fedélzeti funkció közötti teljes frekvencia-különbség ne haladja meg a 45 Hz-et. Azonban a szuperszonikus repülőgépek esetén ennél nagyobb frekvencia-különbség is megengedhető.

2.4.1.7 SPEKTRUM HATÁRÉRTÉKEK

2.4.1.7.1 Azoknál a légijármű fedélzeti állomás adó típusoknál és légiforgalmii állomás adóknál, amelyek 1983. február 1-je előtt kerültek először felszerelésre és a H2B, H3E, J3E, J7B vagy J9B sugárzások egy-oldalsávos osztályait használják, bármely sugárzás közepes teljesítményének, bármely frekvencián kisebbnek kell lennie az adó közepes teljesítményénél (P_m), a következőknek megfelelően:
- bármely frekvencián 2 kHz-es vagy nagyobb értékű, maximálisan 6 kHz-es távolságban a kijelölt frekvenciától: legalább 25 dB;
- bármely frekvencián 6 kHz-es vagy nagyobb értékű, maximálisan 10 kHz-es távolságban a kijelölt frekvenciától: legalább 35 dB;
- bármely frekvencián 10 kHz-es vagy nagyobb távolságban a kijelölt frekvenciától:

a) a légijármű fedélzeti állomás adójának: 40 dB;
b) a légiforgalmi állomás adójának:
$[43+10\ \log_{10} P_m\ (W)]$ dB

2.4.1.7.2 Az 1983. február 1-je után először felszerelt légijármű fedélzeti adóknál, és az 1983. február 1-je óta használatban lévő és a H2B, H3E, J3E, J7B vagy J9B sugárzási egy-oldalsávos osztályait használó légiforgalmi állomás adóknál bármely modulációs csúcs-teljesítményének (P_p) bármely frekvencián kisebbnek kell lennie, mint az adó modulációs csúcs-teljesítményének (P_p), a következőknek megfelelően:
- bármely frekvencián 1,5 kHz-es vagy nagyobb értékű, maximálisan 4,5 kHz-es távolságban a kijelölt frekvenciától: legalább 30 dB;
- bármely frekvencián 4,5 kHz-es vagy nagyobb értékű, maximálisan 7,5 kHz-es távolságban a kijelölt frekvenciától: legalább 38 dB;
- bármely frekvencián 7,5 kHz-es vagy nagyobb távolságban a kijelölt frekvenciától:

a) a légijármű fedélzeti állomás adójának: 43 dB;
b) a légiforgalmi állomások adóinak: a maximálisan 50 W teljesítményű adónál.

$$[43+10\ \log_{10} P_m\ (W)]\ \text{dB}$$

az 50 W-nál nagyobb teljesítményű adóknál: 60 dB.

Megjegyzés. – Lásd a 2-1. és a 2-2 ábrát.

2.4.1.8 TELJESÍTMÉNY

2.4.1.8.1 *Légiforgalmi állomási berendezések.* Kivéve az ITU Rádió-Rendszabályzat S27 Függelékének előírásai által engedélyezetteket, az a modulációs csúcs-teljesítmény, amely az antenna tápvonalat látja el a H2B, H3E, J3E, J7B vagy J9B sugárzási osztályoknál, nem haladhatja meg a 6 kW-os maximális értéket.

2.4.1.8.2 *Légijármű fedélzeti állomások.* Az antenna tápvonalhoz szolgáltatott modulációs csúcs-teljesítmény a

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H2B, H3E, J3E, J7B vagy J9B sugárzási osztályoknál nem haladhatja meg a 400 W-ot, kivéve a Rádió-Rendszabályzat S27. Függelékében előírtakat a következők szerint:
S27/68 Elfogadott, hogy a légijármű adók által alkalmazott teljesítmény meghaladhatja a 27/60-ban meghatározott korlátokat. Azonban az ilyen megnövelt teljesítmény (amely általában nem haladhatja meg a 600 W P_p-t) használata nem okozhat káros interferenciát az azon műszaki elvekkel összhangban működő állomásoknál, amely elveken a frekvencia kiosztási terv alapul.
S27/60 Ha ezen Függelék II. Részében nincs másképpen meghatározva, az antenna tápvonalába bevitt modulációs csúcs-teljesítmény nem haladhatja meg az alábbi táblázatban jelzett maximális értékeket; a megfelelő tényleges kisugárzott csúcs-teljesítményekről elfogadott az, hogy az alábbi értékek kétharmadával egyenlők:

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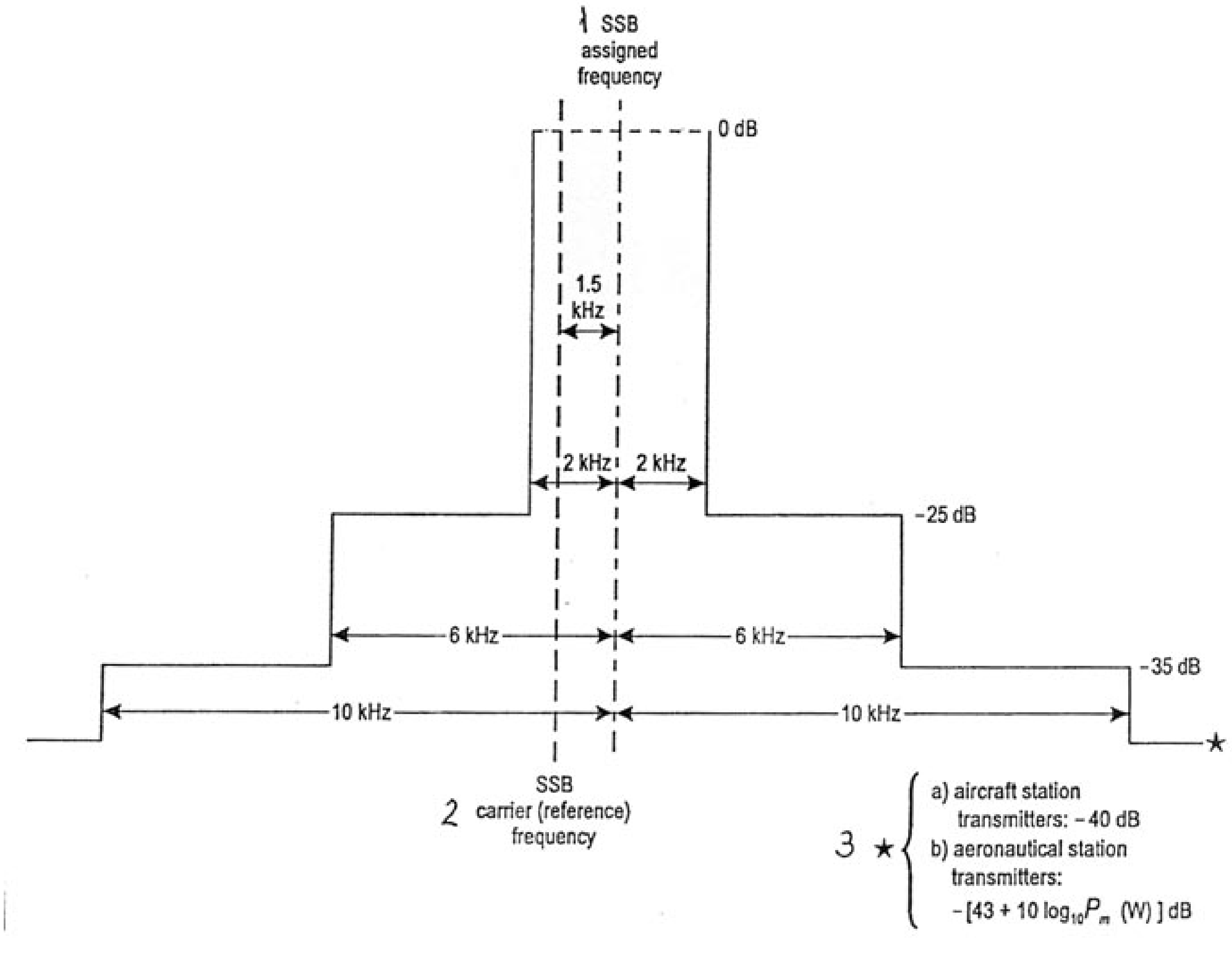
Sugárzási osztály	Állomások	Maximális modulációs csúcs-teljesítmény (P_p)
H2B, J3E, J7B, J9B	Légiforgalmi állomások	6 kW
J9B, A3E*, H3E* (100% moduláció)	Légijármű fedélzeti állomások	400 W
Egyéb sugárzás mint például A1A, F1B	Légiforgalmi állomások Légijármű fedélzeti állomások	1,5 kW 100 W

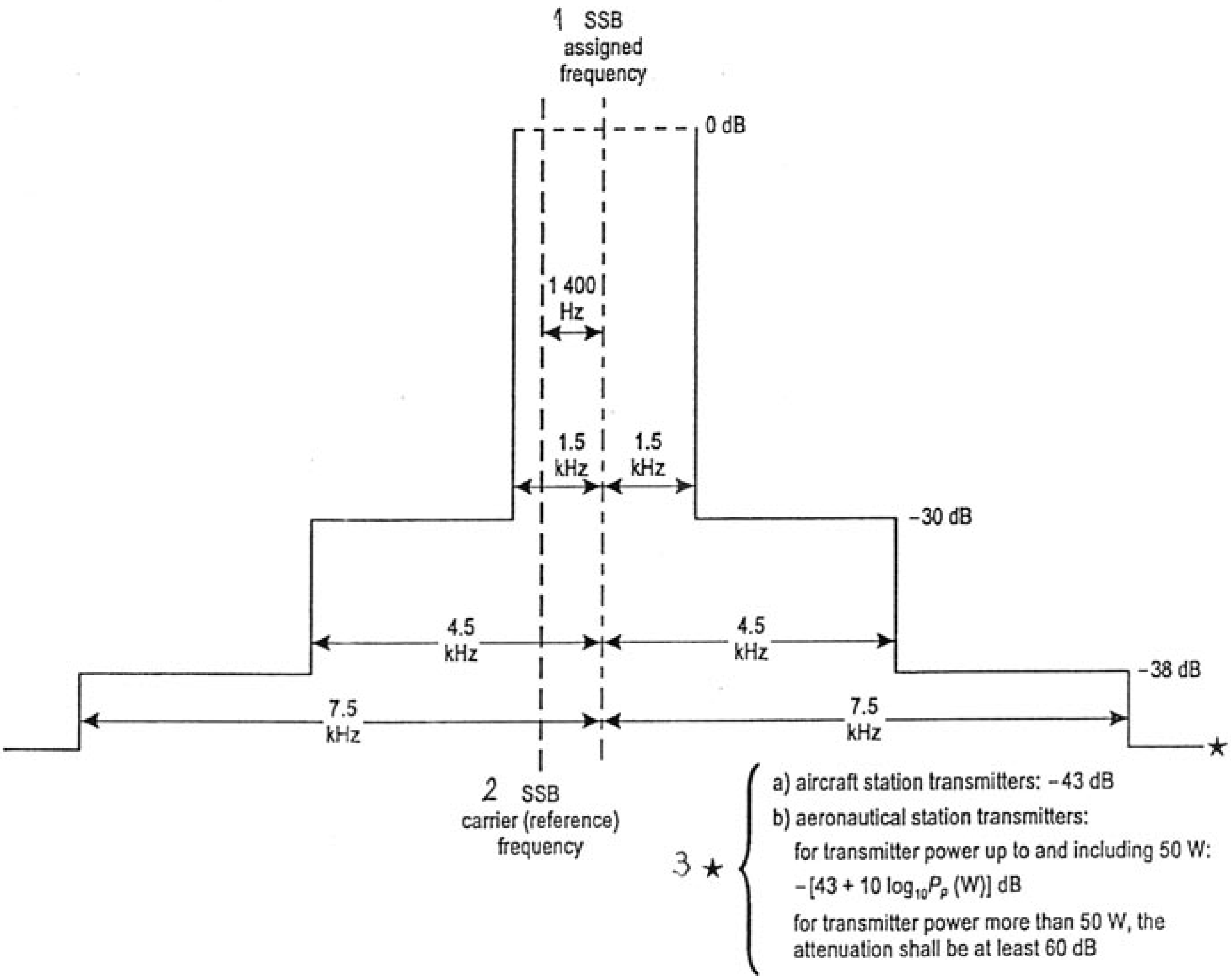
*Az A3E és H3E csak 3023 kHz-en és 5680 kHz-en használhatók.

2.4.1.9 *Üzemmód.* Egy-csatornás szimplex sugárzást kell alkalmazni.



2-1. ábra. Megkívánt spektrum korlátok (közepes teljesítményben kifejezve) a légijármű fedélzeti adó típusoknál és azoknál a légiforgalmi állomások adóinál, amelyeket először 1983. február 1-je előtt szereltek fel.

2-1 ábra szövege:
1 SSB kijelölt frekvencia
2 SSB vivő- (referencia) frekvencia
3 a) légijármű fedélzeti állomás adók: -40 dB
b) légiforgalmi állomási adók:
- [43+10 $\log_{10} P_m$ (W)] dB



2-2. ábra. Megkívánt spektrum korlátok (a csúcs-teljesítményben kifejezve) az először az 1983. február 1-je után felszerelt légijármű fedélzeti állomásoknál és az 1983. február 1-je után használatban lévő légiforgalmi állomási adóknál.

2-2 ábra szövege:
1 SSB kijelölt frekvencia

2 SSB vivő-(referencia) frekvencia
3 a) légijármű fedélzeti állomás adók: -43 dB
b) légiforgalmi állomás adók:
a maximálisan 50 W teljesítményű adóknál:
-[43+10 $\log_{10} P_p$ (W)] dB
az 50 W-nál nagyobb teljesítményű adóknál a csillapítás legalább 60 dB.

3. FEJEZET: SELCAL RENDSZER

3.1 **Ajánlás.** – *Ahol SELCAL rendszert telepítenek, a következő rendszer jellemzőket kell alkalmazni:*
a) Kisugárzott kód. *Mindegyik kisugárzott kódnak két egymást követő hang-impulzusból kell állnia, mindegyik impulzus két szimultán módon átvitt hangot tartalmaz. Az impulzusok 1,0 plusz vagy mínusz 0,25 másodperc idő hosszúságúak, melyeket 0,2 plusz vagy mínusz 0,1 másodperc hosszúságú időközök választanak el.*
b) Stabilitás. *Az átvitt hangok frekvenciáját plusz vagy mínusz 0,15 százalék tűrésen belül kell tartani a fedélzeti dekóder helyes működésének biztosítása érdekében.*
c) Torzítás. *A teljes hangfrekvenciás torzítás az átvitt RF jelen nem haladhatja meg a 15 százalékot.*
d) Százalékos moduláció. *A földi rádióállomás által kisugárzott RF jelnek 3 dB-en belül egyenlő nagyságú, két moduláló hangot kell tartalmaznia. A hangok kombinációja egy modulációs burkológörbét eredményez, amely a lehető legmagasabb névleges modulációs százalékkal bír, és semmi esetre sem kisebb, mint 60 százalék.*
e) Kisugárzott hangok. *A hang-kódok a következő táblázatban felsorolt hangok különböző kombinációiból állnak, és színnel és betűvel vannak jelölve.*

Jelölés	*Frekvencia (Hz)*
Piros A	*312,6*
Piros B	*346,7*
Piros C	*384,6*
Piros D	*426,6*
Piros E	*473,2*
Piros F	*524,8*
Piros G	*582,1*
Piros H	*645,7*
Piros J	*716,1*
Piros K	*794,3*
Piros L	*881,0*
Piros M	*977,2*
Piros P	*1083,9*
Piros Q	*1202,3*
Piros R	*1333,5*
Piros S	*1479,1*

1. Megjegyzés. – Meg kell jegyezni, hogy a hangok frekvenciájának aránya exp(0,045) harmonikus kombinációk lehetőségének elkerülése céljából.
2. Megjegyzés. – Az Összeköttetési Részleg Hatodik Ülése által kifejlesztett alkalmazási elveknek megfelelően, jelenleg nemzetközi használatra csak a piros csoportból választottak kódokat.
3. Megjegyzés. – A SELCAL rendszerek használatára vonatkozó útmutató anyagot a II. Rész "A" Melléklete tartalmazza.
4. Megjegyzés. – A Piros P, Piros Q, Piros R és Piros S hangok 1985. szeptember 1-je után alkalmazhatók, az alábbi 3.2 pontnak megfelelően.

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3.2 Mivel 1985. szeptember 1-jétől a légiforgalmi állomásokat, amelyektől megkövetelik a kommunikációt a SELCAL-lal felszerelt légijárművekkel, fel kell szerelni SELCAL kódokkal a piros csoportnak megfelelően a fenti 3.1 pontban feltüntetett hangfrekvencia táblázat szerint. 1985. szeptember 1-je után a Piros P, Piros Q, Piros R és Piros S SELCAL kódokat használatra ki lehet jelölni.

4. FEJEZET: LÉGIFORGALMI BESZÉD-ÁTVITELI ÁRAMKÖRÖK

4.1 A FÖLD-FÖLD KÖZÖTTI ALKALMAZÁSÚ NEMZETKÖZI LÉGIFORGALMI BESZÉD-ÁTVITELI ÁRAMKÖRÖK KAPCSOLÁSAINAK ÉS JELZÉSEINEK MŰSZAKI ELŐÍRÁSAI

Megjegyzés. - A föld - föld közötti alkalmazású nemzetközi légiforgalmi beszéd-átviteli áramkörök kapcsolásainak és jelzéseinek kivitelezésére vonatkozó útmutató anyagot a Légiforgalmi Szolgálatok (ATS) Föld - Föld Közötti Beszéd-átviteli Kapcsolások és Jelzések Kézikönyve (Doc 9804) tartalmazza. Az anyag magába foglalja a szakkifejezések magyarázatát, a teljesítmény paramétereket, útmutatást ad az alapvető hívás típusokról és a kiegészítő funkciókról, utal a megfelelő ISO/IEC nemzetközi szabványokra és az ITU-T ajánlásokra, útmutatásokat ad a jelzési rendszerek használatáról, részletezi az ajánlott számozási tervezeteket és útmutatásokat ad a jövőbeli tervezetekről.

4.1.1 A nem külön-vonallal összekapcsolt Légiforgalmi Szolgálatoknál a kapcsolás és jelzés felhasználásával biztosított beszéd-átviteli áramkörök alkalmazása az illetékes Hatóságok közötti megállapodás tárgya.

4.1.2 A légiforgalmi beszéd-átviteli áramkörök kapcsolási és jelzési rendszereinek alkalmazását a körzeti léginavigációs egyezmények alapján kell megvalósítani.

4.1.3. **Ajánlás.** – *Az Annex 11, 6.2 Részében meghatározott Légiforgalmi Irányítási összeköttetési követelményeket a következő alap hívástípus közül egynek vagy többnek a megvalósításával kell kielégíteni:*
a) Azonnali hozzáférés;
b) Közvetlen hozzáférés; és
c) Közvetett hozzáférés.

4.1.4 **Ajánlás.** – *A telefon-hívások létrehozásának alap képességéhez kiegészítőleg a következő funkciókat kell biztosítani ahhoz, hogy az Annex 11-ben lefektetett követelmények kielégítésre kerüljenek:*
a) Hívó/hívott fél azonosításának jelzésére szolgáló eszköz;
b) Sürgős/prioritási hívások kezdeményezésére szolgáló eszköz; és
c) Konferencia-beszélgetés képesség.

4.1.5 **Ajánlás.** – *A légiforgalmi beszéd-átviteli áramkörök kapcsolási és jelzési rendszerben használt áramkörök jellemzőinek meg kell felelniük a megfelelő ISO/IEC nemzetközi szabványoknak és az ITU-T ajánlásoknak.*

4.1.6 **Ajánlás.** – *Digitális jelző rendszereket kell felhasználni, amikor a következő tényezők valamelyikénél azok használata indokolható:*
a) A szolgáltatás jobb minősége;
b) Javított minőségű felhasználói berendezések; vagy
c) Csökkentett költségek ott, ahol a szolgáltatás minősége fennmarad.

4.1.7 **Ajánlás.** – *A felhasználandó ellenőrző hangjelzések jellemzői (mint például csengetés, foglaltság, nem-kapcsolható-szám) meg kell, hogy feleljenek a vonatkozó ITU-T ajánlásoknak.*

4.1.8 **Ajánlás.** - *A körzeti és nemzeti légiforgalmi beszéd-átviteli hálózatok összekapcsolási előnyeinek kihasználása érdekében a nemzetközi légiforgalmi telefon-hálózati számozási rendszert kell használni.*

5. FEJEZET: KÉNYSZERHELYZETI HELYJELADÓ (ELT) A KUTATÁSHOZ ÉS MENTÉSHEZ

5.1 ÁLTALÁNOS RÉSZ

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5.1.1 2005. január 1-ig a kényszerhelyzeti helyjeladó adóberendezéseknek vagy mindkét, a 406 MHz-es és a 121,5 MHz-es frekvencián, vagy a 121,5 MHz frekvencián kell üzemelniük.

Megjegyzés. – 2000. január 1-jétől a 121,5 MHz-en üzemelő kényszerhelyzeti helyjeladókkal szemben az a követelmény, hogy megfeleljenek az 5.2.1.8 pontban leírt tökéletesített műszaki jellemzőknek.

5.1.2 Az összes, 406 MHz-en üzemelő kényszerhelyzeti helyjeladó adóberendezésnek meg kell felelnie az 5.3 pont előírásainak.
5.1.3 Az összes, 121,5 MHz-en üzemelő kényszerhelyzeti helyjeladó adóberendezésnek meg kell felelnie az 5.2 pont előírásainak.
5.1.4 2005. január 1-jétől a kényszerhelyzeti helyjeladók adóberendezéseinek egyidejűleg kell működniük a 406 MHz-en és a 121,5 MHz-en.
5.1.5 A 2002. január 1. után felszerelt összes kényszerhelyzeti helyjeladó adóberendezésnek egyidejűleg a 406 MHz-en és a 121,5 MHz-en kell üzemelniük.
5.1.6 Egy integrált kényszerhelyzeti helyjeladó adóberendezés 406 MHz-es részének a műszaki jellemzői meg kell, hogy feleljenek az 5.3 pontban leírtaknak.
5.1.7 Egy integrált kényszerhelyzeti helyjeladó adóberendezés 121,5 MHz-es részének a műszaki jellemzői meg kell, hogy feleljenek az 5.2 pontban leírtaknak.
5.1.8 Az Államoknak egyezményt kell kötniük egy 406 MHz-es ELT jegyzék elkészítéséről. A kényszerhelyzeti helyjeladóra vonatkozó jegyzék információit - amint rendelkezésre állnak - azonnal a kutató és mentő hatóságok rendelkezésére kell bocsájtani. Az Államoknak biztosítaniuk kell, hogy amikor az szükséges, a jegyzék felfrissítésre kerüljön.
5.1.9 Az ELT jegyzék információinak a következőket kell magába foglalniuk:
a) Az adó azonosítóját (15 hexadecimális karakterből álló alfanumerikus kód formájában kifejezve);
b) Az adó gyártóját, modelljét és - amikor rendelkezésre áll - a gyártási sorozatszámát;
c) A COSPAS-SARSAT típus engedélyezési számot;
COSPAS = A vészhelyzetben lévő hajók kutatási műholdas rendszere;
SARSAT = Kutatási és mentési műholdas automatikus pályakövetés.
d) A tulajdonos és járató nevét, címét (postai és e-mail) és kényszerhelyzeti telefonszámát;
e) Az olyan más kényszerhelyzeti kapcsolatok (kettő, ha lehetséges) nevét, címét (postai és e-mail) és telefonszámát, akiket a tulajdonos vagy az üzemeltető ismer;
f) A légijármű gyártóját és típusát; és
g) A légijármű színét.

1. Megjegyzés. - Különféle kódolási protokollok állnak az Államok rendelkezésére. Az elfogadott protokolloktól függően az Államok, saját belátásuk szerint beépíthetik az alábbiak egyikét, mint nyilvántartásba vett, kiegészítő azonosító információt:
a) A légijármű üzemeltető 'ügynökség' megnevezése és az üzemeltetők sorozatszáma; vagy
b) A légijármű 24-bites címzése; vagy
c) A légijármű 'nemzetisége' és lajstromozási jelzése.
A légijármű üzemeltető 'ügynökségének' megjelölését az üzemeltető részére az ICAO jelöli ki az Állam hatóságán keresztül és az üzemeltetők sorozatszámát az üzemeltető foglalja le a 0001-től a 4096-ig terjedő blokkból.

2. Megjegyzés. - Az Államok a saját belátásuk szerint az érvényben lévő megállapodásoktól függően beépíthetnek olyan nyilvántartásba veendő egyéb lényeges információkat is, mint például a lajstromozás utolsó dátuma, az akkumulátor 'lejárati dátuma' és az ELT elhelyezése a légijárművön (például: "elsődleges ELT" vagy "1.számú mentőtutaj").

5.2 A KUTATÓ ÉS MENTŐ KÉNYSZERHELYZETI HELYJELADÓ ADÓBERENDEZÉSEK (ELT) 121,5 MHz-ES RÉSZÉNEK ELŐÍRÁSAI

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1. Megjegyzés. - A 121,5 MHz-es kényszerhelyzeti helyjeladók /ELT/ műszaki jellemzőire és üzemeltetési teljesítményére vonatkozó tájékoztatásokat az RTCA Dokumentum DO-183 és a Polgári Repülési Berendezések Európai Szervezete (EUROCAE) Dokumentum ED.62 tartalmazza.

2. Megjegyzés. - A 121,5 MHz-en üzemelő kényszerhelyzeti helyjeladó adóberendezések műszaki jellemzőit a Nemzetközi Távközlési Unió - Ajánlás M.690-1 /ITU-R Recommendation M.690-1/ foglalja magába. Egy kényszerhelyzeti helyjeladó /ELT/ ITU-meghatározása a Kényszerhelyzeti Helyzet - Jelző Rádió Helyjeladó (EPIRB).

5.2.1 Műszaki jellemzők

5.2.1.1 A kényszerhelyzeti helyjeladó adóberendezéseknek (ELT) a 121,5 MHz-es frekvencián kell üzemelni. A frekvencia tűrés nem haladhatja meg a plusz vagy mínusz 0,005 százalékot.
5.2.1.2 Egy ELT sugárzásának szabvány körülmények közötti és helyzetű antenna mellett függőlegesen polarizáltnak és a vízszintes síkban alapvetően körsugárzónak kell lenni.
5.2.1.3 48 órás folyamatos működési időtartam alatt és mínusz 20°C üzemelési hőmérséklet mellett a csúcs kisugárzott teljesítmény semmilyen esetben nem lehet 50 mW-nál kevesebb.
5.2.1.4 A sugárzás típusának A3X-nek kell lenni. Bármilyen más típusú modulációt, amely megfelel az alábbi 5.2.1.5, 5.2.1.6 és 5.2.1.7 pont követelményeinek, fel lehet használni, feltéve, hogy az nem fogja károsan befolyásolni a helyjeladónak a célkereső berendezés általi pontos hely-meghatározását.

Megjegyzés. – Néhány ELT fel van szerelve egy választható beszéd-átviteli képességgel (A3E) az A3X sugárzáshoz kiegészítőleg.

5.2.1.5 A vivőhullámnak amplitúdó-moduláltnak kell lenni, legalább 0,85-os modulációs tényezővel.
5.2.1.6 A vivőhullámra alkalmazott modulációnak minimum 33 százalékos kitöltési tényezővel kell rendelkezni.
5.2.1.7 A sugárzásnak megkülönböztető hangfrekvenciás jellemzővel kell rendelkezni, amelyet a vivőhullámnak az 1600 Hz - 300 Hz közötti tartományon belül nem kisebb, mint 700 Hz-es tartomány felett lefelé eltérített 2 Hz és 4 Hz közötti eltérítés ismétlési gyakoriságú hangfrekvenciás amplitúdó-moduláció valósít meg.
5.2.1.8 2000. január 1. után a sugárzásnak egy világosan meghatározott, a modulációs oldalsáv összetevőktől eltérő frekvencia- különbséget kell tartalmazni; nevezetesen, a teljesítménynek legalább a 30 százalékát kell ennek tartalmaznia, mindenkor a vivő- hullám plusz vagy mínusz 30 Hz-en belül a 121,5 MHz-en.

5.3 A KUTATÓ ÉS MENTŐ KÉNYSZERHELYZETI HELYJELADÓ ADÓBERENDEZÉSEK (ELT) 406 MHz-ES RÉSZÉNEK ELŐÍRÁSAI

5.3.1 Műszaki jellemzők

1. Megjegyzés. – A 406 MHz-es kényszerhelyzeti helyjeladóadó berendezések sugárzási jellemzőit az ITU-R M.633 tartalmazza.

2. Megjegyzés. – A 406 MHz-es kényszerhelyzeti helyjeladók /ELT/ műszaki jellemzőire és üzemeltetési teljesítményére vonatkozó tájékoztatásokat az RTCA Dokumentum DO-204 és a Polgári Repülési Berendezések Európai Szervezete (EUROCAE) Dokumentum ED.62 tartalmazza.

5.3.1.1 A kényszerhelyzeti helyjeladó adóberendezéseknek a 406,0 - 406,1 MHz-es frekvencia-sávban való használatra kijelölt frekvencia csatornák egyikén kell üzemelni.

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Megjegyzés. - A COSPAS-SARSAT 406 MHz-es csatorna kijelölési tervet a COSPAS-SARSAT Dokumentum C/S T.012 tartalmazza.

5.3.1.2 Az adások közötti időtartamnak 50 másodperc plusz/mínusz 5 százaléknak kell lenni.
5.3.1.3 Egy 24 órás folyamatos működési időtartam alatt -20°C-os üzemelési hőmérséklet mellett az adó kimenő teljesítményének az 5 W plusz vagy mínusz 2 dB-es határértékeken belül kell lenni.
5.3.1.4 A 406 MHz-es ELT-nek képesnek kell lenni egy digitális közlemény továbbítására.

5.3.2 Adó azonosító kódolás

5.3.2.1 A 406 MHz-en üzemelő kényszerhelyzeti helyjeladó adóberendezésének kijelölt egyedülálló kóddal kell rendelkezni az adónak vagy annak a légijárműnek az azonosításához, amelyre fel van szerelve.
5.3.2.2 A kényszerhelyzeti helyjeladó adóberendezést vagy a légiközlekedési felhasználói protokollnak megfelelően, vagy egy, az ennek a fejezetnek az 1. Függelékében leírt soros műveletű felhasználói kódnak megfelelően kell kódolni, és az illetékes hatósággal „lajstromoztatni" kell.

AZ 5. FEJEZET 1. FÜGGELÉKE: KÉNYSZERHELYZETI HELYJELADÓ ADÓBERENDEZÉS KÓDOLÁS

(lásd az 5. Fejezet 5.3.2 pontját)

Megjegyzés. - A helyjeladó kódolásának részletes leírását az ITU-R Ajánlás M.633-1 tartalmazza. A következő információk a légiközlekedésben használatos jellegzetes kényszerhelyzeti helyjeladó adóberendezésekre vonatkoznak.

1. ÁLTALÁNOS

1.1 A 406 MHz-en üzemelő kényszerhelyzeti helyjeladó adóberendezés (ELT) rendelkezik azzal a képességgel, hogy egy olyan programozott digitális közleményt sugározzon, amely az ELT-re és/vagy arra a légijárműre vonatkozik, amelyre fel van szerelve.
1.2 Az ELT-nek egyedileg kódoltnak kell lenni az alábbi 1.3 pontban megadottaknak megfelelően, és az illetékes hatóság által 'lajstromozott' kell, hogy legyen.
1.3 Az ELT digitális közleményének tartalmaznia kell vagy az helyjeladó adóberendezés sorozat-számát, vagy a következő információ elemek egyikét:
a) A légijármű üzemeltető 'ügynökség' megnevezése és a sorozat-szám 0001-től 4096-ig;
b) A 24-bites légijármű címzés;
c) A légijármű nemzetisége és lajstromozási jelzések.
1.4 Az összes kényszerhelyzeti helyjeladó adóberendezésnek a COSPAS-SARSAT rendszerrel együttműködő rendszerűnek és típus-engedélyezettnek kell lenni.
COSPAS = A vészhelyzetben lévő hajók kutatási műholdas rendszere;
SARSAT = Kutatási és mentési műholdas automatikus pályakövetés.
Megjegyzés. - Az ELT jel sugárzási jellemzőit a gyártásnál felhasznált COSPAS-SARSAT Típus Alkalmassági Szabvánnyal (C-S T.007) lehet hitelesíteni.

2. A KÉNYSZERHELYZETI HELYJELADÓ ADÓBERENDEZÉS /ELT/ KÓDOLÁSA

2.1 Az ELT digitális közlemény tartalmazza a közlemény formátumra, a kódolási protokollra, az ország kódra és a fenti 1.3 pontban az információ-elemekben megadott azonosító adatok valamelyikére vonatkozó információkat.
2.2 Azoknál az ELT-knél, amelyek nem biztosítanak navigációs adatokat, az ITU-R Ajánlás M.633-1-ben leírt

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rövid közlemény formátumot kell alkalmazni, az 1.-től a 112.-ig terjedő bitek felhasználásával.

2.3 Védett adat mező

2.3.1 A védett adat mezőt, ami a 25.bittől a 85.bitig tart, egy hiba-javító kóddal kell védeni, és ez annak a közleménynek a része kell, hogy legyen, aminek minden egyes vészhelyzeti ELT-ben egyedinek kell lenni.
2.3.2 A közlemény formátumjelzést, amelyet a 25.bit mutat, "0"-ra kell állítani a rövid közlemény formátum jelzésére, vagy "1"-re az olyan hosszú formátumú ELT-k jelzésére, amelyek képesek a helyzet adat biztosítására.
2.3.3 A protokoll jelzést az "1"-re állított 26.bitnek kell jelezni.
2.3.4 Az ország kódot, ami azt az Államot jelzi, ahol kiegészítő adatok állnak rendelkezésre arról a légijárműről, amely az ELT-vel el van látva, a 27.-től a 36.-ig terjedő bitek foglalják magukba, ezek adják meg a három-számjegyű decimális ország kód számot bináris számrendszerben kifejezve.

Megjegyzés. – Az ország kódok a Nemzetközi Távközlési Unió (ITU) ország kódjai, azok, amelyek az ITU Hívójelek és Számjegyes Azonosítók Jegyzéke I. Kötete I. Részének 4. táblázatában kerültek megadásra.

2.3.5 A 37.-től a 39.-ig terjedő bitek jelzik a felhasználói protokollok egyikét, ahol a "001" és a "011" értékek használatosak a légiközlekedésben, ahogy azt az ebben a Függelékben lévő példák bemutatják.
2.3.6 Az ELT digitális közleménynek magába kell foglalnia vagy az adó sorozat-számát, vagy a légijármű, illetve a járató azonosítóját a 40.-től a 83.-ig terjedő bitekben, ahogy az az alábbiakban bemutatásra kerül. Ezt az információt bináris számrendszerben kell kódolni a legkisebb helyi értékű bitekkel a jobb oldalon, vagy az 5-1. táblázatban bemutatott módosított Baudot kódot felhasználva.
2.3.7 A soros felhasználói protokollban (amelyet a 37.-től a 39.-ig terjedő bitekben "011"-ként jelöltek) a 40.-től a 42.-ig terjedő biteknek kell jelölni a helyjeladó típusát, ahol a:
- "000" azt jelzi, hogy az ELT sorozat-száma a 44.-től a 63.-ig terjedő bitekben van kódolva;
- "001" azt jelzi, hogy a légijármű üzemeltetője és a sorozat-szám a 44.-től a 61.-ig és a 62.-től a 73.-ig terjedő bitekben van kódolva külön külön;
- "011" azt jelzi, hogy a 24-bites légijármű címzés a 44.-től a 67.-ig terjedő bitekben van kódolva, és az ugyanazon a légijárművön lévő további ELT-k a 68.-tól a 73.-ig terjedő bitekben kódoltak.

Megjegyzés. - Az Államok fogják biztosítani azt, hogy az egyes olyan helyjeladók, amelyek az Állam ország kódjával vannak kódolva, egyedileg legyenek kódolva és lajstromozva egy adatbázisban. A sorosan kódolt helyjeladók egyedi kódolását elő lehet segíteni azzal, hogy a COSPAS-SARSAT Típus Alkalmassági Bizonyítvány számát építik be, ami egy, a COSPAS-SARSAT által kijelölt egyedi szám minden egyes jóváhagyott ELT modellre, az ELT közlemény részeként.

2.3.8 A légiközlekedési felhasználói protokollba (a 37.bittől a 39.bitig "001"-ként kijelölve), a légijármű nemzetiségi és lajstromozási jelét kell kódolni a 40.-től a 81.-ig terjedő bitekbe, az 5-1. táblázatban bemutatott módosított Baudot kódot használva, hét alfanumerikus karakterrel. Ezt az adatot pontosan kell indokolni azzal, hogy a módosított Baudot „szóköz” /üres jel/ ("100100") kerül alkalmazásra ott, ahol nincs karakter.
2.3.9 A 84. és 85. bitnek kell jeleznie bármilyen 'célra repülési' /rávezető/ adó meglétét, ami a kényszerhelyzeti helyjeladó adóberendezésbe beépítésre kerülhetett.
2.3.10 A szabvány és a nemzeti protokollokban minden azonosítási és helyi adatot bináris jelöléssel kell kódolni a lehető legkisebb helyiértékű bit-el.. A légijármű üzemeltetőjének 3 betűből álló azonosítóját 1 5 bit-el kell kódolni a módosított Baudot kód használatával (5-1 táblázat) csak a legnagyobb helyiértékű 5 bit-et betűnként és kihagyva azt a bit-et, amelyik 1 betű értéket képvisel.

5-1. táblázat. Módosított Baudot kód

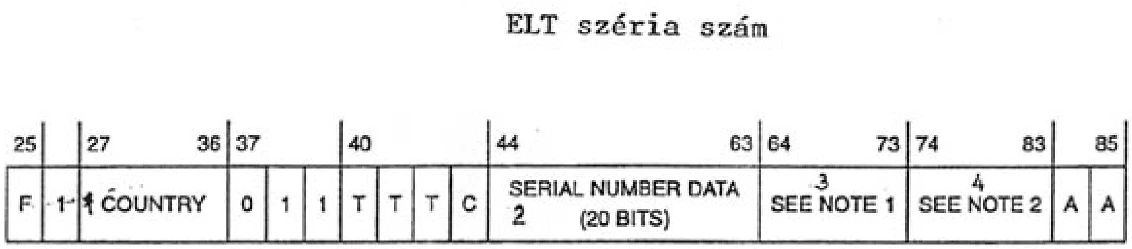
Betű	Kód MSB LSB	Szám	Kód MSB LSB

A	111000	(-)*	011000
B	110011		
C	101110		
D	110010		
E	110000	3	010000
F	110110		
G	101011		
H	100101		
I	101100		
J	111010	8	001100
K	111110		
L	101001		
M	100111		
N	100110		
O	100011	9	000011
P	101101	0	001101
Q	111101	1	011101
R	101010	4	001010
S	110100		
T	100001	5	000001
U	111100	7	011100
V	101111		
W	111001	2	011001
X	110111	/	010111
Y	110101	6	010101
Z	110001		
( )**	100100		

MSB = Legnagyobb helyiértékű bit
LSB = Legkisebb helyiértékű bit
* = Kötőjel
** = Szóköz /üres jel/

KÓDOLÁSI PÉLDÁK

ELT széria szám



1 Ország

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2 Sorszám adat (21 bit)
3 Lásd az 1. Megjegyzést
4 Lásd a 2. Megjegyzést

Légijármű címzés

Légijármű címzés

25		27 36	37			40				44 67	68 73	74 83		85
F	1	1 COUNTRY	0	1	1	T	T	T	C	2 AIRCRAFT ADDRESS (24 BITS)	SEE NOTE 3 3	4 SEE NOTE 2	A	A

1 Ország
2 24-bites légijármű címzés (24 bit)
3 Lásd az 1. Megjegyzést
4 Lásd a 2. Megjegyzést

Légijármű üzemeltető jelölő és sorszám

Légijármű üzemeltető jelölő és sorszám

25		27 ,36	37			40				44 61	62 73	74 83		85
F	1	1 COUNTRY	0	1	1	T	T	T	C	OPERATOR 3-LETTER 2 DESIGNATOR	3 SERIAL NUMBER 0-4096	4 SEE NOTE 2	A	A

1 Ország
2 3-betűs üzemeltető jelölő
3 Sorszám 1–4096 *Az eredeti ábrában a sorszám 1-el kezdődik. - Lektor*
4 Lásd a 2. Megjegyzést

Légijármű lajstrom szám

Légijármű lajstrom szám

25		27 36	37			40 81		83		85
F	1	1 COUNTRY	0	0	1	2 AIRCRAFT REGISTRATION MARKING (UP TO 7 ALPHANUMERIC CHARACTERS) (42 BITS)	0	0	A	A

1 Ország
2 Légijármű lajstromjel (maximálisan 7 alfanumerikus karakter) (42 bit)

T = Helyjeladó típus TTT = 000 jelzi, a kódolt ELT sorszámot
= 001 jelzi, a kódolt üzemeltető ügynökséget és sorszámot

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= 011 jelzi, a kódolt 24-bites légijármű címzést

C = Bizonyítvány jelző bit: 1 = annak jelzésére, hogy a COSPAS-SARSAT Típus Alkalmassági Bizonyítvány szám kódolva a 74–83 bitben és

0 = másképpen

F = Formátum jelző: 0 = rövid közlemény

1 = hosszú közlemény

A = Rádió-helymeghatározó segédberendezés:

00 = nincs rádió-helymeghaítározó segédberendezés

01 = 121,5 MHz

11 = más rádió-helymeghatározó eszköz

1. Megjegyzés. – 10 bit, mind 0 vagy ország szerinti felhasználás.

2. Megjegyzés. – COSPAS-SARSAT Típus Alkalmassági Bizonyítvány szám bináris számokban, a legkisebb helyiértékű bittel a jobb oldalon vagy ország szerinti felhasználás.

3. Megjegyzés. – Sorszám, bináris számjegyekben, a legkisebb helyiértékű bittel a jobb oldalon, további ELT-k ugyanazon légijárművön, vagy 0-k, amikor csak egy ELT van felszerelve.

„B” Melléklet az I. Részhez: ÚTMUTATÓ ANYAG A VHF DIGITÁLIS KAPCSOLATOKHOZ (VDL)

1. ÚTMUTATÓ ANYAG A VHF DIGITÁLIS KAPCSOLATOKHOZ (VDL)

Megjegyzés. – A hivatkozott Szabványok és Ajánlott Gyakorlatokat (SARPs) az Annex 10, III. Kötet, I. Rész, 6. Fejezete tartalmazza.

2. RENDSZER LEÍRÁS

2.1 A VDL rendszer levegő-föld adat-összeköttetési kapcsolatot szolgáltat a Légiforgalmi Távközlési Hálózaton (ATN) belül. A VDL párhuzamosan üzemel a többi ATN levegő-föld alhálózatokkal.

2.2 A VDL földi állomások egy VHF rádióból és a VDL protokollt a fedési területen belül kezelni képes számítógépből áll. A VDL állomások összekapcsolhatósági lehetőséget nyújtanak egy földi telepítésű távközlési hálózaton keresztül (pl. X. 25 alapon) az ATN közbenső rendszerekkel, amelyek hozzáférést biztosítanak a földi telepítésű ATN végrendszerekhez.

2.3 A VDL földi állomásokkal való kommunikálás érdekében megkövetelt az, hogy a légijármű fel legyen szerelve VDL repülés-elektronikával, amely egy VHF rádiót és a VDL protokoll kezelésére képes számítógépet tartalmaz. A levegő-föld kommunikáció 25 kHz-es csatornákat használ a VHF légiforgalmi mozgó (útvonal) szolgáltatás sávban.

3. VDL alapelvek

3.1 Összeköttetési átviteli alapelvek

3.1.1 Az összekapcsolhatóságot az ATN végrendszerekben (ES) lévő alkalmazások között, amelyek a levegő-föld összeköttetéshez az ATN-t és ennek alrendszereit használják, beleértve a VDL-t is, az ezekben a végrendszerekben lévő átviteli réteg entitások szolgáltatják. A légijármű fedélzeti és földi végrendszerek közötti adat-továbbítási kapcsolatokat az ezeket szolgáltató precíz ATN közbenső rendszerek (IS) és VDL hálózati elemek vezérelt átalakításain keresztül tartják fenn.

3.1.2 Az ATN ES közötti adat-átviteli összeköttetések nincsenek egy meghatározott alrendszerhez hozzákötve és az ISO 8473 alhálózati protokoll adat egységek, amelyeket egy ES továbbít, bármely levegő-föld ATN kompatíbilis alhálózaton átvihetők (olyanokon, mint például a légiforgalmi mozgó műholdas szolgáltatás (AMSS) adatkapcsolat, SSR S-módú adatkapcsolat vagy VDL), amelyek kielégítik a szolgáltatás minőségi (QOS) követelményeit. Egy légijármű ES és egy földi ES közötti adat-átviteli összeköttetést addig kell fenntartani, amíg a légijármű IS és a földi IS között legalább egy olyan levegő-föld alrendszeri összekapcsolhatóság van, amelynek összeköttetése van a földi ES-sel. Az alhálózati összekapcsolhatóság maximalizálása érdekében a légijárművektől elvárják, hogy levegő-föld alhálózati összeköttetéseket tartsanak fel bármely alhálózaton (AMSS, S-mód vagy VDL) keresztül, amelyekkel kapcsolat réteg összekapcsolhatóság létesíthető.

3.1.3 A VDL alhálózat összekapcsolhatóságot biztosít a kapcsolt virtuális áramkör formájában a légijármű ISO 8208 adat terminál berendezés (DTE) entitások és a földi bázisú ATN közbenső rendszerek között. Azon tény következtében, hogy a VHF jelek csak rálátás vonali terjedéssel rendelkeznek, a repülést végrehajtó légijárműnek meg szükséges az, hogy rendszeresen kapcsolati összeköttetést létesítsen az új VDL földi állomásokkal, hogy a VHF fedésterületet fenntartsa. Egy légijármű DTE és egy földi DTE között létrehozott VDL virtuális áramkört olyan földi állomási vezérelt adatcserén keresztül tartják fenn, amelyen keresztül a földi DTE elérhető.

3.1.4 A VDL virtuális áramkörök felszabadíthatók, amikor a légijármű vagy földi IS olyan döntési helyzetet azonosít, amikor a virtuális áramkör a földi DTE-hez már nem szükséges, de ez csak akkor következhet be, ha egy másik VDL virtuális áramkör nyitva marad. A döntési helyzet olyan helyzet, ahol a lefedettségen kívül más megfontolások is befolyásolják az összeköttetés létrehozására vonatkozó döntést. Ilyen szituáció lehet például az, amikor egy légijármű különböző üzemeltetők által üzemeltetett földi állomások kijelölt üzemelési területén belül van és döntést kell hozni, hogy melyik üzemeltetővel létesítsen kapcsolatot. Az az eset, amikor egy légijármű két ország közötti határt keresztez, különös figyelmet igényel. Egy légijárműnek virtuális áramköri kapcsolatot kell létesítenie annak az államnak az IS-ében lévő DTE-hez, amelybe belép, mielőtt felszabadítaná az elhagyott ország IS-ében lévő DTE-vel létesített virtuális áramkört.

3.1.5 Az alhálózat kapcsolat fenntartás forgatókönyveit a B-1. ábra* mutatja be. Ha az államhatár egyes oldalain lévő földi állomások nem nyújtanak ISO 8208 összekapcsolhatósági lehetőséget a két államban lévő IS-ek DTE-inek, a határt keresztező légijárműnek kapcsolati összeköttetést kell létesíteni annak az országnak a területén lévő földi állomással, amelybe belép, mielőtt képes lenne ennek az államnak az IS-éhez virtuális áramkört létrehozni. Csak az új kapcsolati összeköttetés és a virtuális áramkör létrehozása után fogja a légijármű felszabadítani a virtuális áramkört az elhagyott ország IS-ének DTE-jével azon a kapcsolaton keresztül, amely hozzáférést biztosít ahhoz az IS-hez. Ha a VDL légiforgalmi állomások az államhatár mindkét oldalán összeköttetést nyújtanak a mindkét államban lévő IS-hez, a virtuális áramkörök cseréje ugyanazon kapcsolati összeköttetésen keresztül kell, hogy végbemenjen.

* Minden ábra jelen melléklet végén van elhelyezve.

3.2 VDL szolgáltatás minőség ATN útvonal kijelöléssel

3.2.1 A VDL rendszer levegő-föld kommunikációhoz való felhasználása a légijármű és a földi bázisú ATN közbenső rendszerek (IS) útvonal kijelölési döntéseitől függ. Ezek az IS-ek határozzák meg azokat a pályákat, amelyeket a levegő-föld kommunikációhoz használnak az átviteli végberendezések (ES) által kért szolgáltatás minőség értékek alapján.

3.2.2 A levegő-föld összeköttetések egyes végein lévő IS-eknek értelmezniük kell a kívánt QOS értéket és el kell dönteniük, hogy a rendelkezésre álló összeköttetések közül melyiket lehet a legjobban felhasználni. Nagyon fontos, hogy a QOS szint, amely a VDL kapcsolatot szolgáltatásnak érzékeli, olyan szintre beállított legyen, amely a valódi teljesítményének felel meg.

3.2.3 Azokban az esetekben, amelyekben a VDL az egyetlen adatkapcsolat, amellyel a légijármű el van látva, az összes kommunikációt VDL összekapcsoláson keresztül kell lebonyolítani és a QOS értékek, amelyeket az összeköttetés szolgáltat, nem zárhatják le a kommunikációt.

3.2.4 Más esetekben, amikor a légijármű más levegő-föld adatkapcsolatokkal is fel van szerelve (mint például AMSS és SSR S-mód), lehetséges a több egyidejű párhuzamos összekapcsolás többszörös alhálózaton keresztül. Ezekben az esetekben az egyes alhálózatok által szolgáltatott QOS értékeket úgy kell beállítani, hogy biztosítsák azt, hogy a VDL kapcsolatot a megfelelő helyen alkalmazzák.

3.2.5 Szükséges az, hogy koordináció történjen a légijármű üzemeltetők, a földi állomás üzemeltetők és a földi rendszer üzemeltetők között annak biztosítása érdekében, hogy a különböző alhálózatok között helyes egyensúly álljon be.

4. VDL FÖLDI ÁLLOMÁS HÁLÓZAT KONCEPCIÓ

4.1 Hozzáférés

4.1.1 A VDL földi állomás hozzáférést biztosít a légijárműnek a földi ATN IS-hez, felhasználva a VDL protokollt egy VHF csatornán keresztül.

4.2 A VDL földi állomás hálózat üzemeltetők intézményi ügyeit érintő általános kérdések

4.2.1 Egy ATS szolgáltatónak, amely a VDL-t légiforgalmi szolgálati (ATS) összeköttetésekre kívánja használni, biztosítania kell, hogy a VDL szolgáltatás rendelkezésre álljon. Az ATS szolgáltató vagy magát, a VDL földi állomás hálózatot tudja üzemeltetni, vagy gondoskodik arról, hogy a VDL állomásokat (vagy a VDL hálózatot) egy távközlési szolgáltatást nyújtó üzemeltesse. Valószínűnek látszik, hogy az egyes országok különféle intézkedéseket tesznek a VDL szolgáltatás biztosítására a légijárművek részére. A VDL üzemeltetést és megvalósítást körzeti szinten kell koordinálni, hogy a nemzetközi útvonalakon elfogadható üzemelést biztosítsanak.

4.2.2 A VDL földi állomás hálózat az ATS szolgáltatóhoz külső entitás általi használata az ATS szolgáltató és a

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távközlési szolgáltatást nyújtó közötti szolgáltatási egyezmények tárgya. Ezek a szerződések rögzítik a két fél kötelezettségeit és különösen fontos, hogy meg legyen határozva benne a nyújtott szolgáltatások minősége, valamint a felhasználói interfész.
4.2.3 Valószínűnek látszik, hogy néhány VDL földi állomás hálózat üzemeltető használati díjat fog kivetni. A fizetésre kötelezettek vagy a légijármű üzemeltetők és/vagy az ATS szolgáltatók lesznek. Biztosítani kell azt, hogy a VDL használata megvalósítható legyen azoknak a légijármű üzemeltetőknek a számára, amelyek a VDL-t az ATS/AOC kommunikációkhoz akarják felhasználni.

4.3 VDL földi állomás berendezés

4.3.1 A VDL földi állomás egy VHF rádióból és egy számítógépből áll, amely egy különálló, vagy vele integrált számítógép lehet. A VHF rádióberendezés VHF-el kapcsolatos funkciója hasonló a légijárművekre felszereltekével.
4.3.2 A hálózati állapot figyelés előírása fontos elem a lehetséges legnagyobb mértékű rendelkezésre állás fenntartásában.

4.4 Földi állomás telepítése

4.4.1 A VHF terjedés rálátási egyenes vonalának korlátozása fontos tényező a földi állomások telepítésénél. Biztosítani kell, hogy a földi állomásokat olyan módon telepítsék, hogy fedést szolgáltassanak a kijelölt üzemelési fedésterület (DOC) felett.
4.4.2 A VDL-el szembeni fedési követelmények függnek azoktól az alkalmazásoktól, amelyekre a VDL üzemeltetést szánják. Ezek az alkalmazások például akkor funkcionálhatnak, amikor a légijármű útvonal-utazási magasságon, a közel-körzeti területen, vagy egy repülőtéren, a földön van.
4.4.3 Az útvonali fedést biztosítani lehet kis számú, nagy DOC-val rendelkező földi állomás felhasználásával (például a VHF jel hatótávolsága egy tengerszinten lévő állomástól egy 37000 láb magasságon lévő légijárműhöz közelítőleg 200 tengeri mérföld). Ebből következően valóban kívánatos az, hogy a lehető legkisebb számú földi állomást használják útvonali lefedésre, azért, hogy minimalizálják az egyidejű felfelé irányú kapcsolati átviteleket a földi állomásoktól, amelyek közlemény ütközést okozhatnak a VHF csatornán. Az útvonali lefedést korlátozó tényezők a terep rendelkezésre állás és egy földi állomástól más földi rendszerekhez vezető összeköttetési kapcsolat rendelkezésre állása.
4.4.4 A közel-körzeti terület fedés általában megköveteli földi állomások felszerelését minden olyan repülőtéren, ahol VDL operáció szükséges ahhoz, hogy a közel-körzeti területen fedést biztosítsanak.
4.4.5 Repülőtér felszíni kommunikációs fedést kell szolgáltatni egy földi állomás által a repülőtéren, azonban a repülőtér fizikai felépítése miatt lehetséges az, hogy nem lehet a teljes terület lefedését egyetlen állomással garantálni.

4.5 Földi állomás frekvencia műszaki kezelése

4.5.1 Annak a VHF csatornának a megválasztása, amelyen egy földi állomás üzemelni fog, attól a fedéstől függ, amelyen a szolgáltatást a földi állomástól megkövetelik. A fedést egy adott csatornán az ezen a csatornán üzemelő földi állomások egy együttese szolgáltatja és az ezen a csatornán zajló kommunikáció lefoglalja a csatornát a fedési területen lévő összes földi állomás részére.
4.5.2 A VHF beszéd kommunikációtól eltérően, a VDL kommunikációt nem lehet terjedésben csak országokon belülre korlátozni és az államok között koordináció szükséges a VDL frekvenciák elosztásában. A protokoll jellege viszont lehetővé teszi a frekvencia újra-felhasználását több, ugyanazon fedési területen belüli földi állomás részére, és ebből eredően a frekvencia kijelölésre vonatkozó rendszabályok nem ugyanazok, mint amik a beszéd-üzemű összeköttetésekre vonatkozók.
4.5.3 A vivőhullám érzékelő idő-osztásos hozzáférésű (CSMA) és az adathordozó hozzáférési vezérlő (MAC) protokoll réteg, amelyet a VDL-nél használnak, nem tudják kizárni a közlemény ütközéseket, ha egy frekvencia-csatornát használó állomások nem tudják venni más állomások továbbításait, ez a helyzet "rejtett adó" helyzetként ismert. A rejtett adók egyidejű átvitelekhez vezetnek, amelyek olyan jelenséget idézhetnek elő, hogy az egyik vagy mindkét átvitel megcélzott vevője a vett jelet nem tudja dekódolni.

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4.5.4 Egy frekvenciát jelölnek ki az útvonal fedés biztosítására, és az összes útvonali állomást ezen a frekvencián való üzemelésre állítják be. Ahhoz, hogy minimalizálják a rejtett adók általi, CSMA környezetben történő szimultán átvitelek valószínűségét a csatornán, ezt a csatornát lehetőleg nem használják a közel-körzeti vagy a repülőtéri felszíni kommunikációkhoz, kivéve a nagyon kis csatorna terhelésű területeket.
4.5.5 A VDL-re vonatkozó SARP előírja egy közös jelzés csatorna (CSC) biztosítását, amelyen a hozzáférés a VDL szolgáltatáshoz garantált az összes területen, ahol a VDL 2-módú szolgáltatás rendelkezésre áll. Ez különösen fontos azoknál a repülőtereknél és a VDL útvonal lefedési zónák peremén, ahol a légijármű minden valószínűség szerint "kezdeti" VDL összekapcsolást hoz létre. Mivel az 1.-módú és a 2.-módú rádiófrekvenciás átvitel jellemzői nem kompatibilisek, a CSC nem használható 1.-módú kommunikációhoz. Nincs követelmény a CSC-re 1.-módú VDL-nél.

4.6 A földi állomás összeköttetése közbenső rendszerekkel

4.6.1 Ahhoz, hogy hozzáférést biztosítson azokhoz a földi rendszerekhez, amelyek össze vannak kötve a légiforgalmi távközlési hálózattal, a VDL földi állomásnak összekapcsolva kell lennie egy vagy több ATN IS-el. A VDL földi állomás rendeltetése az, hogy összekösse a légijárműveket a földi bázisú ATN-el, amelyen keresztül a kommunikáció a felszíni ATN ES-ekkel történik.
4.6.2 A földi bázisú ATN IS társítva lehet elhelyezve a VDL földi állomás számítógépben, amely esetben a VDL alhálózati virtuális áramkör ebben a számítógépben végződik. Ennek a felépítésnek hatása van arra a megkívánt cserére, amikor a légijármű VDL kapcsolatot hoz létre egy új földi állomással. Az egzakt csere attól függ, hogy a földi állomások külön IS-t tartalmaznak, vagy ugyanannak az elosztott közbenső rendszernek az elemei.
4.6.3 Ha az IS-t a VDL földi állomás nem tartalmazza, akkor azt a következő eszközök egyikével kapcsolják a földi állomáshoz:
a) széles területi hálózat (WAN);
b) helyi területi hálózat (LAN); és
c) célra rendelt összeköttetési vonal.
4.6.4 Mindegyik esetben annak érdekében, hogy összhangban legyen a Légiforgalmi Távközlési Hálózati Kézikönyv (ATN) (*Manual of the Aeronautical Telecommunication Network (ATN)*) (Doc 9578) kiadvánnyal, egy Nyílt Rendszerek Összekapcsolása (OSI) szolgáltatást biztosítson, amely kompatíbilis kapcsolat-orientált alhálózat szolgáltatás,a légijármű IS és a földi bázisú IS között, a VDL földi állomás számítógéptől megkövetelik, hogy terjessze ki a VDL virtuális áramkört a felszíni hálózaton vagy kapcsolaton keresztül.
4.6.5 Azért, hogy szimultán virtuális áramköröket szolgáltasson több felszíni IS-nek, a VDL földi állomás számítógépnek tartalmaznia kell egy VDL alhálózat entitást, amely képes a VDL alhálózat hibás kérésekben lévő címzéseket a földi bázisú hálózatban lévő címzésekbe konvertálni.

5. VDL LÉGIJÁRMŰ FEDÉLZETI ÜZEMELÉSI KONCEPCIÓ

5.1 Repüléselektronika

5.1.1 *VDL repüléselektronika.* Ahhoz, hogy egy VDL hálózatban üzemelni tudjon, a légijárműnek egy olyan repüléselektronikai rendszerrel felszereltnek kell lennie, amely a VDL alhálózat felhasználói (ISO 8208 DTE) funkciót szolgáltatja. A rendszer, amely ezt a funkciót szolgáltatja, az alhálózat felhasználói funkciókat a többi levegő-föld ATN kompatíbilis alhálózatnak is szolgáltatja azt, és a légijármű ATN közbenső rendszer funkció és következésképpen annak fejlesztése szükséges ahhoz, hogy ATN kommunikációt szolgáltasson a többszörös vég-rendszereknek vagy többszörös levegő-föld alhálózatokon keresztül.

5.2 VDL repüléselektronikai alkalmassági bizonyítvány

5.2.1 A VHF digitális rádió ugyancsak szolgáltathat két-oldalsávos amplitúdó-modulációs (DSB-AM) beszéd-üzemű képességet kényszerhelyzeti alátámasztásra a VHF rádióknak, amelyeket a beszéd-összeköttetésre használnak. Ebben az esetben szükség lenne demonstrálni, hogy a VDL VDR-funkcionalitása nem interferál a DSB-AM beszéd-funkcionalitással.
5.2.2 A VDL funkció a VHF digitális rádióban egy levegő-föld adatkapcsolat szolgáltatást nyújt a légijármű ATN

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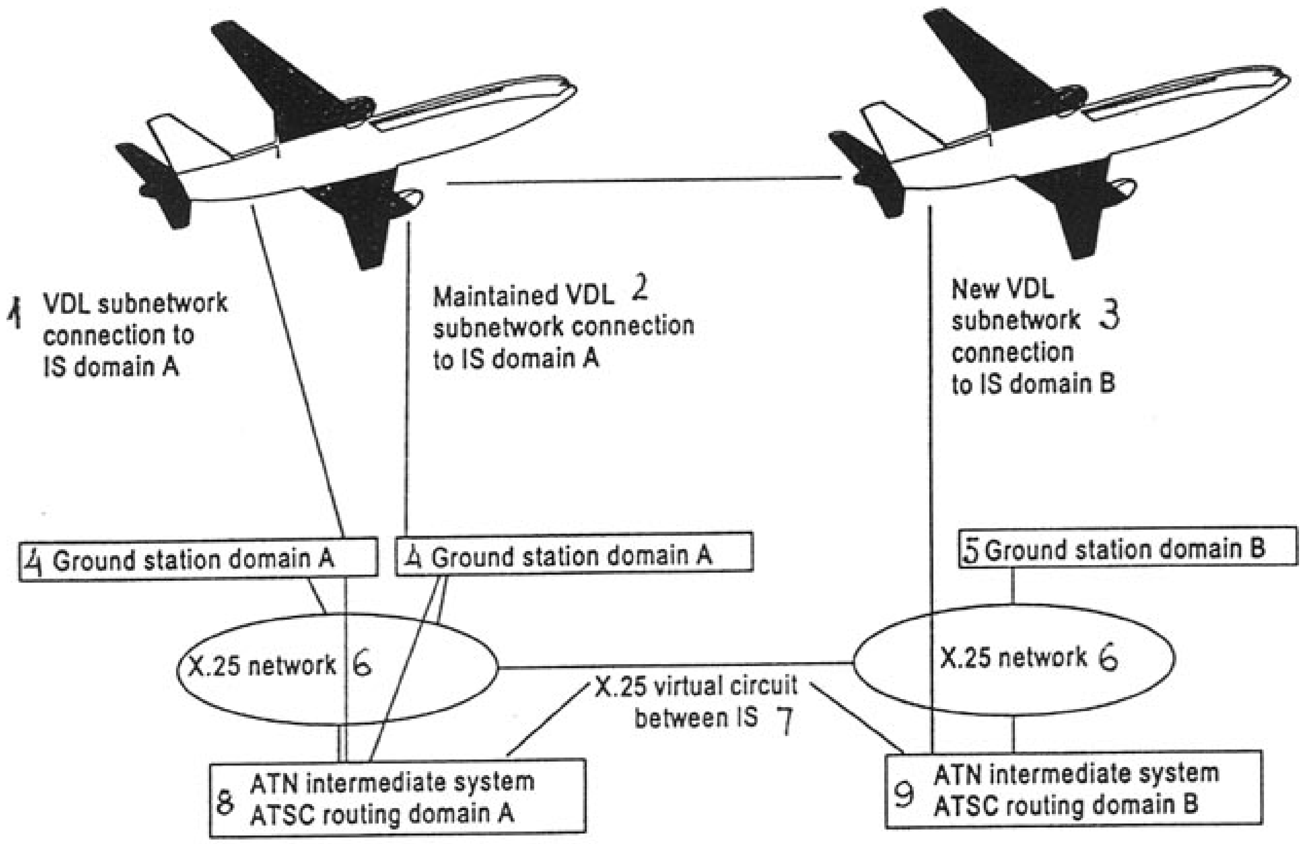
közbenső rendszer VDL alhálózat felhasználó entitásnak. Ha a VHF alhálózat szolgáltatás nyújtását egy ATN közbenső rendszer részére lényeges szolgáltatásnak tekintik, akkor egy adott telepítésnél, a VDL VDR-funkcionalitását lényeges funkciónak kell elismerni. A VDL használata az ATS kommunikációra azonban nem igényli két légijármű-rádió egyidejű üzemelését a VDL üzemmódban.

5.3 Légijármű regisztráció a VDL hálózat üzemeltetőknél

5.3.1 Normál összeköttetési szolgáltatásnál elvárható, hogy a légijármű üzemeltetőktől megköveteljék a légijárműveik regisztráltatását a hálózat üzemeltetőkkel. Vészhelyzetben, vagy "alátámasztási /tartalék/ szituációkban" bármely VDL-el felszerelt légijárműnek lehetőségének kell lennie kapcsolatot létrehozni bármely VDL földi állomás hálózaton keresztül.
5.3.2 A légijármű VDL állomások regisztráltatása VDL hálózat üzemeltetőkkel kívánatos a hálózat kezeléshez, mivel például egy hálózat üzemeltető felismerhet egy átmeneti meghibásodást a légijárműtől eredő kommunikációban, és érintkezésbe kívánna lépni a légijármű üzemeltetővel, hogy a hibát megoldják. A légijármű regisztráció hasznos a megkívánt állomás hálózat kapacitás megtervezésénél is. Egy VDL földi állomás hálózat üzemeltetővel való regisztráltatás nem szükségszerűen vonja maga után azt, hogy a légijármű üzemeltetőnek a VDL földi állomás hálózat használatáért fizetnie kell.

A „B" MELLÉKLET ÁBRÁJA



10 Scenario where boundary ground stations provide access to a single IS

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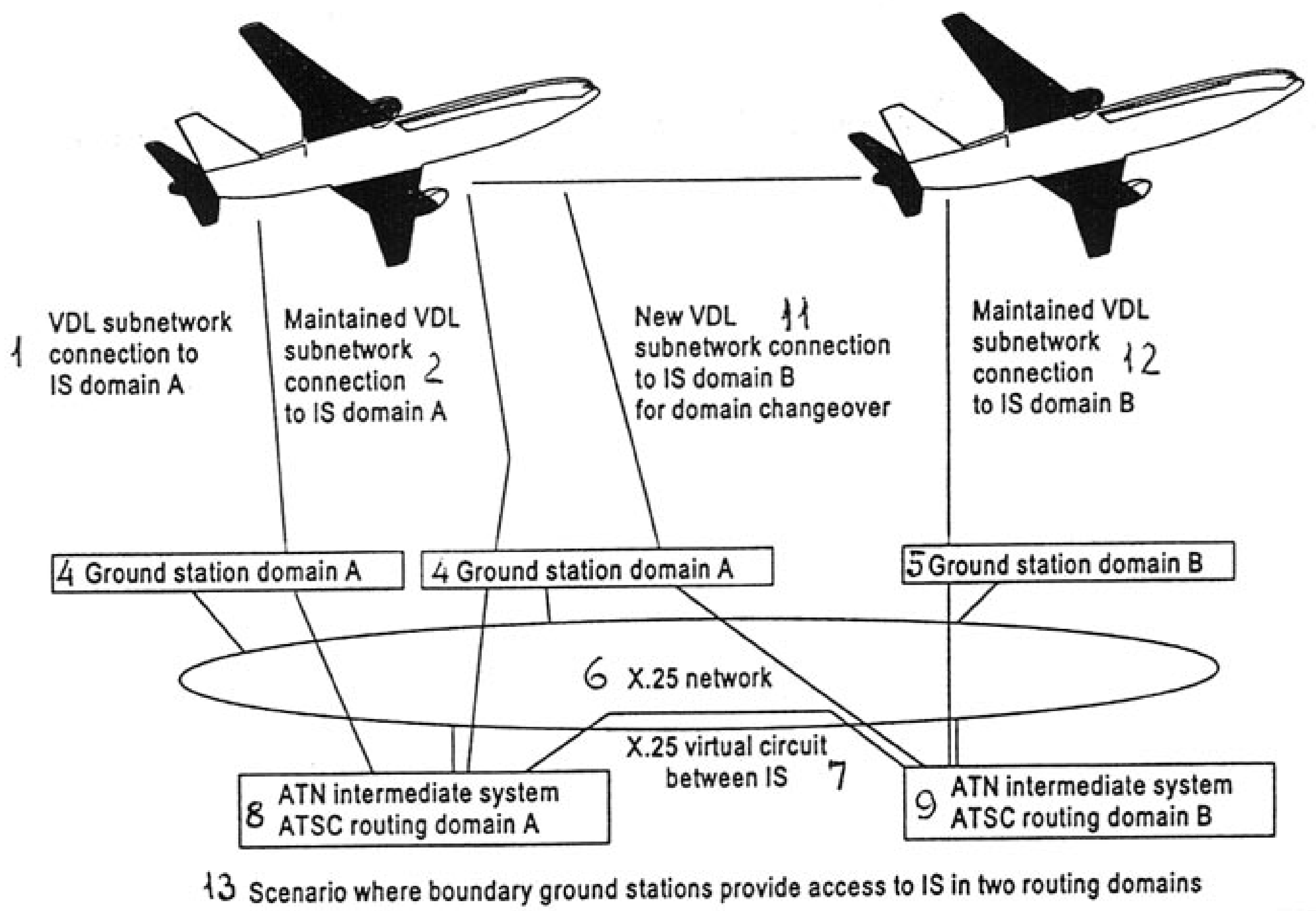

B-1 ábra.

A B-1. ábra szövegei:
1 VDL alhálózat összeköttetés az IS-hez az A területen
2 Fenntartott VDL alhálózat összeköttetés az IS-hez az A területen
3 Új VDL alhálózat összeköttetés az IS-hez a B területen
4 Földi állomás az „A" területen
5 Földi állomás a „B" területen
6 X. 25 hálózat
7 X. 25 virtuális áramkör az IS-ek között
8 ATN közbenső rendszer az ATSC-útválasztó az A területen
9 ATN közbenső rendszer ATSC útválasztó a B területen
10 Forgatókönyv, ahol határállomások hozzáférést szolgáltatnak egy egyedülálló IS-hez
11 Új VDL alhálózat összeköttetés az IS-hez aB területen terület-váltásnál
12 Fenntartott VDL alhálózat összeköttetés az IS-hez a B területen
13 Forgatókönyv, ahol határállomások hozzáférést szolgáltatnak az IS-hez két útvonal-vezetésű területen

„A” Melléklet a II. Részhez: Útmutató anyag az összeköttetési rendszerekhez

1. VHF ÖSSZEKÖTTETÉS

1.1 A VHF összeköttetési berendezések hangfrekvenciás jellemzői

1.1.1 A légiforgalmi rádiótelefon szolgáltatások a rádiótelefon alkalmazásoknak egy speciális esetét képezik, amelyben a közlemény átvitelének követelménye oly módon érvényesül, hogy a hullámforma torzításmentessége másodrendű fontosságú, a hangsúly az alapértelem torzításmentességén van. Ez azt jelenti, hogy nem szükséges a hullámformának azokat a részeit átvinni, amelyek csupán az egyediséget, a hangsúlyozást és a kiemelést érintik.
1.1.2 A tényleges megengedhető sávszélességtől a 8,33 kHz-es berendezésnél megkövetelt, hogy legalább plusz / mínusz 3462 Hz legyen. Ez az érték általános esetre, azaz a levegő-föld összeköttetésekre vonatkozik, és a következőkből áll: a 2500 Hz-es hang- frekvenciás sávszélességből, a 685 Hz-es légijármű adó instabilitásból - egy 5 rész per millió - és a 137 Hz-es földi vevő instabilitásbó1- 1 rész per millió -, valamint a Doppler eltolódás miatti 140 Hz-ből (II. Rész 2.2.2.4 és 2.3.2.6 pont).

1.2 Frekvencia eltolásos vivőhullám rendszer

A következők példák azokra az eltolt vivőhullámú rendszerekre vonatkoznak, amelyek kielégítik a II. Rész, 2.2.1.1.1 pont követelményeit.
a) *Két-vivőhullámos rendszer.* A vivőhullámot plusz és mínusz 5 kHz-nél kell elhelyezni. Ez plusz vagy mínusz 2 kHz-es frekvencia stabilitást követel meg (15,3 rész per millió 130 MHz-nél).
b) *Három-vivőhullámos rendszer.* A vivőhullámokat a nullánál és a plusz és a mínusz 7,3 kHz-nél kell elhelyezni. Ez egy plusz vagy mínusz 0,65 kHz-es frekvencia stabilitást követel meg (5 rész per millió 130 MHz-nél).
A következő példák a négy-vivőhullámú és öt-vivőhullámú rendszerekre vonatkoznak, amelyek kielégítik a II. Rész, 2.2.1.1.1 pont követelményeit.
c) *Négy-vivőhullámos rendszer.* A vivőhullámokat a plusz és a mínusz 2,5 kHz-nél, valamint a plusz és a mínusz 7,5 kHz-nél kell elhelyezni. Ez plusz vagy mínusz 0,5 kHz-es frekvencia stabilitást követel meg (3,8 rész per millió 130 MHz-nél).
d) *Öt-vivőhullámos rendszer.* A vivőhullámokat a nullánál, a plusz és a mínusz 4 kHz-nél, valamint a plusz és a mínusz 8 kHz-nél kell elhelyezni. Egy plusz vagy mínusz 40 Hz-es nagyságrendű frekvencia stabilitás (0,3 rész per millió 130 MHz-nél) a követelményeknek egy elérhető és megvalósítható interpretációja ebben az esetben.

1. Megjegyzés. – A fentiekben hivatkozott vivőfrekvencia távolságok a kijelölt csatorna frekvenciára vonatkoznak.

2. Megjegyzés. – Azokban a légijármű vevőkben, amelyek vett vivőhullám-zajviszony mérést alkalmaznak a zaj-zár működtetésére, a két vagy több eltolású vivőfrekvencia vétele által okozott audio heterodineket zajként lehet értelmezni, és azt eredményezik, hogy az audio kimeneten a zaj-zár működését idézik elő még akkor is, amikor kielégítő megkívánt jel van. Annak érdekében, hogy a fedélzeti vevő rendszer megfeleljen a II. Rész 2.3.2.2 pontjába foglalt érzékenységre vonatkozó ajánlásoknak, a vevők tervezésénél szükség lehet annak biztosítására, hogy érzékenységüket magas szinten tartsák, amikor eltolt vivőfrekvenciás átviteleket vesznek. A zajzár működtetés vivőszintfüggő módosítása nem megfelelő megoldás erre a követelményre, a szintfüggő zajzár nyitási szint lehető legalacsonyabbra történő állítása javít a helyzeten.

1.3 A COM vevő rendszerek érzéketlenségi teljesítménye a VHF FM rádióadás interferencia jelenlétében

1.3.1 Hivatkozással a II. Rész 2.3.3.2 pontjának Megjegyzésére, a meghatározott érzéketlenségi paramétert a vevő rendszer normál vételi paramétereihez képesti romlásként kell definiálni és mérni, a megkívánt bemenő jel jelenléte esetén szabványos feltételek között. Ez a vevőállomás berendezéseinek rendszeresen ismételt

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ellenőrzését teszi lehetővé és megkönnyíti annak minősítését. Megfelelő immunitási méréshez mínusz 87 dBm-es hasznos jel alkalmazható 1 kHz-es hang-frekvenciás modulációval 30 százalékos modulációs mélység mellett. A jel-zaj viszony nem eshet 6 dB alá akkor, amikor a II. Rész 2.3.3.1 és 2.3.3.2 pontjában meghatározott interferáló jeleket alkalmazzák. A műsorszóró sávbeli jeleket a 87,5 és a 107,9 MHz közötti intervallumban lévő frekvenciákból kell kiválasztani és egy reprezentatív rádióadás jellemző jellel kell modulálni.

1. Megjegyzés. – A mínusz 87 dBm-es jelszint együttesen 0 dB tápvonalveszteséget és antennanyereséget feltételez.

2. Megjegyzés. – A jel-zaj viszony fent idézett csökkentése a szabványosítás célját szolgálja, amikor azt ellenőrzik, hogy a vevőállomás berendezés a próbapadi méréseken kielégíti-e a megkövetelt érzéketlenséget. A frekvenciák tervezésében és az FM rádióadás interferenciától való védelem becslésében egy ennél nem kisebb, és sok esetben nagyobb értéket kell választani, amely függ az üzemelési körülményektől egyedi esetekben az interferencia becslések alapjaként.

2. SELCAL RENDSZER

2.1 Ennek az anyagnak az a célja, hogy a SELCAL rendszer működésére vonatkozó információt és útmutatást szolgáltasson. Ez kapcsolódik a II. Rész, 3. Fejezet által tartalmazott Ajánlott Gyakorlatokhoz.
1) *Funkció.* A SELCAL rendszer célja lehetővé tenni az egyes légijárművek szelektív hívását a földi állomást a légijárművel összekötő rádiótelefon csatornákon keresztül, és az a célja, hogy az útvonal-frekvenciákon üzemeljen a meglévő HF és VHF föld-levegő kommunikációs adókkal és vevőkkel, minimális elektromos és mechanikai módosítással. A föld-levegő kommunikációs kapcsolat normális működésének érintetlennek kell maradnia, kivéve az olyan időszakokat, mint például amikor a szelektív hívási funkciót kialakítják.
2) *Üzemelési alapelvek.* A szelektív hívást a földi adó kódolója hajtja végre, amely kódolt hang-impulzusok egy csoportját küldi a légijármű vevőnek és dekódolónak. A fedélzeti vevő és dekódoló berendezés egy indikátor segítségével képes a helyes kód vételére és értelmezésére, és az összes többi kód elutasítására véletlen zaj és interferencia jelenlétében. A kódoló berendezés földi része (földi szelektív hívó egység) szállítja a kódolt információt a föld-levegő adónak. A fedélzeti szelektív hívó egység az a speciális fedélzeti berendezés, amely a légijárművön meglévő kommunikációs vevővel üzemel, lehetővé téve a föld-levegő jelek dekódolását a jel indikátoron lévő kijelző számára. A jelzőeszközt úgy lehet választani, hogy illeszkedjen a felhasználó üzemelési követelményeihez és egy lámpából, egy csengőből, egy jelzőhang-adóból vagy ilyen jelző berendezések tetszőleges kombinációjából állhat.

VÉGE

ANNEX 10/IV.

Légiforgalmi távközlés: Légtérellenőrző radar és összeütközés-elhárító fedélzeti rendszerek

IV. kötet 4. kiadás – 2007. július
82. módosítással
A jelen kiadvány magába foglalja a Tanács által 2007. február 27-e előtt elfogadott minden módosítást, és 2007. november 22-től hatálytalanítja a 10. Annex IV. kötetének összes korábbi kiadásait.

A nemzetközi előírások és ajánlott gyakorlati eljárások alkalmazhatóságára vonatkozóan lásd az Előszót.

Nemzetközi Polgári Repülési Szervezet

Módosítások

A módosítások kiadásáról az ICAO Journal és az ICAO kiadványok valamint Audio-vizuális kiképzési segédanyagok katalógusának havi Kiegészítései rendszeres tájékoztatást biztosítanak. Kísérjék figyelemmel a fenti kiadványokat és a módosításokat az alábbi rovatokba vezessék be:

A módosítások és helyesbítések bejegyzése

Módosítás			
száma	A hatályosság dátuma	Az alkalmazhatóság dátuma	bevezette
70-82	Beépítve a jelen kiadásba		

Kiegészítés			
száma	A kiadás dátuma	A bevezetés dátuma	bevezette

Tartalomjegyzék

Előszó

Történelmi háttér

A repülési távközlésre vonatkozó nemzetközi előírásokat és ajánlott gyakorlati eljárásokat a Tanács először a Nemzetközi Polgári Légiközlekedési Egyezmény (1944. Chicago) 37. cikkelyének rendelkezései alapján 1949 május 30-án fogadta el és foglalta a 10. számú Annex-be. Az előírások 1950 március 1-én léptek hatályba. A nemzetközi előírások és ajánlott gyakorlati eljárások az Távközlési Részleg 1949 januári harmadik ülésének ajánlásain alapszanak.

A 10. Annex Hetedik Kiadását és az ezt megelőző kiadásokat egy kötetben adták ki, amely négy részt tartalmazott a hozzátartozó mellékletekkel együtt: I. Rész – Berendezések és rendszerek, II. Rész – Rádió frekvenciák, III. Rész – Eljárások, és IV. Rész – Kódok és rövidítések.

A 42. Módosítással a IV. Részt törölték az Annexből; az ebben a Részben szereplő kódokat és rövidítéseket egy új dokumentumba, a Doc 8400-ba vitték át.

A 44. Módosítás 1965 május 31-i elfogadásával a 10. Annex Hetedik Kiadását két kötettel helyettesítették: I. Kötet (Első Kiadás), amely az I. Rész – Berendezések és rendszerek és a II. Rész – Rádió frekvenciák részeket tartalmazza, és a II. Kötet (Első Kiadás), amely az Összeköttetési eljárásokat tartalmazza.

A 70. Módosítás 1995 március 20-i elfogadásával a 10. Annex-et öt kötetből állóra szerkesztették át: I. Kötet – Rádiónavigációs segédeszközök; II. Kötet – Összeköttetési eljárások; III. Kötet – Összeköttetési rendszerek; IV. Kötet – Légtérellenőrző radar és összeütközés-elhárító fedélzeti rendszerek; és V. Kötet – Repülési rádió frekvencia spektrum felhasználása. A 70. Módosítás alapján a III. és IV. Köteteket 1995-ben adták ki, és az V. Kötet kiadását a 71. Módosítással tervezték.

Az A. táblázat a 10. Annex, IV. Kötet módosításainak forrását, valamint a vonatkozó fontosabb témakörök rövid összefoglalását mutatja be a 70. Módosítást követően és megadja azokat a dátumokat, amelyeken az Annexet és a módosításokat a Tanács elfogadta, amikor azok érvénybe léptek illetve amikor alkalmazhatóvá váltak.

A Szerződő Államok tevékenysége

Az eltérések jelentése

Felhívjuk a szerződő államok figyelmét az Egyezmény 38. cikkelyéből adódó azon kötelezettségükre, hogy a szerződő állam értesítse a Szervezetet bármely eltérésről, amely saját nemzeti előírásai és gyakorlata illetve a jelen Annex nemzetközi előírásai és ennek bármely módosítása között van. Felkérjük továbbá a szerződő államokat, hogy az ilyen értesítést terjesszék ki valamennyi olyan eltérésre is, amely a jelen Annex-ben található ajánlott gyakorlati eljárásokat és ezek bármely módosítását érinti, amennyiben ezen eltérések a légiközlekedés biztonsága szempontjából lényegesek. Ezen felül kérjük, hogy a szerződő államok folyamatosan tájékoztassák a Szervezetet bármilyen jövőbeni eltérésről valamint a korábbiakban jelzett eltérés megszűnéséről. A jelen Annex minden egyes módosításának elfogadása után külön az eltérésekről szóló értesítést kérő levelet küldünk majd minden szerződő államnak.

Felhívjuk a szerződő államok figyelmét a 15. Annex rendelkezéseire, amelynek alapján saját nemzeti előírásaik és gyakorlatuk valamint a vonatkozó ICAO előírások és ajánlott gyakorlati eljárások közötti eltérésekről szóló tájékoztatásaikat az Egyezmény 38. cikkelyében előírt kötelezettségük mellett a Légiforgalmi Tájékoztató Szolgálat útján is tegyék közzé.

A tájékoztatások továbbítása és közzététele

A jelen Annex-ben ismertetett nemzetközi előírások és ajánlott gyakorlati eljárások alapján biztosított, a légijárművek üzemeltetését érintő létesítmények, szolgálatok és eljárások létrehozását illetve megszüntetését a 15. Annex előírásainak megfelelően jelentsék be.

Az Annex szövegének felhasználása a nemzeti szabályozásokban.

A Tanács 1948. április 13-án elfogadott egy határozatot, amely felhívja a Szerződő Államok figyelmét arra, hogy kívánatos saját nemzeti szabályozásaikban, amennyiben lehetséges, azoknak az ICAO előírásoknak a pontos nyelvezetét használni, amelyek szabályozó jellegűek; továbbá, hogy kívánatos a nemzetközi előírásoktól való eltérések közlése, beleértve bármely pótlólagos nemzeti szabályozásról adott tájékoztatást, amely fontos a légiközlekedés biztonsága és rendszeressége szempontjából. Ahol csak lehetséges volt, jelen Annex rendelkezései szándékosan olyan módon íródtak, hogy megkönnyítsék a nemzeti rendelkezésekbe a nagyobb szövegváltoztatások nélküli beillesztést.

Az Annex részeinek jogállása

Egy Annex a következő részekből áll, de nem feltétlenül szükséges, hogy minden rész megtalálható legyen minden egyes Annex-ben. Az egyes részek jogállása a következő:

1.— Az Annex anyaga:

a) *Nemzetközi előírások és ajánlott gyakorlati eljárások*, amelyeket az Egyezmény rendelkezései szerint a Tanács fogad el. Ezek meghatározása a következő:

Előírás vagy Szabvány: Bármilyen fizikai jellemzőre, kialakításra, anyagra, teljesítményre, személyzetre vagy eljárásra vonatkozó követelmény, amelynek egységes alkalmazását szükségesnek tartják a nemzetközi légiközlekedés biztonsága és menetrendszerű fenntartása érdekében, és amelynek az Egyezmény alapján a Szerződő Államok megfelelnek. Amennyiben a megfelelés nem lehetséges, az eltérést az Egyezmény 38. cikkelyében foglaltak alapján a Tanács felé jelenteniük kell.

Ajánlott gyakorlati eljárás: Bármilyen fizikai jellemzőre, kialakításra, anyagra, teljesítményre, személyzetre vagy eljárásra vonatkozó követelmény, amely egységes alkalmazását a nemzetközi légiközlekedés biztonsága, menetrendszerű és hatékony lebonyolítása érdekében, kívánatosnak értékelik és amelynek való megfelelésre a Szerződő Államok az Egyezmény értelmében törekszenek.

b) *Függelékek:* A célszerűség érdekében külön csoportosított anyagok, amelyek azonban a Tanács által elfogadott nemzetközi előírások és ajánlott gyakorlati eljárások szerves részét képezik.

c) *Meghatározások:* A nemzetközi előírásokban és ajánlott gyakorlati eljárásokban alkalmazott azon szakkifejezések pontos magyarázata, amelyek elfogadott szótári jelentés hiányában nem maguktól értetődőek. A meghatározás külön jogállással nem rendelkezik, azonban szerves részét képezi azon nemzetközi előírásnak vagy ajánlott gyakorlati eljárásnak, amelyben a szakkifejezés előfordul, mert a szakkifejezés értelmének megváltoztatása a követelményt befolyásolja.

d) *Táblázatok és ábrák:* Ezek egy nemzetközi előírást vagy ajánlott gyakorlati eljárást egészítenek ki vagy szemléltetnek, és amelyekre az adott nemzetközi előírásban vagy ajánlott gyakorlati eljárásban utalnak. A táblázatok és az ábrák az adott nemzetközi előírás vagy ajánlott gyakorlati eljárás részét képezik és jogállásuk ezekkel megegyező.

2.— A nemzetközi előírásokkal és ajánlott gyakorlati eljárásokkal együtt, a Tanács által kiadásra jóváhagyott egyéb anyagok:

a) *Előszó: A* Tanács tevékenységén alapuló történeti áttekintő és magyarázó anyagot tartalmaz, amely magában foglalja továbbá az államok nemzetközi előírások és gyakorlati eljárások alkalmazására vonatkozó, az Egyezményből és a Bevezetési Határozatból következő kötelezettségeinek magyarázatát is.
b) *Bevezető:* Az Annex egyes részeinek, fejezeteinek vagy bekezdéseinek elején található magyarázó anyag, amely segítséget nyújt a vonatkozó szöveg megértéséhez illetve alkalmazásához.

c) *Megjegyzések:* Szükség szerint a szövegbe iktatott anyag, amely tényszerű tájékoztatást vagy utalást tartalmaz a szóban forgó nemzetközi előírásra vagy ajánlott gyakorlati eljárásra vonatkozóan, azonban nem képezi ezek szerves részét.

d) *Mellékletek:* A nemzetközi előírást és ajánlott gyakorlati eljárást kiegészítő anyagot tartalmaznak, vagy azok alkalmazásához szükséges útmutatásként szolgálnak.

Felelősség elhárítás szabadalmakra vonatkozóan

Felhívjuk a figyelmet arra a lehetőségre, hogy ebben az Annexben a nemzetközi előírások és ajánlott gyakorlati eljárások bizonyos elemei szabadalmak vagy más szellemi tulajdonjog tárgyát képezhetik. Az ICAO-t nem lehet felelőssé tenni, ha ilyen jogokat nem ismer fel. Az ICAO nem foglal állást bejelentett szabadalmak vagy más szellemi tulajdonjog létezése, érvényessége, hatásköre vagy alkalmazhatósága vonatkozásában és nem vállal felelősséget azok vonatkozásában.

Az alkalmazandó nyelv kiválasztása

A jelen Annex-et négy nyelven — angol, francia, orosz és spanyol nyelven fogadták el. Minden egyes szerződő államot felkérünk, hogy ezek közül válasszon ki egy szöveget a nemzeti bevezetés céljára vagy egyéb, az egyezményben számításba vett célra akár az adott nyelv közvetlen felhasználásával, akár saját nemzeti nyelvére történő lefordításával, és erről értesítse a Szervezetet.

Szerkesztői gyakorlat

Annak érdekében, hogy minden egyes mondat jogállását az első pillantásra jelezhessük, az alábbi szerkesztői gyakorlatot követjük: A *nemzetközi előírásokat* vékony álló, az *ajánlott gyakorlati eljárásokat* vékony *dőlt* betűkkel nyomtatjuk. Ez utóbbiak jogállását ***"Ajánlás"*** előtaggal jelezzük. A *Megjegyzéseket* vékony dőlt betűvel nyomtatjuk és jogállásukat "*Megjegyzés* " előtaggal jelezzük.

Az írásmód szempontjából az angol szövegben az előírások esetén alkalmazott „shall" ige helyett a „kell" kifejezést, az ajánlott gyakorlati eljárások esetén alkalmazott "should" ige helyett a „szükséges" kifejezést használjuk.
Megjegyzés: a magyar fordítás alkalmával ezt a gyakorlatot nem minden esetben alkalmazzuk, mert a jelzett jogállás és a nyelvi sajátosságok ezt szükségtelenné teszik. Ha ez szükséges, a fordításban nyomatékos (kell) felszólító módot alkalmazunk.

A jelen kiadványban alkalmazott mértékegységek a nemzetközi polgári légiközlekedésről szóló Egyezmény 5. Annex előírásainak megfelelően a nemzetközi mértékegység rendszerrel /SI/ összhangban állnak. Ahol az 5. Annex lehetővé teszi a nem SI, alternatív mértékegységek alkalmazását, ott az alapegységet követően ezen mértékegységek zárójelben szerepelnek. Ahol az anyagban két mértékegység fajtát alkalmazunk, ott nem szabad azt feltételezni, hogy a mértékegységek értékei egyenlők és azok egymással felcserélhetők. Mindazonáltal lehetséges, hogy azonos biztonsági szint érhető el bármelyik mértékegység kizárólagos alkalmazásával.

A jelen kiadvány bármely, számmal és/vagy címmel azonosított részére történő hivatkozás vonatkozik az adott rész minden egyes pontjára is.

A. táblázat — A 10. Annex IV. kötetének módosításai

módosítás	*forrás(ok)*	*tárgy*	*elfogadva/ hatályos/ alkalmazható*
70	Léginavigációs Bizottság Másodlagos Légtérellenőrző Radar Tökéletesítési és Összeütközés-elhárító fedélzeti rendszerek Munkacsoport ötödik ülése	A IV. Kötet megalkotása, és a nemzetközi előírások és ajánlott gyakorlati eljárások és a vonatkozó útmutató anyagok bevezetése az összeütközés-elhárító fedélzeti rendszerre (ACAS) vonatkozóan.	1995. március 20. 1995. július 24. 1995. november 9.
71	Léginavigációs Bizottság Másodlagos Légtérellenőrző Radar Tökéletesítési és Összeütközés-elhárító fedélzeti rendszerek Munkacsoport (SICASP) negyedik és ötödik ülése	Az SSR S-módú levegő-föld adatkapcsolati rendszerre és az SSR válaszjeladók felszerelésére vonatkozó anyagok változásai.	1996. március12. 1996. július 15. 1996. november 7.
72	—	Nincs változás	—
73 **(2. kiadás)**	Léginavigációs Bizottság Másodlagos Légtérellenőrző Radar Tökéletesítési és Összeütközés-elhárító fedélzeti rendszerek Munkacsoport (SICASP) hatodik ülése	Követelményekkel való kiegészítés az SSR S-módú rendszerekhez; az összeütközés elhárító logika működési jellemzőire vonatkozó anyag bevezetése; az összeütközés-elhárító fedélzeti rendszerre vonatkozó útmutató változásai; az Emberi Tényezőkre vonatkozó anyag bevezetése.	1998. március 19. 1998. július 15. 1998. november 5.
74	Léginavigációs Bizottság	Megjegyzés az S-módú kiterjesztett squitter eljárás szabadalmi jogairól való lemondásra vonatkozóan	1999. március 18. 1999. március 18.
75	—	Nincs változás	—
76	Légiforgalmi Mobil Összeköttetési Munkacsoport (AMCP) hetedik ülése	Az ITU Rádiószabályzatra való hivatkozások frissítésére vonatkozó megjegyzés	2001. március 12. 2001. március 12. -
77 **(3. kiadás)**	Másodlagos Légtérellenőrző Radar Tökéletesítési és Összeütközés-elhárító fedélzeti rendszerek Munkacsoport (SICASP) hetedik ülése	SSR S-mód (2. és 3. fejezet); és ACAS (1. és 4. fejezet)	2002. február 27. 2002. július 15. 2002. november 28.
78-81	—	Nincs változás	—
82	Légtérellenőrző és Konfliktusmegoldási Rendszerek munkacsoport (SCRSP)	A Nemzetközi előírások és ajánlott gyakorlati eljárások (SARP-ok) naprakész állapotba hozása az ADS-B vonatkozásában	2007. február 26. 2007. július 16. 2007. november 22.

NEMZETKÖZI ELŐÍRÁSOK ÉS
AJÁNLOTT GYAKORLATI ELJÁRÁSOK

1. fejezet Meghatározások

1. Megjegyzés.— A "Nemzetközi Rádiószabályzat"-ra vonatkozó minden hivatkozás a Nemzetközi Távközlési Egyesület (ITU) által közzétett Nemzetközi Rádiószabályzatra vonatkozik. A Nemzetközi Rádiószabályzat időről időre módosításra kerül az általában két vagy három évenként megrendezésre kerülő Rádiótávközlési Világértekezletek záróközleményeiben kifejezett döntéseknek megfelelően. További információt a Nemzetközi Távközlési Egyesület /ITU/ eljárásairól, amelyek a légiforgalmi rádió-rendszerek frekvenciáinak felhasználására vonatkoznak, a Polgári Légiközlekedés Rádió Frekvencia Spektrum Követelmények kézikönyve tartalmaz, amely a jóváhagyott ICAO álláspontot is magába foglalja *(DOC 9718).*

2 Megjegyzés: — Az S-módú kiterjesztett squitter rendszer a Massachusetts Institute of Technology (MIT) Lincoln Laboratory által bejegyzett szabadalom. A MIT Lincoln Laboratory 1966. augusztus 22-én közleményt adott ki a Commerce Business Daily-ben (CBD), az Egyesült Államok Kormányának egyik kiadványában, amely szerint nem kívánja szabadalom tulajdonosi jogát érvényesíteni senki ellen a szabvány kereskedelmi vagy nem-kereskedelmi használatánál annak érdekében, hogy elősegítse az S-módú kiterjesztett squitter technológia lehető legszélesebb felhasználását. Továbbá az ICAO-hoz írott 1998. augusztus 27-én kelt levelében a MIT Lincoln Laboratory megerősítette, hogy a CBD közleményt azért adták ki, hogy kielégítsék a szabadalmi jogra vonatkozó nyilatkozattal szembeni ICAO követelményeket a nemzetközi előírásokban és ajánlott gyakorlati eljárásokban foglalt műszaki eljárásokra nézve,, és hogy a szabadalom tulajdonosai ezt a műszaki eljárást díjmentesen felajánlják bármilyen célú felhasználásra.

Airborne collision avoidance system (ACAS) – Összeütközés-elhárító fedélzeti rendszer
A másodlagos légtérellenőrző radar (SSR) válaszjeladó egysége jeleinek segítségével működő fedélzeti rendszer, amely a földi berendezésektől függetlenül működik és tájékoztatja a légijármű vezetőjét az SSR válaszjeladóval felszerelt, összeütközési veszélyt jelentő egyéb légijárművekről.

Megjegyzés. - A fent hivatkozottak azok az SSR válaszjeladók, amelyek C-módban vagy S-módban működnek.

Aircraft address – Légijármű címzés
Huszonnégy bit egyedi kombinációja, amely egy légijárműhöz való hozzárendelésre használható levegő-föld kommunikáció, navigáció és légtérellenőrzés céljára.

Megjegyzés. – SSR S-módú válaszjeladók kiterjesztett squittereket továbbítanak, hogy biztosítsák a légijármű származtatású helyzet sugárzását légtérellenőrzési célokból. Az ilyen típusú információ sugárzása a helymeghatározó rendszertől függő automatikus légtérellenőrzés (ADS) egy formája, amely ADS - adatsugárzásként (ADS-B) ismert.

Automatic dependent surveillance-broadcast (ADS-B) OUT – Adatsugárzás üzemmódban működő, helymeghatározó rendszertől függő automatikus légtérellenőrzés
Egy légijárművön vagy egy közlekedési eszközön, azok állapotvektorának (helyzet és sebesség) valamint a fedélzeti rendszerekről származó egyéb információknak az ADS-B IN képességgel rendelkező vevőkészülékek számára alkalmas formában történő időközönkénti sugárzására alkalmazott működési mód.

Automatic dependent surveillance-broadcast (ADS-B) IN - Adatvétel üzemmódban működő, helymeghatározó rendszertől függő automatikus légtérellenőrzés
Az ADS-B OUT adatforrásoktól kapott felderítési adatok vételére alkalmazott működési mód.

Collision avoidance logic - Összeütközés elhárító logika
Az ACAS alrendszere vagy része, amely analizálja a megközelítő- és a saját légijárműre vonatkozó adatokat, eldönti, hogy a tanácsadások alkalmasak-e vagy nem, ha igen, akkor a tanácsadásokat generálja. A következő feladatokat látja el: távolság- és tengerszint feletti magasság követés, veszélyérzékelés és megoldási tanácsadás (bólintási utasítás) létrehozás. Nem tartalmazza a felderítést.

Human Factors principles - Emberi tényező alapelvek
A tervezésre, tanúsításra, kiképzésre, üzemeltetésre és karbantartásra vonatkozó alapelvek, amelyek célja az emberi teljesítmény és teljesítőképesség tényezőinek átfogó és teljes mértékű figyelembevételével biztonságos kapcsolat kialakítása az ember és a rendszer egyes (műszaki) elemei között.

Secondary surveillance radar (SSR) - Másodlagos légtérellenőrző radar
Légtérellenőrző radar rendszer, amely adókat/vevőket (lekérdező) és válaszjeladókat használ.

Megjegyzés. - A lekérdezőkkel és válaszjeladókkal szembeni követelményeket a 3. fejezet tartalmazza.

Légtérellenőrző radar - Surveillance radar
A légijármű, távolság és azimut szerinti helyzetének meghatározására használatos radarberendezés.

Traffic information service – broadcast (TIS-B) IN - Adatvétel üzemmódban működő, légiforgalmi információs szolgáltatás
Egy felderítési megoldás a TIS-B OUT adatforrásoktól kapott felderítési adatok vételére és feldolgozására.

Traffic information service – broadcast (TIS-B) OUT – Adatsugárzás üzemmódban működő, légiforgalmi információs szolgáltatás
A földön telepített érzékelők által biztosított felderítési információk földről történő rendszeres időközönkénti sugárzására alkalmazott működési megoldás, amely az adatokat a TIS-B IN képességgel rendelkező vevőkészülékek számára alkalmas formában sugározza.

Megjegyzés: Ez a műszaki megoldás különböző adatkapcsolatokon keresztül érhető el. Az S módú kiterjesztett squitter-re vonatkozó követelményeket az Annex 10, IV kötet, 5. fejezete tartalmazza. A VHF-sávú digitális adatkapcsolat 4-es üzemmód és az általános hozzáférésű adóvevő (UAT) követelményeit az Annex 10, III. kötet, I. Rész tartalmazza.

2. fejezet Általános ismertetés

2.1 Másodlagos légtérellenőrző radar (SSR)

2.1.1 Amikor légiforgalmi szolgálatok berendezéseként egy másodlagos légtérellenőrző radart felállítanak és üzemben tartanak, annak meg kell felelnie a 3.1 pont szerinti rendelkezéseknek, hacsak a jelen 2.1 pontban nincs másképpen előírva.

Megjegyzés. – Ahogyan a jelen Annexben említést nyert, az A/C módú válaszjeladók azok, amelyek a 3.1.1 pontban leírt jellemzőknek megfelelnek. Az S-módú válaszjeladók azok, amelyek a 3.1.2 pontban *leírt jellemzőknek megfelelnek. Az A/C-módú válaszjeladók funkcionális képességei az S-módú válaszjeladók funkcionális képességeinek integrált részét képezik.*

2.1.2 Lekérdezési módok (föld-levegő)

2.1.2.1 A lekérdezést a légiforgalmi szolgálatoknál a 3.1.1.4.3 vagy 3.1.2 pontban leírt módokban kell végrehajtani. Az egyes módok használata a következő:

1) *A-mód* – válaszjeladó válaszokat kapni azonosítás és felderítés céljából.

2) *C-mód* –válaszjeladó válaszokat kapni automatikus nyomásmagasság átvitel és felderítés céljából.

3) *Inter (közös) mód –*

a) *A/C/S körhívás mód:* válaszokat kapni az A/C-módú válaszjeladók felderítése és az S-módú válaszjeladók begyűjtése céljából.

b) *Csak A/C körhívás mód*: válaszokat kapni az A/C válaszjeladók felderítése céljából. Az S-módú válaszjeladók nem válaszolnak.

4) *S-mód –*

a) *Csak S körhívás mód:* válaszokat kapni az S-módú válaszjeladók begyűjtése céljából

b) *Közvetítés:* információkat továbbítani az összes S-módú válaszjeladóhoz. Válaszokat nem kapnak.

c) *Szelektív:* az egyedi S-módú válaszjeladók felderítésére és az egyedi S-módú válaszjeladókkal való kommunikációra. Az egyes lekérdezésekre választ csak a lekérdezés által egyedileg megcímzett válaszjeladóktól kapnak.

1. Megjegyzés. – Az A/C-módú válaszjeladókat az S-módú lekérdezések elnyomják, és ezek nem válaszolnak.

2. Megjegyzés. – 25 lehetséges lekérdezési (fedélzetre irányuló adattovábbítás) formátum és 25 lehetséges S-módú válasz (fedélzetről leadott adattovábbítás) formátum van. A formátum meghatározásokat lásd a 3.1.2.3.2 pont, 3-7 és 3-8 ábrákon.

2.1.2.1.1 **Ajánlás.** – *Az igazgatásoknak a megfelelő nemzeti és nemzetközi hatóságokkal kell koordinálni a másodlagos légtérellenőrző radarrendszer azon megvalósítási szempontjait illetően, amelyek lehetővé teszik annak optimális használatát.*

Megjegyzés. – Hogy lehetővé tegyék azoknak a földi berendezéseknek a hatékony működését, amelyeket az egymáshoz közeli lekérdező berendezéseknek a légijármű válaszjeladó által adott nem-kívánt válaszaiból adódó zavarok kiküszöbölésére terveztek (aszinkron impulzus jelek elnyomására szolgáló berendezések), az Államoknak szüksége lehet koordinált tervek kialakítására az impulzus-ismétlődési frekvenciák (PRF) kijelölésére vonatkozóan a másodlagos légtérellenőrző radar lekérdező berendezésekhez.

2.1.2.1.2 A lekérdező azonosító (II) kódok kijelölése, ahol a repülési információs körzetek nemzetközi határain keresztül átlapoló lefedési területeken szükséges, körzeti léginavigációs egyezmények tárgyát kell, hogy képezze.

2.1.2.1.3 A légtérellenőrző azonosító (SI) kódok kijelölése, ahol az átlapoló lefedési területeken szükséges, körzeti léginavigációs egyezmények tárgyát kell, hogy képezze.

Megjegyzés. – Az SI kizárási eszköz nem használható, hacsak a fedési távolságon belül az összes S-módú válaszjeladó nincs erre a célra alkalmassá téve.

2.1.2.2 A-módú és C-módú lekérdezéseket biztosítani kell.

Megjegyzés. – Ezt a követelményt kielégíthetik azok a közös módú lekérdezések, amelyek A-módú és C-módú válaszokat váltanak ki A/C-módú válaszjeladóktól.

2.1.2.3 **Ajánlás. –** *Azokon a területeken, ahol a Légiforgalmi irányítási rendszer hatékonyságának növeléséhez korszerűsített légijármű azonosítás szükséges, az S-módú lehetőséggel bíró másodlagos légtérellenőrző radar földi berendezéseknek légijármű azonosító képességgel kell rendelkezniük.*

Megjegyzés. – Az S-módú adatkapcsolaton keresztül történő légijármű azonosítás jelentés biztosítja az alkalmasan felszerelt légijármű egyértelmű azonosítását.

2.1.2.4 Oldalszirom elnyomását szabályozó lekérdezés

2.1.2.4.1 Oldalszirom elnyomást a 3.1.1.4 és 3.1.1.5 pontok rendelkezéseivel összhangban kell biztosítani minden A-módú, C-módú és közös módú lekérdezésnél.

2.1.2.4.2 Oldalszirom elnyomást a 3.1.2.1.5.2.1 pont rendelkezéseivel összhangban kell biztosítani minden csak S körhívás módú lekérdezésnél.

2.1.3 Válaszjeladó válasz módok (levegő-föld)

2.1.3.1 A válaszjeladóknak az A-módú lekérdezésekre a 3.1.1.7.12.1 pont rendelkezéseinek megfelelően, a C-módú lekérdezésekre a 3.1.1.7.12.2 pont rendelkezéseinek megfelelően kell válaszolniuk.

Megjegyzés. – Ha nyomásmagasság információ nem áll rendelkezésre, a válaszjeladók a C-módú lekérdezésekre csak keretimpulzusokkal válaszolnak.

2.1.3.1.1 Az S-módú válaszokban foglalt nyomásmagasság jelentéseket a 3.1.1.7.12.2 pontban meghatározottak szerint kell származtatni.

Megjegyzés. – A 3.1.1.7.12.2 a C-módú válaszokra vonatkozik, és többek között megadja, hogy a C-módú nyomásmagasság jelentéseket az 1013,25 hektopascal szabványos nyomásbeállításra vonatkoztassák. A 2.1.3.1.1 pont szándékozik biztosítani, hogy ne csak a C-módú válaszjeladók, hanem az összes válaszjeladó korrigálatlan nyomásmagasságot jelentsen.

2.1.3.2 Ahol a C-módú automatikus nyomásmagasság továbbítási képesség szükségességét egy megadott légtéren belül megállapították, a válaszjeladóknak, amikor a szóban forgó légtéren belül kerülnek használatra, a C-módú lekérdezésekre nyomásmagasság kódolással kell válaszolniuk az információ impulzusokban.

2.1.3.2.1 1999. Január 1-jétől minden válaszjeladónak tekintet nélkül a légtérre, amelyben használni fogják, a C-módú lekérdezésekre nyomásmagasság információval kell válaszolnia.

Megjegyzés. – Az összeütközés-elhárító fedélzeti rendszer (ACAS) működése a veszélyeztető légijármű C-módú válaszaiban foglalt nyomásmagasság közlésétől függ.

2.1.3.2.2 **Ajánlás.** – *A 7,62 m (25 láb) vagy ennél jobb nyomásmagasság forrású légijárműveknél az S-módú válaszjeladók által a szelektív lekérdezésekre adott válaszban (azaz az AC mezőben, 3.1.2.6.5.4 pont) szolgáltatott nyomásmagasság információt 7,62 m (25 láb) növekményekben kell jelenteni.*

Megjegyzés. – Az ACAS teljesítménye jelentősen megnövekszik, ha egy veszélyeztető légijármű 7,62 m 25 láb) növekményekben jelenti a nyomásmagasságot.

2.1.3.2.3 Minden A/C-módú válaszjeladónak a nyomásmagasságot C-módú válaszokban, az információ impulzusokban kódolva kell jelentenie.

2.1.3.2.4 Minden S-módú válaszjeladónak a nyomásmagasságot C-módú válaszokban az információ impulzusokban kódolva, és az S-módú válaszok AC mezejében kell jelentenie.

2.1.3.2.5 Amikor egy S-módú válaszjeladó nem kap több nyomásmagasság információt a 7,62 m (25 láb) vagy annál jobb növekményt biztosító forrástól, akkor a jelentett magasság érték legyen azonos a légijármű nem-korrigált nyomásmagassága mért értékének 30,48 m (100 láb) növekményekben való kifejezéséből nyert értékével és a Q bit értékét (lásd 3.1.2.6.5.4 b)) 0-ra kell beállítani.

Megjegyzés. – Ez az előírás az S-módú válaszjeladó beépítésére és használatára vonatkozik. A cél annak biztosítása, hogy egy 30,48 m (100 láb) növekmény forrásból nyert magasság adatokat ne jelentsék a 7,62 m (25 láb) kifejezésű adatok számára szolgáló formátumok felhasználásával.

2.1.3.3 Azon válaszjeladóknak, amelyeket azon légtéren belül használnak, amelyre S-módú fedélzeti képesség szükségességét állapították meg, szintén válaszolniuk kell a közös módú és S-módú lekérdezésekre a 3.1.2 pont alkalmazható rendelkezéseivel összhangban.

2.1.3.3.1 A másodlagos légtérellenőrző radar S-módú válaszjeladók kötelező felszerelésére vonatkozó követelményeknek körzeti léginavigációs egyezményeken kell alapulniuk, amelyeknek meg kell határozniuk a légteret és a fedélzethez kapcsolódó megvalósítás időléptékét.

2.1.3.3.2 **Ajánlás.** – *A 2.1.3.3.1 pontban jelzett egyezményeknek biztosítaniuk kell a legalább öt évvel korábbi előzetes értesítés lehetőségét.*

2.1.4 A-módú válasz kódok (információ impulzusok)

2.1.4.1 Minden válaszjeladó legyen képes 4096, a 3.1.1.6.2 pontban megadott jellemzők szerinti válasz kód generálására.

2.1.4.1.1 **Ajánlás** – *A légiforgalmi szolgálatok hatóságai hozzák létre a másodlagos légtérellenőrző radar kódok kijelölési eljárásait a körzeti léginavigációs egyezményeknek megfelelően, figyelembe véve a rendszer többi felhasználóit is.*

Megjegyzés. – A másodlagos légtérellenőrző radar kódok kijelölésének alapelvei a Doc 4444, 8. fejezetében találhatók.

2.1.4.2 Különleges célokra az alábbi A-módú kódokat fenn kell tartani:

2.1.4.2.1 A 7700-as kódot a vészhelyzetben lévő légijármű felismerésének biztosításához.

2.1.4.2.2 A 7600-as kódot rádiókommunikáció meghibásodással rendelkező légijármű felismerésének biztosításához.

2.1.4.2.3 A 7500-as kódot a jogellenes beavatkozás alatt lévő légijármű felismerésének biztosításához.

2.1.4.3 A földi dekódoló berendezések esetén megfelelően biztosítani kell, hogy az A-módú 7500-as, 7600-as és 7700-as kódokat azonnal felismerjék.

2.1.4.4 **Ajánlás**. – *A körzeti egyezménytől függően az A-módú 0000 kódot általános célú kódként való kijelölésre kell fenntartani.*

2.1.4.5 Az A-módú 2000-es kódot olyan légijármű felismerésére kell fenntartani, amely a légiforgalmi irányító egységtől nem kapott utasítást a válaszjeladó működtetésére.

2.1.5 Az S-módú fedélzeti berendezés képességei

2.1.5.1 Minden S-módú válaszjeladó az alábbi öt szint egyikének feleljen meg:

2.1.5.1.1 Szint 1 – az 1. szintű válaszjeladók rendelkezzenek a következőkhöz előírt képességekkel:

a) A-módú azonosság és C-módú nyomásmagasság közlés (3.1.1 pont);

b) közös módú és S-módú körhívás tranzakciók (3.1.2.5 pont);

c) címzett felderítési magasság és azonosság tranzakciók (3.1.2.6.1, 3.1.2.6.3, 3.1.2.6.5 és 3.1.2.6.7 pontok);

d) kizárás protokollok (3.1.2.6.9 pont);

e) alapvető adat protokollok, kivéve az adatkapcsolat képesség közlés (3.1.2.6.10 pont); és

f) levegő-levegő szolgáltatás és squitter tranzakciók (3.1.2.8 pont).

Megjegyzés. – Az 1. szint lehetővé teszi a másodlagos légtérellenőrző radarral történő felderítést, a nyomásmagasság közlés és az A-módú azonosítási kód alapján. A másodlagos légtérellenőrző radar S-módú környezetében, az S-módú szelektív légijármű lekérdezés miatt, az A/C-módú válaszjeladóra vonatkozóan tökéletesítették a műszaki teljesítőképességet .

2.1.5.1.2 Szint 2 – a 2. szintű válaszjeladók rendelkezzenek a 2.1.5.1.1 pont szerinti képességekkel, és rendelkezzenek a következőkhöz előírt képességekkel is:

a) szabványos hosszúságú kommunikáció (Comm-A és Comm-B) (3.1.2.6.2, 3.1.2.6.4, 3.1.2.6.6, 3.1.2.6.8 és 3.1.2.6.11 pontok);

b) adatkapcsolat képességének közlése (3.1.2.6.10.2.2 pont); és

c) légijármű azonosítás közlés (3.1.2.9 pont).

Megjegyzés. – A 2. szint lehetővé teszi a légijármű azonosítás közlést és más szabványos hosszúságú adatkapcsolat kommunikációt a földről a levegőbe és levegőből a földre. A légijármű azonosítás közlés képesség egy illesztő egységet és megfelelő bemeneti eszközt igényel.

2.1.5.1.3 Szint 3 – a 3. szintű válaszjeladók rendelkezzenek a 2.1.5.1.2 pont szerinti képességekkel, és rendelkezzenek azokkal is, amelyek föld-levegő kiterjesztett hosszúságú közlemény (ELM) kommunikációhoz vannak előírva (3.1.2.7.1-től 3.1.2.7.5-ig pontok).

Megjegyzés. – A 3. szint lehetővé teszi a kiterjesztett hosszúságú adatkapcsolat kommunikációt a földről a levegőbe és így biztosíthatja a visszakeresést földi adattárakból, és más légiforgalmi szolgáltatások fogadását, amelyek a 2. szintű válaszjeladóknál nem állnak rendelkezésre.

2.1.5.1.4 Szint 4 – a 4. szintű válaszjeladók rendelkezzenek a 2.1.5.1.3 pont szerinti képességekkel, és rendelkezzenek azokkal is, amelyek levegő-föld kiterjesztett hosszúságú közlemény (ELM) kommunikációhoz vannak előírva (3.1.2.7.7 és 3.1.2.7.8 pontok).

Megjegyzés. – A 4. szint lehetővé teszi a kiterjesztett hosszúságú adatkapcsolat kommunikációt a levegőből a földre és így hozzáférést biztosíthat a földről a fedélzeti adatforrásokhoz és más adatok átviteléhez, amelyeket a légiforgalmi szolgálatok igényelnek és amelyek a 2. szintű válaszjeladóknál nem állnak rendelkezésre.

2.1.5.1.5 Szint 5 – az 5. szintű válaszjeladók rendelkezzenek a 2.1.5.1.4 pont szerinti képességekkel, és azokkal is, amelyek megnövelt Comm-B és kiterjesztett hosszúságú közlemény (ELM) kommunikációhoz vannak előírva (3.1.2.6.11.3.4, 3.1.2.7.6 és 3.1.2.7.9 pontok).

Megjegyzés. – Az 5. szint lehetővé teszi a Comm-B és kiterjesztett hosszúságú adatkapcsolat kommunikációt több lekérdezővel anélkül, hogy többszörös telephely igénye lenne. Az ilyen szintű válaszjeladó magasabb adatkapcsolati kapacitás minimummal rendelkezik, mint más válaszjeladó szintek.

2.1.5.1.6 *Kiterjesztett squitter – A* kiterjesztett squitter válaszjeladók rendelkezzenek:
- a 2.1.5.1.2, 2.1.5.1.3, 2.1.5.1.4 vagy 2.1.5.1.5 pontokban előírt képességekkel;
- a kiterjesztett squitter üzemeléshez előírt képességekkel (3.1.2.8.6);
- és az ACAS keresztkapcsolati működési módra előírt képességekkel (3.1.2.8.3 és 3.1.2.8.4).

Az ilyen képességekkel rendelkező válaszjeladókat az “e” utótaggal kell megjelölni.

Megjegyzés. – Például egy kiterjesztett squitter képességgel rendelkező 4. szintű válaszjeladót "4.e szint"-tel kell jelölni.

2.1.5.1.7 *SI képesség* – SI kódok feldolgozására képes válaszjeladóknak a 2.1.5.1.2, 2.1.5.1.3, 2.1.5.1.4 vagy 2.1.5.1.5 pontokban ismertetett, valamint az SI kód üzemelésre előírt (3.1.2.3.2.1.4, 3.1.2.5.2.1, 3.1.2.6.1.3, 3.1.2.6.1.4.1, 3.1.2.6.9.1.1 és 3.1.2.6.9.2) képességekkel kell rendelkezniük. Az ilyen képességgel rendelkező válaszjeladókat az "s" utótaggal kell megjelölni.

Megjegyzés. – Például egy kiterjesztett squitter képességgel és SI képességgel rendelkező 4. szintű válaszjeladót "4-es szint"-tel kell jelölni.

2.1.5.1.7.1 SI kód képességgel kell ellátni a 2.1.5.1.7 pont előírásainak megfelelően az összes 2003. január 1-jén vagy azután felszerelt S-módú válaszjeladót, és 2005. január 1-jéig az összes S-módú válaszjeladót.

Megjegyzés. – Egyes Államok rendelkezései az alkalmazhatóságot ennél a dátumnál előbb megkövetelhetik.

2.1.5.1.8 V*álaszjeladóval nem azonos kiterjesztett squitter eszközök.* Azok az eszközök, amelyek kiterjesztett squitter-ek sugárzására képesek, és nem részei egy S-módú válaszjeladónak, feleljenek meg az 1090 MHz RF térbeli jelekre vonatkozó összes követelménynek, amelyek egy S-módú válaszjeladóra vannak megadva, az 5.1.1 pontban meghatározott azonosított berendezés osztályra vonatkozó adási teljesítmény szintek kivételével.

2.1.5.2 Minden, a nemzetközi polgári légiforgalom által használt S-módú válaszjeladó feleljen meg legalább a 2.1.5.1.2 pontban előírt 2. szint követelményeinek.

1. Megjegyzés. – Az 1. szint használata megengedett lehet valamelyik Államon belül vagy egy körzeti léginavigációs egyezmény kitételein belül. Az S-módú 1. szintű válaszjeladó a tulajdonságok minimális együttesére szorítkozik az S-módú válaszjeladók másodlagos légtérellenőrző radar S-módú lekérdezőkkel megegyező működésénél. Ez a meghatározás azért szükséges, hogy megakadályozzák a 2. szint alatti válaszjeladó típusok elszaporodását, amelyek nem illeszthetők a másodlagos légtérellenőrző radar S-módú lekérdezőihez.

2. Megjegyzés. – A 2. szintű képességre vonatkozó követelmény szándéka az, hogy biztosítsa egy ICAO szabvány szerinti válaszjeladó képesség széleskörű felhasználását, ami lehetővé teszi az S-módú földi berendezések és szolgálatok tervezését világszerte. A követelmény azon kívül visszatartó erőt képvisel az 1. szintű válaszjeladók kezdetiként történő felszerelésével szemben, amelyeket elavulttá tesznek bizonyos légtérre vonatkozó későbbi követelmények, amelyek ott 2. szintű képességekkel bíró válaszjeladók kötelező felszerelését írják elő.

2.1.5.3 Az 5700 kg bruttó tömeget meghaladó, vagy a 463 km/óra (250 csomó) tényleges utazósebességet meghaladó képességű légijárművekre szerelt S-módú válaszjeladóknak a 3.1.2.10.4 pontban előírtaknak megfelelő antenna eltéréssel kell működniük, ha:

a) a légijármű egyedi légialkalmassági bizonyítványát első ízben 1990. január 1-jén vagy azután adták ki; vagy

b) S-módú válaszjeladó fedélzeti felszerelését körzeti léginavigációs egyezmény alapján a 2.1.3.3.1 és 2.1.3.3.2 pontoknak megfelelően követelik meg.

Megjegyzés. – 324 km/h (175 csomó) sebességet meghaladó maximális tényleges utazósebességű légijárművek számára előírt, hogy 21,0 dBW-nál nem kisebb csúcsteljesítménnyel üzemeljenek, ahogyan azt a 3.1.210.2 c) pontban meghatározták.

2.1.5.4 Képesség közlés S-módú squitter-ek esetén

2.1.5.4.1 S-módú adatgyűjtő squitter (kérés nélküli fedélzetről leadott sugárzás) esetén, a 3.1.2.8.5.1 pont rendelkezéseivel összhangban kell biztosítani a képesség közlést minden 1995. január 1-jén vagy ezután felszerelt S-módú válaszjeladó számára.

2.1.5.4.2 **Ajánlás. –** *Kiterjesztett squitter üzemelésre kialakított válaszjeladók rendelkezzenek olyan lehetőséggel, hogy az adatgyűjtő squitter-eket üzemen kívül helyezzék, amikor a kiterjesztett squitter-ek kerülnek sugárzásra.*

Megjegyzés. – Ez megkönnyíti az adatgyűjtő squitter-ek elnyomását, ha az összes ACAS egységet átalakították a kiterjesztett squitter vételére.

2.1.5.5 Kiterjesztett hosszúságú közlemény (ELM) sugárzási teljesítménye

Annak érdekében, hogy megkönnyítsék a meglévő S-módú válaszjeladók olyan átalakítását, hogy a teljes S-mód képességet magukban foglalják, az eredetileg 1999. január 1-je előtt gyártott válaszjeladóknak lehetővé kell tenniük 16 ELM szegmensből álló köteg sugárzását 20 dBW minimális teljesítmény szinten.

Megjegyzés. – Ez 1 dB engedményt jelent a 3.1.2.10.2 pontban megadott teljesítmény előíráshoz képest.

2.1.6 SSR S-módú címzés (légijármű címzés)

A másodlagos légtérellenőrző radar S-módú címzése a 16 777 214 huszonnégy-bites légijármű címek egyike, amelyet az ICAO a Lajstromozó Államnak, vagy a közös jel regisztráló hatóságnak osztott ki és a 3.1.2.4.1.2.3.1.1 pontban és a 10. Annex III. kötet, I. rész, 9. fejezet Függelékében leírtaknak megfelelően kijelölt.

2.2 Emberi tényezőkre vonatkozó meggondolások

Ajánlás. – *Az emberi tényezők alapelveit a légtérellenőrző radar és összeütközés-elhárító fedélzeti rendszerek tervezésénél és tanúsításánál figyelembe kell venni.*

Megjegyzés. – Az emberi tényezők alapelveire vonatkozó útmutató anyag a Doc 9683-ban, Emberi tényezők oktatási kézikönyv (Human Factors Training Manual) *és a Circular 249-ben* (Emberi tényezőkre vonatkozó tömör kivonat 11. szám – Emberi tényezők a CNS/ATM rendszerekben) (Human Factors Digest No. 11 – Human Factors in CNS/ATM Systems) *kiadványokban található.*

3. fejezet Légtérellenőrző radarrendszerek

3.1 Másodlagos légtérellenőrző radar (SSR) rendszer jellemzők

1. Megjegyzés. – A 3.1.1 szakasz csak azoknak a másodlagos radar rendszereknek a műszaki jellemzőit írja elő, amelyek A-módú és C-módú képességekkel rendelkeznek. Az S-módú képességekkel rendelkező rendszer jellemzőit a 3.1.2 szakasz írja elő. Az 5. fejezet kiegészítő követelményeket tartalmaz az S-módú kiterjesztett squitter műveletekre.

2 Megjegyzés. – S-módú képességeket használó rendszereket általában légiforgalmi irányítási légtérellenőrző rendszereknél használnak. Ezen kívül, bizonyos ATC alkalmazások használhatnak S-módú kisugárzókat, pl. jármű földi felderítésére, vagy rögzített céltárgy észlelésére alkalmas légtérellenőrző rendszereken. Ilyen különleges feltételek között a "légijármű" fogalom alatt "légijármű vagy jármű (A/V)" érthető. Míg ezek az alkalmazások az adatok korlátolt halmazára használhatók, a szabványos fizikai jellemzőktől való eltéréseket az illetékes hatóságoknak nagyon óvatosan kell kezelniük. Nemcsak a saját felderítési (SSR) környezetüket kell figyelembe venniük, hanem más rendszerekre, mint például az ACAS, gyakorolt lehetséges hatásokat is.

3. Megjegyzés. – A szabványostól eltérő nemzetközi alternatív egységeket az 5. Annex, 3. fejezet, 3.2.2 pontjában engedélyezettek szerint használják.

3.1.1 Csak A-módú és C-módú képességekkel rendelkező rendszerek

1. Megjegyzés. – Ebben a szakaszban a másodlagos légtérellenőrző radar üzemmódokat A és C betűkkel jelöljük. Az indexszel ellátott betűket, pl. A_2, C_4, a levegő-föld impulzussorozatokban lévő egyes impulzusok jelölésére használják. A betűknek ezt a közös használatát nem úgy kell értelmezni, mint módok és kódok valamilyen konkrét összetársítását.

2. Megjegyzés. – A radar adatok rögzítésére és megőrzésére vonatkozó rendelkezéseket a 11. Annex 6. fejezete tartalmazza.

3.1.1.1 Lekérdezési és vezérlési (lekérdezési oldalszirom elnyomás) rádió frekvenciák (föld-levegő)

3.1.1.1.1 A lekérdezési és vezérlési sugárzási vivőfrekvencia 1030 MHz.

3.1.1.1.2 A frekvencia tűrés plusz vagy mínusz 0,2 MHz legyen.

3.1.1.1.3 A vezérlési átvitel és a lekérdezési impulzus átvitelek vivő frekvenciái egymástól nem különbözhetnek 0,2 MHz-nél nagyobb értékkel.

3.1.1.2 Válaszvivő frekvencia (levegő-föld)

3.1.1.2.1 A válasz átvitel vivő frekvenciája 1090 MHz legyen.

3.1.1.2.2 A frekvenciatűrés plusz vagy mínusz 3 MHz legyen.

3.1.1.3 Polarizáció

3.1.1.3.1 A lekérdezés, vezérlés és válasz átvitelek polarizációja túlnyomóan függőleges.

3.1.1.4 Lekérdezési módok (térbeli jelek)

3.1.1.4.1 A lekérdezés két, P_1 és P_3-al jelölt, továbbított impulzusból áll. Az első P_1 lekérdezési impulzust követően egy P_2 vezérlő impulzust kell átvinni.

3.1.1.4.2 Az A- és C-módú lekérdezés a 3.1.1.4.3 pontban meghatározottaknak feleljen meg.

3.1.1.4.3 A P_1 és P_3 közötti időköz határozza meg a lekérdezési módot a következők szerint:

A-mód	8 ± 0,2 mikromásodperc
C-mód	21 ± 0,2 mikromásodperc

3.1.1.4.4 A P_1 és P_2 közötti időköz 2,0 plusz, vagy mínusz 0,15 mikromásodperc legyen.

3.1.1.4.5 A P_1, P_2 és P_3 impulzusok időtartama 0,8 plusz vagy mínusz 0,1 mikromásodperc legyen.

3.1.1.4.6 A P_1, P_2 és P_3 impulzusok felfutási ideje 0,05 és 0,1 mikromásodperc között legyen.

1. Megjegyzés. – A meghatározásokat a 3-1 ábra "Másodlagos légtérellenőrző radar hullámforma alakjainak, időközeinek és az érzékenységi és teljesítmény referencia pontjainak meghatározása" tartalmazza.

2. Megjegyzés. – A felfutási idő alsó korlátjának (0,05 mikromásodperc) szerepe az oldalsáv sugárzás csökkentése. A berendezések akkor teljesítik ezt a követelményt, ha az oldalsáv sugárzás nem nagyobb, mint az, amelyet egy megállapított felfutási idővel rendelkező, trapezoid formájú hullám elméletileg létrehozna.

3.1.1.4.7 A P_1, P_2 és P_3 impulzus lefutási ideje 0,05 és 0,2 mikromásodperc között legyen.

Megjegyzés. – A lefutási idő alsó korlátjának (0,05 mikromásodperc) szándéka az oldalsáv sugárzás csökkentése. A berendezések kielégítik ezt a követelményt, ha az oldalsáv sugárzás nem nagyobb, mint az, amelyet egy megállapított lefutási idővel rendelkező trapezoid formájú hullám elméletileg létrehozna.

3.1.1.5 Lekérdező és vezérlő sugárzási jellemzők (Lekérdezés oldalszirom elnyomás – Térbeli jelek)

3.1.1.5.1 A P_2 sugárzott amplitúdója a válaszjeladó antennánál legyen:

a) egyenlő vagy nagyobb, mint a P_1 sugárzott amplitúdója a P_1-et sugárzó antenna oldalszirom sugárzásai következtében; és

b) a P_1 sugárzott amplitúdója alatt 9 dB-el alacsonyabb szinten a lekérdezés kívánt körívén belül.

3.1.1.5.2 Az irányított lekérdezés (sugárzási főirány) kívánt sugárnyaláb szélességén belül a P_3 sugárzott amplitúdójának a P_1 sugárzott amplitúdójának 1 dB értékén belül kell lennie.

3.1.1.6 Válaszsugárzási jellemzők (Térbeli jelek)

3.1.1.6.1 Keret impulzusok. A válasz feladat két keret impulzust magában foglaló, egymástól 20,3 mikromásodperc távolságra lévő jelet alkalmaz, mint legelemibb kódot.

3.1.1.6.2 Információ impulzusok. Az információ impulzusokat 1,45 mikromásodperces növekményekkel kell elválasztani az első keret impulzustól. Ezeknek az információ impulzusoknak a jelölése és helyzete a következő:

Impulzusok	Helyzet (mikromásodperc)
C_1	1,45
A_1	2,90
C_2	4,35
A_2	5,80
C_4	7,25
A_4	8,70
X	10,15
B_1	11,60
D_1	13,05
B_2	14,50
D_2	15,95
B_4	17,40
D_4	18,85

Megjegyzés. – Ezen impulzusok használatára vonatkozó előírást a 2.1.4.1 pont tartalmazza. Azonban az "X" impulzus helyzete csak műszaki előírásként szerepel, a lehetséges jövőbeni használat biztosítása érdekében.

3.1.1.6.3 *Különleges helyzetazonosítási impulzus (SPI).* A szolgáltatott információ impulzusokon kívül egy különleges helyzetazonosítási impulzust is továbbítani kell, de csak manuális (repülőgépvezetői) kiválasztás eredményeként. Amikor továbbítják, egy 4,35 mikromásodperces időközzel kell elválasztani, a csak A-módú válaszok utolsó keret impulzusától.

3.1.1.6.4 *Válasz impulzus alakok.* Minden válasz impulzusnak 0,45 plusz vagy mínusz 0,1 mikromásodperc hosszúságú impulzussal, 0,05 és 0,1 mikromásodperc közötti impulzus felfutási idővel, és 0,05 és 0,2 mikromásodperc közötti lefutási idővel kell rendelkeznie. Egy impulzus amplitúdó változása a válasz sorozatban lévő bármely más impulzushoz képest, nem haladhatja meg az 1 dB-t.

Megjegyzés. – A felfutási és lefutási idők alsó korlátjának (0,05 mikromásodperc) rendeltetése az oldalsáv sugárzás csökkentése. A berendezés kielégíti ezt a követelményt, ha az oldalsáv sugárzás nem nagyobb, mint az, amelyet elméletileg az adott felfutási és lefutási idővel rendelkező trapezoid hullám állítana elő.

3.1.1.6.5 *Válasz impulzus helyzet tűrései.* Az impulzustávolság tűrése az egyes impulzusoknál (beleértve az utolsó keret impulzust) a válasz csoport első keret impulzusához viszonyítva plusz vagy mínusz 0,10 mikromásodperc legyen. A különleges helyzetazonosítási impulzus impulzustávolság tűrése a válasz csoport utolsó keret impulzusához viszonyítva plusz vagy mínusz 0,10 mikromásodperc legyen. A válasz csoportban lévő bármely impulzus impulzustávolság tűrése bármely más impulzushoz viszonyítva (kivéve az első keret impulzust) nem haladhatja meg a plusz vagy mínusz 0,15 mikromásodpercet.

3.1.1.6.6 *Kód nomenklatúra.* A kód jelölés 0-tól 7-ig terjedő számjegyeket tartalmazzon, és a fenti 3.1.1.6.2 pontban megadott impulzus számok indexeinek összegét tartalmazza, a következők szerint alkalmazva:

Számjegy	*Impulzus csoport*
Első (legnagyobb helyértékű)	A
Második	B
Harmadik	C
Negyedik	D

3.1.1.7 Csak A-mód és C-mód képességgel rendelkező válaszjeladók műszaki jellemzői

3.1.1.7.1 *Válasz.* A válaszjeladó válaszoljon (nem kisebb, mint 90 százalékos indítással), ha az összes alábbi feltétel fennáll:

a) a P_3 vett amplitúdója meghaladja a P_1 vett amplitúdójánál 1 dB-el lejjebb lévő szintet, de nem nagyobb, mint a P_1 vett amplitúdója plusz 3 dB;

b) vagy nem vesznek impulzust a P1 utáni 1,3 mikromásodperc és 2,7 mikromásodperc közti időközben, vagy a P_1 több mint 9 dB-el meghalad bármely ebben az időközben vett impulzust;

c) egy megfelelő lekérdezés vett amplitúdója több mint 10 dB-el fölötte van a véletlen impulzusok vett amplitúdójának, ahol az utóbbiakat a válaszjeladó nem ismeri fel, mint a P_1, P_2 vagy P_3.

3.1.1.7.2 A válaszjeladó ne válaszoljon az alábbi körülmények között:

a) olyan lekérdezésekre, amikor a P_1 és P_3 közötti időköz több mint plusz vagy mínusz 1,0 mikromásodperccel különbözik a 3.1.1.4.3 pontban megadott időközöktől;

b) bármely olyan egyedülálló impulzus vétele után, amelynek nincsenek normál lekérdezési körülményeket megközelítő amplitúdó változásai.

3.1.1.7.3 *Holtidő.* Egy megfelelő lekérdezés felismerése után a válaszjeladó nem válaszolhat semmilyen más lekérdezésre, legalább a válasz impulzus sorozat időtartama alatt. Ennek a holtidőnek nem később, mint 125 mikromásodperccel a csoport utolsó válasz impulzusának továbbítása után kell véget érnie.

3.1.1.7.4 *Elnyomás*

Megjegyzés. – Ezt a jellemzőt a lekérdező antenna oldalszirmai révén vett lekérdezések megválaszolásának megakadályozására használják, és hogy megóvják az A/C-módú válaszjeladókat az S-módú lekérdezések megválaszolásától.

3.1.1.7.4.1 A válaszjeladót el kell nyomni, ha a P_2 vett amplitúdója egyenlő vagy nagyobb, mint a P_1 vett amplitúdója, és 2,0 plusz vagy mínusz 0,15 mikromásodperc impulzustávolsággal rendelkezik. A P_3 észlelését nem követelik meg előfeltételként az elnyomási művelet kezdeményezésénél.

3.1.1.7.4.2 A válaszjeladó elnyomás 35 plusz vagy mínusz 10 mikromásodperc időperiódusig tartson.

3.1.1.7.4.2.1 Az elnyomásnak a teljes időtartam alatt bármely elnyomási időperiódus befejeződése után 2 mikromásodpercen belül képesnek kell lennie újra indulni.

3.1.1.7.5 *Vevő érzékenység és dinamikatartomány*

3.1.1.7.5.1 A válaszjeladó minimális indítási szintjének olyannak kell lenni, hogy válaszokat generáljon a lekérdezési jeleknek legalább a 90 százalékára, amikor:

a) a P_1 és P_3 impulzusok, amelyek lekérdezést képeznek, egyenlő amplitúdójúak és a P_2 -t nem érzékelik; és

b) ezeknek a jeleknek az amplitúdója névlegesen 71 dB 1 mW alatt, 69 dB és 77 dB közötti korlátokkal 1 mW alatt.

3.1.1.7.5.2 A válasz és elnyomás jellemzők a P_1 impulzusnak a minimális indító szint és 50 dB-el ezen szint felett vett amplitúdó értékei között érvényesek.

3.1.1.7.5.3 A minimális indító szint változása az üzemmódok között nem haladhatja meg az 1 dB-t névleges impulzustávolság és impulzus szélesség esetén.

3.1.1.7.6 *Impulzus időtartam megkülönböztetés.*

A minimális indítási szint és a 6 dB-el e fölötti szint közötti vett amplitúdójú és 0,3 mikromásodpercnél rövidebb időtartamú jelek, nem válthatják ki, hogy a válaszjeladó válasz vagy elnyomás műveletet kezdeményezzen. Egy lekérdezést közelítő amplitúdó változásokkal bíró egyedülálló impulzusok kivételével, bármely 1,5 mikromásodperccel hosszabb időtartamú egyedülálló impulzus nem válthatja ki, hogy a válaszjeladó válasz vagy elnyomás műveletet kezdeményezzen a minimális indító szinttől (MTL) az e fölött 50 dB-ig terjedő jel amplitúdó tartomány felett.

3.1.1.7.7 V*isszavert jel elnyomás és visszaállítás.*

A válaszjeladónak visszavert jel elnyomó eszközt kell tartalmaznia, ami arra szolgál, hogy lehetővé tegye a normális üzemelést visszavert térbeli jelek jelenléte esetén. Ennek az eszköznek a szolgáltatása kompatibilis legyen az oldalszirmok elnyomásának 3.1.1.7.4.1 pontban megadott előírásaival.

3.1.1.7.7.1 *Érzékenység csökkentés.* Bármely 0,7 mikromásodpercnél hosszabb időtartamú impulzus vétele után a vevő érzékenységét olyan értékkel kell csökkenteni, ami az érzékenységet csökkentő impulzus amplitúdójának értékén legalább 9 dB-el belül van, de ami soha nem haladja meg az érzékenységet csökkentő impulzus amplitúdóját, kivéve az érzékenységet csökkentő impulzust követő első mikromásodperc alatti túlszabályozás lehetőségét.

Megjegyzés. – 0,7 mikromásodpercnél kisebb időtartamú egyedülálló impulzusokkal szemben nem követelmény, hogy előidézzék a megadott érzékenység csökkentést, sem az, hogy a 3.1.1.7.7.1 és 3.1.1.7.7.2 által megengedettnél nagyobb időtartamú érzékenység csökkentést okozzanak.

3.1.1.7.7.2 *Helyreállítás*. Érzékenység csökkentést követően, a vevőnek helyre kell állítani az érzékenységet (a minimális indító szint 3dB értékén belül) 15 mikromásodpercen belül egy érzékenységet csökkentő impulzus vétele után, amely a minimális indító szint felett maximálisan 50 dB-ig terjedő jelerősséggel rendelkezik. A helyreállításnak 4,0 dB per mikromásodpercet nem meghaladó átlagsebességgel kell megvalósulnia.

3.1.1.7.8 *Véletlen indítási sebesség.*

Érvényes lekérdezési jelek hiányában az A/C-módú válaszjeladók nem generálhatnak több mint 30 nem kívánatos A-módú vagy C-módú választ másodpercenként, összesítve egy olyan időintervallum alatt, amely egyenértékű legkevesebb 300 véletlen indítással vagy 30 másodperccel, amelyik a kisebb. Ezt a véletlen indítási sebességet nem múlhatják felül, amikor az összes lehetséges, ugyanarra a légijárműre telepített zavaró berendezés maximális zavarszintekkel üzemel.

3.1.1.7.8.1 *Véletlen indítási sebesség alacsony szintű, hullámsávon belüli folyamatos hullámú (CW) interferencia jelenlétében.* A véletlen indítási sebesség teljes értéke az összes A-módú és/vagy C-módú válaszoknál nem haladhatja meg a 30 másodperces időtartam alatt átlagolt, másodpercenkénti 10 válaszimpulzus csoportot vagy elnyomást, amikor nem-koherens CW interferencia jelenlétében működik 1030 ± 0,2 MHz frekvencián és -60dBm vagy annál alacsonyabb jelszinten.

3.1.1.7.9 *Válasz sebesség*

3.1.1.7.9.1 A válaszjeladó másodpercenként legyen képes legalább 1200 válaszra egy 15-impulzusú kódolt válasznál, kivéve, hogy a kizárólag 4500m (15000 láb) alatt, vagy az illetékes hatóság vagy körzeti léginavigációs egyezmény által megállapított kisebb magasság alatt használt válaszjeladó beépítéseknél a 15-impuzusú kódolt válasznál másodpercenként legalább 1000 válaszra képes válaszjeladókat engedélyezni kell.

3.1.1.7.9.2 *Válasz sebesség korlát szabályozás.* Hogy a rendszert megvédjék a válaszjeladó túlkérdezés hatásaitól azáltal, hogy megakadályozzák a gyengébb jelekre adott választ, amikor egy előre meghatározott válasz sebességet elértek, egy érzékenység csökkentés típusú válasz korlát szabályozást kell beépíteni a berendezésbe. Ezen szabályozás tartománya tegye lehetővé a beállítást minimum, bármely 500 és 2000 válasz per másodperc közötti értékre, vagy a maximális válasz sebesség képességre, ha kevesebb, mint 2000 válasz van másodpercenként, tekintet nélkül az egyes válaszokban lévő impulzusok számára. 3 dB-t meghaladó érzékenység csökkenés nem következhet be, amíg a kiválasztott érték 90 százalékát túl nem lépik. Az érzékenység csökkenésnek legalább 30 dB-nek kell lenni a kiválasztott érték 150 százalékát meghaladó sebességeknél.

3.1.1.7.9.3 **Ajánlás**. – *A válasz sebesség korlátot 1200 válasz per másodpercre kell beállítani, vagy 1200 válasz per másodperc alatt a maximális értékre, amelyre a válaszjeladó képes.*

3.1.1.7.10 *Válasz késés és vibrálás*

Az időbeli késés a P_3 felfutó élének válaszjeladó vevőhöz érkezése és a válasz első impulzusa felfutó élének átvitele között 3 plusz vagy mínusz 0,5 mikromásodperc legyen. A válasz impulzus kódcsoport teljes vibrálása a P_3-ra vonatkoztatva nem haladhatja meg a 0,1 mikromásodpercet 3 dB és 50 dB közötti vevő bemenet szinteknél a minimális indító szint felett. A késés változások azon üzemmódok között, amelyeken a válaszjeladó válaszra képes, nem haladhatják meg a 0,2 mikromásodpercet.

3.1.1.7.11 *Válaszjeladó teljesítmény kimenet és működési ciklus*

3.1.1.7.11.1 A válaszjeladó átviteli vonalának antenna felőli végén rendelkezésre álló impulzus-csúcsteljesítmény 1W felett legalább 21 dB és nem több, mint 27 dB legyen, kivéve hogy azon válaszjeladó berendezéseknél, amelyeket kizárólag 4500 m (15000 láb) alatti magasságokon, vagy a megfelelő hatóság vagy körzeti léginavigációs egyezmény által megállapított kisebb magasságokon használnak, a válaszjeladó átviteli vonalának antenna felőli végén rendelkezésre álló impulzus-csúcsteljesítményként 1 W felett legalább 18,5 dB-t és nem több, mint 27 dB-t kell megengedni.

Megjegyzés: Egy repülőtéri földi járművön alkalmazott, a válaszjeladóval nem azonos kiterjesztett squitter eszköz az 5.1.1.2 fejezetben meghatározottak szerinti alacsonyabb minimális kimenő teljesítménnyel működhet.

3.1.1.7.11.2 **Ajánlás.** – *A 3.1.1.7.11.1 pontban megadott impulzus-csúcsteljesítményt fenn kell tartani a 0000 kódtól és 400 válasz per másodperc sebességtől, egy maximális impulzus tartalomig és 1200 válasz per másodperc sebességig vagy egy 1200 válasz per másodperc alatti maximális értékig terjedő tartományban, amelyre a válaszjeladó képes.*

3.1.1.7.12 *Válasz kódok*

3.1.1.7.12.1 *Azonosítás.* Egy A-módú lekérdezésre adott választ a 3.1.1.6.1 pontban meghatározott két keret impulzusnak a 3.1.1.6.2 pontban meghatározott információ impulzusokkal (A-módú kód) együttesen kell alkotniuk.

Megjegyzés. – Az A-mód kód jelölés egy négy-számjegyű sorozat a 3.1.1.6.6 ponttal összhangban.

3.1.1.7.12.1.1 Az A-mód kódot manuálisan kell kiválasztani a rendelkezésre álló 4096 kódból.

3.1.1.7.12.2 *Nyomásmagasság továbbítás.* A C-módú lekérdezésre adott válasznak a fenti 3.1.1.6.1 pontban megadott két keret impulzusból kell állnia. Ha digitalizált nyomásmagasság információ rendelkezésre áll, a 3.1.1.6.2 pontban megadott információ impulzusokat is továbbítani kell.

3.1.1.7.12.2.1 A válaszjeladókat el kell látni az információ impulzusok eltávolítására, de a keret impulzusok megtartására szolgáló eszközzel arra az esetre, amikor a lentebbi 3.1.1.7.12.2.4 pont előírásai nem teljesülnek a C-módú lekérdezésre adott válaszban.

3.1.1.7.12.2.2 Az információ impulzusokat automatikusan kell kiválasztani egy analóg – digitális átalakító segítségével, amely a légijárművön lévő, az 1013,25 hektopascal szabványos nyomásbeállításra vonatkoztatott. nyomásmagasság adatforráshoz kapcsolódik.

Megjegyzés. – Az 1013,25 hektopascal nyomás beállítás 29,92 higany-inch értékkel egyenlő.

3.1.1.7.12.2.3 A nyomásmagasságot 100-láb növekményekben kell jelenteni, az impulzusok jelen fejezethez tartozó Függelékben bemutatott kiválasztásával.

3.1.1.7.12.2.4 Az analóg – digitális átalakító kiválasztott kódjának plusz vagy mínusz 38,1 m (125 láb) értéken belüli eltéréssel, 95 százalékos valószínűségi alapon meg kell egyeznie a légijármű fedélzetén használt nyomásmagasság információval (az 1013,25 hektopascal szabványos magasság beállításra vonatkoztatva), hogy a kijelölt repülési profilt tartani lehessen.

3.1.1.7.13 *Különleges helyzetazonosítási (SPI) impulzus továbbítása.* Ha előírt, ezt az impulzust a 3.1.1.6.3 pontban meghatározottaknak megfelelően az A-módú válaszokkal kell továbbítani, 15 és 30 másodperc közötti időtartamon keresztül.

3.1.1.7.14 *Antenna*

3.1.1.7.14.1 A válaszjeladó antennarendszernek, ha légijárműre szerelik, olyan sugárzási diagrammal kell rendelkeznie, amely lényegében 360 fokos a vízszintes síkban.

3.1.1.7.14.2 **Ajánlás. –** *A függőleges sugárzási diagram legyen névlegesen azonos egy vízszintes síkon elhelyezett negyedhullámú monopolantenna sugárzási diagramjával.*

3.1.1.8 Csak A-módú és C-módú képességekkel rendelkező földi lekérdezők műszaki jellemzői

3.1.1.8.1 *Lekérdezés ismétlési gyakoriság*

A maximális lekérdezés ismétlési gyakoriság 450 lekérdezés per másodperc lehet.

3.1.1.8.1.1 **Ajánlás. –** *A szükségtelen válaszjeladó indítás és az ebből eredő nagysűrűségű kölcsönös interferencia minimalizálása érdekében minden lekérdezőnek a lehető legalacsonyabb lekérdező ismétlési gyakoriságot kell használnia, amely összhangban van a kijelzési jellemzőkkel, a lekérdező antenna nyalábszélességgel, és az alkalmazott antenna forgási sebességgel.*

3.1.1.8.2 *Sugárzási teljesítmény*

Ajánlás. – *A rendszer interferencia minimalizálása érdekében a lekérdezők effektív sugárzási teljesítményét arra a legkisebb értékre kell csökkenteni, amely összhangban van az egyes lekérdező helyek üzemelés szempontjából megkívánt távolságával.*

3.1.1.8.3 **Ajánlás. –** *Ha az átmeneti magasságszintek alatt repülő légijárműtől származó C-módú információt kell felhasználni, a magasságmérő nyomás referenciaadatot figyelembe kell venni.*

Megjegyzés. – Az átmeneti szintek alatti C-módú használat összhangban van azzal a filozófiával, hogy a C-mód hasznosan alkalmazható minden környezetben.

3.1.1.9 A lekérdező sugárzási diagramja

Ajánlás- – *A P_3-at sugárzó irányított lekérdező antenna sugárnyaláb szélessége nem lehet nagyobb, mint az üzemeltetés szempontjából megkívánt. Az irányított antenna oldal- és hátszirom sugárzása legalább 24 dB-el alatta legyen a fő szirom sugárzás csúcsértékének.*

3.1.1.10 Lekérdező ellenőrző-berendezés

3.1.1.10.1 A földi lekérdező berendezés távolság és azimut pontosságát elegendően gyakori időközönként folyamatosan ellenőrizni kell a rendszer integritásának biztosítása érdekében.

Megjegyzés. – Azok a lekérdező berendezések, amelyek elsődleges radarral vannak társítva és azzal együtt működnek, az elsődleges radart ellenőrző berendezésként használhatják, vagy alternatív lehetőségként elektronikus távolság és azimut pontosság ellenőrző-berendezés szükséges.

3.1.1.10.2 **Ajánlás**. – *A távolság és azimut ellenőrzésen felül folyamatosan ellenőrizni kell a földi lekérdező berendezés többi kritikus paraméterét is a megengedett rendszertűrést meghaladó teljesítmény romlás szempontjából, és jelzést kell biztosítani, ha ilyen eset előfordul.*

3.1.1.11 Parazita sugárzások és téves válaszok

3.1.1.11.1 *Parazita sugárzás*

Ajánlás. – *A CW sugárzás nem haladhatja meg 1 W alatt a 76 dB-t a lekérdező berendezés, és 1W alatt a 70 dB-t a válaszjeladó esetén.*

3.1.1.11.2 *Téves válaszok*

Ajánlás. – *Úgy a fedélzeti, mint a földi berendezések válaszjelének az olyan jelekre, amelyek nem a vevő áteresztő sávján belülre esnek, legalább 60 dB-el a normál érzékenység alatt legyen.*

3.1.2 S-módú képességekkel rendelkező rendszerek

3.1.2.1 Lekérdezés térközi jel jellemzők.

A jelen bekezdés pontjai a térközi jeleket úgy írják le, ahogyan azok várhatóan a válaszjeladó antennánál megjelennek.

Megjegyzés. – Mivel a jelek a terjedés során leromolhatnak, bizonyos lekérdezési impulzus időtartam, impulzus távolság és impulzus amplitúdó tűrések a lekérdezőknél szigorúbbak, ahogyan az a 3.1.2.11.4 pontban le van írva.

3.1.2.1.1 *Lekérdezési vivőfrekvencia.* Minden S-módú képességgel rendelkező földi berendezéstől jövő lekérdezés és vivőfrekvenciája (fedélzetre irányuló közlemény továbbítás) 1030 plusz vagy mínusz 0,01 MHz legyen.

3.1.2.1.2 *Lekérdezési spektrum.* Az S-módú vivőfrekvencia lekérdezési spektruma nem lépheti túl a 3-2 ábrán megadott határokat.

Megjegyzés. – Az S-módú lekérdezési spektrum adatfüggő. A legszélesebb spektrumot olyan lekérdezés generálja, amely az összes bináris EGY-et tartalmazza.

3.1.2.1.3 *Polarizáció.* A lekérdező és vezérlő átvitelek polarizációja névlegesen függőleges legyen.

3.1.2.1.4 *Moduláció.* S-módú lekérdezéseknél a vivőfrekvencia impulzus-modulált. Ezenkívül a P_6 adat-impulzus belső fázis modulációval is rendelkezik.

3.1.2.1.4.1 *Impulzus moduláció.* A közös módú és S-módú lekérdezések az impulzusok egy sorozatát tartalmazzák a 3.1.2.1.5 pontban és a 3-1, 3-2, 3-3 valamint a 3-4 táblázatban meghatározottak szerint.

Megjegyzés. – A közös módú és S-módú lekérdezésekben használt 0,8 mikromásodperces impulzusok alakban azonosak azokkal, amelyeket az A- és C-módban használnak úgy, ahogyan azt a 3.1.1.4 pont meghatározza.

3.1.2.1.4.2 *Fázis moduláció.* A 3.1.2.1.4.1 alpont rövid (16,25 mikromásodperces) és a hosszú (30,25 mikromásodperces) P_6 impulzusai belső bináris differenciál fázis modulációval rendelkeznek, amelyek 4 megabit per másodperc sebességnél tartalmazzák a vivő 180 fokos fázis megfordítását.

3.1.2.1.4.2.1 *Fázisváltási intervallum.* A fázisváltás időtartama legyen kisebb, mint 0,08 mikroszekundum és a fázisváltás folyamatos legyen („siessen˝” vagy „késsen”) a fázisváltás időtartama alatt. A fázisváltási intervallumra nem szuperponálódhat amplitúdó moduláció.

Megjegyzés. – A fázisváltás minimális időtartama nincs meghatározva. Mindazonáltal a 3.1.2.1.2 pont spektrum követelményeit ki kell elégíteni.

3.1.2.1.4.2.2 *Fázisviszony*. Az egymást követő bit helyi értékek és a P6-os impulzuson belüli szinkronizáló fázisváltás (3.1.2.1.5.2.2), 0 és 180 fokos fázisviszony tűrése nem lehet nagyobb, mint +/- 5 fok.

Megjegyzés: Az S-módú lekérdezés egy bit helyiértéke, két egymást követő lehetséges fázisváltás közötti, 0.25 mikroszekundomos, rádiófrekvenciás vivő-intervallum.

3.1.2.1.5 *Impulzus és fázisváltás sorozatok.* A 3.1.2.1.4 pontban leírt impulzusok vagy fázisváltások specifikus sorozatai lekérdezéseket hoznak létre.

3.1.2.1.5.1 Közös módú lekérdezés

3.1.2.1.5.1.1 *A/C/S-módú körhívás lekérdezés.* Ez a lekérdezés három impulzust tartalmaz: P_1-et, P_3-at és a hosszú P_4-et, ahogyan azt a 3-3 ábra mutatja. Egy vagy két szabályozó impulzust (P_2 egyedül, vagy P_1 és P_2) továbbítanak, egy külön antenna diagramot használva a légijárműtől jövő reagálások elnyomására a lekérdező antenna oldalszirmokban.

Megjegyzés. – Az A/C/S-módú körhívás lekérdezés egy A-módú vagy C-módú választ vált ki (a P_1-P_3 impulzus távolságtól függően) egy A/C-módú válaszjeladóból, mivel ez a P_4 impulzust nem ismeri el. Egy S-módú válaszjeladó elismeri a hosszú P_4 impulzust és S-üzemmóddal válaszol. Ezt a lekérdezést eredetileg izolált vagy kötegelt lekérdezők számára tervezték. A kizárás ennél a lekérdezőnél II=0 használatán alapszik. Az S-módú alhálózat fejlesztése most egy zérustól különböző II kód használatát diktálja kommunikációs célokra. Ezen okból kifolyólag II egyenlő 0-t fenntartják az S-módú adatgyűjtést támogató használatra, amely sztochasztikus/ kizárás felülbírálást használ (3.1.2.5.2.1.4 és 3.1.2.5.2.1.5 pontok). Az A/C/S körhívás mód nem használható teljes S-módú művelethez, mivel II egyenlő 0 csak rövid időperiódusra zárható ki (3.1.2.5.2.1.5.2.1 pont). Ezt a lekérdezést nem lehet sztochasztikus/kizárás felülbírálással használni, mivel a válasz valószínűségét nem lehet megadni.

3.1.2.1.5.1.2 *Csak A/C-módú körhívás lekérdezés.* Ez a lekérdezés azonos az A/C/S-módú körhívás lekérdezéssel, azzal az eltéréssel, hogy a rövid P_4 impulzust használja.

Megjegyzés. – A csak A/C-módú körhívás lekérdezés A-módú vagy C-módú válaszra készteti az A/C-módú válaszjeladót. Az S-módú válaszjeladó felismeri a rövid P_4 impulzust és nem válaszol erre a lekérdezésre.

3.1.2.1.5.1.3 *Impulzus időközök.* A P1, P2 és P3 közötti impulzus időközök értéke feleljen meg a 3.1.1.4.3 és 3.1.1.4.4 pontokban meghatározottaknak. A P3 és P4 közötti impulzus időközök értéke legyen 2 plusz vagy mínusz 0,05 mikromásodperccel azonos.

3.1.2.1.5.1.4 *Impulzus amplitúdók.* A P_1, P_2 és P_3 impulzusok közötti relatív amplitúdók összhangban vannak a 3.1.1.5 pontban leírtakkal. A P_4 amplitúdójának eltérése a P_3 amplitúdójától 1 dB-en belül van.

3.1.2.1.5.2 *S-módú lekérdezés*. Az S-módú lekérdezés három impulzusból áll: P_1, P_2 és P_6, ahogyan azt a 3-4 ábra mutatja.

Megjegyzés. – A P_6-ot megelőzi a P_1 - P_2 pár, amely elnyomja az A/C válaszjeladóktól jövő válaszokat, hogy elkerüljék az S-módú lekérdezés által keltett véletlen indítás miatti szinkron csonkítást. A P_6-on belüli szinkronizáló fázis megfordítás az időjel a 0,25 mikromásodperc időtartamú időközök (chipek) sorozatának demodulációjához. A chipeknek ez a sorozata a szinkronizáló fázis után 0,5 mikromásodperccel kezdődik és a P_6 lefutó éle előtt 0,5 mikromásodperccel végződik. Egy fázis megfordítás megelőzheti, vagy nem kell, hogy megelőzze az egyes chipeket a bináris információs érték kódolásához.

3.1.2.1.5.2.1 *S-módú oldal-szirom elnyomás*. A P_5 impulzust a csak S körhívás módú lekérdezéssel használják (UF=11 lásd 3.1.2.5.2 pont), hogy megakadályozzák a válaszokat a légijárműtől az antenna oldal- és hátsó szirmában (3.1.2.1.5.2.5 pont). Amikor használják, P_5-öt külön antenna diagram felhasználásával továbbítják.

1. Megjegyzés. – A P_5 beavatkozása automatikus. Ennek jelenléte, ha kielégítő amplitúdójú a vevő helyén, eltakarja a P_6 szinkronizáló fázis megfordítását.

2. Megjegyzés. – A P_5 impulzus más S-módú lekérdezésekkel is használható.

3.1.2.1.5.2.2 *Szinkronizáló fázis megfordítás*. Az első fázis megfordítás a P_6 impulzusban a szinkronizáló fázis megfordítás. Ez lesz az idő referencia a lekérdezésre vonatkozó egymást követő válaszjeladó működésekre.

3.1.2.1.5.2.3 *Adat fázis megfordítások.* Mindegyik adat fázis megfordítás csak egy (N-szer 0,25) plusz vagy mínusz 0,02 mikromásodperc (N egyenlő vagy nagyobb, mint 1) időközzel a szinkronizáló fázis megfordítás után jelenik meg. A 16,25 mikromásodperces P_6 impulzus legfeljebb 56 adat fázis megfordítást tartalmazhat. A 30,25 mikromásodperces P_6 impulzus legfeljebb 112 adat fázis megfordítást tartalmazhat. Az utolsó chipet, vagyis a 1,25 mikromásodperces időközt, amely az utolsó adat fázis megfordítási pozíciót követi, egy 0,5 mikromásodperces őr időköz követi.

Megjegyzés. – A 0,5 mikromásodperces őr időköz, amely az utolsó chipet követi, megakadályozza, hogy a demodulációs folyamattal a P_6 lefutó ága interferáljon.

3.1.2.1.5.2.4 *Időközök.* A P_1 és P_2 közötti impulzus időköz 2 plusz vagy mínusz 0,05 mikromásodperc. A P_2 közötti impulzus időköz 2 plusz vagy mínusz 0,05 mikromásodperc. A P_2 felfutó éle és a P_6 szinkronizáló fázis megfordítás közötti időköz 2,75 plusz vagy mínusz 0,05 mikromásodperc. A P_6 felfutó éle 1,25 plusz vagy mínusz 0,05 mikromásodperccel a szinkronizáló fázis megfordítás előtt jelenik meg. A P_5, ha továbbításra kerül, a szinkronizáló fázis megfordítása fölött legyen központosítva; a P_5 felfutó éle 0,4 plusz vagy mínusz 0,05 mikromásodperccel a szinkronizáló fázis megfordítása előtt jelenik meg.

3.1.2.1.5.2.5 *Impulzus amplitúdók.* A P_2 amplitúdója és a P_6 első mikromásodpercének amplitúdója nagyobb, mint a P_1 amplitúdója mínusz 0,25 dB. Nem számítva a fázis megfordítással kapcsolódó amplitúdó tranzienseket, a P_6 amplitúdó változása kisebb, mint 1 dB, és a P_6-ban az egymást követő chipek közötti amplitúdó kisebb, mint 0,25 dB. A P_5 sugárzott amplitúdója a válaszjeladó antennájánál:

a) egyenlő vagy nagyobb, mint a P_6 sugárzott amplitúdója, amely a P_6-ot sugárzó antenna oldalszirom átviteleitől érkezik; és

b) olyan szinten, amely a P_6 sugárzott amplitúdója alatt 9 dB-nél alacsonyabban helyezkedik el, a lekérdezés kívánt ívén belül.

3.1.2.2 Válasz térbeli jelek jellemzői

3.1.2.2.1 *Válasz vivő frekvenciája*. Az S-módú képességgel rendelkező válaszjeladóktól jövő (fedélzetről leadott adattovábbítás) összes válasz vivő frekvenciája 1090 plusz vagy mínusz 1 MHz.

3.1.2.2.2 *Válasz spektrum.* Az S-módú válasz spektrum a vivő frekvenciánál nem haladhatja meg a 3-5 ábrán megadott határokat.

3.1.2.2.3 *Polarizáció.* A válasz továbbítások polarizációja névlegesen függőleges legyen.

3.1.2.2.4 *Moduláció.* Az S-módú válasz egy bevezetőből és egy adat blokkból áll. A bevezető egy 4-impulzusos sorozat, és az adatblokk bináris impulzus-pozíció modulált 1 megabit per másodperc adat sebességgel.

3.1.2.2.4.1 *Impulzus alakok.* Az impulzus alakok a 3-2 táblázatban előírtaknak feleljenek meg. Az összes érték mikromásodpercben van megadva.

3.1.2.2.5 *S-módú válasz.* Az S-módú válasz a 3-6 ábrán bemutatottnak megfelelő. Az adatblokk S-módú válaszokban vagy 56 vagy 112 információs bitből áll.

3.1.2.2.5.1 *Impulzus időközök.* Minden válasz impulzus a 0,5 mikromásodperc meghatározott többszöröseinél kezdődik az első továbbított impulzustól számítva. A tűrés minden esetben plusz vagy mínusz 0,05 mikromásodperc.

3.1.2.2.5.1.1 *Válasz bevezetés*. A bevezetés négy impulzusból áll, egyenként 0,5 mikromásodperc időtartammal. Az impulzus időközöknek az első továbbított impulzustól a második, harmadik és negyedik átvitt impulzusig 1, 3,5 és 4,5 mikromásodpercnek kell lenniük, a felsorolás egyező sorrendjében.

3.1.2.2.5.1.2 *Válasz adat impulzusok*. A válasz adatblokk 8 mikromásodperccel az első továbbított impulzus felfutó éle után kezdődik. Az egyes továbbításokhoz vagy 56, vagy 110 mikromásodperces bit intervallumokat jelölnek ki. Egy 0,5 mikromásodperces impulzust továbbítanak az egyes intervallumok első vagy második felében. Amikor az impulzust, amelyet az egyik tartomány második felében továbbítanak, egy másik, a következő időköz első felében továbbított impulzus követi, a két impulzus egyesül és egy-mikromásodperces impulzust kell továbbítani.

3.1.2.2.5.2 *Impulzus amplitúdók*. Az egyik impulzus és egy másik impulzus közötti impulzus amplitúdó változás S-módú válaszban nem haladhatja meg a 2 dB-t.

3.1.2.3 Az S-mód adatszerkezete

3.1.2.3.1 *Adatkódolás*

3.1.2.3.1.1 *Lekérdezési adat*. A lekérdezési adatblokkot egy 56 vagy 112 adat chipből álló sorozat alkotja, amely a P_6 impulzuson belül, az adatfázis megfordítások után helyezkedik el (3.1.2.1.5.2.3

pont). Egy chipet megelőző 180 fokos hordozó fázis megfordítás az adott chip-et bináris EGY-ként jellemzi. A megelőző fázis megfordítás hiánya egy bináris ZÉRO-t jelez.

3.1.2.3.1.2 *Válasz adatok.* A válasz adatblokk 56 vagy 112 adat bitből áll, amelyet a válasz adat bináris impulzus pozíció modulációval alakítanak ki a 3.1.2.2.5.1.2 pontban leírtak szerint. Az időköz első felében továbbított impulzus egy bináris EGY-et jelent, míg a második felében továbbított impulzus egy bináris ZÉRO-t jelent.

3.1.2.3.1.3 *Bit számozás.* A biteket továbbításuk sorrendjének megfelelően kell számozni az 1-es bittel kezdve. Ha nincs másképpen elrendelve, a bit csoportokkal (mezők) kódolt numerikus értékek kódolása pozitív bináris jelek felhasználásával történik, és az első továbbított bit a legjelentősebb bit (MSB). Az információkat olyan mezőkben kell kódolni, amelyek legalább egy bitből állnak.

Megjegyzés. – Az S-módú formátumok leírásában a bit sorozatok által egy mezőn belül kialakított bináris kód decimális megfelelőjét, mező funkció vagy utasítás jelölőjeként használják.

3.1.2.3.2 *S-módú lekérdezések és válaszok formátumai*

Megjegyzés. – Minden S-módú lekérdezési és válasz formátum összesítve a 3-7 és 3-8 ábrákon látható. A fedélzetre irányuló és a fedélzetről leadott adattovábbítás formátumokban megjelenő összes mező összegezését a 3-3 táblázat mutatja, és az összes almező összegezését a 3-4 táblázat tartalmazza.

3.1.2.3.2.1 *Lényeges mezők.* Minden S-módú továbbítás két lényeges mezőt tartalmaz. Az egyik egy olyan kulcs-szó (deszkriptor), amely egyértelműen meghatározza a továbbítás formátumát. Ez minden formátumnál a továbbítás elején jelenik meg. A deszkriptorokat az UF (fedélzetre irányuló adattovábbítási formátum) vagy DF (fedélzetről leadott adattovábbítás formátum) mezőt jelölik. A második lényeges mező egy 24-bites mező, amely az egyes továbbítások végén jelenik meg és paritás információkat tartalmaz. Minden fedélzetre irányuló adattovábbítási formátumban és a folyamatosan meghatározott fedélzetről leadott adattovábbítás formátumban a paritás információ rákerül vagy a légijármű címzésre (3.1.2.4.1.2.3.1 pont) vagy a lekérdező azonosítóra a 3.1.2.3.3.2 pontnak megfelelően. A megjelölések AP (cím/paritás) vagy P_1 (paritás/lekérdező azonosító).

Megjegyzés. – A megmaradó kódolási helyeket a missziós mezők továbbítására használják. Különleges feladatokra a missziós mezők különleges halmazát írják elő. Az S-módú missziós mezőknek kétbetűs jelzésük van. Az almezők a missziós mezőkön belül jelenhetnek meg. Az S-módú almezők hárombetűs jelöléssel vannak címkézve.

3.1.2.3.2.1.1 *UF: fedélzetre irányuló adattovábbítási formátum.* Ez a fedélzetre irányuló adattovábbítási formátum mező (5 bit hosszúságú, kivéve a 24 számú formátumot, ahol ez 2 bit hosszúságú) fedélzetre irányuló adattovábbítási formátum kulcs-szóként (deszkriptorként) szolgál minden S-módú lekérdezésben, és a 3-7 ábrának megfelelően kell kódolni.

3.1.2.3.2.1.2 *DF: fedélzetről leadott adattovábbítási formátum.* Ez a fedélzetről leadott adattovábbítás formátum mező (5 bit hosszúságú, kivéve a 24 számú formátumban, ahol ez 2 bit hosszúságú) fedélzetről leadott adattovábbítás kapcsolat formátum kulcs-szóként (deszkriptorként) szolgál minden S-módú válaszban, és a 3-8 ábrának megfelelően kell kódolni.

3.1.2.3.2.1.3 *AP: címzés/paritás*. Ez a 24-bites (33-56 vagy 89-112) mező minden fedélzetre irányuló adattovábbítási és jelenleg meghatározott fedélzetről leadott adattovábbítási formátumban megjelenik, kivéve a csak S körhívás módú választ, a DF = 11-el. A mező paritást tartalmaz, amely rákerül a légijármű címzésre a 3.1.2.3.3.2 pontnak megfelelően.

3.1.2.3.2.1.4 *PI: paritás/lekérdező azonosító.* Ez a 24-bites (33-56) fedélzetről leadott adattovábbítási mező rendelkezzen paritással, amely rákerül a lekérdező azonosítási kódjára a 3.1.2.3.3.2 pontnak megfelelően, és az S körhívás módú válaszban jelenjen meg, DF = 11-el és a kiterjesztett squitterben DF = 17-el vagy DF = 18-al. Ha a választ egy A/C/S körhívásra, egy S-módú CL mező (3.1.2.5.2.1.3 pont) és IC mező (3.1.2.5.2.1.2 pont) egyenlők 0-val esetekre való reagálásnál adják, vagy egy adatgyűjtő vagy kiterjesztett squitternél (3.1.2.8.5, 3.1.2.8.6 pontok), akkor a II és az SI kódok O értékűek legyenek.

3.1.2.3.2.2 *Kijelöletlen kódolási térköz.* A kijelöletlen kódolási térköz tartalmazza az összes ZÉRO-t, mint a lekérdező berendezések és a válaszjeladók által továbbított értékeket.

Megjegyzés: – Bizonyos kódolási térköz, amely ebben a szakaszban kijelöletlennek van jelezve, más alkalmazásokra, mint például ACAS, adat kapcsolat, stb. van fenntartva.

3.1.2.3.2.3 *Nulla és kijelöletlen kódok.* A nulla kód kijelölés minden meghatározott mezőben azt jelöli, hogy a mező nem igényel beavatkozást. Ezenkívül, a mezőkön belüli kijelöletlen kódok azt jelzik, hogy nincs igény beavatkozásra.

Megjegyzés. – A 3.1.2.3.2.2 és 3.1.2.3.2.3 pontok rendelkezési biztosítják, hogy az előzőleg kijelöletlen kódolási térköz jövőbeli kijelölései nem okoznak kétértelműséget. Azaz, az S-módú berendezés, amelyben az új kódolás nincs megvalósítva, tisztán fogja jelezni, hogy nincs továbbított információ az újonnan kijelölt kódolási térközben.

3.1.2.3.2.4 *Katonai célra tartalékolt formátumok.* Az államok biztosítsák, hogy a fedélzetre irányuló adattovábbítási formátumokat csak kiválasztott címzésű lekérdezésekhez alkalmazzák és a fedélzetre irányuló, vagy a fedélzetről leadott formátumok ne haladják meg a 10. Annexben a rádiófrekvenciás teljesítményre, lekérdezési és válaszadási sebességre, és squitter sebességre meghatározott követelményeket.

3.1.2.3.2.4.1 **Ajánlás.** – *Kivizsgálások és megerősítések útján az államok tegyék lehetővé, hogy a katonai alkalmazások ok nélkül ne befolyásolják a meglévő polgári felhasználású 1030 / 1090 Mhz üzemeltetési környezetet.*

3.1.2.3.3 *Hiba védelem*

3.1.2.3.3.1 *Eljárás.* Paritás ellenőrző kódolást használjanak az S-módú lekérdezéseken és válaszokon belül, hogy védelmet nyújtsanak hibák előfordulása ellen.

3.1.2.3.3.1.1 *Paritás ellenőrzési sorozat.* A 3.1.2.3.3.1.2 pontban leírt szabály szerint egy 24 paritás ellenőrzési bitből álló sorozatot generáljanak és ez kerüljön beépítésre az összes S-módú sugárzás utolsó 24 bitje által formált mezőbe. A 24 paritás ellenőrzés bitet vagy a címzés kódolóval, vagy a lekérdező azonosító kóddal kombinálják, a 3.1.2.3.3.2 pontban leírtak szerint. A létrejövő kombináció akkor vagy az AP (címzés/paritás, 3.1.2.3.2.1.3 pont) mezőt, vagy a PI (paritás/lekérdező azonosító, 3.1.2.3.2.1.4 pont) mezőt fogja kialakítani.

3.1.2.3.3.1.2 *Paritás ellenőrzés sorozat generálás.* A (p_1, p_2 ..., p_{24}) 24 paritás bitből álló sorozat az ($m_1, m_2, ..., m_k$) információs bitek sorozatából generálódik, ahol a rövid vagy hosszú sugárzásoknál a k értéke 32-vel vagy 88-al egyenlő. Ezt a következő többtagú kifejezés (polinommal) útján generált kód segítségével készítik:

$$G(x) = 1 + x^3 + x^{10} + x^{12} + x^{13} + x^{14} + x^{15} + x^{16} + x^{17} + x^{18} + x^{19} + x^{20} + x^{21} + x^{22} + x^{23} + x^{24}$$

Amikor a bináris polinom algebra alkalmazásával, x^{24} [*M(x)*]-et elosztjuk *G(x)*-el, ahol *M*(*x*) információ sorozat a következő kifejezéssel egyenlő:

$$m_k + m_{k-1}x + m_{k-2}x^2 + \ldots + m_1x^{k-1},$$

akkor az eredmény egy hányados és egy 24-nél alacsonyabb fokú R(x) maradék. E maradék által formált bit sorozat a paritás ellenőrzés sorozatot képviseli. A p_i paritás bit bármely i értékre az 1-től 24-ig terjedő kitevők esetén, az x^{24-i} együtthatójaként jelenik meg az *R(x)*-ben.

Megjegyzés. – Az M(x) és az x^{24} *szorzásának eredményeként 24 ZÉRUS bitet kell csatolni a sorozat végéhez.*

3.1.2.3.3.2 *AP és PI mező generálás.* A fedélzetre irányuló- és fedélzetről leadott adattovábbításhoz különböző címzés paritás sorozatokat használnak.

Megjegyzés. – A fedélzetre irányuló adattovábbítási sorozat elegendő egy válaszjeladó dekódoló megvalósításhoz. A fedélzetről leadott adattovábbítás sorozat a hiba korrekció alkalmazását teszi lehetővé a fedélzetről leadott adattovábbítás dekódolásban.

A fedélzetre irányuló adattovábbítási AP mező generálásában használt kódot az alább ismertetett módon vagy a légijármű címzésből (3.1.2.4.1.2.3.1.1 pont), vagy az körhívás címzésből (3.1.2.4.1.2.3.1.2 pont), vagy az adási címzésből (3.1.2.4.1.2.3.1.3) kell képezni.

A fedélzetről leadott adattovábbítás AP mező generálásában használt kódot közvetlenül az ($a_1, a_2, \ldots, a_{24}$) 24 S-módú címzés bit sorozatból képezik, ahol az a_i az i-edik bit, amelyet egy körhívás válasz légijármű címzés (AA) mezejében továbbítanak (3.1.2.5.2.2.2 pont).

A fedélzetről leadott adattovábbítás PI mező generálásában használt kódot az ($a_1, a_2, \ldots, a_{24}$) 24 bites sorozatból képezik, ahol az első 17 bit ZÉRO, a következő három bit a kód címke (CL) mezőre adott válasz (3.1.2.5.2.2.2), és az utolsó négy bit válasz a lekérdező azonosító (IC) mezőre (3.1.2.5.2.1.2 pont).

Megjegyzés. – A PI kódot fedélzetre irányuló közlemények átvitelében nem használják.

Egy ($b_1, b_2, \ldots, b_{24}$) módosított sorozatot használnak a fedélzetre irányuló adattovábbítási AP mező generálásnál. A b_i bit az x^{48-i} együtthatója a *G(x)A(x)* többtagú kifejezésben, ahol

$$A(x) = a_1x^{23} + a_2x^{22} + \ldots + a_{24}$$

és

G(x) megfelel a 3.1.2.3.3.1.2 pontban megfogalmazottnak.

A légijármű címzésben a_i az i-edik bit, amelyet egy körhívás válasz AA mezőjében továbbítanak. A körhívás és adási címzésekben $a_i = 1$, az i minden értékénél.

3.1.2.3.3.2.1 *Fedélzetre irányuló közlemények átviteli sorrendje.* A fedélzetre irányuló AP mezőben átvitt bitek sorozat:

$$t_{k+1}, + t_{k+2}, \ldots, t_{k+24}$$

ahol a bitek k+1-el kezdődően az átvitel sorrendje szerint vannak számozva.

Fedélzetre irányuló közlemények esetén:

$$t_{k+1} = b_i + p_i$$

ahol a ”+” modulo-2 összeadást jelöl: i = 1 az AP mezőben átvitt első bit.

3.1.2.3.3.2.2 *Fedélzetről leadott közlemények átviteli sorrendje.* A fedélzetről leadott AP és PI mezőkben átvitt bit sorozat:

$$t_{k+1}, t_{k+2}, \ldots, t_{k+24}$$

ahol a bitek k+1-el kezdődően az átvitel sorrendje szerint vannak számozva. Fedélzetről leadott közlemények esetén:

$$t_{k+1} = a_i + p_i$$

ahol a ”+” moduló-2 összeadást jelöl: i = 1 az AP vagy PI mezőben átvitt első bit.

3.1.2.4 Általános lekérdezés – válasz protokoll

3.1.2.4.1 *Válaszjeladó tranzakció ciklus.* A válaszjeladó tranzakció ciklus akkor kezdődik, amikor a másodlagos légtérellenőrző radar S-módú válaszjeladója egy lekérdezést felismer. A válaszjeladó ezután értékeli a lekérdezést és megállapítja, hogy azt fogadja-e. Ha igen, akkor a kapott lekérdezést feldolgozza és választ generál, ha az megfelelő. A tranzakció ciklus befejeződik, ha:

a) a vételhez szükséges feltételek valamelyike nincs kielégítve, vagy

b) egy lekérdezést vettek és a válaszjeladó vagy

   1) a vett lekérdezés feldolgozását befejezte és válaszra nincs igény, vagy

   2) a válasz továbbítását befejezte.

Új válaszjeladó tranzakció ciklus nem kezdődik el, amíg az előző ciklus nem fejeződik be.

3.1.2.4.1.1 *Lekérdezés felismerés.* A másodlagos légtérellenőrző radar S-módú válaszjeladója a lekérdezések következő különböző típusait képes megkülönböztetni:

a) A- és C-módú
b) közös módú; és
c) S-módú.

Megjegyzés. – A felismerési folyamat a jel bemeneti szinttől és az előírt dinamikus távolságtól függ (3.1.2.10.1 pont).

3.1.2.4.1.1.1 *A-módú és C-módú lekérdezés nyugtázás.* A-módú vagy C-módú lekérdezés akkor kerüljön visszaigazolásra, ha egy, a 3.1.1.4 pont követelményeit kielégítő P_1-P_3 impulzus pár vétele megtörtént és a P_3 amplitúdójánál 6 dB-el lejjebb lévő szintnél nagyobb amplitúdó P_4 impulzus felfutó éle nem érkezik be a P_3 felfutó élét követő, 1,7-től 2,3 mikromásodpercig terjedő időközön belül.

Ha egy P_1–P_2 elnyomás pár és egy A-módú leképezés egyidőben kerül felismerésre, a válaszjeladó kerüljön elnyomásra. Egy lekérdezés ne kerüljön elismerésre, mint A-módú vagy C-módú, ha a válaszjeladó elnyomásban van (3.1.2.4.2 pont). Ha egy A-módú és egy C-módú lekérdezés egyidejűleg elismerésre kerül, a válaszjeladó a tranzakció ciklust úgy hajtsa végre, mintha csak C-módú lekérdezést ismert volna el.

3.1.2.4.1.1.2 *Inter (közös) módú lekérdezés elismerés.* Inter (közös) módú lekérdezést ismerjenek el, amikor egy, a 3.1.2.1.5.1 pont követelményeit kielégítő P_1–P_3–P_4 impulzus hármas vételére kerül sor. Egy lekérdezést ne ismerjenek el inter (közös) módú lekérdezésként, ha:

a) a P_4 pozícióban lévő impulzus vett amplitúdója kisebb, mint a P_3 amplitúdójánál 6 dB-el lejjebb lévő szint; vagy

b) a P_3 és P_4 között lévő impulzus időköz nagyobb, mint 2,3 mikromásodperc, vagy kisebb, mint 1,7 mikromásodperc; vagy

c) P_1 és P_3 impulzusa a minimális indító szint és -45 dBm között van és P_1 vagy P_3 impulzus időtartama kisebb, mint 0,3 mikromásodperc; vagy

d) a válaszjeladó elnyomásban van (3.1.2.4.2 pont)

Ha a P_1 – P_2 elnyomás pár és egy A-módú vagy C-módú közös módú lekérdezést egyidőben ismer el, a válaszjeladót el kell nyomni.

3.1.2.4.1.1.3 *S-módú lekérdezés elismerés*. Egy S-módú lekérdezést el kell ismerni, ha egy P_6 impulzus egy szinkronizáló fázis megfordítással P_6 felfutó élét követő, 1,20-tól - 1,30 mikromásodpercig terjedő időközön belül kerül vételre. Egy S-módú lekérdezés ne legyen elismerve, ha egy szinkronizáló fázis megfordítás a P_6 felfutó élét követő, 1,05-től – 1,45 ezredmásodpercig terjedő intervallumon belül nem kerül vételre.

3.1.2.4.1.2 *Lekérdezés vétel*. A 3.1.2.4.1 pontnak megfelelő felismerés előfeltétele bármely lekérdezés vételének.

3.1.2.4.1.2.1 *A-módú és C-módú lekérdezés vétele*. A-módú és C-módú lekérdezéseket fogadni kell, ha felismerik őket (3.1.2.4.1.1.1 pont).

3.1.2.4.1.2.2 *Közös módú lekérdezés vétel.*

3.1.2.4.1.2.2.1 *A/C/S-módú körhívás lekérdezés vétel.* A/C/S-módú körhívás lekérdezést fogadják, ha a P_4 lefutó élét a P_3 felfutó élét követően 3,45-3,75 mikromásodpercen belül veszik és a vételt kizárási feltételek (3.1.2.6.9 pont) nem akadályozzák. A/C/S-módú körhívás lekérdezést ne fogadjanak, ha P_4 lefutó élét a P_3 felfutó élét követő 3,3 mikromásodpercnél korábban és 4,2 mikromásodpercnél később veszik, vagy ha a vételt kizárási feltétel (3.1.2.6.9 pont) akadályozza.

3.1.2.4.1.2.2.2 *Csak A/C-módú körhívás lekérdezés vétel.* Csak A/C-módú körhívás lekérdezést S-módú válaszjeladó ne fogadjon.

Megjegyzés. – Csak A/C-módú körhívás elutasításának műszaki feltételét az előző alpont tartalmazza azon követelményen keresztül, amely egy olyan impulzusos közös módú lekérdezés elvetését írja elő, ahol a P_4 impulzus lefutó éle a P_3 felfutó élét 3,3 mikromásodpercnél rövidebb időn belül követi.

3.1.2.4.1.2.3 *S-módú lekérdezés vétele.* S-módú lekérdezés csak akkor kerüljön vételre, ha:

a) a válaszjeladó képes a lekérdezés fedélzetre irányuló adattovábbítási formátumának (UF) feldolgozására (3.1.2.3.2.1.1);

b) a lekérdezés címzése a címzések egyikéhez illeszkedik a 3.1.2.4.1.2.3.1 pontban előírtak szerint, amely magában foglalja, hogy a paritás létrejött, ahogyan a 3.1.2.3.3 pontban előírták;

c) nincs körhívás kizárás feltétel érvényben, ahogy a 3.1.2.6.9 pontban előírásra került; és

d) a válaszjeladó képes a fedélzetre irányuló hosszú levegő-levegő felderítő (ACAS) lekérdezés (UF – 16) adatának feldolgozására és bemutatására egy kimeneti csatlakozó felületnél, ahogyan azt a 3.1.2.10.5.2.2.1 alpont előírja.

Megjegyzés: Az S-módú lekérdezést csak abban az esetben lehet elfogadni, ha a 3.1.2.4.1.2.3.a) és b) alpontokban leírt követelmények teljesülnek és a válaszjeladó nem képes sem a fedélzetre irányuló Comm-A lekérdezés (UF=20 és 21) létrehozására sem annak egy kimeneti csatoló egységen való megjelenítésére, ahogy azt a 3.1.2.10.5.2.2.1 előírja.

3.1.2.4.1.2.3.1 *Címzések.* Az S-módú lekérdezések tartalmazzák vagy

a) a légijármű címzést; vagy

b) a körhívás címzést; vagy

c) az adás címzést.

3.1.2.4.1.2.3.1.1 *Légijármű címzés*. Ha a légijármű címzés azonos egy, a 3.1.2.3.3.2 és 3.1.2.3.3.2.1 pontok szerinti eljárással összhangban vett lekérdezésből származtatott címzéssel, akkor a származtatott címzést korrektnek kell tekinteni az S-módú lekérdezés vételének céljára.

3.1.2.4.1.2.3.1.2 *Körhívás címzés.* Egy csak S körhívás módú lekérdezés (fedélzetre irányuló adattovábbítási formátum UF = 1) egy körhívás címzéssel jelölt címzést tartalmaz, amely huszonnégy egymást követő EGY-et tartalmaz. Ha a körhívás címzést egy UF = 11 formátumban fogadott lekérdezésből a 3.1.2.3.3.2 és a 3.1.2.3.3.2.1 pontok eljárása szerint származtatták, akkor a címzést megfelelőnek kell tekinteni a csak S körhívás módú lekérdezés fogadásához.

3.1.2.4.1.3.1.3 *Adási címzés*. Egy közlés továbbításához minden S-módú válaszjeladóhoz a lekérdezési sugárnyalábon belül 20-as vagy 21-es számú S-módú lekérdezési fedélzetre irányuló adattovábbítási formátumot használnak és egy huszonnégy egymást követő EGY-ből álló címzés helyettesíti a légijármű címzést. Ha az UF kód 20-as vagy 21-es, és ezt az adási címzést egy vett lekérdezésből a 3.1.2.3.3.2 és 3.1.2.3.3.2.1 pontok szerinti eljárás alapján nyerték, a címzést S-módú adási lekérdezés vételére alkalmasnak kell tekinteni.

Megjegyzés. – Összeütközés-elhárító fedélzeti rendszerekhez kötődő válaszjeladók szintén fogadnak UF = 16 adásokat.

3.1.2.4.1.3 *Válaszjeladó válaszok.* Az S-módú válaszjeladók a következő válasz típusokat továbbítják:

a) A-módú és C-módú válaszok; és

b) S-módú válaszok.

3.1.2.4.1.3.1 *A-módú és C-módú válaszok.* A-módú (C-módú) választ kell továbbítani a 3.1.1.6 pontban meghatározott módon, ha A-módú (C-módú) lekérdezést vettek.

3.1.2.4.1.3.2 *S-módú válaszok.* Az A-módú és C-módú lekérdezésektől eltérő lekérdezésekre a válaszok S-módúak.

3.1.2.4.1.3.2.1 *Válaszok közös módú lekérdezésekre.* Fedélzetről leadott 11-es formátumú S-módú választ a 3.1.2.5.2.2 alpont rendelkezéseivel összhangban kell továbbítani, ha A/C/S-módú körhívás lekérdezést vettek.

Megjegyzés. – Mivel S-módú válaszjeladók nem vesznek csak A/C-módú lekérdezéseket, választ nem generálnak.

3.1.2.4.1.3.2.2 *Válaszok S-módú lekérdezésekre*. Az S-módú választ tartalmazó információk azokat a körülményeket tükrözzék vissza, amelyek a válaszjeladókban ezt a választ kiváltó lekérdezés teljes feldolgozásának befejezése után fennállnak. A fedélzetre irányuló- és fedélzetről leadott közlemények formátumai közötti összefüggés feleljen meg a 3-5 táblázatban összegezetteknek.

Megjegyzés. – Az S-módú válaszok négy kategóriáját lehet átvinni az S-módú lekérdezésekre adott válaszokban:

a) S-módú körhívás válaszok (DF = 11)

b) felderítési és szabványos hosszúságú kommunikációs válaszok (DF = 4, 5, 20 és 21);

c) kiterjesztett hosszúságú kommunikációs válaszok (DF = 24

d) levegő-levegő felderítési válaszok (DF = O és 16)

3.1.2.4.1.3.2.2.1 *Válaszok a másodlagos légtérellenőrző radar csak S körhívás módú lekérdezéseire.* Egy csak S körhívás módú lekérdezésre adott válasz (ha igényelt) fedélzetről leadott adattovábbítási formátuma DF = 11 legyen. A válasz tartalma és a válasz megkövetelésének meghatározásához szükséges szabályok a 3.1.2.5 pontban előírtaknak feleljenek meg.

Megjegyzés. – Egy S-módú választ, vagy továbbítanak, vagy nem továbbítanak, ha egy S-módú lekérdezést UF = 11-el vettek.

3.1.2.4.1.3.2.2.2 *Válaszok felderítési és szabványos hosszúságú lekérdezésekre*. S-módú választ akkor kell továbbítani, ha S-módú lekérdezést UF = 4, 5, 20 vagy 21-el vettek és egy légijármű címzés elfogadásra került. Ezeknek a lekérdezéseknek és válaszoknak a tartalma a 3.1.2.6 pontban előírtaknak feleljen meg.

Megjegyzés. – Ha egy UF = 20 vagy 21 értékű S-módú lekérdezést és egy adás címzést vesznek, akkor választ nem továbbítanak (3.1.2.4.1.2.3.1.3 alpont).

3.1.2.4.1.3.2.2.3 *Válaszok kiterjesztett hosszúságú kommunikációs lekérdezésekre.* Egy értéktartományon belül 0-tól - 16-ig terjedő S-módú válasz sorozatot kell továbbítani, ha egy S-módú lekérdezést UF = 24-el vettek. A válasz (ha van) fedélzetről leadott adattovábbítási formája DF = 24. A válasz számát és tartalmát meghatározó protokollok a 3.1.2.7 pontban előírtaknak feleljenek meg.

3.1.2.4.1.3.2.2.4 *Válaszok a levegő-levegő felderítési lekérdezésekre.* S-módú választ kell továbbítani, ha egy UF = 0 értékű S-módú lekérdezést és egy légijármű címzést vettek. Ezeknek a lekérdezéseknek és válaszoknak a tartalma a 3.1.2.8 pontban előírtaknak feleljen meg.

3.1.2.4.2 *Elnyomás*

3.1.2.4.2.1 *Az elnyomás hatásai.* Elnyomásban lévő válaszjeladó (3.1.1.7.4 pont) ne fogadjon el A-módú, C-módú vagy közös módú lekérdezéseket, ha a lekérdezés a P_1 impulzusát akár egyedül, akár a P_1 és P_3 impulzusát együtt vette az elnyomási időköz során. Az elnyomás nincsen hatással az S-módú lekérdezések felismerésére, vételére vagy a reá adott válaszokra.

3.1.2.4.2.2 *Elnyomás párok.* A 3.1.7.4.1 pontban meghatározott két-impulzusú A/C elnyomás pár kezdeményezzen elnyomást az S-módú válaszjeladóban, tekintet nélkül az impulzus párnak az impulzus csoportban elfoglalt pozíciójára, feltéve, hogy a válaszjeladó nem került már elnyomásba, vagy nincs átviteli ciklusban.

Megjegyzés. – A csak A/C-módú lekérdezés P_3 - P_4 párja megakadályozza a választ, és elnyomást indít el. Hasonlóan, az S-módú lekérdezés P_1 - P_2 bevezetője elnyomást indít be, függetlenül az őt követő hullámformától.

3.1.2.5 Inter (közös) módú és S-módú körhívás tranzakciók

3.1.2.5.1 *Közös módú tranzakciók*

Megjegyzés. – A közös módú tranzakciók lehetővé teszik csak A/C-módú légijárművek felderítését és S-módú légijárművek kiválasztását. Az A/C/S-módú körhívás lekérdezések lehetővé teszik, hogy ugyanazok az átvitelek kérdezzék le a csak A/C-módú és S-módú válaszjeladókat. A csak A/C-módú körhívás lekérdezés kizárólag A/C-módú válaszjeladók válaszra késztetését teszi lehetővé. Többhelyes körülmények között a lekérdezőnek az azonosító kódját továbbítania kell csak S-módú körhívás lekérdezésben. Így egy csak S-módú és egy csak A/C-módú körhívás pár lekérdezést használnak. A közös módú lekérdezéseket a 3.1.2.1.5.1 alpont írja elő és a hozzátartozó lekérdezés-válasz protokollok a 3.1.2.4 pontban vannak meghatározva.

3.1.2.5.2 *Csak S körhívás módú tranzakciók*

Megjegyzés. – Ezek a tranzakciók lehetővé teszik, hogy a föld befogja az S-módú légijárművet az összes S móddal ellátott légijárműnek címzett lekérdezés alkalmazásával. A válasz 11-es fedélzetről leadott adattovábbítási formátumon keresztüli, amely visszaküldi a légijármű címzést. A lekérdezés-válasz protokollok a 3.1.2.4 pontban lettek meghatározva.

3.1.2.5.2.1 *Csak S körhívás módú lekérdezés*, *fedélzetre irányuló 11-es adattovábbítási formátum*

1	6	10	14	17	33	
UF	PR	IC	CL		AP	
5	9	13	16	32		56

Ennek a lekérdezésnek a formátuma az alábbi mezőkből áll:

Mező	*Hivatkozás*
UF fedélzetre irányuló adattovábbítási formátum	3.1.2.3.2.1.1
PR a válasz valószínűsége	3.1.2.5.2.1.1
IC lekérdező kód	3.1.2.5.2.1.2
CL kód címke tartalék - 16 bit	3.1.2.5.2.1.3
AP címzés/paritás	3.1.2.3.2.1.3

3.1.2.5.2.1.1 *PR: válasz valószínűsége*. Ez a 4-bites (6-9) fedélzetre irányuló adattovábbítási mező utasításokat tartalmaz a válaszjeladó részére, amelyek meghatározzák a lekérdezésre adott válasz valószínűségét. A kódok a következők:

0	1 valószínűséggel rendelkező választ jelent
1	1/2 valószínűséggel rendelkező választ jelent
2	1/4 valószínűséggel rendelkező választ jelent
3	1/8 valószínűséggel rendelkező választ jelent
4	1/16 valószínűséggel rendelkező választ jelent
5, 6, 7	nincs kijelölve
8	elhanyagolási kizárást, 1 valószínűséggel rendelkező választ jelent
9	elhanyagolási kizárást, 1/2 valószínűséggel rendelkező választ jelent
10	elhanyagolási kizárást, 1/4 valószínűséggel rendelkező választ jelent
11	elhanyagolási kizárást, 1/8 valószínűséggel rendelkező választ jelent
12	elhanyagolási kizárást, 1/16 valószínűséggel rendelkező választ jelent
13, 14, 15	nincs kijelölve

3.1.2.5.2.1.2 *IC: Lekérdező kód.* Ez a 4-bites (10-13) fedélzetre irányuló adattovábbítási mező vagy egy 4-bites érték vagy lekérdező azonosító kódot (3.1.2.5.2.1.2.3 alpont) vagy a 6-bites ellenőrzés azonosító kód alsó 4-bitjét (3.1.2.5.2.1.2.4 alpont) tartalmazza a CL mező értékétől függően (3.1.2.5.2.1.3 pont).

3.1.2.5.2.1.2.1 **Ajánlás. –** Ajánlott, hogy amikor lehetséges, a lekérdező egyetlen lekérdező kódot használjon.

3.1.2.5.2.1.2.2 *Többszörös lekérdező kód egy lekérdező berendezés általi használata.* Egy lekérdező nem illeszthet be csak S körhívás módú lekérdezéseket különböző lekérdező kódok alkalmazásával.

Megjegyzés: A rádiófrekvenciás interferencia kibocsátások, a szektor méretek és az adatkapcsolatokra gyakorolt hatások magyarázata a ”Manual of the Secondary Surveillance Radar (SSR) Systems *(Doc 9684)” kiadványban találhatók.*

3.1.2.5.2.1.2.3. *II. Lekérdező azonosító.* Ez a 4-bites érték egy lekérdező azonosító (II) kódot határoz meg. Ezeket az II kódokat a lekérdezőknek a 0-tól 15-ig terjedő értéktartományban jelölik ki. A 0 értékű II kódot csak a kiegészítő adatgyűjtésre használják, a kizárás hatálytalanításon alapuló adatgyűjtéssel kapcsolatban (3.1.2.5.2.1.4 és 3.1.2.5.2.1.5 pontok). Amikor két II kód csak egy lekérdezőhöz van kijelölve, az egyik kódot teljes adatkapcsolati célokra kell használni.

Megjegyzés: Korlátozott adatkapcsolati tevékenységet, amely egyetlen szegmens Comm-A szegmenst, fedélzetre irányuló adattovábbítási és fedélzetről leadott adattovábbítás adási protokollokat és GICB kivonatot tartalmaz, mindkét II kód végezhet.

3.1.2.5.2.1.2.4 *SI: Felderítési azonosító.* Ez a 6-bites érték egy ellenőrzés azonosító (SI) kódot határoz meg. Ezeket az SI kódokat a lekérdezőkhöz az 1-től 63-ig terjedő értéktartományban jelölik ki. A 0 értékű SI kódot nem használják. Az SI kódokat többhelyes kizárás protokollokkal használják (3.1.2.6.9.1). Az SI kódokat többhelyes kommunikációs protokollokkal nem használják. (3.1.2.6.11.3.2, 3.1.2.7.4 vagy 3.1.2.7.7 pontok).

3.1.2.5.2.1.3 *CL: Kód címke.* Ez a 3-bites (14-16) fedélzetre irányuló adattovábbítási mező az IC mező tartalmát határozza meg.

Kódolás (bináris)

000	azt jelöli, hogy az IC mező a II kódot tartalmazza
001	azt jelöli, hogy az IC mező az SI kódokat 1-től 15-ig tartalmazza
010	azt jelöli, hogy az IC mező az SI kódokat 16-tól 31-ig tartalmazza
011	azt jelöli, hogy az IC mező az SI kódokat 32-től 47-ig tartalmazza
100	azt jelöli, hogy az IC mező az SI kódokat 48-tól 63-ig tartalmazza

A CL mező többi értékét nem használják.

3.1.2.5.2.1.3.1 *Felderítés azonosító (SI) kód képesség jelentés.* Azon válaszjeladók, amelyek feldolgozzák az SI kódokat (3.1.2.5.2.1.2.4 pont), ezt a képességet a 35-ös bit 1-re állításával jelentik az adatkapcsolat képesség jelentés (3.1.2.6.10.2.2 pont) MB mezője felderítés azonosító képesség (SIC) almezőjében.

3.1.2.5.2.1.4 *Kizárás felülbírálásán alapuló működés.*

1. Megjegyzés – A csak S körhívás módú kizárás felülbírálásának használata teszi lehetővé a lekérdezők számára az adatgyűjtést, azon S-módú légijárművekről, amelyek számára egyedi IC (II vagy SI kód) nincs kijelölve a teljes S-módú működéshez (védett adatgyűjtési üzemmód, amely biztosítja, hogy más lekérdezők, azonos IC kóddal ne zárhassák ki az azonos lefedettségükben lévő céltárgyakat).

2. Megjegyzés – A kizárás felülbírálása bármely lekérdező kóddal megvalósítható.

3.1.2.5.2.1.4.1 *Maximális csak S körhívás módú lekérdezési sebesség.* Egy kizárás felülbírálásán alapuló kiválasztást felhasználó lekérdező által végzett csak S körhívás módú lekérdezések maximális sebessége a válaszolási valószínűségtől függ az alábbiak szerint:

a) 1,0-el egyenlő válaszadási valószínűségnél:

a 3 lekérdezés per 3 dB-es sugárszünet vagy 30 lekérdezés per másodperc közül a kisebbik;

b) 0,5-el egyenlő válaszadási valószínűségnél:

az 5 lekérdezés per 3 dB-es sugárszünet vagy 60 lekérdezés per másodperc közül a kisebb; és

c) 0,25-el vagy kevesebbel egyenlő válaszadási valószínűségnél:

a 10 lekérdezés per 3 dB-es sugárszünet vagy 125 lekérdezés per másodperc közül a kisebb.

Megjegyzés: Ezeket a határértékeket abból a célból határozták meg, hogy minimumra lehessen csökkenteni az ilyen módszerek által keltett rádiófrekvenciás zajokat, miközben a sugárszüneteken belül a légijárművek begyűjtése érdekében a válaszokat minimumon tartják.

3.1.2.5.2.1.4.2 *Olyan szelektíven címzett lekérdezés mező tartalma, amely kijelölt lekérdező kóddal nem rendelkező lekérdezőtől származik.* Az egyedi kijelölt lekérdező kóddal nem rendelkező, adatsugárzásra engedélyezett lekérdező, a szelektív lekérdezéshez, használja a II kód 0 értéket. Ebben az esetben az olyan szelektíven címzett lekérdezések, amelyek adatgyűjtéshez kizárás felülbírálást használnak a lekérdezés adatmezők a következő tartalomkorlátozással rendelkezzenek:

UF = 4, 5, 20 vagy 21
PC = 0
RR $\neq$ 16, ha RRS = 0
DI = 7
IIS = 0
LOS = 0, kivéve a 3.1.2.5.2.1.5 pontban előírtakat
TMS = 0

Megjegyzés. – Ezek a korlátozások az ellenőrzési és GICB tranzakciókat lehetővé teszik, de megakadályozzák a lekérdezést a válaszjeladó többhelyes kizárást vagy kommunikáció protokoll állapot változást előidézőktől.

3.1.2.5.2.1.5 *0-val egyenlő lekérdező azonosítót (II) használó kiegészítő adatgyűjtés*

1. Megjegyzés. – A 3.1.2.5.2.1.4 pontban meghatározott adatgyűjtési eljárás gyors befogási lehetőséget ad a legtöbb légijármű számára. A folyamat valószínűségi jellege miatt ez sok lekérdezést jelenthet, hogy egy nagy légijármű együttesből az utolsó légijármű befogásra kerüljön ugyanazon sugárszünetben és majdnem ugyanazon távolságban (helyi csonkítás zónának nevezik). A megszerzési teljesítmény nagymértékben javul ezeknek a légijárműveknek a megszerzésével a 0-val egyenlő lekérdezési azonosítót használó korlátozott szelektív kizárás alkalmazása által.

2. Megjegyzés. - A kiegészítő adatgyűjtés a II = 0 értékig befogott légijárművek kizárásából áll, a II = 0 értékkel bíró csak S körhívás módú lekérdezési eszközökkel történő adatgyűjtéseket követően. Csak azok a légijárművek válaszolnak az egyszerűsített adatgyűjtésre,amelyek még nem lettek befogva és nincsenek kizárva sem.

3.1.2.5.2.1.5.1 *Kizárás egy sugárszüneten belül*

3.1.2.5.2.1.5.1.1 **Ajánlás.** – *Amikor II egyenlő 0 kizárást használnak az adatgyűjtési eljárás kiegészítésére, akkor a befogott légijármű sugárszünetén belüli összes légijárművet utasítani kell az II egyenlő 0 kizárásra, nemcsak azokat, amelyek a csonkítás zónán belül vannak.*

Megjegyzés. – A sugárszüneten belül lévő összes légijármű kizárása lecsökkenti az II egyenlő 0 körhívás lekérdezésekre generált körhívás válaszok mennyiségét.

3.1.2.5.2.1.5.2 *Kizárás időtartama*

3.1.2.5.2.1.5.2.1 Kiegészítő adatgyűjtést teljesítő, II egyenlő 0-t használó lekérdezőknek az adatgyűjtést egy kizárás utasítás továbbításával kell végrehajtani nem több, mint két egymást követő pásztázással a befogott légijármű mindegyikéhez a csonkítás zónát tartalmazó sugárszünetben, és nem ismételhetik meg azt, mielőtt 48 mp eltelne.

Megjegyzés: A kizárási idő minimalizálása lecsökkenti a konfliktus valószínűségét ami a kiegészítő adatgyűjtéshez II egyenlő 0-t használó szomszédos lekérdező adatgyűjtési aktivitása során alakulhat ki.

3.1.2.5.2.1.5.2.2 **Ajánlás**. – *A kiegészítő adatgyűjtésre szolgáló II = 0 értékű csak S körhívás módú lekérdezéseket csak két egymást követő pásztázásnál, vagy maximum 18 mp-ig alkalmazzák a csonkításos zónán belül.*

3.1.2.5.2.2 *Körhívás válasz, fedélzetről leadott 11-es adattovábbítási formátum:*

1	6	9	33
DF	CA	AA	PI
5	8	32	56

A válasz a csak S körhívás módú vagy A/C/S-módú körhívás lekérdezésekre az S-módú körhívás, 11-es fedélzetről leadott adattovábbítás formátum legyen. Ennek a válasznak a formátuma a következő mezőkből áll.

Mező	Hivatkozás
DF fedélzetről leadott adattovábbítás formátum	3.1.2.3.2.1.2
CA képesség	3.1.2.5.11.1
AA közölt cím	3.1.2.5.2.2.2
PI paritás/lekérdezés azonosító	3.1.2.3.2.1.4

3.1.2.5.2.2.1 *CA: képesség*. Ez a 3-bites (6-8) fedélzetről leadott adattovábbítási mező a válaszjeladó kommunikációs képességének kódolt meghatározását tartalmazza és DF= 11 valamint DF = 17 formátumokban kerül felhasználásra.

Kódolás

0 azt jelenti, hogy a válaszjeladó 1. szintű (csak felderítés), és nem rendelkezik a CA 7 kód valamint a földön vagy a levegőben való tartózkodás beállításának képességével

1 fenntartott

2 fenntartott

3 fenntartott

4 azt jelenti, hogy a válaszjeladó 2. szintű vagy afölötti és rendelkezik a CA 7 kód valamint a földön való tartózkodás beállításának képességével

5 azt jelenti, hogy a válaszjeladó 2. szintű vagy afölötti és rendelkezik a CA 7 kód valamint a levegőben való tartózkodás beállításának képességével

6 azt jelenti, hogy a válaszjeladó 2. szintű vagy afölötti és rendelkezik a CA 7 kód valamint a földön vagy a levegőben való tartózkodás beállításának képességével

7 azt jelenti, hogy a DR mező nem egyenlő 0-val és az FS mező egyenlő 2, 3, 4 vagy 5-el, és vagy a földön vagy a levegőben való állapot áll fenn.

Amikor a CA 7 kódhoz tartozó feltételek nem teljesülnek, akkor a 2. szintű vagy afölötti válaszjeladók melyek nem rendelkeznek automatikus eszközökkel a földön való tartózkodási feltételek beállítására, CA 6 kódot használnak. A földön való tartózkodás automatikus meghatározására alkalmas légijárművek CA 4 kódot használnak amikor a földön tartózkodnak és 5 kódot használnak amikor a levegőben vannak. Adatkapcsolat képesség közlések (3.1.2.6.10.2.2 pont) olyan felszereltségű légijárműveknél állnak rendelkezésre, amelyeken a CA 4, 5, 6 vagy 7 kód beállítható.

Megjegyzés. – A CA 1-től 3-ig kódok a visszafelé irányuló kompatibilitás megteremtésére vannak fenntartva.

3.1.2.5.2.2.2 *AA: közölt cím.* Ez a 24-bites (9-32) fedélzetről leadott adattovábbítási mező tartalmazza a légijármű címzést, amely a légijármű egyértelmű azonosítását biztosítja.

3.1.2.5.3 *Kizárás protokoll.* A 3.1.2.6.9 pontban megfogalmazott körhívás kizárás protokollt azok a lekérdezők használják egy adott légijármű vonatkozásában, ha az adott légijármű címzését egy lekérdező befogta, feltéve, hogy:

– a lekérdező IC kód nullától különbözik; és

– a légijármű olyan légtérben tartózkodik, ahol a lekérdező kizárásra engedélyezett.

1. Megjegyzés – Az adatgyűjtést követően a válaszjeladót szelektíven címezve kérdezik, ahogy azt 3.1.2.6, 3.1.2.7 és 3.1.2.8 leírja és a körhívás kizárás protokollt a további körhívás lekérdezésekre adandó válaszok kiküszöbölésére használják.

2. Megjegyzés – A körzeti IC kód kijelölésért felelős hatóságok szabályozásában a szelektív lekérdezések és kizárás protokollok alkalmazása korlátozható (pl. kizárás tiltása egy meghatározott korlátozott légtérben, időszakos kizárás alkalmazás egy meghatározott légtérben, a légijárművek kizárásának tiltása SI kód kapacitás hiánya miatt).

3.1.2.5.4 *Sztochasztikus körhívás protokoll.* A válaszjeladónak véletlenszerű folyamatot kell végrehajtania olyan csak S körhívás módú vételnél, amelynek PR kódja 1-től 4-ig vagy 9-től 12-ig terjedő értékű. A válaszra vonatkozó döntést a lekérdezésben előírt valószínűséggel kell meghozni. A válaszjeladónak nem kell válaszolnia, ha 5, 6, 7, 13, 14 vagy 15-el egyenlő PR kód került vételre (3.1.2.5.2.1.1 alpont).

Megjegyzés. – A válaszok véletlen előfordulása lehetővé teszi a lekérdező számára, hogy befogjon közelben tartózkodó légijárműveket, amelyektől a válaszok más esetben szinkron módon csonkítanák egymást.

3.1.2.6 Címzett felderítés és szabványos hosszúságú kommunikációs tranzakciók

1. Megjegyzés. – Az ebben a szakaszban leírt lekérdezések meghatározott légijárműveknek vannak címezve. Két lekérdezési és válasz típus van, rövid és hosszú. A rövid lekérdezések és válaszok UF 4 és 5, míg a hosszú lekérdezések és válaszok UF 20 és 21 és DF 20 és 21.

2. Megjegyzés. – A kommunikációs protokollokat a 3.1.2.6.11 alpont tartalmazza. Ezek a protokollok az adatcsere szabályozást írják elő.

3.1.2.6.1 *Felderítés, magasság kérés, 4-es fedélzetre irányuló adattovábbítási formátum*

1	6	9	14	17	33
UF	PC	RR	DI	SD	AP
5	8	13	16	32	56

Ennek a lekérdezésnek a formátuma a következő mezőkből áll:

Mező	*Hivatkozás*
UF felfelé irányuló	3.1.2.3.2.1.1
kapcsolat formátum	3.1.2.6.1.1
PC protokoll	3.1.2.6.1.2
RR válasz kérés	3.1.2.6.1.3
DI jelölő azonosító	3.1.2.6.1.4
SD különleges jelölő	3.1.2.3.2.1.3
AP címzés/paritás	

3.1.2.6.1.1 *PC protokoll.* Ez a 3-bites (6-8) fedélzetre irányuló adattovábbítási mező működési utasításokat tartalmaz a válaszjeladó számára. A PC mezőt elhanyagolják a felderítés vagy DI=3-at tartalmazó Comm-A lekérdezések feldolgozásánál (3.1.2.6.1.4.1).

Kódolás

0	azt jelenti, hogy nincs beavatkozás
1	a nem-szelektív körhívás kizárást (3.1.2.6.9.2 pont) jelenti
2	nincs kijelölve
3	nincs kijelölve
4	a Comm-B kizárást (3.1.2.6.11.3.2.3 pont) jelenti
5	a fedélzetre irányuló ELM kizárást (3.1.2.7.4.2.8 pont) jelenti
6	a fedélzetről leadott ELM kizárást (3.1.2.7.7.3 pont) jelenti
7	nincs kijelölve

3.1.2.6.1.2 *RR: válasz kérés.* Ez az 5-bites (9-13) fedélzetre irányuló adattovábbítási mező a kért válasz hosszúságára és tartalmára ad utasítást.

Az 5-bites RR kód utolsó négy bitje át lett alakítva a annak decimális megfelelőjévé, és kijelöli az igényelt Comm-B közlés BDS1 kódját (3.1.2.6.11.2 vagy 3.1.2.6.11.3 pont), ha az RR kód legértékesebb bitje 1-el egyenlő (RR egyenlő vagy nagyobb mint 16).

Kódolás

RR =	0-15 felderítési formátummal (DF = 4 vagy 5) válasz kérésére használják;
RR =	16-31 Comm-B formátummal (DF = 20 vagy 21) válasz kérésére használják;
RR =	16 a 3.1.2.6.11.3 alpontnak megfelelően, levegőből kezdeményezett Comm-B adattovábbítás kérésére használják;
RR =	17 a 3.1.2.6.10.2.2 alpont szerinti adatkapcsolat képességi közlés kérésére használatos;
RR =	18 a 3.1.2.9 pontnak megfelelő légijármű azonosítás kérésére használatos;
19-31	nincs kijelölve a 3.1 szakaszban.

Megjegyzés. – A 19-31 kódok olyan alkalmazásokra vannak fenntartva, mint például adat kapcsolat kommunikáció, összeütközés-elhárító fedélzeti rendszer (ACAS), stb.

3.1.2.6.1.3 *DI: jelölő azonosító.* Ez a 3-bites (14-16) fedélzetre irányuló adattovábbítási mező azonosítja az SD mező struktúráját (3.1.2.6.1.4 pont).

Kódolás

0	azt jelenti, hogy az SD nincs kijelölve, kivéve az IIS esetét
1	azt jelenti, hogy az SD többhelyes és kommunikáció szabályozási információt tartalmaz
2	azt jelenti, hogy az SD irányítás adatokat tartalmaz a kiterjesztett squitter számára
3	azt jelenti, hogy az SD SI többhelyes kizárási, rádióadási és GICB irányítás információkat tartalmaz
4-6	azt jelenti, hogy az SD nincs kijelölve
7	azt jelenti, hogy az SD kiterjesztett adat kiolvasás kérést, többhelyes és kommunikáció szabályozási információt tartalmaz.

3.1.2.6.1.4 *SD: különleges jelölő.* Ez a 16-bites (17-32) fedélzetre irányuló adattovábbítási mező szabályozási kódokat tartalmaz, melyek a DI mezőben való kódolástól függnek.

Megjegyzés. – A különleges jelölő (SD) mező feladata a többhelyes, kizárási és kommunikációs szabályozási információk továbbítása a földi állomástól a válaszjeladóig.

DI KÓD *SD MEZŐ STRUKTÚRA*

	17	21					
0	IIS						
	20					32	

	17	21	23	26	27	29	
1	IIS	MBS	MES	LOS	RSS	TMS	
	20	22	25		28	32	

	17	21	24	27	29		
2		TCS	RCS	SAS			
	20	23	26	28		32	

	17	23	24	28			
3	SIS	LSS	RRS				
	22		27			32	

	17	21	25	26	27	29	
7	IIS	RRS		LOS		TMS	
	20	24			28	32	

3.1.2.6.1.4.1 *Almezők az SD-ben.* Az SD mező a következő információkat tartalmazza:

a) Ha DI = 0, 1 vagy 7:

IIS, a 4 bites (17-20) lekérdező azonosító almező tartalmazza a lekérdező egy kijelölt azonosító kódját (3.1.2.5.2.1.2 pont).

b) Ha DI = 0
21-32 bitek nincsenek kijelölve

c) Ha DI = 1

MBS, a 2-bites (21-22) többhelyes Comm-B almező a következő kódokkal rendelkezzen:

0 azt jelenti, hogy nincs Comm-B akció
1 a levegőből kezdeményezett Comm-B helyfoglalás kérést (3.1.2.6.11.3.1 pont) jelenti
2 a Comm-B kizárást (3.1.2.6.11.3.2.3 pont) jelenti
3 nincs kijelölve

MES, a 3-bites (23-25) többhelyes ELM almező tartalékolási és kizárási utasításokat tartalmaz az ELM részére a következők szerint:

0 azt jelenti, hogy nincs ELM beavatkozás
1 a fedélzetre irányuló ELM helyfoglalás kérést (3.1.2.7.4.1 pont) jelenti
2 a fedélzetre irányuló ELM kizárást (3.1.2.7.4.2.8 pont) jelenti
3 a fedélzetről leadott ELM helyfoglalás kérést (3.1.2.7.7.1.1 pont) jelenti
4 a fedélzetről leadott ELM kizárást (3.1.2.7.7.3 pont) jelenti
5 a fedélzetre irányuló- ELM helyfoglalás kérést és fedélzetről leadott ELM kizárást jelenti
6 a fedélzetre irányuló ELM kizárást és fedélzetről leadott adattovábbítási helyfoglalás kérést jelenti
7 a fedélzetre irányuló ELM és fedélzetről leadott ELM kizárásokat jelenti.

RSS, a 2-bites (27, 28) helyfoglalási állapot almező a válaszjeladótól közlést kér tartalékolási állapotáról az UM mezőben. A következő kódok lettek kijelölve:

0 azt jelenti, hogy nincs kérés
1 a Comm-B tartalékolási állapot UM-ben közlést jelenti
2 a fedélzetre irányuló ELM foglalási állapot közlést jelenti
3 a fedélzetről leadott ELM foglalási állapot közlést jelenti.

d) Ha DI = 1 vagy 7:

LOS, az 1-bites (26) kizárás almező egy többhelyes kizárási utasítást jelöl az IIS-ben jelzett lekérdezőtől. A LOS 0-ra állítását annak jelölésére használják, hogy nincs utasítás a kizárás állapot megváltoztatására.

TMS, a 4-bites (29-32) taktikai közlemény almező az adatkapcsolati repüléselektronika által használt kommunikáció szabályozási információkat tartalmaz.

e) Ha DI = 7:
RRS, a 4-bites (21-24) válasz kérési almező SD-ben megadja a kért Comm-B válasz BDS2 kódját.
A 25, 27 és 28-s bitek nincsenek kijelölve.

f) Ha DI = 2:

TCS, a 3-bites (21-23) típus irányítás almező SD-ben irányítja a válaszjeladó által használt pozíció típust. A következő kódok lettek kijelölve:

0 azt jelenti, hogy nincs helyzet típusú utasítás
1 a földi helyzet típus használatát jelenti a következő 15 másodpercre
2 a földi helyzet típus használatát jelenti a következő 60 másodpercre
3 a felszín típusú utasítás törlését jelenti
4-7 nincs kijelölve

RCS, a 3-bites sebesség szabályozás almező SD-ben szabályozza a válaszjeladó squitter sebességét a földi formátum jelentése során. Ennek az almezőnek nincs hatása a válaszjeladó squitter sebességére, a levegőben lévő helyzet típusának jelentése során. A következő kódok lettek kijelölve:

0 azt jelzi, hogy nincs földfelszíni pozícióról szóló kiterjesztett squitter sebesség utasítás
1 a 60 másodpercig tartó, nagy magasságú földfelszíni pozíció kiterjesztett squitter sebesség jelentést jelzi
2 a 60 másodpercig tartó, kismagasságú földfelszíni pozíció kiterjesztett squitter sebesség jelentést jelzi
3 az összes földfelszíni pozíció kiterjesztett squitter 60 másodpercig tartó elnyomását jelzi
4 az összes földfelszíni pozíció kiterjesztett squitter 120 másodpercig tartó elnyomását jelzi
5-7 nincs kijelölve

Megjegyzés. – Nagy- és kissebességű squitter sebesség meghatározását a 3.1.2.8.6.4.3 pont tartalmazza.

Megjegyzés: a 3.1.2.8.5.2 d) alpontban közöltek szerint az adatbegyűjtési squitter-ek sugárzására csak akkor kerül sor, ha a földi elhelyezésű kiterjesztett squitterek összenyomását RCS = 3 vagy 4 felhasználásával végzik.

SAS, a 2-bites (27-28) felületi antenna almező SD-ben irányítja a válaszjeladó eltérés antennát, amelyet (1) a kiterjesztett squitter-hez használnak, amikor az a felületi formátumot közli és (2) adatbegyűjtési squitter-hez használnak, amikor az a földi állapotot jelzi. Ez az almező nincs hatással a válaszjeladó eltérés antenna megszerzésére, amikor az a fedélzeti pozíció típust közli. A következő kódok lettek kijelölve:

0 azt jelöli, hogy nincs antenna utasítás
1 az egymást felváltó felső és alsó antennákat jelöli 120 másodpercig
2 az alsó antennát jelöli 120 másodpercig
3 az alapértelmezéshez való visszatérést jelenti.

Megjegyzés. – A felső (tető) antenna az alapértelmezett állapot (3.1.2.8.6.5 pont).

g) Ha DI = 3

SIS a 6-bites (17-22) felderítés azonosító almező az SD-ben, amelynek tartalmaznia kell a lekérdező kijelölt felderítési azonosító kódját (3.1.2.5.2.1.2.4).

LSS, az 1-bites (23) kizárás felderítés almező, ha 1-re állítják, egy többhelyes kizárás utasítást jelöl a SIS-ben jelzett lekérdezőtől. Ha 0-ra állítják, LSS azt jelöli, hogy nincs változás, a kizárás állapotban utasítás van.

RRS, a 4-bites (24-27) válasz kérés almező SD-ben a kért GICB regiszter BDS2 kódot tartalmazza.

A 28 -32 bitek nem lettek kijelölve.

3.1.2.6.1.5 *PC és SD mező feldolgozás*. Amikor DI = 1, a PC mező feldolgozás az SD mező feldolgozás előtt befejeződik.

3.1.2.6.2 *Comm-A magasság kérés, fedélzetre irányuló 20-as adattovábbítási formátum*

1	6	9	14	17	33	89
UF	PC	RR	DI	SD	MA	AP
5	8	13	16	32	88	112

Ennek a lekérdezésnek a formátuma a következő mezőkből tevődik össze:

Mező *Hivatkozás*

UF fedélzetre irányuló adattovábbítási formátum 3.1.2.3.2.1.1
PC protokoll 3.1.2.6.1.1
RR válasz kérés 3.1.2.6.1.2
DI jelölő azonosítás 3.1.2.6.1.3
SD különleges jelölő 3.1.2.6.1.4
MA közlemény, Comm-A 3.1.2.6.2.1
AP címzés/paritás 3.1.2.3.2.1.3

3.1.2.6.2 1 *MA: Közlemény, Comm-A. Ez az 56-bites (33-88) mező egy adat kapcsolat közleményt tartalmaz a légijárműhöz.*

3.1.2.6.3 *Felderítési azonosság kérés, fedélzetre irányuló 5-ös adattovábbítási formátum*

1	6	9	14	17	33
UF	PC	RR	DI	SD	AP
5	8	13	16	32	56

Ennek a lekérdezésnek a formátuma a következő mezőkből áll:

Mező Hivatkozás

UF fedélzetre irányuló adattovábbítási formátum 3.1.2.3.2.1.1
PC protokoll 3.1.2.6.1.1
RR válasz kérés 3.1.2.6.1.2
DI jelölő azonosítás 3.1.2.6.1.3
SD különleges jelölő 3.1.2.6.1.4
AP címzés/paritás 3.1.2.3.2.1.3

3.1.2.6.4 *Comm-A azonosság kérés, fedélzetre irányuló 21-es adattovábbítási formátum*

1	6	9	14	17	33	89
UF	PC	RR	DI	SD	MA	AP
5	8	13	16	32	88	112

Ennek a lekérdezésnek a formátuma a következő mezőkből áll:

Mező	Hivatkozás
UF fedélzetre irányuló adattovábbítási formátum	3.1.2.3.2.1.1
PC protokoll	3.1.2.6.1.1
RR válasz kérés	3.1.2.6.1.2
DI jelölő azonosítás	3.1.2.6.1.3
SD különleges kijelölő	3.1.2.6.1.4
MA közlemény, Comm-A	3.1.2.6.2.1
AP címzés/paritás	3.1.2.3.2.1.3

3.1.2.6.5 *Felderítési magasság válasz, fedélzetről leadott 4-es adattovábbítási formátum*

1	6	9	14	20	33
DF	FS	DR	UM	AC	AP
5	8	13	19	32	56

Ez a válasz egy 16-nál kisebb értékű RR mezőjű UF4 vagy 20 lekérdezésre adott visszajelzésre jön létre. Ezen válasz formátuma a következő mezőkből áll:

Mező	*Hivatkozás*
DF fedélzetről leadott adattovábbítási formátum	3.1.2.3.2.1.2
FS repülési állapot	3.1.2.6.5.1
DR fedélzetről leadott adattovábbítás kérés	3.1.2.6.5.2
UM közlemény	3.1.2.6.5.3
AC magasság kód	3.1.2.6.5.4
AP címzés/paritás	3.1.2.3.2.1.3

3.1.2.6.5.1 *FS: repülési állapot. Ez a 3-bites (6-8) fedélzetről leadott adattovábbítási mező a következő információkat tartalmazza:*

Kódolás

0 azt jelenti, hogy nincs figyelmeztetés és nincs SPI, a légijármű a levegőben van
1 azt jelenti, hogy nincs figyelmeztetés és nincs SPI, a légijármű a földön van
2 azt jelenti, hogy figyelmeztetés van, nincs SPI, a légijármű a levegőben van
3 azt jelenti, hogy figyelmeztetés van, nincs SPI, a légijármű a földön van
4 azt jelenti, hogy figyelmeztetés és SPI van, a légijármű a levegőben vagy a földön van
5 azt jelenti, hogy nincs figyelmeztetés és SPI, a légijármű a levegőben vagy a földön van
6 fenntartott

7 nincs kijelölve

Megjegyzés. – Azok a feltételek, amelyek figyelmeztetést váltanak ki, a 3.1.2.6.10.1.1 pontban találhatók.

3.1.2.6.5.2 *DR: fedélzetről leadott adattovábbítási kérés*. Ez az 5-bites (9-13) fedélzetről leadott adattovábbítás mező fedélzetről leadott adattovábbítási információ kéréseket tartalmaz.

Kódolás

0	azt jelenti, hogy nincs fedélzetről leadott adattovábbítási kérés
1	Comm-B közlemény küldése iránti kérést jelent
2	ACAS részére fenntartva
3	ACAS részére fenntartva
4	azt jelenti, hogy Comm-B adás közlemény 1 rendelkezésre áll
5	azt jelenti, hogy Comm-B adás közlemény 2 rendelkezésre áll
6	ACAS részére fenntartva
7	ACAS részére fenntartva
8-15	nincs kijelölve
16-31	lásd a fedélzetről leadott ELM protokollt (3.1.2.7.7.1 pont)

Az 1-15 kódok elsőbbséget élveznek a 16-31 kódokkal szemben.

Megjegyzés. – Az 1-15 kódoknak adott elsőbbség lehetővé teszi egy Comm-B közlemény számára, hogy egy fedélzetről leadott ELM bejelentést félbeszakítson. Ez prioritást ad a rövidebb közlemény közzétételének.

3.1.2.6.5.3 *UM: Végső közlemény.* Ez a 6-bites (14-19) fedélzetről leadott adattovábbítási mező válaszjeladó kommunikáció állapot információt tartalmaz a 3.1.2.6.1.4.1 és 3.1.2.6.5.3.1 pontokban előírtak szerint.

3.1.2.6.5.3.1 Almezők UM-ben többhelyes protokollok számára

UM mező struktúra

	14	18	
	IIS	IDS	
17	19		

A válaszjeladó a következő almezőket illeszti be a válasz UM mezejébe, ha egy ellenőrzés vagy Comm-A lekérdezés (UF egyenlő 4, 5, 20, 21) DI = 1 és RSS 0-tól különböző értéket tartalmaz:

IIS: A 4-bites (14-17) lekérdezés azonosító almező a lekérdező azonosítót közli, amely többhelyes kommunikáció részére van fenntartva.

IDS: A 2-bites (18-29) azonosító jelölő közli az IIS-ben azonosított lekérdező által eszközölt helyfoglalás típusát.

A kijelölt kódolás:

0	azt jelenti, hogy nincs információ
1	azt jelenti, hogy az IIS Comm-B II kódot tartalmaz

2 azt jelenti, hogy az IIS Comm-C II kódot tartalmaz
3 azt jelenti, hogy az IIS Comm-D II kódot tartalmaz

3.1.2.6.5.3.2 *Többhelyes tartalékolási állapot*. A földi állomás lekérdező azonosítója, amelyet a többhelyes Comm-B továbbítás részére (3.1.2.6.11.3.1 pont) éppen tartalékoltak, az IIS almezőben kerül továbbításra az 1-es kóddal együtt az IDS almezőben, ha az UM tartalma nincs a lekérdezés által előírva (ha DI = 0 vagy 7, vagy amikor DI = 1 és RSS = 0).

A földi állomás lekérdező azonosítója, amely jelenleg tartalékolva van a fedélzetről leadott ELM továbbítás (3.1.2.7.6.1 pont) részére, ha van ilyen, az IIS almezőben a 3-as kóddal együtt az IDS almezőben kerül továbbításra, ha az UM tartalmát a lekérdezés nem határozza meg és nincs éppen Comm-B helyfoglalás.

3.1.2.6.5.4 *AC: magasság kód.* Ez a 13-bites (20-32) mező a magasságot tartalmazza, amely a következők szerint van kódolva:

a) A 26-os bit M bit-ként van jelölve és 0, ha a magasság értékét lábban közlik. M egyenlő 1 értéket fenntartják arra az esetre, ha a magasság közlése metrikus egységekben történik.

b) Ha M egyenlő 0, akkor a 28-as bit Q bit-ként van jelölve. Q egyenlő 0-t annak jelölésére használják, hogy a magasságot 100-lábas növekményekben közöljék. A Q egyenlő 1-et annak jelzésére használják, hogy a magasságot 25-lábas növekményekben közöljék.

c) Ha az M bit (26-os bit) és a Q bit (28-as bit) egyenlő 0, a magasságot a 3.1.1.7.12.2.3 pont C-módú válaszai sémájának megfelelően kell kódolni. A 20-as bit-el kezdve a sorozat C1, A1, C2, A2, C4, A4, ZÉRO, B1, ZÉRO, B2, D2, B4, D4 lesz.

d) Ha az M bit egyenlő 0, és a Q bit egyenlő 1, a 20-tól-25-ig, 27 és 29-től 32 bit-ek által képviselt mező a 25 láb legkisebb jelentésű bit-hez (LSB) tartozó bináris kódolású mezőt reprezentál. “N” pozitív decimális egész szám bináris értékét kódolni kell a nyomásmagasság ((25 N-1000) plusz vagy mínusz 12,5 láb) tartományban való közlésére. A 3.1.2.6.5.4c pontnak megfelelő kódolást az 50 187,5 láb feletti nyomásmagasság közlésére használják.

1. Megjegyzés. – Ez a kódolási módszer csak mínusz 1000 láb és plusz 50 175 láb közötti értékek szolgáltatására képes.

2. Megjegyzés. – Ennek a mezőnek a legjelentősebb bitje (MSB) a 20-as bit, ahogyan azt a 3.1.2.3.1.3 pont megköveteli.

e) Ha az M bit egyenlő 1-el, a 20-tól - 25-ig és a 27-től - 31-ig bit-ek által reprezentált 12 bit-es mezőt a magasság metrikus egységekben történő kódolására tartják fenn.

f) 0-t az AC mező 13 bit-jének mindegyikében át kell vinni, ha magassági információ nem áll rendelkezésre, vagy a magasság értékét érvénytelenül határozták meg.

3.1.2.6.6 *Comm-B magasság válasz, fedélzetről leadott 20-as adattovábbítási formátum*

1	6	9	14	20	33	89
DF	FS	DR	UM	AC	MB	AP
5	8	13	19	32	88	112

Ez a válasz egy UF 4 vagy 20 lekérdezésre jön létre 15-nél nagyobb értékű RR mezővel. Ennek a válasznak a formátuma a következő mezőkből áll:

Mező	Hivatkozás
DF fedélzetről leadott adattovábbítás formátum	3.1.2.3.2.1.2
FS repülési állapot	3.1.2.6.5.1
DR fedélzetről leadott adattovábbítás kérés	3.1.2.6.5.2
UM közlemény	3.1.2.6.5.3
AC magasság kód	3.1.2.6.5.4
MB közlemény, Comm-B	3.1.2.6.6.1
AP címzés/paritás	3.1.2.3.2.1.3

3.1.2.6.6.1 *MB: közlemény, Comm-B.* Ezt az 56 bit-es (33-88) fedélzetről leadott adattovábbítási mezőt adatkapcsolati közleményeknek a földre való továbbítására használják.

3.1.2.6.7 *Felderítési azonosítási válasz, fedélzetről leadott 5-ös adattovábbítási formátum*

1	6	9	14	20	33
DF	FS	DR	UM	ID	AP
5	8	13	19	32	56

Ez a válasz egy UF 5 vagy 21 lekérdezésre adott válaszként jön létre, egy 16-nál kisebb értékű RR mezővel. Ennek a válasznak a formátuma a következő mezőkből áll:

Mező	Hivatkozás
DF fedélzetről leadott adattovábbítás formátum	3.1.2.3.2.1.2
FS repülési állapot	3.1.2.6.5.1
DR fedélzetről leadott adattovábbítás kérés	3.1.2.6.5.2
UM közlemény	3.1.2.6.5.3
ID azonosság	3.1.2.6.7.1
AP címzés/paritás	3.1.2.3.2.1.3

3.1.2.6.7.1 ID: azonosság (A-módú kód). Ez a 13 bit-es (20-32) mező légijármű azonossági kódot tartalmaz a 3.1.1.6 pontban lévő A-módú válaszok sémájának megfelelően. A 20-as bittel kezdve a sorozat C1, A1, C2, A2, C4, A4, ZÉRO, B1, D1, B2, D2, B4, D4 lesz.

3.1.2.6.8 *Comm-B azonosság válasz, 21-es fedélzetről leadott adattovábbítási formátum*

1	6	9	14	20	33	89
DF	FS	DR	UM	ID	MB	AP
5	8	13	19	32	88	112

Ez a válasz az UF 5 vagy 21 formátumú lekérdezés hatására jön létre, amikor az RR mező értéke nagyobb lesz, mint 15. A válasz formátuma az alábbi mezőket tartalmazza:

Mező	Hivatkozás
DF fedélzetről leadott adattovábbítás formátum	3.1.2.3.2.1.2
FS repülési állapot	3.1.2.6.5.1
DR fedélzetről leadott adattovábbítás kérés	3.1.2.6.5.2
UM közlemény	3.1.2.6.5.3
ID azonosság	3.1.2.6.7.1
MB közlemény, Comm-B	3.1.2.6.6.1
AP címzés/paritás	3.1.2.3.2.1.3

3.1.2.6.9 *Kizárás protokollok*

3.1.2.6.9.1 *Többhelyes körhívás kizárás*

Megjegyzés. – A többhelyes kizárás protokoll megakadályozza, hogy egy válaszjeladó kiválasztást egy földi állomás letiltson egy olyan szomszédos földi állomástól jövő letiltási utasítással, amely földi állomás átlapoló lefedéssel rendelkezik.

3.1.2.6.9.1.1 A többhelyes kizárási utasítást az SD mezőben (3.1.2.6.1.4.1 pont) továbbítják. Egy kizárás utasítást egy II kód számára egy SD-ben továbbítják DI = 1, vagy DI = 7 mellett. Egy kizárás utasítást egy SI kód számára egy DI = 3 beállítású SD-ben továbbítanak. SI kizárást 1-el egyenlő LSS és az SD SIS almezőjében, egy nem-zérus lekérdező azonosító jelenléte jelzi. Egy II kizárás utasítást LOS kód egyenlő 1-el jelzik és egy nem-zérus lekérdező azonosító jelenlétével az SD IIS almezőjében. Miután egy válaszjeladó egy többhelyes kizárási utasítást tartalmazó lekérdezést vesz, ez a válaszjeladó elkezdi bármely csak S körhívás módú lekérdezés kizárását (azaz nem-vételét), amely tartalmazza a kizárás utasítást adó lekérdező azonosítóját. A kizárás a többhelyes kizárás utasítást tartalmazó lekérdezés utolsó vétele utáni T_L időközön keresztül tart (3.1.2.10.3.9 pont). Többhelyes kizárás nem akadályozza meg egy PR 8-tól 12-ig kódokat tartalmazó, csak S körhívás módú lekérdezés vételét. Ha egy kizárás utasítást (LOS = 1) IIS = 0-val együtt fogadnak, ezt nem-szelektív körhívás kizárásként kell értelmezni (3.1.2.6.9.2 pont).

1. Megjegyzés. – Tizenöt lekérdező tud független többhelyes II kizárás utasítást küldeni. Kiegészítésként, 63 lekérdező tud független SI kizárás utasítást küldeni. Ezeknek az utasításoknak mindegyikét külön kell időzíteni.

2. Megjegyzés. – Többhelyes kizárás (amely csak nem-zérus II kódokat használ) nem befolyásolja a válaszjeladó reagálását II egyenlő 0-t tartalmazó, csak S körhívás módú lekérdezésekre vagy A/C/S-módú lekérdezésekre.

3.1.2.6.9.2 *Nem szelektív körhívás kizárás*

1. Megjegyzés. – Azokban az esetekben, ahol a többhelyes kizárás protokollt nem igénylik (pl. nincs átlapoló lefedés, vagy földi állomás koordináció van föld-föld kommunikáción keresztül), a nem-szelektív kizárás protokoll használható.

A PC mezőben 1-es kódot tartalmazó lekérdezés vétele után a válaszjeladó kizárást indít (azaz nem vesz) a körhívás lekérdezés két típusánál:

a) csak S körhívás módú (UF = 11) II egyenlő 0 mellett; és

b) a 3.1.2.1.5.1.1 pont szerinti A/C/S körhívás mód mellett.

Ez a kizárás állapot egy T_D időközön keresztül tart (3.1.2.10.3.9 alpont) az utasítás utolsó vétele után. Nem-szelektív kizárás nem akadályozza meg PR 8-tól 12-ig kódokat tartalmazó, csak S körhívás módú lekérdezés vételét.

2. Megjegyzés. – Nem szelektív kizárás nem befolyásolja a válaszjeladó reagálását a II nem egyenlő 0-t tartalmazó, csak S körhívás módú lekérdezésekre.

3.1.2.6.10 *Alapvető adat protokollok*

3.1.2.6.10.1 *Repülési állapot protokoll.* Repülési állapotot az FS mezőben kell jelenteni (3.1.2.6.5.1 alpont).

3.1.2.6.10.1.1 *Figyelmeztetés.* Figyelmeztetés állapotot az FS mezőben kell közölni, ha A-módú válaszokban és DF egyenlő 5 és DF egyenlő 21 fedélzetről leadott adattovábbítási formátumokban átvitt azonosítás kódot a pilóta megváltoztatja.

3.1.2.6.10.1.1.1 *Permanens figyelmeztetés állapot.* A figyelmeztetés állapot fennmarad, ha az A-módú azonosítás kódot 7500-ra, 7600-ra vagy 7700-ra változtatják.

3.1.2.6.10.1.1.2 *Átmeneti figyelmeztetés állapot.* A figyelmeztetés állapot átmeneti és megszünteti magát T_c másodperc múlva, ha az A-módú azonosítás kódot a 3.1.2.6.10.1.1.1 pontban felsoroltaktól különböző értékűre változtatják.

Megjegyzés. – A T_c értéket a 3.1.2.10.3.9 alpont tartalmazza.

3.1.2.6.10.1.1.3 *A permanens figyelmeztetés állapot befejeződése.* A permanens figyelmeztetés állapotot be kell fejezni és átmeneti figyelmeztetés állapottal kell helyettesíteni, amikor az A-módú azonosítás kódot 7500, 7600 vagy 7700-tól eltérő értékre állítják.

3.1.2.6.10.1.2 *Földi közlés.* A légijármű földi állapotát az FS mezőben (3.1.2.6.5.1), a VS mezőben (3.1.2.8.2.1 alpont) és a CA mezőben (3.1.2.5.2.2.1) kell jelenteni Ha a földi állapotot (azaz a kerekeket vagy a futómű támaszokat terhelő súly) automatikusan jelző eszköz rendelkezésre áll a válaszjeladó adat csatoló felületnél, akkor ezt alapként kell használni a földi állapot jelentéséhez, ahogy ezt a 3.1.2.6.10.3.1 alpontban meghatározták. Ha a válaszjeladó adat csatoló felületénél nem áll rendelkezésre eszköz a földi állapot automatikus jelzésére (3.1.2.10.5.1.3 alpont), az FS és VS kódoknak jelezniük kell, hogy a légijármű a levegőben van, és a CA mezőnek jeleznie kell, hogy a légijármű vagy a levegőben, vagy a földön van (CA=6).

3.1.2.6.10.1.3 *Különleges pozíció azonosítás (SPI).* Az SPI impulzus egyenértékű jelét az S-módú válaszjeladókkal az FS mezőben kell továbbítani, és a felderítési állapot almezőben (SSS) kell továbbítani, amikor manuálisan aktivizálják. Ezt az impulzust a megkezdés után T_1 másodpercig továbbítják (3.1.1.6.3, 3.1.1.7.13 és 3.1.2.8.6.3.1.1 pontok).

Megjegyzés. – A T_1 értékét a 3.1.2.10.3.9 pont tartalmazza.

3.1.2.6.10.2 *Képesség közlés protokoll.* Az adatkapcsolat képesség jelentés regiszterének adatszerkezetét és tartalmát az együttműködési képesség figyelembevételével alakítsák ki.

1. Megjegyzés. – A légijármű képességet különleges mezőkben kell közölni, a következő pontokban megfogalmazottaknak megfelelően.

2. Megjegyzés. – A jelentési képesség regiszterének adatformátumát a "Technical Provisions for Mode S Services and Extended Squitter (Doc. 9871)" határozza meg.

3.1.2.6.10.2.1 *Képesség közlés.* A 3-bites CA mező, amelyet a körhívás válasz foglal magában DF egyenlő 11 mellett, az S-módú válaszjeladó alap-képességét közli a 3.1.2.5.2.2.1 pontban leírtaknak megfelelően.

3.1.2.6.10.2.2 *Adatkapcsolat képesség közlés*. Az adatkapcsolat közlés a lekérdezőt az S-mód telepítésével összefüggő adatkapcsolat képességének leírásával látja el.

Megjegyzés. – Az adatkapcsolat képesség közlését a 10_{16} regiszter tartalmazza a 11_{16} - 16_{16} közötti regiszterekben való kiterjesztés lehetőségével, amikor egy folytatás válik szükségessé.

3.1.2.6.10.2.2.1 *Kivonat és almezők MB-ben adatkapcsolat képességi közlésben*.

3.1.2.6.10.2.2.1.1 *A 10_{16} regiszterben tárolt adatkapcsolat képesség jelentés leh*ívása. A jelentés egy földi kezdeményezésű Comm-B típusú válaszként nyerhető ki, egy olyan lekérdezésre, amelyben RR=17 és DI≠7 vagy DI=7 és RRS=0 (lásd 3.1.2.6.11.2).

3.1.2.6.10.2.2.1.2 *Adatkapcsolat képesség eredete*. Az adatkapcsolat képesség jelentés a válaszjeladó, az ADLP és az ACAS képességét jelenti. A külső bemenet elvesztése esetén a válaszjeladó állítsa 0-ba az adatkapcsolat képesség jelentés megfelelő bitjeit.

3.1.2.6.10.2.2.1.3 Az adatkapcsolat képesség jelentés tartalmazza a 3-6 Táblázatban meghatározott információkat.

3.1.2.6.10.2.2.1.4 Az S-módú alhálózati verzió számozás, tartalmazzon - a korábbi fedélzeti berendezésekkel történő együttműködést biztosító információkat.

3.1.2.6.10.2.2.1.4.1 Az S-módú alhálózati verziószámozás jelezze, hogy az összes bennfoglalt alhálózati funkció megfelel a jelzett verzió számozás követelményeinek. Az S-módú alhálózati számozás nullától különbözzön, ha legalább egy DTE vagy specifikus S-módú szolgáltatást biztosít.

Megjegyzés – A verziószámozás nem jelzi az összes a verzió által tartalmazott lehetséges funkciót.

3.1.2.6.10.2.2.2 *Az adatkapcsolat képesség jelentés frissítése.* A válaszjeladó nem kevesebb, mint 4 sec időintervallumonként hasonlítsa össze a jelenlegi adatkapcsolat képesség státuszt (41-88 bitek az adatkapcsolat képesség jelentésben) a legutolsóként jelentettel, ha különbség áll fenn, kezdeményezzen egy módosított, Comm-B adatsugárzás (lásd 3.1.2.6.11.4) adatkapcsolat képesség jelentést, BDS1=1 (33-36) és BDS2=0 (37-40). A válaszjeladó, akkor is kezdeményezzen, szerkesszen és sugározzon adatkapcsolat képesség jelentésfrissítést, ha a légijármű adatkapcsolat képesség lecsökkent vagy elveszett. A válaszjeladó állítsa be a BDS kódot az adatkapcsolat képesség jelentéshez.

Megjegyzés – A BDS kód, válaszjeladó által történő beállítása biztosítja, hogy az adatkapcsolat képesség jelentés adatsugárzása tartalmazza az összes lehetséges kódot az adatkapcsolat képesség hibája esetén (pl. a válaszjeladó adatkapcsolat interfész meghibásodása).

3.1.2.6.10.2.2.3 *Az adatkapcsolat képesség jelentés bitek nullára állítása.*

Ha a válaszjeladó képesség, legalább 4 sec-os gyakorisággal meghibásodik, a válaszjeladó állítsa nullára (ZÉRÓ) az adatkapcsolat képesség jelentés 41 – 56 bitjeit (a válaszjeladó 10_{16} regisztere).

Megjegyzés – Az 1-8 bitek tartalmazzák a BDS1 és BDS2 kódokat. A 16-os bit és 37-40 bitek tartalmazzák az ACAS képesség információt. A 33-as bit jelzi a légijármű azonosító adat rendelkezésre állását és a válaszjeladó állítja be, ha az adat nem az ADLP-l, hanem különálló interfésztől származik. A 35-s bit az SI kódot mutatja. Az összes felsorolt bitet a válaszjeladó állítja be.

3.1.2.6.10.2.3 *Általános használatú GICB képesség jelentés*. A folyamatosan frissített, általános használatú GICB szolgáltatást a válaszjeladó 17_{16} regisztere tartalmazza.

3.1.2.6.10.2.4 S-*módú specifikus GICB képesség jelentés.* A rendelkezésre álló, S-módú specifikus GICB szolgáltatást a 18_{16} - $1C_{16}$ regiszterek tartalmazzák.

3.1.2.6.10.2.5 S-*módú specifikus MSP képesség jelentés*. A rendelkezésre álló, S-módú specifikus MDSP szolgáltatást a $1D_{16} – 1F_{16}$ regiszterek tartalmazzák.

3.1.2.6.10.3 A*utomatikus eszközökkel bejelentett földi telepítésű állomás érvényesítése*

Megjegyzés. – A függőleges állapot meghatározásához automatikus eszközökkel rendelkező légijárműveknél a CA mező jelenti, hogy a légijármű a levegőben van-e vagy a földön. Az ACAS II befogja a rövid vagy kiterjesztett squittert használó légijárművet ahol mindkettő tartalmazza a CA mezőt. Ha a légijármű földön tartózkodási állapotot jelent, az ACAS II ezt a légijárművet nem fogja lekérdezni annak érdekében, hogy csökkentsék a szükségtelen lekérdezési aktivitást. Ha a légijármű kiterjesztett squitter közlemények jelentésére alkalmas felszereléssel el van látva, a funkció, amely ezeket a közléseket megformázza, rendelkezhet információval, amely lehetővé teszi annak érvényesítését, hogy egy "földön" tartózkodást jelentő légijármű ténylegesen a levegőben van.

3.1.2.6.10.3.1 A földön tartózkodási feltétel meghatározására szolgáló automatikus eszközökkel felszerelt légijárműveknek, amelyek el vannak látva kiterjesztett squitter közlemények megformázására szolgáló eszközökkel, a következő érvényességi ellenőrzéseket kell elvégezniük:

Ha az automatikusan meghatározott levegő/föld állapot nem áll rendelkezésre vagy "levegőben" állapotú, érvényesítés nem végezhető. Ha az automatikusan meghatározott levegő/föld állapot rendelkezésre áll, és "a földön" állapotot jelentenek, a levegő/föld állapotot felülírja és "levegőben" jelzésre változtatja, ha a jármű kategóriára a 3-6 táblázatban adott feltételek teljesülnek.

Megjegyzés. – Bár ezt a vizsgálatot csak olyan légijárműtől követelik meg, amely kiterjesztett squitter közlemények megformázására fel van szerelve, ez minden légijármű számára kívánatos lenne.

3.1.2.6.11 *Szabványos hosszúságú kommunikáció protokollok*

1. Megjegyzés. – A szabványos hosszúságú kommunikációs protokollok a Comm-A és a Comm-B; az ezeket a protokollokat használó közleményeket a lekérdező irányítása alatt továbbítják. A Comm-A közleményeket közvetlenül a válaszjeladónak küldik, és egy tranzakción belül befejezik. A Comm-B közleményt levegőből a földre történő információ továbbításhoz használják és vagy a lekérdező, vagy a válaszjeladó kezdeményezi ezt. A földi kezdeményezésű Comm-B átadások esetében a lekérdező adatokat kér a válaszjeladótól, amely a közleményt ugyanabban a tranzakcióban szállítja. Levegő kezdeményezésű Comm-B átadások esetében a válaszjeladó közli a közlemény átadásának szándékát; egy ezt követő tranzakcióban egy lekérdező kivonatolja a közleményt.

2. Megjegyzés. – Nem-szelektív levegőből történő kezdeményezésű Comm-B protokollban minden szükséges tranzakciót bármelyik lekérdező irányíthatja.

3. Megjegyzés. – Az átlapoló lekérdezési lefedés néhány területén lehet, hogy nincsenek eszközök lekérdezési tevékenységek összehangolására földi kommunikáción keresztül. Levegőből történő kezdeményezésű Comm-B kommunikációs protokollok egynél több tranzakciót igényelnek a végrehajtáshoz. Gondoskodás történik annak biztosításáról, hogy egy Comm-B közleményt csak olyan lekérdező zárhasson ki, amely ténylegesen átviszi a közleményt. Ezt a többhelyes Comm-B kommunikációs protokollok használatán keresztül, vagy a megnövelt Comm-B kommunikációs protokollok használatán keresztül lehet megvalósítani.

4. Megjegyzés. – A többhelyes és a nem-szelektív kommunikációs protokollok nem használhatók egyidejűleg átlapoló lekérdező lefedésű régióban, hacsak a lekérdezőik nem koordinálják kommunikációs tevékenységüket a földi kommunikáción keresztül.

5. Megjegyzés. – A többhelyes kommunikációs protokoll független a többhelyes kizárási protokolltól. Azaz a többhelyes kommunikációs protokoll nem-szelektív kizárás protokollal használható és fordítva. A használatra kerülő kizárás és kommunikáció protokollok kiválasztása a felhasznált hálózati management eljárástól függ.

6. Megjegyzés. – A Comm-B protokoll rádióadása egy közlemény készítésére használható, amely minden aktív lekérdező rendelkezésére áll.

3.1.2.6.11.1 *Comm-A.* A lekérdező egy Comm-A közleményt szállít egy lekérdezés MA mezejében UF = 20 vagy 21 lekérdezés esetében.

3.1.2.6.11.1.1 *Comm-A műszaki nyugtázása*. Egy Comm-A lekérdezést egy válaszjeladó automatikusan műszakilag nyugtáz a kívánt válasz továbbításával (3.1.2.10.5.2.2.1 pont).

Megjegyzés. – Egy, a válaszjeladótól érkező, a 3.1.2.4.1.2.3 d) és 3.1.2.4.1.3.2.2.2 pontok szabályainak megfelelő válasz annak elismerését jelenti a lekérdező részére, hogy a közlést megkapta és a válaszjeladó tárolta. Ha vagy a föld-légijármű kapcsolat, vagy fedélzetről leadott adattovábbítás hiányzik, ez a válasz is hiányozni fog, és a lekérdező normálisan a közleményt újra elküldi. A fedélzetről leadott adattovábbítás hiányának esetében a válaszjeladó a választ többször is megkaphatja.

3.1.2.6.11.1.2 *Comm-A adás.* Ha egy Comm-A sugárzású lekérdezés érkezik (3.1.2.4.1.2.3.1.3 alpont), az információ továbbítást a 3.1.2.10.5.2.1.1 pontnak megfelelően kezelik, de más válaszjeladó feladatot nem befolyásol és válasz továbbítás nem történik.

1. Megjegyzés. – Nincs műszaki nyugtázás egy Comm-A sugárzású közlemény számára.

2. Megjegyzés. – Mivel a válaszjeladó nem dolgozza fel a Comm-A sugárzású lekérdezés szabályozási mezejét, az UF mezőt követő 27 bit is a felhasználói adatok rendelkezésére áll.

3.1.2.6.11.2 *Földi kezdeményezésű Comm-B*

3.1.2.6.11.2.1 *Comm-B adat szelektor, BDS.* A 8-bites BDS kód határozza meg a regisztert, amelynek tartalmát a Comm-B válasz MB mezejében továbbítják. Ezt két, egyenként 4-bites csoportban fejezik ki: BDS1 (legjelentősebb 4 bit) és BDS2 (legkisebb jelentőségű 4 bit).

Megjegyzés. – A válaszjeladó regiszter szétosztás a 10. Annex, III. kötet, I. rész, 5. Fejezet 5-24 táblázatban kerül ismertetésre.

3.1.2.6.11.2.2 *BDS1 kód.* A BDS1 kód az ellenőrzés vagy a Comm-A lekérdezés RR mezejében meghatározottaknak megfelelő.

3.1.2.6.11.2.3 *BDS2 kód.* A BDS2 kód az SD mező RRS almezejében (3.1.2.6.1.4.1 alpont) előírtaknak felel meg, amikor DI = 7. Ha nincs BDS2 kód meghatározva (azaz DI nem egyenlő 7), ez azt jelenti, hogy BDS2 = 0.

3.1.2.6.11.2.4 *Protokoll.* Ilyen kérés vétele esetén, a válaszadás MB mezőjének tartalmaznia kell a kért, földről történő kezdeményezésű Comm-B regiszter tartalmát.

3.1.2.6.11.3 *Levegőből történő kezdeményezésű Comm-B.*

3.1.2.6.11.3.1 *Általános protokoll.* A válaszjeladó közli egy levegőből történő kezdeményezésű Comm-B közlemény meglétét az 1-es kódnak a DR mezőbe való beillesztésével. Egy levegőből történő kezdeményezésű Comm-B közlemény kinyeréséhez a lekérdező egy Comm-B közlés válasz iránti igényt továbbít egy sorra következő lekérdezésben, RR egyenlő 16 segítségével, és ha DI egyenlő 7, RRS-nek egyenlőnek kell lenni 0-val. (3.1.2.6.11.3.2.1 és 3.1.2.6.11.3.3.1 pontok). Ennek a kérés kódnak a vétele a válaszjeladót egy levegőből történő kezdeményezésű Comm-B közlemény átvitelére készteti. Ha egy levegőből történő kezdeményezésű Comm-B közlemény továbbítására vonatkozó parancsot vesz, míg nincsen továbbításra váró közlemény, a válasz MB mezőben lévő összes ZÉRO-t tartalmazza.

A közleményt szállító válasz továbbra is az 1-es kódot tartalmazza a DR mezőben. Miután egy Comm-B kizárást valósítanak meg, a közleményt törlik és az ehhez a közleményhez tartozó DR kódot azonnal eltávolítják. Ha egy másik levegőből történő kezdeményezésű Comm-B közlemény vár továbbításra, a válaszjeladó a DR kódot 1-re állítja, úgyhogy a válasz ennek a következő közleménynek a bejelentését tartalmazza.

Megjegyzés. – A közlési és törlési protokoll biztosítja, hogy egy légi kezdeményezésű közlemény nem vész el a fedélzetre irányuló vagy fedélzetről leadott adattovábbítás meghibásodása miatt, amely a kézbesítési folyamat során fordul elő.

3.1.2.6.11.3.2 *Kiegészítő protokoll a többhelyes levegőből történő kezdeményezésű Comm-B-hez.*

Megjegyzés. – Egy légi kezdeményezésű, továbbításra váró Comm-B közlemény bejelentését egy többhelyes foglalási állapot közlemény kisérheti az UM mezőben (3.1.2.6.5.3.2 alpont).

Ajánlás. – *Egy lekérdező ne kisérelje meg egy közlemény kinyerését, ha megállapította, hogy az nem a fenntartott hely.*

3.1.2.6.11.3.2.1 *Közlemény továbbítás.* Egy lekérdező egy Comm-B helyfoglalást és egy légi kezdeményezésű Comm-B közlemény kinyerését egy ellenőrzési vagy Comm-A lekérdezés UF egyenlő 4, 5, 20 vagy 21 továbbításával kérheti, amely a következőket tartalmazza:

RR = 16
DI = 1
IIS = kijelölt lekérdező azonosító
MBS = 1 (Comm-B helyfoglalás kérés)

Megjegyzés. – Egy Comm-B többhelyes helyfoglalási kérést normál módon egy Comm-B helyfoglalási állapot kérés kisér (RRS = 1). Ez azt idézi elő, hogy a fenntartott helyű lekérdező azonosítót a válasz UM mezejébe illesztik be.

3.1.2.6.11.3.2.1.1 Az erre a lekérdezésre reagáló protokoll eljárás a B-időzítő állapotától függ, amely azt jelzi, hogy a Comm-B helyfoglalás működik-e. Ez az időzítő T_R másodpercig fut.

1. Megjegyzés. – A T_R értéke a 3.1.2.10.3.9 pontban található.

a) Ha a B-időzítő nem működik, a válaszjeladó a következők által biztosít helyfenntartást a kérő lekérdezőnek:

1) a lekérdezés IIS-ének tárolása mint a Comm-B II; és

2) a B-időzítő indításával.

Többhelyes Comm-B tartalékolást a válaszjeladó nem tud biztosítani, hacsak egy levegőből történő kezdeményezésű Comm-B közlemény nem vár továbbításra és a hívó lekérdezés nem tartalmazza az RR egyenlő 16, DI egyenlő 1, MBS egyenlő 1 és IIS nem egyenlő 0 értékeket.

b) Ha a B-időzítő működik és a lekérdezés IIS-e egyenlő a Comm-B II-vel, a válaszjeladó újra indítja B-időzítőt.

c) Ha a B-időzítő működik és a lekérdezés IIS-e nem egyenlő a Comm-B II-vel, akkor nincs változás a Comm-B II-nél vagy a B-időzítőnél.

2. Megjegyzés. – A c) esetében a helyfoglalás kérést megtagadták.

3.1.2.6.11.3.2.1.2 Mindegyik esetben a válaszjeladó Comm-B közleménnyel válaszol az MB mezőben.

3.1.2.6.11.3.2.1.3 Egy lekérdező az UM mezőben való kódoláson keresztül meghatározza, hogy ennek a közleménynek ez egy fenntartott helye-e. Ha ez a fenntartott hely, törekedni fog a közlemény kizárására a következő lekérdezésben. Ha az nem a fenntartott hely, akkor nem fogja megkísérelni a közlemény kizárását.

3.1.2.6.11.3.2.2 *Többhelyes irányított Comm-B átvitelek.* Egy levegőből történő kezdeményezésű Comm-B közleménynek egy meghatározott lekérdezőhöz való irányítására a többhelyes Comm-B protokollt használják. Ha a B-időzítő nem működik, a kívánt rendeltetési hely leképező azonosítóját, mint Comm-B II-t kell tárolni. Ezzel egyidőben a B-időzítőt indítani kell és a DR-kódot 1-esre kell állítani. Többhelyes irányított Comm-B közleménynél a B-időzítő nem fog automatikusan kiidőzíteni, hanem folytatja a működését, amíg:

a) a tárolt hely az üzenetet olvassa és kizárja; vagy

b) az adatkapcsolati repüléselektronika a közleményt törli (3.1.2.10.5.4 alpont)

Megjegyzés. – A 3.1.2.6.5.3 és 3.1.2.6.11.3.2.1 pontok protokolljai a közleménynek a fenntartott helyre való juttatását fogják eredményezni. Az adatkapcsolati repüléselektronika a közleményt törölheti, ha a fenntartott helyre való juttatást nem lehet megvalósítani.

3.1.2.6.11.3.2.3 *Többhelyes Comm-B kizárás.* A lekérdező egy többhelyes levegőből történő kezdeményezésű Comm-B-t vagy egy ellenőrzési, vagy egy Comm-A lekérdezéssel zár ki, amely tartalmazza:

vagy DI = 1
IIS = kijelölt lekérdező azonosító
MBS = 2 (Comm-B kizárás)

vagy DI = 0, 1, vagy 7
IIS = kijelölt lekérdező azonosító
PC = 4 (Comm-B kizárás)

A válaszjeladó összehasonlítja a lekérdező IIS-ét a Comm-B II-vel és ha a lekérdező azonosítók nem illeszkednek, a közlemény nem kerül törlésre, a Comm-B II, a B-időzítő és a DR kód változatlan marad. Ha a lekérdező azonosítók illeszkednek, a válaszjeladó a Comm-B II-t 0-ra állítja, visszaállítja a B-időzítőt, törli a DR kódot ehhez a közleményhez és törli magát a közleményt is. A válaszjeladó nem zár ki többhelyes levegő kezdeményezésű Comm-B közleményt, hacsak ezt nem olvasta le legalább egyszer a fenntartott hely.

3.1.2.6.11.3.2.4 *A Comm-B helyfoglalás automatikus megszűnése.* Ha a B-időzítő periódus lejár, mielőtt a többhelyes kizárás végbemegy, a Comm-B II-t 0-ra állítják és a B-időzítőt visszaállítják. A Comm-B közleményt és a DR mezőt a válaszjeladó nem törli.

Megjegyzés. – Ez lehetővé teszi egy másik hely számára ennek a közleménynek a leolvasását és törlését.

3.1.2.6.11.3.3 *Kiegészítő protokoll nem-szelektív levegőből történő kezdeményezésű Comm-B-hez.*

Megjegyzés. – Azokban az esetekben, amikor nem igényelnek többhelyes protokollt (azaz nincs átlapoló lefedés vagy érzékelő koordináció a föld-föld kommunikáción keresztül), a nem-szelektív levegő kezdeményezésű Comm-B protokoll használható.

3.1.2.6.11.3.3.1 *Közlemény továbbítás*. A lekérdező a közleményt vagy RR egyenlő 16 és DI nem egyenlő 7, vagy RR egyenlő 16, DI egyenlő 7 és RRS egyenlő 0 továbbításával nyeri ki egy ellenőrzési vagy Comm-A lekérdezésben.

3.1.2.6.11.3.3.2 *Comm-B kizárás.* A lekérdező a PC egyenlő 4 továbbításával kizár egy nem-szelektív, levegőből történő kezdeményezésű Comm-B közleményt (Comm-B kizárás). Ennek az utasításnak a vétele nyomán a válaszjeladó kizárást végez, hacsak a B-időzítő nem működik. Ha a B-időzítő működik, jelezve azt, hogy többhelyes helyfoglalás van érvényben, kizárás megy végbe a 3.1.2.6.11.3.2.3 pontnak megfelelően. A válaszjeladó nem zár ki nem-szelektív levegő kezdeményezésű Comm-B közleményt, hacsak azt egy lekérdezés, nem-szelektív protokollt használva, nem olvasta le legalább egyszer.

3.1.2.6.11.3.4 *Megnövelt, levegőből történő kezdeményezésű Comm-B protokoll.*

Megjegyzés. – A megnövelt, levegőből történő kezdeményezésű Comm-B protokoll nagyobb adatkapcsolat kapacitást szolgáltat levegőből történő kezdeményezésű Comm-B közlemények párhuzamos továbbításának lehetővé tételével maximálisan tizenhat lekérdező által mindegyik II kódnál egyet. Többhelyes Comm-B helyfoglalás szükségessége nélküli működés átlapolásos lefedési régiókban lehetséges olyan lekérdezők számára, amelyek a megnövelt levegőből történő kezdeményezésű Comm-B protokollal fel vannak szerelve. A protokoll teljesen megegyezik a szabványos többhelyes protokollal és így kompatibilis azokkal a lekérdezőkkel, amelyek nincsenek felszerelve a megnövelt protokollal.

3.1.2.6.11.3.4.1 A válaszjeladó képes a tizenhat II kód mindegyikének tárolására: (1) levegőből történő kezdeményezésű vagy többhelyes-irányított Comm-B közlemény és (2) GICB 2-4 regiszterek tartalma.

Megjegyzés. – A 2-4 GICB regisztereket a SARP S-módú alhálózatban meghatározott Comm-B kapcsolati protokollhoz használják (10. Annex, III. kötet, I. rész, 5. Fejezet).

3.1.2.6.11.3.4.2 *Megnövelt többhelyes levegőből történő kezdeményezésű Comm-B protokoll.*

3.1.2.6.11.3.4.2.1 *Kezdeményezés*. Levegő kezdeményezésű Comm-B közlemény belépést a válaszjeladóba a II = 0-nak kijelölt regiszterekben tárolják.

3.1.2.6.11.3.4.2.2 *Bejelentés és kinyerés*. Várakozási levegőből történő kezdeményezésű Comm-B közleményt a válasz DR mezőjében bejelentik minden lekérdezőnek, amely részére többhelyes irányított Comm-B közlemény nem várakozik. A bejelentés válasz UM mezője mutatja, hogy a közlemény nincs fenntartva semmilyen II kód részére, azaz az IIS almező 0-ra van állítva. Ha ennek a közleménynek az olvasására vonatkozó utasítás érkezik egy adott lekérdezőtől, a közleményt tartalmazó válasz IIS almező tartalmat foglal magában, amely jelzi, hogy a közlemény az II kód részére van fenntartva, amely attól a lekérdezőtől származó lekérdezésben szerepel. A kiolvasás után és a kizárásig a közlemény továbbra is ennek a II kódnak van kijelölve. Ha egy közlemény egy II kód részére egyszer ki van jelölve, ennek a közleménynek a bejelentését már nem lehet más II kódú lekérdezőknek adott válaszokban megtenni. Ha a közleményt a kijelölt lekérdező nem zárja ki a B-időzítő periódusa alatt, a közlemény visszatér a többhelyes levegőből történő kezdeményezés állapothoz, és a folyamat megismétlődik. Egyidőben csak egy többhelyes levegőből történő kezdeményezésű Comm-B közleményt lehet feldolgozni.

3.1.2.6.11.3.4.2.3 *Kizárás*. Többhelyes levegőből történő kezdeményezésű közlemény kizárása csak olyan lekérdezőtől vehető, amelyik akkor ki van jelölve a közlemény továbbítására.

3.1.2.6.11.3.4.2.4 *A következő közlemény várakozásának bejelentése.* A DR mező egy Comm-B kizárást tartalmazó lekérdezésre adott válaszban várakozó közleményt jelez, ha egy kijelöletlen levegőből történő kezdeményezésű közlemény várakozik, és nincs kijelölve egy II kódnak, vagy egy többhelyes irányított közlemény várakozik erre az II kódra (3.1.2.6.11.3.4.3 pont)

3.1.2.6.11.3.4.3 *Megnövelt többhelyes irányított Comm-B protokoll.*

3.1.2.6.11.3.4.3.1 *Kezdeményezés.* Ha egy többhelyes irányított közlemény a válaszjeladó bemeneteként szerepel, akkor azt a közlemény részére meghatározott II-kód részére kijelölt Comm-B regiszterekbe helyezik el. Hogyha ennek az II-kódnak a regiszterei már foglaltak, (azaz a többhelyes irányított kód már feldolgozásban van ehhez az II-kódhoz) az új közleménynek sorba kell állnia, amíg ennek az II-kódnak a folyó tranzakciója ki nem záródik.

3.1.2.6.11.3.4.3.2 *Bejelentés.* A továbbításra váró Comm-B közlemény bejelentését a 3.1.2.6.5.2 pontban meghatározott DR mező felhasználásával lehet biztosítani a rendeltetési hely lekérdező II-kódjával, amelyet az IIS almező tartalmaz, ahogyan azt a 3.1.2.6.5.3.2 pontban meghatározták. A DR mező és az IIS almező tartalmát meghatározva annak a lekérdezőnek a részére kell beállítani, amelynek a választ fogadnia kell. A várakozó többhelyes irányított közleményt csak a szándékozott lekérdezőnek adott válaszokban lehet bejelenteni. Nem lehet bejelentést alkalmazni más lekérdezőknek adott válaszokban.

1. Megjegyzés. – Ha egy többhelyes irányított közlemény II = 2-re vár, ennek a lekérdezőnek adott ellenőrzési válaszok DR = 1 és IIS = 2 tartalmuk lesz. Ha ez az egyetlen közlemény áll feldolgozás alatt, az összes többi lekérdezőnek adott válasz azt fogja jelölni, hogy nincs várakozó közlemény.

2. Megjegyzés. – A párhuzamos működés engedélyezésén felül a bejelentésnek ez a formája a fedélzetről leadott ELM-ek bejelentésének magasabb fokát teszi lehetővé. A fedélzetről leadott ELM és a Comm-B bejelentések felosztják a DR mezőt. A kódolási korlátozások miatt egyidőben csak egy bejelentés mehet végbe. Abban az esetben, ha egy Comm-B és egy fedélzetről leadott ELM várakozik, a Comm-B-nek van bejelentés elsőbbsége. A fenti példában, ha egy levegőből irányított Comm-B várt II = 1-re, és egy többhelyes irányítású fedélzetről leadott ELM várt II = 6-ra, mindkét lekérdező az első pásztában keresi a bejelentést, mivel nem volt Comm-B bejelentés II = 6-ra, amely blokkolná a várakozó fedélzetről leadott ELM-et.

3.1.2.6.11.3.4.3.3 *Kizárás*. Kizárás végrehajtása a 3.1.2.6.11.3.2.3 pontban meghatározottak szerint történik.

3.1.2.6.11.3.4.3.4 *A következő várakozó közlemény bejelentése.* A DR mező egy Comm-B kizárást tartalmazó lekérdezésre adott válaszban várakozó közleményt jelez, ha egy másik többhelyes irányítású közlemény várakozik erre a II kódra, vagy ha egy levegő kezdeményezésű közlemény várakozik és nem lett kijelölve II kód részére (lásd 3.1.2.6.11.3.4.4.2 alpont).

3.1.2.6.11.3.4.4 *Megnövelt nem-szelektív Comm-B protokoll.* Egy nem-szelektív Comm-B közlemény rendelkezésre állását minden lekérdezőnek bejelentik. Más esetben a protokoll a 3.1.2.6.11.3.3 pontban meghatározottaknak megfelelő.

3.1.2.6.11.4 *Comm-B közvetítés.*

1. Megjegyzés. – Egy Comm-B üzenet az értéktartományon belül lévő valamennyi aktív lekérdező számára közvetíthető. Az üzeneteket váltogatva 1 és 2 számjegyekkel látják el és 18 másodperc után maguktól törlődnek. Lekérdezők semmiképpen sem törölhetnek Comm-B közvetítéses üzeneteket.

2. Megjegyzés. – A Comm-B közvetítés használata olyan információk továbbítására korlátozódik, amelyek nem igényelnek rákövetkező földi kezdeményezésű fedélzetre irányuló adattovábbítási reagálást.

3. Megjegyzés. – A Comm-B közvetítés ciklushoz használt időzítő ugyanaz, mint amit a Comm-B többhelyes protokollhoz használnak.

4. Megjegyzés. - A Comm-B adatközléshez használt adatformátumot a "Technical Provisions for Mode S Services and Extended Squitter (Doc. 9871)"határozza meg

3.1.2.6.11.4.1 *Kezdeményezés.* Comm-B közvetítést nem kezdeményeznek, ha egy légi kezdeményezésű Comm-B továbbításra vár. A Comm-B közvetítés ciklus a következőkkel kezdődhet:

a) a DR 4-es vagy 5-ös kód (3.1.2.6.5.2 pont) behelyezése a válaszokba DF4, 5, 20 vagy 21-el; és

b) a B-számláló indításával.

3.1.2.6.11.4.2 *Kinyerés.* A közvetítés közlemény kinyeréséhez egy lekérdező RR egyenlő 16 és DI nem egyenlő 7 vagy RR egyenlő 16 és DI egyenlő 7, RRS egyenlő 0 továbbítást végez egy következő lekérdezésben.

3.1.2.6.11.4.3 *Megszűnés.* Amikor a B-időzítő periódus letelik, a válaszjeladó törli a DR kódot ehhez a közleményhez, félreteszi az éppen ott lévő közvetítési közleményt és megváltoztatja a közvetítési közlemény számozását (1-ről 2-re vagy 2-ről 1-re) a következő Comm-B közvetítés előkészítésében.

3.1.2.6.11.4.4 *Megszakítás.* Hogy megakadályozzuk a Comm-B közvetítés ciklust a légi kezdeményezésű Comm-B közlemény továbbításának elhalasztásában, gondoskodni kell, hogy egy légi kezdeményezésű Comm-B megszakítsa a közvetítési ciklust. Ha egy közvetítési ciklust megszakítanak, a B-időzítőt visszaállítják, a megszakított közvetítési közleményt visszatartják, és a közlemény számozást nem változtatják meg. A megszakított közvetítési közlemény továbbítása akkor kezdődik el, amikor nincs érvényben légi kezdeményezésű Comm-B tranzakció. A közlemény közvetítése akkor a B-időzítő teljes időtartama alatt folyik.

3.1.2.6.11.4.5 *Megnövelt közvetítési Comm-B protokoll.* Közvetítési Comm-B közleményt minden II kódot használó lekérdezőnek be kell jelenteni. A közlemény aktív marad a B-időzítő periódusa alatt minden II kód számára. A közvetítés nem közvetítési Comm-B által történő megszakításáról való gondoskodást a 3.1.2.6.11.4.4 alpont szerint minden egyes II kódra biztosítani kell. Amikor a B-időzítő az összes II kódot elérte, a közvetítési közlemény automatikusan törlődik a 3.1.2.6.11.4.3 alpont szerint. Új közvetítési közleményt nem kezdeményeznek, amíg a meglévő közvetítést nem szabadítják fel.

Megjegyzés. – Annak következtében, hogy a közvetítési közlemény megszakítás mindegyik II kódtól függetlenül történik, lehetséges, hogy a közvetítési közlemény szünet különböző II kódoknál különböző időben jelenik meg.

3.1.2.7 Kiterjesztett hosszúságú kommunikációs tranzakció

1. Megjegyzés. – Hosszú közleményeket akár fedélzetre irányuló-, akár fedélzetről leadott adattovábbításon kiterjesztett hosszúságú közlemény (ELM) protokollal lehet továbbítani Comm-C (UF = 24) és Comm-D (DF = 24) formátumok felhasználásával. A kiterjesztett hosszúságú közlemény fedélzetre irányuló adattovábbítási protokoll maximum tizenhat 80-bites közlemény szegmens továbbításáról gondoskodik a fedélzetre irányuló kapcsolaton, mielőtt válasz kérés érkezne a válaszjeladótól. Ezek lehetővé teszik a megfelelő eljárást a fedélzetről leadott adattovábbításon is.

2. Megjegyzés. – Az átlapolási lekérdező lefedés bizonyos területein semmiképpen sem lehet koordináló lekérdező tevékenység a földi kommunikáción keresztül. Azonban az ELM kommunikációs protokollok egynél több tranzakciót igényelnek a végrehajtáshoz; koordináció ily módon ahhoz szükséges, hogy biztosítsák a különböző közleményektől származó szegmensek átlapolódásának megakadályozását, és hogy a nem odatartozó lekérdező ne zárja ki elkerülhetetlenül ezt a tranzakciót. Ezt vagy a többhelyes kommunikációs protokollok használatával, vagy megnövelt kiterjesztett hosszúságú közlemény protokollok használatával lehet megvalósítani.

3. Megjegyzés. – Fedélzetről leadott kiterjesztett hosszúságú közleményeket csak a lekérdező engedély adása után továbbítanak. A továbbításra kerülő szegmenseket a Comm-D válaszok tartalmazzák. Mint a légi kezdeményezésű Comm-B közleményeknél, a fedélzetről leadott adattovábbítás kiterjesztett hosszúságú közleményeket vagy az összes lekérdezőnek bejelentik, vagy csak egy meghatározott lekérdezőhöz irányítják. Az előző esetben egy egyedi lekérdező használhatja a többhelyes protokollt, hogy fenntartsa magának a lehetőséget a fedélzetről leadott adattovábbítás kiterjesztett hosszúságú közlemény tranzakciójára. A válaszjeladót utasítani lehet a lekérdező azonosítására, amelyik lefoglalta a válaszjeladót egy kiterjesztett hosszúságú közlemény tranzakcióhoz. Csak ez a lekérdező zárhatja ki a kiterjesztett hosszúságú közlemény tranzakciót és tartalékolást.

4. Megjegyzés. – A többhelyes protokollt és a nem-szelektív protokollt nem lehet egyidejűleg felhasználni átlapoló lekérdező átfedéses régióban, hacsak a lekérdezők nem koordinálják kommunikációs tevékenységüket egy földi kommunikáción keresztül.

3.1.2.7.1 *Comm-C, 24-es fedélzetre irányuló adattovábbítási formátum*

1	3	5	9	89
UF	RC	NC	MC	AP
2	4	8	88	112

Ennek a lekérdezőnek a formátuma a következő mezőket tartalmazza:

Mező	*Hivatkozás*
UF fedélzetre irányuló adattovábbítási formátum	3.1.2.3.2.1.1
RC válasz szabályozás	3.1.2.7.1.1
NC C szegmens száma	3.1.2.7.1.2
MC közlemény, Comm-C	3.1.2.7.1.3
AP címzés/paritás	3.1.2.3.2.1.3

3.1.2.7.1.1 *RC: válasz szabályozás.* Ez a 2-bites (3 - 4) fedélzetre irányuló kapcsolati mező jelöli ki a szegmens fontosságát és a válasz döntést.

Kódolás

RC	=	0	jelöli a fedélzetre irányuló ELM kezdeti szegmenst MC-ben
	=	1	jelöli a fedélzetre irányuló ELM közbenső szegmenst MC-ben
	=	2	jelöli a fedélzetre irányuló ELM végső szegmenst MC-ben
	=	3	a fedélzetről leadott ELM küldés iránti kérést jelöli

3.1.2.7.1.2 *NC: C szegmens száma.* Ez a 4-bites (5 - 8) fedélzetre irányuló adattovábbítási mező az MC által tartalmazott közlemény számát jelöli ki (3.1.2.7.4.2.1 pont). Az NC-t bináris számként kódolják.

3.1.2.7.1.3 *MC: közlemény, Comm-C.* Ez a 80-bites (9 - 88) fedélzetre irányuló adattovábbítási mező tartalmazza:

a) a 4-bites (9 - 12) IIS almezőt tartalmazó válaszjeladóhoz tartozó fedélzetre irányuló ELM átvitelére használt sorozat egyik szegmensét;

b) a fedélzetről leadott ELM, a 16-bites (9-24) SRS almező (3.1.2.7.7.2.1 alpont) és a 4-bites (25-28) IIS altér szabályozó kódját.

Megjegyzés. – A közlemény tartalmát és a kódokat ez a fejezet nem tartalmazza, kivéve a 3.1.2.7.7.2.1 pontot.

3.1.2.7.2 *Lekérdező-válasz protokoll UF-24-nél*

Megjegyzés. – Lekérdezés-válasz koordináció a fenti formátumnál a 3-5 táblázatban körvonalazott protokollt követi (3.1.2.4.1.3.2.2 alpont).

3.1.2.7.3 *Comm-D, 24-es fedélzetről leadott adattovábbítási formátum*

1		4	5	9	89
DF		KE	ND	MD	AP
2			8	88	112

A jelen válasz formátuma tartalmazza ezeket a mezőket:

Mező	*Hivatkozás*
DF fedélzetről leadott adattovábbítási formátum	3.1.2.3.2.1.2
tartalék - 1 bit	
KE szabályozás, ELM	3.1.2.7.3.1
ND D-szegmens száma	3.1.2.7.3.2
MD közlemény, Comm-D	3.1.2.7.3.3
AP címzés/paritás	3.1.2.3.2.1.3

3.1.2.7.3.1 *KE: Szabályozás, ELM.* Ez az 1-bites (4) fedélzetről leadott adattovábbítás mező az ND és MD mezők tartalmát határozza meg.

Kódolás

KE = 0 jelöli a fedélzetről leadott ELM továbbítást
1 jelöli a fedélzetre irányuló ELM elismerést

3.1.2.7.3.2 *ND: D-szegmens száma.* Ez a 4-bites (5-8) fedélzetről leadott adattovábbítási mező az MD által tartalmazott közlemény szegmens számát jelöli ki (3.1.2.7.7.2 alpont). Az ND-t bináris számként kódolják.

3.1.2.7.3.3 *MD: Közlemény, Comm-D.* Ez a 80-bites (9-88) fedélzetről leadott adattovábbítási mező tartalmazza:

a) a lekérdezőhöz tartozó fedélzetről leadott ELM továbbítására használt sorozat egyik szegmensét, vagy

b) fedélzetre irányuló ELM szabályozó kódját.

3.1.2.7.4 *Többhelyes fedélzetre irányuló ELM protokoll*

3.1.2.7.4.1 *Többhelyes fedélzetre irányuló ELM helyfoglalás.* Egy lekérdező kérjen egy helyfoglalást egy fedélzetre irányuló ELM részére az alábbi tartalmú felderítési vagy Comm-A lekérdezés továbbításával:

DI = 1
IIS = kijelölt lekérdező azonosító
MES = 1 vagy 5 (fedélzetre irányuló ELM helyfoglalás kérés)

Megjegyzés. – Többhelyes fedélzetre irányuló ELM helyfoglalás kérést általában egy fedélzetre irányuló ELM helyfoglalási állapot kérés kísér (RSS = 2). Ez azt idézi elő, hogy a lefoglalt hely lekérdező azonosítóját behelyezik a válasz UM mezőjébe.

3.1.2.7.4.1.1 Protokoll eljárás erre a lekérdezésre való reagálásban a C-időzítő állapotától függ, amely jelzi, ha egy fedélzetre irányuló ELM helyfoglalás aktív. Ez az időzítő T_R másodpercen át fut.

1. Megjegyzés. – A T_R értéket a 3.1.2.10.3.9 alpont tartalmazza.

a) ha a C-időzítő nem működik, a válaszjeladó az alábbiak segítségével nyújt helyfoglalást a lekérdező kezdeményező számára:

1) a lekérdező IIS tárolása, minta Comm-C II és

2) a C-időzítő elindítása

b) Ha a C-időzítő működik és a lekérdező IIS-e egyenlő a Comm-C II-vel, a válaszjeladó a C-időzítőt újraindítja.

c) Ha a C-időzítő működik és a lekérdező IIS-e nem egyenlő a Comm-CII-vel, a Comm-CII vagy a CS-időzítő változatlan marad.

2. Megjegyzés. – A c) esetben a helyfoglalási kérést megtagadták.

3.1.2.7.4.1.2 A lekérdező nem indít ELM aktivitást, hacsak, ugyanazon pászta során, miután fedélzetre irányuló ELM állapot közlést kért, nem a saját lekérdező azonosítóját kapta helyfoglalási lekérdezőként a fedélzetre irányuló ELM-nél az UM mezőben.

Megjegyzés. – Ha ELM tevékenység ugyanazon pásztában nem indul helyfoglalásként, akkor a következő pászta során új helyfoglalás kérést lehet csinálni.

3.1.2.7.4.1.3 Ha a fedélzetre irányuló ELM továbbítása nem fejeződik be az aktuális pászta során, a lekérdező biztosítson magának helyfoglalást, mielőtt további szegmenseket továbbítana a következő pászta során.

3.1.2.7.4.2 *Többhelyes fedélzetre irányuló ELM továbbítás.* A fedélzetre irányuló ELM minimális hossza 2 szegmens, a maximális hossz 16 szegmens.

3.1.2.7.4.2.1 *Kezdeti szegmens átvitel.* A lekérdező az ELM fedélzetre irányuló adat továbbítást egy n-szegmensű közlemény (NC a 1-tól n-ig terjedő értékeket veszi fel) részére egy RC egyenlő 0-t tartalmazó Comm-C átvitelével kezdi. Az MC mezőben továbbított közlemény szegmens a közlemény utolsó szegmense és NC egyenlő n-1 értéket hordoz.

Egy szegmens kezdet beállítás (RC = 0) vétele után a válaszjeladó létrehoz egy (kezdeti) "beállítást", amelyet a következők határoznak meg:

a) az előző szegmens tárolási regiszterek és a hozzájuk tartozó TAS mező számának és tartalmának felszabadítása;

b) tároló térköz kijelölése ennek a lekérdezésnek az NC-jében bejelentett szegmensek száma részére; és

c) a vett szegmens MC mezejének tárolása.

A válaszjeladó erre a lekérdezésre nem válaszolhat.

Egy másik kezdeti szegmens vétele egy új felállítást eredményez a válaszjeladón belül.

3.1.2.7.4.2.2 *Továbbítás nyugtázás.* A válaszjeladó a TAS almezőt egy fedélzetre irányuló ELM sorozatban addig vett szegmensek közlésére használja. A TAS almező által tartalmazott információkat a válaszjeladó folyamatosan felfrissíti, ahogyan a szegmensek érkeznek.

Megjegyzés. – A fedélzetre irányuló átvitelben elvesztett szegmenseket a TAS közlésben lévő hiányukkal jelzi, és a lekérdező újra továbbítja őket, amely aztán végső szegmenseket küld tovább a közlemény terjedelmének értékelése céljából.

3.1.2.7.4.2.2.1 *TAS, továbbítás nyugtázás almező MD-ben.* Ez a 16-bites (17-32) fedélzetről leadott adattovábbítás almező MD-ben közli a fedélzetre irányuló ELM sorozatban addig vett szegmensek számait. A 17-es bittel kezdve, amely a 0 számú szegmenset jelöli, az ezt követő bitek mindegyikét EGY-re állítják, ha a sorozat megfelelő szegmensét már vették. A TAS megjelenik az MD-n, ha KE egyenlő 1 ugyanabban a válaszban.

3.1.2.7.4.2.3 *Közbenső szegmens továbbítása.* A lekérdezőnek közbenső szegmenseket RC egyenlő 1 Comm-C lekérdezések átvitelével kell továbbítania. A válaszjeladó csak akkor tárolja a szegmenseket és frissíti fel a TAS-t, ha a 3.1.2.7.4.2.1 alpont szerinti beállítás érvényben van, és ha a vett NC kisebb, mint a kezdeti szegmens vételénél tárolt érték. Közbenső szegmens vételekor nem jön létre válasz.

Megjegyzés. – Közbenső szegmensek bármilyen sorrendben továbbíthatók.

3.1.2.7.4.2.4 *Végső szegmens továbbítása.* A lekérdező a végső szegmenst Comm-C lekérdezés egyenlő 2 melletti továbbítással visz át. Ez a lekérdezés bármely közlemény szegmenst tartalmazhat. A válaszjeladó tárolja az MC mező tartalmát és felfrissíti a TAS-t, ha a 3.1.2.7.4.2.1 alpont szerinti beállítás érvényben van., és ha a vett NC kisebb, mint a kezdeti NC szegmens értéke. A válaszjeladó minden körülmények között válaszol a 3.1.2.7.4.2.5 alpont szerint.

1. Megjegyzés. – Ez a végső szegmens továbbítású lekérdezés bármilyen üzenet szegmenst tartalmazhat.

2. Megjegyzés. – RC egyenlő 2 bármikor továbbításra kerül, amikor a lekérdező a válaszban fogadni akarja a TAS almezőt. Ezért egynél több “végső” szegmens továbbítható egy fedélzetre irányuló ELM szállítása alatt.

3.1.2.7.4.2.5 *Nyugtázási válasz.* Végső szegmens vétele után a válaszjeladó Comm-D választ (DF=24) továbbít KE egyenlő 1 mellett és az MD mezőben lévő TAS almező mellett. Ezt a választ 128 mikromásodperc plusz vagy mínusz 0,25 mikromásodperc idővel a végső szegmenset szállító lekérdezés szinkronizáló fázis megfordítást követően továbbítják.

3.1.2.7.4.2.6 *Befejezett közlemény*. A válaszjeladó a közleményt befejezettnek ítéli, ha az NC által a kezdeti szegmensben bejelentett összes szegmenst vették. Ha a közlemény teljesen készen van, a küldemény tartalmát kívülre szállítják a 3.1.2.10.5.2.1.3 pont szerinti ELM csatoló felületen keresztül és törlik. Semmilyen ezután érkező szegmenst nem tárolnak. A TAS tartalom változatlan marad, amíg vagy egy új felállítás igénye jelentkezik (3.1.2.7.4.2.1 pont) vagy a kizárásig (3.1.2.7.4.2.8 pont).

3.1.2.7.4.2.7 *C-időzítő újraindítás.* A C-időzítőt újraindítják mindannyiszor, amikor egy vett szegmenst tárolnak és a Comm-C II nem 0.

Megjegyzés. – A Comm-C II nem zérus követelmény megakadályozza, hogy a C-időzítőt újraindítsák egy nem szelektív fedélzetre irányuló ELM tranzakció alatt.

3.1.2.7.4.2.8 *Többhelyes fedélzetre irányuló ELM kizárás.* Egy felderítés, vagy az alábbiakat tartalmazó Comm-A lekérdezés továbbításával a lekérdező kizárja a többhelyes fedélzetre irányuló ELM-et:

vagy DI = 1
IIS = kijelölt lekérdező azonosító
MES= 2,6 vagy 7 (fedélzetre irányuló ELM kizárás)

vagy DI = 0, 1, vagy 7
IIS = kijelölt lekérdező azonosító
PC = 5 (fedélzetre irányuló ELM kizárás)

A válaszjeladó összehasonlítja a lekérdezés IIS-ét a Comm-C II-vel, és ha a lekérdező azonosítók nem illeszkednek, az ELM fedélzetre irányuló adattovábbítási folyamatának állapotában nem eszközölnek változást.

Ha a lekérdező azonosítók illeszkednek, a válaszjeladó a Comm-C II-t 0-ra állítja, visszaállítja a C-időzítőt, törli a tárolt TAS-t és a befejezetlen közlemények tárolt szegmenseit kiselejtezi.

3.1.2.7.4.2.9 *Automatikus többhelyes fedélzetre irányuló ELM kizárás.* Ha a C-időzítő periódus lejár, mielőtt egy többhelyes kizárás végbement volna, a 3.1.2.7.4.2.8 pontban leírt kizárási akciókat a válaszjeladó automatikusan kezdeményezi.

3.1.2.7.5 *Nem szelektív* fedélzetre *irányuló ELM*

Megjegyzés. – Azokban az esetekben, amikor a többhelyes protokollokat nem igénylik (például nincs átlapoló lefedés vagy érzékelő koordináció a föld-föld kommunikáción keresztül), a nem-szelektív fedélzetre irányuló ELM protokoll használható.

A nem-szelektív fedélzetre irányuló ELM továbbítás úgy történik, ahogyan az a többhelyes fedélzetre irányuló ELM-ekre a 3.1.2.7.4.2 pontban le van írva. A lekérdező a fedélzetre irányuló ELM-et a PC egyenlő 5 továbbításával (fedélzetre irányuló ELM kizárás) zárja ki egy ellenőrzési vagy Comm-A lekérdezésben. Ennek az utasításnak a vétele után a válaszjeladó kizárást hajt végre, hacsak a C-időzítő nem működik, amely azt mutatja, hogy egy többhelyes helyfoglalás van érvényben, a kizárás a 3.1.2.7.4.2.8 pont szerint megy végbe. A befejezetlen közlemény, amely a kizárás vételekor van jelen, törlésre kerül.

3.1.2.7.6 *Megnövelt fedélzetre irányuló ELM protokoll*

Megjegyzés. – A megnövelt fedélzetre irányuló ELM protokoll nagyobb adat összeköttetési kapacitást nyújt a fedélzetre irányuló ELM közlemények párhuzamos szállításának lehetővé tételével, maximálisan tizenhat lekérdezővel, minden II kódnak egyet. Többhelyes fedélzetre irányuló ELM, helyfoglalás igénye nélküli működés átlapolásos lefedésű régiókban lehetséges a megnövelt fedélzetre irányuló ELM protokollhoz felszerelt lekérdezők számára. A protokoll teljes mértékben megegyezik a szabványos többhelyes protokollal, és így csereszabatos azokkal a lekérdezőkkel, amelyek nincsenek ellátva megnövelt protokollal.

3.1.2.7.6.1 *Általános*

3.1.2.7.6.1.1 Az adatkapcsolati képesség közlésből a lekérdező megállapítja, hogy a válaszjeladó alátámasztja-e a megnövelt protokollokat. Ha a megnövelt protokollokat sem a lekérdező, sem a válaszjeladó nem támasztja alá, a 3.1.2.7.4.1 pontban részletezett többhelyes helyfoglalási protokollt kell használni.

Megjegyzés. – Ha a megnövelt protokollt alátámasztják, akkor a fedélzetre irányuló többhelyes protokollok felhasználásával továbbított ELM-ek továbbítása előzetes helyfoglalás nélkül történhet.

3.1.2.7.6.1.2 ***Ajánlás****. – Ha a válaszjeladó és a lekérdező fel lett szerelve a megnövelt protokollhoz, akkor a lekérdező használja a megnövelt fedélzetre irányuló adattovábbítási protokollt.*

3.1.2.7.6.1.3 A válaszjeladó tizenhat szegmenses közlemény tárolására képes a tizenhat II kód mindegyikéhez.

3.1.2.7.6.2 *Helyfoglalási eljárás*. A válaszjeladó támogatja a helyfoglalási eljárást mindegyik II kódhoz, ahogyan azt a 3.1.2.7.4.1 pontban meghatározták.

1. *Megjegyzés. – Helyfoglalási eljárást kérnek azon lekérdezők részére, amelyek nem támogatják a megnövelt protokollt.*

2. Megjegyzés. – Mivel a válaszjeladó szimultán képes feldolgozni a fedélzetre irányuló ELM-eket mind a tizenhat II kódra, így a helyfoglalás minden esetben garantált.

3.1.2.7.6.3 *Megnövelt fedélzetre irányuló ELM továbbítás és kizárás.* A válaszjeladó a vett szegmenseket külön-külön dolgozza fel a II kóddal. Az II kód mindegyik értékére fedélzetre irányuló ELM továbbítást és kizárást hajt végre, ahogyan azt a 3.1.2.7.4.2 alpont meghatározza, kivéve hogy a technikai visszaigazolás átvitelére használt MD mező a 4-bites (33-36) IS almezőt is tartalmazza.

Megjegyzés. –A technikai visszaigazolást tartalmazó II-kódot a lekérdező használhatja a helyes technikai visszaigazolást vételének megerősítésére.

3.1.2.7.7 *Többhelyes fedélzetről leadott ELM protokoll*

3.1.2.7.7.1 *Kezdőérték megadása.* A válaszjeladó az n szegmensből álló fedélzetről leadott adattovábbítás ELM meglétét a 15+n decimális értékhez tartozó bináris kód képzésével jelentheti be, amely egy ellenőrzési, vagy Comm-B válasz DR mezőbe való beillesztéshez rendelkezésre áll, és a DF egyenlő 4, 5, 20, 21. Ez a bejelentés aktív mard, amíg az ELM-et ki nem zárják (3.1.2.7.7.3, 3.1.2.7.8 pontok).

3.1.2.7.7.1.1 *Többhelyes fedélzetről leadott ELM helyfoglalás.* A lekérdezőnek helyfoglalást kell kérnie egy fedélzetről leadott adattovábbítás ELM kinyeréséhez egy ellenőrzési, vagy Comm-A lekérdezés továbbításával, amely a következőket tartalmazza:

DI = 1
IIS = kijelölt lekérdező azonosító
MES = 3 vagy 6 (fedélzetről leadott adattovábbítás ELM helyfoglalás kérés)

Megjegyzés. – A többhelyes fedélzetről leadott ELM helyfoglalási kérést általában egy fedélzetről leadott adattovábbítás helyfoglalási állapotkérés (RSS = 3) kísér. Ez a fenntartott lekérdező azonosítójának a válasz UM mezőjébe való beillesztését eredményezi.

3.1.2.7.7.1.1.1 A protokoll eljárás erre a lekérdezésre történő reagálásban a D-időzítő állapotától függ, amely jelzi, ha egy fedélzetről leadott ELM helyfoglalás még aktív. Ez az időzítő T_R másodpercig működik.

1. Megjegyzés. – A T_R értékét a 3.1.2.10.3.9 alpont határozza meg.

a) ha a D-időzítő nem működik, a válaszjeladónak a kérő lekérdező számára helyfoglalást kell biztosítania a következőképpen:

   1) A lekérdezés IIS tárolása mint Comm-DII; és

   2) A D-időzítő indítása

   Többhelyes fedélzetről leadott ELM helyfoglalást a válaszjeladó nem szolgáltathat, hacsak egy fedélzetről leadott ELM nem vár továbbításra.

b) ha a D-időzítő működik, és a lekérdezés IIS egyenlő a Comm-DII-vel, a válaszjeladónak újra kell indítania a D-időzítőt; és

c) ha a D-időzítő működik és a lekérdező IIS nem egyenlő a Comm-DII-vel, akkor a Comm-DII vagy D-időzítőnek változatlannak kell maradnia.

2. Megjegyzés. – c) esetben a helyfoglalási kérést elutasították.

3.1.2.7.7.1.1.2 A lekérdező megállapítja, hogy van-e lefoglalt hely a kódoláson keresztül az UM mezőben, és ha igen, akkor folytatódhat a fedélzetről leadott ELM kérés továbbítása. Ellenkező esetben az ELM működése nem kezdődik meg ezalatt a pásztázás alatt.

Megjegyzés. – Ha a lekérdező nem egy lefoglalt hely, akkor a következő pásztázás során új helyfoglalási kérést kell készíteni.

3.1.2.7.7.1.1.3 Ha a fedélzetről leadott ELM működése az éppen folyó pásztázás során nem fejeződik be, a lekérdezőnek meg kell győződnie, hogy van-e még egy helyfoglalás, mielőtt további szegmenseket kérne a következő pásztázásra.

3.1.2.7.7.1.2 *Többhelyes irányítású fedélzetről leadott ELM átvitele.* A fedélzetről leadott ELM közlemény egy adott lekérdezőhöz történő irányításához a többhelyes, fedélzetről leadott adattovábbítás ELM protokollt kell használni. Amikor a D-időzítő nem működik, a kívánt rendeltetési hely lekérdező azonosítóját Comm-D II-ként kell tárolni. Ezzel egyidőben a D-időzítőt indítani kell és a DR-kódot (3.1.2.7.7.1 alpont) be kell állítani. Többhelyes irányított fedélzetről leadott ELM-nél a D-időzítő nem járhat le automatikusan, hanem működését addig kell folytatnia, amíg:

a) a fenntartott hely a közleményt elolvassa és kizárja; vagy

b) a közleményt az adatkapcsolati repüléselektronika törli (3.1.2.10.5.4 alpont).

Megjegyzés. – A 3.1.2.7.7.1 alpont protokolljai ekkor a közleménynek a lefoglalt helyre való továbbítását eredményezik. Az adatkapcsolati repüléselektronika a közleményt törölheti, ha a lefoglalt helyre való továbbítást nem lehet végrehajtani.

3.1.2.7.7.2 *A fedélzetről leadott adat ELM-ek továbbítása.* A lekérdező a fedélzetről leadott ELM-et egy Comm-C lekérdezés továbbításával nyeri ki az RC egyenlő 3 segítségével. Ez a lekérdezés a SRS almezőt hordozza, amely a továbbításra kerülő szegmenseket határozza meg. Ennek a kérésnek a vétele után a válaszjeladó továbbítja a kért szegmenseket a Comm-D válaszok segítségével KE egyenlő 0 és az MD-ben lévő szegmensek számának megfelelő ND esetén. Az első szegmenst 128 mikromásodperc + vagy -0,25 mikromásodperc idő után a továbbítást kérő lekérdezés szinkronizáló fázis megfordítását követően viszi át, és a következő szegmenseket egyenként minden 136 mikromásodperc + vagy -1 mikromásodperc sebességgel továbbítja. Ha a fedélzetről leadott ELM szegmensek továbbítására vonatkozó kérés érkezik, és közlemény nem várakozik, minden válasz szegmense az összes ZÉRO-t tartalmazza az MD mezőben.

1. Megjegyzés. – A kért szegmenseket bármilyen sorrendben lehet továbbítani.

2. Megjegyzés. – A fedélzetről leadott adattovábbításoknál elveszett szegmenseket a lekérdező újra kéri egy következő lekérdezésben, amely az SRS almezőt hordozza. Ez a folyamat addig ismételhető, amíg az összes szegmenst nem továbbították.

3.1.2.7.7.2.1 *SRS, szegmenskérő almező MC-ben.* Ez a 16-bites (9-24) fedélzetről leadott adattovábbítási almező MC-ben kéri a válaszjeladót fedélzetről leadott ELM szegmensek továbbítására. A 9-es bittel kezdve, amely a 0 számú szegmenset jelöli, a következő bitek mindegyikét EGY-re kell állítani, ha a megfelelő szegmens továbbítását kérik. SRS az MC-ben jelenik meg, ha RC egyenlő 3 ugyanabban a lekérdezésben.

3.1.2.7.7.2.2 *D-időzítő újraindítása.* A D-időzítőt újra kell indítani mindannyiszor, amikor Comm-D szegmensek iránti kérelem érkezik, ha a Comm-D II nem zérus.

Megjegyzés. – Az a követelmény, hogy a Comm-D II zérustól különböző legyen, megakadályozza, hogy a D-időzítőt újra indítsák nem szelektív fedélzetről leadott ELM tranzakció alatt.

3.1.2.7.7.3 *Többhelyes fedélzetről leadott ELM kizárás.* A lekérdező a többhelyes fedélzetről leadott ELM-et vagy egy ellenőrzési vagy egy Comm-A lekérdezés továbbításával zárja ki. Az ellenőrzési, illetve Comm-A lekérdezés a következőket tartalmazza:

vagy DI = 1
IIS = kijelölt lekérdező azonosító
MES = 4, 5, vagy 7 (fedélzetről leadott ELM kizárás)

vagy DI = 0, 1, vagy 7
IIS = kijelölt lekérdező azonosító
PC = 6 (fedélzetről leadott ELM-kizárás)

A válaszjeladó összehasonlítja a lekérdező IIS-ét a Comm-D II-vel és ha a lekérdező azonosítók nem illeszkednek, a fedélzetről leadott adattovábbítási folyamat állapota változatlan marad.

Ha a lekérdező azonosítók illeszkednek és a továbbítás iránti kérelem legalább egyszer teljesül, a válaszjeladó a Comm-D II-t 0-ra állítja, a D-időzítőt visszaállítja, törli a DR kódot ehhez a közleményhez és törli magát a követelményt.

Ha egy fedélzetről leadott ELM továbbításra vár, a válaszjeladó a DR-kódot (ha a Comm-B üzenet nem vár továbbításra) úgy állítja be, hogy a válasz tartalmazza a következő közlemény bejelentését.

3.1.2.7.7.4 *Fedélzetről leadott adattovábbítás ELM helyfoglalás automatikus lejárata.* Ha a D-időzítő periódus lejár, mielőtt egy többhelyes kizárás lezajlik, a Comm-D II-t 0-ra állítják, és a D-időzítőt visszaállítják. A közleményt és a DR-kódot nem törlik.

Megjegyzés. – Ez lehetővé teszi egy másik hely számára ennek a közleménynek az elolvasását és szabaddá tételét.

3.1.2.7.8 *Nem szelektív fedélzetről leadott ELM*

Megjegyzés. – Azokban az esetekben, amikor a többhelyes protokollokat nem igénylik (azaz nincs átlapoló lefedés vagy érzékelő koordináció a föld-föld kommunikáción keresztül), a nem-szelektív fedélzetről leadott adattovábbítás ELM protokoll használható.

Nem-szelektív fedélzetről leadott ELM továbbítás úgy történik, ahogyan a 3.1.2.7.7.2 pontban meghatározták.

3.1.2.7.8.1 *Nem-szelektív fedélzetről leadott ELM kizárás*. A lekérdező egy nem-szelektív fedélzetről leadott ELM-et PC egyenlő 6 (fedélzetről leadott ELM kizárás) átvitelével zár ki egy ellenőrzési vagy Comm-A lekérdezésben. Ennek az utasításnak a vétele után, és ha továbbítás iránti kérelemnek már legalább egyszer eleget tett, a válaszjeladó kizárást hajt végre, hacsak a D-időzítő nincs működésben. Ha a D-időzítő működésben van és jelzi, hogy a többhelyes foglalás érvényben van, akkor a kizárást a 3.1.2.7.7.3 alpont szerint kell végrehajtani.

3.1.2.7.9 *Megnövelt fedélzetről leadott ELM protokoll*

Megjegyzés. – A megnövelt fedélzetről leadott adattovábbítási protokoll nagyobb adatkapcsolat kapacitást szolgáltat azáltal, hogy megengedi a fedélzetről leadott ELM közlemények párhuzamos továbbítását maximálisan tizenhat lekérdező által, mindegyik II kódhoz egyet. Többhelyes fedélzetről leadott adattovábbítási helyfoglalások szükségessége nélküli működés átlapolási lefedési régiókban lehetséges a megnövelt fedélzetről leadott ELM protokollhoz felszerelt lekérdezők számára. A protokoll teljesen megegyezik a szabványos többhelyes protokollal és így csereszabatos azokkal a lekérdezőkkel, amelyek nincsenek megnövelt protokollhoz felszerelve.

3.1.2.7.9.1 *Általános.*

3.1.2.7.9.1.1 A lekérdező az adatkapcsolati képesség közlésből megállapítja, hogy a válaszjeladó támogatja-e a megnövelt protokollokat. Ha a megnövelt protokollokat sem a lekérdező, sem a válaszjeladó nem támogatja, a 3.1.2.6.11 pontban előírt többhelyes helyfoglalási protokollokat kell felhasználni a többhelyes és a többhelyes-irányítású fedélzetről leadott adattovábbítású ELM-ekhez.

Megjegyzés. - Hogyha a megnövelt protokollok támogatást kapnak, akkor a többhelyes irányított protokoll felhasználásával továbbított fedélzetről leadott ELM-eket előzetes helyfoglalás nélkül lehet továbbítani.

3.1.2.7.9.1.2 **Ajánlás. –** *Ha a válaszjeladó és a lekérdező fel van szerelve a megnövelt protokollhoz, akkor a lekérdező használja a megnövelt fedélzetről leadott adattovábbítási protokollt.*

3.1.2.7.9.2 *Megnövelt többhelyes fedélzetről leadott ELM protokoll.*

3.1.2.7.9.2.1 A válaszjeladó tizenhat szegmensű közlemény tárolására képes, a tizenhat II kódok mindegyikéhez.

3.1.2.7.9.2.2 *Kezdőérték beállítása*. A válaszjeladóba belépő többhelyes közleményt az II = 0-hoz kijelölt regiszterekben tárolják.

3.1.2.7.9.2.3 Bejelentés és kinyerés. Többhelyes fedélzetről leadott ELM közlemény várakozását a válaszok DR mezejében jelentik be az összes lekérdezőnek, amelyek részére többhelyes irányított fedélzetről leadott ELM közlemény nem várakozik. A bejelentési válasz UM mezője jelzi, hogy a közleményt nem foglalták le egyetlen II-kód részére sem, azaz az IIS 0-ára van állítva. Ha ennek a közleménynek a helyfoglalására vonatkozó utasítás érkezik egy adott lekérdezőtől, a közleményt az II kód számára lefoglalják, amely kódot a lekérdezőtől érkező lekérdezés tartalmazza. A kiolvasás után és kizárólag a közlemény továbbra is ennek a II kódnak a részére lesz kijelölve. Ha egy közlemény egyszer egy meghatározott II kód számára ki van jelölve, ennek a közleménynek a bejelentését már nem alkalmazzák a lekérdezőnek adott válaszban más II-kódokkal. Ha a közleményt a kapcsolódó lekérdező nem zárja ki a D-időzítő periódusa alatt, a közlemény visszatér a többhelyes állapotba és a folyamat megismétlődik. Egyidőben csak egy többhelyes fedélzetről leadott ELM közlemény lehet folyamatban.

3.1.2.7.9.2.4 *Kizárás.* Többhelyes közlemény kizárását csak olyan lekérdezőtől vehetik, amelyet a közlemény továbbítására legutoljára kijelöltek.

3.1.2.7.9.2.5 *A következő közlemény várásának bejelentése*. A DL mező jelzi egy fedélzetről leadott ELM kizárást tartalmazó lekérdezésre adott válaszban várakozó közleményt, ha egy kijelöletlen többhelyes fedélzetről leadott ELM várakozik, vagy ha egy többhelyes irányított közlemény várakozik erre az II-kódra (3.1.2.7.9.2 alpont).

3.1.2.7.9.3 Megnövelt többhelyes irányított fedélzetről leadott ELM protokoll.

3.1.2.7.9.3.1 *Kezdőérték beállítása.* Ha egy többhelyes irányított közlemény a válaszjeladó bemenetét képezi, akkor abba a fedélzetről leadott ELM regiszterekbe helyezik el, amelyet a közlemény részére meghatározott II-kódnak jelölnek ki. Ha ennek az II-kódnak a regiszterei már használatban vannak (azaz a többhelyes irányított fedélzetről leadott ELM közlemény már feldolgozásban van ennek az II-kódnak a részére), az új közlemény sorban fog állni, amíg az éppen folyó tranzakciót ezzel az II-kóddal kizárják.

3.1.2.7.9.3.2 *Bejelentés.* Továbbításra váró fedélzetről leadott ELM közlemény bejelentését a DR mező felhasználásával végzik a 3.1.2.7.7.1 pontban meghatározottak szerint az IIS almező által tartalmazott, a 3.1.2.6.5.3.2 pontban meghatározottak szerinti rendeltetési lekérdező II-kóddal. A DR-mező és az IIS almező tartalmát meghatározva annak a lekérdezőnek a részére állítják be, amelynek a választ venni kell. Egy várakozó többhelyes irányított közleményt csak a szándékolt lekérdező részére szolgáltatott válaszokban kell bejelenteni. A várakozó többhelyes irányított közleményt nem kell bejelenteni más lekérdezők részére adott válaszokban.

3.1.2.7.9.3.3. *Továbbítás.* Egy lekérdező az UM mező kódolásán keresztül állapítja meg, hogy fenntartott helyként szerepel-e. A továbbítást csak akkor lehet lekérni, amennyiben a lekérdező tartalék helyként szerepel és megfelel a 3.1.2.7.7.2 pontban meghatározottaknak. A válaszjeladó továbbítja a pufferben lévő közleményt, amely puffer a II-kódhoz kapcsolódik, amelyet viszont a lekérdezés kérési szegmens IIS almező határoz meg.

3.1.2.7.9.3.4 *Kizárás.* Kizárást a 3.1.2.7.7.3 pontban előírtak szerint kell végrehajtani, kivéve, amikor a közlemény kizárást csak az II-kóddal rendelkező lekérdezőtől veszik, amely kód egyenlő azzal, amelyet a közlemény továbbított.

3.1.2.7.9.3.5 *Következő közlemény várakozásának bejelentése.* A DR mező jelzi egy fedélzetről leadott ELM kizárást tartalmazó lekérdezésre adott válaszban várakozó közleményt, ha egy másik többhelyes irányított közlemény várakozik erre az II-kódra, vagy ha egy fedélzetről leadott adattovábbítási közlemény várakozik, amely nem lett kijelölve a II-kódnak (3.1.2.7.9.2 alpont).

3.1.2.7.9.4 *Megnövelt nem-szelektív fedélzetről leadott ELM protokoll.* Egy nem-szelektív kapcsolati ELM közlemény rendelkezésre állását az összes lekérdező részére be kell jelenteni. Más esetben a protokoll a 3.1.2.7.7 pontban meghatározottnak fog megfelelni.

3.1.2.8 Levegő-levegő forgalom és squitter tranzakció

Megjegyzés. – Az összeütközés-elhárító fedélzeti rendszer (ACAS) berendezése az UF vagy DF egyenlő 0 vagy 16 formátumokat használja levegő-levegő felderítésre.

3.1.2.8.1 *Rövid levegő-levegő forgalom, fedélzetre irányuló 0-s adattovábbítási formátum*

1		9		14	15		33
UF		RL		AQ	DS		AP
5					22		56

E lekérdezés formátuma ezekből a mezőkből áll:

Mező	*Hivatkozás*
UF fedélzetre irányuló adattovábbítási formátum	3.1.2.3.2.1.1
tartalék - 3 bit	
RL válaszhossz	3.1.2.8.1.2
tartalék - 4 bit	
AQ elfogás	3.1.2.8.1.1
DS adat választó	3.1.2.8.1.3
tartalék - 10 bit	
AP címzés/paritás	3.1.2.3.2.1.3

3.1.2.8.1.1 *AQ: Adatgyűjtés.* Ez az egy-bites (14) fedélzetre irányuló adattovábbítási mező olyan kódot tartalmaz, amely szabályozza az RI mező tartalmát.

3.1.2.8.1.2 *RL: Válasz hosszúság.* Ez az 1-bites (9) fedélzetre irányuló adattovábbítási mező ad utasítást a válaszhoz használt formátumra.

Kódolás

0 jelöli a DF = 0 választ
1 jelöli a DF = 16 választ

Megjegyzés. – Egy válaszjeladó ha nem támogatja a DF = 16 választ (vagyis az a válaszjeladó, amelyik nem támogatja az ACAS keresztcsatolási képességet és nem társul egy összeütközés-elhárító fedélzeti rendszerrel), nem fog válaszolni az RL = 1 tartalmú UF = 0 lekérdezésre.

3.1.2.8.1.3 *DS: Adat Kiválasztó.* Ez a 8 bites (15-22) fedélzetre irányuló adattovábbítási mező a GICB adattároló BDS kódját (3.1.2.6.11.2.1 alpont) tartalmazza, amelynek tartalmát vissza kell küldeni a megfelelő, DF = 16 értékű válasz részére.

3.1.2.8.2 *Rövid levegő-levegő felderítés, 0 értékű fedélzetről leadott adattovábbítási formátum*

1	6	7		14		20	33
DF	VS	CC		RI		AC	AP
5				17		32	56

Ezt a választ egy UF egyenlő 0 és RL egyenlő 0 lekérdezésre történő reagálásban küldik el. Ennek a válasznak a formátuma a következő mezőkből áll:

Mező		*Hivatkozás*
DF	fedélzetről leadott adattovábbítási formátum	3.1.2.3.2.1.2
VS	függőleges állapot	3.1.2.8.2.1
CC	kereszt-kapcsolati képesség tartalék	3.1.2.8.2.3
tartalék - 6 bit		
RI	válasz információ	3.1.2.8.2.2
tartalék - 2 bit		
AC	magasság kód	3.1.2.6.5.4
AP	címzés/paritás	3.1.2.3.2.1.3

3.1.2.8.2.1 *VS: függőleges állapot.* Ez az 1-bites (6) kapcsolati mező a légijármű állapotát jelzi (3.1.2.6.10.1.2 alpont).

Kódolás

0 azt jelenti, hogy a légijármű a levegőben van.
1 azt jelenti, hogy a légijármű a földön van.

3.1.2.8.2.2 *RI: válaszinformáció, levegő-levegő.* Ez a 4-bites (14-17) fedélzetről leadott adattovábbítási mező közli a légijármű maximális tényleges utazósebesség képességét és a lekérdező légijárműnek adott válasz típusát. A kódolás a következők szerint történik:

0 egy levegő-levegő lekérdezésre adott választ jelöl, UF = 0, AQ = 0, nincs működő ACAS
1-7 ACAS részére fenntartott
8-15 egy levegő-levegő lekérdezésre adott választ jelöl, ahol UF = 0, AQ = 1 és azt, hogy a maximális önsebesség a következő:
8 maximális önsebesség adat nem áll rendelkezésre
9 maximális önsebesség .KE. 140 kilométer/h (75 csomó)
10 maximális önsebesség .NM. 140 és .KE.28O km/h (75 és 150 csomó)
11 maximális önsebesség .NM. 280 és .KE. 560 km/h (150 és 300 csomó)
12 maximális önsebesség .NM. 560 és .KE. 1110 km/h (300 és 600 csomó)
13 maximális önsebesség .NM. 1110 és .KE. 2220 km/h (600 és 1200 csomó)
14 maximális önsebesség nagyobb, mint 2220 km/h (1200 csomó)
15 nincs kijelölve.

Megjegyzés. – “.KE.” azt jelenti, hogy “kisebb vagy egyenlő” és “.NM.” jelenti: “nagyobb, mint”

3.1.2.8.2.3 *CC: Kereszt-kapcsolat képesség.* Ez az 1-bites (7) fedélzetről leadott adattovábbítási mező a válaszjeladónak azt a képességét jelzi, hogy keresztkapcsolat képességet tud fenntartani, azaz dekódolja a DS mező tartalmát UF egyenlő 0 lekérdezésben és válaszol a specifikus GICB regiszter tartalmával a DF egyenlő 16 megfelelő válaszban.

Kódolás

0 azt jelenti, hogy a válaszjeladó nem tudja a keresztkapcsolat képességet fenntartani
1 azt jelenti, hogy a válaszjeladó fenntartja a kereszt-kapcsolat képességet

3.1.2.8.3 *Hosszú levegő-levegő felderítés, fedélzetről leadott 16-os adattovábbítási formátum*

1	6		14		20	33	89
DF	VS		RI		AC	MV	AP
5			17		32	88	112

Ezt a választ egy UF egyenlő 0 és RL egyenlő 1 lekérdezésre adott válaszban küldik el. Ennek a válasznak a formátuma a következő mezőket tartalmazza:

Mező	*Hivatkozás*
DF fedélzetről leadott adattovábbítási formátum	3.1.2.3.2.1.2
VS függőleges állapot	3.1.2.8.2.1
tartalék – 7 bit	
RI válasz információ	3.1.2.8.2.2
tartalék – 2 bit	
AC magasság kód	3.1.2.6.5.4
MV közlemény, ACAS	3.1.2.8.3.1
AP címzés/paritás	3.1.2.3.2.1.3

3.1.2.8.3.1 *MV: Közlemény, ACAS.* Ez az 56-bites (33-88) fedélzetről leadott adattovábbítási mező, amely a kérés szerint GICB információt tartalmazza az UF 0 lekérdezés DS mezejében, amely lekérdezés a választ kiváltotta.

Megjegyzés. – Az MV mezőt az ACAS is használja levegő-levegő koordinációhoz (4.3.8.4.2.4 alpont)

3.1.2.8.4 *Levegő-levegő tranzakció protokoll*

Megjegyzés. – Lekérdezés-válasz koordináció a levegő-levegő formátumoknál a 3-5 táblázatban körvonalazott protokollt követi (3.1.2.4.1.3.2.2 alpont).

Egy levegő-levegő válasz RI mezőjének a legjelentősebb bitje (14-es bit) megismétli az AQ mező értékét (14-es bit), amely egy UF egyenlő 0 lekérdezésben érkezett.

Ha AQ egyenlő 0 a lekérdezésben, a válasz RI mezője tartalmazni fogja a 0-kódot.

Ha AQ egyenlő 1 a lekérdezésben, a válasz RI mezője a légijármű maximális tényleges utazósebesség képességét tartalmazza, ahogyan azt 3.1.2.8.2.2 alpont meghatározza.

Az UF = 0-ra, az RL = 1 és DS nem egyenlő 0 esetén való válaszban a válaszjeladó egy DF = 16 válasszal felel, amelyben az MV mező a DS értékkel jelölt GICB regiszter tartalmát tartalmazza. Az UF = 0-ra, az RL = 1 és DS = 0 esetén adott válaszban a válaszjeladó egy mindenütt zérus mezőjű DF = 16-tal felel. UF = 0 vételéhez DS $\neq$ 0, de RL = 0 esetén nem tartozik ACAS kereszt-kapcsolás akció és a válaszjeladó a 3.1.2.8.2.2 pontban leírtak szerint válaszol.

3.1.2.8.5 *Adatgyűjtő squitter*

Megjegyzés. – Másodlagos légtérellenőrző radar S-módú válaszjeladók adatgyűjtő squittereket továbbítanak (nem-kért fedélzetről leadott közlemények), hogy lehetővé tegyék a széles antenna sugarakkal rendelkező lekérdezők passzív befogását, ahol az aktív befogást a körhívás szinkron csonkítás akadályozhatja. Ilyen lekérdezőkre példák az összeütközés-elhárító fedélzeti rendszer és egy repülőtéri földi légtérellenőrző rendszer.

3.1.2.8.5.1 *Adatgyűjtő squitter formátum.* Az adatgyűjtő squitter átvitelekhez használt formátum körhívás válasz lesz (DF = 11) II = 0 beállítással.

3.1.2.8.5.2 *Adatgyűjtő squitter sebesség*. Az adatgyűjtő squitter sugárzások véletlen időközönként kerülnek szétosztásra, amelyek egyenletesen vannak elosztva a 0,8- 1,2 másodperc időtartamon belül. Az elosztás a megelőző adatgyűjtő squitterhez képest legfeljebb 15 ezredmásodpercnél nagyobb időkvantálással kerül kialakításra, a következő kivételekkel:

a) az időütemezett adatgyűjtő squittert késleltetni kell, ha a válaszjeladó tranzakciós ciklusban van (3.1.2.4.1 alpont).

b) az időütemezett adatgyűjtő squittert késleltetni kell, ha kiterjesztett squitter folyamatban van;

c) az időütemezett adatgyűjtő squittert késleltetni kell, ha egy közös elnyomás csatoló felület működésben van (lásd az alábbi 1. megjegyzést); vagy

d) adatgyűjtő squitter-eket csak akkor sugároznak ki a földön, ha a válaszjeladó nem jelenti az S-módú kiterjesztett squitter földi elhelyezésének típusát.

Az adatgyűjtő squittert nem szakíthatják meg kapcsolati tranzakciók, vagy közös elnyomás működés azután, hogy a squitter átvitel elkezdődött.

1. Megjegyzés. – Közös elnyomási rendszer használható az ugyanazon frekvenciasávban működő fedélzeti berendezések összekapcsolására, hogy a közös interferenciát megakadályozza. Az adatbegyűjtő squitter tevékenység folytatódik egy közös elnyomási időköz után.

2. Megjegyzés. – A földi jelentés típust vagy a légijármű, vagy egy squitter földi állomástól jövő utasítások automatikusan választják ki (3.1.2.8.6.7 pont).

3.1.2.8.5.3 *Adatbegyűjtő squitter antenna kiválasztás*. Eltérő antennákkal működő válaszjeladók (3.1.2.10.4 pont) a squittereket a következők szerint viszik át:

a) a levegőben tartózkodáskor (3.1.2.8.6.7 pont), a válaszjeladó adatbegyűjtő squittert továbbít felváltva a két antennától¸és

b) a földön tartózkodáskor (3.1.2.8.6.7 pont), a válaszjeladó adatbegyűjtő squittert továbbít SAS irányítása alatt (3.1.2.6.1.4.1f) alpont). SAS utasítás elmaradása esetén, a felső antenna alkalmazása csak alapértelmezett módon történhet.

Megjegyzés. – Adatbegyűjtő squittereket nem késztetik kisugárzásra a földön, ha a válaszjeladó a kiterjesztett squitter földi típusát jelenti (3.1.2.8.6.4.3 alpont).

3.1.2.8.6 *Kiterjesztett squitter*, *fedélzetről leadott 17-es adattovábbítási formátum*

1	6	9	33	89
DF	CA	AA	ME	PI
5	8	32	88	112

Megjegyzés. – SSR S-módú válaszjeladók kiterjesztett squittereket továbbítanak, hogy fenntartsák a légijármű származtatású helyzet adatsugárzást felderítési célokból. Az ilyen típusú adatsugárzás a helymeghatározó eszköztől függő automatikus felderítés (ADS) egy formája, amely ADS adatsugárzásként (ADS-B) ismert.

3.1.2.8.6.1 *Kiterjesztett squitter formátum.* A kiterjesztett squitterhez használt formátum egy 112-bites fedélzetről leadott adattovábbítási formátum (DF = 17), amely a következő mezőket tartalmazza:

Mező	*Hivatkozás*
DF fedélzetről leadott adattovábbítás formátum	3.1.2.3.2.1.2
CA képesség	3.1.2.5.2.2.1
AA címzés, bejelentett	3.1.2.5.2.2.2
ME közlemény, kiterjesztett squitter	3.1.2.8.6.2
PI paritás/lekérdező azonosító	3.1.2.3.2.1.4

A PI mezőt II egyenlő 0-ként kell kódolni.

3.1.2.8.6.2 *ME: Kiterjesztett squitter közlemény.* Ez a DF=17, 56 bites (33-88) lefelé irányuló üzenetmezőt kell használni az adatsugárzás közleményekhez. A 05, 06, 07, 08, 09, 0A {HEX} és a 61-6F {HEX} regiszterek támogassák a kiterjesztett squitter közleményeket és egyaránt feleljenek meg a verzió 0 és verzió 1 közlemény formátumoknak a lentiek szerint:

a) A verzió 0, ES közlemény formátumok és vonatkozó követelmények a korai kiterjesztett squitter alkalmazásoknak felelnek meg. A felderítés minőségét, az ADS-B által használatos, navigációs adatok pontosságát vagy integritását kifejező navigációs bizonytalanság kategória (NUC) kell jelenteni. Ugyanakkor nincs jelzés arról, hogy ezek közül melyik, a bizonytalanság vagy integritás határozza meg a NUC értékét.

b) A verzió 1, ES közlemény formátumok az emelt szintű követelményeknek megfelelő ADS-B alkalmazásoknak felel meg. A felderítés minőségét és integritását egymástól függetlenül, úgy, mint navigációs pontosság (NAC), navigációs integritás (NIC) és felderítési integritási szint (SIL) kell jelenteni.

1. Megjegyzés – Az összes regiszter formátumára és frissítési gyakoriságára vonatkozó meghatározásokat a ”Technical Provisions for Mode S Services and Extended Squitter (Doc. 9871)” ismerteti.

2. Megjegyzés – A két verzióra vonatkozó formátumok együtt működnek .A kiterjesztett squitter vevőrendszerek, fel kell, hogy ismerjék és dekódolják mindkét, verzió 0 és verzió 1 közlemény formátumot.

3. Megjegyzés – A válaszjeladó regiszter formátumokra és adatforrásokra vonatkozó útmutató a ”Manual on Mode S Specific Services *(Doc.9688)*” *kiadványban található.*

3.1.2.8.6.3 *Kiterjesztett squitter fajták*

3.1.2.8.6.3.1 R*epülés közbeni helyzet squitter*. A repülés közbeni helyzet kiterjesztett squitter típus DF = 17 formátumot használ az ME mezőbe beillesztett GICB 05 {HEX} regiszter tartalmával.

Megjegyzés. – Egy GICB kérés (3.1.2.6.11.2 pont), amely RR egyenlő 16 és DI egyenlő 7 és RRS egyenlő 5 értékű jelet tartalmaz, egy olyan választ idéz elő, amely tartalmazza a repülés közbeni helyzet jelentést az MB mezőjében.

3.1.2.8.6.3.1.1 *SSS, légtérellenőrzés állapot almező ME-ben*. A válaszjeladó jelenti a válaszjeladó légtérellenőrzés állapotát az ME-nek, ebben a 2-bites (38-39) almezőben, ha az ME egy repülés közbeni helyzet squitter jelentést tartalmaz.

Kódolás
0 azt jelzi, hogy nincs állapot információ
1 azt jelzi, hogy a válaszjeladó folyamatos riasztás körülményeket jelent (3.1.2.6.10.1.1.1 pont)
2 azt jelzi, hogy a válaszjeladó átmeneti riasztás körülményeket jelent (3.1.2.6.10.1.1.2 pont)
3 azt jelzi, hogy a válaszjeladó SPI körülményeket jelent (3.1.2.6.10.1.3 pont)

Az 1. és 2. kód elsőbbséget élvez a 3. kóddal szemben.

3.1.2.8.6.3.1.2 *ACS, magasság kód almező ME-ben*. ATS irányítás alatt (3.1.2.8.6.3.1.3 pont) a válaszjeladó a barometrikus magasság kódot jelenti ebben a 12-bites (41-52) ME almezőben, amikor ME egy repülés közbeni helyzet jelentést tartalmaz. Az ACS tartalma olyan, ahogyan a 13-bites AC mezőnél meghatározásra került (3.1.2.6.5.4 pont), kivéve, hogy az M-bit (26-os bit) elhagyásra kerül.

3.1.2.8.6.3.1.3 *ACS jelentésadás irányítása.* A magassági adatok válaszjeladóval történő jelentése akkor kerül adásba, amikor az 1-bites magasság típusú almező (ATS) (3.1.2.8.6.8.2 pont) 0 értékű. Az ACS almezőben a barometrikus magasság adatot a válaszjeladónak akkor illeszti be, ha az ATS almező értéke ZERO nagyságú. A válaszjeladó magassági adat beillesztését ACS-ben megakadályozzák, amikor ATS 1-es értékű.

3.1.2.8.6.3.2 *Földi helyzet squitter.* A földi helyzet kiterjesztett squitter típus a DF = 17 formátumot használja az ME mezőbe beillesztett 06 {HEX} GICB regiszter tartalmával.

Megjegyzés. – Egy GICB kérés (3.1.2.6.11.2 pont), amely RR egyenlő 16 és DI egyenlő 7 és RRS egyenlő 6 értékű jelet tartalmaz, egy olyan választ idéz elő, amely tartalmazza a földi helyzet jelentést az MB mezőjében.

3.1.2.8.6.3.3 *Légijármű azonosítás squitter.* A légijármű azonosítás kiterjesztett squitter típus a DF = 17 formátumot használja az ME mezőbe beillesztett 08 {HEX} GICB regiszter tartalmával.

Megjegyzés. – Egy GICB kérés (3.1.2.6.11.2 pont), amely RR egyenlő 16 és DI egyenlő 7 és RRS egyenlő 8 értékű jelet tartalmaz, olyan választ idéz elő, amely tartalmazza a légijármű azonosítás jelentést az MB mezőjében.

3.1.2.8.6.3.4 R*epülés közbeni sebesség squitter.* A repülés közbeni sebesség kiterjesztett squitter típus a DF = 17 formátumot használja az ME mezőjébe beillesztett 09 {HEX} GICB regiszter tartalmával.

Megjegyzés. – Egy GICB kérés (3.1.2.6.11.2 pont), amely RR egyenlő 16 és DI egyenlő 7 és RRS egyenlő 9 értékű jelet tartalmaz, olyan választ idéz elő, amely tartalmazza a repülés közbeni sebesség jelentését az MB mezőjében.

3.1.2.8.6.3.5 *Esemény-működtetett squitter.* Az esemény-működtetett kiterjesztett squitter típus a DF = 17 formátumot használja az ME mezőbe beillesztett QA {HEX} GICB regiszter tartalmával.

Megjegyzés. – Egy GICB kérés (3.1.2.6.11.2 pont), amely RR egyenlő 16 és DI egyenlő 7 és RRS egyenlő 10 értékű jelet tartalmaz, olyan választ idéz elő, amely tartalmazza az esemény-működtetett jelentést az MB mezőjében.

3.1.2.8.6.4 *Kiterjesztett squitter sebesség*

3.1.2.8.6.4.1 *Kezdőérték megadása.* Bekapcsoláskor bekövetkező kezdőérték megadáskor a válaszjeladó abban az üzemmódban kezdi a működését, amelyben csak befogási squittereket tud sugározni (3.1.2.8.5 pont). A válaszjeladó elindítja a kiterjesztett squitterek sugárzását repülés közbeni helyzetre, földi helyzetre, repülés közbeni sebességre és légijármű azonosításra, amikor az adatok a 0,5 , 0,6, 09 és 08 {HEX} GICB regiszterekbe be vannak illesztve, a két felsorolás összeillő sorrendjében. Ezt a meghatározást egyedenként mindegyik típusra meg kell csinálni. Amikor kiterjesztett squittereket közvetítenek, a továbbítási sebességeknek a következő pontokban jelzettnek megfelelőnek kell lenniük. A kiterjesztett squittereken kívül adatgyűjtő squittereket is jelentenek, hacsak az adatgyűjtő squitter nincs gátolva (2.1.5.4). Adatgyűjtő squittereket mindig jelenteni kell, amennyiben kiterjesztett helyzet vagy sebesség squittereket nem jelentenek.

1. Megjegyzés. – Ez elnyomja a légijárműtől jövő hosszú squittereket, s így a légijármű nem tud helyzetet, sebességet vagy azonosítást jelenteni. Ha egy squitter típusú regiszter bemenete 60 másodpercig áll, akkor ennek a kiterjesztett squitter típusnak az adása szünetel addig, amíg az adat bevitel újra nem kezdődik.

2. Megjegyzés. – Rövid szünet után (3.1.2.8.6.6.) ez a squitter típus egy mindenütt zérus ME mezőt tartalmazhat.

3.1.2.8.6.4.2 *Repülés közbeni helyzet squitter sebesség*. Repülés közbeni helyzet squitter adásokat akkor sugároznak, amikor a légijármű a levegőben van (3.1.2.8.6.7 alpont). A sugárzás véletlenszerű időközökkel történik, amelyek egyenletesen oszlanak el a 0,4-től 0,6 másodpercig tartó értéktartományon belül. Az elosztás a megelőző repülés közbeni helyzet squitterhez képest legfeljebb 15 ezredmásodpercnél nagyobb időkvantálással kerül kialakításra, a 3.1.2.8.6.4.7 pontban ismertetett kivételekkel.

3.1.2.8.6.4.3 *Földi helyzet squitter sebesség.* Földi helyzet squitter közleményeket akkor sugároznak, amikor a légijármű a földön tartózkodik (3.1.2.8.6.7 pont), egy vagy két sebességet használva attól függően, hogy kis vagy nagy squitter sebességet választottak ki (3.1.2.8.6.9 pont). Amikor a nagy squitter sebességet választották ki, a földi helyzet squittereket véletlenszerű időközökkel sugározzák, amelyek egyenletesen oszlanak el a 0,4-től 0,6 másodpercig tartó értéktartományon keresztül. Az elosztás a megelőző földi helyzet squitterhez képest legfeljebb 15 ezredmásodpercnél nagyobb időkvantálással kerül kialakításra (ezt nagy sebességnek nevezzük). Ha a kis squitter sebességet választották ki, akkor a földi helyzet squittereket olyan véletlenszerű időközökkel sugározzák ki, amelyek 4,8-tól 5,2 másodpercig tartó értéktartományon belül egyenletesen oszlanak el. Az elosztás a megelőző földi helyzet squitterhez képest legfeljebb 15 ezredmásodpercnél nagyobb időkvantálással kerül kialakításra (ezt kis sebességnek nevezzük). Ezen továbbítási sebességekhez viszonyított kivételek a 3.1.2.8.6.4.7 pontban kerülnek ismertetésre.

3.1.2.8.6.4.4 *Légijármű azonosítás squitter sebesség.* Légijármű azonosító squitter közleményt véletlenszerű időközökkel sugároznak, amelyek egyenletesen oszlanak el a 4,8-tól 5,2 másodpercig tartó értéktartományon belül. Az elosztás legfeljebb 15 ezredmásodpercnél nagyobb időkvantálással kerül kialakításra az előző azonosítási squitterhez viszonyítva, amikor a légijármű a repülés közbeni helyzet squitter típusú jelentését végzi, vagy amikor a légijármű a földi helyzet squitter típusú jelentését adja le, és a nagy földi squitter sebességet választották ki. Amikor a földi helyzet squitter típust kis földi sebességgel jelentik, a légijármű azonosítási squitter véletlenszerű időközökkel sugározzák, amelyek egyenletesen oszlanak el a 9,8-tól 10,2 másodpercig tartó értéktartományon belül. Az elosztás legfeljebb 15 ezredmásodpercnél nagyobb időkvantálással kerül kialakításra az előző azonosítási squitterhez viszonyítva. Ezen átviteli sebességek alóli kivételek a 3.1.2.8.6.4.7 pontban találhatók.

3.1.2.8.6.4.5 *Repülés közbeni sebesség squitter gyakoriság.* Repülés közbeni sebesség squitter adásokat akkor sugároznak, amikor a légijármű a levegőben van (3.1.2.8.6.7 alpont). A sugárzás véletlenszerű időközökkel történik, amelyek egyenletesen oszlanak el a 0,4-től 0,6 másodpercig tartó értéktartományon belül. Az eloszlás legfeljebb 15 ezredmásodpercnél nagyobb időkvantálással kerül kialakításra az előző repülés közbeni sebesség squitterhez viszonyítva. Kivételt képeznek a 3.1.2.8.6.4.7 alpontban előírtak.

3.1.2.8.6.4.6 *Esemény-működtetett squitter sebesség.* Esemény-működtetett squittert egyszer továbbítanak, mindig akkor, amikor az OA {HEX} GICB regiszter le van terhelve, mialatt a 3.1.2.8.6.4.7 alpontban ismertetett késleltetés körülményeket figyelik. Az esemény-működtetett squitternél a maximális adási sebességet a válaszjeladó kettő per másodperc értékben korlátozza. Ha egy közlemény az esemény-működtetett regiszterbe be van illesztve, és a sebesség korlátozás miatt nem lehet továbbítani, azt meg kell tartani és akkor kell továbbítani, amikor a sebesség korlátozás feloldódott. Ha az adás engedélyezése előtt új közleményt vesznek, ez a korábbi közleményt felülírja.

Megjegyzés. – A squitter átviteli sebesség és a squitter átvitelek időtartama alkalmazás-függő. Az egyes alkalmazásoknál végrehajtott választásoknak figyelemmel kell lenniük az interferencia meggondolásokra (hivatkozással a ”Manual of the Secondary Surveillance Radar (SSR) Systems *(Doc 9684)*” *kiadvány 8. fejezetére).*

3.1.2.8.6.4.7 *Késleltetett továbbítások.* Kiterjesztett squitter átvitelt az alábbi körülmények között kell késleltetni:

a) ha a válaszjeladó tranzakció ciklusban van (3.1.2.4.1 alpont);

b) ha egy adatbegyűjtési vagy más típusú kiterjesztett squitter feldolgozás alatt van; vagy

c) vagy közös elnyomás csatoló elem van működésben.

A késleltetett squittert azonnal továbbítani kell, mihelyt a válaszjeladó működésre kész.

3.1.2.8.6.5 *Kiterjesztett squitter antenna kiválasztás*. Antenna eltéréssel működő válaszjeladók (3.1.2.10.4 alpont) a következők szerint továbbítanak kiterjesztett squittereket:

a) a levegőben (3.1.2.8.6.7 alpont), a válaszjeladó az összes típusú kiterjesztett squittert felváltva továbbítja a két antennáról; és

b) a földön (3.1.2.8.6.7 alpont), a válaszjeladó a SAS irányítása alatt (3.1.2.6.1.4.1f) továbbít kiterjesztett squittereket.

SAS utasítások hiányában a tetőantenna használata az alaphelyzet.

3.1.2.8.6.6 *Regiszter üzemszünet.* A válaszjeladó felszabadítja a repülés közbeni helyzet, a földi helyzet, a squitter állapot és a repülés közbeni sebesség információ 05, 06, 07 és 09 {HEX} GICB regiszterek mind az 56 bitjét, ha ezeket a regisztereket az előző felfrissítéshez viszonyított két másodpercen belül nem frissítik fel. Ezt az üzemszünetet ezeknek a regisztereknek mindegyikére külön-külön kell meghatározni.

1. Megjegyzés. - A kiterjesztett squitter adatsugárzás befejezési időpontját a "Technical Provisions for Mode S Services and Extended Squitter (Doc. 9871)" kiadvány határozza meg.

2. Megjegyzés. – Ezeket a regisztereket azért szabadítják fel, hogy megakadályozzák idejétmúlt helyzet, sebesség és squitter sebesség információk jelentését.

3.1.2.8.6.7 *Levegő/föld helyzet meghatározása.* Azon légijárművek, amelyek a földi helyzet automatikus meghatározására szolgáló eszközökkel rendelkeznek, ezt a bemenetet használják a légi vagy földi közlemény típusok kiválasztásához. Ilyen alkalmazás hiányában - a légijárművek légi típusú közleményeket jelentsenek, kivéve a 3-8 Táblázatban meghatározott eseteket. A táblázat csak olyan légijárművek esetében alkalmazható, amelyeken rendelkezésre áll a rádiómagasság ÉS minimálisan a levegőhöz viszonyított sebesség VAGY a földhöz viszonyított sebesség. Egyébként, ha ebbe a kategóriába tartozó légijárművön csak a levegőhöz viszonyított sebesség és a földhöz viszonyított sebesség áll rendelkezésre, csak akkor sugározzon földi közlemény formátumot ha:

a levegőhöz viszonyított sebesség < 50 knots (csomó) ÉS a földhöz viszonyított sebesség < 50 knots (csomó).

Az automatikus földi helyzet meghatározással rendelkező vagy nem rendelkező légijárművek alkalmazzák a TCS vezérlő kódok (3.1.2.6.1.4.1 f)) szerint meghatározott közlemény típust. A TCS vezérlő kódok időzítésének lejárata után a levegő/föld típusú közlemény választás a fent leírtak szerint történjék.

1. Megjegyzés – A fenti eljárás - földi közlemény típus sugárzásakor – eredményezheti a levegő-föld helyzet jelzését a CA mezőben, „levegőben vagy földön”értéket.

2. Megjegyzés – A kiterjesztett squitter földi állomások, a légijárművek - „levegőben” vagy „földön” – helyzetét a légijármű pozíció, magasság és földhöz viszonyított sebesség paraméterek alapján határozzák meg. Földi/légi helyzetet nem jelentő, földi helyzetben lévő légijárművet a TCS (lásd 3.1.2.6.1.4.1 f) kóddal lehet földi közlemény formátum sugárzására utasítani. A légi közlemény formátumhoz való visszatérés szokásos módja, egy földi utasítás, amely elrendeli a légi közlemény típust. A felszállást követő, kommunikáció megszakadása elleni biztosítást a földi közlemény formátum sugárzására utasító parancs automatikus időzítése jelenti.

3.1.2.8.6.8 S*quitter állapot jelentés.* Egy GICB kérés (3.1.2.6.11.2 alpont), amely RR egyenlő 16 és DI egyenlő 7 és RRS egyenlő 7 tartalommal bír, előidézi, hogy az eredményezett válasz squitter állapot jelentést tartalmazza az MB mezőjében.

3.1.2.8.6.8.1 *TRS, átviteli sebesség almező MB-ben.* A válaszjeladónak jelentenie kell a légijármű képességét a földi squitter sebességének automatikus megállapítására és a fennálló squitter sebességet az MB-nek ebben a 2-bites (33, 34) almezőjében.

Kódolás

0 azt jelzi, hogy nincs automatikus földi squitter sebesség meghatározás képesség
1 azt jelzi, hogy nagy földi squitter sebességet választottak ki
2 azt jelzi, hogy kis földi squitter sebességet választottak ki
3 kijelöletlen

1. Megjegyzés. – Nagy és kis squitter sebességet a légijármű fedélzetén határozzák meg.

2. Megjegyzés. – A kis sebességet akkor használják, amikor a légijármű nem mozog, és a nagy sebesség akkor használatos, amikor a légijármű mozog. Az, hogy a légijármű miként „mozog”, a ”Technical Provisions for Mode S Services and Extended Squitter (Doc. 9871)” című előírásból határozható meg a 07_{16} regiszter adatformátuma segítségével.

3.1.2.8.6.8.2 *ATS, magasság típusú almező MB-ben.* A válaszjeladó jelenti a magasság típusát, amelyet az MB-nek ebben az 1-bites (35) almezőjében lévő repülés közbeni kiterjesztett squitterben szolgáltatnak, amikor a válasz a 07 {HEX} GICB regiszter tartalmát magában foglalja.

Kódolás

0 azt jelzi, hogy a barometrikus magasságot a 05 {HEX} válaszjeladó regiszter ACS-ben (3.1.2.8.6.3.1.2 pont) kell jelenteni.
1 azt jelzi, hogy a navigációból származtatott magasságot a 05 {HEX} válaszjeladó regiszter ACS-ben (3.1.2.8.6.3.1.2 pont) kell jelenteni.

Megjegyzés. – A 05 {HEX} és a 07 {HEX} válaszjeladó regiszterek tartalmának részleteiről lásd a ”Technical Provisions for Mode S Services and Extended Squitter (Doc. 9871)” című előírást.

3.1.2.8.6.9 *Földi squitter sebesség irányítás*. A földi squitter sebességet a következők szerint határozzák meg:

a) másodpercenként egyszer leolvassák a TRS tartalmát. Ha a TRS értéke 0 vagy 1, a válaszjeladó a földi squittereket nagy sebességgel továbbítja. Ha a TRS értéke 2, a válaszjeladó a földi squittereket kis sebességgel továbbítja;

b) a TRS-en keresztül meghatározott squitter sebességet az RCS-en keresztül vett utasításokkal felül kell bírálni (3.1.2.6.1.4.1f) pont). Az RCS 1 kód a válaszjeladót 60 másodpercen keresztül nagysebességű squitterelésre készteti. Az RCS 2 kód a válaszjeladót 60 másodpercen át kis sebességű squitterelésre készteti. Ezek az utasítások felfrissítésre képesek egy új 60 másodperces periódus alatt az előző periódus üzemszünetét megelőzően; és

c) az üzemszünet után és az RCS 1 és 2 kódok hiányában az irányítás visszatér a TRS-hez.

3.1.2.8.6.10 Hosszúság/szélesség kódolás kompakt helyzet-jelentés (CPR) felhasználásával. S-módú kiterjesztett squitter kompakt helyzetjelentést (CPR) használ a szélesség és hosszúság hatékony kódolására a közleményekben.

Megjegyzés. - A CPR kódolásra/dekódolásra használt módszert a ”Technical Provisions for Mode S Services and Extended Squitter (Doc. 9871)” *határozza meg.*

3.1.2.8.6.11 *Adatbevitel.* Amikor a válaszjeladó szerint elérkezett a fedélzeti pozíció squitter kisugárzásának az ideje, be kell illesztenie a barometrikus magasság pillanatnyi értékét (hacsak nincs letiltva az ATS almező által – lásd 3.1.2.8.6.8.2) és a felderítési állapotot a 05 {HEX} megfelelő regisztermezőbe. Ezt követően a regisztertartalmat beszúrják a DF=17, ME mezőbe, majd kisugározzák.

Megjegyzés – A fentiek szerinti adatbetöltés biztosítja: (1) a squitter a legfrissebb barometrikus magasságot és felderítési állapotot tartalmazza, (2) a földi kiolvasó regiszter 05 {HEX} ugyanazt az információt nyeri ki, amely az S-módú felderítési válasz AC mezőben is található.

3.1.2.8.7 *Lefelé irányuló, kiterjesztett squitter /kiegészítő adatsugárzás - 18. formátum*

10010	CF:3			PI:24

1. Megjegyzés – Ez a formátum támogatja a nem válaszjeladó típusú eszközök által létrehozott ADS-B kiterjesztett squitter sugárzást. A nem válaszjeladó típusú eszközök nem részei az S-módú válaszjeladónak. Egy elkülönített formátum biztosítja a nem válaszjeladó típusú berendezést, azért, hogy az ACAS II vagy földi, kiterjesztett squitter adóállomás ne kérdezhesse az ilyen típusú berendezéseket.

2. Megjegyzés –Mint az Adatsugárzás Üzemmódban Működő Légiforgalmi Információs Szolgáltatás (TIS-B), ez az formátum használatos a földi ADS-B adatsugárzás szolgáltatások esetében is.

3. Megjegyzés – A DF 18 adatsugárzás formátumot, a CF mező értéke határozza meg.

3.1.2.8.7.1 *ES kiegészítő formátum.* Az ES kiegészítő formátum a következő mezőket (DF=18) tartalmazó, 112 bites lefelé irányuló adatátviteli formátum:

Mező	Hivatkozás
DF lefelé irányuló adatátviteli formátum	3.1.2.3.2.1.2
CF vezérlő mező	3.1.2.8.7.2
PI paritás/lekérdező azonosító	3.1.2.3.2.1.4

A PI mezőt a nullával azonos II mezővel kell kódolni.

3.1.2.8.7.2 *Vezérlő mező.* Ez a lefelé irányuló, 3 bites mező a DF=18-n kell, hogy meghatározza 112 bites adatsugárzás formátumot a következők szerint.

Kód 0 = Az AA mezőben (lásd 3.1.2.8.7), az ICAO 24 bites címzést jelentő ADS-B ES/NT eszközök

Kód 1 = Fenntartva azon ADS-B ES/NT eszközök számára, amelyek az AA (lásd 3.1.2.8.7.3), mezőben más címzési eljárást használnak.

Kód 2 = Finom felbontású TIS-B közlemény formátum

Kód 3 = Durva felbontású TIS-B közlemény formátum

Kód 4 = Fenntartva a TIS-B adatkezelés közleményeknek.

Kód 5 = Az AA mezőben más címzési eljárást alkalmazó ADS-B közleményeket átjátszó TIS-B közlemények

Kód 6 = Az ADS-B közlemények újrasugárzása, amely ugyanazt a kódot és közlemény formátumot használja, amelyet a DF=17 ADS-B közlemény definiál.

Kód 7 = Fenntartva

1. Megjegyzés – Azért, hogy a 24-bites címtartomány növelhető legyen, az ES/NT eszközök számára, a hatóságok – az ICAO (10. Annex, III Kötet, I Rész, 9. Fejezet) 24-bites címtartományon túl – kijelölhetnek más címzést is.

2. Megjegyzés – Ez, a nem ICAO 24 bites címtartomány nem használatos a nemzetközi gyakorlatban.

3.1.2.8.7.3 *ADS-B kiterjesztett adatsugárzás nem válaszjeladó típusú (ES/NT) eszközök számára*

10010	CF=0	AA:24	ME:56	PI:24

3.1.2.8.7.3.1 *ES/NT formátum*. A formátum az ES/NT alkalmazásokhoz használatos, 112 bites lefelé irányuló formátum (DF = 18) és a következő mezőket tartalmazza:

Mező	Hivatkozás
DF lefelé irányuló adatátviteli formátum	3.1.2.3.2.1.2
CF vezérlő mező = 0	3.1.2.8.7.2
AA regisztrált címzés	3.1.2.5.2.2.2
ME közlemény, kiterjesztett squitter	3.1.2.8.6.2
PI paritás/lekérdező azonosító	3.1.2.3.2.1.4

A PI mezőt a nullával azonos II mezővel kell kódolni.

3.1.2.8.7.3.2 *ES/NT squitter típus*

3.1.2.8.7.3.2.1 *Repülés közbeni pozíció squitter*. A repülés közbeni pozíció típusú ES/NT a DF=18 formátumot az ME mezőbe beillesztett, és a 3.1.2.8.6.2 pontban meghatározott a 05 {HEX} regiszter formátummal együtt használja.

3.1.2.8.7.3.2.2 *Földi pozíció squitter*. A földi pozíció típusú ES/NT a DF=18 formátumot az ME mezőbe illesztett, és a 3.1.2.8.6.2 pontban meghatározott 06 {HEX} regiszter formátummal együtt használja.

3.1.2.8.7.3.2.3 *Légijármű azonosító squitter*. A légijármű azonosító típusú ES/NT a DF=18 formátumot az ME mezőbe illesztett, és a 3.1.2.8.6.2 pontban meghatározott 08 {HEX} regiszter formátummal együtt használja.

3.1.2.8.7.3.2.4 *Repülés közbeni sebesség squitter*. A repülés közbeni sebesség típusú ES/NT a DF=18 formátumot az ME mezőbe illesztett, és a 3.1.2.8.6.2 pontban meghatározott 09 {HEX} regiszter formátummal együtt használja.

3.1.2.8.7.3.2.5 *Esemény vezérelt squitter*. Az esemény vezérelt típusú ES/NT a DF=18 formátumot az ME mezőbe illesztett, és a 3.1.2.8.6.2 pontban meghatározott 0A {HEX} regiszter formátummal együtt használja.

3.1.2.8.7.3.3 *ES/NT squitter gyakoriság*

3.1.2.8.7.3.3.1 *Kezdőérték megadása*. A táplálás bekapcsolását követő kezdőérték beállítás során a nem válaszjel típusú eszközök a működésüket úgy indítsák, hogy közben semmilyen squitter-t ne sugározzanak. A nem válaszjeladó típusú eszközök a repülés közbeni pozíció, földi pozíció, repülés közbeni sebesség és légijármű azonosító típusú ES/NT squitter-t akkor kezdeményezzék, ha a szükséges adatok rendelkezésre állnak az adott squitter típus ME mezőbe illesztéshez. A fentiek eldöntése egyedi eljárást igényel mindegyik squitter típus esetében. Az ES/NT squitter adatátviteli gyakorisága feleljen meg a 3.1.2.8.6.4.2 - 3.1.2.8.6.4.6 fejezeteknek.

1. Megjegyzés – Ha a légijármű nem képes pozíciót, sebességet vagy azonosítót jelenteni, ez megakadályozza a kiterjesztett squitter adatsugárzást is. Ha a bemeneti adatközlés a különböző squitter típus regiszterekhez 60 sec-ra megszakad, az adott squitter típus adatsugárzása szünetel, amíg az adatközlés helyre nem áll, kivéve a földön üzemelő ES/NT eszközöket (ahogy azt az 1. változatú kiterjesztett squitter formátumokhoz a "Technical Provisions for Mode S Services and Extended Squitter (Doc. 9871)" meghatározza).

2. Megjegyzés – Az időzítés (3.1.2.8.7.6) leteltével az ilyen squitter típus az ME mező összes helyi értékén zérót tartalmaz.

3.1.2.8.7.3.3.2 *Késleltetett adatsugárzás*. Az ES/NT squitter adatsugárzást késleltetni kell, ha a nem válaszjeladó típusú eszköz más egyéb típusú squitter-t sugároz.

3.1.2.8.7.3.3.2.1 A késleltetett squitter-t azonnal ki kell sugározni amint a nem válaszjeladó típusú eszköz felszabadult.

3.1.2.8.7.3.3.3 *ES/NT antenna kiválasztás*. Az antenna átkapcsolással (3.1.2.10.4) működő, nem válaszjeladó típusú eszközök az ES/NT squitter-t a következők szerint sugározzák:

a) a levegőben (3.1.2.8.6.7), a nem válaszjeladó típusú eszközök a különböző típusú ES/NT squitter-t felváltva sugározzák a két antennáról ; és

b) a földön (3.1.2.8.6.7), a nem válaszjeladó típusú eszközök az ES/NT squitter-t a felső antennáról sugározzák ki.

3.1.2.8.7.3.3.4 *Regiszter időzítés*. A nem válaszjeladó típusú eszközök törlik a repülés közbeni pozíció, földi pozíció, sebesség közleményekhez használatos 56 bites regiszterek tartalmát, ha az utolsó frissítéstől számított 2 sec-n belül a regiszter tartalom nem került frissítésre. Ez az időzítés, az összes regiszter esetében, egymástól függetlenül kerül megállapításra.

1. Megjegyzés – A kiterjesztett squitter adatsugárzás lezárásának meghatározását a "Technical Provisions for Mode S Services and Extended Squitter (Doc. 9871)" tartalmazza.

2. Megjegyzés – A fenti regiszter tartalmakat törlik annak érdekében, hogy az idejétmúlt pozíció és sebesség adatok ne kerüljenek kisugárzásra.

3.1.2.8.7.3.3.5 *Repülés közbeni/földi helyzet meghatározása*. A földi helyzetet automatikusan meghatározó légijárművek, ezt az interfész bemenetet használják, a légi vagy földi közlemény típusok kiválasztásához, kivéve a 3.1.2.6.10.3.1 pontban leírtakat. Azok a légijárművek, amelyek nem rendelkeznek automatikus földi helyzet meghatározással, a 3.1.2.8.6.7 pontban leírtak kivételével, repülés közbeni típusú közleményeket jelentenek.

3.1.2.8.7.3.3.6 *Földi squitter sűrűség vezérlés*. A légijármű mozgását 1 másodpercenként kell ellenőrizni. A földi squitter sűrűséget az ellenőrzés eredményétől függően kell meghatározni.

Megjegyzés – A légijármű mozgásának meghatározásához szüksége algoritmust a "Technical Provisions for Mode S Services and Extended Squitter (Doc. 9871)" dokumentumban a 0716 regiszterre vonatkozó előírások határozzák meg.

3.1.2.8.8 *Kiterjesztett squitter katonai alkalmazása, fedélzetről leadott 19-es adattovábbítási formátum*

10010	AF:3	

Megjegyzés. – Ez a formátum támogatja a kiterjesztett squitter ADS-B közlemények rádióadását katonai alkalmazások támogatásában. Külön formátumot használnak ezeknek a kiterjesztett squittereknek a megkülönböztetésére a szabványos ADS-B közlés együttes rádióadásoktól, amelyek DF = 17 vagy 18-at használnak.

3.1.2.8.8.1 *Katonai formátum.* A DF = 19-hez használt formátum egy 112-bites fedélzetről leadott adattovábbítási formátum, amely a következő mezőket tartalmazza:

Mező	*Hivatkozás*
DF fedélzetről leadott adattovábbítási formátum	3.1.2.3.2.1.2
AF irányítás mező	3.1.2.8.8.2

3.1.2.8.8.2 *Alkalmazás mező.* Ez a 3-bites (6 – 8) fedélzetről leadott adattovábbítási mezőt DF = 19-ben a 112-bites átvitel formátumának meghatározásához kell használni.

0 – 7 kód = Fenntartott

3.1.2.8.9 Kiterjesztett squitter maximális átviteli sebesség

Egy kiterjesztett squitter alkalmazás által sugárzott kiterjesztett squitterek (DF = 17, 18 vagy 19) maximális teljes száma nem haladhatja meg a 6,2 per másodpercet.

3.1.2.9 Légijármű azonosítási protokoll

3.1.2.9.1 *Légijármű azonosítás jelentés*. Egy földi kezdeményezésű Comm-B kérés (3.1.2.6.11.2 pont), amely RR egyenlő 18 és vagy DI nem egyenlő 7, vagy DI egyenlő 7 és RRS egyenlő 0 megfeleléseket tartalmaz, olyan választ állíthat elő, amely a légijármű azonosítását tartalmazza az MB mezőjében.

3.1.2.9.1.1 *AIS, légijármű azonosítási almező MB-ben.* A válaszjeladó a légijármű azonosítását a 48-bites (41-88) AIS MB almezőben jelenti. Az átvitt légijármű azonosítás lesz az, ami a repülési tervben alkalmazásra kerül. Hogyha repülési terv nem áll rendelkezésre, a légijármű lajstromjele kerül beillesztésre ebbe az almezőbe.

Megjegyzés. – Ha a légijármű lajstromjelét használják, ezt "rögzített közvetlen adatként" minősítik (3.1.2.10.5.1.1 pont). Ha egy másik légijármű azonosítási fajtát használnak, ezt "változó közvetlen adatként" minősítik (3.1.2.10.5.1.3 pont).

3.1.2.9.1.2 *AIS almező kódolása*. Az AIS almezőt a következőképpen kódolják:

33	41	47	53	59	65	71	77	83
BDS	Char. 1	Char. 2	Char. 3	Char. 4	Char. 5	Char. 6	Char. 7	Char. 8.
40	46	52	58	64	70	76	82	88

Megjegyzés. – Légijármű azonosítás kódolás maximum 8 karaktert szolgáltat.

A légijármű azonosítási közleményhez használt BDS kód legyen: BDS1 egyenlő 2 (33-36) és BDS2 egyenlő 0 (37-40).

Minden karaktert az 5. számú Nemzetközi Betűrend Sorszám (IA-5) 6-bites almezőjeként kódolnak, ahogyan az a 3-6 táblázatban fel van tüntetve. A karakter kódot először a magasabb rendű egységével (b_6) kell továbbítani, és a közölt légijármű azonosítást a balszélső karakterrel kell kezdeni. A karaktereket egymás után, SPACE kód közbeiktatása nélkül kell kódolni. Bármely nem használt karakter az almező szélén egy SPACE karakter kódot tartalmaz.

3.1.2.9.1.3 *Légijármű azonosítási képesség jelentés*. A válaszjeladók, amelyek egy földi kezdeményezésű légijármű azonosításra vonatkozó kérésre reagálnak, ezt a képességet az adatkapcsolati képesség közlésben (3.1.2.6.10.2.2.2 alpont) jelentik a MB almező 33-as bitjének 1 értékre állításával.

3.1.2.9.1.4 *Légijármű azonosítás változás*. Ha az AIS almezőben közölt légijármű azonosítás repülés közben változik, a válaszjeladó közli a földdel az új azonosítást a Comm-B adás közlemény protokoll felhasználásával, amely a 3.1.2.6.11.4 pontban szerepel.

3.1.2.10 A másodlagos felderítő radar S-módú válaszjeladójának lényeges rendszer jellemzői

3.1.2.10.1 *Válaszjeladó érzékenység és dinamikus tartomány*. A válaszjeladó érzékenységét egy adott lekérdezési jel bemeneti szintjének és a hozzátartozó válaszok adott százalékának fogalmával határozzák meg. Csak a vett lekérdezéshez tartozó kért bit-sémát tartalmazó helyes válaszok jönnek számításba. Egy adott lekérdezésnél, amely a 3.1.2.4 pontnak megfelelő választ igényel, a minimális indító szintet, MTL-t, a 90%-os válasz-lekérdezés arányhoz tartozó minimális bemenő teljesítmény szintként határozzák meg. A MTL értéke -74 dBm ±3 dB. Egy S-módú válaszjeladó válasz-lekérdezés aránya a következő:

a) legalább 99% a 3 dB-el MTL fölött és a -21 dBm közötti jel bemeneti szinteknél; és

b) nem több, mint 10% -81 dBm alatti jel bemeneti szinteknél.

Megjegyzés. – A válaszjeladó érzékenység és kimenő teljesítmény ebben a szakaszban az antenna termináloknál lévő jelszint fogalmában van leírva. Ez szabadságot ad a tervezőnek a beszerelés elrendezéséhez a kábelhossz optimalizálására és a vevő-adó tervezéshez és nem zárja el a vevő és/vagy adó alkatrészeket attól a lehetőségtől, hogy az antenna alszerelvény integrált részévé váljanak.

3.1.2.10.1.1 *Válasz-arány interferencia jelenlétében.*

Megjegyzés.– A következő pontok az S-módú válaszjeladó teljesítmény mérését mutatják be interferáló A/C-módú lekérdezés impulzusok és alacsony szintű hullámsávon belüli CW interferencia jelenlétében.

3.1.2.10.1.1.1 *Válasz-arány interferáló impulzus jelenlétében.* Ha adott egy S-módú lekérdezés, amely választ igényel (3.1.2.4 alpont), a válaszjeladó válasz aránya legalább 95% egy zavaró A/C-módú lekérdezés impulzus jelenlétében, ha a zavaró impulzus szintje 6 dB-vel vagy ennél nagyobb értékkel a -68 dBm és -21 dBm közötti S-módú input jel jelszintje alatt van és az interferáló impulzus S-módú lekérdezés P_6 impulzusát átlapolja, bárhol a szinkronizáló fázis megfordítás után.

Ugyanazon feltételek mellett a válasz arány legalább 50 százalék, ha az interferencia impulzus szint 3 dB-el vagy ennél többel a jelszint alatt van.

3.1.2.10.1.1.2 *Válasz-arány impulzus pár interferencia jelenlétében*. Ha adott egy lekérdezés, amely választ igényel (3.1.2.4 alpont), a válaszjeladó válasz aránya legalább 90 százalék egy P_1 és P_2 impulzus pár jelenlétében, ha az interferáló impulzuspár 9 dB-el vagy többel a jelszint alatt van - 68 dBm és -21 dBm közötti bemeneti jel szinteknél, és az interferáló pár P_1 impulzusa nem előbb jelenik meg, mint az S-módú jel P_1 impulzusa.

3.1.2.10.1.1.3 *Válasz-arány alacsonyszintű aszinkron interferencia jelenlétében*. Az összes, -65 dBm és -21 dBm közötti vett jelnél és adott egy S-módú lekérdezés, amely a 3.1.2.4 pontnak megfelelő választ kér, és ha nincs kizárási feltétel érvényben, a válaszjeladó legalább 95 százalékos válaszaránnyal helyesen válaszol aszinkron interferencia jelenlétében. Az aszinkron interferenciát egyetlen A/C-módú lekérdezési impulzusnak vesszük, amely maximálisan 10000 Hz-es ismétlési sebességgel fordul elő 12 dB-el vagy többel az S-módú jel szintje alatt.

Megjegyzés. – Az ilyen impulzusokat kombinálni lehet az S-módú lekérdezés P_1 és P_2 impulzusaival egy érvényes, csak A/C módú körhívás lekérdezés kialakításához. Az S-módú válaszjeladó nem reagál a csak A/C-módú körhívás lekérdezésekre. Az előző impulzus ugyancsak kombinálható az S-módú lekérdezés P_2-jével egy érvényes A-módú vagy C-módú lekérdezés kialakítására. Azonban az S-módú bevezetés P_1 és P_2 párja elsőbbséget élvez (3.1.2.4.1.1.1 alpont). Az S-módú dekódolási eljárás független az A-módú/C-módú dekódoló eljárástól és a vett S-módú lekérdezéstől.

3.1.2.10.1.1.4 *A válasz sűrűség alacsonyszintű, azonos sávú, CW interferencia mellett*. 1030 ± 0.2 MHz-es, az elvárt Mode A/C vagy S-módú lekérdező jelszinttől legalább 20 dB-l vagy annál nagyobb mértékben, kisebb jelszintű, nem koherens CW interferencia esetén, a válaszjeladó a lekérdezések legalább 90 %-ra helyesen kell, hogy válaszoljon.

3.1.2.10.1.1.5 *Hamis reagálás*

Ajánlás. – *A nem a vevő sáváteresztőjén belüli jelekre való reagálásnak legalább 60 dB-el a normál érzékenység alatt kell lennie.*

3.1.2.10.2 V*álaszjeladó impulzus-csúcsteljesítmény.* Egy válasz mindegyik impulzusának csúcsteljesítménye a következők szerinti:

a) nem kisebb, mint 18,5 dBW olyan légijárműveknél, amelyek 4570 m (15000 láb) feletti magasságokon nem tudnak üzemelni;

b) nem kisebb, mint 21,0 dBW olyan légijárműveknél, amelyek 4570 m (15000 láb) feletti magasságokon képesek üzemelni;

c) nem kisebb, mint 21,0 dBW olyan légijárműveknél, amelyek maximális utazó sebessége meghaladja 324 km/h-t (175 csomó); és

d) nem haladja meg a 27,0 dBW-t.

3.1.2.10.2.1 *Inaktív állapotú válaszjeladó kimenő teljesítmény.* Amikor a válaszjeladó inaktív állapotban van, az impulzus-csúcsteljesítmény 1090 MHz plusz vagy mínusz 3 MHz-nél nem haladja meg a -50 dBm-et. Az inaktív állapot úgy lett meghatározva, hogy benne van az első átviteli impulzust megelőző és az utolsót követő 10 mikromásodpercnél kisebb átviteli periódusú átvitelek közötti teljes periódusban.

Megjegyzés. – Inaktív állapotú válaszjeladó teljesítmény ily módon arra szorítkozik, hogy egy légijármű számára biztosítsa, hogy amikor nagyon közel, 185 m-re (0,1 NM) van egy A/C-módú vagy S-módú lekérdezőhöz, ne okozzon a válaszjeladónál interferenciát. Az S-mód bizonyos alkalmazásainál, például az összeütközés-elhárító fedélzeti rendszernél, ahol 1090 MHz-es adó és vevő van ugyanazon a légijárművön, az inaktív állapotú válaszjeladó teljesítmény további korlátozására lehet szükség.

3.1.2.10.2.2 *Hamis emisszió sugárzás*

Ajánlás – *CW sugárzás nem haladhatja meg a 70 dB-t 1 Watt alatt.*

3..1.2.10.3 *Különleges jellemzők*

3.1.2.10.3.1 *S-módú oldalszárny elnyomás*

Megjegyzés. – Oldalszárny elnyomás S-módú formátumoknál akkor fordul elő, amikor a P_5 impulzus rákerül a P_6 szinkronizáló fázis megfordítás elhelyezésre, amelynek az a következménye, hogy a válaszjeladó nem nyugtázza a lekérdezést (3.1.2.4.1.1.3 alpont).

Ha adott egy választ igénylő S-módú lekérdezés, a válaszjeladónak:

a) minden MTL +3 dB és -21 dBm közötti jelszintnél 10 százaléknál kisebb válasz aránya lesz, ha a P_5 vett amplitúdó 3 dB-el vagy többel meghaladja a P_6 vett amplitúdót;

b) minden MTL +3 dB és -21 dBm közötti jelszintnél legalább 99 százalékos válasz aránya lesz, ha a vett P_6 amplitúdó 12 dB-el vagy többel meghaladja a P_5 vett amplitúdót.

3.1.2.10.3.2 *S-módú holtidő.* A holtidő olyan időközként lett meghatározva, amely egy válasz továbbítás végénél kezdődik, és akkor fejeződik be, amikor a válaszjeladó visszanyeri az érzékenységét az MTL 3 dB-én belül. S-módú válaszjeladónak nem lehet 125 mikromásodpercnél hosszabb holtideje.

3.1.2.10.3.3 *S-módú vevő érzékenység csökkentés.* A válaszjeladó vevőjének érzékenységét a 3.1.1.7.7.1 pontnak megfelelően csökkentik a 0,7 mikromásodpercnél hosszabban tartó impulzusok vételével szemben.

3.1.2.10.3.3.1 *Helyreállítás érzékenység csökkentésből.* Az érzékenység csökkentésből történő helyreállítás a vett jel mindegyik impulzusának a lefutó élénél kezdődik, és a 3.1.1.7.7.2 pontban előírt sebességgel folyik le, feltéve, hogy nincs válasz- vagy adatátvitel a vett jelre való reagálás keretében.

3.1.2.10.3.4 *Helyreállítás olyan S-módú lekérdezések után, amelyek nem váltanak ki választ.*

3.1.2.10.3.4.1 *Helyreállítás egyedüli S-módú lekérdezés után.*

3.1.2.10.3.4.1.1 A válaszjeladó az MTL 3 dB-jén belüli érzékenységét nem később, mint 128 mikromásodperccel a szinkronizáló fázis megfordítás vétele után állítja helyre, egy olyan S-módú lekérdezést követően, amelyet nem fogadnak (3.1.2.4.1.2 alpont), vagy amelyet fogadnak, de nem igényel választ.

3.1.2.10.3.4.1.2 **Ajánlás**. – *A válaszjeladó az MTL 3 dB-jén belüli érzékenységét nem később, mint 45 mikromásodperccel a szinkronizáló fázis megfordítás vétele után állítja helyre, egy olyan S-módú lekérdezést követően, amelyet nem fogadnak (3.1.2.4.1.2 alpont), vagy amelyet fogadnak, de nem igényel választ.*

3.1.2.10.3.4.1.3 Minden S-módú válaszjeladó, melyet 1999. Január 1-jén vagy azután szerelnek fel, az MTL 3 dB-jén belüli érzékenységét nem később, mint 45 mikromásodperccel a szinkronizáló fázis megfordítás vétele után állítja helyre, egy olyan S-módú lekérdezést követően, amelyet nem fogadnak (3.1.2.4.1.2 alpont), vagy amelyet fogadnak, de nem igényel választ.

3.1.2.10.3.4.2 *Helyreállítás S-módú Comm-C lekérdezés után.* Comm-C képességgel rendelkező S-módú válaszjeladó az MTL 3 dB-je belüli érzékenységét nem később, mint 45 mikromásodperccel a szinkronizáló fázis megfordítás vétele után állítja helyre, egy olyan Comm-C lekérdezés vételét követi, amelynek részére nincs válasz igény.

3.1.2.10.3.5 *Nem-kívánt S-módú válaszok.* Az S-módú válaszjeladók nem-kívánt S-módú válaszokat, 10 másodpercenként legfeljebb egyszer állíthatnak elő. A légijárműben a felszerelést úgy kell elvégezni, hogy ezt a szintet elérjék, amikor az összes lehetséges interferáló berendezés, amelyet ugyanarra a gépre felszereltek, maximális interferencia szinten működik.

3.1.2.10.3.5.1 *Nem-kívánt S-módú válaszok, alacsonyszintű, azonos sávú, CW interferencia mellett.* 1030 ± 0.2 MHz-es, -60dBm vagy kisebb jelszintű, nem koherens CW interferencia és érvényes S-módú lekérdezés esetén, az S-módú válaszjeladó nem-kívánat S-módú választ legfeljebb egyszer sugározhat minden 10 másodperc alatt.

3.1.2.10.3.6 *Válasz sebesség korlátozás*

Megjegyzés. – A válasz sebesség korlátozás külön van előírva A és C-módra és S-módra.

3.1.2.10.3.6.1 *S-módú válasz sebesség korlátozás*. Egy válaszjeladó S-módú formátumainál nem kívánnak válasz sebesség korlátozást. Ha ilyen korlátozó az áramkör védelem céljából be van építve, ez a 3.1.2.10.3.7.2 és 3.1.2.10.2.7.3 pontokban megkövetelt minimális lekérdezési sebességet teszi lehetővé.

3.1.2.10.3.6.2 *A- és C-módú válasz sebesség korlátozás.* A válasz sebesség korlátozás A- és C-módnál a 3.1.1.7.9.1 pontnak megfelelően érvényesül. Az előírt érzékenység csökkentés (3.1.1.7.9.2 alpont) nem befolyásolja a válaszjeladó S-módú teljesítményét.

3.1.2.10.3.7 *Minimális válasz sebesség képesség, A-, C- és S-módok.*

3.1.2.10.3.7.1 A 3.1.2.10.3.7 pontban meghatározott összes válasz-sebesség hozzáadódik bármely squitter továbbításhoz, amelynek megvalósítását a válaszjeladó megköveteli.

3.1.2.10.3.7.2 *Minimális válasz sebesség képesség, A- és C-módok.* A minimális válasz sebesség képesség A- és C-módnál a 3.1.1.7.9. pontnak felel meg.

3.1.2.10.3.7.3 *Minimális válasz sebesség képesség, S-mód.* A csak rövid S-módú válaszok továbbítására képes válaszjeladó a következő sebességekkel képes válaszokat generálni.

50 S-módú válasz bármely 1-másodperces időközben
18 S-módú válasz egy 100 ezredmásodperces időközben
8 S-módú válasz egy 25 ezredmásodperces időközben
4 S-módú válasz egy 1,6 ezredmásodperces időközben

A fedélzetről leadott ELM továbbításokon kívül, egy 2-es, 3-as, vagy 4-es szintű válaszjeladó hosszú válaszokként képes generálni legalább az alábbiaknak megfelelő számban:

16 az 50 S-módú válaszból bármely 1 másodperces időközben
6 a 18 S-módú válaszból egy 100 ezredmásodperces időközben
4 a 8 S-módú válaszból egy 25 ezredmásodperces időközben
2 a 4 S-módú válaszból egy 1,6 ezredmásodperces időközben

A fedélzetről leadott ELM továbbításokon kívül egy 5-ös szintű válaszjeladó hosszú válaszokként képes generálni legalább az alábbiaknak megfelelően:

24 az 50 S-módú válaszból bármely 1-másodperces időközben
9 a 18 S-módú válaszból egy 100 ezredmásodperces időközben
6 a 8 S-módú válaszból egy 25 ezredmásodperces időközben
2 a 4 S-módú válaszból egy 1,6 ezredmásodperces időközben

Ezenkívül egy ACAS berendezésen belüli válaszjeladó ACAS koordinációs válaszként képes legalább 3-at generálni az 50 S-módú válaszból 1-másodperces időközben.

3.1.2.10.3.7.4 *Minimális S-módú ELM csúcs válasz sebesség*

1. Megjegyzés. – Amikor egy fedélzetről leadott ELM kezdeményezése történik (3.1.2.7.7.1 alpont), az S-módú válaszjeladó közli a várakozó közlemény hosszát (szegmensekben). A válaszjeladó legyen képes ilyen számú szegmens, plusz a hiányzó válaszok pótláshoz még egy ráhagyás átvitelére a földi lekérdező sugárzási szünete alatt.

Minden másodpercben legalább egyszer, a fedélzetről leadott ELM továbbítás üzemelésére kialakított S-módú válaszjeladó képes egy 25-ezredmásodperces időközben legalább 25 százalékkal több szegmenst továbbítani, mint amennyit a kezdeményezésben közölt (3.1.2.7.7.1 alpont). A fedélzetről leadott minimális hosszúságú ELM továbbítási képesség 4-es és 5-ös szintű válaszjeladóknál a 3.1.2.10.5.2.2.2 pontban meghatározottaknak felel meg.

2. Megjegyzés. – A fedélzetről leadott, maximális hosszúságú ELM továbbítás (16 szegmens) feldolgozására képes válaszjeladótól ezért megkövetelik, hogy képes legyen a fenti körülmények között 20-as hosszúságú válaszok átvitelére. A 4-es szintű válaszjeladók épülhetnek arra a folyamatra, amelynek hosszúsága kisebb, mint a maximális közlemény hossz. Ezek a válaszjeladók nem tudnak olyan közlemény hosszt kezdeményezni, amely meghaladja az adattovábbítási-képességeket. Pl. egy válaszjeladó, amely legfeljebb 10-es hosszúságú válaszokat tud átvinni, a fenti feltételek mellett soha nem tud bejelenteni egy 8 szegmensnél hosszabb közleményt.

3.1.2.10.3.8 *Válaszkésés és vibrálás*

Megjegyzés. – Egy lekérdezést vétele után amennyiben választ kértek rá, akkor ennek a válasznak a továbbítása a protokollok kivitelezéséhez szükséges rögzített késleltetés után kezdődik. Ehhez a késéshez különböző értékek vannak hozzárendelve az A- és C-módú, S-módú és A/C/S-módú körhívás válaszoknál.

3.1.2.10.3.8.1 *Válaszkésés és vibrálás A- és C-módoknál.* A válaszkésés és vibrálás az A- és C-módú tranzakcióknál a 3.1.1.7.10 pontban előírtaknak felel meg.

3.1.2.10.3.8.2 *Válaszkésés és vibrálás S- és C-módnál.* Az MTL és -21 dBm közötti összes bemeneti jelszintnél a válasz első bevezető impulzusának felfutó éle (3.1.2.1.5.1.1 alpont) 128 plusz vagy mínusz 0,25 mikromásodperccel a vett P_6 impulzus fordított szinkronizáló fázisában (3.1.2.1.5.2.2 alpont) jelenik meg. A válaszkésés vibrálása nem haladhatja meg a 0,08 mikromásodpercet, a csúcs (99,9 %-os).

3.1.2.10.3.8.3 *Válaszkésés és vibrálás A/C/S körhívás módnál.* MTL jellel +3 dB és -21 dBm közötti összes bemeneti jelszintnél a válasz első bevezető impulzusának felfutó éle (3.1.2.2.5.1.1) 128 plusz vagy mínusz 0,5 mikromásodperccel a lekérdezés P_4 impulzusának lefutó éle után jelenik meg (3.1.2.1.5.1.1 alpont). A vibrálás nem haladhatja meg a 0,1 mikromásodpercet, a csúcs (99,9 %-os).

Megjegyzés. – Egy 0,1 mikromásodperces csúcs vibrálás megegyezik a 3.1.1.7.10 pontban előírt vibrálással.

3.1.2.10.3.9 *Időzítő*. Az időzítők időtartama és sajátosságai a 3-10 táblázatban találhatók.

Minden időzítő legyen képes az újraindulásra. Valamilyen indítási utasítás vételére saját előírt idejükig fognak futni. Ez attól függetlenül megy végbe, hogy az indítási utasítás vételének idején működő vagy nem működő állapotban vannak. Az időzítő újraállítására vonatkozó utasítás az időzítő működését megállítja és visszaviszi a kezdeti állapotába egy következő indítási utasítás előkészítéseként.

3.1.2.10.3.10 *Válaszok gátlása*. Az A/C/S körhívás módú és csak S körhívás módú lekérdezésekre adott válaszokat mindig gátolni kell, ha a légijármű a földön van. Nincs lehetőség külön címzett S-módú lekérdezésekre adott válaszok gátlására, függetlenül attól, hogy a légijármű a levegőben vagy a földön van.

3.1.2.10.3.10.1 **Ajánlás.** – *A légijárműnek eszközzel kell rendelkeznie a földön tartózkodás megállapítására, és ennek az információnak a válaszjeladóhoz továbbítására.*

3.1.2.10.3 10.2 **Ajánlás.** – *Az A/C-módú válaszokat gátolni kell amikor a légijármű a földön van, hogy megakadályozzák az interferenciát, amikor szoros közelségben van egy lekérdezőhöz, vagy egy másik légijárműhöz.*

Megjegyzés. – Az S-módú különállóan címzett lekérdezések nem keltenek ilyen interferenciát, és a repülőtéren tartózkodó légijárművekkel való adatkapcsolati kommunikációnál kerülhetnek alkalmazásra. Adatbegyűjtő squitter sugárzások használhatók a repülőtéren lévő légijárművek passzív felderítésére.

3.1.2.10.3.10.3 *Squitter adatátvitelek gátlása.* Nem lehet kiterjesztett squitter adatátviteleket gátolni, kivéve a 3.1.2.8.6 pontban előírtakat, és nem lehet adatbegyűjtési squitter közleményeket gátolni, kivéve a 3.1.2.8.5 pontban előírtakat, függetlenül attól, hogy a légijármű a levegőben vagy a földön van.

Megjegyzés. – A squitter gátlására vonatkozó további információk a „Manual of Secondary Surveillance Radar (SSR) Systems *(Doc 9684)”* kiadványban találhatók.

3.1.2.10.4 V*álaszjeladó antenna rendszer és széttelepített üzemelés.* A széttelepített működésre alkalmas S-módú válaszjeladók két RF csatlakozási ponttal rendelkeznek a két antennával való üzemeléshez, melyek közül az egyik antenna a légijármű törzsének tetején, a másik az alján van elhelyezve. Az antennák egyikéről vett jelet a vételhez választják ki és a választ csak a kiválasztott antennáról továbbítják.

3.1.2.10.4.1 *Sugárzási diagram.* Egy légijárműre szerelt S-módú antenna sugárzási diagramja legyen névlegesen azonos egy vízszintes síkon elhelyezett negyedhullámú monopolantenna sugárzási diagramjával.

Megjegyzés. – Az olyan válaszjeladó antennák, amelyek a függőleges sugárnyaláb szélességnél való nyereség növelésére szolgálnak, nem kívánatosak, az elfordulásuk alatti alacsony teljesítményük miatt.

3.1.2.10.4.2 *Antenna elhelyezés.* A légijármű tetején és alján elhelyezett antennákat úgy kell felszerelni, hogy minél közelebb legyenek a törzs középvonalához. Az antennák elhelyezése tegye lehetővé a vízszintes síkban lévő mezőjük akadályozásának minimalizálását.

3.1.2.10.4.2.1 **Ajánlás**. – A törzs tetején és alján elhelyezett antennák közötti vízszintes távolság nem lehet nagyobb, mint 7,6 m (25 láb).

Megjegyzés. – Ez az ajánlás arra szolgál, hogy fenntartsa bármely széttelepített válaszjeladó (a kábeleket is beleértve) működését bármilyen széttelepített antenna felszereléssel és még kielégítse a 3.1.2.10.4.5 alpont követelményeit.

3.1.2.10.4.3 *Antenna kiválasztás.* A széttelepített működésre alkalmas S-módú válaszjeladók azzal a képességgel rendelkeznek, amely lehetővé teszi a két antenna csatornára egyidőben érkező impulzus sorozat értékelését. Az értékeléssel mindkét antennára egyenként határozzák meg, hogy az S-módú lekérdezés bekezdő jelszakaszának P_1 impulzusa és P_2 impulzusa kielégíti-e az S-módú lekérdezésre a 3.1.2.1 pontban előírt követelményeket, valamint az A-módú, C-módú vagy a közös lekérdezés P_1 impulzusa és P_3 impulzusa kielégíti-e az A-módú, és C-módú lekérdezésekre a 3.1.1 pontban előírt követelményeket.

Megjegyzés. – A széttelepített működésre felszerelt válaszjeladók nem kötelezően rendelkezhetnek azzal a képességgel, hogy a lekérdezések vett impulzusainak további jellemzőit értékeljék a széttelepített csatorna kiválasztások végrehajtásánál. A válaszjeladó opcióként értékelhet egy teljes S-módú lekérdezést, amelyet mindkét csatornán egyidőben vett, hogy egyenként megállapítsa az egyes csatornáknál, hogy a lekérdezés kielégíti-e a 3.1.2.4.1.2.3 pontban meghatározott, az S-módú lekérdezés vételére vonatkozó követelményeket.

3.1.2.10.4.3.1 Ha a két csatorna egyidőben veszi legalább a P_1 – P_2 impulzus párt, amely kielégíti az S-módú lekérdezésre vonatkozó követelményeket, vagy egy P_1-P_3 impulzus párt, amely kielégíti az A-módú vagy C-módú lekérdezésre vonatkozó követelményeket, vagy ha a két csatorna egyidőben vesz egy komplett lekérdezést, akkor azt az antennát választja ki a megmaradó lekérdezés (ha van ilyen) vételére és a válasz továbbítására, amelyiknél a jelerősség nagyobb.

3.1.2.10.4.3.2 Ha csak egy csatorna vesz egy olyan impulzus párt, amely kielégíti a lekérdezéssel szembeni követelményeket, vagy ha csak egy csatorna vesz egy lekérdezést, az ezzel összekötött antennát választja ki, tekintet nélkül a vett jel erősségére.

3.1.2.10.4.3.3 *Kiválasztási küszöb.* Ha az antenna kiválasztás jelszinten alapul, ezt az összes MTL és -21 dBm között lévő szintre elvégzik.

Megjegyzés. – A kettő közül bármelyik antenna választható, ha a különbség a jelszintben kisebb, mint 3 dB.

3.1.2.10.4.3.4 *A vett jel késési tűrése.* Ha egy lekérdezés vételére az egyik antennánál 0,125 mikromásodperccel, vagy ennél rövidebb idővel kerül sor, mint a másik antennánál, akkor a lekérdezéseket egyidejű lekérdezéseknek kell tekinteni, és a fenti antenna kiválasztási követelményt kell alkalmazni. Ha egy lekérdezés vételére az egyik antennánál a másik antenna vétele előtt 0,375 mikromásodperccel vagy ennél nagyobb időértékkel kerül sor, akkor azt az antennát választják ki a válaszadásra, amelyik a korábbi lekérdezést vette. Ha a vételek közötti időkülönbség 0,125 és 0,375 mikromásodperc között van, akkor a válaszjeladó a válaszadáshoz vagy az egyidejű lekérdezés alapján, vagy a korábbi érkezési idő alapján választja ki az antennát.

3.1.2.10.4.4 *Széttelepített átviteli csatorna elkülönítése.* A kiválasztott antennáról átvitt RF csúcs teljesítmény legalább 20 dB-el haladja meg a nem kiválasztott antennáról továbbított teljesítményt.

3.1.2.10.4.5 *Széttelepített válaszjeladók válaszkésése.* A két antenna csatorna (beleértve a válaszjeladótól az antennáig vezető kábelek és a két antenna között a légijármű középvonala mentén mért vízszintes távolság által okozott különbözeti késést is) közötti válaszadási késleltetés vonatkozásában megállapított kétirányú adatátvitel teljes különbsége nem haladhatja meg a 0,13 mikromásodpercet egyenlő amplitúdójú lekérdezéseknél. Ez a követelmény fennáll MTL +3 dB és 21 dBm közötti lekérdezési jel erősségekre is. A vibrálási követelmények mindegyik csatornára megmaradnak úgy, ahogy a nem széttelepített válaszjeladóra azt előírták.

Megjegyzés. – Ez a követelmény korlátozza az antenna bekapcsolás és a kábelkésés különbségek okozta látszólagos vibrálást.

3.1.2.10.5 *Adatfeldolgozás és csatolóegységek*

3.1.2.10.5.1 *Közvetlen adatok.* Közvetlen adatok azok, amelyeket az S-módú rendszer felderítési protokollja igényel.

3.1.2.10.5.1.1 *Rögzített közvetlen adatok.* Rögzített közvetlen adatok azok a légijárművektől érkező adatok, amelyek repülés közben nem változnak és ezek a következők:

a) a légijármű címzés (3.1.2.4.1.2.3.1.1 és 3.1.2.5.2.2.2 pontok);
b) a levegőhöz viszonyított maximális sebesség (3.1.2.8.2.2 pont); és
c) a lajstromozási jel, ha repülési azonosításra használják (3.1.2.9.1.1 pont).

3.1.2.10.5.1.2 *Rögzített közvetlen adatok csatolóegységei*

Ajánlás. – *A válaszjeladó és a légijármű közötti csatolóegységeket úgy kell tervezni, hogy a rögzített közvetlen adat értékek inkább a légijármű telepítés függvényévé, mint a válaszjeladó összeállításának függvényévé váljanak.*

Megjegyzés. – Ennek az ajánlásnak az a célja, hogy olyan csatolóegység eljárást bátorítson, amely lehetővé teszi a válaszjeladó cseréjét a válaszjeladó befolyásolása nélkül, a rögzített közvetlen adat beállításánál.

3.1.2.10.5.1.3 *Változó közvetlen adatok.* A változó közvetlen adatok azok a légijárműtől jövő adatok, amelyek repülés közben változhatnak és ide sorolhatók:

a) a C-módú magasság kód (3.1.2.6.5.4 alpont);

b) az A-módú azonosítás kód (3.1.2.6.7.1 alpont);

c) a földön levő állapot (3.1.2.5.2.2.1, 3.1.2.6.5.1 és 3.1.2.8.2.1 pontok);

d) a légijármű azonosítás, ha az nem a lajstrom jel (3.1.2.9.1.1 alpont); és

e) az SPI feltétel (3.1.2.6.10.1.3 pont).

3.1.2.10.5.1.4 *Változó közvetlen adatok csatolóegységei.* Egy eszközt kell alkalmazni az A-módú azonosítási kódhoz, az SPI állapothoz és a 2-es és e feletti szintű válaszjeladókhoz, és a repülőgép azonosítás pilóta által történő a változó adat csatolóegységen keresztül történő beállításához.

Csatolóegységeket kell alkalmazni a nyomásmagasság és a földön tartózkodás kódolásának elfogadásához.

Megjegyzés. – A változó közvetlen adatokhoz nincsen specifikus csatolóegység kialakítás előírva.

3.1.2.10.5.2 *Közvetett adatok.*

Megjegyzés. – Közvetett (indirekt) adatok azok, amelyek valamilyen irányban keresztül haladnak a válaszjeladón, de nincsenek hatással a felderítési feladatra.

Ha a közvetett adatok forrása és/vagy rendeltetési helye nincs a válaszjeladó zárt egységén belül, a szükséges kapcsolatokhoz csatolóegységeket kell használni.

3.1.2.10.5.2.1 *A csatolóegységek feladata*

Megjegyzés. – A közvetett adat csatolóegységek a szabványos tranzakcióknál olyan lekérdezéseket szolgálnak ki, amelyek választ és általános adási feladatot igényelnek. A közvetett adat csatolóegységek ELM-nél ezt a rendszert szolgálják ki és pufferolást és protokoll áramkört igényelnek a válaszjeladón belül. A csatolóegységek csatlakozó pontjait az egyes irányok és az egyes kiszolgálások szerint el lehet különíteni, vagy bármilyen módon kombinálni lehet őket.

3.1.2.10.5.2.1.1 *Fedélzetre irányuló szabványos hosszúságú tranzakció csatolóegységek.* A fedélzetre irányuló szabványos hosszúságú tranzakció csatolóegység a vett lekérdezések összes bitjét átviszi (az AP mező lehetséges kivételével) kivéve UF = 0, 11, vagy 16 esetét.

Megjegyzés. – AP szintén átvihető, az integritás megvalósításának elősegítésére.

3.1.2.10.5.2.1.2 *Fedélzetről leadott szabványos hosszúságú tranzakció csatolóegység.* Egy válaszjeladó, amely perifériális berendezéstől származó információkat továbbít, képes bitek, vagy bitminták vételére, a megfelelő helyre való beillesztéshez az adatátvitelen belül. Ezen adatforrás helyek nem tartalmazzák sem azokat, melyeken belül a saját válaszjeladó hozza létre a bitmintákat, sem a válasz AP mezőjét.

Egy válaszjeladó amely a Comm-B formátum felhasználásával információkat továbbít, azonnali hozzáféréssel rendelkezik a kért adatokhoz olyan értelemben, hogy a válaszjeladó egy lekérdezésre a lekérdezés által kért adatokkal válaszol.

Megjegyzés. – Ez a követelmény két módon elégíthető ki:

a) a válaszjeladó rendelkezik belső adat- és protokoll pufferrel;

b) a válaszjeladó "valós idejű" ("real time") csatolóegységet alkalmaz, amelynek működése során a fedélzetre irányuló adatok még azelőtt elhagyják a válaszjeladót, mielőtt a megfelelő válasz létrejön és a fedélzetről leadott adatok időben belépnek a válaszjeladóba, hogy a válaszba beépüljenek.

3.1.2.10.5.2.1.3 *Kiterjesztett hosszúságú közlemény csatolóegység.*

Megjegyzés. – Az ELM csatolóegység kinyeri a válaszjeladóból és beviszi a válaszjeladóba a levegő és föld között cserélődő adatokat az ELM protokoll segítségével (3.1.2.7 alpont).

3.1.2.10.5.2.2 *Közvetett adat tranzakció sebességek*

3.1.2.10.5.2.2.1 Szabványos *hosszúságú tranzakciók.* Az a válaszjeladó, amely lehetővé teszi a külső berendezésekbe és a külső berendezésekből való adattovábbítást, legalább annyi választ képes létrehozni, amennyit a minimális válasz sebességre a 3.1.2.10.3.7.2 pont előír, valamint a lekérdezőtől származó adatokat a legalább az alábbi sebességgel továbbítja a fedélzet felé:

50 hosszú lekérdezés minden 1-másodperces időközben
18 hosszú lekérdezés egy 100 ezredmásodperc időközben
8 hosszú lekérdezés egy 25 ezredmásodperc időközben
4 hosszú lekérdezés 1,6 ezredmásodperc időközben.

1. Megjegyzés. – Egy válaszjeladó, amely a 3.1.2.10.3.7.2 pont szerinti minimálisnál nagyobb válasz sebességre képes, nem kell hosszú lekérdezéseket vennie azután, hogy elérte a fenti fedélzetre irányuló adatok feldolgozási korlátait.

2. Megjegyzés. – Az S-módú válasz az egyetlen eszköz egy S-módú lekérdezés adat tartalma vételének visszaigazolására. Így, ha a válaszjeladó képes egy lekérdezésre válaszolni, az S-módú kialakításnak képesnek kell lennie az ebben a lekérdezésben tartalmazott adatok vételére, tekintet nélkül ez és más vett lekérdezések közötti időütemezésre. Néhány lekérdező átlapoló S-módú sugárnyalábjai jelentős mennyiségű adatfeldolgozás és pufferolás igényléshez vezethetnek. Az itt leírt minimum egy realisztikus szintre csökkenti az adatfeldolgozást és nem-vételi kikötés bejelentést szolgáltat a lekérdezőnek, hogy az adatokat átmenetileg nem veszi.

3.1.2.10.5.2.2.2 *Kiterjesztett hosszúságú tranzakciók.* A 3-as szintű (2.1.5.1.3 pont) és a 4-es szintű (2.1.5.1.4 pont) válaszjeladók képesek adatokat átadni legalább négy komplett tizenhat-szegmenses fedélzetre irányuló ELM-ektől (3.1.2.7.4 pont) négy másodperces időtartományban. Egy 5-szintes válaszjeladó (2.1.5.1.5 pont) képes adatok átvitelére legalább négy komplett tizenhat-szegmenses fedélzetre irányuló ELM-ből bármely egy-másodperces időközben, és képes legalább két komplett tizenhat-szegmenses fedélzetre irányuló ELM vételére ugyanazon II kóddal egy 250 ezredmásodperces időközben. Egy 4-es szintű válaszjeladó képes átvinni legalább egy négyszegmenses fedélzetre irányuló ELM-et (3.1.2.7.7 és 3.1.2.10.3.7.3 pontok) egy-másodperces időközben. Egy 5-ös szintű válaszjeladó képes átvinni legalább egy tizenhat-szegmensű fedélzetről leadott ELM-et bármely egy másodperces időközben.

3.1.2.10.5.2.2.2.1 **Ajánlás**. – *3-as szintű és 6-os szintű válaszjeladóknak képesek legalább két komplett tizenhat-szegmenses fedélzetre irányuló ELM vételére egy 250 ezredmásodperces időközben.*

3.1.2.10.5.2.3 *A szabványos hosszúságú tranzakciók adat formátumai és a megkövetelt lefelé irányuló légijármű paraméterek (DAPs)*

3.1.2.10.5.2.3.1 Az összes 2-es és magasabb szintű válaszjeladó, támogassa a következő regiszter alkalmazásokat:

- képesség jelentés (3.1.2.6.10.2);

- légijármű azonosító protokoll regiszter 20 {HEX} (3.1.2.9); és

- az ACAS rendszerrel felszerelt légijárművek részére az aktív döntési tanácsadás regiszter 30 {HEX} (4.3.8.4.2.2).

3.1.2.10.5.2.3.2 Ha szükséges, a 3-11 Táblázat szerinti regiszterek támogassák a DAPs-t. A válaszjeladók regisztereinek formátumát és a minimum frissítési időket, az együttműködés érdekében konzisztensen kell megválasztani.

3.1.2.10.5.2.3.3 A szabványos hosszúságú tranzakció interfészek továbbítják a lefelé irányuló légijármű paramétereket (DAPs) a válaszjeladókhoz, amelyek továbbítják azokat a föld felé. Mindegyik DAP-t egy Comm-B formátumba (MB mező) kell illeszteni, és kiolvasható kell, hogy legyen egy földi kezdeményezésű Comm-B (GICB) protokoll által vagy a flash háttértároló alkalmazásával az MSP lefelé irányuló 3-as csatornán keresztül.

Megjegyzés – A regiszterekre vonatkozó formátumokat és frissítési időket valamint a flash háttértároló alkalmazást, a "Technical Provisions for Mode S Services and Extended Squitter (Doc. 9871)" ismerteti.

3.1.2.10.5.3 *Adat tartalom átvitel integritása.* Egy válaszjeladó, amely adat csatolóegységeket alkalmaz, elegendő védelmet tartalmaz ahhoz, hogy kisebb hiba rátát biztosítson mint, egy hiba minden 10^3 közleményben és kevesebb, mint egy nem-észlelt hibát 10^7 112-bites átvitelben az antenna és a minden csatolóegység bekötési pontjai között mindkét irányban.

3.1.2.10.5.4 *Közlemény törlés*. A fedélzetről leadott szabványos hosszúságú tranzakció csatolóegység és a kiterjesztett hosszúságú közlemény csatolóegység magában foglalja azt a képességet, hogy töröljön egy közleményt, amelyet a válaszjeladónak küldtek a földre továbbítás céljából, de amelynek továbbítási ciklusa még nem fejeződött be (azaz a kizárást földi lekérdező nem hajtotta végre.)

Megjegyzés. – Egy példa ennek a képességnek a szükségességére egy közlemény törlése, ha szállítást kísérel meg, amikor a légijármű nincs S-módú földi állomás lefedésén belül. A közleményt ekkor törlik, hogy megakadályozzák, annak leolvasását, és éppen aktuális közleményként értelmezzék, amikor a légijármű visszatér az S-módú légtérbe.

3.1.2.10.5.5 *Légi-irányítású közlemények.* Az ilyen fajtájú közlemény az összes 3.1.2.10.5.4 pontban jelzett tevékenységet igényli plusz a továbbítást a hely lekérdező azonosítójának válaszjeladójához, amelynek a közleményt vennie kell.

3.1.2.11 A földi lekérdező lényeges rendszer jellemzői

Megjegyzés. – Annak biztosítására, hogy az S-módú lekérdező akció ne legyen káros az A/C-módú lekérdezőkre, az S-módú lekérdezőkre teljesítmény korlátok léteznek.

3.1.2.11.1 *Lekérdezés ismétlési sebességek*. Az S-módú lekérdezők a legkisebb megvalósítható lekérdezési ismétlési sebességet használják az összes lekérdezési módra.

Megjegyzés. – Kis lekérdezés ismétlési sebességeknél, pontos azimut adatok monoimpulzus eljárással nyerhetők.

3.1.2.11.1.1 K*örhívás lekérdezés ismétlési sebesség.* A befogásnál használt lekérdezési ismétlési sebesség A/C/S körhívás mód esetén, kisebb, mint 250 per másodperc. Ez a sebesség érvényes a párosított csak S körhívás módú és csak A/C körhívás módú lekérdezésekre, amelyeket többhelyes módban történő befogásra használnak.

3.1.2.11.1.2 *Lekérdezési ismétlési sebesség egyedülálló légijárműnél***.**

3.1.2.11.1.2.1 *Választ igénylő lekérdezések.* Választ igénylő S-módú lekérdezéseket nem továbbítanak egyedülálló légijárműhöz 400 mikromásodpercnél rövidebb időközöknél.

3.1.2.11.1.2.2 *Fedélzetre irányuló ELM lekérdezések.* Az egymást követő Comm-C lekérdezések kezdete közötti minimális idő 50 mikromásodperc.

3.1.2.11.1.3 *Átviteli sebesség szelektív lekérdezéseknél.*

3.1.2.11.1.3.1 Minden S-módú lekérdezőnél az átviteli sebesség szelektív lekérdezéseknél a következő:

a) kisebb, mint 2400 per másodperc egy 40-ezredmásodperces időköz felett átlagolva; és
b) kisebb, mint 480 bármely 3-fokos szektorban egy 1-másodperces időköz felett átlagolva.

3.1.2.11.1.3.2 Kiegészítőleg, egy S-módú lekérdezőnél, amelynek átlapoló lefedése van bármely más S-módú lekérdező oldalszirmaival, az átviteli sebesség szelektív lekérdezéseknél a következő lesz:

a) kisebb, mint 1200 per másodperc egy 4-másodperces időköz felett átlagolva; és

b) kisebb 1800 per másodperc egy egy-másodperces időköz felett átlagolva.

Megjegyzés. – A lekérdezők között oldalszirom elválasztását biztosító tipikus minimális távolság 35 km.

3.1.2.11.2 *Lekérdező-effektív sugárzott teljesítmény*

Ajánlás. – *Az összes lekérdezési impulzus effektív sugárzott teljesítményét a 3.1.1.8.2 pontban leírtak szerint kell minimalizálni.*

3.1.2.11.3 *Inaktív állapotú lekérdező kimenő teljesítmény.* Amikor a lekérdező adó berendezés nem továbbít lekérdezést, a kimenet nem haladhatja meg a -5 dBm effektív sugárzott teljesítményt, bármely 960 MHz és 1215 MHz közötti frekvenciánál.

Megjegyzés. – Ez a korlátozás biztosítja, hogy a lekérdező közelében repülő légijárművek 1,85 km (1 NM) közelségben nem vesznek interferenciát, amely megvédi őket attól, hogy egy másik lekérdező által követve legyenek. Bizonyos esetekben még kisebb lekérdező-légijármű távolságok bírnak jelentőséggel, pl. ha S-módú felderítést repülőtéri felszínen használnak. Ilyen esetekben az inaktív állapotú lekérdező kimenő teljesítményre további korlátozás válhat szükségessé.

3.1.2.11.3.1 *Hamis emisszió sugárzás*

Ajánlás. – *A CW-sugárzás nem haladhatja meg a 76 dB-t egy Watt alatt.*

3.1.2.11.4 *Továbbított jelek tűrései.* Hogy a térköz jelet a válaszjeladó a 3.1.2.1 pontban leírtaknak megfelelően venni tudja, a továbbított jelek tűrései megfelelnek a 3-12 táblázatban összegezettekkel.

3.1.2.11.5. *Hamis reagálás*

Ajánlás. – *A nem sáváteresztőn belüli jelekre való reagálásnak legalább 60 dB-el a normál érzékenység alatt kell lennie.*

3.1.2.11.6 *Kizárás koordináció.* Egy S-módú lekérdező nem üzemel körhívás kizárást alkalmazva, amíg nem érték el az együttműködést az összes többi működő S-módú lekérdezőkkel, amelyek átlapoló lefedés térfogattal rendelkeznek, azért, hogy biztosítsák, hogy ne lehessen a lekérdezőtől megtagadni az S-móddal felszerelt légijármű befogását.

Megjegyzés. – Ezt a koordinációt földi hálózaton keresztül vagy a lekérdező azonosító (II) kódokon keresztül lehet megvalósítani, és körzeti megegyezések szükségesek, ahol a lefedés nemzetközi határokat lapol át.

3.1.2.11.7 *Mobil lekérdezők*

3.1.2.11.7.1 **Ajánlás** – *Mobil lekérdezők S-módú légijárműveket, ahol csak lehet, squitterek vételén keresztül fogjanak be.*

Megjegyzés. – Passzív squitter megszerzés csökkenti a csatorna terhelést és koordináció szükségessége nélkül végrehajtható.

A 3. FEJEZET TÁBLÁZATAI

3-1 táblázat. Impulzus alakok, S-módú és közös módú lekérdezések

Impulzus	*Időtartam*	*Időtartam tűrés*	*(Felfutási idő)*		*(Lefutási idő)*	
			Min.	*Max.*	*Min.*	*Max.*
P_1, P_2, P_3, P_5	0,8	±0,1	0,05	0,1	0,05	0,2
P_4 (rövid)	0,8	±0,01	0,05	0,1	0,05	0,2
P_4 (hosszú)	1,6	±0,1	0,05	0,1	0,05	0,2
P_6 (rövid)	16,25	±0,25	0,05	0,1	0,05	0,2
P_6 (hosszú)	30,25	±0,25	0,05	0.1	0,05	0,2

3-2 táblázat. Impulzus formák, S-módú válaszok

Impulzus időtartam	*Időtartam tűrés*	*(Felfutási idő)*		*(Lefutási idő)*	
		Min.	*Max.*	*Min.*	*Max.*
0,5	±0,05	0,05	0,1	0,05	0,2
1,0	±0,05	0,05	0,1	0,05	0,2

3-3 táblázat. Mező definíció

M e z ő		*Formátum*		*Hivatkozás*
Jelölés	*Feladat*	*UF*	*DF*	
AA	Címzés közlése		11, 17, 18	3.1.2.5.2.2.2
AC	Magasság kód		4, 20	3.1.2.6.5.4
AF	Alkalmazás mező		19	3.1.2.8.8.2
AP	Címzés/paritás	Mind	0, 4, 5, 16, 20, 21, 24	3.1.2.3.2.1.3
AQ	Célelfogás	0		3.1.2.8.1.1
CA	Képesség		11, 17	3.1.2.5.2.2.1
CC	Keresztkapcsolat képesség		0	3.1.2.8.2.3
CF	Irányítás mező		18	3.1.2.8.7.2
CL	Kódcímke	11		3.1.2.5.2.1.3
DF	Fedélzetről leadott adattovábbítási formátum		Mind	3.1.2.3.2.1.2
DI	Jelölő azonosítás	4, 5, 20, 21		3.1.2.6.1.3
DR	Fedélzetről leadott adattovábbítás kérése		4, 5, 20, 21	3.1.2.6.5.2
DS	Adatkiválasztó	0		3.1.2.8.1.3
FS	Repülési állapot		4, 5, 20, 21	3.1.2.6.5.1
IC	Lekérdező kód	11		3.1.2.5.2.1.2
ID	Azonosság		5, 21	3.1.2.6.7.1
KE	Szabályozás, ELM		24	3.1.2.7.3.1

MA	Közlés, Comm-A	20, 21		3.1.2.6.2.1
MB	Közlés, Comm-B		20, 21	3.1.2.6.6.1
MC	Közlés, Comm-C	24		3.1.2.7.1.3
MD	Közlés, Comm-D		24	3.1.2.7.3.3
ME	Közlés, kiterjesztett squitter		17, 18	3.1.2.8.6.2
MU	Közlés, ACAS	16		4.3.8.4.2.3
MV	Közlés, ACAS		16	3.1.2.8.3.1, 4.3.8.4.2.4
NC	C-szegmens száma	24		3.1.2.7.1.2
ND	D-szegmens száma		24	3.1.2.7.3.2
PC	Protokoll	4, 5, 20, 21		3.1.2.6.1.1
PI	Paritás/lekérdező azonosító		11, 17, 18	3.1.2.3.2.1.4
PR	Válasz valószínűsége	11		3.1.2.5.2.1.1
RC	Válasz szabályozás	24		3.1.2.7.1.1
RI	Válasz információ		0	3.1.2.8.2.2
RL	Válasz hossz	0		3.1.2.8.1.2
RR	Válasz kérés	4, 5, 20, 21		3.1.2.6.1.2
SD	Különleges jelölő	4, 5, 20, 21		3.1.2.6.1.4
UF	Fedélzetre irányuló adattovábbítási formátum	mind		3.1.2.3.2.1.1
UM	Felhasználás közlés		4, 5, 20,21	3.1.2.6.5.3
VS	Függőleges állapot		0	3.1.2.8.2.1

3-4 táblázat. Almező definíciók

Almező		*Mező*	*Hivatkozás*
Jelölés	*Funkció*		
ACS	Tengerszint feletti magasság	ME	3.1.2.8.6.3.1.2
AIS	Légijármű azonosítás almező	MB	3.1.2.9.1.1
ATS	Tengerszint feletti magasság típus	MB	3.1.2.8.6.8.2
BDS1	Comm-B adat szelektor 1. almező	MB	3.1.2.6.11.2.1
BDS2	Comm-B adat szelektor 2. almező	MB	3.1.2.6.5.3.1
IDS	Azonosító jelölő almező	UM	3.1.2.6.5.3.1
IIS	Lekérdező azonosító almező	SD UM	3.1.2.6.1.4.1a) 3.1.2.6.5.3.1
LOS	Kizárás almező	SD	3.1.2.6.1.4.1d)
LSS	Kizárás felderítés almező	SD	3.1.2.6.1.4.1g)
MBS	Többhelyes, Comm-B almező	SD	3.1.2.6.1.4.1c)
MES	Többhelyes, ELM almező	SD	3.1.2.6.1.4.1c)
RCS	Sebesség vezérlés almező	SD	3.1.2.6.1.4.1f)
RRS	Válaszkérés almező	SD	3.1.2.6.1.4.1e) és g)
RSS	Tartalék állapot almező	SD	3.1.2.6.1.4.1c)
SAS	Földi antenna almező	SD	3.1.2.6.1.4.1f)

SCS	Squitter képesség almező	MB	3.1.2.6.10.2.2.1
SIC	Felderítés azonosító képesség	MB	3.1.2.6.10.2.2.1
SIS	Felderítés azonosító almező	SD	3.1.2.6.1.4.1g)
SRS	Szegmens kérés almező	MC	3.1.2.7.7.2.1
SSS	Felderítési állapot almező	ME	3.1.2.8.6.3.1.1
TAS	Továbbítást nyugtázó almező	MD	3.1.2.7.4.2.6
TCS	Típus vezérlés almező	SD	3.1.2.6.1.4.1f)
TMS	Taktikai közlemény almező	SD	3.1.2.6.1.4.1d)
TRS	Továbbítási sebesség almező	MB	3.1.2.8.6.8.1

3-5 táblázat. Lekérdezés-válasz protokoll összegzése

Lekérdezés UF	*Különleges feltételek*	*Válasz DF*
0	RL (3.1.2.8.1.2) egyenlő 0	0
	RL (3.1.2.8.1.2) egyenlő 1	16
4	RR (3.1.2.6.1.2) kisebb, mint 16	4
	RR (3.1.2.6.1.2) egyenlő vagy nagyobb, mint 16	20
5	RR (3.1.2.6.1.2) kisebb, mint 16	5
	RR (3.2.2.6.1.2) egyenlő vagy nagyobb, mint 16	21
11	Válaszjeladó kizárva az IC lekérdező kódhoz (3.1.2.5.2.1.2)	Nincs válasz
	Sztochasztikus válasz teszt hibák (3.1.2.5.4)	Nincs válasz
	Egyébként	11
20	RR (3.1.2.6.1.2) kisebb, mint 16	4
	RR (3.1.2.6.1.2) egyenlő vagy nagyobb, mint 16	20
	AP adási címzést tartalmaz (3.1.2.4.1.2.3.1.3)	Nincs válasz
21	RR (3.1.2.6.1.2) kisebb, mint 16	5
	RR (3.1.2.6.1.2) egyenlő vagy nagyobb, mint 16	21
	AP adás címzést tartalmaz (3.1.2.4.1.2.3.1.3)	Nincs válasz
24	RC (3.1.2.7.1.1) egyenlő 0 vagy 1	Nincs válasz
	RC (3.1.2.7.1.1) egyenlő 2 vagy 3	24

3-6 Táblázat. A 10_{16} regiszter

A 10_{16} regiszter almezői	*MB bit*	*Comm-B bit*
Folytatólagos jelzőbit	9	41
ACAS képesség	16 és 37-40	48 és 69-72
S-módú alhálózati verzió szám	17-23	49-55
Emeltszintű válaszjeladó protokolljelzés	24	56
Speciális szolgáltatás képesség	25	57
Felfelé irányuló, ELM képesség	26-28	58-60
Lefelé irányuló, ELM képesség	29-32	61-64
Légijármű azonosító képesség	33	65
Squitter képesség almező (SCS)	34	66
Felderítési azonosító kód képesség (SIC)	35	67
Általános használatú, GICB képesség jelentés	36	68
DTE állapot alcímzés, 0-15	41-56	73-88

3-7 táblázat. "A földön" állapot érvényesítése

Repülés közbeni állapot meghatározása			
A/V kategória	*Földhöz viszonyított sebesség*	*Levegőhöz viszonyított sebesség*	*Rádió magasság*
Nincs információ	Nincs földi állapot változás		
Súly < 15500 font (7031 kg)	Nincs földi állapot változás		
Súly ≥ 15500 font (7031 kg)	>100 csomó, vagy	>100 csomó, vagy	>50 láb
Nagy teljesítmény (>5g gyorsulás és >400 láb)	>100 csomó, vagy	>100 csomó, vagy	>50 láb
Helikopter	Nincs földi állapot változás		

3-8 Táblázat. Automatikus földi helyzet meghatározás nélküli, földi adatsugárzás formátum

ADS-B kisugárzás kategória, „A" készlet						
Kódolás	*Jelentés*	*Földhöz viszonyított sebesség*		*Levegőhöz viszonyított sebesség*		*Rádió-magasság*
0	Nincs ADS-B kisugárzás kategóriába tartozó információ	Mindig fedélzeti pozíciót sugároz (3.1.2.8.6.3.1)				
1	Könnyű kategória (<15500 lbs vagy 7031 kg)	Mindig fedélzeti pozíciót sugároz (3.1.2.8.6.3.1)				
2	Kis kategória (15500 – 75000 lbs vagy 7031 – 34019 kg)	< 100 csomó	és	< 100 csomó	és	< 50 láb
3	Nagy kategória (75000 – 300000 lbs vagy 34019-136078 kg)	< 100 csomó	és	< 100 csomó	és	< 50 láb
4	Légijármű erős légörvénnyel	< 100 csomó	és	< 100 csomó	és	< 50 láb
5	Nehéz kategória (> 300000 lbs vagy 136078 kg)	< 100 csomó	és	< 100 csomó	és	< 50 láb

6	Nagy teljesítőképességű (> 5g gyorsulás és > 400 csomó)	< 100 csomó	és	< 100 csomó	és	< 50 láb
7	Forgószárnyas kategória	Mindig fedélzeti pozíciót sugároz (3.1.2.8.6.3.1)				
ADS-B kisugárzás kategória, „B” készlet						
Kódolás	*Jelentés*	*Földhöz viszonyított sebesség*		*Levegőhöz viszonyított sebesség*		*Rádió-magasság*
0	Nincs ADS-B kisugárzás kategóriába tartozó információ	Mindig fedélzeti pozíciót sugároz (3.1.2.8.6.3.1)				
1	Vitorlázó/segédmotoros vitorlázó	Mindig fedélzeti pozíciót sugároz (3.1.2.8.6.3.1)				
2	Levegőnél könnyebb	Mindig fedélzeti pozíciót sugároz (3.1.2.8.6.3.1)				
3	Ejtőernyő/siklóernyő	Mindig fedélzeti pozíciót sugároz (3.1.2.8.6.3.1)				
4	Ultra könnyű/sárkány/sikló ernyő	Mindig fedélzeti pozíciót sugároz (3.1.2.8.6.3.1)				
5	Fenntartva	Fenntartva				
6	Pilóta nélküli repülő eszköz	Mindig fedélzeti pozíciót sugároz (3.1.2.8.6.3.1)				
7	Űreszköz/Atmoszférán kívüli eszköz	< 100 csomó	és	< 100 csomó	és	< 50 láb
ADS-B kisugárzás kategória, „C” készlet						
Kódolás	*Jelentés*					
0	Nincs ADS-B kisugárzás kategóriába tartozó információ	Mindig fedélzeti pozíciót sugároz (3.1.2.8.6.3.1)				
1	Földi eszköz – biztonsági eszköz	Mindig fedélzeti pozíciót sugároz (3.1.2.8.6.3.1)				
2	Földi eszköz – kiszolgáló eszköz	Mindig fedélzeti pozíciót sugároz (3.1.2.8.6.3.1)				
3	Fix földi vagy függesztett akadály	Mindig fedélzeti pozíciót sugároz (3.1.2.8.6.3.1)				
4-7	Fenntartva	Fenntartva				
ADS-B kisugárzás kategória, „D” készlet						
Kódolás	*Jelentés*					
0	Nincs ADS-B kisugárzás kategóriába tartozó információ	Mindig fedélzeti pozíciót sugároz (3.1.2.8.6.3.1)				
1-7	Fenntartva	Fenntartva				

3-9 táblázat Karakter kódolás légijármű azonosítás adatkapcsolati átviteléhez

(IA-5 alhalmaz - lásd 3.1.2.9.1.2 pont)

				b_6	0	0	1	1
				b_5	0	1	0	1
b_4	b_3	b_2	b_1					
0	0	0	0			P	SP	0

0	0	0	1		A	Q		1
0	0	1	0		B	R		2
0	0	1	1		C	S		3
0	1	0	0		D	T		4
0	1	0	1		E	U		5
0	1	1	0		F	V		6
0	1	1	1		G	W		7
1	0	0	0		H	X		8
1	0	0	1		I	Y		9
1	0	1	0		J	Z		
1	0	1	1		K			
1	1	0	0		L			
1	1	0	1		M			
1	1	1	0		N			
1	1	1	1		O			

3-10 táblázat. Időzítő jellemzők

Időzítő		*Hivatkozás*	*Szimbólum*	*Időtartam s*	*Tűrés s*	*Visszaállítható*
Név	*Szám*					
Nem-szelektív kizárás	1	3.1.2.6.9.2	T_D	18	±1	Nem
Ideiglenes figyelmeztetés	1	3.1.2.6.10.1.1.2	T_C	18	±1	Nem
SPI	1	3.1.2.6.10.1.3	T_1	18	±1	Nem
B, C, D helyfoglalás	3*	3.1.2.6.11.3.1	T_R	18	±1	Igen
Többhelyes kizárás	78	3.1.2.6.9.1	T_L	18	±1	Nem
*Ahogy kívánt						

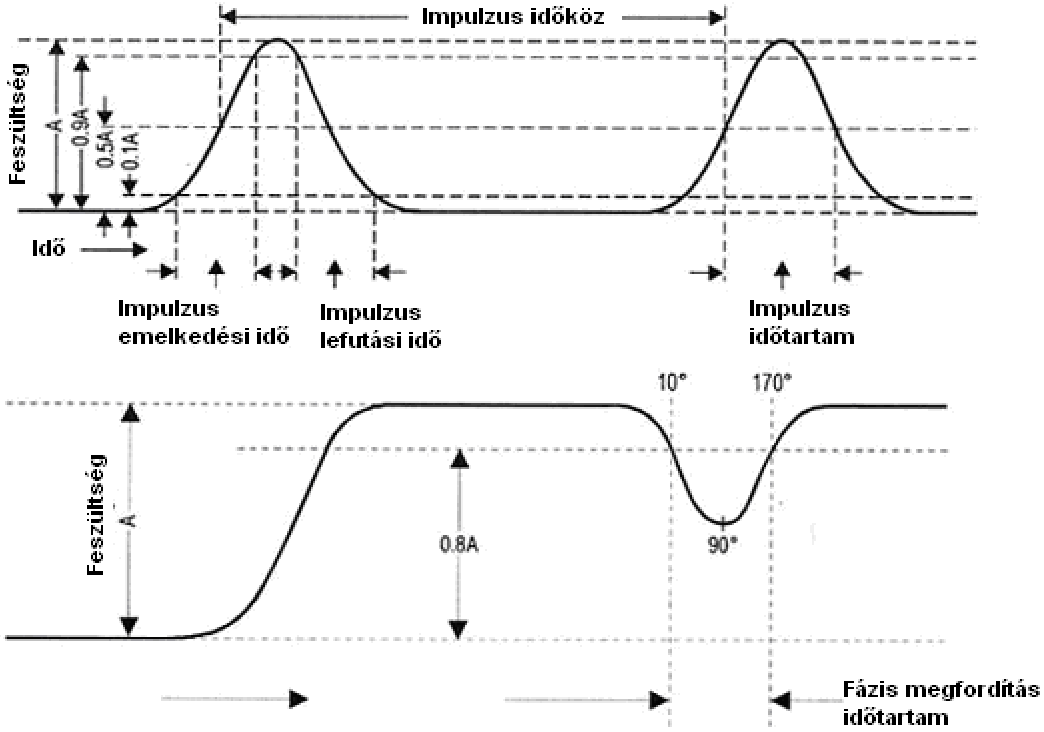
3-11 táblázat. DAP regiszterek

Regiszter	*Megnevezés*	*Adattartalom*	*Bit*
40 {HEX}	Kiválasztott, függőleges irányú elmozdulás	MCP/FCU kiválasztott magasság	1-13
		FMS kiválasztott magasság	14-26
		Beállított barometrikus nyomás mínusz 800 mb	27-39
		MCP/FCU üzemmód bitek	48-51
		Cél magasság forrás bitek	54-56
50 {HEX}	Útvonal és forduló jelentés	Bedöntési szög	1-11
		Tényleges útvonalszög	12-23
		Földhöz viszonyított sebesség	24-34
		Tényleges útvonalszög sebesség	35-45
		Tényleges levegőhöz viszonyított sebesség	46-56
60 {HEX}	Irányszög és sebesség jelentés	Mágneses irányszög	1-12
		Kijelzett levegőhöz viszonyított sebesség	13-23
		Mach szám	24-34
		Barometrikus magasság szerinti emelkedés/süllyedés	35-45
		Inerciális függőleges sebesség	46-56

3-12 táblázat. Átvitt jel tűrések

Hivatkozás	*Feladat*	*Tűrés*
3.1.2.1.4.1	Impulzus időtartam P_1, P_2, P_3,	±0,09 mikromásodperc
	Impulzus időtartam P_6	±0,20 mikromásodperc
3.1.1.4	Impulzus időtartam P_1 - P	±0,18 mikromásodperc
	Impulzus időtartam P_1 - P_2	±0,10 mikromásodperc
3.1.2.1.5.1.3	Impulzus időtartam P_3 - P_4	±0,04 mikromásodperc
3..1.2.1.5.2.4	Impulzus időtartam P_1 -P_2	±0,04 mikromásodperc
	Impulzus időtartam P_2 - szinkron fázismegfordítás	±0,04 mikromásodperc
	Impulzus időtartam P_6 - szinkron fázismegfordítás	±0,04 mikromásodperc
	Impulzus időtartam P_5 - szinkron fázismegfordítás	±0,05 mikromásodperc
3.1.1.5	Impulzus amplitúdó P_3	P_1 ± 0,5 dB
3.1.2.1.5.1.4	Impulzus amplitúdó P_4	P_3 ± 0,5 dB
3.1.2.1.5.2.5	Impulzus amplitúdó P_6	Egyenlő vagy nagyobb, mint P_2 - 0,25 dB
3.1.2.1.4.1	Impulzus felfutási idő Impulzus lefutási idő	0,05 mikromásodperc minimum 0,1 mikromásodperc maximum 0,05 mikromásodperc minimum 0,2 mikromásodperc maximum

A 3. FEJEZET ÁBRÁI



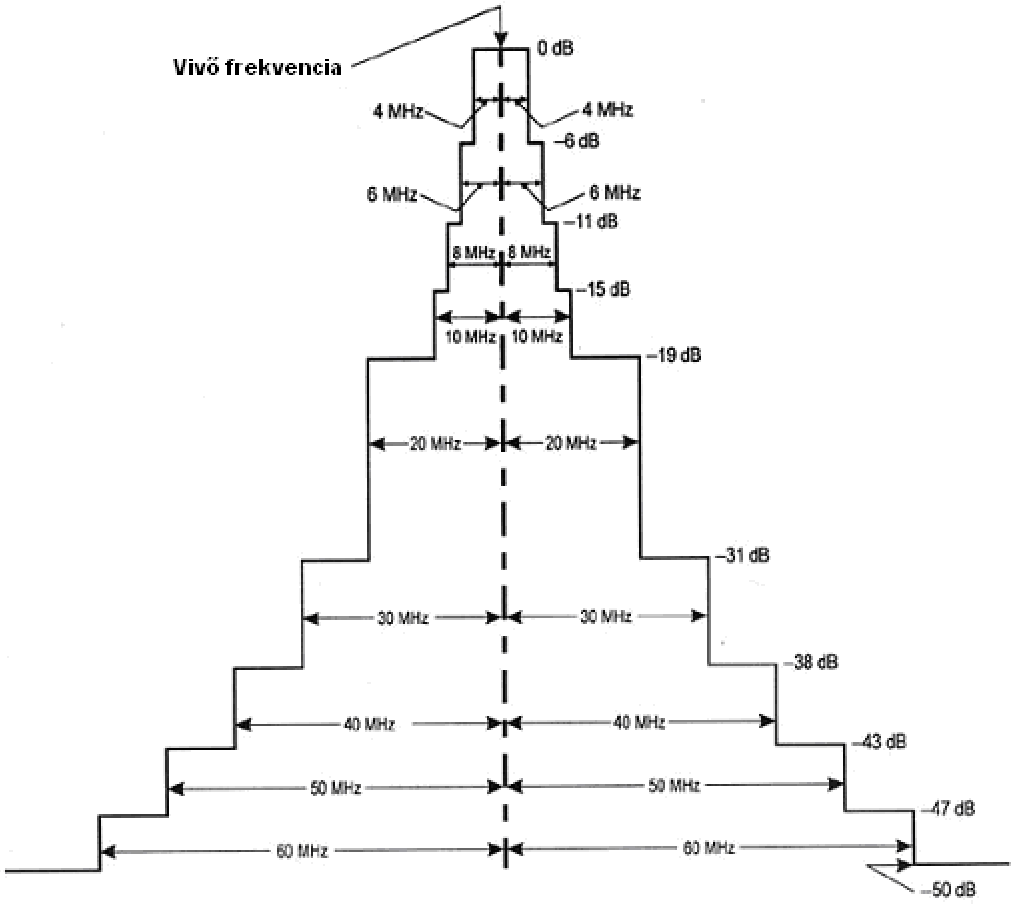
Meghatározások

Fázis megfordítás. A rádiófrekvencia hordozó fázisában 180 fokos váltás.
Fázis megfordítás időtartam. A fázis megfordítás 10 fokhoz és 170 fokhoz tartozó pontjai közötti idő.
Impulzus amplitúdó. Az impulzus burkológörbe csúcsfeszültségű amplitúdó.
Impulzus késési idő. Az impulzus burkoló görbe lefutó élén lévő 0,9A és 0,1A közötti idő.
Impulzus időtartam. Az impulzus burkoló görbe felfutó és lefutó éle 0,5A pontjai közötti időintervallum.
Impulzus időköz. Az első impulzus felfutó élén lévő 0,5A pontja és a második impulzus felfutó élén lévő 0,5A pont közötti időköz.
Impulzus felfutási idő. Az impulzus burkoló görbe felfutó élén a 0,1A és 0,9A pontok közötti idő.
Időközök. Az időközök a következőkre vonatkoznak:
a) 0,5 A pont az impulzus felfutó élén;
b) 0,5 A pont az impulzus lefutó élén; vagy
c) a fázis megfordítás 90 fokos pontján.

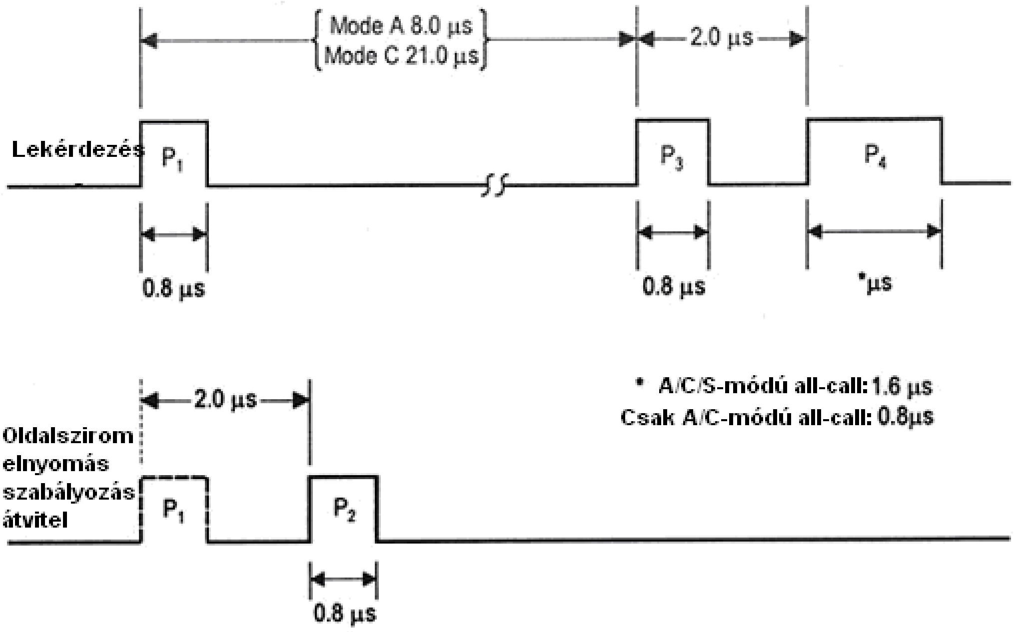
Válaszjeladó érzékenység és teljesítmény referencia pont. A válaszjeladó átviteli vonalának antenna vége.

Megjegyzés. – A fázis megfordítás 90 fokos pontja közelíthető a fázis megfordítással kapcsolódó amplitúdó tranziens burkológörbén lévő minimális amplitúdó tranziens burkológörbén lévő 0,8A pontok közötti idővel

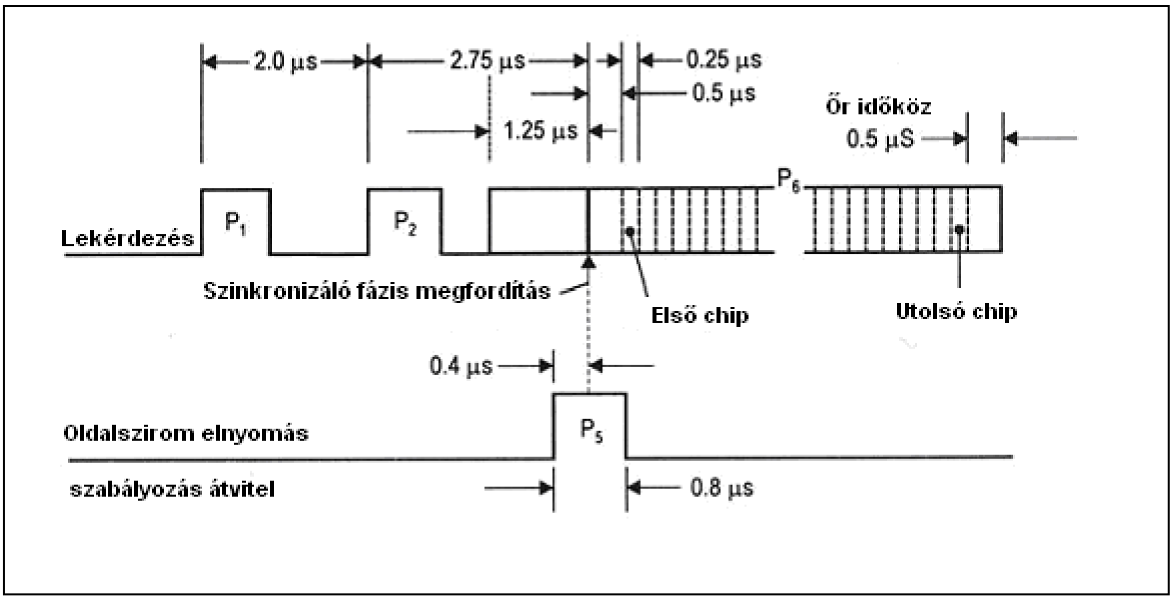
3.1. ábra. Másodlagos felderítő radar hullámforma alakjainak, időközeinek és az érzékenységi és teljesítmény referencia pontjainak meghatározása



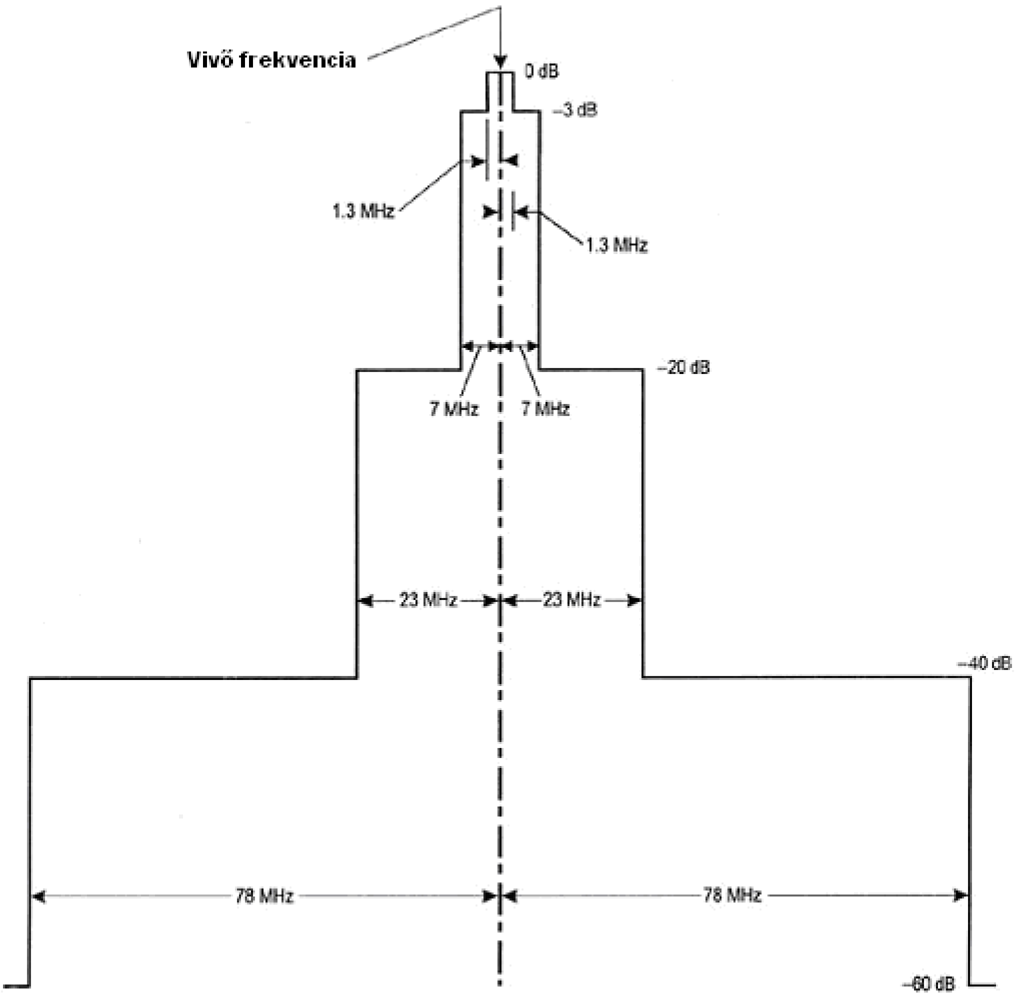
3-2 ábra. Az előírt spektrum határok a lekérdező adóberendezéshez



3-3 ábra. Közös módú lekérdezés impulzus sorozat

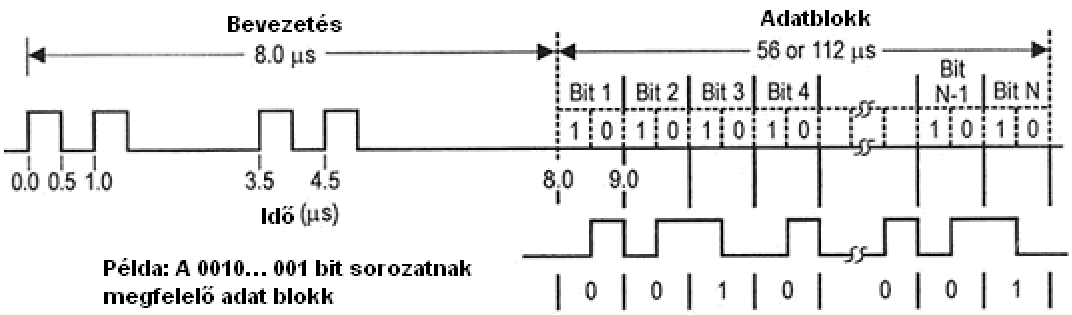


3-4 ábra. S-módú lekérdezés impulzus sorozat

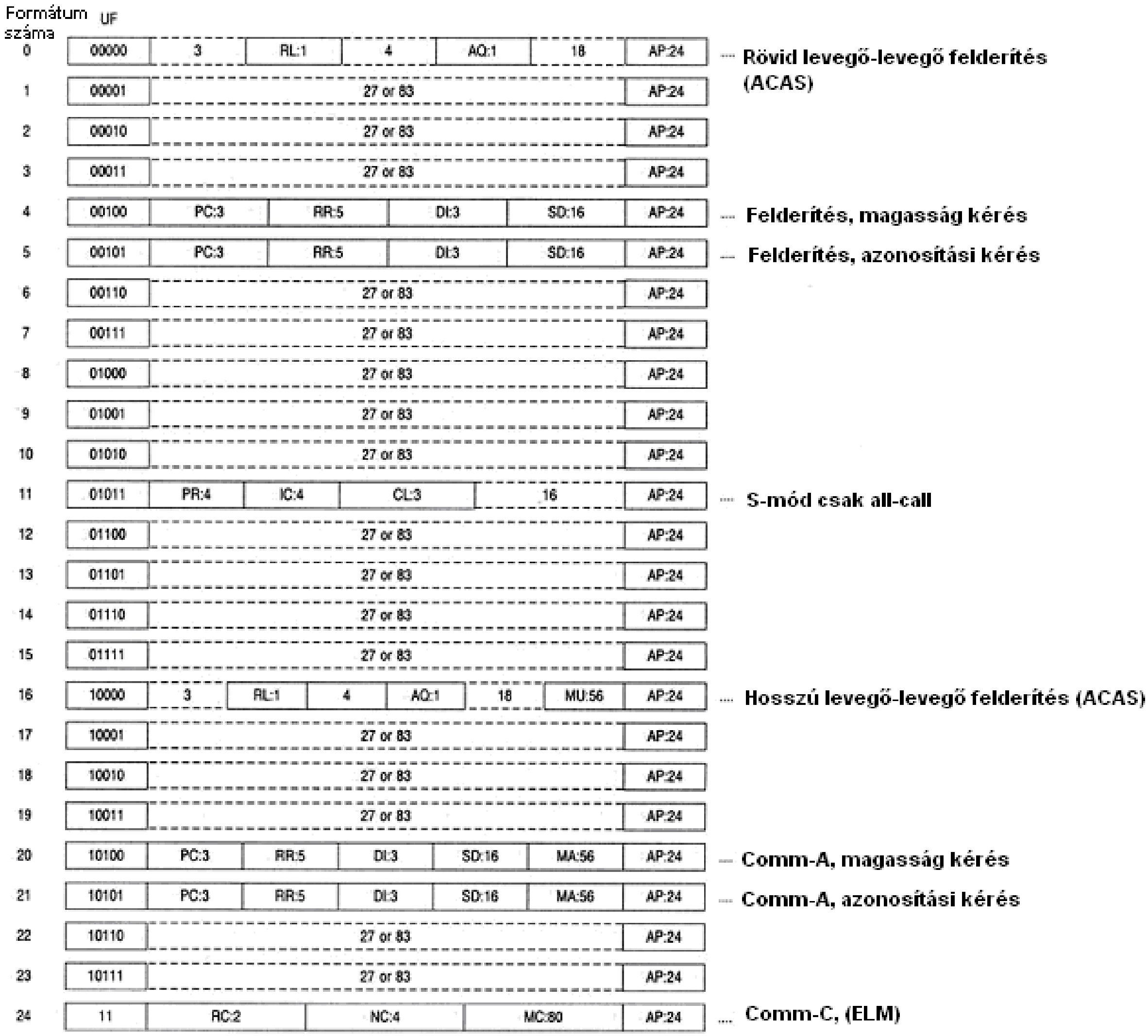


3-5 ábra. Válaszjeladó adó-berendezésétől elvárt spektrum korlátok

Megjegyzés. – A jelen ábra a vivőfrekvencián összpontosuló spektrumot mutatja, és emiatt összességében plusz vagy mínusz 1 MHz értékben fog elmozdulni a vivőfrekvencia mentén.



3-6 ábra. S-módú válasz



MEGJEGYZÉSEK

1. XX: M - egy “XX” jelölésű mezőt jelöl, amelyet M bit jelöl ki.

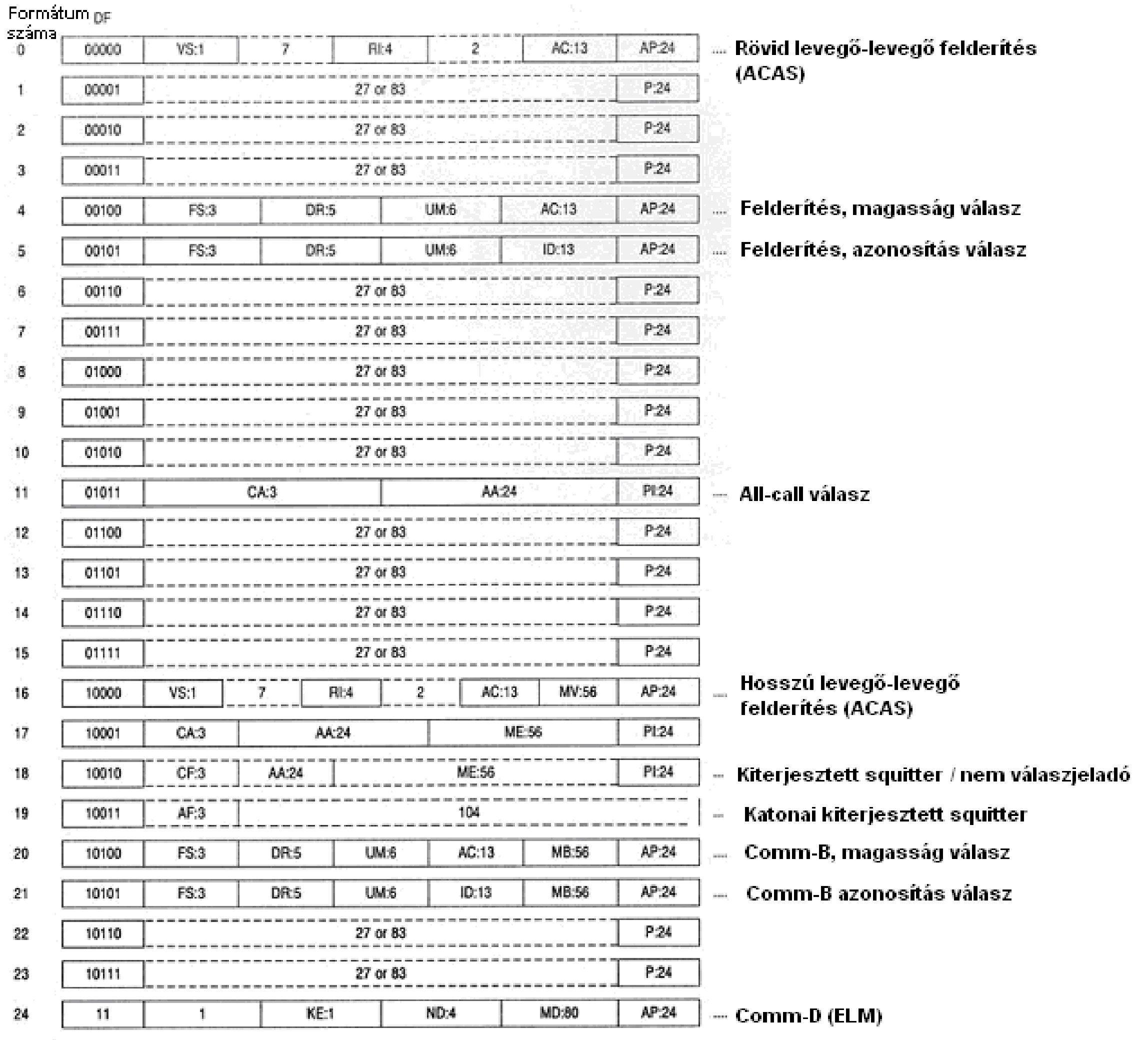
2. N - kijelöletlen kódolási térközt jelöl, N rendelkezésre álló bittel. Ezeket ZÉRO-val kell kódolni a továbbításhoz.

3. A 0-tól 23-ig formátum-számú fedélzetre irányuló adattovábbítási formátumoknál (UF) a formátum szám a lekérdezés első öt bitjében lévő bináris kódhoz tartozik. A 24. számú formátum olyan formátumként lett meghatározva, amely az első két bit pozícióban “11”-el kezdődik, míg a következő három bit a lekérdezés tartalmával változik.

4. A teljesség kedvéért az összes formátum bemutatásra kerül, bár közülük számosat nem használnak. Azok a formátumok, amelyekre jelenleg nincs felhasználás meghatározva, hosszban meghatározás nélkül maradnak. A jövőben kijelöléstől függően, ezek rövid (56 bit) vagy hosszú (112 bit) formátumok lehetnek. Az S-módú képességi szintekhez kapcsolódó különleges formátumok a későbbi pontokban kerülnek leírásra.

5. A PC, RR, DI és SD mezőket ne alkalmazzák a Comm-A adatsugárzású lekérdezéseknél.

3-7. ábra. S-módú lekérdezés vagy fedélzetre irányuló adattovábbítási formátumainak összessége



MEGJEGYZÉSEK

1. XX: M - egy "XX" jelölésű mezőt jelöl, amelyet M bit jelöl ki.

P: 24 - egy 24-bites mezőt jelöl, amely paritás információ részére van fenntartva.

2. N kijelöletlen kódolási térközt jelöl N rendelkezésre álló bittel. Ezeket ZÉRO-ként kell kódolni a továbbításhoz.

3. A 0-tól 23-ig számozású fedélzetről leadott adattovábbítás formátumoknál (DF) a formátum szám megfelel a válasz első öt bitjében lévő bináris kódnak. A 24 számú formátum az első két bit pozícióban "11"-el kezdődő formátumként lett meghatározva, míg a következő három bit a válasz tartalmával változhat.

4. A teljesség kedvéért az összes formátum bemutatásra kerül, bár közülük számosat nem használnak. Azok a formátumok, amelyekre jelenleg nincs felhasználás meghatározva, hosszban meghatározatlanok maradnak. A jövőben kijelöléstől függően, ezek rövid (56 bit), vagy hosszú (112 bit) formátumok lehetnek. Az S-módú képességi szintekhez kapcsolódó különleges formátumok a későbbi alpontokban kerülnek leírásra.

3-8 ábra. S-módú lekérdezés vagy fedélzetről leadott adattovábbítás formátumainak összessége

Függelék a 3. fejezethez

SSR automatikus nyomásmagasság átviteli kód
(impulzus pozíció kijelölés)

TARTOMÁNY		*IMPULZUS POZÍCIÓ (0 vagy 1 az impulzus pozícióban egy impulzus hiányát vagy meglétét jelöli)*										
NÖVEKMÉNY *(láb)*		D_2	D_4	A_1	A_2	A_4	B_1	B_2	B_4	C_1	C_2	C_4
-1000	-950	0	0	0	0	0	0	0	0	0	1	0
-950	-850	0	0	0	0	0	0	0	0	1	1	0
-850	-750	0	0	0	0	0	0	0	0	1	0	0
-750	-650	0	0	0	0	0	0	0	1	1	0	0
-650	-550	0	0	0	0	0	0	0	1	1	1	1
-550	-450	0	0	0	0	0	0	0	1	0	1	0
-450	-350	0	0	0	0	0	0	0	1	0	1	1
-350	-250	0	0	0	0	0	0	0	1	0	0	1
-250	-150	0	0	0	0	0	0	1	1	0	0	1
-150	-50	0	0	0	0	0	0	1	1	0	1	1
-50	50	0	0	0	0	0	0	1	1	0	1	0
50	150	0	0	0	0	0	0	1	1	1	1	0
150	250	0	0	0	0	0	0	1	1	1	0	0
250	350	0	0	0	0	0	0	1	0	1	0	0
350	450	0	0	0	0	0	0	1	0	1	1	0
450	550	0	0	0	0	0	0	1	0	0	1	0
550	650	0	0	0	0	0	0	1	0	0	1	1
650	750	0	0	0	0	0	0	1	0	0	0	1
750	850	0	0	0	0	0	1	1	0	0	0	1
850	950	0	0	0	0	0	1	1	0	0	1	1
950	1050	0	0	0	0	0	1	1	0	0	1	0
1050	1150	0	0	0	0	0	1	1	0	1	1	0
1150	1250	0	0	0	0	0	1	1	0	1	0	0
1250	1350	0	0	0	0	0	1	1	1	1	0	0
1350	1450	0	0	0	0	0	1	1	1	1	1	0
1450	1550	0	0	0	0	0	1	1	1	0	1	0
1550	1650	0	0	0	0	0	1	1	1	0	1	1
1650	1750	0	0	0	0	0	1	1	1	0	0	1
1750	1850	0	0	0	0	0	1	0	1	0	0	1
1850	1950	0	0	0	0	0	1	0	1	0	1	1
1950	2050	0	0	0	0	0	1	0	1	0	1	0
2050	2150	0	0	0	0	0	1	0	1	1	1	0
2150	2250	0	0	0	0	0	1	0	1	1	0	0
2250	2350	0	0	0	0	0	1	0	0	1	0	0
2350	2450	0	0	0	0	0	1	0	0	1	1	0
2450	2550	0	0	0	0	0	1	0	0	0	1	0
2550	2650	0	0	0	0	0	1	0	0	0	1	1
2650	2750	0	0	0	0	0	1	0	0	0	0	1
2750	2850	0	0	0	0	1	1	1	0	0	0	1
2850	2950	0	0	0	0	1	1	0	0	0	1	1

2950	3050	0	0	0	0	1	1	0	0	0	1	0
3050	3150	0	0	0	0	1	1	0	0	1	1	0
3150	3250	0	0	0	0	1	1	0	0	1	0	0
3250	3350	0	0	0	0	1	1	0	1	1	0	0
3350	3450	0	0	0	0	1	1	0	1	1	1	0
3450	3550	0	0	0	0	1	1	0	1	0	1	0
3550	3650	0	0	0	0	1	1	0	1	0	1	1
3650	3750	0	0	0	0	1	1	0	1	0	0	1
3750	3850	0	0	0	0	1	1	1	1	0	0	1
3850	3950	0	0	0	0	1	1	1	1	0	1	1
3950	4050	0	0	0	0	1	1	1	1	0	1	0
4050	4150	0	0	0	0	1	1	1	1	1	1	0
4150	4250	0	0	0	0	1	1	1	1	1	0	0
4250	4350	0	0	0	0	1	1	1	0	1	0	0
4350	4450	0	0	0	0	1	1	1	0	1	1	0
4450	4550	0	0	0	0	1	1	1	0	0	1	0
4550	4650	0	0	0	0	1	1	1	0	0	1	1
4650	4750	0	0	0	0	1	1	1	0	0	0	1
4750	4850	0	0	0	0	1	0	1	0	0	0	1
4850	4950	0	0	0	0	1	0	1	0	0	1	1
4950	5050	0	0	0	0	1	0	1	0	0	1	0
5050	5150	0	0	0	0	1	0	1	0	1	1	0
5150	5250	0	0	0	0	1	0	1	0	1	0	0
5250	5350	0	0	0	0	1	0	1	1	1	0	0
5350	5450	0	0	0	0	1	0	1	1	1	1	0
5450	5550	0	0	0	0	1	0	1	1	0	1	0
5550	5650	0	0	0	0	1	0	1	1	0	1	1
5650	5750	0	0	0	0	1	0	1	1	0	0	1
5750	5850	0	0	0	0	1	0	0	1	0	0	1
5850	5950	0	0	0	0	1	0	0	1	0	1	1
5950	6050	0	0	0	0	1	0	0	1	0	1	0
6050	6150	0	0	0	0	1	0	0	1	1	1	0
6150	6250	0	0	0	0	1	0	0	1	1	0	0
6250	6350	0	0	0	0	1	0	0	0	1	0	0
6350	6450	0	0	0	0	1	0	0	0	1	1	0
6450	6550	0	0	0	0	1	0	0	0	0	1	0
6550	6650	0	0	0	0	1	0	0	0	0	1	1
6650	6750	0	0	0	0	1	0	0	0	0	0	1
6750	6850	0	0	0	1	1	0	0	0	0	0	1
6850	6950	0	0	0	1	1	0	0	0	0	1	1
6950	7050	0	0	0	1	1	0	0	0	0	1	0
7050	7150	0	0	0	1	1	0	0	0	1	1	0
7150	7250	0	0	0	1	1	0	0	0	1	0	0
7250	7350	0	0	0	1	1	0	0	1	1	0	0
7350	7450	0	0	0	1	1	0	0	1	1	1	0
7450	7550	0	0	0	1	1	0	0	1	0	1	0
7550	7650	0	0	0	1	1	0	0	1	0	1	1
7650	7750	0	0	0	1	1	0	0	1	0	0	1
7750	7850	0	0	0	1	1	0	1	1	0	0	1

7850	7950	0	0	0	1	1	0	1	1	0	1	1
7950	8050	0	0	0	1	1	0	1	1	0	1	0
8050	8150	0	0	0	1	1	0	1	1	1	1	0
8150	8250	0	0	0	1	1	0	1	1	1	0	0
8250	8350	0	0	0	1	1	0	1	0	1	0	0
8350	8450	0	0	0	1	1	0	1	0	1	1	0
8450	8550	0	0	0	1	1	0	1	0	0	1	0
8550	8650	0	0	0	1	1	0	1	0	0	1	1
8650	8750	0	0	0	1	1	0	1	0	0	0	1
8750	8850	0	0	0	1	1	1	1	0	0	0	1
8850	8950	0	0	0	1	1	1	1	0	0	1	1
8950	9050	0	0	0	1	1	1	1	0	0	1	0
9050	9150	0	0	0	1	1	1	1	0	1	1	0
9150	9250	0	0	0	1	1	1	1	0	1	0	0
9250	9350	0	0	0	1	1	1	1	1	1	0	0
9350	9450	0	0	0	1	1	1	1	1	1	1	0
9450	9550	0	0	0	1	1	1	1	1	0	1	0
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9650	9750	0	0	0	1	1	1	1	1	0	0	1
9750	9850	0	0	0	1	1	1	0	1	0	0	1
9850	9950	0	0	0	1	1	1	0	1	0	1	1
9950	10050	0	0	0	1	1	1	0	1	0	1	0
10050	10150	0	0	0	1	1	1	0	1	1	1	0
10150	10250	0	0	0	1	1	1	0	1	1	0	0
10250	10350	0	0	0	1	1	1	0	0	1	0	0
10350	10450	0	0	0	1	1	1	0	0	1	1	0
10450	10550	0	0	0	1	1	1	0	0	0	1	0
10550	10650	0	0	0	1	1	1	0	0	0	1	1
10650	10750	0	0	0	1	1	1	0	0	0	0	1
10750	10850	0	0	0	1	0	1	0	0	0	0	1
10850	10950	0	0	0	1	0	1	0	0	0	1	1
10950	11050	0	0	0	1	0	1	0	0	0	1	0
11050	11150	0	0	0	1	0	1	0	0	1	1	0
11150	11250	0	0	0	1	0	1	0	0	1	0	0
11250	11350	0	0	0	1	0	1	0	1	1	0	0
11350	11450	0	0	0	1	0	1	0	1	1	1	0
11450	11550	0	0	0	1	0	1	0	1	0	1	0
11550	11650	0	0	0	1	0	1	0	1	0	1	1
11650	11750	0	0	0	1	0	1	0	1	0	0	1
11750	11850	0	0	0	1	0	1	1	1	0	0	1
11850	11950	0	0	0	1	0	1	1	1	0	1	1
11950	12050	0	0	0	1	0	1	1	1	0	1	0
12050	12150	0	0	0	1	0	1	1	1	1	1	0
12150	12250	0	0	0	1	0	1	1	1	1	0	0
12250	12350	0	0	0	1	0	1	1	0	1	0	0
12350	12450	0	0	0	1	0	1	1	0	1	1	0
12450	12550	0	0	0	1	0	1	1	0	0	1	0
12550	12650	0	0	0	1	0	1	1	0	0	1	1
12650	12750	0	0	0	1	0	1	1	0	0	0	1

12750	12850	0	0	0	1	0	0	1	0	0	0	1
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12950	13050	0	0	0	1	0	0	1	0	0	1	0
13050	13150	0	0	0	1	0	0	1	0	1	1	0
13150	13250	0	0	0	1	0	0	1	0	1	0	0
13250	13350	0	0	0	1	0	0	1	1	1	0	0
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13550	13650	0	0	0	1	0	0	1	1	0	1	1
13650	13750	0	0	0	1	0	0	1	1	0	0	1
13750	13850	0	0	0	1	0	0	0	1	0	0	1
13850	13950	0	0	0	1	0	0	0	1	0	1	1
13950	14050	0	0	0	1	0	0	0	1	0	1	0
14050	14150	0	0	0	1	0	0	0	1	1	1	0
14150	14250	0	0	0	1	0	0	0	1	1	0	0
14250	14350	0	0	0	1	0	0	0	0	1	0	0
14350	14450	0	0	0	1	0	0	0	0	1	1	0
14450	14550	0	0	0	1	0	0	0	0	0	1	0
14550	14650	0	0	0	1	0	0	0	0	0	1	1
14650	14750	0	0	0	1	0	0	0	0	0	0	1
14750	14850	0	0	1	1	0	0	0	0	0	0	1
14850	14950	0	0	1	1	0	0	0	0	0	1	1
14950	15050	0	0	1	1	0	0	0	0	0	1	0
15050	15150	0	0	1	1	0	0	0	0	1	1	0
15150	15250	0	0	1	1	0	0	0	0	1	0	0
15250	15350	0	0	1	1	0	0	0	1	1	0	0
15350	15450	0	0	1	1	0	0	0	1	1	1	0
15450	15550	0	0	1	1	0	0	0	1	0	1	0
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15850	15950	0	0	1	1	0	0	1	1	0	1	1
15950	16050	0	0	1	1	0	0	1	1	0	1	0
16050	16150	0	0	1	1	0	0	1	1	1	1	0
16150	16250	0	0	1	1	0	0	1	1	1	0	0
16250	16350	0	0	1	1	0	0	1	0	1	0	0
16350	16450	0	0	1	1	0	0	1	0	1	1	0
16450	16550	0	0	1	1	0	0	1	0	0	1	0
16550	16650	0	0	1	1	0	0	1	0	0	1	1
16650	16750	0	0	1	1	0	0	1	0	0	0	1
16750	16850	0	0	1	1	0	1	1	0	0	0	1
16850	16950	0	0	1	1	0	1	1	0	0	1	1
16950	17050	0	0	1	1	0	1	1	0	0	1	0
17050	17150	0	0	1	1	0	1	1	0	1	1	0
17150	17250	0	0	1	1	0	1	1	0	1	0	0
17250	17350	0	0	1	1	0	1	1	1	1	0	0
17350	17450	0	0	1	1	0	1	1	1	1	1	0
17450	17550	0	0	1	1	0	1	1	1	0	1	0
17550	17650	0	0	1	1	0	1	1	1	0	1	1

17650	17750	0	0	1	1	0	1	1	1	0	0	1
17750	17850	0	0	1	1	0	1	0	1	0	0	1
17850	17950	0	0	1	1	0	1	0	1	0	1	1
17950	18050	0	0	1	1	0	1	0	1	0	1	0
18050	18150	0	0	1	1	0	1	0	1	1	1	0
18150	18250	0	0	1	1	0	1	0	1	1	0	0
18250	18350	0	0	1	1	0	1	0	0	1	0	0
18350	18450	0	0	1	1	0	1	0	0	1	1	0
18450	18550	0	0	1	1	0	1	0	0	0	1	0
18550	18650	0	0	1	1	0	1	0	0	0	1	1
18650	18750	0	0	1	1	0	1	0	0	0	0	1
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18850	18950	0	0	1	1	1	1	0	0	0	1	1
18950	19050	0	0	1	1	1	1	0	0	0	1	0
19050	19150	0	0	1	1	1	1	0	0	1	1	0
19150	19250	0	0	1	1	1	1	0	0	1	0	0
19250	19350	0	0	1	1	1	1	0	1	1	0	0
19350	19450	0	0	1	1	1	1	0	1	1	1	0
19450	19550	0	0	1	1	1	1	0	1	0	1	0
19550	19650	0	0	1	1	1	1	0	1	0	1	1
19650	19750	0	0	1	1	1	1	0	1	0	0	1
19750	19850	0	0	1	1	1	1	1	1	0	0	1
19850	19950	0	0	1	1	1	1	1	1	0	1	1
19950	20050	0	0	1	1	1	1	1	1	0	1	0
20050	20150	0	0	1	1	1	1	1	1	1	1	0
20150	20250	0	0	1	1	1	1	1	1	1	0	0
20250	20350	0	0	1	1	1	1	1	0	1	0	0
20350	20450	0	0	1	1	1	1	1	0	1	1	0
20450	20550	0	0	1	1	1	1	1	0	0	1	0
20550	20650	0	0	1	1	1	1	1	0	0	1	1
20650	20750	0	0	1	1	1	1	1	0	0	0	1
20750	20850	0	0	1	1	1	0	1	0	0	0	1
20850	20950	0	0	1	1	1	0	1	0	0	1	1
20950	21050	0	0	1	1	1	0	1	0	0	1	0
21050	21150	0	0	1	1	1	0	1	0	1	1	0
21150	21250	0	0	1	1	1	0	1	0	1	0	0
21250	21350	0	0	1	1	1	0	1	1	1	0	0
21350	21450	0	0	1	1	1	0	1	1	1	1	0
21450	21550	0	0	1	1	1	0	1	1	0	1	0
21550	21650	0	0	1	1	1	0	1	1	0	1	1
21650	21750	0	0	1	1	1	0	1	1	0	0	1
21750	21850	0	0	1	1	1	0	0	1	0	0	1
21850	21950	0	0	1	1	1	0	0	1	0	1	1
21950	22050	0	0	1	1	1	0	0	1	0	1	0
22050	22150	0	0	1	1	1	0	0	1	1	1	0
22150	22250	0	0	1	1	1	0	0	1	1	0	0
22250	22350	0	0	1	1	1	0	0	0	1	0	0
22350	22450	0	0	1	1	1	0	0	0	1	1	0
22450	22550	0	0	1	1	1	0	0	0	0	1	0

22550	22650	0	0	1	1	1	0	0	0	0	1	1
22650	22750	0	0	1	1	1	0	0	0	0	0	1
22750	22850	0	0	1	0	1	0	0	0	0	0	1
22850	22950	0	0	1	0	1	0	0	0	0	1	1
22950	23050	0	0	1	0	1	0	0	0	0	1	0
23050	23150	0	0	1	0	1	0	0	0	1	1	0
23150	23250	0	0	1	0	1	0	0	0	1	0	0
23250	23350	0	0	1	0	1	0	0	1	1	0	0
23350	23450	0	0	1	0	1	0	0	1	1	1	0
23450	23550	0	0	1	0	1	0	0	1	0	1	0
23550	23650	0	0	1	0	1	0	0	1	0	1	1
23650	23750	0	0	1	0	1	0	0	1	0	0	1
23750	23850	0	0	1	0	1	0	1	1	0	0	1
23850	23950	0	0	1	0	1	0	1	1	0	1	1
23950	24050	0	0	1	0	1	0	1	1	0	1	0
24050	24150	0	0	1	0	1	0	1	1	1	1	0
24150	24250	0	0	1	0	1	0	1	1	1	0	0
24250	24350	0	0	1	0	1	0	1	0	1	0	0
24350	24450	0	0	1	0	1	0	1	0	1	1	0
24450	24550	0	0	1	0	1	0	1	0	0	1	0
24550	24650	0	0	1	0	1	0	1	0	0	1	1
24650	24750	0	0	1	0	1	0	1	0	0	0	1
24750	24850	0	0	1	0	1	1	1	0	0	0	1
24850	24950	0	0	1	0	1	1	1	0	0	1	1
24950	25050	0	0	1	0	1	1	1	0	0	1	0
25050	25150	0	0	1	0	1	1	1	0	1	1	0
25150	25250	0	0	1	0	1	1	1	0	1	0	0
25250	25350	0	0	1	0	1	1	1	1	1	0	0
25350	25450	0	0	1	0	1	1	1	1	1	1	0
25450	25550	0	0	1	0	1	1	1	1	0	1	0
25550	25650	0	0	1	0	1	1	1	1	0	1	1
25650	25750	0	0	1	0	1	1	1	1	0	0	1
25750	25850	0	0	1	0	1	1	0	1	0	0	1
25850	25950	0	0	1	0	1	1	0	1	0	1	1
25950	26050	0	0	1	0	1	1	0	1	0	1	0
26050	26150	0	0	1	0	1	1	0	1	1	1	0
26150	26250	0	0	1	0	1	1	0	1	1	0	0
26250	26350	0	0	1	0	1	1	0	0	1	0	0
26350	26450	0	0	1	0	1	1	0	0	1	1	0
26450	26550	0	0	1	0	1	1	0	0	0	1	0
26550	26650	0	0	1	0	1	1	0	0	0	1	1
26650	26750	0	0	1	0	1	1	0	0	0	0	1
26750	26850	0	0	1	0	0	1	0	0	0	0	1
26850	26950	0	0	1	0	0	1	0	0	0	1	1
26950	27050	0	0	1	0	0	1	0	0	0	1	0
27050	27150	0	0	1	0	0	1	0	0	1	1	0
27150	27250	0	0	1	0	0	1	0	0	1	0	0
27250	27350	0	0	1	0	0	1	0	1	1	0	0
27350	27450	0	0	1	0	0	1	0	1	1	1	0

27450	27550	0	0	1	0	0	1	0	1	0	1	0
27550	27650	0	0	1	0	0	1	0	1	0	1	1
27650	27750	0	0	1	0	0	1	0	1	0	0	1
27750	27850	0	0	1	0	0	1	1	1	0	0	1
27850	27950	0	0	1	0	0	1	1	1	0	1	1
27950	28050	0	0	1	0	0	1	1	1	0	1	0
28050	28150	0	0	1	0	0	1	1	1	1	1	0
28150	28250	0	0	1	0	0	1	1	1	1	0	0
28250	28350	0	0	1	0	0	1	1	0	1	0	0
28350	28450	0	0	1	0	0	1	1	0	1	1	0
28450	28550	0	0	1	0	0	1	1	0	0	1	0
28550	28650	0	0	1	0	0	1	1	0	0	1	1
28650	28750	0	0	1	0	0	1	1	0	0	0	1
28750	28850	0	0	1	0	0	0	1	0	0	0	1
28850	28950	0	0	1	0	0	0	1	0	0	1	1
28950	29050	0	0	1	0	0	0	1	0	0	1	0
29050	29150	0	0	1	0	0	0	1	0	1	1	0
29150	29250	0	0	1	0	0	0	1	0	1	0	0
29250	29350	0	0	1	0	0	0	1	1	1	0	0
29350	29450	0	0	1	0	0	0	1	1	1	1	0
29450	29550	0	0	1	0	0	0	1	1	0	1	0
29550	29650	0	0	1	0	0	0	1	1	0	1	1
29650	29750	0	0	1	0	0	0	1	1	0	0	1
29750	29850	0	0	1	0	0	0	0	1	0	0	1
29850	29950	0	0	1	0	0	0	0	1	0	1	1
29950	30050	0	0	1	0	0	0	0	1	0	1	0
30050	30150	0	0	1	0	0	0	0	1	1	1	0
30150	30250	0	0	1	0	0	0	0	1	1	0	0
30250	30350	0	0	1	0	0	0	0	0	1	0	0
30350	30450	0	0	1	0	0	0	0	0	1	1	0
30450	30550	0	0	1	0	0	0	0	0	0	1	0
30550	30650	0	0	1	0	0	0	0	0	0	1	1
30650	30750	0	0	1	0	0	0	0	0	0	0	1
30750	30850	0	1	1	0	0	0	0	0	0	0	1
30850	30950	0	1	1	0	0	0	0	0	0	1	1
30950	31050	0	1	1	0	0	0	0	0	0	1	0
31050	31150	0	1	1	0	0	0	0	0	1	1	0
31150	31250	0	1	1	0	0	0	0	0	1	0	0
31250	31350	0	1	1	0	0	0	0	1	1	0	0
31350	31450	0	1	1	0	0	0	0	1	1	1	0
31450	31550	0	1	1	0	0	0	0	1	0	1	0
31550	31650	0	1	1	0	0	0	0	1	0	1	1
31650	31750	0	1	1	0	0	0	0	1	0	0	1
31750	31850	0	1	1	0	0	0	1	1	0	0	1
31850	31950	0	1	1	0	0	0	1	1	0	1	1
31950	32050	0	1	1	0	0	0	1	1	0	1	0
32050	32150	0	1	1	0	0	0	1	1	1	1	0
32150	32250	0	1	1	0	0	0	1	1	1	0	0
32250	32350	0	1	1	0	0	0	1	0	1	0	0

32350	32450	0	1	1	0	0	0	1	0	1	1	0
32450	32550	0	1	1	0	0	0	1	0	0	1	0
32550	32650	0	1	1	0	0	0	1	0	0	1	1
32650	32750	0	1	1	0	0	0	1	0	0	0	1
32750	32850	0	1	1	0	0	1	1	0	0	0	1
32850	32950	0	1	1	0	0	1	1	0	0	1	1
32950	33050	0	1	1	0	0	1	1	0	0	1	0
33050	33150	0	1	1	0	0	1	1	0	1	1	0
33150	33250	0	1	1	0	0	1	1	0	1	0	0
33250	33350	0	1	1	0	0	1	1	1	1	0	0
33350	33450	0	1	1	0	0	1	1	1	1	1	0
33450	33550	0	1	1	0	0	1	1	1	0	1	0
33550	33650	0	1	1	0	0	1	1	1	0	1	1
33650	33750	0	1	1	0	0	1	1	1	0	0	1
33750	33850	0	1	1	0	0	1	0	1	0	0	1
33850	33950	0	1	1	0	0	1	0	1	0	1	1
33950	34050	0	1	1	0	0	1	0	1	0	1	0
34050	34150	0	1	1	0	0	1	0	1	1	1	0
34150	34250	0	1	1	0	0	1	0	1	1	0	0
34250	34350	0	1	1	0	0	1	0	0	1	0	0
34350	34450	0	1	1	0	0	1	0	0	1	1	0
34450	34550	0	1	1	0	0	1	0	0	0	1	0
34550	34650	0	1	1	0	0	1	0	0	0	1	1
34650	34750	0	1	1	0	0	1	0	0	0	0	1
34750	34850	0	1	1	0	1	1	0	0	0	0	1
34850	34950	0	1	1	0	1	1	0	0	0	1	1
34950	35050	0	1	1	0	1	1	0	0	0	1	0
35050	35150	0	1	1	0	1	1	0	0	1	1	0
35150	35250	0	1	1	0	1	1	0	0	1	0	0
35250	35350	0	1	1	0	1	1	0	1	1	0	0
35350	35450	0	1	1	0	1	1	0	1	1	1	0
35450	35550	0	1	1	0	1	1	0	1	0	1	0
35550	35650	0	1	1	0	1	1	0	1	0	1	1
35650	35750	0	1	1	0	1	1	0	1	0	0	1
35750	35850	0	1	1	0	1	1	1	1	0	0	1
35850	35950	0	1	1	0	1	1	1	1	0	1	1
35950	36050	0	1	1	0	1	1	1	1	0	1	0
36050	36150	0	1	1	0	1	1	1	1	1	1	0
36150	36250	0	1	1	0	1	1	1	1	1	0	0
36250	36350	0	1	1	0	1	1	1	0	1	0	0
36350	36450	0	1	1	0	1	1	1	0	1	1	0
36450	36550	0	1	1	0	1	1	1	0	0	1	0
36550	36650	0	1	1	0	1	1	1	0	0	1	1
36650	36750	0	1	1	0	1	1	1	0	0	0	1
36750	36850	0	1	1	0	1	0	1	0	0	0	1
36850	36950	0	1	1	0	1	0	1	0	0	1	1
36950	37050	0	1	1	0	1	0	1	0	0	1	0
37050	37150	0	1	1	0	1	0	1	0	1	1	0
37150	37250	0	1	1	0	1	0	1	0	1	0	0

37250	37350	0	1	1	0	1	0	1	1	1	0	0
37350	37450	0	1	1	0	1	0	1	1	1	1	0
37450	37550	0	1	1	0	1	0	1	1	0	1	0
37550	37650	0	1	1	0	1	0	1	1	0	1	1
37650	37750	0	1	1	0	1	0	1	1	0	0	1
37750	37850	0	1	1	0	1	0	0	1	0	0	1
37850	37950	0	1	1	0	1	0	0	1	0	1	1
37950	38050	0	1	1	0	1	0	0	1	0	1	0
38050	38150	0	1	1	0	1	0	0	1	1	1	0
38150	38250	0	1	1	0	1	0	0	1	1	0	0
38250	38350	0	1	1	0	1	0	0	0	1	0	0
38350	38450	0	1	1	0	1	0	0	0	1	1	0
38450	38550	0	1	1	0	1	0	0	0	0	1	1
38550	38650	0	1	1	0	1	0	0	0	0	1	1
38650	38750	0	1	1	0	1	0	0	0	0	0	1
38750	38850	0	1	1	1	1	0	0	0	0	0	1
38850	38950	0	1	1	1	1	0	0	0	0	1	1
38950	39050	0	1	1	1	1	0	0	0	0	1	0
39050	39150	0	1	1	1	1	0	0	0	1	1	0
39150	39250	0	1	1	1	1	0	0	0	1	0	0
39250	39350	0	1	1	1	1	0	0	1	1	0	0
39350	39450	0	1	1	1	1	0	0	1	1	1	0
39450	39550	0	1	1	1	1	0	0	1	0	1	0
39550	39650	0	1	1	1	1	0	0	1	0	1	1
39650	39750	0	1	1	1	1	0	0	1	0	0	1
39750	39850	0	1	1	1	1	0	1	1	0	0	1
39850	39950	0	1	1	1	1	0	1	1	0	1	1
39950	40050	0	1	1	1	1	0	1	1	0	1	0
40050	40150	0	1	1	1	1	0	1	1	1	1	0
40150	40250	0	1	1	1	1	0	1	1	1	0	0
40250	40350	0	1	1	1	1	0	1	0	1	0	0
40350	40450	0	1	1	1	1	0	1	0	1	1	0
40450	40550	0	1	1	1	1	0	1	0	0	1	0
40550	40650	0	1	1	1	1	0	1	0	0	1	1
40650	40750	0	1	1	1	1	0	1	0	0	0	1
40750	40850	0	1	1	1	1	1	1	0	0	0	1
40850	40950	0	1	1	1	1	1	1	0	0	1	1
40950	41050	0	1	1	1	1	1	1	0	0	1	0
41050	41150	0	1	1	1	1	1	1	0	1	1	0
41150	41250	0	1	1	1	1	1	1	0	1	0	0
41250	41350	0	1	1	1	1	1	1	1	1	0	0
41350	41450	0	1	1	1	1	1	1	1	1	1	0
41450	41550	0	1	1	1	1	1	1	1	0	1	0
41550	41650	0	1	1	1	1	1	1	1	0	1	1
41650	41750	0	1	1	1	1	1	1	1	0	0	1
41750	41850	0	1	1	1	1	1	0	1	0	0	1
41850	41950	0	1	1	1	1	1	0	1	0	1	1
41950	42050	0	1	1	1	1	1	0	1	0	1	0
42050	42150	0	1	1	1	1	1	0	1	1	1	0

42150	42250	0	1	1	1	1	1	0	1	1	0	0
42250	42350	0	1	1	1	1	1	0	0	1	0	0
42350	42450	0	1	1	1	1	1	0	0	1	1	0
42450	42550	0	1	1	1	1	1	0	0	0	1	0
42550	42650	0	1	1	1	1	1	0	0	0	1	1
42650	42750	0	1	1	1	1	1	0	0	0	0	1
42750	42850	0	1	1	1	0	1	0	0	0	0	1
42850	42950	0	1	1	1	0	1	0	0	0	1	1
42950	43050	0	1	1	1	0	1	0	0	0	1	0
43050	43150	0	1	1	1	0	1	0	0	1	1	0
43150	43250	0	1	1	1	0	1	0	0	1	0	0
43250	43350	0	1	1	1	0	1	0	1	1	0	0
43350	43450	0	1	1	1	0	1	0	1	1	1	0
43450	43550	0	1	1	1	0	1	0	1	0	1	0
43550	43650	0	1	1	1	0	1	0	1	0	1	1
43650	43750	0	1	1	1	0	1	0	1	0	0	1
43750	43850	0	1	1	1	0	1	1	1	0	0	1
43850	43950	0	1	1	1	0	1	1	1	0	1	1
43950	44050	0	1	1	1	0	1	1	1	0	1	0
44050	44150	0	1	1	1	0	1	1	1	1	1	0
44150	44250	0	1	1	1	0	1	1	1	1	0	0
44250	44350	0	1	1	1	0	1	1	0	1	0	0
44350	44450	0	1	1	1	0	1	1	0	1	1	0
44450	44550	0	1	1	1	0	1	1	0	0	1	0
44550	44650	0	1	1	1	0	1	1	0	0	1	1
44650	44750	0	1	1	1	0	1	1	0	0	0	1
44750	44850	0	1	1	1	0	0	1	0	0	0	1
44850	44950	0	1	1	1	0	0	1	0	0	1	1
44950	45050	0	1	1	1	0	0	1	0	0	1	0
45050	45150	0	1	1	1	0	0	1	0	1	1	0
45150	45250	0	1	1	1	0	0	1	0	1	0	0
45250	45350	0	1	1	1	0	0	1	1	1	0	0
45350	45450	0	1	1	1	0	0	1	1	1	1	0
45450	45550	0	1	1	1	0	0	1	1	0	1	0
45550	45650	0	1	1	1	0	0	1	1	0	1	1
45650	45750	0	1	1	1	0	0	1	1	0	0	1
45750	45850	0	1	1	1	0	0	0	1	0	0	1
45850	45950	0	1	1	1	0	0	0	1	0	1	1
45950	46050	0	1	1	1	0	0	0	1	0	1	0
46050	46150	0	1	1	1	0	0	0	1	1	1	0
46150	46250	0	1	1	1	0	0	0	1	1	0	0
46250	46350	0	1	1	1	0	0	0	0	1	0	0
46350	46450	0	1	1	1	0	0	0	0	1	1	0
46450	46550	0	1	1	1	0	0	0	0	0	1	0
46550	46650	0	1	1	1	0	0	0	0	0	1	1
46650	46750	0	1	1	1	0	0	0	0	0	0	1
46750	46850	0	1	0	1	0	0	0	0	0	0	1
46850	46950	0	1	0	1	0	0	0	0	0	1	1
46950	47050	0	1	0	1	0	0	0	0	0	1	0

47050	47150	0	1	0	1	0	0	0	0	1	1	0
47150	47250	0	1	0	1	0	0	0	0	1	0	0
47250	47350	0	1	0	1	0	0	0	1	1	0	0
47350	47450	0	1	0	1	0	0	0	1	1	1	0
47450	47550	0	1	0	1	0	0	0	1	0	1	0
47550	47650	0	1	0	1	0	0	0	1	0	1	1
47650	47750	0	1	0	1	0	0	0	1	0	0	1
47750	47850	0	1	0	1	0	0	1	1	0	0	1
47850	47950	0	1	0	1	0	0	1	1	0	1	1
47950	48050	0	1	0	1	0	0	1	1	0	1	0
48050	48150	0	1	0	1	0	0	1	1	1	1	0
48150	48250	0	1	0	1	0	0	1	1	1	0	0
48250	48350	0	1	0	1	0	0	1	0	1	0	0
48350	48450	0	1	0	1	0	0	1	0	1	1	0
48450	48550	0	1	0	1	0	0	1	0	0	1	0
48550	48650	0	1	0	1	0	0	1	0	0	1	1
48650	48750	0	1	0	1	0	0	1	0	0	0	1
48750	48850	0	1	0	1	0	1	1	0	0	0	1
48850	48950	0	1	0	1	0	1	1	0	0	1	1
48950	49050	0	1	0	1	0	1	1	0	1	0	0
49050	49150	0	1	0	1	0	1	1	0	1	1	0
49150	49250	0	1	0	1	0	1	1	0	1	0	0
49250	49350	0	1	0	1	0	1	1	1	1	0	0
49350	49450	0	1	0	1	0	1	1	1	1	1	0
49450	49550	0	1	0	1	0	1	1	1	0	1	0
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49650	49750	0	1	0	1	0	1	1	1	0	0	1
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50250	50350	0	1	0	1	0	1	0	0	1	0	0
50350	50450	0	1	0	1	0	1	0	0	1	1	0
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50650	50750	0	1	0	1	0	1	0	0	0	0	1
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51750	51850	0	1	0	1	1	1	1	1	0	0	1
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52150	52250	0	1	0	1	1	1	1	1	1	0	0
52250	52350	0	1	0	1	1	1	1	0	1	0	0
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53150	53250	0	1	0	1	1	0	1	0	1	0	0
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55150	55250	0	1	0	0	1	0	0	0	1	0	0
55250	55350	0	1	0	0	1	0	0	1	1	0	0
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55450	55550	0	1	0	0	1	0	0	1	0	1	0
55550	55650	0	1	0	0	1	0	0	1	0	1	1
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56150	56250	0	1	0	0	1	0	1	1	1	0	0
56250	56350	0	1	0	0	1	0	1	0	1	0	0
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57050	57150	0	1	0	0	1	1	1	0	1	1	0
57150	57250	0	1	0	0	1	1	1	0	1	0	0
57250	57350	0	1	0	0	1	1	1	1	1	0	0
57350	57450	0	1	0	0	1	1	1	1	1	1	0
57450	57550	0	1	0	0	1	1	1	1	0	1	0
57550	57650	0	1	0	0	1	1	1	1	0	1	1
57650	57750	0	1	0	0	1	1	1	1	0	0	1
57750	57850	0	1	0	0	1	1	0	1	0	0	1
57850	57950	0	1	0	0	1	1	0	1	0	1	1
57950	58050	0	1	0	0	1	1	0	1	0	1	0
58050	58150	0	1	0	0	1	1	0	1	1	1	0
58150	58250	0	1	0	0	1	1	0	1	1	0	0
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59150	59250	0	1	0	0	0	1	0	0	1	0	0
59250	59350	0	1	0	0	0	1	0	1	1	0	0
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59650	59750	0	1	0	0	0	1	0	1	0	0	1
59750	59850	0	1	0	0	0	1	1	1	0	0	1
59850	59950	0	1	0	0	0	1	1	1	0	1	1
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60150	60250	0	1	0	0	0	1	1	1	1	0	0
60250	60350	0	1	0	0	0	1	1	0	1	0	0
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60650	60750	0	1	0	0	0	1	1	0	0	0	1
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63150	63250	1	1	0	0	0	0	0	0	1	0	0
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64050	64150	1	1	0	0	0	0	1	1	1	1	0
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64250	64350	1	1	0	0	0	0	1	0	1	0	0
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64650	64750	1	1	0	0	0	0	1	0	0	0	1
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65250	65350	1	1	0	0	0	1	1	1	1	0	0
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66250	66350	1	1	0	0	0	1	0	0	1	0	0
66350	66450	1	1	0	0	0	1	0	0	1	1	0
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67250	67350	1	1	0	0	1	1	0	1	1	0	0
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67550	67650	1	1	0	0	1	1	0	1	0	1	1
67650	67750	1	1	0	0	1	1	0	1	0	0	1
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68050	68150	1	1	0	0	1	1	1	1	1	1	0
68150	68250	1	1	0	0	1	1	1	1	1	0	0
68250	68350	1	1	0	0	1	1	1	0	1	0	0
68350	68450	1	1	0	0	1	1	1	0	1	1	0
68450	68550	1	1	0	0	1	1	1	0	0	1	0
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68650	68750	1	1	0	0	1	1	1	0	0	0	1
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68950	69050	1	1	0	0	1	0	1	0	0	1	0
69050	69150	1	1	0	0	1	0	1	0	1	1	0
69150	69250	1	1	0	0	1	0	1	0	1	0	0
69250	69350	1	1	0	0	1	0	1	1	1	0	0
69350	69450	1	1	0	0	1	0	1	1	1	1	0
69450	69550	1	1	0	0	1	0	1	1	0	1	0
69550	69650	1	1	0	0	1	0	1	1	0	1	1
69650	69750	1	1	0	0	1	0	1	1	0	0	1
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69850	69950	1	1	0	0	1	0	0	1	0	1	1
69950	70050	1	1	0	0	1	0	0	1	0	1	0
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70150	70250	1	1	0	0	1	0	0	1	1	0	0
70250	70350	1	1	0	0	1	0	0	0	1	0	0
70350	70450	1	1	0	0	1	0	0	0	1	1	0
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70650	70750	1	1	0	0	1	0	0	0	0	0	1
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71850	71950	1	1	0	1	1	0	1	1	0	1	1
71950	72050	1	1	0	1	1	0	1	1	0	1	0
72050	72150	1	1	0	1	1	0	1	1	1	1	0
72150	72250	1	1	0	1	1	0	1	1	1	0	0
72250	72350	1	1	0	1	1	0	1	0	1	0	0
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72950	73050	1	1	0	1	1	1	1	0	0	1	0
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73150	73250	1	1	0	1	1	1	1	0	1	0	0
73250	73350	1	1	0	1	1	1	1	1	1	0	0
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74150	74250	1	1	0	1	1	1	0	1	1	0	0
74250	74350	1	1	0	1	1	1	0	0	1	0	0
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74650	74750	1	1	0	1	1	1	0	0	0	0	1
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74950	75050	1	1	0	1	0	1	0	0	0	1	0
75050	75150	1	1	0	1	0	1	0	0	1	1	0
75150	75250	1	1	0	1	0	1	0	0	1	0	0
75250	75350	1	1	0	1	0	1	0	1	1	0	0
75350	75450	1	1	0	1	0	1	0	1	1	1	0
75450	7550	1	1	0	1	0	1	0	1	0	1	0
75550	75650	1	1	0	1	0	1	0	1	0	1	1
75650	75750	1	1	0	1	0	1	0	1	0	0	1
75750	75850	1	1	0	1	0	1	1	1	0	0	1
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75950	76050	1	1	0	1	0	1	1	1	0	1	0
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76150	76250	1	1	0	1	0	1	1	1	1	0	0
76250	76350	1	1	0	1	0	1	1	0	1	0	0
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76450	76550	1	1	0	1	0	1	1	0	0	1	0
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76850	76950	1	1	0	1	0	0	1	0	0	1	1
76950	77050	1	1	0	1	0	0	1	0	0	1	0
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77150	77250	1	1	0	1	0	0	1	0	1	0	0
77250	77350	1	1	0	1	0	0	1	1	1	0	0
77350	77450	1	1	0	1	0	0	1	1	1	1	0
77450	77550	1	1	0	1	0	0	1	1	0	1	0
77550	77650	1	1	0	1	0	0	1	1	0	1	1
77650	77750	1	1	0	1	0	0	1	1	0	0	1
77750	77850	1	1	0	1	0	0	0	1	0	0	1
77850	77950	1	1	0	1	0	0	0	1	0	1	1
77950	78050	1	1	0	1	0	0	0	1	0	1	0
78050	78150	1	1	0	1	0	0	0	1	1	1	0
78150	78250	1	1	0	1	0	0	0	1	1	0	0
78250	78350	1	1	0	1	0	0	0	0	1	0	0
78350	78450	1	1	0	1	0	0	0	0	1	1	0
78450	78550	1	1	0	1	0	0	0	0	0	1	0
78550	78650	1	1	0	1	0	0	0	0	0	1	1
78650	78750	1	1	0	1	0	0	0	0	0	0	0
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78850	78950	1	1	1	1	0	0	0	0	0	1	1
78950	79050	1	1	1	1	0	0	0	0	0	1	0
79050	79150	1	1	1	1	0	0	0	0	1	1	0
79150	79250	1	1	1	1	0	0	0	0	1	0	0
79250	79350	1	1	1	1	0	0	0	1	1	0	0
79350	79450	1	1	1	1	0	0	0	1	1	1	0
79450	79550	1	1	1	1	0	0	0	1	0	1	0
79550	79650	1	1	1	1	0	0	0	1	0	1	1
79650	79750	1	1	1	1	0	0	0	1	0	0	1
79750	79850	1	1	1	1	0	0	1	1	0	0	1
79850	79950	1	1	1	1	0	0	1	1	0	1	1
79950	80050	1	1	1	1	0	0	1	1	0	1	0
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80250	80350	1	1	1	1	0	0	1	0	1	0	0
80350	80450	1	1	1	1	0	0	1	0	1	1	0
80450	80550	1	1	1	1	0	0	1	0	0	1	0
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80650	80750	1	1	1	1	0	0	1	0	0	0	1
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81950	82050	1	1	1	1	0	1	0	1	0	1	0
82050	82150	1	1	1	1	0	1	0	1	1	1	0
82150	82250	1	1	1	1	0	1	0	1	1	0	0
82250	82350	1	1	1	1	0	1	0	0	1	0	0
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82950	83050	1	1	1	1	1	1	0	0	0	1	0
83050	83150	1	1	1	1	1	1	0	0	1	1	0
83150	83250	1	1	1	1	1	1	0	0	1	0	0
83250	83350	1	1	1	1	1	1	0	1	1	0	0
83350	83450	1	1	1	1	1	1	0	1	1	1	0
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83850	83950	1	1	1	1	1	1	1	1	0	1	1
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84150	84250	1	1	1	1	1	1	1	1	1	0	0
84250	84350	1	1	1	1	1	1	1	0	1	0	0
84350	84450	1	1	1	1	1	1	1	0	1	1	0
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84550	84650	1	1	1	1	1	1	1	0	0	1	1
84650	84750	1	1	1	1	1	1	1	0	0	0	1
84750	84850	1	1	1	1	1	0	1	0	0	0	1
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84950	85050	1	1	1	1	1	0	1	0	0	1	0
85050	85150	1	1	1	1	1	0	1	0	1	1	0
85150	85250	1	1	1	1	1	0	1	0	1	0	0
85250	85350	1	1	1	1	1	0	1	1	1	0	0
85350	85450	1	1	1	1	1	0	1	1	1	1	0
85450	85550	1	1	1	1	1	0	1	1	0	1	0
85550	85650	1	1	1	1	1	0	1	1	0	1	1
85650	85750	1	1	1	1	1	0	1	1	0	0	1
85750	85850	1	1	1	1	1	0	0	1	0	0	1
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85950	86050	1	1	1	1	1	0	0	1	0	1	0
86050	86150	1	1	1	1	1	0	0	1	1	1	0
86150	86250	1	1	1	1	1	0	0	1	1	0	0

86250	86350	1	1	1	1	1	0	0	0	1	0	0
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86450	86550	1	1	1	1	1	0	0	0	0	1	0
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86650	86750	1	1	1	1	1	0	0	0	0	0	1
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86950	87050	1	1	1	0	1	0	0	0	0	1	0
87050	87150	1	1	1	0	1	0	0	0	1	1	0
87150	87250	1	1	1	0	1	0	0	0	1	0	0
87250	87350	1	1	1	0	1	0	0	1	1	0	0
87350	87450	1	1	1	0	1	0	0	1	1	1	0
87450	87550	1	1	1	0	1	0	0	1	0	1	0
87550	87650	1	1	1	0	1	0	0	1	0	1	1
87650	87750	1	1	1	0	1	0	0	1	0	0	1
87750	87850	1	1	1	0	1	0	1	1	0	0	1
87850	87950	1	1	1	0	1	0	1	1	0	1	1
87950	88050	1	1	1	0	1	0	1	1	0	1	0
88050	88150	1	1	1	0	1	0	1	1	1	1	0
88150	88250	1	1	1	0	1	0	1	1	1	0	0
88250	88350	1	1	1	0	1	0	1	0	1	0	0
88350	88450	1	1	1	0	1	0	1	0	1	1	0
88450	88550	1	1	1	0	1	0	1	0	0	1	0
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88650	88750	1	1	1	0	1	0	1	0	0	0	1
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88950	89050	1	1	1	0	1	1	1	0	0	1	0
88050	89150	1	1	1	0	1	1	1	0	1	1	0
89150	89250	1	1	1	0	1	1	1	0	1	0	0
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89350	89450	1	1	1	0	1	1	1	1	1	1	0
89450	89550	1	1	1	0	1	1	1	1	0	1	0
89550	89650	1	1	1	0	1	1	1	1	0	1	1
89650	89750	1	1	1	0	1	1	1	1	0	0	1
89750	89850	1	1	1	0	1	1	0	1	0	0	1
89850	89950	1	1	1	0	1	1	0	1	0	1	1
89950	90050	1	1	1	0	1	1	0	1	0	1	0
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90150	90250	1	1	1	0	1	1	0	1	1	0	0
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90350	90450	1	1	1	0	1	1	0	0	1	1	0
90450	90550	1	1	1	0	1	1	0	0	0	1	0
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90650	90750	1	1	1	0	1	1	0	0	0	0	1
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91350	91450	1	1	1	0	0	1	0	1	1	1	0
91450	91550	1	1	1	0	0	1	0	1	0	1	0
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91950	92050	1	1	1	0	0	1	1	1	0	1	0
92050	92150	1	1	1	0	0	1	1	1	1	1	0
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92250	92350	1	1	1	0	0	1	1	0	1	0	0
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92850	92950	1	1	1	0	0	0	1	0	0	1	1
92950	93050	1	1	1	0	0	0	1	0	0	1	0
93050	93150	1	1	1	0	0	0	1	0	1	1	0
93150	93250	1	1	1	0	0	0	1	0	1	0	0
93250	93350	1	1	1	0	0	0	1	1	1	0	0
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94050	94150	1	1	1	0	0	0	0	1	1	1	0
94150	94250	1	1	1	0	0	0	0	1	1	0	0
94250	94350	1	1	1	0	0	0	0	0	1	0	0
94350	94450	1	1	1	0	0	0	0	0	1	1	0
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94650	94750	1	1	1	0	0	0	0	0	0	0	1
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94950	95050	1	0	1	0	0	0	0	0	0	1	0
95050	95150	1	0	1	0	0	0	0	0	1	1	0
95150	95250	1	0	1	0	0	0	0	0	1	0	0
95250	95350	1	0	1	0	0	0	0	1	1	0	0
95350	95450	1	0	1	0	0	0	0	1	1	1	0
95450	95550	1	0	1	0	0	0	0	1	0	1	0
95550	95650	1	0	1	0	0	0	0	1	0	1	1
95650	95750	1	0	1	0	0	0	0	1	0	0	1
95750	95850	1	0	1	0	0	0	1	1	0	0	1
95850	95950	1	0	1	0	0	0	1	1	0	1	1
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96050	96150	1	0	1	0	0	0	1	1	1	1	0
96150	96250	1	0	1	0	0	0	1	1	1	0	0
96250	96350	1	0	1	0	0	0	1	0	1	0	0
96350	96450	1	0	1	0	0	0	1	0	1	1	0
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96950	97050	1	0	1	0	0	1	1	0	0	1	0
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97150	97250	1	0	1	0	0	1	1	0	1	0	0
97250	97350	1	0	1	0	0	1	1	1	1	0	0
97350	97450	1	0	1	0	0	1	1	1	1	1	0
97450	97550	1	0	1	0	0	1	1	1	0	1	0
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98050	98150	1	0	1	0	0	1	0	1	1	1	0
98150	98250	1	0	1	0	0	1	0	1	1	0	0
98250	98350	1	0	1	0	0	1	0	0	1	0	0
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98950	99050	1	0	1	0	1	1	0	0	0	1	0
99050	99150	1	0	1	0	1	1	0	0	1	1	0
99150	99250	1	0	1	0	1	1	0	0	1	0	0
99250	99350	1	0	1	0	1	1	0	1	1	0	0
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99550	99650	1	0	1	0	1	1	0	1	0	1	1
99650	99750	1	0	1	0	1	1	0	1	0	0	1
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100050	100150	1	0	1	0	1	1	1	1	1	1	0
100150	100250	1	0	1	0	1	1	1	1	1	0	0
100250	100350	1	0	1	0	1	1	1	0	1	0	0
100350	100450	1	0	1	0	1	1	1	0	1	1	0
100450	100550	1	0	1	0	1	1	1	0	0	1	0
100550	100650	1	0	1	0	1	1	1	0	0	1	1
100650	100750	1	0	1	0	1	1	1	0	0	0	1
100750	100850	1	0	1	0	1	0	1	0	0	0	1
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101050	101150	1	0	1	0	1	0	1	0	1	1	0
101150	101250	1	0	1	0	1	0	1	0	1	0	0
101250	101350	1	0	1	0	1	0	1	1	1	0	0
101350	101450	1	0	1	0	1	0	1	1	1	1	0
101450	101550	1	0	1	0	1	0	1	1	0	1	0
101550	101650	1	0	1	0	1	0	1	1	0	1	1
101650	101750	1	0	1	0	1	0	1	1	0	0	1
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101850	101950	1	0	1	0	1	0	0	1	0	1	1
101950	102050	1	0	1	0	1	0	0	1	0	1	0
102050	102150	1	0	1	0	1	0	0	1	1	1	0
102150	102250	1	0	1	0	1	0	0	1	1	0	0
102250	102350	1	0	1	0	1	0	0	0	1	0	0
102350	102450	1	0	1	0	1	0	0	0	1	1	0
102450	102550	1	0	1	0	1	0	0	0	0	1	0
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102650	102750	1	0	1	0	1	0	0	0	0	0	1
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103150	103250	1	0	1	1	1	0	0	0	1	0	0
103250	103350	1	0	1	1	1	0	0	1	1	0	0
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104150	104250	1	0	1	1	1	0	1	1	1	0	0
104250	104350	1	0	1	1	1	0	1	0	1	0	0
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104550	104650	1	0	1	1	1	0	1	0	0	1	1
104650	104750	1	0	1	1	1	0	1	0	0	0	1
104750	104850	1	0	1	1	1	1	1	0	0	0	1
104850	104950	1	0	1	1	1	1	1	0	0	1	1
104950	105050	1	0	1	1	1	1	1	0	0	1	0
105050	105150	1	0	1	1	1	1	1	0	1	1	0
105150	105250	1	0	1	1	1	1	1	0	1	0	0
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105650	105750	1	0	1	1	1	1	1	1	0	0	1
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105950	105050	1	0	1	1	1	1	0	1	0	1	0
106050	106150	1	0	1	1	1	1	0	1	1	1	0
106150	106250	1	0	1	1	1	1	0	1	1	0	0
106250	106350	1	0	1	1	1	1	0	0	1	0	0
106350	106450	1	0	1	1	1	1	0	0	1	1	0
106450	106550	1	0	1	1	1	1	0	0	0	1	0
106550	106650	1	0	1	1	1	1	0	0	0	1	1
106650	106750	1	0	1	1	1	1	0	0	0	0	1
106750	106850	1	0	1	1	0	1	0	0	0	0	1
106850	106950	1	0	1	1	0	1	0	0	0	1	1
106950	107050	1	0	1	1	0	1	0	0	0	1	0
107050	107150	1	0	1	1	0	1	0	0	1	1	0
107150	107250	1	0	1	1	0	1	0	0	1	0	0
107250	107350	1	0	1	1	0	1	0	1	1	0	0
107350	107450	1	0	1	1	0	1	0	1	1	1	0
107450	107550	1	0	1	1	0	1	0	1	0	1	0
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107650	107750	1	0	1	1	0	1	0	1	0	0	1
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107850	107950	1	0	1	1	0	1	1	1	0	1	1
107950	108050	1	0	1	1	0	1	1	1	0	1	0
108050	108150	1	0	1	1	0	1	1	1	1	1	0
108150	108250	1	0	1	1	0	1	1	1	1	0	0
108250	108350	1	0	1	1	0	1	1	0	1	0	0
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108450	108550	1	0	1	1	0	1	1	0	0	1	0
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108650	108750	1	0	1	1	0	1	1	0	0	0	1
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109150	109250	1	0	1	1	0	0	1	0	1	0	0
109250	109350	1	0	1	1	0	0	1	1	1	0	0
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110050	110150	1	0	1	1	0	0	0	1	1	1	0
110150	110250	1	0	1	1	0	0	0	1	1	0	0
110250	110350	1	0	1	1	0	0	0	0	1	0	0
110350	110450	1	0	1	1	0	0	0	0	1	1	0
110450	110550	1	0	1	1	0	0	0	0	0	1	0
110550	110650	1	0	1	1	0	0	0	0	0	1	1
110650	110750	1	0	1	1	0	0	0	0	0	0	1

110750	110850	1	0	0	1	0	0	0	0	0	0	1
110850	110950	1	0	0	1	0	0	0	0	0	1	1
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111450	111550	1	0	0	1	0	0	0	1	0	1	0
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111650	111750	1	0	0	1	0	0	0	1	0	0	1
111750	111850	1	0	0	1	0	0	1	1	0	0	1
111850	111950	1	0	0	1	0	0	1	1	0	1	1
111950	112050	1	0	0	1	0	0	1	1	0	1	0
112050	112150	1	0	0	1	0	0	1	1	1	1	0
112150	112250	1	0	0	1	0	0	1	1	1	0	0
112250	112350	1	0	0	1	0	0	1	0	1	0	0
112350	112450	1	0	0	1	0	0	1	0	1	1	0
112450	112550	1	0	0	1	0	0	1	0	0	1	0
112550	112650	1	0	0	1	0	0	1	0	0	1	1
112650	112750	1	0	0	1	0	0	1	0	0	0	1
112750	112850	1	0	0	1	0	1	1	0	0	0	1
112850	112950	1	0	0	1	0	1	1	0	0	1	1
112950	113050	1	0	0	1	0	1	1	0	0	1	0
113050	113150	1	0	0	1	0	1	1	0	1	1	0
113150	113250	1	0	0	1	0	1	1	0	1	0	0
113250	113350	1	0	0	1	0	1	1	1	1	0	0
113350	113450	1	0	0	1	0	1	1	1	1	1	0
113450	113550	1	0	0	1	0	1	1	1	0	1	0
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113650	113750	1	0	0	1	0	1	1	1	0	0	1
113750	113850	1	0	0	1	0	1	0	1	0	0	1
113850	113950	1	0	0	1	0	1	0	1	0	1	1
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114150	114250	1	0	0	1	0	1	0	1	1	0	0
114250	114350	1	0	0	1	0	1	0	0	1	0	0
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114450	114550	1	0	0	1	0	1	0	0	0	1	0
114550	114650	1	0	0	1	0	1	0	0	0	1	1
114650	114750	1	0	0	1	0	1	0	0	0	0	1
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115050	115150	1	0	0	1	1	1	0	0	1	1	0
115150	115250	1	0	0	1	1	1	0	0	1	0	0
115250	115350	1	0	0	1	1	1	0	1	1	0	0
115350	115450	1	0	0	1	1	1	0	1	1	1	0
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115950	116050	1	0	0	1	1	1	1	1	0	1	0
116050	116150	1	0	0	1	1	1	1	1	1	1	0
116150	116250	1	0	0	1	1	1	1	1	1	0	0
116250	116350	1	0	0	1	1	1	1	0	1	0	0
116350	116450	1	0	0	1	1	1	1	0	1	1	0
116450	116550	1	0	0	1	1	1	1	0	0	1	0
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116650	116750	1	0	0	1	1	1	1	0	0	0	1
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116850	116950	1	0	0	1	1	0	1	0	0	1	1
116950	117050	1	0	0	1	1	0	1	0	0	1	0
117050	117150	1	0	0	1	1	0	1	0	1	1	0
117150	117250	1	0	0	1	1	0	1	0	1	0	0
117250	117350	1	0	0	1	1	0	1	1	1	0	0
117350	117450	1	0	0	1	1	0	1	1	1	1	0
117450	117550	1	0	0	1	1	0	1	1	0	1	0
117550	117650	1	0	0	1	1	0	1	1	0	1	1
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117750	117850	1	0	0	1	1	0	0	1	0	0	1
117850	117950	1	0	0	1	1	0	0	1	0	1	1
117950	118050	1	0	0	1	1	0	0	1	0	1	0
118050	118150	1	0	0	1	1	0	0	1	1	1	0
118150	118250	1	0	0	1	1	0	0	1	1	0	0
118250	118350	1	0	0	1	1	0	0	0	1	0	0
118350	118450	1	0	0	1	1	0	0	0	1	1	0
118450	118550	1	0	0	1	1	0	0	0	0	1	0
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118650	118750	1	0	0	1	1	0	0	0	0	0	1
118750	118850	1	0	0	0	1	0	0	0	0	0	1
118850	118950	1	0	0	0	1	0	0	0	0	1	1
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119050	119150	1	0	0	0	1	0	0	0	1	1	0
119150	119250	1	0	0	0	1	0	0	0	1	0	0
119250	119350	1	0	0	0	1	0	0	1	1	0	0
119350	119450	1	0	0	0	1	0	0	1	1	1	0
119450	119550	1	0	0	0	1	0	0	1	0	1	0
119550	119650	1	0	0	0	1	0	0	1	0	1	1
119650	119750	1	0	0	0	1	0	0	1	0	0	1
119750	119850	1	0	0	0	1	0	1	1	0	0	1
119850	119950	1	0	0	0	1	0	1	1	0	1	1
119950	120050	1	0	0	0	1	0	1	1	0	1	0
120050	120150	1	0	0	0	1	0	1	1	1	1	0
120150	120250	1	0	0	0	1	0	1	1	1	0	0
120250	120350	1	0	0	0	1	0	1	0	1	0	0
120350	120450	1	0	0	0	1	0	1	0	1	1	0
120450	120550	1	0	0	0	1	0	1	0	0	1	0

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120650	120750	1	0	0	0	1	0	1	0	0	0	1
120750	120850	1	0	0	0	1	1	1	0	0	0	1
120850	120950	1	0	0	0	1	1	1	0	0	1	1
120950	121050	1	0	0	0	1	1	1	0	0	1	0
121050	121150	1	0	0	0	1	1	1	0	1	1	0
121150	121250	1	0	0	0	1	1	1	0	1	0	0
121250	121350	1	0	0	0	1	1	1	1	1	0	0
121350	121450	1	0	0	0	1	1	1	1	1	1	0
121450	121550	1	0	0	0	1	1	1	1	0	1	0
121550	121650	1	0	0	0	1	1	1	1	0	1	1
121650	121750	1	0	0	0	1	1	1	1	0	0	1
121750	121850	1	0	0	0	1	1	0	1	0	0	1
121850	121950	1	0	0	0	1	1	0	1	0	1	1
121950	122050	1	0	0	0	1	1	0	1	0	1	0
122050	122150	1	0	0	0	1	1	0	1	1	1	0
122150	122250	1	0	0	0	1	1	0	1	1	0	0
122250	122350	1	0	0	0	1	1	0	0	1	0	0
122350	122450	1	0	0	0	1	1	0	0	1	1	0
122450	122550	1	0	0	0	1	1	0	0	0	1	0
122550	122650	1	0	0	0	1	1	0	0	0	1	1
122650	122750	1	0	0	0	1	1	0	0	0	0	1
122750	122850	1	0	0	0	0	1	0	0	0	0	1
122850	122950	1	0	0	0	0	1	0	0	0	1	1
122950	123050	1	0	0	0	0	1	0	0	0	1	0
123050	123150	1	0	0	0	0	1	0	0	1	1	0
123150	123250	1	0	0	0	0	1	0	0	1	0	0
123250	123350	1	0	0	0	0	1	0	1	1	0	0
123350	123450	1	0	0	0	0	1	0	1	1	1	0
123450	123550	1	0	0	0	0	1	0	1	0	1	0
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123650	123750	1	0	0	0	0	1	0	1	0	0	1
123750	123850	1	0	0	0	0	1	1	1	0	0	1
123850	123950	1	0	0	0	0	1	1	1	0	1	1
123950	124050	1	0	0	0	0	1	1	1	0	1	0
124050	124150	1	0	0	0	0	1	1	1	1	1	0
124150	124250	1	0	0	0	0	1	1	1	1	0	0
124250	124350	1	0	0	0	0	1	1	0	1	0	0
124350	124450	1	0	0	0	0	1	1	0	1	1	0
124450	124550	1	0	0	0	0	1	1	0	0	1	0
124550	124650	1	0	0	0	0	1	1	0	0	1	1
124650	124750	1	0	0	0	0	1	1	0	0	0	1
124750	124850	1	0	0	0	0	0	1	0	0	0	1
124850	124950	1	0	0	0	0	0	1	0	0	1	1
124950	125050	1	0	0	0	0	0	1	0	0	1	0
125050	125150	1	0	0	0	0	0	1	0	1	1	0
125150	125250	1	0	0	0	0	0	1	0	1	0	0
125250	125350	1	0	0	0	0	0	1	1	1	0	0
125350	125450	1	0	0	0	0	0	1	1	1	1	0

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125550	125650	1	0	0	0	0	0	1	1	0	1	1
125650	125750	1	0	0	0	0	0	1	1	0	0	1
125750	125850	1	0	0	0	0	0	0	1	0	0	1
125850	125950	1	0	0	0	0	0	0	1	0	1	1
125950	126050	1	0	0	0	0	0	0	1	0	1	0
126050	126150	1	0	0	0	0	0	0	1	1	1	0
126150	126250	1	0	0	0	0	0	0	1	1	0	0
126250	126350	1	0	0	0	0	0	0	0	1	0	0
126350	126450	1	0	0	0	0	0	0	0	1	1	0
126450	126550	1	0	0	0	0	0	0	0	0	1	0
126550	126650	1	0	0	0	0	0	0	0	0	1	1
126650	126750	1	0	0	0	0	0	0	0	0	0	1

4. fejezet Összeütközés-elhárító fedélzeti rendszer

1. *Megjegyzés. – Az összeütközés-elhárító fedélzeti rendszerre vonatkozó útmutató anyagot az A melléklet tartalmazza.*

2. Megjegyzés. – Nem-SI alternatív mértékegységek az 5. Annex, 3. fejezet, 3.2.2 pontja által megengedett módon kerülnek használatra. Korlátozott esetekben, a következetesség biztosítása céljából - a logikai számítások szintjén - olyan mértékegységek kerülnek felhasználásra, mint láb/s, NM/s és kt/s.

4.1 Az összeütközés-elhárító fedélzeti rendszerekre vonatkozó meghatározások

ACAS I
Egy olyan ACAS, amely "lásd és kerüld el" cselekvést elősegítő információt állít elő, de nincs megoldási tanácsadás (RA) generáló képessége.

Megjegyzés. – Az ICAO nem törekszik az ACAS I. nemzetközi bevezetésére és szabványosítására. Ezért az ACAS I. jellemzőitől csupán más ACAS konfigurációkkal összeegyeztethető működés biztosítását és interferencia korlátozást követelnek meg a 4.2 pontban meghatározottak szerint.

ACAS II
Egy olyan ACAS, amely a forgalmi tanácsadás (TA) mellett függőleges megoldási javaslatot (RA) is szolgáltat.

ACAS III
Egy olyan ACAS, amely a forgalomi tanácsadás (TA) mellett függőleges és vízszintes megoldás javaslatot (RA) is szolgáltat.

ACAS broadcast – ACAS adatsugárzás
Hosszú S-módú levegő-levegő felderítési lekérdezés (UF = 16) az adatsugárzás címekkel.

Active RAC – Aktív RAC
A RAC aktív, ha folyamatosan korlátozza az RA szelektálását. RAC-ok, amelyeket az utolsó hat másodpercen belül vettek, és nincsenek félreérthetetlenül törölve, aktívak.

Altitude crossing RA – Magasság keresztezési megoldási tanácsadás
A magasság keresztezésére szolgáló megoldási tanácsadás, ha a saját ACAS légijármű jelenleg legalább 30 m-el (100 láb) van a fenyegető légijármű felett vagy alatt, megfelelőképpen lefelé- vagy felfelé irányuló mozgásra szóló javaslatként.

Climb RA – Emelkedési megoldási tanácsadás
Pozitív megoldási tanácsadás, amely emelkedést, de nem egy fokozott emelkedést tanácsol.

Closest approach – Legszorosabb megközelítés
A saját ACAS légijármű és a megközelítő légijármű közötti minimális távolság bekövetkezése. Így a legszorosabb megközelítés tartománya a két légijármű közötti legkisebb távolság, és a legszorosabb megközelítés ideje az az időpont, amelynél ez bekövetkezik.

Coordination – Koordináció
Az a folyamat, amelynek során két ACAS-al felszerelt légijármű összeegyeztethető megoldási javaslatokat (RA) választ a megoldási javaslatok kiegészítésének (RAC) cseréje útján.

Coordination interrogation – Koordinációs lekérdezés
ACAS II vagy III által sugárzott S-módú lekérdezés (fedélzetre irányuló adattovábbítás), amely megoldási közleményt tartalmaz.

Coordination reply – Koordinációs válasz
Az ACAS II vagy III kialakítású rendszer részét képező S-módú válaszjeladónak, a koordinációs lekérdezés fogadását visszaigazoló S-módú válasza (fedélzetről leadott adattovábbítás).

Corrective RA – Korrekciós megoldási tanácsadás
Megoldás tanácsadás, amely azt tanácsolja a légijárművezetőnek, hogy térjen le a jelenlegi repülési pályáról.

Cycle – Ciklus
Az ebben a fejezetben használt "ciklus" fogalom egy teljes áthaladást jelent az ACAS II vagy ACAS III által végrehajtott feladatok sorozatán, névlegesen egyszer egy másodperc alatt.

Descend RA – Süllyedés megoldási tanácsadás
Pozitív megoldási javaslat, amely süllyedést, de nem fokozott süllyedést tanácsol.

Established track – Létrehozott nyomvonal
ACAS levegő-levegő felderítés által generált nyomvonal, melyet tényleges légijármű nyomvonalként kezelnek.

Increased rate RA – Megnövelt mértékű megoldási tanácsadás
Megoldási javaslat, amely azt tanácsolja, hogy a magasságváltozási sebességet az előző emelkedési vagy süllyedési javaslatot meghaladó mértékben növeljék.

Intruder – Megközelítő légijármű
SSR válaszjeladóval felszerelt légijármű az ACAS felderítési távolságán belül, amelyre az ACAS-nek létrehozott nyomvonala van.

Own aircraft – Saját légijármű
A tárgybani ACAS-al felszerelt légijármű, amely ACAS a lehetséges összeütközés elleni védelemre szól, és amely légijármű manőverezésbe kezdhet egy ACAS kijelzésre válaszolva.

Positive RA – Pozitív megoldási tanácsadás
Megoldás javaslat, amely a légijárművezetőnek vagy emelkedést vagy süllyedés végrehajtását tanácsolja (csak ACAS II esetén alkalmazzák).

Potential threat – Potenciális veszélyeztető légijármű
Egy megközelítő légijármű, amely különleges figyelmet érdemel vagy a saját légijárműhöz valós szoros közelsége miatt, vagy mert az egymást követő távolság és magasság mérések azt jelzik, hogy összeütközésbe vagy összeütközés közelségbe kerülhet a saját repülőgéppel. A figyelmeztetési idő, amelyet egy potenciális veszélyeztetéssel szemben biztosítanak, elegendően kicsi, hogy egy forgalmi javaslatot (TA) indokoljon, de nem annyira kicsi, hogy megoldás javaslatot (RA) indokolna.

Preventive RA – Megelőző megoldási tanácsadás
Megoldás javaslat, amely azt tanácsolja a repülőgépvezetőnek, hogy kerüljön el bizonyos eltéréseket a jelenlegi repülési pályától, de nem kíván semmilyen változást a jelenlegi repülési pályában.

RA sense – Megoldási tanácsadás értelme
Egy ACAS II megoldási tanácsadás "felfelé irányuló" (upward) értelmű, ha emelkedést, vagy süllyedési sebesség korlátozást igényel, és "lefelé irányuló" (downward) értelmű, ha süllyedést, vagy emelkedési sebesség korlátozást igényel. Úgy a felfelé irányuló mint a lefelé irányuló mozgás is megjelenhet egyidőben, ha a függőleges sebességet meghatározott értéktartományon belül kell tartani.

Megjegyzés. – A megoldás tanácsadás értelme mind felfelé, mind lefelé irányulhat egyszerre, amikor egyidőben több veszélyeztetés lép fel, és az ACAS olyan megoldási javaslatot generál, amely valamely veszélyeztető(k) alatt és valamely másik veszélyeztető(k) felett megfelelő elkülönítés biztosítását célozza.

Resolution advisory (RA) – Megoldási tanácsadás
A repülőszemélyzet részére adott kijelzés, amely javaslatot ad:

a) egy manőverre, amely minden veszélyeztetőtől való elkülönítés biztosítását célozza; vagy

b) manőver korlátozására, amely a meglévő elkülönítés fenntartására törekszik.

Resolution advisory complement (RAC) – Megoldási tanácsadás kiegészítés
Egy ACAS által a másiknak egy S-módú lekérdezésen keresztüli információ szolgáltatása annak érdekében, hogy RAC-t fogadó ACAS részére rendelkezésre álló manőverek választékának korlátozásával biztosítsák a kiegészítő manővereket.

Resolution advisory complements record (RAC record) – Megoldási tanácsadás kiegészítéseinek rögzítése
Az összes jelenleg aktív függőleges RAC (VRC) és vízszintes RAC (HRC) együttese, amelyet az ACAS vett. Ezeket az információkat egyik ACAS szolgáltatja egy másik ACAS-nak, vagy egy S-módú földi állomásnak, S-módú válaszon keresztül.

Resolution advisory strength – Megoldási tanácsadás erőssége
Az RA által jelzett manőver nagysága. Egy RA több egymás utáni erősséget is felvehet, mielőtt törlésre kerül. Amikor új RA erősség kerül kiadásra, az előző automatikusan érvényét veszti.

Resolution message – Megoldási közlemény
A megoldás tanácsadás kiegészítését (RAC) tartalmazó közlés.

Reversed sense RA – Fordított értelmű megoldási tanácsadás
Megoldási tanácsadás amelynek értelme megfordult.

Sensitivity level (S) – Érzékenységi szint
Egy egész szám, amely a paraméterek egy halmazát definiálja, amelyeket a forgalmi tanácsadás (TA) és összeütközés elhárító algoritmusok használnak fel a figyelmeztetési idő szabályozására, amelyet a potenciális veszélyeztető és a veszélyeztető észlelési logika szolgáltat, valamint meghatározza az RA kiválasztási logika szempontjából releváns paraméterek értékeit.

Threat – Veszélyeztető légijármű
Egy megközelítő légijármű, amely különös figyelemre szolgál vagy a saját légijárműhöz való szoros közelsége miatt, vagy mert egymás utáni távolság és magasság mérések jelzik, hogy összeütközési vagy majdnem ütközési útvonalon lehet a saját légijárművel. A veszéllyel szemben rendelkezésre álló figyelmeztetési idő elegendően kicsi ahhoz, hogy egy RA-t indokoljon.

Track – Nyomvonal
Legalább három egymás utáni mérés, amely olyan pozíciókat mutat, amelyet egy légijármű ésszerűen elfoglalhat.

Traffic advisory (TA) – Forgalmi tanácsadás
A repülő személyzet részére adott jelzés arról, hogy bizonyos megközelítő légijármű egy potenciális veszélyt jelent.

Vertical speed limit (VSL) RA – Függőleges sebességhatár megoldási tanácsadás
Megoldás tanácsadás, amely azt tanácsolja a légijármű vezetőnek, hogy kerüljön bizonyos adott emelkedési sebesség tartományokat. A függőleges sebességhatár megoldási tanácsadás vagy helyesbítésre (corrective), vagy megelőzésre (preventive) ad lehetőséget.

Warning time – Figyelmeztetési idő
A potenciális veszélyeztető légijármű vagy a veszélyeztető légijármű észlelése és a legszorosabb megközelítés közötti időtartam, ha egyik légijármű sem gyorsul.

4.2 ACAS I általános előírások és jellemzők

4.2.1 *Funkcionális követelmények.* Az ACAS I-nek a következő feladatokat kell ellátnia:

a) a közelben lévő SSR válaszjeladóval felszerelt légijármű felderítése; és

b) jelzések szolgáltatása a repülő személyzet részére, amely azonosítja a közelben lévő légijármű megközelítési pozícióját a vizuális észlelés segítéseként.

Megjegyzés. – Az ACAS I csak A/C-módú lekérdezésre van szánva. Továbbá nem koordinál másik ACAS berendezéssel. Ennek folytán az ACAS I telepítésének részeként S-módú válaszjeladót nem igényel.

4.2.2 *Jel formátum.* Minden ACAS I jel RF jellemzőjének összhangban kell lennie a 3. fejezet 3.1.1.1-től – 3.1.1.6-ig és 3.1.2.1-től – 3.1.2.4-ig terjedő pontjainak rendelkezéseivel.

4.2.3 Interferencia szabályozás

4.2.3.1 *Maximális sugárzott RF teljesítmény.* Az ACAS I adattovábbítás effektív sugárzott teljesítménye a légijármű hosszanti tengelyéhez viszonyított nulla fokos látóhatár fölötti szögmagasságánál (elevációs szögnél) nem haladhatja meg a 24 dBW értéket.

4.2.3.2 *Nem-kívánt sugárzott teljesítmény.* Amikor az ACAS I nem továbbít lekérdezést, az effektív sugárzott teljesítmény egyik irányban sem haladhatja meg a -70 dBm-et.

Megjegyzés. – Ennek a követelménynek kell biztosítania, hogy amikor nem továbbít lekérdezést, az ACAS I ne sugározzon RF teljesítményt, amely interferálhatna másik közelben lévő légijárművön vagy *földi létesítményben elhelyezett SSR válaszjeladóval vagy rádió berendezéssel, vagy csökkentené azok érzékenységét.*

4.2.3.3 *Interferencia lehatárolás.* Mindegyik ACAS I lekérdezőnek szabályoznia kell lekérdezési sebességét vagy teljesítményét vagy mindkettőt az összes SSR módokban, hogy minimumra csökkentse az interferencia hatásokat (4.2.3.3.3 és 4.2.3.3.4).

Megjegyzés. – Ezek a korlátok arra szolgálnak, hogy az összes interferencia hatás, amely ezekből a lekérdezésekből származik, a közelben lévő többi ACAS I, ACAS II és ACS III lekérdezőktől származókkal együtt, alacsony szinten maradjon.

4.2.3.3.1 *Saját válaszjeladó válasz sebesség meghatározás.* Az ACAS I-nek figyelnie kell a sebességet, amellyel a saját válaszjeladója válaszol a lekérdezésekre, hogy biztosítsa a 4.2.3.3.3 pont rendelkezéseinek kielégítését.

4.2.3.3.2 *Az ACAS II és ACAS III lekérdezők számának meghatározása.* Az ACAS I-nek számolnia kell a közelben lévő ACAS II és ACAS III lekérdezők számát, hogy a 4.2.3.3.3, illetve 4.2.3.3.4 pontban lévő rendelkezéseket kielégítsék. Ezt a számlálást az ACAS adások (UF = 16) figyelemmel kisérésével lehet megszervezni (4.3.7.1.2.4) és fel kell frissíteni, a különböző S-módú ACAS címzések számával, amelyeket a megelőző 20 másodperces periódus során a legalább 1 Hz-es névleges frekvenciánál vettek.

4.2.3.3.3 *A/C ACAS I interferencia korlátok.* A lekérdezési teljesítmény nem haladhatja meg a következő korlátokat:

n_a	Felső határ $\{\sum_{k=1}^{k_1} P_a(k)\}$ esetén	
	Ha $f_r \leq 240$	Ha $f_r > 240$
0	250	118
1	250	113
2	250	108
3	250	103
4	250	98
5	250	94
6	250	89
7	250	84
8	250	79
9	250	74
10	245	70
11	228	65
12	210	60
13	193	55
14	175	50
15	158	45
16	144	41
17	126	36
18	109	31
19	91	26
20	74	21

21	60	17
$\geq$ 22	42	12

ahol:

n_a = ACAS II-vel és ACAS III-mal felszerelt, a saját légijármű közelében repülő légijárművek száma (egy -74 dBm küszöbű válaszjeladó vevővel vett ACAS adásokra alapozva);

{ } = a zárójeleken belüli kifejezésnek az utolsó 8 lekérdezési ciklusra vonatkozó átlagértéke;

$P_a(k)$ = csúcsteljesítmény, amelyet az antenna sugároz annak az impulzusnak az összes irányában, amely a legnagyobb amplitúdóval rendelkezik abban az impulzus csoportban, amelyben az impulzusok egyetlen lekérdezést tartalmaznak egy 1 másodperces lekérdezési ciklusban a k-adik A/C-módú lekérdezés során, W;

k = A/C- módú lekérdezések index száma, $k = 1, 2.., k_t$;

k_t = egy 1 másodperces lekérdezési ciklusban továbbított A/C-módú lekérdezések száma;

f_r = saját válaszjeladó A/C-módú válasz sebessége.

4.2.3.3.4 *S-módú ACAS I interferencia korlátok.* Egy ACAS I, amely S-módú lekérdezéseket használ, nem okozhat nagyobb interferencia hatásokat, mint egy csupán A/C-módú lekérdezéseket használó ACAS I.

4.3 ACAS II-re és ACAS III-ra vonatkozó általános előírások

1. Megjegyzés. – Ebben a szakaszban az ACAS II és az ACAS III jelölésére a CAS betűszót használjuk.

2. Megjegyzés. – Az ACAS berendezések felszerelésére vonatkozó követelményeket a 6. Annex, I. Rész, 6. fejezete tartalmazza.

3. Megjegyzés. – A "felszerelt veszélyeztető légijármű" fogalmát ebben a szakaszban ACAS II-vel vagy ACAS III-mal felszerelt veszélyeztető légijármű megjelölésére használjuk.

4.3.1 Funkcionális követelmények

4.3.1.1 *ACAS tevékenységek.* Az ACAS-nak a következő feladatokat kell ellátnia:

a) felderítés;

b) forgalom tanácsadások generálása;

c) veszélyeztetés észlelés;

d) megoldás tanácsadások generálása;

e) koordinálás; és

f) kommunikáció földi állomásokkal.

A berendezéseknek a b) - e) feladatokat mindegyik működési ciklusban végre kell hajtani.

Megjegyzés. – A fenti tevékenységek bizonyos jellemzőinek szabványosítottaknak kell lenniük annak érdekében, hogy az ACAS egységek kielégítően kooperáljanak más ACAS egységekkel, S-módú földi állomásokkal és a légiforgalmi irányítási rendszerekkel. Az egyes szabványosított jellemzőket az alábbiakban tárgyaljuk Más jellemzőket ajánlásként ismertetünk.

4.3.1.1.1 Egy ciklus időtartama nem haladhatja meg az 1, 2 másodpercet.

4.3.2 Felderítés végrehajtási követelmények

4.3.2.1 *Általános felderítési követelmények.* Az ACAS-nak le kell kérdeznie más légijárműveken lévő SSR A/C-módú és S-módú válaszjeladókat és észlelnie kell a válaszjeladó válaszokat. Az ACAS-nak mérnie kell a válaszoló légijármű távolságát és viszonylagos helyzetét. Ezen mérések eredményeit és a válaszjeladó válaszok által szolgáltatott információkat felhasználva, az ACAS-nak meg kell becsülnie az egyes válaszoló légijárművek pozícióját. Az ACAS-nak tartalmazni kell rendelkezéseket ilyen pozíció meghatározás megvalósítására földi visszaverődések, interferencia és jel erősség változások megléte esetén.

4.3.2.1.1 N*yomvonal létrehozásának valószínűsége.* Az ACAS-nak olyan létrehozott nyomvonalat kell generálnia, amely legalább 0,90-es valószínűséggel rendelkezik arra vonatkoztatva, hogy a nyomvonal, a válaszjeladóval felszerelt légijárművek esetén, 30 másodperccel a legszorosabb megközelítés előtt létrejön, ha az alábbi feltételek mindegyike teljesül:

a) ezeknek a légijárműveknek a látóhatár fölötti szögmagasságai (elevációs szögei) az ACAS légijármű bólintási síkjához viszonyítva ±10 fokon belül vannak;

b) ezeknek a légijárműveknek a magasság változási sebesség mértéke kisebb vagy egyenlő 51 m/s-al (10 000 láb/perc);

c) ezeknek a légijárműveknek a válaszjeladói és antennái kielégítik a 3. fejezet 3.1.1 és 3.1.2 pontjában megadott szabványok előírásait;

d) ezeknek a légijárműveknek a közeledési sebességei és irányai, az SSR válaszjeladóval felszerelt légijárművek helyi sűrűsége, más ACAS lekérdezők száma a szomszédos környezetben (ahogyan az ACAS rádióadások figyelése által meg vannak határozva a 4.3.7.1.2 pont szerint) kielégítik a 4-1 táblázatban megadott feltételeket; és

e) a minimális ferde távolság egyenlő vagy nagyobb, mint 300 m (1000 láb).

4-1 táblázat: ACAS tervezési előfeltételek

Feltételek									*Teljesítmény*
Kvadráns						*Maximális forgalom sűrűség*		*56 km-en (30 NM) belül lévő más ACAS-ok max. száma*	*Sikeresség valószínűsége*
Előre		*Oldalt*		*Hátra*					
Maximális közeledési sebesség									
m/s	*csomó*	*m/s*	*csomó*	*m/s*	*csomó*	*ljmű/km^2*	*ljmű/km^2*		
260	500	150	300	93	180	0,087	0,30	30	0,90
620	1200	390	750	220	430	0,017	0,06	30	0,90

Megjegyzés. – A 4-1 táblázat azokat a tervezési előfeltételeket tartalmazza, amelyekre az ACAS kidolgozását alapozták. Az üzemeltetési gyakorlat és szimulációk azt mutatják, hogy az ACAS akkor is megfelelő felderítést biztosít az összeütközések elkerülése érdekében, ha az 56 km-en (30 NM) belül lévő más ACAS-ok max. száma egy kissé magasabb a 4-1 táblázatban megadott értéknél. A jövőbeni ACAS kidolgozások figyelembe fogják venni a jelenlegi és a várható ACAS sűrűséget.

4.3.2.1.1.1 Az ACAS-nak folytatnia kell a légtér ellenőrzést a nyomvonal létrejöveteli valószínűségének hirtelen leromlása nélkül, ha a 4.3.2.1.1 pontban meghatározott feltétel határok bármelyikét a valóságos értékek meghaladják.

4.3.2.1.1.2 Az ACAS nem követi azokat az S-módú légijárműveket, amelyek jelentik, hogy a földön vannak.

Megjegyzés. – Egy S-módú légijármű azt, hogy a földön van, a képesség (CA) mezőben DF=11 vagy DF=17 kódolás továbbítással (3. fejezet, 3.1.2.5.2.2.1 pont), vagy a függőleges állapot (VS) mezőben DF=0 kódolás továbbításával jelentheti (3. fejezet, 3.1.2.8.2.1 pont). Megfordítva, ha a légijármű S-módú földi ellenőrzés alatt áll, a földön tartózkodása a repülés-állapot (FS) mező figyelésével fedélzetről leadott adattovábbítási DF= 4, 5, 20 vagy 21 formátumokban állapítható meg (3. fejezet, 3.1.2.6.5.1 pont).

4.3.2.1.1.3 **Ajánlás –** *Az ACAS akkor éri el a kívánt követési teljesítményt, amikor az A/C-módú SSR átlagos aszinkron válasz sebesség az ACAS légijármű környezetében lévő válaszjeladóktól, 240 válasz per másodperc, és amikor a csúcs lekérdezési sebesség az egyes válaszjeladóktól ellenőrzések alatt 500 per másodperc.*

Megjegyzés. – A fent említett csúcs lekérdezési sebesség az összes forrásból származó lekérdezést tartalmazza.

4.3.2.1.2 *Téves nyomvonal valószínűsége.* Annak valószínűsége, hogy egy létrehozott A/C-módú nyomvonal távolságban és magasságban nem felel meg, ha jelentették, egy tényleges légijárműnek, kisebb kell legyen mint 10^{-2}. Egy megvalósított S-módú útvonalnál ennek a valószínűségnek kisebbnek kell lenni, mint 10^{-6}. Ezeket a határokat semmilyen forgalmi környezetben sem lehet túllépni.

4.3.2.1.3 *Távolság és irányhelyzet pontosság*

4.3.2.1.3.1 A távolságot 14,5 m (1/128 NM) vagy ennél jobb felbontással kell mérni.

4.3.2.1.3.2 **Ajánlás.** – *A megközelítő légijárművek becsült helyzeteinek viszonylagos hibái nem haladhatják meg a 10 fokos négyzetes középhibát.*

Megjegyzés. – A megközelítő légijárművek viszonyított irányhelyzeteinek ez a pontossága alkalmazható és kielégítő a potenciális veszélyeztetés vizuális észlelésének eszközeként. Ezen felül, az ilyen viszonyított irányhelyzet információt hasznosnak találták a veszélyeztetés észlelésében, ahol ez azt mutatja, hogy egy megközelítő légijármű a veszélyeztetés oka. Azonban ez a pontosság nem kielégítő mint bázis a vízszintes megoldási javaslatokhoz, és nem kielégítő a vízszintes elkerülési távolság megbízható becsléséhez sem.

4.3.2.2 Interferencia szabályozás

4.3.2.2.1 *Maximális sugárzott RF teljesítmény* Egy ACAS átvitel effektív sugárzott teljesítménye a légijármű hossztengelyéhez viszonyított zérus értékű látóhatár fölötti szögmagasságnál (elevációs szögénél) nem haladhatja meg a 27 dBW értéket.

4.3.2.2.1.1 *Nem-kívánt sugárzott teljesítmény.* Amikor az ACAS nem továbbít lekérdezést, az effektív sugárzott teljesítmény semmilyen irányban sem haladhatja meg a -70 dBm értéket.

4.3.2.2.2 *Interferencia lehatárolás.* Mindegyik ACAS lekérdezőnek, amelyik 5490 m (18000 láb) nyomásmagasság alatt repül, ellenőriznie kell a lekérdezési sebességét vagy teljesítményét, vagy mindkettőt, hogy összeegyeztethető legyen specifikus egyenlőtlenségekkel (4.3.2.2.2.2 pont).

4.3.2.2.2.1 *Más ACAS-ok számának meghatározása.* Az ACAS megállapítja a környezetében lévő más ACAS II és III lekérdezők számát, hogy biztosítsa az interferencia korlátozások kielégítését. Ezt a számot az ACAS adások figyelésével nyerik (UF=16), (4.3.7.1.2.4 pont). Mindegyik ACAS-nak figyelnie kell az ilyen rádióadásos lekérdezéseket, hogy meghatározzák az észlelési távolságon belül lévő többi ACAS-ok számát.

4.3.2.2.2.2 *ACAS interferencia határoló egyenlőtlenségek.* Az ACAS-nak úgy kell beállítani a lekérdezési sebességét és lekérdezési teljesítményét, hogy a következő három egyenlőtlenség igaz maradjon, kivéve a 4.3.2.2.2.1 pontbeli előírások szerintieket.

$$\left\{ \sum_{i=1}^{i_1} \left[\frac{p(i)}{250}\right]^{\alpha} \right\} < minimum \left[\frac{280}{1+n_a}, \frac{11}{\alpha^2}\right] \qquad (1)$$

$$\left\{ \sum_{i=1}^{i_1} m(i) \right\} < 0.01 \qquad (2)$$

$$\left\{ \frac{1}{B} \sum_{k=1}^{k_1} \frac{P_a(k)}{250} \right\} < minimum \left[\frac{80}{1+n_a}, 3\right] \qquad (3)$$

Az ezekben az egyenlőtlenségekben szereplő változók meghatározásai a következők:

i_t = az 1 másodperces lekérdezési ciklusban továbbított lekérdezések (A/C-módú és S-módú) száma;

i = A/C-módú és S-módú lekérdezések indexszáma, i=1, 2, ...,i_t;

α = az α_1 minimuma, amelyet $1/4[n_b/n_c]$-ként számítanak, a lentebb megadott különleges körülményeknek van kitéve, és alfa$_2$ $\mathrm{Log}_{10}[n_a/n_b]\mathrm{Log}_{10}25$-ként számított, ahol n_b és n_c úgy van definiálva, mint ACAS II és ACAS III rendszerekkel felszerelt üzemelő légijárművek száma (a levegőben vagy a földön), 11,2 km (6 NM) és 5,6 km (3NM) távolságon belül a saját ACAS-ra számítva (ACAS ellenőrzésre alapozva). A 610 m (2000 láb) föld feletti rádiómagasságon vagy az alatt üzemelő ACAS légijárműveknek mind a földön, mind a levegőben tartalmazni kell ACAS II és ACAS III légijárművet n_b és n_c számban. Egyébként az ACAS-nak csak levegőben lévő ACAS II és ACAS III légijárműveket n_b és n_c értékben. Az α értéke tovább korlátozódik 0,5 minimumra és 1,0 maximumra.

Továbbá:

HA [(n_b≤1) VAGY (n_b>4n_c) VAGY (n_b≤4 ÉS n_c ≤ 2 ÉS n_a>25)] AKKOR α_1=1,0

HA [(n_c>2) ÉS (n_b>2n_c) ÉS (n_a<40)] AKKOR α_1=0,5

p(i) = csúcsteljesítmény, amelyet az antenna sugároz annak az impulzusnak az összes irányában, amely a legnagyobb amplitúdóval rendelkezik abban az impulzus csoportban, amelyben az impulzusok egyetlen lekérdezést tartalmaznak egy 1-másodperces ciklusban az *i*-edik lekérdezés során, W;

m(i) = a kölcsönös elnyomási tartomány a saját válaszjeladónál, amely egy 1-másodperces lekérdezési ciklusban az *i*-edik lekérdezéshez kapcsolódik, s;

B = sugárnyaláb élezési tényező (3dB-es sugárszélesség aránya a lekérdezési mellékirány elnyomásból eredő sugárszélességhez). Olyan lekérdezőknél, amelyek adóberendezés oldalszirom elnyomást (SLS), alkalmaznak az alkalmas sugárszélesség egy válaszjeladóból jövő A/C-módú válaszok azimut szögének kiterjedése lesz, az SLS által limitálva, a válaszjeladó populáció felett átlagolva.

{ } lásd 4.2.3.3.3
$P_a(k)$ "
k "
k_t "
n_a "

Megjegyzés. – Az RA és ACAS adatsugárzások (4.3.6.2.1 és 4.3.7.1.2.4 pontok) lekérdezésekkel azonosak.

4.3.2.2.2.2.1 *Adattovábbítások megoldás javaslatok alatt.*. Az összes levegő-levegő koordinációs lekérdezéseket és megoldási javaslatot és ACAS adásokat teljes teljesítménnyel kell továbbítani és ezeket a lekérdezéseket ki kell hagyni az S-módú lekérdezések összegezéséből az (1) és (2) egyenlőtlenség baloldali tagjaiban a 4.3.2.2.2.2 pontban az RA tartama alatt.

4.3.2.2.2.2.2 *Adattovábbítások ACAS egységektől a földön.* Amikor az ACAS légijármű jelzi, hogy a földön van, az ACAS lekérdezéseket korlátozni kell a többi ACAS II és III légijárművek számának (n_a) beállításával, amelyeket az interferencia határoló egyenlőtlenségbe számítanak be egy olyan értékig, amely háromszorosa annak az értéknek, amelyet egy -74 dBm-es válaszjeladó vevő küszöbbel vett ACAS rádióadás alapján nyertek. Amikor az A/C lekérdezési teljesítményt az interferencia korlátozás miatt lecsökkentik, először az előremenő sugárban kell csökkenteni az A/C-módú lekérdezési teljesítményt, amíg az előreirányuló sorozat nem illeszkedik a jobb és bal sorozatokhoz. Az előreirányuló, jobb és bal lekérdezési teljesítményeket akkor egymásután addig kell csökkenteni, amíg nem illeszkednek a hátsó lekérdezési teljesítményhez. Az A/C-módú teljesítmény további csökkentését az előremenő, az oldal és hátsó lekérdezési teljesítmények egymás utáni csökkentésével kell végrehajtani.

4.3.2.2.2.2.3 *Adatátvitelek 5490 m (18000 láb) tengerszint feletti magasság feletti ACAS egységektől.* Mindegyik ACAS lekérdező, amely 5490 m (18000 láb) nyomásmagasság felett repül, úgy kell szabályoznia a lekérdezési sebességet vagy teljesítményt vagy mindkettőt, hogy a 4.3.2.2.2.2 pont (1) és (3) egyenlőtlensége igaz maradjon, amikor n_a és α egyenlő 1, kivéve a 4.3.2.2.2.2.1 pontban leírtakat.

4.3.3 Forgalmi tanácsadások (TA)

4.3.3.1 *Forgalmi tanácsadás funkció.* Az ACAS forgalmi tanácsadást szolgáltat, hogy figyelmeztesse a repülő személyzetet a potenciális veszélyeztetésre. Az ilyen forgalmi tanácsadásokat a potenciális veszélyeztetés közelítőleg viszonylagos pozíciójának jelzése kell, hogy kísérje.

4.3.3.2 *Közeli forgalom kijelzése*

***Ajánlás. –** Míg bármely megoldási tanácsadás és/vagy forgalmi tanácsadás kijelzésre kerül, a 11 km (6 NM) távolságon belüli közeli forgalmat és, ha magasságot jelentenek, ±370 m (1200 láb) magasságot ki kell jelezni. Ezt a közeli forgalmat meg kell különböztetni (például színnel vagy szimbólum típussal) a veszélyeztetőtől és potenciális veszélyeztetőtől, amelyeket szembetűnő módon kell jelezni.*

4.3.3.3 *Forgalmi tanácsadások, mint megoldási javaslatok előzményei.* A forgalmi tanácsadás kritériumai olyanok, hogy ezek a megoldási tanácsadás kritériumai előtt teljesülnek.

4.3.3.3.1 *Forgalmi tanácsadás figyelmeztetési idő.* A megközelítő légijárművek magasság jelentéseinél, a névleges forgalmi tanácsadás figyelmeztetési idő nem lehet nagyobb, mint (T+20 s), ahol T a névleges figyelmeztetési idő a megoldási tanácsadás generálásához.

Megjegyzés. – Ideálisan a megoldási javaslatot a forgalmi tanácsadás mindig megelőzné, de ez nem mindig lehetséges, pl. a megoldási tanácsadás kritériumok már teljesülhetnek, amikor egy nyomvonal először létrejön, vagy a megközelítő légijármű egy hirtelen és éles manővere előidézheti, hogy a forgalmi tanácsadás vezetési ideje kisebb lesz, mint egy ciklus.

4.3.4 Veszélyeztető légijármű észlelése

4.3.4.1 *Veszélyeztető légijármű deklarálása.* Az ACAS-nak értékelnie kell az egyes megközelítő légijárművek jellemzőit, hogy megállapítsa, hogy az veszélyeztetést jelent-e vagy nem.

4.3.4.1.1 *A megközelítő légijárművek jellemzői.* Minimumként egy megközelítő légijármű jellemzői között, amelyeket a veszélyeztetés azonosításhoz felhasználnak, szerepelnie kell a következőknek:

a) követett magasság;

b) a követett magasság változás sebessége;

c) követett ferde távolság;

d) ferde távolság változásának követési sebessége; és

e) a megközelítő légijármű ACAS-ának érzékenységi szintje, S_i

Egy megközelítő légijárműnél, amely nincs ACAS II-vel vagy ACAS III-mal felszerelve, S_i-t 1-re kell beállítani.

4.3.4.1.2 *Saját légijármű jellemzők.* Minimumként a veszélyeztető légijármű felismeréséhez használt saját légijármű jellemzői között az alábbiaknak kell szerepelni:

a) magasság

b) magasság változtatás sebessége; és

c) saját ACAS érzékenységi szintje (4.3.4.3 pont)

4.3.4.2 *Érzékenységi szintek.* Az ACAS-nak működőképesnek kell lennie bármely érzékenységi szint számnál. Ezeknek tartalmazniuk kell a következőket:

a) S = 1 "tartalék" mód, amelyben a többi légijármű lekérdezése és az összes tanácsadás tiltott;

b) S = 2, "csak TA" mód, amelyben a megoldási javaslatok tiltottak; és

c) S = 3-7, további szintek, amelyek képesek a forgalmi tanácsadások és megoldási javaslatok kiadására, amelyek a 4-2 táblázatban feltüntetett figyelmeztetési időket, valamint a forgalmi tanácsadásokat szolgáltatják.

4-2 táblázat

Érzékenységi szint	*2*	*3*	*4*	*5*	*6*	*7*
Névleges figyelmeztetési idő	nincs RA	15s	20s	25s	30s	35s

4.3.4.3 *Saját érzékenységi szint (S_o) megválaszolása.* A saját ACAS érzékenységi szint megválasztását az érzékenységi szint szabályozó (SLC) utasítások határozzák meg, amelyeket egy sor, az alábbiakban felsorolt forrásból kapnak:

a) SLC utasítás, amelyet az ACAS automatikusan generál a magasság sávra vagy más külső tényezőkre alapozva;

b) SLC utasítás repülőgépvezető inputból; és

c) SLC utasítás S-módú földi állomásoktól.

4.3.4.3.1 *Engedélyezett SLC utasítás kódok.* Minimumként az elfogadható SLC utasítás kódoknak tartalmazniuk kell a következőket:

	Kódolás
Magasság sávon alapuló SLC-re	2-7
Repülőgépvezetőtől	0, 1, 2
S-módú földi állomásoktól	0, 2 - 6

4.3.4.3.2 *Magasság-sáv SLC utasítás.* Ahol az ACAS magasságon alapuló SLC utasítást választ, a névleges magasság küszöbhöz olyan hiszterézist kell alkalmazni, amelynél a következők szerinti SLC utasítás értékváltozást követelnek meg: emelkedő ACAS légijárműnél az SLC utasításnak növekedni kell a megfelelő magasság küszöb plusz a hiszterézis értéknél; süllyedő ACAS légijárműnél az SLC utasításnak csökkenni kell a megfelelő magasság küszöb mínusz hiszterézis értéknél.

4.3.4.3.3 *Repülőgépvezető SLC utasítás.* Az SLC utasítás repülőgépvezető általi 0 értékre állítása az "automatikus" mód választását jelöli, amelynél az érzékenységi szint kiválasztás a többi utasításon alapszik.

4.3.4.3.4 *S-módú földi állomás SLC utasítás.* S-módú földi állomásokon keresztül továbbított SLC utasításoknál (4.3.8.4.2.2.1 pont) a 0 érték azt jelzi, hogy a szóban forgó állomás nem ad ki SLC utasítást és hogy az érzékenységi szint kiválasztása a többi utasításon alapszik, köztük más S-módú földi állomásoktól jövő nem 0 utasításokon. Az ACAS nem dolgoz fel 1-értékű fedélzetre irányuló adattovábbítási SLC utasítást.

4.3.4.3.4.1 *SLC utasítás kód ATS kiválasztása.* ATS hatóságoknak biztosítaniuk kell, hogy eljárások legyenek a repülőgépvezető informálására bármely, a 0-tól eltérő ATS kiválasztású SLC utasításról (4.3.4.3.1 pont).

4.3.4.3.5 *Kiválasztási szabály.* A saját ACAS érzékenységi szintet a legkisebb, nem-0 SLC utasításra kell beállítani, amely utasítás a 4.3.4.3 pontban felsorolt bármely forrástól jöhetett.

4.3.4.4 *Paraméter értékek kiválasztása RA generálásához.* Ha a saját ACAS érzékenységi szintje 3 vagy ennél nagyobb, az RA generálására használt paraméter értékeknek, amelyek érzékenységi szinttől függnek, az S_0 saját ACAS érzékenységi szint és a megközelítő ACAS S_i érzékenységi szintje közül a nagyobbikon kell alapulniuk.

4.3.4.5 *Paraméter értékek kiválasztása TA generálásához.* A forgalmi tanácsadás generálásához használt paraméter értékeket, amelyek az érzékenységi szinttől függnek, ugyanazon az alapon kell kiválasztani, mint a megoldási javaslatnál (4.3.4.4 pont), kivéve, amikor egy 2 értékű ("csak TA" mód) SLC utasítás érkezett vagy a légijárművezetőtől vagy egy S-módú földi állomástól. Ebben az esetben a paraméter értékek a forgalmi tanácsadás generálásához azok az értékek maradnak, amelyeket azok a légijárművezetőtől vagy az S-módú földi állomástól felvettek volna érkező SLC utasítás hiányában.

4.3.5 Megoldási tanácsadás (RA)

4.3.5.1 *RA generálás*. Minden veszélyeztetésre az ACAS egy megoldási javaslatot generál, kivéve, ahol nem lehetséges kiválasztani egy olyan megoldást, amelytől adekvát elkülönítés várható vagy a megközelítő légijármű repülési pályájának diagnózisában lévő bizonytalanság miatt, vagy mert nagy a kockázata annak, hogy veszélyeztető légijármű által végrehajtott manőver érvényteleníteni fogja a megoldási javaslatot, amely esetben tanácsadást nem továbbítanak.

4.3.5.1.1 *RA törlés.* Ha egy vagy több veszélyeztető légijármű ellen egy megoldási javaslatot egyszer már generáltak, azt fenn kell tartani, vagy módosítani kell, amíg a vizsgálatok, amelyek kevésbé szigorúak, mint a veszélyeztető légijármű észlelésére vonatkozó vizsgálatok, két egymás utáni cikluson keresztül nem jelzik, hogy a megoldási tanácsadás törölhető, amikor is azt törölni kell.

4.3.5.2 *Az RA kiválasztása.* Az ACAS-nak azt a megoldási javaslatot kell generálnia, amely várhatóan adekvát elkülönítést szolgáltat az összes veszélyeztetéstől, és amelynek a legkisebb hatása van az ACAS légijármű repülési útvonalára, megfelelve az ebben a fejezetben leírt többi rendelkezésnek.

4.3.5.3 *RA hatékonyság.* Az ACAS nem generál vagy nem folytatja a kijelzését olyan megoldási javaslatnak, amely megfontolva a veszélyeztető légijármű valószínű pályáit, valószínűbb, hogy csökkenti az elkülönítést, mint hogy növelje azt a legszorosabb megközelítés előre jelzett időpontjában, a 4.3.5.5.1.1 és 4.3.5.6 pontokban leírt rendelkezésnek megfelelően.

Megjegyzés. – Lásd a 4.3.5.8 pontot is.

4.3.5.4 *Légijármű képesség.* Az ACAS által generált megoldási javaslatnak összhangban kell lenni a légijármű teljesítőképességével.

4.3.5.4.1 *Földközelség.* Süllyedési megoldási javaslatokat nem generálnak vagy tartanak fenn, amikor a saját légijármű 300 m (1000 láb) föld feletti magasság alatt van.

4.3.5.4.2 ACAS nem működhet 3-7 érzékenységi szinteken, amikor a saját légijármű 300 m (1000 láb) földfeletti magasság alatt van.

4.3.5.5. *Az értelem megfordítása.* Az ACAS nem fordíthatja meg egy megoldási tanácsadás értelmét egyik ciklustól a következőig, kivéve a 4.3.5.5.1 pontban engedélyezettet koordináció biztosításához, vagy amikor az előrejelzett elkülönítés a legszorosabb megközelítésnél a meglévő értelemnél nem adekvát.

4.3.5.5.1 *Értelem megfordítások felszerelt veszélyeztető légijárművekkel szemben.* Ha egy felszerelt veszélyeztető légijárműtől kapott megoldási tanácsadás kiegészítés nem összeegyeztethető a meglévő megoldási tanácsadás értelmével, az ACAS-nak módosítania kell a megoldási tanácsadás értelmét, hogy összhangban legyen a vett megoldási tanácsadás kiegészítéssel, ha a saját légijármű S-módú címzése értékben magasabb, mint a veszélyeztetőé.

Megjegyzés. – A 4.3.6.1.3 pont megkívánja, hogy a saját megoldási tanácsadás kiegészítés a veszélyeztető részére szintén megfordításra kerüljön.

4.3.5.5.1.1 Az ACAS nem módosíthatja a megoldási tanácsadás értelmét olyan módon, amely azt összeférhetetlenné teszi egy felszerelt veszélyeztető légijárműtől kapott megoldási tanácsadás kiegészítéssel, ha a saját légijármű S-módú címzése értékben nagyobb, mint a veszélyeztetőé.

4.3.5.6 *RA erősség fenntartás.* Annak a követelménynek alávetve, hogy egy süllyedési megoldási tanácsadás ne kerüljön generálásra kis magasságon (4.3.5.4.1 pont), megoldási javaslatot nem szabad módosítani, ha a legszorosabb megközelítésig az idő túl rövid ahhoz, hogy szignifikáns reagálást lehessen elérni, vagy ha a veszélyeztető távolságban irányát megváltoztatja.

4.3.5.7 *RA gyengítés.* Megoldási tanácsadás nem gyengíthető, ha valószínű, hogy a későbbiekben erősíteni kell.

4.3.5.8 *ACAS-al felszerelt veszélyeztetők.* A megoldási javaslatnak összeegyeztethetőnek kell lennie a veszélyeztető légijárműveknek közvetített összes megoldási tanácsadás kiegészítéssel (4.3.6.1.3). Ha egy veszélyeztető légijárműtől egy megoldási tanácsadás kiegészítés előbb érkezik, mint hogy a saját ACAS a veszélyeztető számára megoldási tanácsadás kiegészítést generál, a generált megoldási javaslatnak összeegyeztethetőnek kell lenni a vett megoldási tanácsadás kiegészítéssel, hacsak egy ilyen megoldás nem nagyobb valószínűséggel csökkenti az elkülönítést, mint növeli azt, és a saját S-módú címzés értékben alacsonyabb, mint a veszélyeztetésé.

Megjegyzés. – Egynél több veszélyeztető légijárművel való találkozásnál, amikor néhány veszélyeztető felett és más veszélyeztetők alatt kell elhaladni, ezt az előírást úgy lehet értelmezni, mint a megoldási tanácsadás teljes időtartamára vonatkozót. Speciálisan, megengedhető egy megoldási javaslatot egy veszélyeztető fölé emelkedést (süllyedést) tartalmazó megoldási tanácsadás megtartása, amely veszélyeztető légijármű a saját légijármű felett (alatt) van, feltéve, hogy van egy számított törekvés megfelelő elkülönítésre az összes veszélyeztető légijárműtől a rákövetkező vízszintes kirepülés által.

4.3.5.9 *ARA almező kódolás.* Mindegyik ciklust, a megoldási tanácsadás értelmet, erősséget és jellegzetességeket kódolni kell az aktív megoldás tanácsadás (ARA) almezőben (4.3.8.4.2.2.1.1 pont). Ha az ARA almezőt nem frissítették fel egy 6 másodperces időtartam alatt, azt 0-ra kell állítani az MTE almezővel együtt ugyanabban a közleményben (4.3.8.4.2.2.1.3 pont).

4.3.5.10 *Rendszer válaszidő.* A rendszer késés a releváns SSR válasz vételétől egy megoldási tanácsadás értelem és erősség szolgáltatásig a repülőgépvezető számára a lehető legrövidebb legyen és nem haladhatja meg az 1,5 másodpercet.

4.3.6 Koordináció és kommunikáció

4.3.6.1 Az ACAS-al felszerelt veszélyeztető légijárművekkel való koordinációra vonatkozó előírások

4.3.6.1.1 *Több légijárművel való koordináció.* Több-légijárműves szituációban az ACAS-nak minden felszerelt veszélyeztető légijárművel egyedenként kell együttműködnie.

4.3.6.1.2 *Adatvédelem a koordináció során.* Az ACAS-nak meg kell akadályoznia párhuzamos folyamatoknál a tárolt adatokhoz való egyidejű hozzáférést az ACAS-on belül, különösen megoldás közlemény feldolgozás alatt.

4.3.6.1.3 *Koordináció lekérdezés.* Az ACAS-nak minden ciklusban koordináció lekérdezést kell továbbítani minden egyes felszerelt veszélyeztető légijárműnek, hacsak a megoldási tanácsadás generálásnak nincs késleltetése amiatt, hogy nincs lehetőség olyan megoldási tanácsadás kiválasztására, amelyről előre látható, hogy adekvát elkülönítést tud biztosítani (4.3.5.1 pont). A veszélyeztető légijárműnek továbbított közlemény egy, a veszélyeztető számára kiválasztott megoldási tanácsadás kiegészítést tartalmaz. Ha a veszélyeztető légijárműtől a megoldási tanácsadás kiegészítés előbb érkezne, mint ahogy az ACAS a veszélyeztető légijármű részére egy megoldási tanácsadás kiegészítést kiválasztana, a kiválasztott megoldási tanácsadás kiegészítőnek összeegyeztethetőnek kell lennie a vett megoldási tanácsadás kiegészítővel, hacsak háromnál nem több ciklus múlt el azóta, amióta a megoldási tanácsadás kiegészítést vették, a megoldási tanácsadás kiegészítés magasságkeresztező, és a saját légijármű címzés értékben kisebb, mint a veszélyeztető légijárműé, amely esetben az ACAS a megoldási javaslatot függetlenül választja ki. Ha egy felszerelt veszélyeztető légijárműtől kapott megoldási tanácsadás kiegészítés összeegyeztethetetlen a megoldási tanácsadás kiegészítéssel, amelyet a saját ACAS választott ki ennek a veszélyeztető légijárműnek, az ACAS-nak módosítania kell a kiválasztott megoldási tanácsadás kiegészítést, ha a saját légijármű címzése értékben nagyobb, mint a veszélyeztetés.

Megjegyzés. – A megoldási közlemény által tartalmazott megoldási tanácsadás kiegészítés függőleges tanácsadás kiegészítés (VRC) formában van az ACAS II esetében (4.3.8.4.2.3.2.2 pont) és/vagy vízszintes megoldási tanácsadás kiegészítés (HRC) formában ACAS III. esetén.

4.3.6.1.3.1 *Koordináció befejezés.* Egy olyan cikluson belül, amikor egy megközelítő légijármű megszűnik megoldási tanácsadás fenntartás okának lenni, az ACAS megoldási közleményt küld ennek a megközelítő légijárműnek egy koordinációs lekérdezés segítségével. A megoldási közleménynek tartalmaznia kell a törlési kódját az utolsó megoldási tanácsadás kiegészítésnek, amelyet ennek a megközelítő légijárműnek küldtek, amíg oka volt a megoldási tanácsadás fenntartásának.

Megjegyzés. Egy egyedülálló veszélyeztető légijárművel való találkozás során a veszélyeztető légijármű megszűnik megoldási tanácsadás okának lenni, ha a megoldási tanácsadás törlésének feltételei teljesülnek. Több veszélyeztető légijárművel való találkozás során a veszélyeztető légijármű megszűnik megoldási tanácsadás okának lenni, ha a megoldási tanácsadás törlésének feltételei erre a veszélyeztető légijárműre vonatkozóan fennállnak, még akkor is, ha a megoldási javaslatot esetleg a többi veszélyeztető légijármű miatt fenn kell tartani.

4.3.6.1.3.2 Az ACAS-nak koordináció lekérdezéseket kell továbbítania, amíg nem kap koordinációs választ a veszélyeztető légijárműtől egy nem kevesebb, mint hat, és nem több, mint tizenkét maximális számú kísérletezésig. Az egymást követő lekérdezéseknek névlegesen egyenlő időközökkel kell követniük egymást egy 100 ± 5 ms-os periódus alatt. Ha a maximális számú kísérletezést elvégezték, és válasz nem érkezett, az ACAS-nak szabályos feldolgozási sorrendjét kell folytatnia.

4.3.6.1.3.3 Az ACAS-nak paritásos védelmet kell nyújtani (4.3.8.4.2.3.2.6 és 4.3.8.4.2.3.2.7 pontok) mindegyik mező számára a koordináció lekérdezésében, amely megoldási tanácsadás kiegészítési információt szolgáltat.

Megjegyzés. – Ez tartalmazza a függőleges megoldási tanácsadás kiegészítést (VRC), a függőleges megoldási tanácsadás kiegészítés törlését (CVC), a vízszintes megoldási tanácsadás kiegészítést (HRC), és a vízszintes megoldási tanácsadás kiegészítés törlését (CHC).

4.3.6.1.3.4 Valahányszor a saját ACAS megfordítja az értelmét egy felszerelt veszélyeztető légijárművel szemben, a megoldás közlésnek, amelyet az éppen folyó és a rákövetkező ciklusban küldenek ennek a veszélyeztető légijárműnek, mind az újonnan kiválasztott megoldási tanácsadás kiegészítést, mind a megfordítás előtt küldött megoldási tanácsadás kiegészítés törlési kódját tartalmaznia kell.

4.3.6.1.3.5 Amikor egy függőleges megoldási tanácsadást kiválasztanak, a függőleges megoldási tanácsadás kiegészítés VRC) (4.3.8.4.2.3.2.2 pont), amelyet saját ACAS egy, a veszélyeztető légijárműnek szóló tanácsadás közlésben tartalmaz, a következő lesz:

a) “ne haladj el felül”, amikor a megoldási tanácsadás a veszélyeztető légijármű feletti elkülönítést szándékozik biztosítani;

b) “ne haladj el alul”, amikor a megoldási tanácsadás a veszélyeztető légijármű alatti elkülönítést szándékozik biztosítani.

4.3.6.1.4 *Megoldási közlemény feldolgozás.* Megoldási közleményeket a vétel sorrendjében dolgozzák fel, és olyan késleltetéssel, amelyet a tárolt adatokhoz való párhuzamos hozzáférés lehetőségének megakadályozása és az előzőleg vett megoldási közlemények feldolgozása miatti késések limitálnak. A késleltetés alatt álló közlemények átmenetileg sorban állnak a közlemények esetleges elvesztésének megelőzése céljából. A megoldási közlemény feldolgozásnak magában kell foglalnia a közlemény dekódolását és a megfelelő adatszerkezetek felfrissítését a közleményből kivonatolt információkkal.

Megjegyzés. – A 4.3.6.1.2 pontnak megfelelően a megoldási közlemény feldolgozásnak nem szabad olyan adathoz jutnia, amelynek felhasználása nincs védve a koordináció zárlat állapot által.

4.3.6.1.4.1 Egy másik ACAS-tól kapott megoldási tanácsadás törlést el kell utasítani, ha a kódolt értelem bitek paritás hiba fennállását mutatják, vagy ha megfogalmazatlan értékeket észleltek a megoldási közleményben. Egy megoldási tanácsadás kiegészítést, vagy megoldási tanácsadás kiegészítés törlést, amelyet paritás hibáktól és megfogalmazatlan megoldási közlemény értékektől mentesen vesznek, érvényesnek kell tekinteni.

4.3.6.1.4.2 *RAC tárolás.* Egy másik ACAS-tól érkező érvényes megoldási javaslatot el kell tárolni vagy ahhoz az ACAS-hoz tartozó előzőleg eltárolt RAC felfrissítésére kell használni. Egy érvényes megoldási tanácsadás kiegészítés törlés előidézi az előzőleg eltárolt RAC törlését. Ha az eltárolt RAC 6 mp időtartam alatt sem került frissítésre, akkor azt ki kell törölni.

4.3.6.1.4.3 *Rögzített RAC-ok frissítése.* Ha egy másik ACAS-ról kapott RAC törlés, vagy érvényes RAC a RAC rögzítések frissítését kell, hogy szolgálják. Ha bármely veszélyeztető légijármű által a rögzített megoldási tanácsadás kiegészítésében (RAC) egy bit nem kerül frissítésre 6 mp időtartamon belül, akkor ezt a bitet 0-ra kell beállítani.

4.3.6.2 Az ACAS földi állomásokkal való kommunikációjára vonatkozó előírások

4.3.6.2.1 *ACAS megoldási javaslatok légi kezdeményezésű fedélzetről leadott kapcsolata.* Ha egy ACAS megoldási tanácsadás létezik, akkor az ACAS:

a) adjon át S-módú válaszjeladójának egy megoldási tanácsadás jelentést a földre történő továbbításra egy Comm-B válaszban (4.3.11.4.1 pont) és

b) továbbítson periodikus megoldási tanácsadás közvetítéseket (4.3.7.3.2 pont).

4.3.6.2.2 *Érzékenységi szint szabályozás (SLC) utasítás.* Az ACAS-nak tárolni kell az S-módú földi állomásoktól jövő szintszabályozás utasításokat. Az S-módú földi állomástól kapott érzékenységi szint-szabályozás utasítás érvényben marad, amíg nem lép helyébe ugyanazon állomástól jövő érzékenységi szint-szabályozás utasítás, ahogyan azt a lekérdezési IIS almezőben lévő helyszín szám jelzi. Ha egy S-módú földi állomástól származó tárolt utasítást 4 percen belül nem frissítenek fel, vagy ha a kapott érzékenységi szint szabályozási utasítás 15-ös értékű (4.3.8.4.2.1.1 pont), a tárolt érzékenységi szint szabályozási utasítást ezen S-módú földi állomás részére 0-ra kell beállítani.

4.3.6.3 Az ACAS és S-módú válaszjeladója közötti adatátvitelre vonatkozó előírások

4.3.6.3.1 *Adatátvitel az ACAS-tól az S-módú válaszjeladóhoz:*

a) az ACAS-nak megoldási tanácsadás információt kell átadni az S-módú válaszjeladójának egy megoldási tanácsadás jelentésben (4.3.8.4.2.2.1 pont) és a koordinációs válaszban (4.3.8.4.2.4.2 pont) való továbbítására;

b) az ACAS-nak az aktuális érzékenységi szintet továbbítania kell az S-módú válaszjeladójának egy érzékenységi szint jelentésben (4.3.8.4.2.5) való továbbítás céljából; és

c) az ACAS-nak képességi információt kell átadni az S-módú válaszjeladójának egy adat kapcsolati képesség jelentésben (4.3.8.4.2.2.2 pont) való továbbítás céljából.

4.3.6.3.2 *Adatátvitel az S-módú válaszjeladótól a hozzátartozó ACAS-hoz:*

a) az ACAS-nak az S-módú válaszjeladójától kapnia kell az S-módú földi állomások által továbbított érzékenységi szint szabályozási utasításokat (4.3.8.4.2.1.1 pont);

b) az ACAS-nak az S-módú válaszjeladójától kapnia kell más ACAS által továbbított ACAS közléseket (4.3.8.4.2.3.3 pont); és

c) az ACAS-nak az S-módú válaszjeladójától kapnia kell más ACAS által továbbított megoldási közleményeket (4.3.8.4.2.3.2 pont) levegő-levegő koordinációs célokra.

4.3.7 ACAS protokollok

4.3.7.1 Felderítési protokollok

4.3.7.1.1 *A/C-módú válaszjeladók felderítése.* Az ACAS a C-módot csak körhívás lekérdezés (3. Fejezet 3.1.2.1.5.1.2 pont) A/C-módú válaszjeladókkal felszerelt légijárművek felderítésére használják.

4.3.7.1.2 *S-módú* válaszjeladók *felderítése*

4.3.7.1.2.1 *Detektálás.* Az ACAS-nak figyelnie kell az 1090 MHz-et az S-módú befogó squitterek céljából (DF = 11). Az ACAS-nak észlelnie kell az S-móddal felszerelt légijárműveket, és meg kell határoznia a címzésüket S-módú befogó squitterek (DF = 11) vagy kiterjesztett squitterek (DF = 17) használatával.

1. Megjegyzés. – Elfogadható egyedi légijármű befogása vagy adatgyűjtő vagy kiterjesztett squitterek (DF = 11 vagy DF = 17) felhasználásával. Azonban az ACAS-nak figyelnie kell a beszerző squittert, mivel nem fogja bármely időben az összes légijármű a kiterjesztett squittert továbbítani.

2. Megjegyzés. – Ha a jövőben a légijárművek számára megengedetté válik, hogy ne továbbítsák az adatbegyűjtő squittert, hanem, helyette a kiterjesztett squitter folyamatos továbbítására támaszkodjanak, az összes ACAS egység számára lényegessé válik mind az adatgyűjtési, mind a kiterjesztett squitter figyelése.

4.3.7.1.2.2 *Felderítési lekérdezések.* Miután először vettek egy 24-bites légijármű címzést egy légijárműtől, amelyről megállapították, hogy a vétel megbízhatóságon alapuló, az ACAS megbízható felderítési távolságon belül van és a saját légijármű felett és alatt elhelyezkedő 3050 m (10000 láb) sávon belül tartózkodik, az ACAS egy rövid levegő-levegő lekérdezést továbbít (UF=0) a távolsági adat beszerzéséhez. A felderítési lekérdezéseket minden öt ciklusban legalább egyszer továbbítani kell, amikor ez a magasság feltétel ki van elégítve. Felderítési lekérdezéseket minden ciklusban továbbítani kell, ha az észlelt légijármű távolsága kisebb, mint 5,6 km (3 NM), vagy a számított idő a legszorosabb megközelítésig kevesebb, mint 60 másodperc, feltéve, hogy mind az észlelt, mind a saját légijármű a meglévő pozíciójából gyorsulás nélküli mozgással halad, és hogy a távolság a legszorosabb megközelítésnél egyenlő 5,6 km (3 NM). A felderítési lekérdezést 5 ciklusos perióduson át fel kell függeszteni, ha:

a) egy választ sikeresen vettek; és

b) a saját légijármű a megközelítő légijármű 5490 m (18000 láb) nyomásmagasság alatt repül; és

c) az észlelt légijármű távolsága nagyobb, mint 5,6 km (3 NM) és a számított idő a legszorosabb megközelítésig meghaladja a 60 másodpercet, feltéve, hogy mind az észlelt, mind a saját légijármű a meglévő pozíciójából gyorsulás nélküli mozgással halad, és hogy a távolság a legszorosabb megközelítésnél 5,6 km-el (3 NM) egyenlő.

4.3.7.1.2.2.1 *Távolság beszerzési lekérdezések.* Az ACAS-nak rövid levegő-levegő felderítési formátumot (UF = 0) kell használni a távolság beszerzéséhez. Az ACAS-t AQ = 1 (3. fejezet, 3.1.2.8.1.1 pont) és RL = 0 (3. fejezet, 3.1.2.8.1.2 pont) értékekre kell beállítani a beszerzési lekérdezéshez.

1. Megjegyzés. – AQ = 1 beállítás az RL mező 14-es bitje egyenlő 1 válaszát eredményezi és segédeszközként szolgál a saját lekérdezésre érkezett válasznak más ACAS egységektől kapott válaszoktól való megkülönböztetésére (4.3.7.1.2.2.2 pont).

2. Megjegyzés. – Az adatgyűjtési lekérdezésben RL 0-ra van beállítva rövid beszerzési válasz utasításhoz (DF = 0).

4.3.7.1.2.2.2 *Követési lekérdezés.* ACAS-nak követési lekérdezésekhez rövid levegő-levegő ellenőrzési formátumot (UF = 0) RL = 0 és AQ = 0 beállításokkal kell alkalmaznia.

4.3.7.1.2.3 *Felderítési válaszok.* Ezeket a protokollokat a 4.3.11.3.1 pont írja le.

4.3.7.1.2.4 *ACAS adás.* Névlegesen minden 8-10 másodpercben sugározni kell egy ACAS adást a tetőantennából. Az irányantennát használó berendezéseknek úgy kell működniük, hogy névlegesen minden 8-10 másodpercben egy teljes kör lefedést szolgáltassanak.

Megjegyzés. – Egy adás más S-módú válaszjeladónál a lekérdezés vételét idézi elő és azt, hogy az MU mező által tartalmazott lekérdezés tartalmát szolgáltatja a válaszjeladó kimenő adat csatolóegységnél. Az UDS1 = 3, UDS2 = 2 kombináció az adatokat ACAS adásként azonosítja, amely a lekérdező ACAS légijármű diszkrét címzését tartalmazza. Ez mindegyik ACAS-nak eszközt szolgáltat az észlelési távolságon belül lévő többi ACAS számának megállapítására az interferencia korlátozásához. Az MU mező formátuma a 4.3.8.4.2.3 pontban kerül leírásra.

4.3.7.2 Levegő-levegő koordinációs protokollok

4.3.7.2.1 *Koordinációs lekérdezések.* Az ACAS UF=16 lekérdezéseket továbbít (3. Fejezet 3.1.2.3.2 pont, 3,7 ábra) AQ = 0 és RL = 1 beállításokkal, amikor RI = 3 vagy 4-et jelentő másik légijárművet veszélyeztető légijárműnek nyilvánítanak (4.3.4 alpont). Az MU mező tartalmazza a megoldási közleményt a 4.3.8.4.2.3.2 pontban ismertetett almezőkben.

1. Megjegyzés. – Az UF 16 lekérdezést AQ = 0 és RL = 1-el arra szánták, hogy egy DF=16 választ váltson ki a másik légijárműtől.

2. Megjegyzés. – Egy RI = 3 illetve RI = 4-et jelentő légijármű egy működő ACAS-al felszerelt légijármű, amelynek csak függőleges, illetve függőleges és vízszintes megoldási képessége van.

4.3.7.2.2 *Koordinációs válasz.* Ezek a protokollok a 4.3.11.3.2 pontban kerülnek ismertetésre.

4.3.7.3 Protokollok ACAS földi állomásokkal folytatott kommunikációhoz

4.3.7.3.1 *RA jelentések S-módú földi állomásoknak.* Ezeket a protokollokat a 4.3.11.4.1 pont tartalmazza.

4.3.7.3.2 *RA adások.* Megoldási javaslatokat teljes teljesítménnyel a törzs alján elhelyezett antennától kell továbbítani vibráló, névlegesen 8 másodperces időközöknél azokban az időszakokban, amikor a megoldási javaslatot jelzik. A megoldási tanácsadás közvetítésének tartalmaznia kell az MU-mezőt, ahogyan azt a 4.3.8.4.2.3.4 pont ismerteti. A megoldási javaslatnak ismertetnie kell a legutóbbi megoldási javaslatot, amely a megelőző 8 másodperces időszakban állt fenn. Irány antennát használó berendezéseknek úgy kell működniük, hogy névlegesen minden 8 másodpercben teljes körkörös lefedést biztosító tanácsadási értelmet és erősséget közvetítsenek.

4.3.7.3.3 *Adat kapcsolat képesség jelentés.* Ezeket a protokollokat a 4.3.11.4.2 pont tartalmazza.

4.3.7.3.4 *ACAS érzékenységi szint szabályozás.* Az ACAS akkor és csak akkor hajt végre érzékenységi szint utasítást, ha a TMS (3. fejezet, 3.1.2.6.1.4.1 pont) 0 értékű és DI vagy 1 vagy 7 ugyanabban a lekérdezésben.

4.3.8 Jel formátumok

4.3.8.1 Az összes ACAS jel RF jellemzői feleljenek meg a 3. fejezet 3.1.1.1 – 3.1.1.6, 3.1.2.1 – 3.1.2.3, 3.1.2.5 és 3.1.2.8 pontok előírásainak.

4.3.8.2 Kapcsolat az ACAS és S-módú jelformátumok között

Megjegyzés. – Az ACAS S-módú továbbításokat használ ellenőrzésre és kommunikációhoz. Az ACAS levegő-levegő kommunikációk lehetővé teszik a megoldási tanácsadás döntések koordinációját az ACAS-al felszerelt veszélyeztető légijárművekkel. Az ACAS föld-levegő kommunikációs tevékenységek lehetővé teszik a megoldási javaslatok jelentését a földi állomásoknak, és az utasítások továbbítását az ACAS-al felszerelt légijárművekhez az összeütközés elhárító algoritmusok paramétereinek szabályozására.

4.3.8.3 *Jel formátum szabályok.* Valamennyi ACAS jel adat kódolása egyezzen meg a 3. fejezet 3.1.2.3 pontjának előírásaival.

Megjegyzés. – Az ACAS által használt levegő-levegő adatsugárzásokban az 1030 MHz-en továbbított lekérdezéseket "fedélzetre irányuló kapcsolási" (uplink) továbbításnak nevezik és fedélzetre irányuló kapcsolási formátum (UF) kódokat tartalmaznak. Az 1090 MHz-en vett válaszokat "fedélzetről leadott kapcsolási" (downlink) továbbításnak nevezik és fedélzetről leadott kapcsolási formátum(DF) kódokat tartalmaznak.

4.3.8.4 Mező leírás

1. Megjegyzés. – A levegő-levegő ellenőrzési és kommunikációs formátumok, amelyeket az ACAS használ, de a 3. Fejezet, 3.1.2 pontjában nincsenek teljes mértékben ismertetve, a 4-1 ábrán vannak megadva.

Uplink: fedélzetre irányuló adattovábbítás

UF=0	0000	3	RL:1	4	AQ:1	18	AP:24	
UF=16	10000	3	RL:1	4	AQ:1	18	MU:56	AP:24

Downlink: fedélzetről leadott adattovábbítás

DF=0	00000	VS:1	2	SL:3	2	RI:4	2	AC:13	AP:24	
DF=16	10000	VS:1	2	SL:3	2	RI:4	2	AC:13	MV:56	AP:24

4-1 ábra. Az ACAS által használt felderítési és kommunikációs formátumok

2. Megjegyzés. – Ez a szakasz azokat az S-módú mezőket (és azok almezőit) definiálja, amelyeket az ACAS feldolgoz, hogy az ACAS feladatokat teljesítse. Az ACAS mezők közül néhány (azok is, amelyet más SSR S-módú tevékenységhez használnak) kijelöletlen ACAS kódokkal vannak leírva a 3. fejezet, 3.1.2.6 pontjában. Ilyen kódok a 4.3.8.4.1 pontban vannak kijelölve. A csak ACAS berendezések által használt mezők és almezők a 4.3.8.4.2 pontban kerülnek kijelölésre.

3. Megjegyzés. – A 4.3.8.4 pontban használt bit számozási szokás inkább a teljes fedélzetre irányuló vagy fedélzetről leadott kapcsolati formátumon belüli bit számozást tükrözi, semmint az egyedi mezőkön, illetve almezőkön belüli biteket.

4.3.8.4.1 *A 3. fejezet, 3.1.2 pontban bevezetett mezők és almezők*

Megjegyzés. – A 3. fejezet, 3.1.2 pontjában "ACAS részére fenntartott" jelölésű missziós mezők és almezők kódjai kerülnek leírásra.

4.3.8.4.1.1 *DR (fedélzetről leadott adattovábbítási igény).* A fedélzetről leadott adattovábbítási igény mező kódolásának jelentése a következő:

Kódolás

0 - 1	Lásd 3. fejezet 3.1.2.6.5.2 pont
2	ACAS üzenet rendelkezésre áll
3	Comm-B közlés rendelkezésre áll és ACAS közlés rendelkezésre áll
4-5	Lásd 3. fejezet 3.1.2.6.5.2 pont
6	Comm-B adás közlemény 1 rendelkezésre áll és ACAS közlés rendelkezésre áll
7	Comm-B adás közlemény 2 rendelkezésre áll és ACAS közlés rendelkezésre áll
8-31	Lásd 3. fejezet, 3.1.2.6.5.2 pont

4.3.8.4.1.2 *RI (levegő-levegő válaszinformáció).* A kódolás jelentése az RI mezőben a következő:

Kódolás

0	Nem működő ACAS
1	Nem kijelölt
2	ACAS gátolt megoldás képessége
3	ACAS csak függőleges megoldás képességgel
4	ACAS függőleges és vízszintes megoldás képességgel
5-7	Nem kijelölt
8-15	Lásd 3. fejezet, 3.1.2.8.2.2 pont

A válasz formátum 14 bitje, amely ezt a mezőt tartalmazza, válaszol a lekérdezés AQ bitjére. Az RI mező "nem működő ACAS" szöveget jelent (RI=0), ha az ACAS egység meghibásodott, vagy tartalékban van. Az RI mező ACAS gátolt megoldás képességgel (RI = 2) szöveget jelent, ha az érzékenységi mező 2 vagy TA az egyetlen kiválasztott üzemmód.

Megjegyzés. – A 0-7 kód az RI mezőn azt jelzi, hogy a válasz egy követési válasz, és a lekérdezett légijármű ACAS képességét is adja. A 8-15 kódok azt jelzik, hogy a válasz egy befogási válasz, és a lekérdezett légijármű maximális tényleges önsebesség képességét jelenti.

4.3.8.4.1.3 *RR (válasz kérés).* A kódolás jelentése a válasz igény mezőben a következő:

Kódolás:

0-18	Lásd 3. fejezet, 3.1.2.6.1.2 pont
19	Megoldási tanácsadás jelentést továbbítani
20-31	Lásd 3. fejezet, 3.1.2.6.1.2 pont

4.3.8.4.2 *ACAS mezők és almezők*

Megjegyzés. – A következő pontok azoknak a mezőknek és almezőknek az elhelyezkedését és kódolását írják le, amelyeket a 3. fejezet, 3.1.2 pontjában nem határoztak meg, de az ACAS-al felszerelt légijárművek használnak.

4.3.8.4.2.1 *Almező MA-ban*

4.3.8.4.2.1.1 *ADS (A-definíciós almező)* Ez a 8-mezős (33-40) almező az MA megmaradó részét írja le.

Megjegyzés. – A kényelmes kódolás kedvéért két, egyenként négy bitből álló csoportban van kifejezve: ADS1 és ADS2.

4.3.8.4.2.1.2 Amikor ADS1 = 0 és ADS2 = 5, MA a következő almezőt tartalmazza:

4.3.8.4.2.1.3 *SLC (ACAS érzékenységi szint szabályozás (SLC) utasítás).* Ez a bit 4-es (41-44) almező egy érzékenységi szint utasítást jelöl a saját ACAS részére.

Kódolás

0	Nincs utasítás kiadva
1	Nincs kijelölve
2	ACAS érzékenységi szintet 2-re állítani
3	ACAS érzékenységi szintet 3-ra állítani
4	ACAS érzékenységi szintet 4-re állítani
5	ACAS érzékenységi szintet 5-re állítani
6	ACAS érzékenységi szintet 6-ra állítani
7-14	Nincs kijelölve
15	Az ettől a földi állomástól jövő előző SLC utasítást törölni.

Megjegyzés. – Az MA szerkezete érzékenységi szint utasításnál:

33	37	41	45
ADS1=0	ADS2=5	SLC	44
36	40	44	88

4.3.8.4.2.2 *Almezők MB-ben*

4.3.8.4.2.2.1 *Almezők MB-ben RA jelentés részére.* Amikor BDS1=3 és BDS2=0, az alább jelzett almezőket az MB-nek tartalmaznia kell.

Megjegyzés. – Az érvényben lévő vagy a legfrissebb megoldási tanácsadásra vonatkozó információk közlésére vonatkozó követelményeket a 4.3.11.4.1 tartalmazza.

4.3.8.4.2.2.1.1 *ARA (aktív RA-k).* Ez a 14 bites (41-54) almező jelzi a megoldási tanácsadás jellemzőket, ha van megoldási tanácsadás, amelyet az almezőt továbbító válaszjeladóval kapcsolatos ACAS generál (4.3.6.2.1 a)) pont). Az aktív megoldási javaslatnál lévő bitek jelentését az MTE almező (4.3.8.4.2.2.1.4 pont) értéke határozza meg és függőleges megoldási javaslatnál az aktív megoldási tanácsadás 41-es bitjének értéke. Az aktív megoldási tanácsadás 41-es bitjének jelentése a következő:

Kódolás

0 Egynél több veszélyeztető légijármű van és a megoldási tanácsadás létrehozására törekszik veszélyeztető légijármű(vek) alatt és más veszélyeztető légijármű(vek) felett, vagy nem történt megoldási tanácsadás generálás (amikor MTE = 0)

1 Vagy csak egy veszélyeztető légijármű van, vagy a megoldási tanácsadás minden veszélyeztető légijárműnél ugyanolyan irányban törekszik elkülönítés biztosítására.

Amikor az aktív megoldási tanácsadás 41-es bitje = 1 és MTE = 0 vagy 1, a 42-47-es biteknek a következő jelentésük van:

Bit	*Kódolás*	
42	0	Megoldási tanácsadás preventív
	1	Megoldási tanácsadás helyesbítő
43	0	Felfelé értelmű elmozdulásra szóló megoldási tanácsadás került generálásra
	1	Lefelé értelmű elmozdulásra szóló megoldási tanácsadás került generálásra
44	0	Megoldási tanácsadás nem növelt sebesség
	1	Megoldási tanácsadás növelt sebesség
45	0	Megoldási tanácsadás nem az értelem megfordítása
	1	Megoldási tanácsadás az értelem megfordítása
46	0	Megoldási tanácsadás nem magasság keresztezés
	1	Megoldási tanácsadás magasság keresztezés
47	0	Megoldási tanácsadás függőleges sebességkorlátozás
	1	Megoldási tanácsadás pozitív
48-54		ACAS III. részére fenntartott

Amikor az aktív megoldási tanácsadás 41-es bitje = 0 és MTE = 1, a 42-47-es bitek jelentése a következő:

Bit	*Kódolás*	
42	0	Megoldási tanácsadás nem kíván helyesbítést a felfelé értelmű elmozdulásnál
	1	Megoldási tanácsadás helyesbítést kíván a lefelé értelmű elmozdulásnál
43	0	Megoldási tanácsadás nem kíván határozott emelkedést
	1	Megoldási tanácsadás határozott emelkedést kíván

44	0	Megoldási tanácsadás nem kíván helyesbítést a lefelé értelmű elmozdulásnál
	1	Megoldási tanácsadás helyesbítést kíván a lefelé értelmű elmozdulásnál
45	0	Megoldási tanácsadás nem kíván határozott süllyedést
	1	Megoldási tanácsadás határozott süllyedést kíván
46	0	Megoldási tanácsadás nem kíván keresztezést
	1	Megoldási tanácsadás keresztezést kíván
47	0	Megoldási tanácsadás nem az értelem megfordítása
	1	Megoldási tanácsadás az értelem megfordítása
48-54		ACAS III. részére fenntartott

Megjegyzés. – Ha az aktív megoldás tanácsadás 41-es bitje = 0 és MTE = 0, függőleges megoldási tanácsadás nem került generálásra.

4.3.8.4.2.2.1.2 *RAC (RAC-k rögzítése).* Ez a 4-bites (55-58) almező jelzi az összes éppen aktív megoldási tanácsadás kiegészítést, ha van, amelyeket másik ACAS légijárműtől kaptak. A megoldási tanácsadás kiegészítésben lévő biteknek a következő jelentésük van:

Bit	*Megoldási tanácsadás kiegészítés*
55	Ne haladj el alul
56	Ne haladj el felül
57	Ne fordulj balra
58	Ne fordulj jobbra

Egy bit az 1 állásban azt jelzi, hogy a kapcsolódó megoldási tanácsadás kiegészítés aktív. Egy bit 0 állásban azt jelzi, hogy a kapcsolódó megoldási tanácsadás kiegészítés inaktív.

4.3.8.4.2.2.1.3 *RAT (RA befejezését kijelző).* Ez az 1-bites (59) almező akkor jelez, ha az ACAS által előzőleg generált megoldási tanácsadás generálása megszűnik.

Kódolás

0 Az aktív megoldási tanácsadás almező által jelzett megoldási tanácsadás jelenleg aktív
1 Az aktív megoldási tanácsadás almező által jelzett megoldási tanácsadás megszűnt (4.3.11.4.1 pont).

1. Megjegyzés. – Azután, hogy az ACAS a megoldási javaslatot megszüntette, még 18 ± 1 másodpercig szükséges, hogy az S-módú válaszjeladó jelentse azt (4.3.11.4.1 pont). A megoldási tanácsadás befejezését kijelző használható például egy megoldási tanácsadás jelzés egy légiforgalmi irányító kijelzőjéről való időleges eltávolításának engedélyezésére vagy megoldási tanácsadás időtartam értékelésére egy adott légtéren belül.

2. Megjegyzés. – A megoldási tanácsadás számos okból megszűnhet; normálisan, ha a konfliktus megoldódott és a veszélyeztető légijármű távolodik; vagy amikor a veszélyeztető légijármű S-módú válaszjeladója valamilyen ok miatt szünetelteti a magasság jelentését a konfliktus alatt. A megoldási tanácsadás befejezését kijelző arra használatos, hogy kimutassa, hogy a megoldási tanácsadás ezen esetek egyikében megszűnt.

4.3.8.4.2.2.1.4 *MTE (többszörös veszélyeztető légijármű előfordulás).* Ez az 1-bites (60) almező jelzi, hogy két vagy több egyidejű veszélyeztető légijármű éppen feldolgozás alatt áll az ACAS veszélyeztető légijármű megoldási logikája által.

Kódolás

0 A megoldási logika éppen az egyik veszélyeztető légijárművet dolgozza fel (amikor az aktív megoldási tanácsadás 41-es bitje = 1); vagy a veszélyeztető légijármű nem áll megoldási logika által történő feldolgozás alatt.

1 Két vagy több egyidejű veszélyeztető légijármű megoldási logika által történő feldolgozás alatt áll.

4.3.8.4.2.2.1.5 *TTI (veszélyeztető légijármű típusát kijelző almező).* Ez a 2-bites almező (61-62) határozza meg a TID almező által tartalmazott azonosítási adatok típusát.

Kódolás

0	Nincs azonosítási adat a TID-ben
1	A TID egy S-módú válaszjeladó címzést tartalmaz
2	A TID magassági, távolsági és irány adatokat tartalmaz
3	Nincs kijelölve

4.3.8.4.2.2.1.6 *TID (veszélyeztető légijármű azonosítás adat almező).* Ez a 26-bites almező (63-88) tartalmazza a veszélyeztető légijármű S-módú címzését, vagy magasságát, távolságát és irányhelyzetét, ha a veszélyeztető légijármű nincs S-móddal felszerelve. Ha az ACAS megoldási logika két vagy több veszélyeztető légijárművet dolgoz fel egyidőben, a TID a legutoljára bejelentett veszélyeztető légijármű azonosítási vagy pozíciós adatait tartalmazza. Ha TTI = 1, a TID a 63-86 bitekben az S-módú címzést tartalmazza és a 87- és 88-as biteket 0-ra kell állítani. Ha TTI = 2, a TID a következő három almezőt tartalmazza:

4.3.8.4.2.2.1.6.1 *TIDA (veszélyeztető légijármű azonosítási adat magassági almező).* Ez a 13-bites almező (63-75) a veszélyeztető légijármű legutoljára jelentett C-módú magassági kódját tartalmazza.

Kódolás

Bit	63	64	65	66	67	68	69	70	71	72	73	74	75
C-mód	C_1	A_1	C_2	A_2	C_4	A_4	0	B_1	D_1	B_2	D_2	B_4	D_4

4.3.8.4.2.2.1.6.2 *TIDR (veszélyeztető légijármű azonosítási adat távolság almező).* Ez a 7-bites almező (76-82) a veszélyeztető légijármű ACAS által legutoljára becsült távolságát tartalmazza.

Kódolás (n)

n	*Becsült távolság (NM)*
0	Távolság becslés nem áll rendelkezésre
1	Kisebb, mint 0,05
2-126	$(n\text{-}1)/10 \pm 0{,}05$
127	Nagyobb, mint 12,55

4.3.8.4.2.2.1.6.3 *TIDB (veszélyeztető légijármű azonosítás adat irányhelyzet almező).* Ez a 6-bites almező (83-88) a veszélyeztető légijármű legutolsó becsült iránytartását az ACAS légijármű iránytengelyéhez viszonyítva tartalmazza.

Kódolás (n)

n	*Becsült iránytartás (fok)*
0	Irány becslés nem áll rendelkezésre
1-60	$6(n\text{-}1)$ és $6n$ között

61-63 Nem kijelölt

Megjegyzés. – Az MB szerkezete megoldási tanácsadás jelentéshez:

33	37	41	55	59	60	61	63
BDS1=3	BDS2=0	ARA	RAC	RAT	MTE	TTI = 1	TID
36	40	54	58	59	60	62	88

33	37	41	55	59	60	61	63	76	83
BDS1=3	BDS2=0	ARA	RAC	RAT	MTE	TTI = 2	TIDA	TIDR	TIDB
36	40	54	58	59	60	62	75	82	88

4.3.8.4.2.2.2 *Almezők az MB-ben az adatkapcsolat képesség jelentésére.* Amikor BDS1 = 1 és BDS2 = 0, a következő bit sémákat kell biztosítani a válaszjeladó részére, annak adatkapcsolati képességi jelentéséhez:

Bit	*Kódolás*
48	0 ACAS meghibásodott vagy tartalékon van
	1 ACAS működik
69	0 ACAS II
	1 ACAS III
70	0 ACAS csak TA-kat generál
	1 ACAS TA-kat és RA-kat generál
71	0 ACAS-al nincs ellátva
	1 ACAS-al ellátott
72	0 Hibrid felderítés nincs felszerelve
	1 Hibrid felderítés felszerelve

1. Megjegyzés. – Az adatkapcsolati képesség jelentés szerkezet MB altereinek összefoglalása a 3. fejezet 3.1.2.6.10.2.2 pontjában található.

2. Megjegyzés. – Az ACAS aktív lekérdezéseket limitáló hibrid felderítés használatát a 4.5.1 szakasz írja le. Csak a DF = 17 kiterjesztett squitter közlemények dekódolásának támogatására szóló képesség nem elegendő a 72-es bit beállításához.

4.3.8.4.2.3 *MU mező.* A hosszantartó levegő-levegő ellenőrzési lekérdezésnek (4-1 ábra) ezt az 56-bites (33-88) mezejét megoldás közlések, ACAS adások és megoldási tanácsadás közvetítések továbbítására használják.

4.3.8.4.2.3.1 *UDS (U-definíciós almező).* Ez a 8-bites (33-40) almező az MU maradék részét határozza meg.

Megjegyzés. – A kódolás kényelmesebbé tételének kedvéért az UDS-t két, egyenként négy bitből álló csoportban fejezik ki; UDS1 és UDS2.

4.3.8.4.2.3.2 *Almezők MU-ban megoldás közlés részére.* Amikor UDS1 = 3 és UDS2 = 0, az MU a következő almezőket tartalmazza:

4.3.8.4.2.3.2.1 *MTB (többszörös veszélyeztető légijármű bit).* Ez az 1-bites (42) almező többszörös veszélyeztető légijármű jelenlétét vagy hiányát jelöli.

Kódolás

0 Lekérdező ACAS-nak egy veszélyeztető légijárműve van

1 Lekérdező ACAS-nak egynél több veszélyeztető légijárműve van

4.3.8.4.2.3.2.2 *VRC (függőleges RAC).* Ez a 2-bites (45-46) a címzett légijárműre vonatkozó függőleges megoldási tanácsadás kiegészítését jelöli.

Kódolás

0 Nem küldtek függőleges megoldási tanácsadás kiegészítést

1 Ne haladjon el alul

2 Ne haladjon el felül

3 Nem kijelölt

4.3.8.4.2.3.2.3 *CVC (függőleges RAC törlés).* Ez a 2-bites (43-44) almező a címzett légijárműnek előzőleg küldött függőleges megoldási tanácsadás kiegészítés törlését jelöli. Ezt az almezőt 0-ra kell állítani új veszélyeztető légijárműnél.

Kódolás

0 Nincs törlés

1 Törölni az előzőleg küldött "Ne haladjon el alul" függőleges megoldási tanácsadás kiegészítést.

2 Törölni az előzőleg küldött "Ne haladjon el felül" függőleges megoldási tanácsadás kiegészítést.

3 Nem kijelölt

4.3.8.4.2.3.2.4 *HRC (vízszintes RAC).* Ez a 8-bites (50-52) almező a címzett légijárműre vonatkozó vízszintes megoldási tanácsadás kiegészítést jelöl.

Kódolás

0 Nincs vízszintes megoldási tanácsadás kiegészítés vagy nincs vízszintes megoldási tanácsadás

1 Másik ACAS-nak forduljon balra értelme van; ne forduljon balra

2 Másik ACAS-nak forduljon balra értelme van; ne forduljon jobbra

3 Nem kijelölt

4 Nem kijelölt

5 Másik ACAS-nak forduljon jobbra értelme van; ne forduljon balra;

6 Másik ACAS-nak forduljon jobbra értelme van; ne forduljon jobbra

7 Nem kijelölt

4.3.8.4.2.3.2.5 *CHC (vízszintes RAC törlés).* Ez a 3-bites (47-49) almező a címzett légijárműnek előzőleg küldött vízszintes megoldási tanácsadás kiegészítés törlését jelöli. Ezt az almezőt 0-ra kell állítani új veszélyeztető légijárműnél.

Kódolás

0 Nincs törlés vagy nincs vízszintes megoldási képesség

1 Előzőleg küldött "Ne forduljon balra" törlése

2 Előzőleg küldött "Ne forduljon jobbra" törlése

3-7 Nem kijelölt

4.3.8.4.2.3.2.6 *VSB (függőleges értelmű bit almező).* Ez a 4-bites (61-64) almezőt a CVC és VRC almezőkben lévő adatok védelmére használják. A 43-46 bitek 16 lehetséges kombinációhoz a következő VSB kódokat kell továbbítani:

	CVC		VRC		VSB			
Kódolás	43	44	45	46	61	62	63	64
0	0	0	0	0	0	0	0	0
1	0	0	0	1	1	1	1	0
2	0	0	1	0	0	1	0	1
3	0	0	1	1	1	0	0	1
4	0	1	0	0	1	0	1	1
5	0	1	0	1	0	1	0	1
6	0	1	1	0	1	1	0	0
7	0	1	1	1	0	0	1	0
8	1	0	0	0	1	1	0	1
9	1	0	0	1	0	0	1	1
10	1	0	1	0	1	0	1	0
11	1	0	1	1	0	1	0	0
12	1	1	0	0	0	1	1	0
13	1	1	0	1	1	0	0	0
14	1	1	1	0	0	0	0	1
15	1	1	1	1	1	1	1	

Megjegyzés. – A szabály, amelyet a VSB almező bit beállításra használnak, egy 3 Hamming kód távolság, megnövelve egy paritás bittel, amely az érzékelés képességét produkálja három hibáig a nyolc továbbított bitben.

4.3.8.4.2.3.2.7 *HSB (vízszintes értelmű bit almező).* Ezt az 5-bites (56-60) almezőt a CHC és HRC almezőkben lévő adatok védelmére használják. A 47-52 bitek 64 lehetséges kombinációihoz a következő HSB kódokat kell továbbítani.

	CHC			HRC			HSB				
Kódolás	47	48	49	50	51	52	56	57	58	59	60
0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	1	0	1	0	1	1
2	0	0	0	0	1	0	1	0	0	1	1
3	0	0	0	0	1	1	1	1	0	0	0
4	0	0	0	1	0	0	1	1	1	0	0
5	0	0	0	1	0	1	1	0	1	1	1
6	0	0	0	1	1	0	0	1	1	1	1
7	0	0	0	1	1	1	0	0	1	0	0
8	0	0	1	0	0	0	0	1	1	0	1
9	0	0	1	0	0	1	0	0	1	1	0
10	0	0	1	0	1	0	1	1	1	1	0
11	0	0	1	0	1	1	1	0	1	0	1
12	0	0	1	1	0	0	1	0	0	0	1
13	0	0	1	1	0	1	1	1	0	1	0
14	0	0	1	1	1	0	0	0	0	1	0

15	0	0	1	1	1	1	0	1	0	0	1
16	0	1	0	0	0	0	1	0	1	0	1
17	0	1	0	0	0	1	1	1	1	1	0
18	0	1	0	0	1	0	0	0	1	1	0
19	0	1	0	0	1	1	0	1	1	0	1
20	0	1	0	1	0	0	0	1	0	0	1
21	0	1	0	1	0	1	0	0	0	1	0
22	0	1	0	1	1	0	1	1	0	1	0
23	0	1	0	1	1	1	1	0	0	0	1
24	0	1	1	0	0	0	1	1	0	0	0
25	0	1	1	0	0	1	1	0	0	1	1
26	0	1	1	0	1	0	0	1	0	1	1
27	0	1	1	0	1	1	0	0	0	0	0
28	0	1	1	1	0	0	0	0	1	0	0
29	0	1	1	1	0	1	0	1	1	1	1
30	0	1	1	1	1	0	1	0	1	1	1
31	0	1	1	1	1	1	1	1	1	0	0
32	1	0	0	0	0	0	1	1	0	0	1
33	1	0	0	0	0	1	1	0	0	1	0
34	1	0	0	0	1	0	0	1	0	1	0
35	1	0	0	0	1	1	0	0	0	0	1
36	1	0	0	1	0	0	0	0	1	0	1
37	1	0	0	1	0	1	0	1	1	1	0
38	1	0	0	1	1	0	1	0	1	1	0
39	1	0	0	1	1	1	1	1	1	0	1
40	1	0	1	0	0	0	1	0	1	0	0
41	1	0	1	0	0	1	1	1	1	1	1
42	1	0	1	0	1	0	0	0	1	1	1
43	1	0	1	0	1	1	0	1	1	0	0
44	1	0	1	1	0	0	0	1	0	0	0
45	1	0	1	1	0	1	0	0	0	1	1
46	1	0	1	1	1	0	1	1	0	1	1
47	1	0	1	1	1	1	1	0	0	0	0
48	1	1	0	0	0	0	0	1	1	0	0
49	1	1	0	0	0	1	0	0	1	1	1
50	1	1	0	0	1	0	1	1	1	1	1
51	1	1	0	0	1	1	1	0	1	0	0
52	1	1	0	1	0	0	1	0	0	0	0
53	1	1	0	1	0	1	1	1	0	1	1
54	1	1	0	1	1	0	0	0	0	1	1
55	1	1	0	1	1	1	0	1	0	0	0
56	1	1	1	0	0	0	0	0	0	0	1
57	1	1	1	0	0	1	0	1	0	1	0
58	1	1	1	0	1	0	1	0	0	1	0
59	1	1	1	0	1	1	1	1	0	0	1
60	1	1	1	1	0	0	1	1	1	0	1
61	1	1	1	1	0	1	1	0	1	1	0
62	1	1	1	1	1	0	0	1	1	1	0

63	1	1	1	1	1	1	0	0	1	0	1

Megjegyzés. – A szabály, amelyet a HSB almező bit beállításra használnak, egy 3 Hamming kód távolság, megnövelve egy paritás bittel, amely a detektálás képességét produkálja három hibáig nyolc továbbított bitben.

4.3.8.4.2.3.2.8 *MID (Légijármű címzés.).* Ez a 24-bites (65-88) almező a lekérdező ACAS légijármű 24-bites légijármű címzését tartalmazza.

Megjegyzés. – MU szerkezete megoldás közlésnél:

33	37	41	42	43	45	47	50	53	56	61	65
UDS1=3	UDS2=0	-1-	MTB	CVC	VRC	CHC	HRC	-3-	HSB	VSB	MID
36	40	41	42	44	46	49	52	55	60	64	88

4.3.8.4.2.3.3 *Almező MU-ban ACAS adásnál.* Amikor UDS1 = 3 és UDS2 = 2, az MU a következő almezőt tartalmazza:

4.3.8.4.2.3.3.1 *MID (Légijármű címzés).* Ez a 24-bites (65-88) almező a lekérdező ACAS légijármű 24-bites légijármű címzését tartalmazza.

Megjegyzés. – MU szerkezete ACAS adásnál:

33	37	41	65
UDS1=3	UDS2=2	24	MID
36	40	64	88

4.3.8.4.2.3.4 *Almezők MU-ban RA adásnál.* Amikor UDS1 = 3 és UDS2 = 1, az MU a következő almezőket tartalmazza:

4.3.8.4.2.3.4.1 *ARA (aktív RA-k).* Ezt a 14-bites (41-54) almezőt a 4.3.8.4.2.2.1.1 pontban meghatározott módon kell kódolni.

4.3.8.4.2.3.4.2 *RAC (RAC rekord).* Ezt a 4 bites (55-58) almezőt a 4.3.8.4.2.2.1.2 pontban meghatározottak szerint kell kódolni.

4.3.8.4.2.3.4.3 *RAT (RA befejezését kijelző).* Ezt az 1-bites (59) almezőt a 4.3.8.4.2.2.1.3 pontban meghatározott módon kell kódolni.

4.3.8.4.2.3.4.4 *MTE (többszörös veszélyeztető előfordulás).* Ezt az 1-bites (60) almezőt a 4.3.8.4.2.2.1.4 pontban meghatározott módon kell kódolni.

4.3.8.4.2.3.4.5 *AID (A-módú azonosítási kód).* Ez a 13-bites (63-75) almező a jelentő légijármű A-módú azonosítási kódját jelöli.

Kódolás

Bit	63	64	65	66	67	68	69	70	71	72	73	74	75
A-módú kód bit	C_1	A_1	C_2	A_2	C_4	A_4	0	B_1	D_1	B_2	D_2	B_4	D_4

4.3.8.4.2.3.4.6 *CAC (C-módú magasság kód).* Ez a 13-bites (76-88) almező a jelentő légijármű C-módú azonosítási kódját jelöli.

Kódolás

Bit	76	77	78	79	80	81	82	83	84	85	86	87	88
C-módú kód	C_1	A_1	C_2	A_2	C_4	A_4	0	B_1	D_1	B_2	D_2	B_4	D_4

Megjegyzés. – Az MU szerkezete megoldási tanácsadás közvetítésnél.

33	37	41	55	59	60	61	63	76
UDS1=3	DS2=1	ARA	RAC	RAT	MTE	-2-	AID	CAC
36	40	54	58	59	60	62	75	88

4.3.8.4.2.4 *MV mező.* A hosszú levegő-levegő ellenőrző válaszok (4-1 ábra) 56-bites (33-88) mezőjét levegő-levegő koordinációs válasz közlések továbbítására használják.

4.3.8.4.2.4.1 *VDS (V-definíciós almező).* Ez a 8-bites (33-40) almező az MV megmaradó részét határozza meg.

Megjegyzés. – A kódolás megkönnyítése érdekében a VDS-t két, egyenként négy bitből álló csoportban fejezik ki: VDS1 és VDS2.

4.3.8.4.2.4.2 *Almezők MV-ben koordinációs válaszhoz.* Amikor VDS1 = 3 és VDS2 = 0, az MV a következő altereket tartalmazza:

4.3.8.4.2.4.2.1 *ARA (aktív RA-k).* Ezt a 14-bites (41-54) almezőt a 4.3.8.4.2.2.1.1 pontban meghatározott módon kell kódolni.

4.3.8.4.2.4.2.2. *RAC (RAC-k rögzítése).* Ezt a 4-bites (55-58) almezőt a 4.3.8.4.2.2.1.2 pontban meghatározott módon kell kódolni.

4.3.8.4.2.4.2.3 *RAT (RA befejezését kijelző).* Ezt az 1-bites (59) almezőt a 4.3.8.4.2.2.1.3 pontban meghatározott módon kell kódolni.

4.3.8.4.2.4.2.4 *MTE (többszörös veszélyeztető előfordulás).* Ezt az 1-bites (60) almezőt a 4.3.8.4.2.2.1.4 pontban meghatározott módon kell kódolni.

Megjegyzés. – Az MV szerkezete koordinációs válasznál:

33	37	41	55	59	60	61
VDS1 = 3	VDS2 = 0	ARA	RAC	RAT	MTE	-28-
36	40	54	58	59	60	88

4.3.8.4.2.5 *SL (érzékenységi szint jelentés).* Ezt a 3-bites (9-11) fedélzetről leadott adattovábbítási almezőt mind rövid, mind hosszú levegő-levegő válasz formátumok (DF = 0 és 16) tartalmazzák. Ez a mező jelöli azt az érzékenységi szintet, amelynél az ACAS éppen működik.

Kódolás

0	ACAS nem működik
1	ACAS az 1-es érzékenységi szinten működik
2	ACAS a 2-es érzékenységi szinten működik
3	ACAS a 3-as érzékenységi szinten működik
4	ACAS a 4-es érzékenységi szinten működik
5	ACAS az 5-ös érzékenységi szinten működik
6	ACAS a 6-os érzékenységi szinten működik
7	ACAS a 7-es érzékenységi szinten működik

4.3.9 ACAS berendezés jellemzők

4.3.9.1 *Csatolóegységek.* Az ACAS részére minimálisan a következő bemenő adatokat kell biztosítani:

a) légijármű címzés kód;

b) S-módú levegő-levegő és föld-levegő adatátvitelek, amelyeket az S-módú válaszjeladó vesz ACAS általi felhasználásra (4.3.6.3.2 pont);

c) saját légijármű maximális, tényleges utazósebesség képessége (3. Fejezet, 3.1.2.8.2.2 pont);

d) nyomásmagasság; és

e) rádiómagasság

Megjegyzés. – Az ACAS II és ACAS III bemeneteire vonatkozó különleges követelmények alább, a megfelelő szakaszokban kerülnek felsorolásra.

4.3.9.2 *Légijármű antenna rendszer.* Az ACAS két antennán keresztül továbbít lekérdezéseket és veszi a válaszokat, egyik a légijármű tetejére, másik a légijármű aljára van szerelve. A tetőre szerelt antenna irányantenna és iránykeresésre lehet használni.

4.3.9.2.1 *Polarizáció.* Az ACAS adatátvitel polarizációja névlegesen függőleges.

4.3.9.2.2 *Sugárzási iránykarakterisztika*. A légijármű fedélzeti antenna sugárzási iránykarakterisztikájának elevációs szöge legyen névlegesen azonos egy vízszintes síkon elhelyezett, földfelszíni negyedhullámú függőleges sugárzó ekvivalenssel.

4.3.9.2.3 *Antenna kiválasztás*

4.3.9.2.3.1 *Squitter vétel.* Az ACAS-nak képesnek kell lenni squitterek vételére a törzs tetején és alján elhelyezett antennán keresztül.

4.3.9.2.3.2 *Lekérdezések.* ACAS lekérdezéseket nem lehet egyidőben mindkét antennán keresztül továbbítani.

4.3.9.3 *Nyomásmagasság forrás.* Az ACAS részére szolgáltatott saját légijárműre vonatkozó magasság adatokat abból a forrásból kell venni, amely a saját C-módú vagy S-módú jelentések alapjául szolgál a rendelkezésre álló legfinomabb kvantálásnál (mérhető felbontásnál).

4.3.9.3.1 **Ajánlás. –** *Olyan forrást kell használni, amely 7,62 m-nél (25 láb) finomabb felbontást szolgáltat.*

4.3.9.3.2 Ha 7,62 m-nél (25 láb) finomabb felbontást szolgáltató forrás nem áll rendelkezésre, és csak a saját légijármű részére rendelkezésre álló magassági adatok Gilham kódolásúak, legalább két független forrást kell használni és ezeket folyamatosan összehasonlítani, hogy a kódolási hibákat észrevegyék.

4.3.9.3.3 **Ajánlás. –** *Két magassági adatforrást kell használni és összehasonlítani, hogy a hibákat észleljék az ACAS részére történő szolgáltatás előtt.*

4.3.9.3.4 A 4.3.10.3 pont előírásait kell alkalmazni, amikor a két magassági adat összehasonlítása azt jelzi, hogy a források közül az egyik hibás.

4.3.10 Megfigyelés

4.3.10.1 *Megfigyelési tevékenység.* Az ACAS-nak folyamatosan figyelési feladatokat kell teljesítenie, hogy figyelmeztetést adjon ki, ha a következő feltételek közül legalább valamelyik teljesül:

a) nincsen lekérdezés teljesítmény korlátozás interferencia szabályozás miatt (4.3.2.2.2 pont) és a maximális sugárzott teljesítmény kisebbre csökken, mint ami a 4.3.2 pontban részletezett felderítési követelmények kielégítéséhez szükséges; vagy

b) a berendezésben észlelt bármely más meghibásodás, amely a forgalmi tanácsadás vagy megoldási tanácsadás szolgáltatási képességet csökkenti; vagy

c) külső források nem szolgáltatják az ACAS működéséhez elengedhetetlenül szükséges adatokat, vagy a szolgáltatott adatok nem hitelesek.

4.3.10.2 *Hatás az ACAS működésére.* Az ACAS felügyeleti tevékenysége nem befolyásolhatja károsan a többi ACAS funkciót.

4.3.10.3 *Megfigyelési reakció.* Amikor a megfigyelési tevékenység meghibásodást észlel (4.3.10.1 pont), az ACAS:

a) jelzi a repülőszemélyzetnek, hogy rendellenes körülmények állnak fenn;

b) megakadályozza a további ACAS lekérdezéseket; és

c) S-módú adattovábbítást hoz létre, amely a saját légijármű megoldási képességét tartalmazza jelezve, hogy az ACAS nem működik.

4.3.11 Az ACAS-al együtt használt S-módú válaszjeladóval szembeni követelmények

4.3.11.1 V*álaszjeladó képességek.* A 3. fejezet 3.1 pontjában meghatározott minimális válaszjeladó képességeken kívül az ACAS-al együtt használt S-módú válaszjeladónak a következő képességekkel kell rendelkeznie:

a) a következő formátumok kezelésének képessége:

Formátum szám	*Formátum név*
UF = 16	Hosszú levegő-levegő felderítési lekérdezés
DF = 16	Hosszú levegő-levegő felderítési válasz

b) képesség hosszú S-módú lekérdezések (UF = 16) vételére és hosszú S-módú válaszok (DF = 16) generálására 16,6 ms (60 per másodperc) folytonos sebességgel;

c) eszközök az ACAS berendezésekhez címzett összes vett lekérdezés adat tartalmának továbbítására;

d) antenna széttelepítés (ahogyan azt a 3. fejezet, 3.1.2.10.4 pontja meghatározza);

e) kölcsönös elnyomó képesség; és

f) inaktív állapotú válaszjeladó kimenő teljesítmény korlátozás.

Amikor az S-módú válaszjeladó adó inaktív állapotban van, az impulzus-csúcsteljesítmény 1090 MHz ± 3 MHz-nél az S-módú válaszjeladó antenna kimeneténél nem haladhatja meg a -70 dBm-et.

4.3.11.2 Adatátvitel az ACAS és S-módú válaszjeladója között

4.3.11.2.1 *Adat átvitel az ACAS-tól az S-módú válaszjeladójához*

a) Az S-módú válaszjeladó az ACAS-tól megoldási tanácsadás információkat kap, egy megoldási tanácsadás jelentésben (4.3.8.4.2.2.1 pont) és koordinációs válaszban 4.3.8.4.2.4.2 pont) való továbbítás céljából:

b) az S-módú válaszjeladó megkapja az ACAS-ától az aktuális érzékenységi szintet egy érzékenységi szint jelentésben való (4.3.8.4.2.5 pont) továbbítás céljából; és

c) az S-módú válaszjeladó képességi információkat kap az ACAS-ától adatkapcsolati képesség jelentésben (4.3.8.4.2.2.2 pont) való továbbítás céljából és DF = 0 és DF = 16 levegő-levegő fedélzetről leadott kapcsolati formátumok RI mezejében való (4.3.8.4.1.2 pont) továbbítás céljából; és

d) az S-módú válaszjeladó jelzést vesz az ACAS-ától, hogy a megoldási javaslatok képtelenek vagy gátoltak a 0 és 16 fedélzetről leadott kapcsolati formátumok RI mezőjében való továbbításra.

4.3.11.2.2 *Adatátvitel az S-módú válaszjeladótól a saját ACAS-hoz:*

a) az S-módú válaszjeladó átadja a saját ACAS részére a vett érzékenységi szint szabályozás utasításokat (4.3.8.4.2.1.1 pont), amelyeket az S-módú állomások továbbítanak;

b) az S-módú válaszjeladó átadja a saját ACAS részére más ACAS-ok által továbbított ACAS közvetítési közleményeket (4.3.8.4.2.3.3 pont);

c) az S-módú válaszjeladó átadja a saját ACAS részére más ACAS-ok által levegő-levegő koordinációs célokra továbbított megoldási közleményeket (4.3.8.4.2.3.2 pont); és

d) az S-módú válaszjeladó átadja a saját ACAS részére a saját légijármű A-módú azonosítás adatait egy megoldási tanácsadás rádióadásban való továbbítása céljából (4.3.8.4.2.3.4.5 pont).

4.3.11.3 Az ACAS információ közlése más ACAS részére

4.3.11.3.1 *Ellenőrzési válasz.* Az ACAS S-módú válaszjeladónak a rövid (DF = 0) vagy hosszú (DF = 16) ellenőrzési formátumot kell használnia az ACAS ellenőrzési lekérdezésekre adott válaszokhoz. Az ellenőrzési válasznak tartalmaznia kell a VS mezőt, ahogyan azt a 3. fejezet 3.1.2.8.2 pontjában meghatározták, az RI mezőt, ahogyan azt a 3.1.2.8.2 pontban és 4.3.8.4.1.2 pontban meghatározták, és az SL mezőt, ahogyan azt a 4.3.8.4.2.5 pontban meghatározták.

4.3.11.3.2 *Koordinációs válasz.* Az ACAS S-módú válaszjeladójának koordinációs választ kell továbbítania egy felszerelt veszélyeztető légijárműtől vett koordinációs lekérdezésre, alávetve a 4.3.11.3.2.1 pont feltételeinek. A koordinációs válaszhoz a DF = 16 hosszú levegő-levegő ellenőrzési válasz formulát kell használni a VS mezővel, ahogyan az a 3. fejezet 3.1.2.8.2 pontban elő lett írva, az RI mezőt, ahogyan az a 3. fejezet 3.1.2.8.2 és 4.3.8.4.1.2 pontjában meg lett határozva, az SL mezőt, ahogyan az a 4.3.8.4.2.5 pontban megtalálható; és az MV mezőt, ahogyan azt a 4.3.8.4.2.4 pont előírja. Koordinációs válaszokat még akkor is továbbítani kell, ha a válaszjeladó minimális válaszsebesség korlátait (3. fejezet, 3.1.2.10.3.7.2 pont) túllépik.

4.3.11.3.2.1 Az ACAS S-módú válaszjeladójának egy másik ACAS-tól kapott koordinációs lekérdezésre akkor és csak akkor kell koordinációs válasszal válaszolni, ha a válaszjeladó képes a lekérdezés ACAS adat tartalmát a válaszjeladóhoz tartozó ACAS-nak továbbítani.

4.3.11.4 Az ACAS információ közlése földi állomások részére

4.3.11.4.1 *RA jelentések S-módú földi állomásoknak.* A megoldási tanácsadás időszaka alatt és a megoldási tanácsadás végét követő 18 ±1 másodperc során az ACAS S-módú válaszjeladó a megfelelő DR mező kód beállítással jelzi, hogy megoldási tanácsadás jelentése van az S-módú érzékelőnek adott válaszokban, ahogyan azt a 4.3.8.4.1.1 pont ismerteti. A megoldási tanácsadás jelentés leírja a legújabb megoldási javaslatot, amely a megelőző 18 ±1 másodperces időszak alatt fennállt.

1. Megjegyzés. – A 4.3.11.4.1 alpont utolsó mondata azt jelenti, hogy egy megoldási tanácsadás befejezését követő 18 ±1 másodperces időszak részére, az 59-es bit (a megoldási tanácsadás befejezésének jelzése) kivételével a megoldási tanácsadás jelentésben lévő összes MB mező megőrzi a megoldási tanácsadás utolsó aktív időpontjáig jelentett közléseket.

2. Megjegyzés. - DR = 2, 3, 6 vagy 7 válasz vétele után egy S-módú földi állomás a megoldási tanácsadás jelentés fedélzetről leadott kapcsolását kérheti RR = 19 beállítással, és vagy DI = 7 vagy DI = 7 és RRS = 0 beállítással az ACAS légijármű egy felderítésében vagy Comm-A lekérdezésében. Amikor ezt a lekérdezést veszi, a válaszjeladó Comm-B válasszal válaszol, amelynek MB mezeje tartalmazza a megoldási tanácsadás jelentést.

4.3.11.4.2 *Adatkapcsolat képességi jelentés*. Egy ACAS meglétét jelenteni kell a földi állomás részére. A jelentés az ACAS saját S-módú válaszjeladójával történik egy S-módú adatkapcsolat képességi jelentésben.

Megjegyzés. – Ez a jelzés a válaszjeladót arra készteti, hogy az adatkapcsolat képességi jelentésben beállítsa a 4.3.8.4.2.2.2 alpontban meghatározottak szerinti kódokat.

4.3.12 Jelzések a hajózó személyzetnek

4.3.12.1 Helyesbítő és megelőző RA-k

Ajánlás. – *A hajózó személyzetnek szóló jelzések között megkülönböztetünk megelőző és helyesbítő megoldási javaslatot.*

4.3.12.2 Magasság keresztezési RA-k

Ajánlás. – *Ha az ACAS magasság keresztezési megoldási javaslatot generál, specifikus jelzést kell adni a hajózó személyzet részére, hogy keresztezés megy végbe.*

4.4 ACAS II összeütközés-elhárító logika működése

Megjegyzés. – Óvatossággal kell eljárni, amikor az A mellékletben közölt útmutató anyag 4. Részében az ACAS II rendszer hivatkozásaival kapcsolatban potenciális javításokat fontolgatunk, mivel a változások a rendszer teljesítmény több aspektusára is kihatással lehetnek. Lényeges, hogy alternatív elgondolás ne rontsa le a másik elgondolás működését és hogy az ilyen összeegyeztethetőség nagyfokú magabiztossággal legyen demonstrálva.

4.4.1 Az összeütközés-elhárító logika működésére vonatkozó meghatározások

Megjegyzés . – A [t_1, t_2] jelölést a t_1 és t_2 közötti időtartam jelölésére használják.

Altitude layer – Tengerszint feletti magasság réteg
Minden találkozást a következő tengerszint feletti magasság réteg egyike jellemez:

Réteg	1	2	3	4	5	6
-tól		2 300 ft	5 000 ft	10 000 ft	20 000 ft	41 000 ft
-ig	2 300 ft	5 000 ft	10 000 ft	20 000 ft	41 000 ft	

A találkozás tengerszint feletti magasság rétegét a két légijárműnek a legszorosabb megközelítésnél lévő átlagos tengerszint feletti magassága határozza meg.

Megjegyzés. – Az összeütközés elhárító logika működésének meghatározása céljából nincs szükség a magasságmérés vagy a talajszint és a magasság közötti összefüggés fizikai alapjának megadására.

Approach angle – Megközelítési szög
A két légijárműnek a legszorosabb megközelítésnél a földi irányszögek szerinti különbsége, 180 fokkal leírva a szembeni irányokat, és 0 fokkal leírva a párhuzamos irányokat.

Crossing encounter – Keresztező találkozás
Egy olyan találkozás, amelynél a két légijármű magasság elkülönítése a találkozási ablak kezdetén és végén meghaladja a 100 lábat, és a két légijármű egymáshoz viszonyított függőleges helyzete a találkozási ablak végén fordítottja a találkozási ablak elejéhez tartozó helyzetnek.

Encounter – Találkozás
Az összeütközés elkerülés logika működésének meghatározása céljából egy találkozás két utánzott légijármű repülési pályából áll. A légijármű vízszintes koordinátái a légijármű elfoglalt helyzeteit mutatják, míg a függőleges koordináta a tengerszint feletti magasság magasságmérővel mért értékét képviseli.

Encounter class – Találkozási osztály
A találkozásokat aszerint osztályozzák, hogy a légijármű átmenőben van-e a találkozási ablak kezdeténél és végénél és hogy a találkozás keresztező-e vagy nem.

Encounter window - Találkozási ablak
A [*tca* - 40s, *tca* + 10s] időköz

Horizontal miss distance (hmd) – Vízszintes elkerülési távolság
Egy találkozásnál megfigyelt minimális vízszintes elkülönítés.

Level aircraft – Szintbeli légijármű
Légijármű, amely nem átmenő.

Original trajectory – Eredeti repülési pálya
Egy ACAS-al felszerelt légijármű eredeti repülési pályája az, amelyet a légijármű követne ugyanannál a találkozásnál, ha nem lenne ACAS-al felszerelve.

Original rate – Eredeti függőleges sebesség
Egy ACAS-al felszerelt légijármű eredeti sebessége bármely időpontban a légijármű azon magasságváltozási sebessége, amely ugyanabban az időpontban akkor lépne fel, ha az eredeti repülési pályát követné.

Required rate – Megkívánt függőleges sebesség
A szabvány repülőgépvezető modellnél a megkívánt sebesség az, amely a megoldási javaslattal összhangban az eredeti sebességhez legközelebb esik.

Tca
Névlegesen a legszorosabb megközelítés időpontja. A szabványos találkozási modellben (4.4.2.6 pont) lévő találkozásoknál referencia időpont a találkozás létrehozásához, amelynél különböző paraméterek, közöttük a függőleges és vízszintes elkülönítés (vmd és hmd) meg vannak adva.

Megjegyzés. – A szabványos találkozási modellben (4.4.2.6 pont) lévő találkozásokat a két légijármű repülési pályáinak a tca*-nál kezdve, kifelé történő felépítésével konstruálják meg. Amikor a folyamat készen van, a* tca *lehetséges, hogy nem lesz pontosan a legszorosabb megközelítés időpontja, és néhány másodperces eltérés elfogadható.*

Transitioning aircraft – Átmenő légijármű
Egy olyan légijármű, amely 400 láb per perc (láb/p) nagyságot meghaladó, valamilyen alkalmas periódus alatt mért átlagos függőleges sebességgel rendelkezik.

Turn extent – Forduló mértéke
Oly módon meghatározott irányszög különbség, amely a légijármű forduló végén mért földi irányszögéből és mínusz a forduló elején mért földi irányszögéből áll.

Vertical miss distance (vmd) – Függőleges elkerülési távolság
Fogalmilag, a függőleges elkülönítés a legszorosabb megközelítésnél. A szabványos találkozási modellben lévő találkozásoknál (4.4.2.6 pont) a *tca* időpontban a függőleges elkülönítés létrehozásával.

4.4.2 Feltételek, amelyek között a követelmények érvényesek

4.4.2.1 A következő feltételeknek kell teljesülniük a 4.4.3 és 4.4.4 pontokban ismertetett működési követelményeknél:

a) távolság és irány mérések és magasság jelentés áll rendelkezésre a megközelítő légijármű egyes ciklusaira, amennyiben a 14 NM-en belül van, de akkor nem, ha a távolság meghaladja a 14 NM-t;

b) a távolság és irány mérések hibái összhangban vannak a szabványos távolság és irány hiba modellekkel (4.4.2.2 és 4.4.2.3 pontok);

c) a megközelítő légijármű magasság jelentései, amelyek annak C-módú válaszai, 100 lábas kvantumokban vannak kifejezve;

d) egy magasságmérés, amelyet nem kvantáltak és 1 láb vagy nagyobb pontossággal van kifejezve, a saját légijárműre rendelkezésre áll;

e) mindkét légijárműre vonatkozó magasságmérések hibái állandóak bármely adott előfordulás során;

f) mindkét légijárműre vonatkozó magasságmérések hibái összhangban vannak a szabványos magasságmérési hiba modellel (4.4.2.4 pont);

g) a megoldás tanácsadásokra adott repülőgépvezető válaszok összhangban vannak a szabványos repülőgépvezető modellel (4.4.2.5 pont);

h) a légijárművek olyan légtérben repülnek, amelyben szoros találkozások, köztük azok is, amelyeknél az ACAS egy megoldási javaslatot generál, összhangban vannak a szabványos találkozás modellel (4.4.2.6 pont);

i) ACAS-al felszerelt légijárművek képességeikben nem korlátozottak a megoldási javaslataik által megkövetelt manőverek végrehajtásában; és

j) ahogyan 4.4.2.7-ben ismertetve van:

   1) az egyes találkozásokban résztvevő megközelítő légijármű nem felszerelt (4.4.2.7 a) pont); vagy

   2) a megközelítő légijármű ACAS-al felszerelt, de olyan repülési pályát követ, amely azonos a nem felszerelt találkozásban levőével (4.4.2.7 b) pont); vagy

   3) a megközelítő légijármű ACAS-al van felszerelve, amely a saját ACAS-al azonos összeütközés elhárító logikával rendelkezik (4.4.2.7 c) pont).

Megjegyzés. – A "magasságmérés" fogalom egy magasságmérővel a kvantálást megelőzően végzett mérésekre vonatkozik.

4.4.2.1.1 Az összeütközés elhárító logika működése nem romlik le hirtelen a magasság hibák statisztikai eloszlásának, vagy a szabványos találkozási modellt jellemző különböző paraméterek statisztikai eloszlásának változásával, vagy ha a repülőgépvezetőnek a tanácsadásokra adott válasza változik, amikor a felderítési jelentések nem állnak rendelkezésre minden ciklusban, vagy amikor a megközelítő légijárműre vonatkozó magasságmérések kvantálása változik, vagy a saját légijárműre vonatkozó magasságméréseket kvantálják.

4.4.2.2 Szabványos távolság hiba modell

4.4.2.2.1 Az utánzott távolságmérések hibáit normál eloszlásból veszik, 0 láb középérték és 50 láb szabványos eltérés mellett.

4.4.2.3 Szabványos irányszög hiba modell

4.4.2.3.1 Az utánzott irányszög mérések hibáit normál eloszlásból 0,0 fokos középpel és 10,0 fok szabványos eltéréssel veszik.

4.4.2.4 Szabványos magassági hiba modell

4.4.2.4.1 Az utánzott magasság mérések hibáiról feltételezzük, hogy Laplace eloszlásúak zérus középérték mellett, amelynek valószínűségi sűrűségfüggvénye

$$p(e) = \frac{1}{2\lambda}\exp\left(-\frac{|e|}{\lambda}\right)$$

4.4.2.4.2 A λ paraméter, amely a magasságmérő hiba statisztikai eloszlásának definíciójához szükséges, a λ_1 és λ_2 értéke közül mindegyik légijárműre az egyiket veszi fel, amely a találkozási réteg magasságától függ a következők szerint:

Réteg	*1*		*2*		*3*		*4*		*5*		*6*	
	m	*láb*	*m*	*láb*	*m*	*láb*	*m*	*láb*	*m*	*láb*	*m*	*láb*
λ_1	10	35	11	38	13	43	17	58	22	72	28	94
λ_2	18	60	18	60	21	69	26	87	30	101	30	101

4.4.2.4.3 ACAS-al felszerelt légijárműnél a λ értéke λ_1 lesz.

4.4.2.4.4 ACAS-al nem felszerelt légijárműnél λ értékét véletlenszerűen választják ki a következő valószínűségek felhasználásával:

Réteg	*1*	*2*	*3*	*4*	*5*	*6*
Valószín.(λ_1)	0,391	0,320	0,345	0.610	0.610	0.610
Valószín.(λ_2)	0,609	0,680	0,655	0,390	0,390	0.390

4.4.2.5 Szabványos repülőgépvezető modell

4.4.2.5.1 A szabványos repülőgépvezető modell, amit az összeütközés elhárító logika működésének értékelésére használnak, a következő lesz:

a) bármely megoldási tanácsadás teljesül az előírt függőleges sebességre való gyorsítás mellett (ha szükséges) egy alkalmas késleltetés után;

b) amikor a légijármű fennálló függőleges sebessége ugyanaz, mint az eredeti és az eredeti függőleges sebesség eleget tesz a megoldási javaslatnak, a légijármű eredeti függőleges sebességét folytatja, amely nem feltétlenül állandó a gyorsulás lehetősége miatt az eredeti repülési pályán;

c) amikor a légijármű eleget tesz a megoldási javaslatnak, a meglévő függőleges sebessége ugyanaz, mint az eredeti függőleges sebesség és az eredeti függőleges sebesség változik, és következésképpen ellentmondásba kerül a megoldási javaslattal, a légijármű továbbra is a megoldási javaslatnak tesz eleget;

d) amikor egy kezdeti megoldási tanácsadás a magasságváltozási sebesség módosítását kívánja, a légijármű egy 0,25 g-s gyorsulással reagál egy 5 másodperces késleltetés után a megoldási tanácsadás kijelzésétől számítva;

e) amikor a megoldási tanácsadás módosul és az eredeti függőleges sebesség eleget tesz a módosított megoldási javaslatnak, a légijármű visszatér eredeti függőleges sebességéhez (ha szükséges) a g) pontban ismertetett gyorsulással a h) pontban meghatározott késleltetés után;

f) amikor a megoldási tanácsadás módosul és az eredeti függőleges sebesség nem tesz eleget a módosított javaslatnak, a légijármű a megoldási tanácsadás g) pontban meghatározott gyorsulással való teljesítésével reagál a h) pontban ismertetett késleltetés után;

g) a megoldási tanácsadás módosulásakor alkalmazott gyorsítás értéke 0,25 g, hacsak a módosított megoldási tanácsadás nem egy fordított értelmű megoldási tanácsadás vagy egy megnövelt függőleges sebességű megoldási tanácsadás, amely esetben a gyorsulás 0,35 g;

h) egy megoldási tanácsadás módosulásánál alkalmazott késleltetés 2,5 s, hacsak ez azt nem eredményezi, hogy a gyorsulás korábban kezdődik, mint 5 másodperc a kezdeti megoldási javaslattól számítva, amely esetben a gyorsulás a kezdeti megoldástól számítva 5 másodpercre kezdődik; és

i) ha a megoldási javaslatot törlik, a légijármű visszatér az eredeti függőleges sebességéhez (ha szükséges) 0,25 g gyorsulással 2,5 másodperces késleltetés után.

4.4.2.6 Szabványos találkozási modell

4.4.2.6.1 *A szabványos találkozási modell elemei*

4.4.2.6.1.1 Hogy számítani tudják az ACAS hatását az összeütközés kockázatára (4.4.3 alpont) és az ACAS-nak a légiforgalmi áramlásszervezéssel (ATM) (4.4.4 paragrafus) való összeegyeztethetősége érdekében a találkozások együtteseit hozzák létre az alábbiak mindegyikére:

a) a két légijármű címzés elrendezése;

b) a hat magasság réteg;

c) tizenkilenc találkozás osztály; és

d) kilenc vagy tíz *vmd* befoglaló a 4.4.2.6.4 pontban ismertetettek szerint.

Az eredményeket ezeknél az együtteseknél kombinálni kell a 4.4.2.6.2 pontban megadott viszonylagos súlyozások felhasználásával.

4.4.2.6.1.1.1 A találkozás együttesek mindegyike legalább 500 független véletlenszerűen generált előfordulást tartalmaz.

4.4.2.6.1.2 A két légijármű repülési pályáját mindegyik találkozásnál a következő, véletlenszerűen kiválasztott jellemzőkkel szerkesztik meg:

a) a függőleges síkban:

1) *vmd* a megfelelő *vmd* befoglaló belsejéből;

2) függőleges sebesség mindegyik légijárműnél a találkozás ablak kezdeténél, $\dot{z}_1$, és a találkozás ablak végénél, $\dot{z}_2$;

3) függőleges gyorsulás; és

4) a függőleges gyorsulás kezdeti időpontja; és

b) a vízszintes síkban pedig:

1) *hmd;*

2) megközelítési szög;

3) az egyes légijárművek sebessége a legszorosabb megközelítésnél;

4) döntés, hogy az egyes légijárművek fordulóban vannak-e vagy nem;

5) a forduló terjedelme; a bedőlési szög; és a forduló végének időpontja;

6) döntés mindegyik légijárműről, hogy változtatja-e a sebességet vagy nem;

7) a sebességváltozás nagysága

Megjegyzés. – Egy találkozás különböző jellemzőire végzett kiválasztásoknál lehetséges, hogy ellentmondások lesznek. Amikor ez előfordul, a problémát vagy egy adott jellemző kiválasztásának, vagy a teljes találkozás félretételével lehet megoldani, ahogyan a legalkalmasabb.

4.4.2.6.1.3 A *hmd* statisztikai eloszlására két modellt használnak (4.4.2.6.4.1 pont). Az ACAS-nak az összeütközés kockázatára gyakorolt hatásának számításánál (4.4.3 paragrafus) a *hmd* kevesebb, mint 500 lábra korlátozódik. Az ACAS ATM-el való összegyeztethetőségének számításánál (4.4.4 alpont), a *hmd*-t az értékek nagyobb tartományából választják ki (4.4.2.6.4.1.2 pont).

Megjegyzés. – A 4.4.2.6.2 és 4.4.2.6.3 pontok függőleges jellemzőket határoznak meg a légijármű repülési pályákra vonatkoztatva a szabványos előfordulási modellben, amelyek függnek attól, hogy a hmd *kicsinyre szűkül össze (“kockázati arány számításához”), vagy nagyobb értékeket képes felvenni (“ATM kompatibilitásnál”). Más esetben az előfordulások jellemzői a függőleges és vízszintes síkban függetlenek.*

4.4.2.6.2 *Találkozási osztályok és súlyok*

4.4.2.6.2.1 *Légijármű címzés.* Mindegyik légijármű egyenlő valószínűséggel kapja a magasabb légijármű címet.

4.4.2.6.2.2 *Magasság rétegek.* A magasságrétegek viszonylagos súlyai a következők:

Réteg	*1*	*2*	*3*	*4*	*5*	*6*
Valószín.(réteg)	0.13	0,25	0,32	0,22	0,07	0,01

4.4.2.6.2.3 *Találkozás osztályok*

4.4.2.6.2.3.1 A találkozásokat aszerint osztályozzák, hogy a légijárművek vízszintes repülést végzők (L) vagy átmenők (T) a találkozási ablak kezdeténél (*tca* előtt) és a végénél (*tca* után), függetlenül attól, hogy a találkozás keresztező-e vagy nem.

Osztály	*1.sz. légijármű*		*2.sz. légijármű*		*Keresztezés*
	tca *előtt*	tca *után*	tca *előtt*	tca *után*	
1	L	L	T	T	Igen
2	L	L	L	T	Igen
3	L	L	T	L	Igen
4	T	T	T	T	Igen
5	L	T	T	T	Igen
6	T	T	T	L	Igen
7	L	T	L	T	Igen
8	L	T	T	L	Igen
9	T	L	T	L	Igen
10	L	L	L	L	Nem
11	L	L	T	T	Nem
12	L	L	L	T	Nem
13	L	L	T	L	Nem
14	T	T	T	T	Nem
15	L	T	T	T	Nem
16	T	T	T	L	Nem
17	L	T	L	T	Nem
18	L	T	T	L	Nem
19	T	L	T	L	Nem

4.4.2.6.2.3.2 A találkozási osztályok viszonylagos súlyai a következőképpen függnek a rétegtől:

Osztály	*a kockázati arány számításnál*		*ATM kompatibilitásnál*	
	1-3 rétegek	*4-6 rétegek*	*1-3 rétegek*	*4-6 rétegek*
1	0,00502	0,00319	0,06789	0,07802
2	0,00030	0,00018	0,00408	0,00440
3	0,00049	0,00009	0,00664	0,00220
4	0,00355	0,00270	0,04798	0,06593
5	0,00059	0,00022	0,00791	0,00549
6	0,00074	0,00018	0,00995	0,00440
7	0,00002	0,00003	0,00026	0,00082
8	0,00006	0,00003	0,00077	0,00082
9	0,00006	0,00003	0,00077	0,00082
10	0,36846	0,10693	0,31801	0,09011
11	0,26939	0,41990	0,23252	0,35386
12	0,06476	0,02217	0,05590	0,01868
13	0,07127	0,22038	0,06151	0,18571
14	0,13219	0,08476	0,11409	0,07143
15	0,02750	0,02869	0,02374	0,02418
16	0,03578	0,06781	0,03088	0,05714
17	0,00296	0,00098	0,00255	0,00082
18	0,00503	0,00502	0,00434	0,00440
19	0,01183	0,03651	0,01021	0,03077

4.4.2.6.2.4 vmd *befoglalók*

4.4.2.6.2.4.1 Mindegyik előfordulás *vmd*-jét a nem-keresztező találkozási osztályok tíz *vmd* befoglalójának egyikéből és a keresztező találkozási osztályok kilenc vagy tíz *vmd* befoglalójának egyikéből veszik. Mindegyik *vmd* befoglalójának 100 láb kiterjedése van a kockázat számításnál vagy 200 láb kiterjedése az ATM-el való kompatibilitás számításnál. A maximális *vmd* 1000 láb a kockázati arány számításnál és 2000 láb egyébként.

4.4.2.6.2.4.2 Nem-keresztező találkozási osztályoknál a *vmd* befoglaló viszonylagos súlyai a következők lesznek:

vmd *befoglaló*	*Kockázati arány számításához*	*ATM egyezőséghez*
1	0 ,013	0,128
2	0,026	0,135
3	0,035	0,209
4	0,065	0,171
5	0,100	0,160
6	0,161	0,092
7	0,113	0,043
8	0,091	0,025
9	0,104	0,014
10	0,091	0,009

Megjegyzés. – A vmd *befoglaló súlyainak összege nem adja ki az 1,0-t. A specifikus súlyok a légiforgalmi irányítási földi radar adatokban felfogott találkozások analízisén alapulnak. A hiányzó* *részek azt a tényt tükrözik, hogy az észlelt találkozások néhány olyan* vmd-*t tartalmaznak, amelyek meghaladják a modellben lévő maximális* vmd-*ket.*

4.4.2.6.2.4.3 A keresztező osztályoknál a *vmd* befoglalók viszonylagos súlyai a következők lesznek:

vmd *befoglaló*	*kockázati arány számításához*	*ATM egyezőséghez*
1	0.0	0.064
2	0.026	0.144
3	0.036	0,224
4	0,066	0,183
5	0,102	0,171
6	0,164	0,098
7	0,115	0,046
8	0,093	0,027
9	0,106	0,015
10	0,093	0,010

Megjegyzés. – A keresztező osztályoknál a vmd-*nek meg kell haladnia 100 lábat, hogy a találkozás keresztező találkozásnak minősüljön. Így a kockázati arány számításánál nincs 1-es* vmd *befoglaló, és az ATM-el való kompatibilitás számításainál az 1-es* vmd [*100 láb, 200 láb*] *értékre korlátozódik.*

4.4.2.6.3 *Légijármű repülési pályák jellemzői függőleges síkban*

4.4.2.6.3.1 *vmd.* A *vmd*-t minden találkozásnál véletlenszerűen kell kiválasztani az eloszlásból, amely egyenletes a megfelelő *vmd* befoglaló által lefedett sávban.

4.4.2.6.3.2 *Függőleges sebesség*

4.4.2.6.3.2.1 Mindegyik légijárműnél az egyes találkozásokban vagy a függőleges sebesség állandó ($\dot{z}$), vagy a repülési pályát úgy kell megszerkeszteni, hogy a függőleges sebesség *tca* - 35s-nél $\dot{z}_1$ legyen és a függőleges sebesség *tca* + 5-s-nél $\dot{z}_2$ legyen. Az egyes $\dot{z}$, $\dot{z}_1$ vagy $\dot{z}_2$ függőleges sebességeket úgy kell meghatározni, hogy először véletlenszerűen kiválasztanak egy tartományt, amelyen belül az fekszik, azután kiválasztják a pontos értéket egy eloszlásból, amely egyenletes a kiválasztott tartományon keresztül.

4.4.2.6.3.2.2 A sávok, amelyeken belül a függőleges sebességek fekszenek, függnek attól, hogy a légijármű vízszintesen repül, azaz a 4.4.2.6.2.3.1 pontban "L"-el van jelölve, vagy átmenő állapotban , azaz a 4.4.2.6.2.3.1 pontban "T"-vel van jelölve, és a következők lesznek:

L	*T*
[240 láb/perc, 400 láb/perc]	[3200 láb/perc, 6000 láb/perc]
[80 láb/perc, 240 láb/perc]	[400 láb/perc, 3200 láb/perc]
[-80 láb/perc, 80 láb/perc]	[-400 láb/perc, 400 láb/perc]
[-240 láb/perc, 80 láb/perc]	[-3200 láb/perc, 400 láb/perc]
[-400 láb/perc, 240 láb/perc]	[-6000 láb/perc, 3200 láb/perc]

4.4.2.6.3.2.3 Azoknál a légijárműveknél, amelyek a teljes találkozási ablak felett vízszintesen repülnek, a $\dot{z}$ függőleges sebesség állandó. A sávok valószínűségei, amelyeken belül a $\dot{z}$ fekszik, a következők lesznek:

$\dot{z}$ (láb/perc)	*prob ($\dot{z}$)*
[240 láb/perc, 400 láb/perc]	0,0382
[80 láb/perc, 240 láb/perc]	0,0989
[-80 láb/perc, 80 láb/perc]	0,7040
[-240 láb/perc, 80 láb/perc]	0,1198
[-400 láb/perc, 240 láb/perc]	0,0391

4.4.2.6.3.2.4 Azoknál a légijárműveknél, amelyek a teljes találkozási ablak felett nem vízszintes repülést végeznek, az időközöket a $\dot{z}_1$*-re és* $\dot{z}_2$-re közösen kell véletlenszerű kiválasztással meghatározni, közös valószínűségeket használva, amelyek a magassági rétegtől és attól függnek, hogy a légijármű átmenő-e a találkozási ablak kezdeténél (sebesség-vízszintes), a találkozás ablak végénél (vízszintes-sebesség), vagy mind az elején, mind a végén (sebesség-sebesség). A közös valószínűségek a függőleges sebesség sávokra a következők lesznek.

Sebesség-vízszintes repülési pályával rendelkező légijárművekre az 1-3 rétegekben,

$\dot{z}_2$ tartomány	*$\dot{z}_1$ és $\dot{z}_2$ tartomány közös valószínűsége*				
[240 láb/perc, 400 láb/perc]	0,0019	0,0169	0,0131	0,1554	0,0000
[80 láb/perc, 240 láb/perc]	0,0000	0.0187	0,0019	0,1086	0,0000
[-80 láb/perc, 80 láb(perc]	0,0037	0,1684	0,0094	0,1124	0,0075
[-240 láb/perc, -80 láb/perc]	0,0037	0,1461	0,0094	0,0243	0,0037
[-400 láb/perc, -240 láb/perc]	0,0000	0,1742	0,0094	0,0094	0,0019

-6000 láb/perc -3200 láb/perc -400 láb/perc 400 láb/perc 3200 láb/perc 6000 láb/perc $\dot{z}_1$

Sebesség-vízszintes repülési pályával rendelkező légijárművekre a 4-6 rétegekben,

$\dot{z}_2$ tartomány	*$\dot{z}_1$ és $\dot{z}_2$ tartományok közös valószínűsége*				
[240 láb/perc, 400 láb/perc]	0,0105	0,0035	0,0000	0,1010	0,0105
[80 láb/perc, 240 láb/perc]	0,0035	0.0418	0,0035	0,1776	0,0279
[-80 láb/perc, 80 láb(perc]	0,0279	0,1219	0,0000	0,2403	0,0139
[-240 láb/perc, -80 láb/perc]	0,0035	0,0767	0,0000	0,0488	0,0105
[-400 láb/perc, -240 láb/perc]	0,0105	0,0453	0,0035	0,0174	0,0000

-6000 láb/perc -3200 láb/perc -400 láb/perc 400 láb/perc 3200 láb/perc 6000 láb/perc $\dot{z}_1$

Vízszintes-sebesség repülési pályával rendelkező légijárművekre az 1-3 rétegekben,

$\dot{z}_2$ tartomány	*$\dot{z}_1$ és $\dot{z}_2$ tartományok közös valószínűsége*				
[3200 láb/perc, 6000 láb/perc]	0,0000	0,0000	0,0000	0,0000	0,0000
[400 láb/perc, 3200 láb/perc]	0,0074	0.0273	0,0645	0,0720	01538
[-400 láb/perc, 400 láb(perc]	0,0000	0,0000	0,0000	0,0000	0,0000

[-3200 láb/perc, -400 láb/perc]	0,2978	0,2084	0,1365	0,0273	0,0050
[-6000 láb/perc, -3200 láb/perc]	0,0000	0,0000	0,0000	0,0000	0,0000

-400 láb/perc -240 láb/perc -80 láb/perc 80 láb/perc 240 láb/perc 400 láb/perc $\dot{z}_1$

Vízszintes - sebesség repülési pályával rendelkező légijárművekre a 4-6 rétegekben,

$\dot{z}_2$ *tartomány*	$\dot{z}_1$ *és* $\dot{z}_2$ *tartományok közös valószínűsége*				
[3200 láb/perc, 6000 láb/perc]	0,0000	0,0000	0,0000	0,0000	0,0192
[400 láb/perc, 3200 láb/perc]	0,0000	0.0000	0,0962	0,0577	0,1154
[-400 láb/perc, 400 láb/perc]	0,0000	0,0000	0,0000	0,0000	0,0000
[-3200 láb/perc, -400 láb/perc]	0,1346	0,2692	0,2308	0,0577	0,0192
[-6000 láb/perc, -3200 láb/perc]	0,0000	0,0000	0,0000	0,0000	0,0000

-400 láb/perc -240 láb/perc -80 láb/perc 80 láb/perc 240 láb/perc 400 láb/perc $\dot{z}_1$

Sebesség-sebesség repülési pályával rendelkező légijárművekre a 1-3 rétegekben,

$\dot{z}_2$ *tartomány*	$\dot{z}_1$ *és* $\dot{z}_2$ *tartományok közös valószínűsége*				
[3200 láb/perc, 6000 láb/perc]	0,0000	0,0000	0,0007	0,0095	0,0018
[400 láb/perc, 3200 láb/perc]	0,0000	0.0018	0,0249	0,2882	0,0066
[-400 láb/perc, 400 láb/perc]	0,0000	0,0000	0,0000	0,0000	0,0000
[-3200 láb/perc, -400 láb/perc]	0,0048	0,5970	0,0600	0,0029	0,0011
[-6000 láb/perc, -3200 láb/perc]	0,0000	0,0007	0,0000	0,0000	0,0000

-6000 láb/perc -3200 láb/perc -400 láb/perc 400 láb/perc 3200 láb/perc 6000 láb/perc $\dot{z}_1$

Sebesség - sebesség repülési pályával rendelkező légijárművekre az 4-6 rétegekben,

$\dot{z}_2$ *tartomány*	$\dot{z}_1$ *és* $\dot{z}_2$ *tartományok közös valószínűsége*				
[3200 láb/perc, 6000 láb/perc]	0,0014	0,0000	0,0028	0,0110	0,0069
[400 láb/perc, 3200 láb/perc]	0,0028	0.0028	0,0179	0,4889	0,0523
[-400 láb/perc, 400 láb/perc]	0,0000	0,0000	0,0000	0,0000	0,0000
[-3200 láb/perc, -400 láb/perc]	0,0317	0,3029	0,0262	0,0152	0,0028
[-6000 láb/perc, -3200 láb/perc]	0,0110	0,0220	0,0014	0,0000	0,0000

-6000 láb/perc -3240 láb/perc -400 láb/perc 400 láb/perc 3200 láb/perc 6000 láb/perc $\dot{z}_1$

4.4.2.6.3.2.5 Sebesség-sebesség nyomvonal esetén, ha $|\dot{z}_2 - \dot{z}_1| < 566$ láb/perc, akkor a nyomvonalat állandó értékű, $\dot{z}_1$-el egyenlő sebességgel kell létrehozni.

4.4.2.6.3.3 *Függőleges gyorsulás*

4.4.2.6.3.3.1 A 4.4.2.6.3.2.5 pontnak megfelelő esetben, amikor a légijárművek nem vízszintesen repülnek az egész találkozási ablak felett, a függőleges sebesség állandó és $\dot{z}_1$-al egyenlő legalább a [*tca* - 40 s, *tca* - 35 s] tartomány felett a találkozási ablak kezdeténél, és állandó és egyenlő $\dot{z}_2$-al legalább a [*tca* + 5s, *tca* + 10 s] a találkozási ablak végénél. A függőleges gyorsulás állandó a közbenső időszakban.

4.4.2.6.3.3.2 A függőleges gyorsulást ($\ddot{z}$) a következőképpen kell modellezni:

$$\ddot{z} = (A\dot{z}_2 - \dot{z}_1) + \varepsilon$$

ahol az A paraméter esetfüggő az alábbiak szerint:

	$A(s^{-1})$	
Eset	*1-3 rétegek*	*4-6 rétegek*
Sebesség-egyenletes	0,071	0,059
Egyenletes-sebesség	0,089	0,075
Sebesség-sebesség	0,083	0,072

és az ε hibát véletlenszerűen választják ki, a következő valószínűségi sűrűséget használva

$$p(\varepsilon) = \frac{1}{2\mu}\exp\left(-\frac{|\varepsilon|}{\mu}\right)$$

ahol $\mu = 0{,}3$ láb s^{-2}

Megjegyzés. - A $\ddot{z}$ *gyorsulás előjelét a* $\dot{z}_1$ *és* $\dot{z}_2$ *határozza meg. Egy* ε, *hibát, amely ezt az előjelet megváltoztatja, el kell vetni, és a hibát újra kell választani.*

4.4.2.6.3.4 *Gyorsulás kezdetének időpontja*. Gyorsulás kezdetének időpontja egyenletesen oszlik el a [*tca* - 35 s, *tca -5 s*] sávban, és olyannak kell lennie, hogy a $\dot{z}_2$ elérése *tca* + 5 s-nál ne későbben következzék be.

4.4.2.6.4 *A légijármű repülési pályáinak jellemzői vízszintes síkban*

4.4.2.6.4.1 *Vízszintes elkerülési távolság*

4.4.2.6.4.1.1 Az ACAS-nak az összeütközés kockázatára gyakorolt hatásának számításánál (4.4.3 alpont), a *hmd* egyenletes eloszlású a [0,500 láb] sávban.

4.4.2.6.4.1.2 Az ACAS ATM-el való összeegyeztethetőségére vonatkozó számításoknál (4.4.4 alpont), *hmd* eloszlása olyan legyen, hogy a *hmd* értékei a következő kumulatív valószínűségekkel rendelkezzenek:

hmd (láb)	*kumulatív valószínűség*	
	1-3 rétegek	*4-6 rétegek*
0	0,000	0,000
1215	0,152	0,125
2430	0,306	0,195
3646	0,482	0,260
4860	0,631	0,322
6067	0,754	0,398
7921	0,859	0,469
8506	0,919	0,558
9722	0,954	0,624
10937	0,972	0,692
12152	0,982	0,753
13367	0,993	0,801
14582	0,998	0,821
15798	0,999	0,848
17013	0,999	0,868
18228	1,000	0,897
19443		0,916
20659		0,927
21874		0,939
23089		0,946
24304		0,952
25520		0,965
26735		0,983
27950		0,993
29165		0,996
30381		0,999
31596		1,000

4.4.2.6.4.2 *Megközelítési szög.* A kumulatív eloszlás a vízszintes megközelítési szögnél a következők szerinti lesz:

Megközelítési szög (fok)	*Kumulatív valószínűség*	
	1-3 rétegek	*4-6 rétegek*
0	0,00	0,00
10	0,14	0,05
20	0,17	0,06
30	0,18	0,08
40	0,19	0,08
50	0,21	0,10
60	0,23	0,13
70	0,25	0,14
80	0,28	0,19
90	0,32	0,22
100	0,38	0,28
110	0,43	0,31

120	0,49	0,35
130	0,55	0,43
140	0,62	0,50
150	0,71	0,59
160	0,79	0,66
170	0,88	0,79
180	1,00	1,00

4.4.2.6.4.3 *Légijármű sebesség.* A kumulatív eloszlás az egyes légijármű vízszintes földhöz viszonyított sebességekre a legszorosabb megközelítésnél a következők szerinti lesz:

Földfeletti sebesség (csomó)	*Halmozott valószínűség*	
	1-3 rétegek	*4-6 rétegek*
45	0,000	
50	0,005	
75	0,024	0,000
100	0,139	0,005
125	0,314	0,034
150	0,486	0,064
175	0,616	0,116
200	0,700	0,071
225	0,758	0,211
250	0,821	0,294
275	0,895	0,361
300	0,949	0,427
325	0,977	0,528
350	0,988	0,602
375	0,997	0,692
400	0,998	0,813
425	0,999	0,883
450	1,000	0,940
475		0,972
500		0,987
525		0,993
550		0,998
575		0,999
600		1,000

4.4.2.6.4.4 *Vízszintes manőver valószínűségek.* Az egyes légijárművekre az egyes találkozásoknál egy forduló valószínűsége az adott fordulóhoz tartozó sebességváltozás valószínűsége és a forduló nélküli adott sebességváltozás valószínűsége a következő lesz:

Réteg	*Prob (forduló)*	*Prob (sebességváltozás) fordulóval*	*Prob (sebességváltozás) forduló nélkül*
1	0,31	0,20	0,50
2	0,29	0,20	0,25
3	0,22	0,10	0,15

4, 5, 6	0,16	0,05	0,10

4.4.2.6.4.4.1 Egy adott sebességváltozásnál a sebesség növekedésének valószínűsége 0,5, a sebesség csökkenésének valószínűsége 0,5.

4.4.2.6.4.5 *Forduló terjedelem.* Bármely forduló terjedelmének kumulatív eloszlása a következő:

Forduló terjedelem(fok)	*Kumulatív valószínűség*	
	1-3 rétegek	*4-6 rétegek*
15	0,00	0,00
30	0,43	0,58
60	0,75	0,90
90	0,88	0,97
120	0,95	0,99
150	0,98	1,00
180	0,99	
210	1,00	

4.4.2.6.4.5.1 A forduló iránya véletlenszerű, 0,5-ös balforduló valószínűséggel és 0,5-ös jobbforduló valószínűséggel.

4.4.2.6.4.6 *Bedőlési szög.* A légijármű forduló alatti bedőlési szöge nem lehet 15 foknál kisebb. Annak valószínűsége, hogy 15 fokkal lesz egyenlő, 0,79 az 1-3 rétegekben, és 0,54 és 4-5 rétegekben. Az összesített eloszlás nagyobb bedőlési szögeknél a következő:

Bedőlési szög (fok)	*Összesített valószínűség*	
	1-3 rétegek	*4-6 rétegek*
15	0,79	0,54
25	0,96	0,82
35	0,99	0,98
50	1,00	1,00

4.4.2.6.4.7 *Forduló befejezési időpont.* Az egyes légijármű fordulók befejezési időpontjának összesített eloszlása a következő:

Forduló befejezése időpont (másodperc tca előtt)	*Összesített valószínűség*	
	1-3 rétegek	*4-6 rétegek*
0	0,42	0,28
5	0,64	0,65
10	0,77	0,76
15	0,86	0,85
20	0,92	0,94
25	0,98	0,99
30	1,00	1,00

4.4.2.6.4.8 *Sebesség változás.* Állandó gyorsulás vagy lassulás véletlenszerűen kerül kiválasztásra minden légijárműnél, amely sebességváltoztatást hajt végre egy adott találkozásnál, és a találkozás időtartama alatt ez kerül alkalmazásra. A gyorsulások 2 csomó/s és 6 csomó/s között egyenletes eloszlásúak. A lassulások 1 csomó/s és 3 csomó/s között egyenletes eloszlást mutatnak.

4.4.2.7 Megközelítő légijármű ACAS-al való felszerelése

A 4.4.3 és 4.4.4 pontokban ismertetett teljesítmény követelmények három különböző szituációra érvényesek, amelyekben a megközelítő légijármű ACAS-ára és repülési pályájára vonatkozó alábbi feltételek érvényesek:

a) ahol az egyes találkozásokban résztvevő megközelítő légijármű nincs felszerelve (4.4.2.1 j) 1) pont); és olyan repülési pályát követ, amely azonos azzal, amit akkor követ, amikor a saját légijármű nincs felszerelve;

b) ahol a megközelítő légijármű ACAS-al rendelkezik, de olyan repülési pályát követ, amely azonos a nem felszerelt találkozásban levőével (4.4.2.1 j) 2) pont);

   1) az azonos repülési pályát követi függetlenül attól, hogy van megoldási tanácsadás, vagy nincs;

   2) a megközelítő légijármű ACAS-a megoldási javaslatot generál és megoldási tanácsadás kiegészítést továbbít, amelyet azonnal vesznek azután, hogy valamilyen megoldási javaslatot először közöltek a saját légijármű vezetőjével;

   3) a megközelítő ACAS-a által generált és a saját légijárműnek továbbított megoldási tanácsadás kiegészítés értelme ellentétes a saját légijármű által kiválasztott és a megközelítő légijárműnek továbbított első megoldási tanácsadás kiegészítés értelmével (4.3.6.1.3 pont);

   4) a megközelítő légijármű által továbbított megoldási javaslatot a saját légijármű veszi; és

   5) a követelmények érvényesek akkor is, amikor a saját légijárműnek van az alacsonyabb légijármű címzése, és akkor is, amikor a megközelítő légijárműnek van az alacsonyabb légijármű címzése; és

c) ahol a megközelítő légijármű olyan ACAS-al van felszerelve, amely a saját ACAS összeütközés elhárító logikájával azonos összeütközés elhárító logikával rendelkezik (4.4.2.1.j) 3) pont)

   1) a saját légijármű ACAS és repülőgépvezető működésére vonatkozó feltételek egyenlően érvényesek a megközelítő légijárműre, ACAS-ra és légijárművezetőre;

   2) az egyik légijármű által továbbított megoldási tanácsadás kiegészítéseket a másik veszi; és

   3) a követelmények egyaránt érvényesek akkor is, ha a saját légijárműnek van alacsonyabb légijármű címzése, és akkor is, ha a megközelítő légijárműnek van alacsonyabb légijármű címzése.

4.4.2.8 Összeegyeztethetőség a különböző összeütközés elhárító logikák tervezése között

Ajánlás. – *Alternatív összeütközés elhárító logikai tervezéseket illetően a vizsgáztató hatóságoknak a következőket kell megvizsgálniuk:*

a) *az alternatív tervezés működési formái elfogadhatóak-e azoknál a találkozásoknál, amelyekben olyan ACAS egységek vesznek részt, amelyek meglévő tervezéseket használnak; és*

b) *a meglévő tervezések működését nem rontja-e le az alternatív tervezés használata.*

Megjegyzés. – A különböző összeütközés elhárító logikák tervezése közötti összhangot illetően, a 4.4.2.7 b) pontban leírt feltételek a legszigorúbbak, ami ebben a vonatkozásban elképzelhető.

4.4.3 Az összeütközés kockázatának csökkentése

A 4.4.2 pontok feltételei között az összeütközés elhárító logika olyan, hogy az összeütközések várható száma az ACAS hiányában várt szám következő arányaira redukálódik:

a) amikor a megközelítő légijármű nincs ACAS-al felszerelve 0,18;
b) amikor a megközelítő légijármű felszerelt, de nem válaszol 0,32; és
c) amikor a megközelítő légijármű felszerelt és válaszol 0,04.

4.4.4 Összeegyeztethetőség a légiforgalmi áramlásszervezéssel (ATM)

4.4.4.1 Zavarásos riasztási arány

4.4.4.1.1 A 4.4.2 alpont feltételei között az összeütközés elhárító logika olyan, hogy azoknak a megoldási javaslatoknak a száma, amelyek "zavarások" (4.4.4.1.2 pont) nem haladhatja meg:

a 6 %-ot, amikor a saját légijármű függőleges sebessége a megoldási tanácsadás első ízben történő kiadásának időpontjában kisebb, mint 400 láb/perc; vagy

8 %-ot, amikor a saját légijármű függőleges sebessége a megoldási tanácsadás első ízben történő kiadásának időpontjában meghaladja a 400 láb/percet.

Megjegyzés. – Ezt a követelményt a megközelítő légijármű ACAS felszerelése nem elégíti ki (4.4.2.7 pont), mivel ennek elhanyagolható hatása van a találkozásra és a zavarásos megoldási javaslatok gyakoriságára.

4.4.4.1.2 Egy megoldási javaslatot "zavarás"-nak kell tekinteni a 4.4.4.1.1 pont szerinti célból, hacsak ACAS hiányában a találkozás valamely pontjában a vízszintes elkülönítés és a függőleges elkülönítés nem lesz kisebb a következő értékeknél:

	Vízszintes elkülönítés	*Függőleges elkülönítés*
FL 100 felett	2,0 NM	750 láb
FL 100 alatt	1,2 NM	750 láb

4.4.4.2 Összeegyeztethető értelem választás

A 4.4.2 alpont feltételei között az összeütközés elhárító logikának olyannak kell lenni, hogy azoknak a találkozásoknak az aránya, amelyekben a megoldási javaslatot követően ez a legszorosabb megközelítésnél ellenkező előjelű magassági elkülönítést eredményez, mint ami az ACAS hiányában következik be, nem haladhatja meg a következő értékeket:

a) amikor a megközelítő légijármű nincs ACAS-al felszerelve 0.08;
b) amikor a megközelítő légijármű fel van szerelve, de nem válaszol 0.08; és
c) amikor a megközelítő légijármű fel van szerelve, és válaszol , 0.12.

4.4.4.3 Az ACAS által okozott eltérések

4.4.4.3.1 A 4.4.2 alpont feltételei között az összeütközés elhárító logikának olyannak kell lenni, hogy a jelzett értékeknél nagyobb "eltéréseket" eredményező megoldási javaslatok száma ne haladja meg a megoldási javaslatok teljes számához viszonyított következő arányokat:

	Amikor a saját légijármű függőleges sebessége a RA első kiadásának időpontjában	
	kisebb, mint 400 láb/perc	*nagyobb mint 400 láb/perc*
amikor a megközelítő légijármű nincs ACAS-al felszerelve, *eltérés 300 láb esetén, vagy afölött* *eltérés 600 láb esetén, vagy afölött* *eltérés 1000 láb esetén, vagy afölött*	*0,15* *0,04* *0,01*	*0,23* *0,13* *0,07*
amikor a megközelítő légijármű fel van szerelve, de nem válaszol, *eltérés 300 láb esetén, vagy afölött* *eltérés 600 láb esetén, vagy afölött* *eltérés 1000 láb esetén, vagy afölött*	0,23 0,06 0,02	0,35 0,16 0,07
amikor a megközelítő légijármű fel van szerelve és válaszol, *eltérés 300 láb esetén, vagy afölött* *eltérés 600 láb esetén, vagy afölött* *eltérés 1000 láb esetén, vagy afölött*	0,11 0,02 0,01	0,23 0,12 0,06

4.4.4.3.2 A 4.4.4.3.1 alpont céljainak megfelelően, a felszerelt légijármű "eltérések"-et az eredeti repülési pályától abban az időtartományban kell mérni, amely attól az időponttól, amelynél a megoldási tanácsadás első ízben kiadásra kerül, addig az időpontig terjed, amelynél a megoldási tanácsadás törlését követően, a felszerelt légijármű visszaállítja eredeti magasság változtatási sebességét. Az eltérést úgy kell számítani, mint ebben az időtartományban felvett legnagyobb magasság különbséget a felszerelt légijármű által eredetileg követett repülési pálya és a megoldási tanácsadás hatására létrejött repülési pálya között.

4.4.5 Konfliktusban álló célpontok viszonylagos értéke

Ajánlás. – *Az összeütközés elhárító logikának olyannak kell lenni, hogy amennyire megvalósítható, csökkentse az összeütközés kockázatát (a 4.4.3 pontban meghatározottak szerint mérve) és amennyire* *megvalósítható, korlátoznia kell a széttagolást az ATM-nél (a 4.4.4 pontban meghatározottak szerint mérve.)*

4.5 Kiterjesztett squitter jelentések ACAS használata

4.5.1 ACAS hibrid felderítés kiterjesztett squitter helyzetadatok felhasználásával

Megjegyzés. – Hibrid felderítés az az eljárás, amelyet az ACAS használ a kiterjesztett squitteren keresztül rendelkezésre álló passzív helyzetinformáció lehetőségének kihasználására. A hibrid felderítés felhasználásával az ACAS érvényesíti a kiterjesztett squitter által a közvetlen aktív távolságmérésen keresztül szolgáltatott helyzetet. A kezdeti érvényesítést a nyomvonal kezdeténél végzik. Újraérvényesítést 10 másodpercenként egyszer végeznek, ha a megközelítő légijármű egy majdnem veszélyeztető légijárművé válik magasság vagy távolság szerint. Végezetül rendszeres aktív felderítést végeznek másodpercenként egyszer azoknál a megközelítő légijárműveknél, amelyek mind magasság, mind távolság szerint majdnem veszélyeztető légijárművé válnak. Ilyen módon passzív felderítést (egyszer érvényesített) alkalmaznak nem veszélyeztető megközelítő légijárműveknél, így lassítva az ACAS lekérdezési gyakoriságot. Aktív felderítést akkor használnak, amikor egy megközelítő légijármű majdnem veszélyeztető légijárművé válik, hogy megőrizzék az ACAS függetlenségét független biztonsági figyelőként.

4.5.1.1 Meghatározások

Active surveillance – Aktív felderítés
Egy megközelítő légijármű nyomonkövetésének folyamata a saját légijármű lekérdezéseire adott válaszokból nyert információk felhasználásával.

Active track – Aktív nyomvonal
Aktív lekérdezéssel nyert mérések által kialakított nyomvonal.

Hybrid surveillance – Hibrid felderítés
Aktív felderítés használatának folyamata más légijárművek érvényesítésére és figyelésére, amely légijárműveket alapvetően passzív felderítés felhasználásával követik, hogy megőrizzék az ACAS függetlenségét.

Initial aquisition – Kezdeti adatgyűjtés
Új nyomvonal kialakítás elkezdésének folyamata S-módú légijárműtől származó squitter vétele után, amely légijárműre vonatkozóan nincs aktív lekérdezés alapján kialakított nyomvonal.

Initial validation – Kezdeti érvényesítés
Új nyomvonal viszonylagos helyzetének megerősítési folyamata passzív információk felhasználásával az aktív lekérdezéssel nyert viszonylagos helyzettel való összehasonlítása útján.

Passive surveillance – Passzív felderítés
Egy másik légijármű követése annak lekérdezése nélkül, a másik légijármű kiterjesztett squittereinek felhasználásával. Az ACAS a passzív nyomvonalakban tartalmazott információkat az aktív ellenőrzés szükségletének figyelésére, de semmilyen más célra nem használja.

Passive track – Passzív nyomvonal
A kezdeti adatgyűjtés után, aktív lekérdezés nélkül, kiterjesztett squitterekben tartalmazott információ felhasználásával fenntartott nyomvonal.

4.5.1.2 Kiterjesztett squitter helyzet jelentések vételére felszerelt ACAS, nem-veszélyeztető légijármű passzív felderítésénél ezen passzív információkat a következő módon hasznosítja:

4.5.1.3 Passzív felderítés

4.5.1.3.1 *Kezdeti megerősítés.* Egy kiterjesztett squitter információkat jelentő légijármű kezdeti adatgyűjtésénél az ACAS meghatározza a viszonylagos távolságot és tengely irányszöget, ahogyan a saját légijármű helyzetéből és a megközelítő légijárműnek a kiterjesztett squitterben jelentett helyzetéből kiszámították. Ezt a leszármaztatott távolságot és tengely irányszöget és a squitterben jelentett magasságot kell összehasonlítani a légijármű aktív ACAS lekérdezéséből megállapított távolsággal, tengelyirányszöggel és magassággal. A leszármaztatott és mért távolság és tengelyirányszög, és a squitter és squitter és válasz magasság közötti különbségeket ki kell számítani és felhasználni a vizsgálatoknál, melyet annak megállapítására végeznek, hogy a kiterjesztett squitter adatok érvényesek-e. Ha ezek a vizsgálatok kielégítőek, a passzív helyzetet érvényesítettnek kell tekinteni, és a nyomvonalat passzív adaton kell fenntartani. Ha a fenti vizsgálatok bármelyike hibás eredményű, a nyomvonalat aktív nyomvonalnak kell tekinteni, és az ettől a nyomvonaltól vett egymás utáni passzív ellenőrzési adatokat nem használják tovább.

4.5.1.3.2 **Ajánlás**. – *A kiterjesztett squitter közleményben jelentett helyzet megerősítésére a következő vizsgálatokat kell alkalmazni:*

|*ferde távolság különbség*| $\leq$ 200 m;

|*irányszög különbség* | $\leq$ 45 fok; és
|*magasság különbség*| $\leq$ 100 láb.

4.5.1.3.3 *Kiegészítő aktív lekérdezések.* Annak biztosítása érdekében, hogy egy megközelítő légijármű nyomvonalát legalább olyan gyakran felfrissítsék, amilyen kiterjesztett squitter adatok hiányában megkövetelt (4.3.7.1.2.2 pont), egyes időpontokban egy adatot felfrissítenek squitter információk felhasználásával, az időpontot, amelynél egy következő aktív lekérdezésnek kell sorra kerülni, ki kell számítani. Aktív lekérdezést kell végezni ebben az időpontban, ha előtte még nem vették az esedékes lekérdezést.

4.5.1.4 Újraérvényesítés és figyelés. Ha a következő feltétel teljesül egy nyomvonalnál, amelyet passzív ellenőrzési adatok felhasználásával felfrissítettek:

a) $|a| \leq$ 10000 láb és vagy;

b) $|a| \leq$ 3000 láb vagy |a - 3000 láb| / | $\dot{a}$ | $\leq$ 60 s; vagy

c) r $\leq$ 3 NM vagy (r - 3 NM) / | $\dot{r}$ | $\leq$ 60 s

ahol:

a = a megközelítő légijármű magassági elkülönítése, láb
$\dot{a}$ = becsült magasságváltoztatási sebesség, láb/s
r = a megközelítő légijármű ferde távolsága, NM
$\dot{r}$ = becsült távolságváltozási sebesség, NM/s

aktív lekérdezést kell végezni minden 10 másodpercben, hogy folyamatosan újraérvényesítsék és figyeljék a kiterjesztett squitter adatokat, ameddig a fenti feltétel teljesül. A 4.5.1.3.1 pontban megkövetelt vizsgálatokat mindegyik aktív felderítésnél végre kell hajtani. Ha e vizsgálatok közül valamelyik hibás eredményt mutat, a nyomvonalat aktív nyomvonalnak deklarálják.

4.5.1.5 *Teljes aktív felderítés.* Ha a következő feltétel teljesül egy passzív felderítési adatokon keresztül felfrissített nyomvonalra:

a) $|a| \leq 10000$ láb és mindkettő

b) $|a| \leq 3000$ láb vagy $|a$ - 3000 láb$| / |\dot{a}| \leq 60$ s; vagy

c) $r \leq 3$ NM vagy (r - 3 NM) / $|\dot{r}| \leq 60$ s

ahol:

a	=	*a megközelítő légijármű magassági elkülönítése, láb*
$\dot{a}$	=	*becsült magasságváltoztatási sebesség, láb/s*
r	=	*a megközelítő légijármű ferde távolsága, NM*
$\dot{r}$	=	*becsült távolságváltozási sebesség, NM/s*

akkor a légijárműnek jelöljenek ki egy aktív nyomvonalat és frissítsék fel aktív távolság mérésekkel másodpercenként egyszer, amíg a fenti feltétel nem teljesül.

4.5.2 ACAS művelet tökéletesített MTL vevővel

Megjegyzés. – A kiterjesztett squitter alkalmazások, amelyek az ACAS-tól függetlenek, (a kényelem kedvéért) az ACAS használatával valósíthatók meg. Tökéletesített vevő minimális beindítási szint (MTL) használata lehetővé teszi kiterjesztett squitterek vételét maximálisan 60 NM-ről és azon túlról ilyen alkalmazások fenntartásánál.

4.5.2.1 ACAS, amely egy -74 dBm-nél nagyobb érzékenységű vevővel működik, megvalósítja a következő alpontokban ismertetett képességeket.

4.5.2.2 *Kettőzött minimális beindítási szintek.* Az ACAS vevő képes beállítani egy kijelzést minden squitter vételhez, mintha a választ egy hagyományos MTL-el (-74 dBm) működő ACAS észlelte volna. A hagyományos MTL-nél vett squitter vételeket továbbítani kell az ACAS felderítési tevékenységének további feldolgozásra. Azok a squitter vételek, amelyek ezt a feltételt nem elégítik ki, nem továbbíthatók az ACAS felderítési tevékenységének.

1. Megjegyzés. – Helyzet jelentés információkat tartalmazó kiterjesztett squittereket terjeszteni fogják kijelzésre egy kiterjesztett squitter alkalmazással kapcsolatosan.

2. Megjegyzés. – A hagyományos MTL használata az ACAS felderítési tevékenységénél megőrzi az ACAS folyó felderítési műveletvégzését, amikor tökéletesített MTL-es vevővel működik.

4.5.2.3 *Kettőzött vagy újra beindításra képes válasz processzor.* Az ACAS S-módú válasz feldolgozási tevékenysége a következő használati módokat foglalja magában:

a) különálló válaszprocesszorok használata S-módú válasz formátumokhoz, amelyeket a hagyományos MTL-nél vagy afölött vesznek és külön válasz processzor az S-módú válasz formátumokhoz, amelyeket a hagyományos MTL alatt vesznek; vagy

b) S-módú válasz processzor használata, amely újraindítja, ha S-módú bevezetőt észlel, amely 2-3 dB-el erősebb, mint az a válasz, amelynek feldolgozása éppen folyamatban van.

Megjegyzés. – Figyelmet kell fordítani annak biztosítására, hogy az alacsonyszintű squitterek (azaz a hagyományos MTL alattiak) ne interferáljanak az ACAS adatgyűjtő squitterek feldolgozásával. Ez akkor következhet be, ha az alacsonyszintű squitternek lehetősége van a válasz processzor befogására. Ez megelőzhető, ha minden egyes tevékenységhez külön válasz processzort használnak, vagy annak megkövetelésével, hogy a válasz processzor egy magasabb szintű squitter által beindítható legyen.

5. FEJEZET AZ S-MÓDÚ KITERJESZTETT SQUITTER

1. Megjegyzés – Az ADS-B és/vagy TIS-B rendszereket támogató S-módú kiterjesztett squitter funkcionális modellt az 5-1. ábra tartalmazza..

2. Megjegyzés – A fedélzeti rendszerek ADS-B közleményeket (ADS-B OUT) sugároznak és még ADS-B és TIS-B közleményeket (ADS-B és TIS-B) vehetnek. A földi telepítésű rendszerek (azaz földi adókészülékek) TIS-B közleményeket (opcionális) sugároznak és ADS-B közleményeket, vesznek.

3. Megjegyzés – Habár az 5-1. ábra szerinti funkcionális modell nyíltan nem mutatja, a repülőtéri mozgójárművekre vagy domborzati tereptárgy akadályokra telepített S-módú kiterjesztett squitter rendszerek sugározhatnak ADS-B közleményeket (ADS-B OUT) is.

5.1 Az S-módú kiterjesztett squitter adók rendszerjellemzői

Megjegyzés – Számos, a 2. fejezetben található a S-módú kiterjesztett squitter adáshoz kapcsolódó, és a 3. fejezetben található a S-módú válaszjeladók és nem válaszjeladó típusú eszközökhöz kapcsolódó követelményt a "Technical Provisions for Mode S Services and Extended Squitter (Doc. 9871)" kiadvány tartalmazza. A következő alfejezetekben megjelenített műszaki előírások, a specifikus osztályba sorolt, ADS-B és TIS-B alkalmazásokat támogató fedélzeti és földi rendszerekkel szemben támasztott követelményekre összpontosítanak.

5.1.1 ADS-B Out követelmények

5.1.1.1 Az ADS-B szolgáltatást támogató légijármű fedélzeti, mozgó földi és fix tereptárgy akadályokra telepített rendszerek legyenek képesek az ADS-B típusú közlemények szerkesztésére és az ADS-B típusú üzenetváltásra, ahogy az 5-1. ábra mutatja.

5.1.1.1.1 A légijármű fedélzetéről kezdeményezett ADS-B adatsugárzás tartalmazza a légijármű pozícióját, azonosítóját és típusát, a repülés közbeni sebesség vektorát és a közlemény generálását, kiváltó eseményt beleértve a vészhelyzeti és prioritási információkat is.

Megjegyzés – A kiterjesztett squitter típusú adatátviteli formátumokat és protokollokat a "Technical Provisions for Mode S Services and Extended Squitter (Doc. 9871)" kiadvány határozza meg.

5.1.1.2 Az ADS-B, kiterjesztett squitter adatsugárzással szemben támasztott követelmények. Az S-módú kiterjesztett squitter adatsugárzó berendezéseket az alább felsorolt, általános berendezés osztály meghatározásoknak, és az 5-1 és 5-2 táblázatok szerinti specifikus berendezés osztály meghatározásoknak megfelelően a hatótávolság egységek, és a sugárzott paraméterkészlet képességek szerint kell osztályozni.

a) Az „A" osztályú, fedélzeti, kiterjesztett squitter rendszerek támogatják, a kiterjesztett squitter adatsugárzást (úgy, mint ADS-B OUT) és a komplementer kiterjesztett squitter vételt (úgy, mint ADS-B IN) magába foglaló, fedélzeti ADS-B alkalmazást támogató, interaktív képességet.

b) A „B" osztályú, légijármű fedélzeti, földi mozgó járműre vagy fix tereptárgyra telepített kiterjesztett squitter rendszerek csak rádióadásra képesek (úgy, mint ADS-B OUT) kiterjesztett squitter rádióvétel képesség nélkül; és

c) A „C" osztályú kiterjesztett squitter rendszerek csak rádióvételre képesek és így rádióadás képességet velük szemben, nem támasztanak.

5.1.1.3 *Az „A" osztályú, kiterjesztett squitter rendszerekkel szemben támasztott követelmények*. Az „A" osztályú fedélzeti, kiterjesztett squitter rendszerek feleljenek meg az 5.1.1.1 és 5.2.12. alfejezetekben meghatározott, azonos osztályba sorolt (úgy, mint A0, A1, A2 vagy A3) adó és vevő alrendszerek jellemzőinek.

Megjegyzés – Az azonos specifikus osztályba sorolt (pl. A2 osztály) „A" osztályú, kiterjesztett squitter rendszereket úgy tervezték, hogy funkcionálisan és teljesítőképesség szempontjából egymás komplementerei legyenek. Az ugyanabba az osztályba sorolt kiterjesztett squitter adó és vevő rendszerek által támogatott minimum levegő-levegő hatótávolságok:

a) A0 – A0 névleges levegő-levegő hatótávolság 10 NM;

b) A1 – A1 névleges levegő-levegő hatótávolság 20 NM;

c) A2 – A2 névleges levegő-levegő hatótávolság 40 NM; és

d) A3 – A3 névleges levegő-levegő hatótávolság 90 NM;

A felsorolt hatótávolság adatok tervezési paraméterek a tényleges „A" osztályú, kiterjesztett squitter rendszer levegő-levegő hatótávolság egyes esetekben lehet nagyobb (pl. 1090 MHz interferenciával kevésbé terhelt légtérben) és lehet kisebb (pl. 1090 MHz interferenciával erősen terhelt légtérben).

5.1.2 TIS-B OUT követelmények

5.1.2.1 A TIS-B szolgáltatást támogató földi rendszerek legyenek képesek a TIS-B típusú közlemények szerkesztésére és az ADS-B típusú üzenetváltásra.

5.1.2.2 A TIS-B kiterjesztett squitter közleményeket, egy megfelelő légtérellenőrzési adatállományhoz hozzáférő, földi kiterjesztett squitter adóállomás sugározza.

1. Megjegyzés – A TIS-B típusú kiterjesztett squitter közleményt a "Technical Provisions for Mode S Services and Extended Squitter (Doc. 9871)" kiadvány írja le.

2. Megjegyzés – A TIS-B szolgáltatást támogató földi rádióállomás kiterjesztett squitter adatátvitelre képes. A földi rádióállomás műszaki jellemzőit, nevezetesen az adóteljesítményt, antennaerősítést, adatátviteli sebességet és az adatátvitel hatásos lesugárzott teljesítményét olyan TIS-B szolgáltatásra tervezték, amely azt feltételezi, hogy a fedélzeti felhasználó legalább „A" osztályú vevőkészülékkel rendelkezik.

5.1.2.3 **Ajánlás** – *A maximális adatátviteli sebességet és a hatásos lesugárzott teljesítményt szabályozni kell, azért hogy az interferencia az 1090 MHz-es rendszerekkel (úgy, mint SSR és ACAS) ne haladja meg, a még elfogadható szintet.*

5.2 Az S-módú kiterjesztett squitter vevő rendszerek műszaki jellemzői (ADS-B IN, TIS-B IN)

1. Megjegyzés – Az alábbi alpontok az ADS-B és/vagy TIS-B közleményeket hordozó S-módú kiterjesztett squitter adatsugárzás vételére használatos 1090 MHz-es vevőkészülékekkel szemben támasztott követelményeket ismertetik. A fedélzeti vevőkészülékek az ADS-B és TIS-B vételt, míg a földi vevőkészülékek csak az ADS-B vételt támogatják.

2. Megjegyzés – Az S-módú kiterjesztett squitter vevőkészülékekre vonatkozó részletes műszaki előírást az RTCA DO-260A, "Minimum Operational Performance Standards for 1 090 MHz Extended Squitter Automatic Dependent Surveillance – Broadcast (ADS-B) and Traffic Information Services – Broadcast (TIS-B)" kiadvány ismerteti.

5.2.1 Az S-módú kiterjesztett squitter vételi rendszerek funkcionális követelményei

5.2.1.1 Az S-módú kiterjesztett squitter vételi rendszerek legyenek képesek az üzenetváltási (vétel) és a jelentés szerkesztés feladatokra.

Megjegyzés – A kiterjesztett squitter vételi rendszerek veszik az ADS-B S-módú kiterjesztett squitter közleményeket és ADS-B jelentéseket továbbítanak a kliens alkalmazásoknak. A fedélzeti vevőrendszerek ezen túl, veszik a TIS-B kiterjesztett squitter közleményeket és jelentéseket továbbítanak a kliens alkalmazásoknak. Ez, az 5-1. ábrán látható funkcionális modell ábrázolja a fedélzeti és földi 1090 MHz-es, ADS-B vevőrendszereket egyaránt.

5.2.1.2 *Az S-módú kiterjesztett squitter vevő osztályok.* Az S-módú kiterjesztett squitter vevőrendszerekkel szemben támasztott funkcionális és képesség követelmények annak függvényében változnak, hogy milyen ADS-B vagy TIS-B alkalmazást támogatnak, és milyen célra használják a rendszert. A fedélzeti S-módú kiterjesztett squitter vevőkészülékek feleljenek meg az 5-3 táblázatban felsorolt vevőrendszer osztályozás meghatározásoknak.

Megjegyzés – Különböző S-módú kiterjesztett squitter készülék kiépítés lehetséges. Egy meghatározott készülék osztályhoz tartozó vevőkészülék karakterisztikának támogatnia kell a megkövetelt működési képességi szintet. Az A0-A3 készülék osztályok kielégítik az S-módú kiterjesztett squitter adatsugárzásra (ADS-B OUT) és vételre (ADS-B IN) alkalmas, S-módú kiterjesztett fedélzeti kiépítéseket. A B0-B3 készülék osztályok kielégítik a csak S-módú kiterjesztett squitter adatsugárzásra (ADS-B OUT) alkalmas, S-módú kiterjesztett fedélzeti kiépítéseket és megfelelnek a fedélzeti, mozgó földi és fix tereptárgyra telepített készülék osztályba sorolásnak. A C0-C3 készülék osztályok kielégítik az S-módú kiterjesztett squitter földi telepítésű vevőrendszerekkel szemben támasztott követelményeket. Az S-módú kiterjesztett squitter készülékosztályozáshoz, útmutatást a "Manual of the Secondary Surveillance Radar (SSR) Systems (Doc 9684)" *kiadvány tartalmazza*.

5.2.2 Üzenetváltás feladat

5.2.2.1 Az üzenetváltási feladat tartalmazza az 1090 MHz vevőantennát és a szokványos rádiókészülék (vevő/demodulátor/dekódoló/adat puffer) részfeladatokat.

5.2.2.2 *Az üzenetváltási feladat műszaki jellemzői*. A fedélzeti S-módú kiterjesztett squitter vevőrendszer támogassa az 5-3 táblázatban felsorolt összes kiterjesztett squitter közlemény vételét és dekódolását. A földi ADS-B kiterjesztett squitter vevőrendszer, minimálisan támogassa az összes kiterjesztett squitter típusú közlemény vételét és dekódolását, amelynek továbbítása a földi ATM (Automatic Traffic Management – Automatikus Forgalom Szervezés) kliens alkalmazásokat támogató ADS-B jelentések szerkesztéséhez szükséges.

5.2.2.3 *Követelmény a közlemény vételi jellemzőkhöz*. A fedélzeti S-módú kiterjesztett squitter vevő/demodulátor/dekóder vételi megoldásai, és minimum triggerelési küszöb (MTL) értékei feleljenek meg az 5-3 táblázatban a fedélzeti vevőkészülék osztályokra felsorolt követelményeknek. A földi telepítésű kiterjesztett squitter vevőkészüléket úgy kell megválasztani, hogy a vételi megoldásai és minimum triggerelési küszöbe (MTL) biztosítsa az ATN kliens alkalmazásokhoz szükséges vételi jellemzőket (úgy, mint hatótávolság és frissítés).

5.2.2.4 *Emeltszintű vételi megoldások.* Az A1, A2 és A3 osztályú fedélzeti vevő rendszerek, Mode A/C interferencia vagy/és intenzív S-módú átfedés esetén rendelkezzenek az alább felsorolt, az S-módú kiterjesztett squitter közlemény vételének képességével - az A0 osztályú fedélzeti vevőrendszerekben alkalmazott vételi eljárásokkal szemben támasztott követelményekhez viszonyítva - megnövelt vételi valószínűséggel:

a) Tökéletesített S-módú kiterjesztett squitter előzetes észlelés.

b) Emeltszintű hiba észlelés és javítás.

c) Az egyes fedélzeti vevőkészülék osztályokban használatos, emeltszintű bit és megbízhatóság vizsgálati eljárás az alábbiak szerint:

1) A1 osztály – az „amplitúdó közép” vizsgálati eljárással azonos vagy jobb eredményt biztosító.

2) A2 osztály – a „többszörös amplitúdó minta” bázis vizsgálati eljárással azonos vagy jobb eredményt biztosító, ahol minden S-módú bit pozícióból legalább 8 mintavétel használatos a döntési folyamatban.

3) A3 osztály - a „többszörös amplitúdó minta” bázis vizsgálati eljárással azonos vagy jobb eredményt biztosító, ahol minden S-módú bit pozícióból legalább 10 mintavétel használatos a döntési folyamatban.

1. Megjegyzés – A fenti emeltszintű vételi eljárásokat az RTCA DO260A, I. Függelék tartalmazza.

2. Megjegyzés – A fenti emeltszintű vételi eljárások használata esetén, erős interferenciával terhelt környezetben (úgy, mint többszörös Mode A/C átfedés), legalább az RTCA DO260A, I. Függelék-ben definiált eljárással azonos teljesítés várható el.

3. Megjegyzés – A földi kiterjesztett squitter vevőrendszerek esetében az A2 és A3 fedélzeti vevőrendszerekben használatos emeltszintű eljárások alkalmazása tekinthető megfelelőnek.

5.2.3 Jelentés szerkesztés feladat

5.2.3.1 A jelentés szerkesztés feladat tartalmazza a közlemény dekódolási, a jelentés szerkesztési és a kimeneti csatlakozási alfeladatokat.

5.2.3.2 Egy kiterjesztett squitter közlemény vétele esetén, 0.5 sec-on belül dekódolni kell a közleményt, és meg kell szerkeszteni az 5.2.2.3 pontban definiált ADS-B típusú jelentést.

1. Megjegyzés – Az ADS-B típusú üzenetváltás és ADS-B/TIS-B jelentés szerkesztés vételi feladatokat tartalmazó, fedélzeti, kiterjesztett squitter vevőrendszerek két konfigurációja megengedett:

a) Az I. típusú fedélzeti, kiterjesztett squitter vevőrendszerek veszik az ADS-B és TIS-B közleményeket és alkalmazás specifikus ADS-B és TIS-B jelentéseket szerkesztenek. Az I. típusú fedélzeti, kiterjesztett squitter vevőrendszerek egy meghatározott ADS-B és TIS-B jelentéseket felhasználó kliens alkalmazás felhasználói igényei szerint vannak kialakítva. Azon felül, az I. típusú fedélzeti, kiterjesztett squitter vevőrendszerek egy külső egység által vezérelhetők és így előállíthatnak egy olyan kiépítéstől függő, kiegészítő jelentéskészletet, amelyre a vevőrendszer alkalmas.

b) A II. típusú kiterjesztett squitter vevőrendszerek veszik az ADS-B és TIS-B közleményeket, és a berendezések osztályba sorolásától függően képesek teljes ADS-B és TIS-B közlemények kidolgozására. A II. típusú fedélzeti, kiterjesztett squitter vevőrendszerek egy külső egység által vezérelhetők és így előállíthatnak egy olyan kiépítéstől függő, kiegészítő jelentéskészletet, amelyre a vevőrendszer alkalmas.

2. Megjegyzés – A földi, kiterjesztett squitter vevőrendszerek ADS-B közleményeket vesznek és vagy alkalmazás specifikus kiegészítő jelentéskészletet vagy teljes, a földi szolgáltató igényeinek megfelelő ADS-B jelentést szolgáltatnak beleértve a támogatott kliens alkalmazást is.

3. Megjegyzés – A kiterjesztett squitter közlemény vételi feladat fizikailag elkülöníthető a jelentés szerkesztés feladatot megvalósító berendezéstől.

5.2.3.3 ADS-B JELENTÉS TÍPUSOK

1. Megjegyzés – Az ADS-B jelentés szerkesztés az S-módú kiterjesztett squitter adatsugárzásból nyert ADS-B közlemény átstrukturálást (felbontását) jelenti, olyan jelentésekre, amelyeket kliens alkalmazás csoport közvetlenül használhat. A következő alpontok öt, a kliens alkalmazásoknak továbbított ADS-B jelentés típust határoznak meg. További információ az ADS-B jelentések tartalmáról, és az S-módú kiterjesztett squitter közlemények ADS-B közleményként történő leképezéséről, a ”Manual of the Secondary Surveillance Radar (SSR) Systems (Doc 9684)” *kiadványban és az RTCA DO-260A-ban található.*

2. Megjegyzés – Az időjelentéshez szükséges precíziós (pl. GNSS UTC mért idő) kontra nem-precíziós (pl. vevőrendszer belső órája) időmérési források használhatóságát az 5.2.3.5 alpont ismerteti

5.2.3.3.1 *Állapotvektor jelentés.* Az állapotvektor tartalmazza az alkalmazhatósági időt, a repülés közben vagy a földön mozgó jármű mozgási állapotát (pl. pozíció, sebesség vektor), valamint a repülés közben vagy a földön vett információk alapján a navigációs adatok integritásának mérését, a repülés közbeni sebességet, valamint a kiterjesztett squitter közlemény azonosítóját és típusát. Mivel a pozíció és a sebességvektor közlemények elkülönülnek, az alkalmazhatósági időt külön kell jelenteni a pozíció és sebesség vektor paraméter jelentésekben. Továbbá, az állapotvektor jelentésnek tartalmaznia kell a várható pozíció vagy/és várható sebességvektor alkalmazhatósági időadatot (úgy, mint olyan adat, amely nem a frissített várható pozíció vagy/és várható sebességvektor adaton alapul) is, ha ilyen, várható pozíció vagy/és várható sebességvektor információt is tartalmaz az állapotvektor.

Megjegyzés – A kliens alkalmazás szereplőinek (fedélzeti vagy földi) igényei szerint a specifikus felhasználói követelmények változhatnak. A négy ADS-B jelentés közül a legdinamikusabb az állapotvektor, ezért a fedélzeti vagy mozgó földi eszközök légi és földi műveleteinek dinamikájához megkövetelt pontosság elérése érdekében az alkalmazások az állapotvektor gyakori frissítését igénylik.

5.2.3.3.2 *Mód állapot jelentés.* A mód állapot jelentés tartalmazza az alkalmazhatósági időt és az adatsugárzásban résztvevők pillanatnyi műveleti információit, és foglalja magába a fedélzeti/földi mozgó jármű címzését, hívójelét, ADS-B verzió számát, a fedélzeti/földi mozgó jármű hossz és szélességi adatait, az állapotvektor minőségi adatait és más az adott műveleti állapotban vett információkra épülő adatokat, mint a repülés közbeni azonosítót és típust, a repülés közbeni sebességet és a repülés közbeni állapot kiterjesztett „Squitter" közleményét. Minden alkalommal, amikor mód állapot jelentés készült, a jelentésszerkesztő feladat frissítse fel a jelentés alkalmazhatósági időt. Az érvényes adattal nem rendelkező paramétereket, érvénytelenként kell jelölni, vagy ki kell zárni a mód állapot jelentésből

1. Megjegyzés – A kliens alkalmazás szereplőinek (fedélzeti vagy földi) igényei szerint a specifikus felhasználói követelmények változhatnak.

2. Megjegyzés – Amikor a céltárgy állapotvektor és a mód állapot jelentés (ahogy azt a ”Manual on Mode S Specific Services (Doc.9688)*” kiadvány ismerteti) rendelkezésre áll, a jelentés bizonyos paraméterei abból a közlemény típusból megjelennek a mód állapot jelentésben is.*

3. Megjegyzés – A Mode állapot jelentés különböző adatelemeiben jelentett információkhoz tartozó alkalmazhatósági idő változhat attól függően, hogy az adott információ, különböző időpontban vett kiterjesztett squitter közleményből származik. Azt az adatot, amely a paraméter típus hasznos élettartamán túl jelentettek érvénytelenként kell jelölni, vagy ki kell zárni a mód állapot jelentésből, *ahogy azt a* ”Manual of the Secondary Surveillance Radar (SSR) Systems *(Doc 9684)” kiadvány ismerteti.*

5.2.3.3.3 *Levegőhöz viszonyított sebesség jelentés.* Levegőhöz viszonyított sebesség jelentést kell szerkeszteni, amikor egy olyan repülés közbeni sebesség kiterjesztett squitter közleményt vesznek, amely tartalmazza a levegőhöz viszonyított sebesség információt. A levegőhöz viszonyított sebesség jelentés tartalmazza az alkalmazhatósági időt, a levegőhöz viszonyított sebesség adatot és az irányszög adatot. Csak az 5.2.3.5 alpontban előírt típusú kiterjesztett squitter vevőrendszerekre írják elő a levegőhöz viszonyított sebesség jelentések szerkesztési feladatát. Minden esetben, amikor egyedi mód állapot jelentést szerkesztenek, a jelentés szerkesztő üzemmód frissítse a jelentés alkalmazhatósági idejét.

1. Megjegyzés – A levegőhöz viszonyított sebesség jelentés sebesség információt tartalmaz, amely a vett fedélzeti sebesség közleményekből származik más egyéb, a fedélzeti azonosító és típus kiterjesztett squitter közleményből származó információkkal együtt. A levegőhöz viszonyított sebesség jelentés nem kerül kialakításra, ha a vett repülés közbeni sebesség kiterjesztett squitter közlemény földhöz viszonyított sebesség információt tartalmaz. A levegőhöz viszonyított sebesség jelentés tartalmáról szóló útmutatót a ”Manual of the Secondary Surveillance Radar (SSR) Systems (Doc 9684)” *kiadvány tartalmaz.*

2. Megjegyzés – A kliens alkalmazás szereplőinek (fedélzeti vagy földi) igényei szerint a specifikus felhasználói követelmények változhatnak.

5.2.3.3.4 *Döntési tanácsadás (RA) jelentés.* Az RA jelentés tartalmazza az alkalmazhatósági időt és az aktív ACAS döntési tanácsadás (RA) tartalmát, a Típus=28 és Altípus=2 kiterjesztett squitter közleményben foglalt vételnek megfelelően.

Megjegyzés – Földi vevő alrendszer csak akkor fog RA jelentést szerkeszteni, ha aktív RA információt, elváró kliens alkalmazást támogat. Egy RA jelentés névlegesen csak Típus=28 és Altípus=2 kiterjesztett squitter közlemény vétele esetén tud kialakulni.

5.2.3.3.5 CÉLTÁRGY ÁLLAPOT JELENTÉS.

Megjegyzés – A céltárgy állapot jelentés információkra vonatkozó követelményrendszer még nem olyan mértékben kidolgozott, mint más ADS-B jelentés típusokra. A céltárgy állapot jelentés jelenleg nem követelmény, de a jövőben követelmény lehet az A2 és A3 típusú fedélzeti vevőrendszerek esetében. Amennyiben támogatott, a céltárgy állapot jelentés kialakításra kerül, ha más kiegészítő információkkal együtt a fedélzeti azonosítót és típust tartalmazó kiterjesztett squitter közleményekben a céltárgy állapot és helyzet információ vételre kerül. A céltárgy állapot és helyzet jelentést a ”Manual on Mode S Specific Services *(Doc.9688)” kiadvány ismerteti. A kliens alkalmazás szereplőinek (fedélzeti vagy földi) igényei szerint a specifikus felhasználói követelmények változhatnak. A céltárgy állapot jelentés tartalmáról szóló útmutató a* ”Manual of the Secondary Surveillance Radar (SSR) Systems *(Doc 9684)” kiadványban található.*

5.2.3.4 TIS-B JELENTÉS TÍPUSOK

5.2.3.4.1 Amikor a fedélzeti vevőrendszer egy TIS-B közleményt vesz, ezt az információt jelenteni kell a kliens alkalmazásnak. Minden alkalommal, amikor egyedi TIS-B jelentés készül, a jelentés szerkesztő feladat frissítse a jelentés alkalmazhatósági időt az aktuális időpontnak megfelelően.

1. Megjegyzés – A TIS-B közlemény formátumokat a ”Technical Provisions for Mode S Services and Extended Squitter (Doc. 9871)” ismerteti.

2. Megjegyzés – Az TIS-B jelentés szerkesztés az S-módú kiterjesztett squitter adatsugárzásból nyert TIS-B közlemény átstrukturálását (felbontását) jelenti, olyan jelentésekre, amelyeket kliens alkalmazás csoport közvetlenül használhat. A következő alpontok két, a kliens alkalmazásoknak továbbított ADS-B jelentés típust határoznak meg. További információ az TIS-B jelentések tartalmáról, és az S-módú kiterjesztett squitter közlemények ADS-B közleményként történő leképezéséről, a ”Manual of the Secondary Surveillance Radar (SSR) Systems *(Doc 9684)” kiadványban található.*

3. Megjegyzés – A precíziós (pl. GNSS UTC mért idő) kontra nem-precíziós (pl. vevőrendszer belső órája) időmérési források idő-jelentéshez való használhatóságát, az 5.2.3.5. alpont ismerteti.

5.2.3.4.2 *TIS-B céltárgy jelentés*. A pozíció kivételével, az összes információs elemet, beleértve az összes, a precíziós TIS-B közlemény formátumokra tartalékolt mezőket és bármely TIS-B adatkezelő közlemény teljes tartalmát közvetlenül jelenteni kell. A jelentés formátum részletesen nincs meghatározva, annak kivételével, hogy a jelentett információ tartalom meg kell, hogy egyezzen a vett információ tartalommal.

5.2.3.4.3 Egy TIS-B pozíció közlemény vételekor, az útvonal adatokkal összevetve, meghatározható, hogy az dekódolható-e céltárgy pozícióként (azaz összefüggésbe hozható-e egy létező útvonallal). Ha a közlemény céltárgy pozícióként dekódolható, akkor 0.5 sec-t jelentést kell szerkeszteni. A jelentés tartalmazza a vett pozíció információt az alkalmazhatóság idejével, a legutoljára vett sebességvektor információt és annak alkalmazhatósági idejét, a várható pozíciót és sebességvektort hozzárendelve egy közös alkalmazhatósági időponthoz, a fedélzeti/földi mozgó jármű címzését és a vett közleményben továbbított minden egyéb információt is. Az adatok várható értékei a célpont pozíció vett értékein és az útvonal történeten alapuljanak.

5.2.3.4.4 Egy TIS-B sebességvektor közlemény vételekor - ha az hozzárendelhető egy kész útvonalhoz – a közlemény vételétől számított 0.5 sec belül jelentést kell szerkeszteni. A jelentésnek tartalmaznia kell a vett sebességvektor információt az alkalmazhatósági idővel együtt, a várható pozíciót és sebességvektort egy közös alkalmazhatósági idővel, és a vett közleményben továbbított minden egyéb információt is. Az adatok várható értéke a földhöz viszonyított sebességről vett információn és a céltárgy útvonal történetén alapszik.

5.2.3.4.5 *TIS-B adatkezelő közlemény.* A vett TIS-B adatkezelő közlemény teljes közlemény tartalmát közvetlenül kell jelenteni a kliens alkalmazásnak. A vett információ tartalommal azonos információ tartalmat kell jelenteni.

5.2.3.4.5.1 A TIS-B adatkezelő közlemény tartalmát bitről bitre jelenteni kell a kliens alkalmazásnak.

Megjegyzés – A TIS-B adatkezelő közlemény feldolgozását a ”Technical Provisions for Mode S Services and Extended Squitter (Doc. 9871)” ismerteti.

5.2.3.5 ALKALMAZHATÓSÁGI IDŐ JELENTÉSE

Ahogy az meghatározott (lásd 5.2.3.3 és 5.2.3.4), az összes specifikus ADS-B és TIS-B jelentés típus alkalmazhatósági idejének referenciájaként, a vevőrendszerek alkalmazzanak belső időalapot.

5.2.3.5.1 *Precíziós időalap.* Felszíni pozíció közlemények, fedélzeti pozíció közlemények és/vagy TIS-B közlemények szerkesztésére szolgáló vevőrendszerek, a jelentés alkalmazhatósági idő céljára, a következő közlemények esetében alkalmazzák a GNSS UTC rendszerben mért időt:

a) a 3.1.2.8.6.2 szerint meghatározott, zero (0) változatú ADS-B közlemény esetén, ha a navigációs bizonytalansági kategória (NUC) 8 vagy 9;

vagy

b) a 3.1.2.8.6.2 és 3.1.2.8.7 szerint meghatározott, egyes (1) változatú ADS-B vagy TIS-B közlemény esetén, ha a navigációs integritás kategória (NIC) 10 vagy 11;

a mért (UTC) időadat tartomány minimum 300 sec, a felbontás pedig 0.0078125 (1/128) sec legyen.

5.2.3.5.2 *NEM PRECÍZIÓS BELSŐ IDŐALAP*

5.2.3.5.2.1 Azok a vevőrendszerek esetében, amelyek nem szerkesztenek, NUC vagy NIC (lásd az 5.2.3.5.1) kritériumoknak megfelelő ADS-B vagy TIS-B közlemények vételén alapuló ADS-B vagy/és TIS-B jelentéseket, megengedett a nem precíziós időalap forrás használata. Az ilyen esetekben, amikor megfelelő precíziós időalap forrás nem áll rendelkezésre, a vevőrendszer rendelkezzen olyan, megfelelő belső órával vagy számlálóval, ahol a maximális óra ciklus vagy számlálási ciklus 20 msec. A létrehozott belső óra vagy számláló rendelkezzen legalább 300 sec-os számlálási tartománnyal és 0.0078125 (1/128) sec felbontással.

Megjegyzés – Az előzőekben ismertetett nem precíziós időalap lehetővé teszi az alkalmazhatósági idő jelentésekor - egy szekvencián belül – a jelentés időtartamának pontos meghatározását. Például az állapotvektor jelentések között alkalmazott időtartamokat a kliens alkalmazások pontosan meg kell, hogy határozzák, akkor is, ha a jelentés nem tartalmazza az abszolút időt (pl. UTC-ben mért időt).

5.2.3.6 JELENTÉSI KÖVETELMÉNYEK

5.2.3.6.1 *Az I. típusú S-módú kiterjesztett squitter fedélzeti vevőrendszerek jelentési követelményei*. Az I. típusú S-módú kiterjesztett squitter fedélzeti vevőrendszerek jelentés szerkesztési feladatai, az 5.2.3 pontban meghatározottak szerint, minimum támogassák az ADS-B és TIS-B jelentések azon alcsoportjait és jelentik azon értékeket, amelyek szükségesek a vevőrendszerek által kiszolgált kliens alkalmazások számára.

5.2.3.6.2 *A II. típusú S-módú kiterjesztett squitter fedélzeti vevőrendszerek jelentési követelményei.* A II. típusú S-módú kiterjesztett squitter fedélzeti vevőrendszerrel összefüggő jelentés szerkesztési feladatok, az 5.2.3 pontban meghatározottak szerint, a vevőrendszer 5-4 táblázatban ismertetett osztályba sorolásának megfelelően hozzák létre az ADS-B és TIS-B jelentéseket, amikor a jelentés előfeltételeként szolgáló ADS-B és/vagy TIS-B közleményt vesznek.

5.2.3.6.3 *A földi S-módú kiterjesztett squitter vevőrendszerek jelentési követelményei.* A földi S-módú kiterjesztett squitter fedélzeti vevőrendszerek jelentés szerkesztési feladatai, az 5.2.3 pontban meghatározottak szerint minimum támogassák az ADS-B jelentések azon alcsoportjait és jelentsék azon értékeket, amelyek szükségesek a vevőrendszerek által kiszolgált kliens alkalmazások számára.

5.2.4 Együttműködő-képesség

Az S-módú kiterjesztett squitter vevőrendszerek egyaránt kezeljék a verzió 0 és verzió 1 típusú ADS-B kiterjesztett squitter közlemény formátumokat.

1. Megjegyzés - A verzió 0 és verzió 1 típusú közlemények meghatározását a "Technical Provisions for Mode S Services and Extended Squitter (Doc. 9871)"tartalmazza.

2. Megjegyzés - A verzió 0 és verzió1 típusú ADS-B kiterjesztett squitter közlemény formátumok együttműködési eljárásait a "Manual of the Secondary Surveillance Radar (SSR) Systems *(Doc 9684)" kiadvány ismerteti és további információk találhatók az RTCA DO-260A, N Függelékben.*

5.2.4.1 KEZDETI KÖZLEMÉNY DEKÓDOLÁS

Az S-módú kiterjesztett squitter vevőrendszere egy új, ADS-B céltárgy befogása után, először a verzió 0 (zéró) ADS-B közlemények formátumokhoz alkalmazott dekódolási eljárást alkalmazza, amíg a vett, verzió 1 formátumú műveleti állapot közlemény használatban van.

5.2.4.2 VERZIÓ SZÁM ALKALMAZÁS

Az S-módú kiterjesztett squitter vevőrendszere dekódolja a műveleti állapot közleményben továbbított verzió számot, és a megfelelő, verzió – 0 (zéró) vagy verzió – 1 (egy), dekódolási eljárást alkalmazza az adott fedélzeti vagy földi mozgó járműről sugározott kiterjesztett squitter ADS-B közleményhez.

5.2.4.3 FENTTARTOTT MEZŐK KEZELÉSE

Az S-módú kiterjesztett squitter vevőrendszerek hagyják figyelmen kívül a tartalékolt mező tartalmat.

Megjegyzés – Ez a követelmény - lehetővé téve további paraméterek meghatározását, amelyek a korábbi közlemény verziók figyelmen kívül hagytak - biztosítja az együttműködést a korábbi és az újabb közleményeket helyesen dekódoló, újabb verziójú vevők között.

AZ 5. FEJEZET TÁBLÁZATAI

5-1. Táblázat - Az „A” osztályú ADS-B berendezések műszaki jellemzői

<table>
<tr><th>Berendezés osztály</th><th>Adó teljesítmény minimum (az antenna betáplálási pontján)</th><th>Adó teljesítmény maximum (az antenna betáplálási pontján)</th><th>Repülés közbeni vagy földi</th><th>A kiterjesztett squitter közlemény minimális képességei (lásd 2. Megjegyzés)</th></tr>
<tr><td rowspan="2">A0 (Minimum)</td><td rowspan="2">18.5 dbW
(Lásd. 1.Megjegyzés)</td><td rowspan="2">27 dbW</td><td>repülés közbeni</td><td>Repülés közbeni pozició
Légijármű azonosító és típus
Repülés közbeni sebesség
Légijármű üzemi állapot
Kiterjesztett squitter közlemény állapot</td></tr>
<tr><td>földi</td><td>Földi pozíció
Légijármű azonosító és típus
Légijármű üzemi állapot
Kiterjesztett squitter közlemény állapot</td></tr>
<tr><td rowspan="2">A1 (Alap)</td><td rowspan="2">21 dbW</td><td rowspan="2">27 dbW</td><td>repülés közbeni</td><td>Repülés közbeni pozició
Légijármű azonosító és típus
Repülés közbeni sebesség
Légijármű üzemi állapot
Kiterjesztett squitter közlemény állapot</td></tr>
<tr><td>földi</td><td>Földi pozíció
Légijármű azonosító és típus
Légijármű üzemi állapot
Kiterjesztett squitter közlemény állapot</td></tr>
<tr><td rowspan="2">A2 (emelt szintű)</td><td rowspan="2">21 dbW</td><td rowspan="2">27 dbW</td><td>repülés közbeni</td><td>Repülés közbeni pozició
Légijármű azonosító és típus
Repülés közbeni sebesség
Légijármű üzemi állapot
Kiterjesztett squitter légijármű állapot
Fenntartva a céltárgy állapot és üzemmód paraméterek számára</td></tr>
<tr><td>földi</td><td>Földi pozíció
Légijármű azonosító és típus
Légijármű üzemii állapot
Kiterjesztett squitter közlemény állapot</td></tr>
<tr><td rowspan="2">A3 (emelt szintű)</td><td rowspan="2">23 dbW</td><td rowspan="2">27 dbW</td><td>repülés közbeni</td><td>Repülés közbeni pozició
Légijármű azonosító és típus
Repülés közbeni sebességvektor
Légijármű üzemi állapot
Kiterjesztett squitter közlemény állapot
Fenntartva a céltárgy állapot és üzemmód paraméterek számára</td></tr>
<tr><td>földi</td><td>Földi pozíció
Légijármű azonosító és típus
Légijármű üzemi állapot
Kiterjesztett squitter közlemény állapot</td></tr>
<tr><td colspan="5">1. Megjegyzés – Az S-módú válaszjeladó kategória korlátozásait lásd a 3.3.1.2.10.2 fejezet szerint.
2. Megjegyzés – Az „A” osztályú berendezések esetében használatos kiterjesztett squitter közlemények meghatározását a ”Technical Provisions for Mode S Services and Extended Squitter (Doc. 9871)” kiadvány kiterjesztett squitter formátumának 1. változata határozza meg.</td></tr>
</table>

5-2. Táblázat - A „B” osztályú ADS-B berendezések műszaki jellemzői

<table>
<tr><th>Berendezés osztály</th><th>Adó teljesítmény minimum (az antenna betáplálási pontján)</th><th>Adó teljesítmény maximum (az antenna betáplálási pontján)</th><th>Repülés közbeni vagy földi</th><th>A kiterjesztett squitter közlemény minimális képességei</th></tr>
<tr><td rowspan="2">B0
(Fedélzeti)</td><td rowspan="2">18.5 dbW
(lásd 1.Megjegyzés)</td><td rowspan="2">27 dbW</td><td>repülés közbeni</td><td>Repülés közbeni pozició
Légijármű azonosító és típus
Repülés közbeni sebességvektor
Légijármű üzemi állapot
Kiterjesztett squitter közlemény állapot</td></tr>
<tr><td>földi</td><td>Földi pozíció
Légijármű azonosító és típus
Légijármű üzemi állapot
Kiterjesztett squitter közlemény állapot</td></tr>
<tr><td rowspan="2">B1
(Fedélzeti)</td><td rowspan="2">21 dbW</td><td rowspan="2">27 dbW</td><td>repülés közbeni</td><td>Repülés közbeni pozició
Légijármű azonosító és típus
Repülés közbeni sebesség
Légijármű üzemi állapot
Kiterjesztett squitter közlemény állapot</td></tr>
<tr><td>földi</td><td>Földi pozíció
Légijármű azonosító és típus
Légijármű üzemi állapot
Kiterjesztett squitter közlemény állapot</td></tr>
<tr><td>B2 csökkentett (földi mozgójármű)</td><td>8.5 dbW</td><td>< 18.5 dbW (lásd 2.Megjegyzés)</td><td>földi</td><td>Földi pozíció
Légijármű azonosító és típus
Légijármű üzemi állapot</td></tr>
<tr><td>B2 (földi mozgójármű)</td><td>18.5 dbW</td><td>27 dbW (lásd 2.Megjegyzés)</td><td>földi</td><td>Földi pozíció
Légijármű azonosító és típus
Légijármű üzemi állapot</td></tr>
<tr><td>B3 (domborzati akadályokra telepített)</td><td>18.5 dbW</td><td>27 dbW (lásd 2.Megjegyzés)</td><td>Repülés közbeni (ld. 3. Megjegy-zés)</td><td>Repülés közbeni pozíció
Légijármű azonosító és típus
Légijármű üzemi állapot</td></tr>
<tr><td colspan="5">1. Megjegyzés – Az S-módú válaszjeladó kategória korlátozásait lásd a 3.3.1.2.10.2 fejezet szerint.
2. Megjegyzés – Az illetékes ATS által várhatóan engedélyezett legnagyobb teljesítmény szint.
3. Megjegyzés – A földi, domborzati akadályokra telepített állomások a fedélzeti ADS-B közlemény formátumot használják, mivel pozíciójuk elsődleges fontossággal bírnak a levegőben tartózkodó légijármű számára.</td></tr>
</table>

5-3. Táblázat – A fedélzeti vevőrendszerek vételi paraméterei

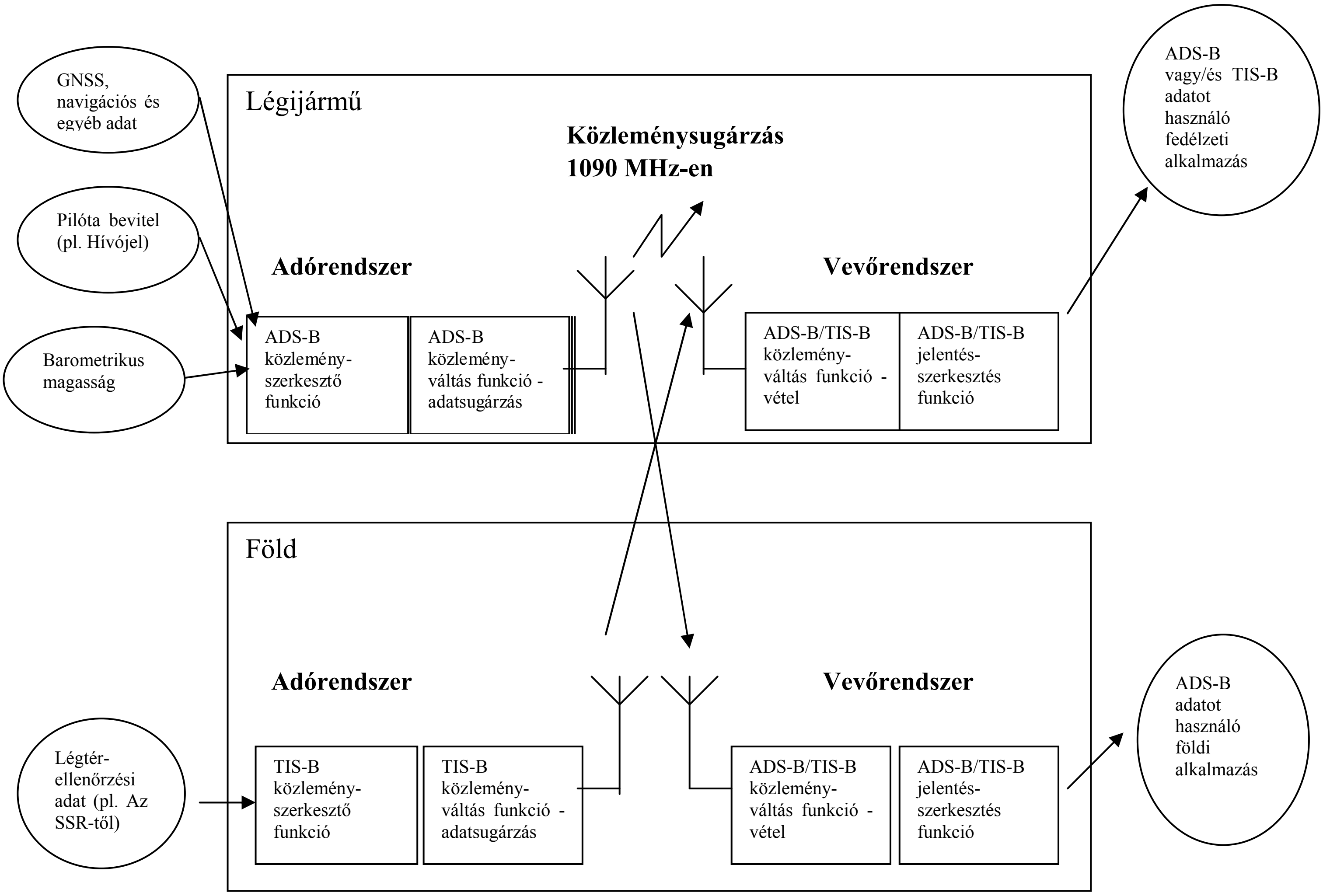
Vevő-rend-szer osztály	*Tervezett levegő-levegő hatótávolság*	*A vevő minimum triggerelési küszöbszintje (MTL)*	*Vételi eljárás*	*A kiterjesztett squitter ADS-B közlemény támogatás (lásd 3. Megjegyzés)*	*A kiterjesztett squitter TIS-B közlemény támogatás (lásd 4. Megjegyzés)*
A0 (alap VFR)	10 nmi.	-72 dBm (lásd 1. Megjegyzés)	Alap (lásd 2. Megjegyzés)	Repülés közbeni pozíció Földi pozíció Repülés közbeni sebesség Repülés közbeni azonosítás és típus Kiterjesztett squitter közlemény repülés közbeni állapot Repülés közbeni üzemi állapot	Repülés közbeni pozíció - finom felbontás Repülés közbeni pozíció - durva felbontás Földi pozíció - finom felbontás Azonosító és típus Repülés közbeni sebesség Adatkezelés
A1 (alap IFR)	20 nmi.	-79 dBm (lásd 1. Megjegyzés)	Emeltszintű (lásd 2. Megjegyzés)	Repülés közbeni pozíció Földi pozíció Repülés közbeni sebességvektor Repülés közbeni azonosító és típus Kiterjesztett squitter közlemény repülés közbeni állapot Repülés közbeni üzemi állapot	Repülés közbeni pozíció - finom felbontás Repülés közbeni pozíció - durva felbontás Földi pozíció - finom felbontás Azonosító és típus Repülés közbeni sebesség Adatkezelés
A2 (emelt-szintű IFR)	40 nmi.	-79 dBm (lásd 1. Megjegyzés)	Emeltszintű (lásd 2. Megjegyzés)	Repülés közbeni pozíció Földi pozíció Repülés közbeni sebesség Repülés közbeni azonosító és típus Kiterjesztett squitter közlemény repülés közbeni állapot Repülés közbeni üzemi állapot Fenntartva a céltárgy állapot és üzemmód részére	Repülés közbeni pozíció - finom felbontás Repülés közbeni pozíció - durva felbontás Földi pozíció - finom felbontás Azonosító és típus Repülés közbeni sebesség Adatkezelés
A3 (emelt-szintű képes-ség)	90 nmi.	-84 dBm (és -87 dBm 15 %-s vételi valószínűség esetén, lásd 1. Megjegyzés)	Emeltszintű (lásd 2. Megjegyzés)	Repülés közbeni pozíció Földi pozíció Repülés közbeni sebesség Repülés közbeni azonosító és típus Kiterjesztett squitter közlemény repülés közbeni állapot Repülés közbeni üzemi állapot Fenntartva a céltárgy állapot és üzemmód részére	Repülés közbeni pozíció - finom felbontás Repülés közbeni pozíció - durva felbontás Földi pozíció - finom felbontás Azonosító és típus Repülés közbeni sebesség Adatkezelés

1. Megjegyzés – Passzív antennát feltételezve, a specifikus MTL szint az antenna talpponti kimeneti csatlakozására vonatkozik. Ha az antenna aktív erősítőt is tartalmaz, akkor az MTL szint az antennaerősítő kimenetére vonatkozik. Az A3 osztályú vevők esetében, a második, -87 dBm jelszint esetén a közlemények 15%-t kell sikeresen dekódolni. Az MTL szintek interferencia mentes vételi környezetre vonatkoznak. *2. Megjegyzés – Az 5.2.2.4 fejezetben előírt kiterjesztett squitter vételi eljárás az ACAS 1090 MHz-es alapvető vételi eljárásként megköveteltre utal mint alap vételi eljárás és amely kezeli a Mode A/C jelek szimpla átfedését. Az „emeltszintű" vételi eljárás olyan vevő teljesítőképességre utal, amely a Mode A/C jelek többszörös átfedése esetére továbbfejlesztett vevő teljesítőképességet és S-módú többszörös átfedés okozta erős zavaró jelszint esetén továbbfejlesztett dekóder újraindítást jelent. A specifikus vevőrendszerekre alkalmazott emeltszintű vételi eljárásokkal szemben támasztott követelményeket az 5.2.2.4 fejezet ismerteti.* *3. Megjegyzés – A kiterjesztett squitter közleményeket a "Technical Provisions for Mode S Services and Extended Squitter (Doc. 9871)" írja le. Ugyanakkor a céltárgy állapot és üzemmód közleményeket* a Mode S Speciális Szolgáltatás Kézikönyv (Doc.9688) *ismerteti, de még nem olyan kiforrott állapotban mint a többi ADS-B közlemény esetében.* *4. Megjegyzés – A TIS-B közleményeket a "Technical Provisions for Mode S Services and Extended Squitter (Doc. 9871)" írja le.*

5-4. Táblázat – Az S-módú kiterjesztett squitter vevőrendszer – jelentés követelmények

Vevő osztály	*ADS-B jelentés követelmények minimuma*	*TIS-B jelentés követelmények minimuma*
A0 (alap VFR)	ADS-B állapotvektor jelentés (lásd 5.2.3.1.1) és ADS-B Mode üzemmód jelentés (lásd 5.2.3.1.2)	TIS-B állapot jelentés és TIS-B adatkezelés jelentés
A1 (alap IFR)	ADS-B állapotvektor jelentés (lásd 5.2.3.1.1) és ADS-B Mode üzemmód jelentés (lásd 5.2.3.1.2) és ADS-B levegőhöz viszonyított sebességvektor jelentés (lásd 5.2.3.1.3)	TIS-B állapot jelentés és TIS-B adatkezelés jelentés
A2 (emelt-szintű IFR)	ADS-B állapotvektor jelentés (lásd 5.2.3.1.1) és ADS-B Mode üzemmód jelentés (lásd 5.2.3.1.2) és ADS-B levegőhöz viszonyított sebességvektor (ARV) jelentés (lásd 5.2.3.1.3) és Fenntartva a ADS-B céltárgy állapot jelentés számára (lásd 5.2.3.1.4)	TIS-B állapot jelentés és TIS-B adatkezelés jelentés
A3 (emelt-szintű képesség)	ADS-B állapotvektor jelentés (lásd 5.2.3.1.1) és ADS-B Mode üzemmód jelentés (lásd 5.2.3.1.2) és ADS-B levegőhöz viszonyított sebességvektor (ARV) jelentés (lásd 5.2.3.1.3) és Fenntartva a ADS-B céltárgy állapot jelentés számára (lásd 5.2.3.1.4)	TIS-B állapot jelentés és TIS-B adatkezelés jelentés

5. FEJEZETHEZ TARTOZÓ ÁBRA



MELLÉKLET A IV. KÖTETHEZ

Összeütközés-elhárító fedélzeti rendszerre (ACAS) vonatkozó útmutató anyag

1. Megjegyzés. – A következő anyag útmutatást kíván adni a függőleges megoldási képességgel rendelkező összeütközés-elhárító fedélzeti rendszer (ACAS II) műszaki jellemzőiről. Az ACAS SARP-okat a 4. fejezet tartalmazza.

2. Megjegyzés. – A nem-SI alternatív egységek használata az 5. Annex, 3. fejezet 3.2.2 szakaszában engedélyezett módon történik. Korlátozott számú esetben a logikai számítások szintjén a következetesség biztosítása érdekében olyan mértékegységek használata is előfordul, mint láb/s, NM/s és csomó/s.

1. Berendezések, feladatok és képességek

1.1 ACAS berendezés jellemzők

1.1.1 Az ACAS berendezés egy ACAS feldolgozó egységet, S-módú válaszjeladót, szabályozó egységet, megfelelő antennákat és tanácsadás szolgáltató eszközöket tartalmaz.

1.1.2 A légijárművön lévő ACAS berendezés lekérdezi a környezetében tartózkodó más légijárműveken lévő SSR válaszjeladókat és meghallgatja a válaszjeladó válaszokat. Ezeknek a válaszoknak a számítógépes elemzésével az ACAS berendezés megállapítja, hogy mely légijárművek jelentenek potenciális összeütközés veszélyt és megfelelő jelzéseket (tanácsadásokat) szolgáltat a személyzetnek az összeütközés elkerülése érdekében.

1.1.3 Az ACAS berendezés kétféle tanácsadás szolgáltatásának képességével rendelkezik. Forgalmi tanácsadás (TA) jelzi a veszélyeztető légijárművek közelítő pozícióit, amely légijárművek később megoldás tanácsadásokat kényszerítenek ki. A megoldási tanácsadás (RA) függőleges manővereket javasol, amelyek várhatóan növelik, vagy fenntartják az elkülönítést a veszélyeztető légijárműtől.

1.2 Szolgáltatott tanácsadások

1.2.1 FORGALMI TANÁCSADÁSOK

A forgalmi tanácsadások jelzik a veszélyeztető légijárműnek a saját légijárműhöz viszonyított távolságát, távolság változási sebességét, magasságát, magasság változási sebességét és iránytengelyét. Magasság információ nélküli forgalmi tanácsadás is szolgáltatható C-módú vagy S-módú felszereltségű légijárművön, amely nem rendelkezik automatikus jelentő képességgel. Az információ, amelyet az ACAS forgalmi tanácsadásban szolgáltat, azt a célt szolgálja, hogy segítse a repülő-személyzetet a közeli forgalom figyelésében.

1.2.2 MEGOLDÁSI TANÁCSADÁS

1.2.2.1 Ha a veszélyeztetés észlelési logika az ACAS számítógépben megállapítja, hogy a találkozás egy közelben lévő légijárművel majdnem összeütközéshez vagy összeütközéshez vezethet, a számítógép veszélyeztetés megoldási logikája megfelelő függőleges manővert határoz meg, amely az ACAS légijármű biztonságos függőleges elkülönítését fogja biztosítani. A kiválasztott manőver megfelelő függőleges elkülönítést olyan korlátokon belül biztosít, amelyeket az ACAS légijármű emelkedő képessége és a földhöz való közelsége határoz meg.

1.2.2.2 A repülőgépvezető részére szolgáltatott megoldási tanácsadások két kategóriába sorolhatók: helyesbítési (corrective) tanácsadások, amelyek a légijárművezetőt a követett repülési pályáról való letérésre utasítják (pl. "EMELKEDJ", amikor a légijármű vízszintes repülést végez); és megelőzési (preventive) tanácsadás, amely a légijárművezetőnek bizonyos függőleges sebességek megtartását vagy elkerülését tanácsolja (pl. "NE EMELKEDJ", amikor a légijármű vízszintes repülést végez).

1.2.2.3 Normál körülmények között az ACAS csak egy megoldási tanácsadást ad ki egy vagy több megközelítő légijárművel való találkozás esetén. A megoldási tanácsadást akkor, vagy röviden azután adja ki, amikor a (az első) megközelítő légijármű veszélyeztető légijárművé válik, és addig marad érvényben, amíg a (valamelyik) megközelítő légijármű veszélyeztető marad, és akkor kerül törlésre, amikor a (az utolsó) megközelítő légijármű megszűnik veszélyeztető lenni. Azonban a repülőszemélyzet részére a megoldási tanácsadás részeként kiadott jelzés módosulhat. Megerősítést nyerhet, vagy még ellenkezőjére is változhat, ha a veszélyeztető légijármű módosítja magasság profilját, vagy amikor a második vagy harmadik veszélyeztető légijármű észlelése megváltoztatja a találkozó kezdeti értékelését. Gyengülhet is, amikor megfelelő elkülönítés megtörtént, de a (bármelyik) megközelítő légijármű átmenetileg veszélyeztető marad.

1.2.3 FIGYELMEZTETÉSI IDŐK

Ha veszélyeztető légijárművet észlelnek, az ACAS berendezés bizonyos idővel a légijármű legszorosabb megközelítése előtt megoldási tanácsadást generál. A figyelmeztetési idő nagysága függ az ACAS rendszer számára használatra kiválasztott védett tér nagyságától. Az ACAS által használt, a legszorosabb megközelítés előtti névleges megoldási tanácsadási idő 15 és 35 másodperc között változik. Forgalmi tanácsadás névlegesen 5-20 másodperc közötti idővel előzi meg a megoldási tanácsadás kiadását. A figyelmeztetési idők függnek az érzékenységi szinttől, ahogyan az a 3.5.12 pontban ismertetésre került.

1.2.4 MEGOLDÁSI TANÁCSADÁSOK LEVEGŐ-LEVEGŐ KOORDINÁCIÓJA

1.2.4.1 Ha az ACAS berendezés által észlelt légijármű csak A/C-módú válaszjeladóval és automatikus nyomásmagasság jelentő berendezéssel rendelkezik, akkor a légijármű pilótája nem lesz tudatában annak, hogy az ACAS berendezéssel felszerelt légijármű figyelemmel követi őt. Ha az ACAS légijármű pilótája egy ilyen légijárművel való találkozáskor megoldási tanácsadást kap, és a tanácsolt manővert végrehajtja, az ACAS légijármű képes lesz a megközelítő légijárművet elkerülni, feltéve, hogy a megközelítő légijármű nem gyorsul fel olyan módon, hogy az ACAS légijármű manőverének hatását lerontja, vagy semmissé teszi.

1.2.4.2 Ha a megközelítő légijármű fel van szerelve ACAS berendezéssel, akkor koordinációs eljárást alkalmaznak a levegő-levegő S-módú adat kapcsolaton keresztül annak biztosítása érdekében, hogy az ACAS megoldási tanácsadások összeegyeztethetők legyenek.

1.2.5 LEVEGŐ-FÖLD KOMMUNIKÁCIÓ

1.2.5.1 Az ACAS az S-módú levegő-föld adatösszeköttetés felhasználásával kommunikálni tud földi állomásokkal. A kommunikáció egyik formája az érzékenységi szint szabályozási utasítás S-módú földi állomások általi továbbítása az ACAS berendezéshez. Ez a tulajdonság lehetővé teszi egy S-módú földi állomás számára, hogy a megoldási tanácsadás figyelmeztetési időt a helyi forgalmi körülményekhez adaptálja, amikor egy ACAS légijármű áthalad az állomás által lefedett körzeten. Ezáltal hatékony összhang jön létre az összeütközés figyelmeztetési idő és a riasztás gyorsasága között.

1.2.5.2 Az S-módú levegő-föld adat-összeköttetés felhasználható az ACAS megoldási tanácsadások S-módú földi állomásokhoz való továbbítására is. Ezeket az információkat azután a légiforgalmi szolgálatok felhasználhatják az ACAS megoldási tanácsadások figyelésére az érdekelt légteren belül.

1.2.6 AZ ACAS ÁLTAL VÉGZETT FELADATOK

1.2.6.1 Az ACAS által végzett feladatokat az A-1 ábra illusztrálja. Az ábrázolás leegyszerűsítése érdekében a "saját légijármű követés" és a "megközelítő légijármű követés" feladatokat egyszerre képviseli a "felderítés" feladat az A-1 ábrán. Azonban a követők, amelyeket az összeütközés elhárító feladat fenntartására szánnak, lehet, hogy nem alkalmasak a felderítés feladatának fenntartására. Különálló követési feladatok válhatnak szükségessé mind az összeütközés elkerülés, mind a felderítési feladatok megfelelő támogatására.

1.2.6.2 Felderítést normál körülmények között ciklusonként egyszer hajtanak végre; azonban bizonyos megközelítő légijárműveknél ezt gyakrabban vagy ritkábban lehet végezni. Például felderítést ritkábban lehet végrehajtani néhány nem veszélyeztető légijárműnél, tekintetbe véve az interferencia korlátozási egyenlőtlenségeket, vagy gyakrabban lehet végrehajtani más megközelítő légijárműveknél az azimut becslés javítása érdekében.

1.2.6.3 Az ACAS feladatok megvalósításánál használt paramétereket automatikusan vagy manuálisan állítják be, hogy a normál légiforgalmi irányítás (ATC) műveletek legkisebb mértékű zavarásával tartsák fenn az összeütközés elkerülés megőrzését.

1.3 Veszélyeztető légijármű jellemzői

1.3.1 A VESZÉLYEZTETŐ LÉGIJÁRMŰ VÁLASZJELADÓ FELSZERELÉSE

Az ACAS megoldási tanácsadásokat szolgáltat magasság jelentő A/C-módú vagy S-módú válaszjeladókkal felszerelt légijárműveken. Néhány légijármű SSR válaszjeladóval van felszerelve, de nincs magasság kódolója. Az ACAS nem tud megoldási tanácsadásokat generálni ilyen légijárművekkel való konfliktus esetén, mert magasság információ nélkül az összeütközés veszélyeztetés becslését nem lehet elvégezni. Az ACAS berendezés ilyen légijárműveken csak forgalmi tanácsadást tud generálni, jellemezve távolságukat, távolság változási sebességüket és iránytengelyüket. Azokat a légijárműveket, amelyek csak A-módú válaszjeladóval vannak felszerelve és nincsenek felszerelve A/C-módú vagy S-módú válaszjeladóval, vagy azok nem működnek, az ACAS nem tudja követni.

1.3.2 A VESZÉLYEZTETŐ LÉGIJÁRMŰ KÖZELÍTŐ SEBESSÉGE ÉS A FORGALOM SŰRŰSÉGE

1.3.2.1 Nagy forgalom sűrűségű légtérben való üzemeltetésre tervezett ACAS berendezés képes a veszélyeztető légijárművekre vonatkozó átfogó felderítési teljesítményt nyújtani a 4. fejezet 4.3.2 pontban és a 4-1 táblázatban meghatározottaknak megfelelően.

1.3.2.2 A 4-1 táblázatban felsorolt körülményeket, amely táblázat két sűrűségi régiót határoz meg a többdimenziós feltétel térben, amely az ACAS teljesítményt befolyásolja, egy tipikus ACAS teljesítményének fedélzeti méréseiből extrapolálták. A fedélzeti mérési adatok azt mutatták, hogy a nyomvonal létrejöttének valószínűsége nem zuhan hirtelen, amikor a feltétel határok egyikét átlépik.

1.3.2.3 A teljesítményt az illető cél követési valószínűségének fogalmával fejezik ki egy maximális közelítési sebességnél adott forgalom sűrűségnél legalább 30 másodperccel a legszorosabb megközelítés előtt. A két sűrűségi régióhoz (egyenként) tartozó maximális forgalomsűrűség definíciója a következő:

$$\zeta = n(r)/\pi r^2$$

ahol n*(r)* az SSR válaszjeladóval felszerelt légijárművek maximálisan 30 másodperc időre vett átlagos száma (a saját légijárművet nem számítva) az ACAS légijármű földi pozíciója feletti *r*-sugarú kör területe felett. A levegőben történő méréseknél a rádiuszok különbözőek voltak a két sűrűségi régiónál. A nagy sűrűség értékű méréseknél a rádiusz 9,3 km (5 NM) volt. A kis sűrűség értékű méréseknél a rádiusz 19 km (10 NM) volt. A forgalom sűrűségről az állandó sűrűségű kör terület határain kívül feltételezhető, hogy a távolsággal fordított arányban csökken, így a légijárművek számát

az

$$n(r) = n(r_0)r/r_0$$

összefüggés adja meg, ahol r_0 az állandó sűrűségű régió sugara.

1.3.2.4 Amikor a sűrűség nagyobb, mint 0,017 légijármű/km^2 (0,06 légijármű/NM^2), az egyenletes sűrűség névleges rádiuszát 9,3 km-nek (5 NM) vesszük. Ha a sűrűség egyenlő vagy kisebb a fenti jelzettnél, r_0 névlegesen 18,5 km (5 NM).

1.3.2.5 A táblázat azon a kiegészítő feltételezésen alapszik, hogy a legnagyobb sűrűségű, 0,087 légijármű/km^2 (0,3 légijármű/NM^2) légtérben a válaszjeladóval felszerelt összes légijármű legalább 25 százaléka S-móddal felszerelt. Ha 5 százaléknál kevesebb van S-móddal felszerelve, a követési valószínűség A/C-módú légijárművek esetében a megnövelt szinkron csonkítás miatt kisebb, mint 0,90. Ha r_0-on belül a forgalom sűrűség meghaladja a táblázatban megadott határokat, vagy ha a forgalom számossága az r_0-on kívül folytatódóan gyorsabban nő, mint *r*, a tényleges nyomvonal megállapítás valószínűsége A/C-módú légijárműveknél ugyancsak kisebb lesz, mint 0,90, a megnövekedett szinkron csonkítás miatt. Ha a közeledési sebesség meghaladja a megadott határokat, a követés az A/C-módú és az S-módú légijárműveknél későn jöhet létre. Ha a más ACAS-ok száma a területen belül meghaladja a táblázatban megadott határokat, a 4. fejezet 4.3.2.2 pontjában szereplő interferencia korlátozó követelmények megkövetelik, hogy az ACAS adattovábbítási teljesítmény és a vevő érzékenység tovább csökkenjen, és ezáltal egy később létrehozott időt eredményez. Mindazonáltal a követési valószínűség várhatóan fokozatosan csökken, ahogyan ezeknek a korlátoknak valamelyikét túlhaladják.

1.3.2.6 A táblázat tükrözi azt a tényt, hogy az ACAS követés teljesítésében a közelítési sebesség és a forgalom sűrűség közötti kompromisszum jut szerephez. Bár előfordulhat, hogy nem lehet fenntartani a nyomvonal nagy valószínűség értékét, amikor a forgalom sűrűség és a megközelítő légijármű közeledési sebessége egyaránt nagy, az ACAS-nak megvan a megbízható nyomvonal létrehozásának képessége nagysebességű megközelítők légijárművekre viszonylag kis sűrűségű útvonali légtérben (amelyeket tipikusan jellemez a 0,017 légijármű/km^2, azaz 0,06 légijármű/NM^2 értéknél kisebb sűrűség), vagy amikor nagyobb sűrűségű, kismagasságú terminál légtérben üzemel, ahol a közlekedési sebességek üzemelési okok miatt tipikusan 260 m/s (500 csomó) alatt vannak.

1.3.2.7 A táblázat arról a tényről is tanúskodik, hogy nagyobb közeledési sebességek inkább az előre tartó irányhoz kapcsolódnak, mint az oldalsó vagy hátrafelé tartó irányhoz, úgy, hogy az ACAS felderítési kialakítás nem kíván megbízható észlelést a legnagyobb közelítési sebességekre oldal vagy hátrafelé irányokban.

1.3.3 RENDSZER TÁVOLSÁGI KORLÁTOZÁSOK

Az ACAS megkövetelt névleges követés hatótávolsága 26 km (14 NM). Azonban amikor nagy sűrűségben üzemel, az interferencia korlátozási sajátosság a rendszer hatótávolságát közelítőleg 9,3 km-re (5 NM) csökkentheti. A 9,3 km-es (5 NM) távolság megfelel egy 260 m/s-os (500 csomó) találkozás elleni védelem létrehozásának.

1.4 Az elektromágneses környezet zavarásának szabályai

1.4.1 Az ACAS berendezés minden forgalom sűrűségben működőképes az elektromágneses környezet lerontása nélkül. Mindegyik ACAS berendezés ismeri a helyi légtérben működő többi ACAS egység számát. Ezt az ismeretet használják fel annak biztosítására, hogy ACAS működés ne nyomja el az idő 2 százalékánál hosszabb ideig a válaszjeladó működését, és annak biztosítására, hogy az ACAS ne járuljon hozzá egy elfogadhatatlanul magas működési sebesség előidézéséhez, amely leronthatná a földi SSR felderítési teljesítményét. Több ACAS egység egymás közelében együttműködően limitálja a saját továbbításait. Ahogyan az ilyen ACAS egységek száma növekszik, mindegyikük lekérdezési kiosztása úgy csökken. Így mindegyik ACAS egység figyeli az észlelési távolságon belül lévő többi ACAS egység számát. Ezt az információt azután saját lekérdezési sebességük és teljesítményük limitálására használják szükség szerint. Amikor ez a korlátozás teljes érvényű, az ACAS egységek hatásos távolsága lehetséges, hogy nem megfelelő elfogadható figyelmeztetési idők szolgáltatására 260 m/s (500 csomó) meghaladása esetén. Ez a körülmény általában kismagasságon fordul elő, ahol ez a közeledési sebesség képesség kielégítő. Amikor az ACAS légijármű a földön van, az ACAS automatikusan limitálja lekérdezésének teljesítményét. Ezt a korlátozást az ACAS számának (n_a) az interferencia korlátozó egyenlőtlenségekben a mért érték háromszoros értékére történő állításával végzik. Ezt az értéket úgy választják, hogy biztosítsa, hogy az ACAS egység a földön ne járuljon hozzá több interferenciával az elektromágneses környezethez, mint ami elkerülhetetlen. Ez az érték egy közelítőleg 5,6 km-es (3 NM) felderítési távolságot szolgáltat a legnagyobb sűrűségű terminál területeken a helyi légiforgalom megbízható földi ACAS felderítés fenntartására, és 26 km-es (14 NM) távolságot nagyon kis sűrűségű légtérben széles területű felderítés biztosítására SSR hiányában.

1.4.2 Egy ACAS egység jelenlétét a többi ACAS egységnek egy ACAS lekérdezés periódikus továbbítása közli, amely az ACAS légijármű címzését megadó közleményt tartalmaz. Ezt a továbbítást névlegesen minden 8-10 másodpercben küldik S-módú közvetítés címzés felhasználásával. Az S-módú válaszjeladók úgy vannak kiképezve, hogy közlési adatokat a közvetítési lekérdezéstől válasz nélkül vegyék. Az ACAS légijármű S-módú válaszjeladója által vett bejelentés közléseket az interferencia korlátozási algoritmus figyeli, hogy a környezetében lévő ACAS egységek számának a becslését kialakítsa.

2. Rendszer teljesítményt befolyásoló tényezők

2.1 Szinkron csonkítás

Amikor egy C-módú lekérdezést továbbítanak, az összes válaszjeladó, amely észleli azt, válaszol. Mivel a válasz időtartama 21 mikromásodperc, azok a légijárművek, amelyek távolsága az ACAS-tól körülbelül 2,8 km-en (1,5 NM) belül van, egymásnak generálnak válaszokat, amelyek a lekérdező légijárműveknél folytonosan és szinkron átfedik egymást. Az egymást átfedő válaszok száma arányos a légijármű sűrűséggel és az ACAS-tól való távolságukkal. Tíz vagy több átfedő választ lehet venni mérsékelten sűrű terminál légtérben. Megbízhatóan dekódolni csak körülbelül három átfedő választ lehet. Ennélfogva redukálni kell az egyes lekérdezésekre válaszoló válaszjeladók számát. Suttogás-kiabálás és irány átvitel eljárások állnak rendelkezésre az ilyen szinkron csonkítások szabályozására (lásd 3.2 és 3.3 pontok). Mindkettő szükséges a legnagyobb forgalomsűrűségben üzemelő ACAS-okhoz.

2.2 Többszörös nyomvonal terep visszaverődésektől

2.2.1 Az SSR válaszjeladók a légijármű aljára szerelt negyed-hullámú monopol antennákat használnak. Ennek a fajtának a végantennája a vízszintes sík alatt 20-30 fok közötti szögeknél csúcs elevációs (látóhatár fölötti szögmagasság) nyereséggel rendelkezik. Ez megfelel a föld-levegő felderítés számára, de a közvetlen levegő-levegő felderítési nyomvonal kedvezőtlen vonatkozásban működhet a föld visszaverődési pályához, különösen víz felett.

2.2.2 Ha az ACAS egység alulra szerelt antennát használ, akkor vannak geometriák, amelyeknél a visszavert jel következetesen erősebb, mint a közvetlen jel. Azonban amikor tetőre szerelt antennát használnak lekérdezéshez, csúcsnyereség jelenik meg egy pozitív látóhatár fölötti szögmagasságnál (elevációs szögnél), és a jel-többszörös nyomvonal arány javul. Így, amikor az ACAS a tetőre szerelt antennáról továbbít adást, a többszörös nyomvonal hatásai jelentősen csökkennek. De még akkor is, amikor tetőre szerelt antennát használnak, a többszörös nyomvonal esetenként meghaladja a vevő küszöböt. Így szükség van alacsonyszintű többszörös nyomvonal kiküszöbölésére. Ezt az ACAS változó vevő küszöb segítségével éri el (lásd 3.4 alpont).

2.3 Magasságmérési adatok minősége

2.3.1 MÉRÉSI HIBÁK

2.3.1.1 Két konfliktusban lévő légijármű közötti függőleges elkülönítést a saját magasság és a megközelítő légijármű magassága közötti különbségként mérik a C-módú vagy S-módú válaszokban közöltek alapján. Ha az ACAS légijármű egy szállító-repülőgép, akkor ez általában pontos magasságméréssel rendelkezik; a megközelítő légijármű kevésbé pontos magasságméréssel rendelkezhet.

2.3.1.2 A magasságmérés hibája kétféle hatást okozhat: először is, ha a légijármű majdnem összeütközési útvonalon repül, a hibák biztonságos elhaladást jelezhetnek, és a fenyegető légi majdnem-összeütközést az ACAS nem háríthatja el; másodszor, ha a légijárművek majdnem-összeütközés útvonalon repülnek, de magasság szerint elkülönítettek, a hibák rossz irányban végrehajtott ACAS manőverekhez vezetnek, amely egy még szorosabb találkozást eredményezhet.

2.3.1.3 Az ACAS a jelentett magasság alapján a legszorosabb megközelítésnél a légijárművek között legalább 90 m-es (300 láb) különbség elérésére törekszik. Így, ha a megközelítő légijármű és az ACAS magasságmérési hibájának kombinációja a 90 m-t (300 láb) megközelíti, az ACAS jelenléte ellenére véges kockázata lenne egy nem megfelelő függőleges elkülönítésnek. A tengerszinttől a 400-as repülési szintig terjedő magasságokban repülő ACAS és nem-ACAS légijárművek várható magasságmérési hibáinak vizsgálata ahhoz a következtetéshez vezetett, hogy a kockázat lényegében elhanyagolható, ha mindkét légijármű nagypontosságú magasságmérő rendszerrel van ellátva, amelyek közelítőleg 15 m-es (50 láb) négyzetes középhiba (RRS) elérésére képesek. Az a következtetés is adódott, hogy ha nagypontosságú magasságmérővel ellátott tipikusan általános célú ACAS légijárműveket tartalmazó légtérben repül (amelyeknek négyzetes középhibája közelítőleg 30 m (100 láb) és normál eloszlású), akkor a magasságmérési hibák alkalmanként nem megfelelő ACAS megoldási tanácsadásokhoz vezetnek. Azonban ez nem fordul elő olyan gyakran, hogy a rendszer hatásosságát komoly mértékben zavarná. A működés nem-megfelelőnek tekinthető akkor, ha mindkét találkozó légijárműnek kispontosságú magasságmérő rendszere van. Ez vezetett ahhoz a követelményhez, hogy az ACAS nagypontosságú rendszerrel rendelkezzen.

2.3.2 MAGASSÁG BIT MEGHIBÁSODÁS

Ha a megközelítő légijárműtől kapott C-módú vagy S-módú magasság jelentések bit hibát tartalmaznak, az ACAS a megközelítő légijármű hibás függőleges helyzet és/vagy hibás sebesség értékelését alakíthatja ki. Ezeknek a hibáknak hasonló hatásuk lehet, mint a mérési hibáknak. Az ilyen hibák a legnagyobb valószínűséggel akkor fordulnak elő, amikor a magassági adat forrás egy Gilham kódoló, és a Gilham kódolású adatok használatának saját légijármű magasságra súlyosan káros következményei lehetnek. Amikor nincs más forrás, mint Gilham kódolású adatok, két kódolót kell használni, és egy összehasonlítási feladatot az S-módú válaszjeladónál, amelyet a magassági adatok hibáinak észleléséhez használnak, mielőtt azokat az ACAS részére szolgáltatják.

2.3.3 SAJÁT LÉGIJÁRMŰ MAGASSÁG HITELESSÉGE

A saját légijármű összes magassági adat forrását meg kell vizsgálni hitelesség szempontjából, beleértve a finom magasság adatokat (amelyek különböző forrásokból származhatnak: giroszkóp, légjel számítógép, stb.) és radar magasság adatokat.

2.4 Annak veszélye, hogy földi SSR helyszíni monitorok (PARROT-ok) hamis forgalmi és megoldási tanácsadásokat váltanak ki

Az ACAS a hatótávolságába eső összes SSR válaszjeladót lekérdezi, beleértve a földi elhelyezésű válaszjeladó telepítéseket, amelyeket földi radarrendszerek működésének figyelésére használnak, vagy a vizsgálati válaszjeladókat is. Ha ezek a földi elhelyezésű válaszjeladók hamis magassági adatokkal válaszolnak, fennáll a potenciális veszélye annak, hogy az ACAS hamis forgalmi tanácsadást vagy megoldási tanácsadást generál. Ennek a problémának a megelőzéséhez a *"Manual of Secondary Surveillance Radar (SSR) Systems* (Doc 9684)" kiadvány információkat szolgáltat a pozíció szerint beállítható távolság referencia orientációs válaszjeladó (PARROT) működéséről és a válaszjeladó vizsgálati berendezésekről.

2.5 SSR S-módú címzések kiosztása és kijelölése

A biztonságos üzemelés érdekében a rendszer megkívánja, hogy az összes S-móddal felszerelt légijármű egyéni címzéssel rendelkezzen. Több légijármű ugyanazon címzéssel vagy légijármű olyan címzéssel, amely nem felel meg a 10. Annex, III. Kötet I. Rész 9. fejezetének, károsan befolyásolhatja a felderítési és koordinációs feladatot.

2.6 ACAS II működésének TCAS I rendszerek általi befolyásolásának lehetősége

Megjegyzés. – Ebben az anyagban a TCAS I, mint olyan rendszer lett meghatározva, amely SSR lekérdezéseket használ a repülőszemélyzet forgalom riasztás figyelmeztető információkkal való ellátására a "láss és kerülj" alapelv kiegészítéseként.

Néhány TCAS I rendszer elnyomott megoldási tanácsadású ACAS II interferencia korlátozó eljárást alkalmaz. Ezek a rendszerek nem elégítik ki az ACAS I Szabványok és Ajánlott Eljárások-at. Mivel az ACAS II interferencia korlátozó más ACAS II légijárművekkel való közvetlen kölcsönhatáson nyugszik (ACAS rádióadást és S-módú válaszjeladó válaszokat használva), ilyen TCAS I légijárművek jelenléte közvetlenül befolyásolhatja a közelben lévő ACAS II légijárművek felderítési működését. Ha a légijárművekre ilyen TCAS I rendszerek vannak felszerelve, amely légijárművekről tudott, hogy egymáshoz szoros közelségben repülnek (pl. helikopterek vagy vitorlázó repülőgépek), akkor a hatás csökkentheti más ACAS II légijárművek ellenőrzési távolságát és késleltetheti az összeütközés elhárító figyelmeztetéseket. Ezeknek a gondoknak a fényében, a TCAS I rendszereket (amelyek ACAS II interferencia korlátozó eljárást alkalmaznak), nem szabad alkalmazni olyan légijárműveknél, amelyekről tudott, hogy egy hosszabb időszakon keresztül egymáshoz szoros közelségben üzemelnek. Gondos figyelmet kell fordítani annak biztosítására, hogy a hatás az SSR elektromágneses környezetére elfogadható legyen, mivel ilyen TCAS I egységek nagyon nagy számban lehetnek felszerelve.

3. Megfontolások a műszaki megvalósításról

3.1 Rendszer működés

3.1.1 VESZÉLYEZTETŐ LÉGIJÁRMŰVEK FELDERÍTÉSE

3.1.1.1 Az alábbiakban ismertetett felderítési eljárások fő célja, hogy helyzet jelentéseket szerezzenek be és ezeket korrelációba (összefüggésbe) hozzák útirányok kialakításához. Ez magában foglalja a célkövetők használatát és megkívánja a sebességek becslését.

3.1.1.2 Az ACAS egység névlegesen másodpercenként egy lekérdezés sorozatot továbbít. A lekérdezéseket +54 +2 dBm névleges effektív sugárzott teljesítménnyel továbbítják, amelyet a légijármű hossztengelyéhez viszonyítva zérus fok látóhatár fölötti szögmagasságnál (elevációs szögnél) mérnek. Amikor az A/C-módú és S-módú magasság jelentő válaszjeladók ezeket a lekérdezéseket veszik, a válaszjeladók válaszokat továbbítanak, amelyek közlik a magasságukat. Az ACAS egység kiszámítja mindegyik megközelítő légijármű távolságát a lekérdezés továbbítás és a válasz vétele között eltelt idő felhasználásával. A magasság és távolság változás mértékét a válasz információk követésével határozzák meg.

3.1.1.3 Ha nincsenek zavarás, túlterhelés, interferencia-korlátozó feltételek, vagy más rontó hatások, a berendezés nominálisan képes felderítés ellátására 26 km-es (14 NM) távolságon belüli A/C-módú és S-módú célok esetében. Azonban, mivel a felderítés megbízhatósága csökken a távolság növekedésével, a berendezés csak azokat a célokat értékeli lehetséges veszélyeztető légijárműként, amelyek egy maximálisan 22 km-es (12 NM) távolságon belül vannak. Ezen a távolságon kívül eső cél nem lehet alkalmas megoldási tanácsadás generálás előidézésére. Azonban az ACAS képes 56 km-es (30 NM) névleges távolságon belüli ACAS-szal felszerelt légijárműtől származó ACAS rádióközvetítésű lekérdezések észlelésére.

3.1.1.4 A berendezésnek képesnek kell lennie A/C-módú vagy S-módú célok bármely kombinációinak ellenőrzésére maximálisan 30 légijárműből álló teljes csúcs kapacitásig. Az ACAS berendezés névlegesen képes nagy közeledési sebességű célok megbízható felderítésére maximálisan 0,017 légijármű per négyzetkilométer (0,06 légijármű per négyzet-NM) csúcs forgalom-sűrűségben, vagy közelítőleg 27 légijármű felderítésére 26 km-es (14 NM) rádiuszon belül.

3.1.1.5 Ha az átlagos forgalom-sűrűség meghaladja a fenti értéket, a megbízható felderítési távolság csökken. Az ACAS berendezés csak maximálisan 260 m/s (500 csomó) közeledési sebességű járműnél tud megbízható ellenőrzést biztosítani 0,087 légijármű per négyzetkilométer (0,3 légijármű per négyzet NM) átlagos forgalom sűrűségnél. A 260 m/s (500 csomó) közeledési sebességű céloknál megkövetelt felderítési távolság körülbelül 9,3 km (5 NM). Lehetséges 9,3 km-es (5NM) felderítést biztosítani egy rövid idejű 0,087 légijármű/km^2 (0,3 légijármű/NM2) vagy nagyobb csúcs forgalom-sűrűségben 30-as teljes cél kapacitás túllépése nélkül. Ha a teljes cél szám meghaladja 30-at bármely 26 km-es (14 NM) maximális távolságnál, a nagytávolságú célokat mindig elhagyhatják a kisebb sebességű célok megbízható felderítési képességének csorbítása nélkül. Így a 30 célhoz tartozó képesség csúcs (az A/C-módú és S-módú bármely kombinációja) megfelel az ACAS-nak, és ha a felderítés alatt álló A/C-módú plusz S-módú célok száma meghaladja a 30-at, az ezen felüli célokat törölni kell a csökkenő távolság sorrendjében, tekintet nélkül a cél típusára.

3.1.2 A/C-MÓDÚ VÁLASZJELADÓKKAL ELLÁTOTT MEGKÖZELÍTŐ LÉGIJÁRMŰVEK FELDERÍTÉSE

3.1.2.1 A/C-módú válaszjeladók felderítési tevékenységét egy csak C-módú körhívás (közös mód) lekérdezés periodikus továbbításával valósítja meg (3. fejezet, 3.1.2.1.5.1.2 pont). Ez válaszokra készteti az A/C-módú válaszjeladókat, de az S-módú válaszjeladókat nem, így megakadályozzák, hogy az S-módú válaszjeladók válaszai szinkron csonkulást szenvedjenek az A/C-módú válaszjeladók válaszaitól. A szinkron csonkulás egyéb eljárásai a következők: (1) irány antennák használata, hogy csak egy azimut szögtartományban lévő légijárműveket kérdezzen le, és (2) teljesítmény elnyomások és lekérdezések egymásutánisága sorozatának alkalmazása ("suttogás-kiabálás"-ként ("whispers-shout") ismert), amely csak azokat a légijárműveket kérdezi le, amelyek hasonló kapcsolat tartalékkal rendelkeznek (lásd 3.2.2 alpont). E két eljárás együttes használata hatékony eszközt szolgáltat a szinkron csonkulás hatásainak leküzdéséhez.

3.1.2.2 A suttogás-kiabálás lekérdezések sorozatát alkalmazza különböző teljesítmény szinten, amelyet az egyes felderítési felfrissítés idején továbbítanak. A lekérdezések mindegyikét a sorozatban, a legkisebb teljesítményhez tartozó kivételével, egy elnyomás továbbítás előz meg, ahol a lekérdezés első impulzusa az elnyomás továbbítás második impulzusaként szolgál. Az elnyomás továbbítási impulzus a lekérdezés első impulzusa előtt 2 mikromásodperccel kezdődik. Az elnyomás impulzust alacsonyabb teljesítmény szinten továbbítják, mint az azt kísérő lekérdezést, úgy, hogy a válaszjeladók, amelyek erre válaszolnak, csak olyanok lehetnek, amelyek a lekérdezést észlelik, de az elnyomást nem. Hogy védekezzenek annak lehetősége ellen, hogy bizonyos válaszjeladók nem válaszolnak a lekérdezésekre a sorozatban, az elnyomás impulzus továbbítás valamivel alacsonyabb teljesítmény szinten történik, mint a következő alacsony lekérdezés teljesítmény szintje. Az egymást követő lekérdezések közötti időközöknek legalább 1 ezredmásodpercnek kell lenni. Ez biztosítja azt, hogy a nagy távolságban lévő válaszjeladóktól érkező válaszokat nem tévesztik össze a rákövetkező lekérdezésre adott válaszokkal. Minden lekérdezést a sorozatban egyetlen felderítés felfrissítési időközön belül továbbítanak.

3.1.2.3. Az egyes csak C-módú körhívás lekérdezésekre adott válaszokat feldolgozzák, hogy meghatározzák az egyes válaszok távolsági és magassági kódját. A magasság kódokat maximálisan három átfedő válasznál lehet meghatározni, ha kellő figyelmet fordítanak a vett impulzusok mindegyike helyének azonosítására.

3.1.2.4 Az összes válasz vétele után, amelyek a suttogás/kiabálás sorozatra való reagálásként érkeztek, a megkettőzött válaszokat egyesíteni kell úgy, hogy mindegyik észlelt légijárműnél csak egy "jelentést" állítsanak elő. A jelentések távolságban és magasságban korrelációba (összefüggésbe) hozhatók az ismert megközelítő légijárművek előrejelzett pozícióival (azaz a meglévő nyomvonalakkal). Mivel a megközelítő légijárműveket nagy gyakorisággal kérdezik le (névlegesen másodpercenként egyszer), szoros korrelációt érnek el a távolság és magasság felhasználásával. A-módú kód nem igényel korrelációt. A jelentéseket, amelyek korrelációban állnak egymással, felhasználják a hozzájuk tartozó nyomvonalak kiterjesztésére. Azok a jelentések, amelyek nem hozhatók korrelációba a meglévő nyomvonalakkal, összehasonlíthatók az előzőleg korrelációba nem hozott jelentésekkel új nyomvonalak indítása érdekében. Új nyomvonal indítása előtt a válaszokat, amelyek a nyomvonal indításához vezetnek, meg lehet vizsgálni annak biztosítására, hogy ezek megegyezzenek az összes jelentősebb magassági kód bitekkel. Geometriai számításokat lehet végezni a terepről való többszörös pálya visszaverődések által okozott visszavert hamis célok azonosítására és kiszűrésére.

3.1.2.5 A megindítandó nyomvonalak megvizsgálhatók nyomvonal érvényességi kritériumok szempontjából, mielőtt beviszik az összeütközés elhárító algoritmusba. Ezeknek a vizsgálatoknak a célja a csonkulások és többszörös repülési pálya által létrehívott hamis nyomvonalak kiselejtezése. A hamis útirányokat általában rövid élettartam jellemzi.

3.1.2.6 Azokat a légijárműveket, amelyek nem jelentenek magasságot a C-módú válaszokban, a C-módú válasz keret impulzusok felhasználásával észlelik. Ezeket a légijárműveket a távolság, mint korrelációs kritérium felhasználásával követik. Az iránytengely kiegészítő felhasználása a korreláció céljából, segít csökkenteni a hamis nem C-módú nyomvonalak számát.

3.1.2.7 *Válasz egyesítés.* Többszörös választ generálhat az A/C-módú cél, amely egynél több suttogás-kiabálás lekérdezésre válaszol az egyes suttogás-kiabálás sorozatok során, vagy az a cél, amely a lekérdezésekre a felső és alsó antennáról egyaránt válaszol. A berendezéstől elvárható, hogy egynél több pozíció jelentést nem generál bármely cél esetén, még ha az a cél egynél több lekérdezésre válaszol az egyes felderítés felfrissítési időközök alatt.

3.1.2.8 *A/C-módú felderítés indítás.* A berendezés csak akkor viszi be a kezdeti pozíció jelentéseket az összeütközés elhárító algoritmusba, ha az alábbi a)-ban és b)-ben közölt feltételek teljesülnek:

a) kezdetben C-módú válasz érkezik a céltól a három egymás utáni ellenőrzés felfrissítési periódus mindegyikében, és

1) a válaszok nincsenek kölcsönös összefüggésben a felderítési válaszokkal, amelyek más nyomvonalakkal kapcsolódnak;

2) a két legutolsó válasz által jelzett távolság változási sebesség kisebb, mint 620 m/s (1200 csomó);

3) a legrégebbi válasz megegyező a fenti távolság változás sebességgel abban az értelemben, hogy a távolsága 95,3 m-en (312,5 láb) belül van egy olyan egyenes vonalon, amely a két legutolsó válaszon megy keresztül;

4) a válaszok korrelációban állnak egymással a magasság kód bitjeikben;

b) egy negyedik összefüggő válasz érkezik öt felderítés felfrissítési időközön belül, amely a három fenti a)-beli három egymás utáni válasz közül a harmadikat követi, és az a)4) fenti pontban meghatározott előrejelzett magasság kód becslés ±60 m-en (±200 láb) belül van.

3.1.2.8.1 Az itt következő példa a szabályok elfogadható együttesére a válasz kód bitek korrelációinak értékeléséhez és a kezdeti magasság nyomvonal kód meghatározásához, amelyek egy célt értékelnek. Három válasz csak akkor kerül összefüggésbe, ha:

a) mind a nyolc D, A és B kód impulzusaik megegyezők, vagy

b) a D, A és B kód impulzusaik közül hét és legalább egy C kód impulzus megegyező.

3.1.2.8.2 A három válasz közötti kód megegyezés vizsgálatát egyedileg végzik a válasz impulzus pozíciók mindegyikére. Ez a vizsgálat egyedül kód impulzusok jelenlétén alapszik; egyezés akkor van egy adott válasz impulzus pozíciónál, ha mind a három választ EGY-el észlelik a pozícióban, vagy mind a három választ ZÉRUS-sal észlelik ebben a pozícióban. Az ezekkel az impulzus észlelésekkel kapcsolatos megbízhatóság az egyezést nem befolyásolja.

3.1.2.8.3 A megbízhatósági jelző egy válaszimpulzus pozíciónál "alacsonyra" állított, ha létezik egy másik vett válasz (akár valódi, akár fantom), amelynek ugyanazon pozícióihoz tartozó ±0,121 mikromásodpercen belül egy impulzusa lehetett volna. Egyéb esetben a megbízhatósági jelző "magasra" van beállítva.

3.1.2.8.4 Ha a három válasz között egy adott válasz impulzus pozíciónál nincs egyezés, a kezdeti nyomvonal impulzus kód becslés erre a pozícióra az egyedi impulzus kódok értékein alapul és ezekkel az impulzus kódokkal három válaszban kapcsolódó megbízhatósági zászló értékeken.

3.1.2.8.5 Amikor a megegyezés egy adott impulzus pozíciónál hiányzik, a kezdeti nyomvonal becslés szabályai ennél a pozíciónál azon az elven alapulnak, hogy "alacsony" megbízhatósági EGY-ek gyanúsak. A szabályok a következők:

a) Ha a legfrissebb (harmadik) válaszban az észlelt kód egy adott impulzus pozícióban “magas” megbízhatóságú vagy ZÉRUS, a kezdeti nyomvonal impulzus kód becslés ennél a pozíciónál ugyanaz, mint az ebben a pozícióban a legfrissebb válaszban észlelt kód.

b) Ha a legfrissebb válaszban az észlelt kód egy adott impulzus pozícióban “alacsony” megbízhatóságú EGY, a kezdeti nyomvonal impulzus kód becslés a pozíciónál ugyanaz, mint az ebben a pozícióban a második válaszban megfigyelt kód, amely nem volt szintén “alacsony” megbízhatóságú EGY. Ha a második szinten egy “alacsony” megbízhatóságú EGY, a kezdeti nyomvonal impulzus kód becslés ugyanaz, mint az a kód, amelyet ebben a pozícióban az első válaszban észleltek.

3.1.2.9 *A/C-MÓDÚ FELDERÍTÉS KITERJESZTÉSE*

3.1.2.9.1 *Általános.* A berendezés csak akkor folytatja egy célra vonatkozó helyzet jelentések bevitelét az összeütközés elkerülési algoritmusba, ha:

a) a nyomvonalat nem azonosították képként (lásd 3.1.2.9.6 pont); és

b) a válasz magasságok egy ±60 m-es (200 láb) magasság ablakon fordulnak elő, amely a válasz előzményeiből előrejelzett magasságon központosul; és

c) az összes válasz, amelyet a veszélyeztető légijármű értékelésére használnak, a kezdeti eljárás után egy távolság ablakban helyezkedik el, amely a válasz előzményeiből előrejelzett távolságon központosul.

3.1.2.9.2 *Távolság korreláció* Az itt következő egy példa a szabályok egy elfogadható együttesére a távolság ablak méreteinek meghatározásához:

a) A nyomvonalakat egyedenként dolgozzák fel növekvő távolság szerinti sorrendben legalább 15 m-es (50 láb) input távolság pontossággal és legalább 1,8 m-es (6 láb) számítási pontossággal. A távolság becslését rekurzív (alfa-béta) célkövetővel végzik, és 0,67-es alfával és 0,25-ös bétával előrejelzik.

b) Mindegyik felderítési felfrissítés után új távolságmérési eredmény áll rendelkezésre mindegyik célra. Mivel a mérés hibákat tartalmaz, ki kell igazítani az előző mérések alapján, hogy az éppen aktuális cél helyzetére és sebességére javított becsléseket nyerjenek. A távolság és távolság változási sebesség becslési egyenletei a következők:

$r(t)$ becslés = $r(t)$ előrejelzés + [alfa x ($r(t)$ mérés - $r(t)$ előrejelzés)]

$\dot{r}(t)$ becslés = $\dot{r}(t - T_p)$ becslés + [(beta /T_p) x ($r(t)$ mérés - $r(t)$ előrejelzés)],

ahol T_p az éppen folyó és az előző mérés közötti időkülönbség.

c) A növekedések, alfa és beta meghatározzák a megbízhatóság viszonylagos fokát az éppen folyó és a megelőző mérésre vonatkozóan; az egység növekedései teljesen megbízhatóak az éppen folyó mérést illetően, és nincs szükség kiigazításra.

d) A fenti egyenletekből nyert becsléseket ezt követően felhasználják a következő mérés időpontjában fennálló távolság előrejelzésére a következőképpen:

$r(t+T_n)$ előrejelzés = $r(t)$ becslés + [$\dot{r}(t)$ becslés x T_n],

ahol T_n az éppen folyamatban lévő és a következő mérés közötti időkülönbség.

e) A távolság korreláció ablak az előrejelzett távolságnál központosul, és fél-ablak szélessége van a következők szerint:

760 láb, ha érintetlen utolsó időköz 570 láb, ha felfrissített utolsó időköz	+	**ha nyomvonalat nem hoztak létre:** 0 **ha nyomvonalat létrehoztak:** 2000 láb, ha 0,00 NM <= r<0,17 NM 1000 láb, ha 0,17 NM <= r<0,33 NM 600 láb, ha 0,33 NM <= r<1,00 NM 240 láb, ha 1,00 NM <= r<1,50 NM 0 láb, ha 1,50 NM <= r

f) Ha a nyomvonal 3050 m (10000 láb) felett van, a második zárójelben lévő tagokat néggyel meg kell szorozni.

3.1.2.9.3 *Magasság korreláció.* A magasság korreláció céljából a magasságot egy 0,28-as alfájú és 0,06-os bétájú alfa-béta követővel becsülik és előrejelzik. A követő 30 m (100 láb) osztva 16-al pontossággal rendelkezik. A magasság előrejelzést a legközelebbi 30 m-re (100 láb) kikerekítik és a szürke kódjait is kiszámítják. A hosszabb távú magasság előrejelzések, amelyeket veszélyeztető észlelési logikával végeznek, pontosabb magasság követési eljárást igényelnek (lásd 3.5.3 alpont). A távolság korrelációs ablakban fekvő válasz(oka)t növekvő távolsági sorrendben vizsgálják magassági korreláció szempontjából. A nyomvonalat első válasszal felfrissítik, amely pontosan megegyezik (minden bitben) a fentiek szerint számolt három szürke kód bármelyikével. Ha a válasz nem illeszthető, két további szürke kódot számolnak ki, és az eljárást újra megpróbálják. A két kód lesz az előrejelzett magasság ±60 m (200 láb).

3.1.2.9.4 *Nyomvonal felfrissítés – létrehozás.* A felfrissítő válasz (ha van) más nyomvonalak felfrissítésénél a további megfontolásoknál, vagy a nyomvonal kezdési folyamatokban kizárásra kerül. Ha nincs felfrissítő válasz, a távolság és magasság becsléseket egyenlővé teszik a megfelelő előrejelzett értékkel. Ha ez a hatodik egymásután következő időköz, amelynek nincs felfrissítő válasza, a nyomvonalat elvetik. Ha felfrissítő válasz esete áll fenn, és a nyomvonalat nem képként azonosították (lásd 3.1.2.9.6 alpont), a nyomvonal létrehozottnak tekinthető, azaz veszélyeztető észlelés logikai felhasználásra rendelkezésre áll. Ha egyszer létrejött, egy nyomvonal megalapozott marad, amíg el nem vetik, még ha sorozatosan egy képi nyomvonal feltételeit elégíti is ki.

3.1.2.9.5 *Nyomvonal szakadások vizsgálata.* Amikor az összes nyomvonalat feldolgozták, ezeket összekombinálják azokkal a nyomvonalakkal, amelyeket az éppen folyamatban lévő pásztázás során újonnan indítottak, azután az összes nyomvonalat párként vizsgálják annak megállapítására, hogy egy adott nyomvonal-pár nagy valószínűséggel ugyanazt a megközelítőt képviseli-e. Ha:

a) a távolságok legalább 150 m-rel (500 láb) eltérnek

b) a távolság változási sebességek legfeljebb 4,6 m/s-al (8,9 csomó) különböznek, vagy

c) vagy

1) a magasságok legfeljebb 30 m-el (10 láb) különböznek, vagy

2) a magasság változási sebességek legfeljebb 3 m/s-al (10 láb/s) különböznek és mindkét nyomvonal ugyanazon pásztázás során indult,

akkor csak az egyik nyomvonalat tartják meg, és annak a nyomvonalnak van preferenciája, amely a válaszok nagyobb számát mutatja fel az indulás óta.

3.1.2.9.6 *Képi nyomvonal feldolgozás.* Azokat a nyomvonalakat, amelyeket a földről tükörszerűen visszavert válaszok alakíthattak volna ki, képi nyomvonalnak nevezzük. Egy nyomvonalat képinek azonosítunk, ha létezik egy nyomvonal a rövidebb távolságnál (valódi nyomvonalnak nevezik) úgy, hogy:

a) a különbség a valódi magasság és a képi magasság között kisebb vagy egyenlő 60 m (200 láb) magasság-jelentő céloknál, vagy mind a képi nyomvonal, mind a valódi nyomvonal nem-magasság-jelentő; és

b) a különbség a mért képi távolság változási sebesség és az $\dot{r}_i$ számított képi távolság változási sebesség között kisebb vagy egyenlő 21 m/s (40 csomó), ahol a számított képi távolság változási sebesség vagy (egyetlen visszaverődés esetére):

$$\dot{r}_i = \left(\frac{1}{2}\right)[\dot{r} + \left(\frac{1}{2r_i - r}\right)[((2r_i - r)^2 - r^2 + (Z_0 - Z)^2)^{\frac{1}{2}}(\dot{Z}_0 + \dot{Z})$$
$$+ r\dot{r} - (Z_0 - Z)(\dot{Z}_0 - \dot{Z})]]$$

vagy (kettős-visszaverődés esetére):

$$\dot{r}_i = \left(\frac{1}{r_i}\right)\left[\left(r_i^2 - r^2 + (Z_0 - Z)^2\right)^{\frac{1}{2}}(\dot{Z}_0 + \dot{Z}) + r\dot{r} - (Z_0 - Z)\ (\dot{Z}_0 - \dot{Z})\right]$$

ahol:

r_i a képi távolság,

r a valódi távolság,

Z a valódi magasság magasságjelentés célok esetében, vagy Z a saját magasságra van beállítva nem-magasság jelentés célok esetén, és

Z_0 a saját magasság

Ha egy nyomvonalat képi nyomvonalként azonosítanak, az megtartható, de nem tekinthető létrehozottnak veszélyeztetés észlelési logika általi felhasználáshoz.

3.1.2.10 *A/C-módú jelentések hiánya.* A berendezés az előrejelzett pozíció jelentések továbbítását A/C-módú céloknál az összeütközés elkerülési algoritmushoz az utolsó érvényes korrelációs választ követő hat ellenőrzés felfrissítési intervallumon keresztül folytatja, hacsak a cél újra ki nem elégíti a 3.1.2.8 alpont ellenőrzés indítási kritériumait.

3.1.3 AZ S-MÓDÚ VÁLASZJELADÓVAL FELSZERELT MEGKÖZELÍTŐ LÉGIJÁRMŰVEK FELDERÍTÉSE

3.1.3.1 Hatékony levegő-levegő felderítési eljárásokat fejlesztettek ki S-módú válaszjeladóval felszerelt megközelítő légijárművekre. Az S-módú szelektív címzés miatt nincs az S-módú válaszjeladók felderítésével kapcsolatos szinkron csonkulás. Azonban a többszörös nyomvonallal foglalkozni kell és az S-módú válaszjeladók felderítését a lehető legkevesebb lekérdezéssel kell végezni a zavarás minimalizálás érdekében.

3.1.3.2 Az S-módú modulációs formátumok jellegüknél fogva inkább többszörös nyomvonal állóak, mint az A/C-módú modulációs formátumok. Azonban az S-módú átvitelek nagyobb hossza valószínűbbé teszi a többszörös nyomvonal általi átlapolást. A felső szerelésű antennák és változó vevő küszöbök használata (az S-módú válasz bevezetés védelmére) elfogadható szintre növeli a többszörös nyomvonal állóságot megbízható levegő-levegő ellenőrzéshez. Széttelepített antennájú válaszjeladók használata ACAS légijárműveken további megbízhatósági tartalékot szolgáltat a konfliktusban lévő ACAS légijármű párok közötti koordinációhoz.

3.1.3.3 Az S-módú lekérdezés gyakoriságokat alacsony szinten tartják a válaszjeladó átvitelek passzív észlelésével és azáltal, hogy csak azokat a megközelítő légijárműveket kérdezik le másodpercenként egyszer, amelyek rövid időn belül veszélyeztető légijárművekké válhatnak. Azokat a megközelítő légijárműveket, amelyek nem valószínű, hogy rövid időn belül veszélyeztető légijárművekké válnak, kisebb gyakorisággal (azaz minden 5 másodpercben egyszer) kell lekérdezni. A passzív címzésre vonatkozó adatbegyűjtés megakadályozza az SSR és ACAS rendszer többi elemével való szükségtelen interferenciát. Az ACAS lehallgatja az S-módú körhívás válaszokat (DF=11, adatgyűjtő squitter adások, 3. fejezet, 3.1.2.8.5.1 pont, vagy DF=17, kiterjesztett squitter átvitelek, 3. fejezet, 3.1.2.8.6.1 pont). Ezek az S-módú földi állomások körhívás lekérdezéseire adott válaszban vagy spontán adattovábbításokban (ezeket nevezzük squitter-nek) jelennek meg, 0,8-1,2 másodperces időközökben. A squitterek vétele váltakozhat a felső és alsó antenna között. Ha vételt kapcsolnak, a kapcsolási idők szabályozása szükséges, a széttelepített antennával rendelkező S-módú válaszjeladók által továbbított squiterekkel való nemkívánatos egyidejűség elkerülése érdekében.

3.1.3.4 A 24-bites légijármű címzést a squitterben hiba kódolás védi, hogy a helyes címzés kinyerését nagy valószínűségét biztosítsák. Mivel a squitter továbbítás nem tartalmaz magassági információt, az ACAS a magasság beszerzését passzív módon, az S-módú válaszokból próbálja megoldani, amely válaszokat a földi lekérdezésekre, vagy más ACAS légijárművektől eredő lekérdezésekre generálták. Ha a magasságot nem veszik röviddel a címzés észlelése után, az S-módú légijárművet aktívan lekérdezik a magasság megszerzése céljából.

3.1.3.5 Miután az ACAS meghatározta egy észlelt S-módú légijármű magasságát, ennek a légijárműnek a magasságát összehasonlítja a saját magasságával. A magasság összehasonlításnak az a célja, hogy meg lehessen határozni a cél elhanyagolhatóságát, vagy azt, hogy a célt le kell-e kérdezni a cél távolságának és sebességének meghatározása érdekében. Ha a mért távolság és a létrehozott sebesség azt jelzi, hogy összeütközés veszélyeztetése áll fenn (vagy hamarosan bekövetkezhet), a megközelítő légijárművet másodpercenként egyszer le kell kérdezni, és az eredményezett nyomvonal adatokat be kell táplálni az összeütközés elhárító algoritmusokba. Egy nagyobb távolságban lévő légijárművet csak olyan gyakran kell lekérdezni, amely a nyomvonal fenntartásához szükséges, és biztosítja, hogy másodpercenként egyszer a légijárművet lekérdezzék, mielőtt veszélyeztető légijárművé válna.

3.1.3.6 Passzív észlelés használata magasság összehasonlítással kombinálva és a nem-veszélyeztető megközelítő légijármű kevésbé gyakori lekérdezése automatikusan csökkenti az S-módú lekérdezési sebességet, amikor a többi ACAS légijármű helyi sűrűsége nagyon nagy. Ezért egy magasabb lekérdezési teljesítmény szint áll rendelkezésre az ellenőrzési teljesítmény növelésére.

3.1.3.7 AZ *S-MÓDÚ FELDERÍTÉS KEZDEMÉNYEZÉSE*

3.1.3.7.1 A berendezést S-módú felderítés minimális S-módú lekérdezéssel való megvalósítására tervezték. Az S-módú célok identitását a DF=11 vagy DF=17 értékekkel vett passzív figyelési adatátvitelekkel határozzák meg. A vett squitterekhez hiba észlelést és helyesbítést alkalmaznak, hogy csökkentsék a feldolgozandó címzések számát. Az S-módú célok magassága, amelyektől squittert kaptak, a DF = 0-val (rövid levegő-levegő ellenőrző válaszok, 3. fejezet, 3.1.2.8.2 alpont) vagy DF = 4-el (ellenőrző magasság válaszok, 3. fejezet 3.1.2.6.5 alpont) vett figyelő adásokkal határozzák meg.

A berendezés figyeli a squittert és a magasság válaszokat, amikor ez nem továbbít vagy vesz S-módú vagy C-módú lekérdezésekre küldött válaszokat. Minden vett választ megvizsgálnak, a további elvégzendő műveletek szempontjából.

3.1.3.7.2 Hogy csökkentsék a szükségtelen lekérdezések számát, egy squitter célt nem kérdeznek le, ha olyan kevés squittert és magasság választ kaptak tőle, hogy ez nem jelez veszélyeztető légijárművet. A célokat, amelyek veszélyeztetők lehetnek, érvényes céloknak nevezik. A berendezés úgy van kialakítva, hogy egy célt nem kérdez le, csak ha a magasság információ azt jelzi, hogy a cél a saját magassághoz képest 3050 m-en (10000 láb) belül van. Az ACAS légijármű lekérdezi azokat a célokat, amelyektől nem kap magasság információt, de folyamatosan kap hibamentes squittereket. Azokat a célokat, amelyek magassága túl van a saját 3050 m-es (10000 láb) magasságon, önkéntes DF = 0 vagy DF = 4 válaszok felhasználásával figyelik, vagy ilyen válaszok hiányában periodikusan lekérdezik egy DF = 0 válasz kiváltásával, hogy megvalósítsák azoknak a céloknak az időben történő megszerzését, amelyek áthaladnak a 3050 m-es (10000 láb) relatív magassági határon,

3.1.3.7.3 A következőkben leírtak példát szolgáltatnak squitterek és magasság válaszok feldolgozásának egyik elfogadható módjára a szükségtelen lekérdezések csökkentéséhez.

a) Amikor egy érvényes squittert először vesznek, egy 0-ról indított futó összeg kapcsolódik hozzá. Mindegyik egymást követő ellenőrzési felfrissítési időköz alatt az összeg 1-el csökken, ha squitterek vagy magasság válaszok egy adott címzéssel nem érkeznek és az összeg 16-al emelkedik egy squitter vagy magasság válasz vételénél. A folyamat addig folytatódik, amíg az összeg egyenlő vagy nagyobb nem lesz 20-nál. Amikor az összeg kisebb vagy egyenlő lesz -20-al, a címet kivonják a rendszerből. Amikor ez egyenlő 20-al vagy nagyobb, mint 20, a célt érvényesnek nyilvánítják.

b) Amikor a célt érvényesnek nyilvánították, akkor lekérdezik, hacsak a magassága az ACAS magasságtól nem különbözik több mint 3050 m-el (10000 láb). Egyéb esetben a magasságát DF = 0 vagy DF= 4 válaszokkal figyelik, vagy ilyen válaszok hiányában minden 10 másodpercben egy lekérdezéssel DF = 0 válasz kiváltásával.

c) Amikor e feltételek közül valamelyik teljesül, a futó összeg folytatja emelkedését vagy csökkenését, még akkor is, ha értéke meghaladja 20-at.

3.1.3.8 *S-MÓDÚ TÁVOLSÁGI ADAT BEGYŰJTÉSE*

3.1.3.8.1 A berendezésnek adatbegyűjtési lekérdezést kell továbbítania (UF = 0, AQ = 1, 3. fejezet, 3.1.2.8.1.1 alpont), hogy meghatározzák az egyes érvényes célok viszonylagos távolságát, amelyek a fent előírt magassággal rendelkeznek, vagy amelyektől nem-megfelelő magasság információt kaptak.

3.1.3.8.2 Ha egy adatbegyűjtési lekérdezésre nem sikerül érvényes választ kapni, további lekérdezéseket kell továbbítani. Egy célnak címzett adatbegyűjtési lekérdezések teljes száma egy ellenőrzési felfrissítési perióduson belül, nem haladhatja meg a hármat. Az első adatbegyűjtési lekérdezést a felső antenna használatával kell továbbítani. Ha két adatbegyűjtési lekérdezésnek egy céltól nem sikerül érvényes választ kiváltani, a következő két adatbegyűjtési lekérdezést ehhez a célhoz az alsó antenna használatával kell továbbítani. Ha az adatbegyűjtési kísérletnél az első felderítés felfrissítés periódusban érvényes válaszok nem érkeznek, az ACAS kilenc adatbegyűjtési lekérdezést továbbít, elosztva az első hat egymást követő felderítés felfrissítési periódus között. Ha az adatbegyűjtési lekérdezéseknek nem sikerül választ kiváltani hat ellenőrzés felfrissítési perióduson belül, az adatbegyűjtési folyamatot meg kell szakítani, amíg elegendő kiegészítő squittert nem sikerül venni, ami jelzi, hogy sikeres adatbegyűjtés valószínű. Egyik eszköz ennek megvalósítására egymás utáni squitterek feldolgozása, ahogyan az a 3.1.3.7 pontban ismertetésre került, de a 16-os növekmény 8-cal helyettesítendő. Ha az adatbegyűjtés második sikertelensége fordul elő, a feldolgozást egy 4-es növekménnyel megismétlik. Bármely ezután bekövetkezett egymást követő sikertelenség esetén 2-es növekményt használnak.

3.1.3.8.3 Ha további kísérletek történnek a céltárgy befogására, akkor azok megegyeznek a fent leírt mintával, kivéve:

a) A második és harmadik kísérletben csak egy kísérletet kell tenni egyetlen ellenőrzési felfrissítési időtartományban; és érvényes válasz hiányában hat lekérdezést kell továbbítani az első hat ellenőrzési felfrissítési időköz során.

b) Bármely további kísérlet a teljes hat felfrissítési időköz során egyetlen lekérdezésből áll.

3.1.3.8.4 Amikor érvényes adatbegyűjtési választ vesznek, a VS mezőt a válaszban megvizsgálják, hogy megállapítsák a cél függőleges állapotát. Ha egy céltárgyat a földön meghatároztak, függőleges állapotát periodikusan figyelik olyan gyakoriságú lekérdezésekkel, amely az idejében történő adatbegyűjtéshez szükséges, amikor az a levegőben van. Amikor érvényes adatbegyűjtési választ vesznek egy levegőben lévő céltól, egy vagy több lekérdezést kell továbbítani a célhoz két felderítési felfrissítési intervallumon belül, hogy megerősítést nyerjen a magassági adat és a magasság kvantálás bit. Ha két választ kaptak egy levegőben lévő céltól, melyiknek magassági értékei egymástól 150 m-en (500 láb) belülre esnek és 3050 m-en (10000 láb) belüli saját magassággal rendelkezik, és azonos kvantálási bit értékük van, periodikus felderítési lekérdezéseket ("követő" lekérdezésnek nevezik) kell indítani ennél a céltárgynál.

3.1.3.8.5 A cél távolságát a becsült távolság változási sebességével használják a potenciális veszélyeztető légijármű meghatározásához az ACAS-felé. Ha a cél nem egy azonnali veszélyeztető légijármű, akkor kisebb gyakorisággal kérdezhető le, mintha potenciális veszélyeztető légijármű lenne, amelynek részére igen nagy valószínűséggel tanácsadást adnának ki. Mindegyik 1-másodperces felderítés felfrissítési időtartományban a cél potenciális veszélyeztetési szintjét (*TAU)* a következőképpen számolják ki.

$$TAU = \text{--}\ (r - \mathrm{SMOD}^2/r)/\acute{r}$$

ahol r a követett távolság, $\acute{r}$ a becsült viszonylagos távolságváltozási sebesség és SMOD egy felderítés távolság modifikátor, amely 5,6 km-el (3 NM) egyezik meg. Ha a becsült távolsági sebesség vagy -6 csomónál kisebb negatív érték, vagy pozitív (vagy egy lassú összetartás, vagy a légijárművek egymástól széttartanak), a *TAU* számításához használt érték -6 csomó. Egy 5,6 km-es *SMOD* érték biztosítja, hogy az ACAS mindig a névleges 1-másodperces lekérdezési ciklust használja olyan szituációkban, ahol a *TAU* értéke gyorsan változhat úgy, mint párhuzamos megközelítésben. Egy 60 másodperces vagy ennél kisebb *TAU* értékkel rendelkező célt másodpercenként 1 névleges gyakorisággal kérdeznek le. Egy 60 másodperces *TAU* értékkel rendelkező célt 5 másodpercenként egyszeres gyakorisággal kérdeznek le, ha a cél és a saját légijármű magassága egyaránt kisebb, mint 5490 m (18000 láb), és legalább öt-másodpercenként egyszer, ha a cél vagy a saját légijármű magassága nagyobb, mint 5490 m (18000 láb).

3.1.3.9 *S-MÓDÚ FELDERÍTÉS KITERJESZTÉSE*

3.1.3.9.1 A berendezés csak akkor továbbít helyzet jelentéseket egy S-módú cél részére az összeütközés elkerülési algoritmusokhoz, ha a kezdeti távolságra vonatkozó adatbegyűjtés után a veszélyeztető légijármű értékelésére használt összes válasz egy, a megelőző válaszokból előrejelzett távolság és magasság középpontú távolság- és magasság-ablakon belül jelenik meg, a magasság kvantálási bit illeszkedik az előző értékhez, és a VS mező a rövid különleges ellenőrzési válaszban jelzi, hogy a cél az előző három felfrissítési ciklus során legalább egyszer a levegőben volt. A távolság- és magasság-ablak ugyanaz, mint a 3.1.2.9.2 és 3.1.2.9.3 pontban leírt, az A/C-módú követésre használt távolság-ablak.

3.1.3.9.2 Ha egy követési lekérdezés nem vált ki érvényes választ, további lekérdezéseket továbbítanak. Egyetlen célnak címzett követő lekérdezések teljes száma várhatóan nem haladja meg az ötöt egyetlen felderítési felfrissítési periódus során, vagy tizenhatot hat egymást követő felfrissítési periódus felett elosztva. Az első követő lekérdezést annak az antennának a felhasználásával továbbítják, amelyet ennek a célnak az utolsó sikeres lekérdezésénél használtak. Ha két egymás utáni követési lekérdezés nem vált ki egy céltól érvényes válaszokat, a következő két lekérdezést ehhez a célhoz a másik antenna felhasználásával kell továbbítani.

3.1.3.10 *S-módú válaszok elmaradása.* A berendezés folytatja az előrejelzett helyzet jelentések továbbítását az összeütközés elkerülési algoritmusokhoz az S-módú célok részére hat ellenőrzési felfrissítési időközön keresztül, amelyek egy követő lekérdezésre adott utolsó érvényes válasz vételét követik, ha a célt minden másodpercben egyszer kérdezik le, vagy tizenegy 1-másodperces felderítés felfrissítési időköz alatt, amelyek egy követő lekérdezésre adott utolsó érvényes válasz vételét követik, ha a célt minden öt másodpercben egyszer kérdezik le. A berendezés nem továbbít helyzet jelentést S-módú céloknál hatnál több felderítés felfrissítés időköz alatt, amelyek egy követő lekérdezésre adott utolsó választ követik, amely lekérdezés sebessége másodpercenként egy, vagy több mint tizenegy 1-másodperces felderítés felfrissítési időköz alatt, amelyek egy követő lekérdezésre adott utolsó érvényes válasz vételét követik, amely lekérdezés sebessége minden öt másodpercben egy, hacsak a cél újra ki nem elégíti a 3.1.3.7 pont távolsági adatok beszerzési kritériumait. Egy elvetett nyomvonal S-módú címzését négy további másodpercig fenntartják az ismételt adatbegyűjtési folyamat lerövidítése érdekében, ha squitterek vétele történik.

3.1.3.11 *S-mód túlterhelés.* A berendezés pozíció jelentéseket továbbít az összes S-módú cél részére, tekintet nélkül a célok távolság szerinti eloszlására, feltéve, hogy a teljes csúcs célszám nem haladja meg a 30-at.

3.1.3.12 *S-módú teljesítmény programozás.* A célok részére közvetített S-módú követő lekérdezés sugárzási teljesítmény szintjét (kivéve a levegő-levegő koordinációs lekérdezéseket), automatikusan csökkenteni kell a 18,5 km-en (10 NM) belül lévő célok távolságának függvényében az alábbiak szerint.

$$P_T = P_{\max} + 20 \log \frac{r}{10}$$

ahol P_T a beállított teljesítmény szint, $P_{\max}$ a névleges teljesítmény szint (tipikusan 250 W), amelyet 18,5 km (10 NM) vagy nagyobb távolságban lévő célok részére továbbítanak, és r a cél előrejelzett távolsága. A ténylegesen továbbított teljesítmény a P_T és a 4. fejezet 4.3.2.2.2.2 alpont szerinti interferencia korlátozó egyenlőtlenségek által megszabott korlát közül a kisebbik.

3.1.3.13 *S-módú nyomvonal kapacitás.* Amikor a légijármű sűrűség névlegesen 0,087 S-módú légijármű per km^2 (0,3 légijármű per NM^2) az ACAS légijármű környezetében, akkor az ACAS légijárműtől 9,3 km (5 NM) távolságon belül körülbelül 24 légijármű, 56 km (30 NM) távolságon belül pedig körülbelül 142 légijármű van. Így az ACAS berendezésnek várhatóan legalább 150 S-módú címzés kapacitással kell rendelkeznie.

3.1.3.14 *IRÁNYSZÖGBECSLÉSEK HASZNÁLATA S-MÓDÚ FELDERÍTÉSNÉL*

3.1.3.14.1 Nagysűrűségű S-módú felderítésnél az irányszög becslés képességet nem követelik meg. Azonban ha irányszög becslések rendelkezésre állnak, látható, hogy irányításos S-módú leképezések használata jelentősen csökkenti a berendezés megkívánt teljesítményét. Az irányításos S-módú lekérdezések irányszög információk hiányában is használhatók, feltéve, hogy az interferencia limiteket nem lépik túl.

3.1.3.14.2 Irányszög becslések a saját sebesség ismeretével összekapcsolva ugyancsak használhatók az általános S-módú leképezési sebesség csökkentésekre. A következőkben az ilyen csökkentésnek egyik lehetséges módját írjuk le.

3.1.3.14.3 Az "idő-a-veszélyeztetésig" számítás helyett, amely azon a konzervatív feltételezésen alapul, hogy két légijármű frontális összeütközési nyomvonalon halad, az "idő-a-veszélyeztetésig" növelhető a veszélyeztető légijármű irányszöge és a saját légijármű korlátozott fordulási sebessége figyelembevételével, és annak az időnek a megengedésével, amely a saját légijárműnek a veszélyeztető légijármű irányába fordulásához szükséges. Egy ilyen számításnál továbbra is fel kell tenni, hogy a cél légijármű a jelentett maximális képességének megfelelő sebességgel repül közvetlenül az összeütközési pont felé.

3.2 Adóállomás

3.2.1 TELJESÍTMÉNY SZINTEK

3.2.1.1 Interferenciamentes esetben és amikor olyan antennát használnak, amelynek diagramja azonos a negyedhullámú aszimmetrikus dipóluséval a föld síkja felett, akkor 54 dBm (250 W) névleges effektív sugárzási teljesítmény használatával a válaszjeladók megbízható levegő-levegő felderítését lehet biztosítani 26 km (14 NM) távolságoknál.

3.2.1.2 Az adóállomás kimenő teljesítményt gondosan korlátozni kell az adattovábbítások között, mivel bármilyen átvezetés komolyan befolyásolja az ACAS légijármű fedélzetén lévő S-módú válaszjeladó teljesítményét. Az átvezetési teljesítmény a válaszjeladóhoz 1030 mHz-nél általában -90 dBm szint alatt kell hogy maradjon. Ha a válaszjeladó antenna és az ACAS antenna közötti fizikai elválasztódás nem kevesebb, mint 50 cm, a két antenna közötti csatolási vesztesége meghaladja a 20 dB-t. Így ha az RF teljesítmény 1030 MHz-nél az ACAS antenna csatlakozó pontjánál nem haladja meg a -70 dBm-et az inaktív állapotban, és ha egy 50 cm-es minimális antenna távköz tartozik hozzá, az ACAS antennától származó válaszjeladó antenna zavarás nem haladja meg a -90 dBm-et. Ez a követelmény hivatott biztosítani, hogy – amikor nem továbbít lekérdezést – az ACAS nem sugároz RF energiát, amely az SSR válaszjeladót vagy más rádió berendezést zavarhatná, vagy érzékenységét csökkentené a légijármű vagy földi létesítmény közelében.

3.2.1.3 Intézkedéseket kell tenni annak biztosítására, hogy a közvetlen 1030 MHz-es átvezetés az ACAS borítástól a válaszjeladó borításhoz kisebb legyen, mint -110 dBm, amikor a két egység egymás mellé van szerelve egy légijárműre történő tipikus szerelésnél.

3.2.1.4 Várható, hogy az ACAS berendezés az ekvivalens osztályozású S-módú válaszjeladókkal egymás mellett kerül vizsgálatra annak biztosítására, hogy mindegyik egység kielégítse a saját érzékenységi követelményeit a másiktól jövő adattovábbítási átvezetés megléte esetén.

3.2.2 SZINKRON INTERFERENCIA SUTTOGÁS-KIABÁLÁS ÁLTALI SZABÁLYOZÁSA

3.2.2.1 Az A/C-módú szinkron interferencia szabályozása, és nagyobb forgalomsűrűségű légtérben történő ACAS üzemelés megkönnyítése érdekében egy lekérdezés sorozatot lehet különböző energiaszinteken továbbítani minden egyes felderítés felfrissítési periódus alatt. A sorozatban lévő minden egyes lekérdezést az egy, legkisebb teljesítményű kivételével, egy elnyomási impulzus előz meg (S_1 -el jelölve) 2 mikromásodperccel megelőzve a P_1 impulzust. Az S_1 és P_1 kombinációja elnyomás átvitelként szolgál. S_1 -et a P_1-énél alacsonyabb teljesítményszinten viszik át. Az egymás utáni lekérdezések közötti minimális időnek 1 ezredmásodpercnek kell lenni. A sorozatban lévő összes lekérdezést egyetlen felderítés felfrissítési időtartamon belül kell továbbítani.

3.2.2.2 Mivel az elnyomási átvitel mindegyik lépésben mindig alacsonyabb teljesítményszinten van, mint a következő lekérdezés, ezt az eljárást suttogás-kiabálásnak nevezik. A szándékolt mechanizmus az, hogy az egyes légijárművek egy sorozatban csak egy vagy két lekérdezésre válaszolnak. Az A/C-módú válaszjeladók bármely adott távolságon nagy effektív érzékenységi terjedelemmel rendelkezhetnek a vevők változása, a kábel-veszteségek és antenna árnyékolása miatt. Ideálisan minden egyes válaszjeladó a populációban két lekérdezésre válaszol a sorozatban és a sorozatban lévő magasabb teljesítményű lekérdezéseket kísérő nagyobb teljesítményű elnyomási átvitelek kikapcsolják ezeket. Egy adott szituációnál, amelyben több légijármű elég közel van egymáshoz, hogy válaszoljanak a szinkron zavarásra, nagyon valószínűtlen, hogy mindnyájan ugyanarra a lekérdezésre válaszoljanak és ennek eredményeként a szinkron zavarás erőssége csökken. A suttogás-kiabálás használata szintén csökkenti a leképezési kapcsolatban lévő többszörös út hatások erősségét.

3.2.2.3 Az A-2a ábra egy suttogás-kiabálás sorozatot határoz meg, amely illeszkedik a nagysűrűségű A/C-módú ellenőrzési követelményekhez, az A-2b ábra pedig olyan suttogás-kiabálás sorozatot jelöl, amely a kissűrűségű A/C-módú felderítési követelményekhez illeszkedik. Öt különböző sorozat lett meghatározva: a felsőszerelésű antenna négy sugarának mindegyikéhez egy, és egy az alsó szerelésű körsugárzó antennához. A lekérdezések bármilyen sorrendben továbbíthatók. Amikor az A-2a ábra nagysűrűségű sorozatát a zavarás lecsonkítása érdekében korlátozzák, a lépéseket a Zavarás korlátozás prioritás oszlopában bemutatott sorrendben ejtik el. Amikor az A-2b ábra kissűrűségű sorozatát teljesítményben csökkentik, a zavarás limitálása érdekében, mindegyik lekérdezés és a vonatkozó MTL értéke, ahogy az utolsó oszlopban látszik, 1 dB-el csökken abban a sorrendben, ahogyan a Zavarás korlátozás prioritás oszlopában fel van tüntetve. A legkisebb számozású lépéseket vetik el elsőként. Az Egyedi impulzusok vagy lépcsők időzítését a sorozatban az A-3 ábra mutatja, amely a legalsó három legkisebb teljesítmény lépcsőt illusztrálja a belső előre irányuló antenna sorozatban. A lekérdezés első impulzusa az elnyomás második impulzusaként szolgál.

3.2.2.4 Az A-2a és az A-2b ábrán tabellázott minimális beindítási szint (MTL) értékek azon a feltételezésen alapulnak, hogy az összes lekérdezésre adott választ körsugárzással veszik. Ha irány-vevő antennát használnak, az MTL értékkel be kell állítani, hogy az antenna nyereséget figyelembe vegyék. Például egy hálózat antenna 3 dB-es nyereségéhez a táblázatban lévő összes MTL értéket 3 dB-el növelik, és a MTL az 1.sz. lépésnél inkább -71 dBm, mint -74 dBm.

3.2.2.5 A teljesítményt, effektív sugárzott teljesítményként határozzák meg a lekérdezéshez. Minden teljesítményszintnek a névleges ±2 dB-en belül kell lennie. A lépésnövekmény tűrésének ±1/2 dB-nek kell lennie, a növekményeknek monotonnak kell lenniük a sorozat teljes teljesítmény tartományában.

3.2.2.6 A legtöbb lekérdezést a felső antennától továbbítják, mivel ez kevésbé érzékeny a földről jövő többutas interferenciára.

3.2.2.7 A megfelelő suttogás-kiabálás sorozat kiválasztása egy adott antennasugárhoz mindegyik lekérdezés ciklusnál az ebben a sugárban jelenlévő A/C-módú szinkron csonkítás éppen aktuális vagy előrelátható szintjén alapul, ahogyan az ACAS felderítés meghatározza. A nagysűrűségű suttogás-kiabálás sorozatot akkor választják ki egy antenna sugárhoz, amikor szinkron csonkítás van jelen ebben a sugárban, ahogyan ez evidens a legalább egy kis megbízhatóságú magasság kód bit létezéséből két egymás utáni S-módú válaszban. A 6-szintű suttogás-kiabálás sorozatot egy antennasugárhoz akkor választanak ki, ha vagy:

a) egy egyedülálló A/C-módú légijármű van ennek a sugárnak a felderítési távolságán belül és szinkron csonkítás nincs jelen; vagy

b) szinkron csonkítás nincs jelen, A/C-módú célok nincsenek egymás csonkítási távolságán belül, és az A/C-módú légijármű sűrűség a megbízható felderítési távolságon belül egyenlő vagy kisebb, mint 0,23 légijármű/km (0,43 légijármű/NM). Amikor forgalmi tanácsadás generálódik egy adott antenna sugáron belüli veszélyeztető légijárműre, a magasszintű sorozatot használják ehhez a sugárhoz a tanácsadás ideje alatt. Amikor megoldási tanácsadás generálódik, a magasszintű sorozatot használják az összes antennasugárhoz a tanácsadás ideje alatt.

3.2.2.8 Ha sem létrehozott A/C-módú felderítési nyomvonal, sem semmilyen jelölt nyomvonal, amely három korreláló C-módú adatbegyűjtési választ tartalmaz, nincsen egy antennasugár felderítési távolságán belül, az ACAS egyedüli C-módú lekérdezést továbbít ebben a sugárban. Az egyedüli lekérdezés szintje és a hozzá kapcsolódó MTL mindegyik sugárnál megegyezik a hozzá tartozó alacsonyszintű suttogás-kiabálás sorozat legmagasabb rendelkezésre álló teljesítmény szintjével, ahogyan azt a zavarás limitálás meghatározza. Egyedüli C-módú lekérdezések érzékenyek a több út miatti fedélzetre irányuló kapcsolati mód váltásra és egy A-módú és C-módú válasz keverékét eredményezi egy megközelítő légijárműtől, amely válaszok 13 mikromásodpercre vannak elválasztva. Az ACAS ennélfogva az alacsonyszintű suttogás-kiabálás sorozatot választja ki egy sugárhoz megbízható felderítési adatbegyűjtéshez és követéshez valahányszor:

a) az egyedüli lekérdezés ebben a sugárban egy A/C-módú választ eredményez, amely egy 1525 m-es (5000 láb) távolság ablakon belül jelenik meg, amely ablak középpontja vagy az előző felderítés felfrissítés időközében vett A/C-módú válasz mért távolságnál, vagy az előző válasz távolságtól ±13 mikromásodperccel való távolság-eltérésnél van; vagy

b) egy létrehozott C-módú nyomvonal vagy egy C-módú nyomvonal, amely az ebbe a sugárba a másik sugárból átmenő adatbegyűjtési átmenetek folyamatában van. Az ACAS visszakapcsol az egyedi lekérdezéshez tíz felderítési felfrissítés időköz után, amelyekben két egymásra ható adatbegyűjtési választ nem vettek.

3.2.3 INTERFERENCIA KORLÁTOZÁS

3.2.3.1 Az ACAS berendezés összhangban van három különleges egyenlőtlenségből álló egyenlőtlenség-rendszerrel (4. fejezet, 4.3.2.2.2.2 alpont) az interferencia hatások szabályozása érdekében. A három egyenlőtlenség a következő fizikai mechanizmushoz kapcsolódik: (1) az ACAS lekérdezések által kiváltott más válaszjeladók működési idejének csökkentése, (2) a lekérdezések átvitele alatt kölcsönös elnyomás által létrehozott, saját válaszjeladó működés idejének csökkentése, és (3) ACAS A/C-módú lekérdezések által kiváltott A/C-módú termék. Az n_a 1-re állítása az (1) és (3) egyenlőtlenségben az 5490 m (18000 láb) nyomásmagasság felett üzemelő ACAS-nál megóvja az egyedüli ACAS-t korlátlan teljesítmény továbbításától egy felső korlát biztosításával az ACAS egy másodperces lekérdezés teljesítmény/sebesség szorzatára.

3.2.3.2 Az (1) egyenlőtlenség biztosítja, hogy egy “áldozat” válaszjeladó soha nem észlel 280-nál több olyan ACAS lekérdezést egy egymásodperces időszakon belül, amelyek az összes 56 km-en (30 NM) belül lévő ACAS lekérdezőtől származnak, bármely ACAS eloszlásnál, amely körülveszi az “áldozat” válaszjeladót a távolság szerint egyenletestől a terület szerint egyenletesig terjedő korlátokon belül. Az egyenlőtlenség baloldala lehetővé teszi az ACAS egység számára a lekérdezés gyakoriságának növelését, ha 250 W-nél kisebb teljesítménnyel végzi az átvitelt, mivel kisebb teljesítményű átvitelt kevesebb válaszjeladó észlel. Mindegyik normalizált teljesítmény érték ezen egyenlőtlenség baloldalán az összegezésen belül egy kitevőt tartalmaz, amely az egyenlőtlenségnek a lokalizált ACAS elosztáshoz való hozzáigazítását szolgálja. Az α értéke a helyi ACAS légijármű eloszlási görbét definiálja és az eloszlás saját ACAS mérésből az 56 km (30 NM) távolságon belül lévő többi ACAS számából származtatják le. Mivel az ACAS eloszlás a terület szerint egyenletestől (α = 1) a távolság szerinti egyenletesig (α = 0,5) változik, az ACAS légijármű sűrűség és ennek következtében az elektromágneses behatásuk az “áldozat” válaszjeladó közelében megnő. Az ACAS interferenciának ez a megnövekedett potenciálját eltéríti az interferencia korlátozás magasabb foka, amely az egyenlőtlenség normalizált értékében egy 1-nél kisebb kitevőhasználatából ered. Ennek az egyenlőtlenségnek a jobboldalán lévő első tagnak a nevezője a környezetben lévő többi ACAS lekérdezőkre és arra a tényre vezethető vissza, hogy minden ACAS egységnek hasonló módon kell korlátoznia a lekérdezési sebességét és teljesítményét úgy, hogy ahogyan a régióban az ACAS egységek száma növekszik, azok mindegyikétől jövő lekérdezési gyakoriság és teljesítmény úgy csökken, és a teljes ACAS lekérdezési gyakoriság bármely válaszjeladónál kisebb marad, mint 280 per másodperc.

3.2.3.3 Egy légtéren belül, amelyben az ACAS légijárművek távolság szerint egyenletes-től a terület szerint egyenletes-ig terjedő korlátok között oszlanak el, és feltételezve, hogy az "áldozatot" 35 mikromásodperces perióduson keresztüli elnyomással vagy válasz holtidővel kiiktatják, valahányszor egy ACAS lekérdezést vesz, a teljes kikapcsolt idő, amelyet ACAS lekérdezések okoztak, nem fogja meghaladni az 1 százalékot. Mérések és szimulációs vizsgálatok azt mutatták, hogy a teljes kikapcsolt idő nagysűrűségű terminál körzeteken belül 1 százaléknál nagyobb is lehet az ACAS légijármű eloszlások miatt, amely a terület szerint egyenletestől a távolság szerint egyenletesig terjedően meghatározott régión túl vannak és bizonyos lekérdezésekhez tartozó S-módú válaszjeladó visszaállási idő miatt, amely várhatóan nagyobb, mint 35 mikromásodperc lehet. Ennek az egyenlőtlenségnek a jobboldalán a második tag korlátozza az ACAS II részére a lekérdezési teljesítmény-sebesség szorzatot tekintet nélkül az n_a-ra, hogy lehetővé tegye a teljes interferencia korlátozás egy részének ACAS I általi felhasználását. A tag, amelyet az α nevezőben lévő értéke illeszt az ACAS eloszláshoz, biztosítja, hogy egy egyedi ACAS II egység sohasem továbbít nagyobb átlagos teljesítményt, mint ha közelítőleg 26 másik ACAS II lenne közvetlen közelben terület szerint egyenletes eloszlásban, vagy közel 6 másik ACAS II a közelben, távolság szerint közel egyenletes eloszlásban.

3.2.3.3.1 A nagysűrűségű terminál körzetek nagyobb terheléstől fognak szenvedni az 1 százalék becslés megsértés miatt, a földetérési ponttól közelítőleg 14,8 - 18,5 km-ig (8 - 10 NM) terjedő nagyobb terhelésből kifolyólag. Hogy kielégítő felderítési teljesítményt biztosítsanak mind az ACAS, mind földi légtérellenőrző rendszerek számára az ilyen területeken, a 610 m (2000 láb) föld feletti magasság alatt repülő ACAS földön üzemelő ACAS II-t és ACAS III-t is tartalmaz n_b és n_c számításánál. Ezt az értéket a következő gyakorlati okokból választották:

a) a rádió magasságmérő használata elegendő mérési pontosságot tesz lehetővé 610 m-en (2000 láb) és ez alatt; és

b) feltételezi, hogy a légijárművek egy ILS siklópályán végeznek megközelítést. Ebben az esetben 610 m (2000 láb) föld feletti magasság megfelel egy repülőtértől való közelítőleg 11,2 km (6 NM) távolságnak.

Új megközelítési eljárások (pl. MLS-en vagy GNSS-en alapuló) további meggondolásokat igényelhetnek az interferencia csökkentésére. És még ILS megközelítésnél is ajánlatos olyan eljárásokat létrehozni, amelyek "tartalékra" ("stand-by"-ra) kapcsolják az ACAS II-t és ACAS III-at, amíg a légijármű nincsen aktív futópályán.

3.2.3.4 A (2) egyenlőtlenség biztosítja, hogy az ACAS légijármű fedélzetén lévő válaszjeladót ne kapcsolják ki az ACAS egységtől jövő kölcsönös elnyomási jelek ugyanazon légijárművön az idő több mint 1 százalékát kitevő ideig.

3.2.3.5 A (3) egyenlőtlenség biztosítja, hogy az "áldozat" A/C-módú választ egymásodperces periódus során nem fog 40-nél több A/C-módú választ generálni, az észlelési távolságán belül lévő összes ACAS lekérdezőtől jövő lekérdezésekre reagálva. Akárcsak az (1) egyenlőtlenség, ez is tartalmaz tagokat csökkentett sugárzási teljesítmény, és a környezetben lévő többi ACAS lekérdező tekintetbe vételére, és egy egyedülálló ACAS egység teljesítményének korlátozására. 40 A/C-módú válasz másodpercenként közelítőleg 20 százaléka a válasz sebességnek olyan válaszjeladónál, amely ACAS nélkül működik többszörös A/C-módú földi érzékelő lefedéses forgalmas területen.

3.2.3.6 *PÉLDA INTERFERENCIA KORLÁTOZÁSRA*

3.2.3.6.1 Példaként, amikor a lekérdezési korlátozás nincs megidézve, az irányított ACAS egység általános A/C-módú és S-módú lekérdezési gyakoriságok tipikusan a következők: az A/C módú lekérdezési k_t gyakoriság tipikusan konstans 83 suttogás-kiabálás lekérdezés per másodpercnél. Tegyük fel, hogy a normalizált suttogás-kiabálás teljesítmények összege, azaz az A/C-módú hozzájárulás az (1) egyenlőtlenség baloldalához közelítőleg 3. Az S-módú lekérdezési gyakoriság függ a környezetben lévő S-módú légijárművek számától. Az útvonalhoz tartozó légtérben a tipikus érték körülbelül 0,08 leképezés per másodperces átlag minden S-módú légijárműnél 56 km-en (30 NM) belül. Egyenletes 0,006 légijármű per négyzetkilométer (0,02 légijármű per négyzet-NM) légijármű sűrűségnél 56 km-en (30 NM) belül a légijárművek száma 57. Ha ezeknek 20 százaléka ACAS-al felszerelt, n_a=12, és a változó tag az egyenlőtlenség jobboldalán 21,5. Ha az ACAS légijárművek száma a területen nem haladja meg a 15-öt, az állandó tag folytatja a szabályozást, és korlátozás nem jelenik meg, amíg nem lesz közelítőleg 100 S-módú légijármű 56 km-en (30 NM) belül.

3.2.3.6.2 Hasonló meggondolások érvényesek a (2) és (3) egyenlőtlenségekre is. A (2) egyenlőtlenségben a kölcsönös elnyomási időköz, amely az összes felső antenna lekérdezésekkel kapcsolatos, 70 mikromásodperc. Az alsó antenna kölcsönös elnyomási időköze 90 mikromásodperc. Igy az A/C-mód hozzájárulása a (2) egyenlőtlenség baloldalához 0,0059, és az S-módú lekérdezési gyakoriság elérheti még az 59 felső antenna lekérdezés per másodperc értéket is, mielőtt korlát átlépést kockáztatna. Tipikus suttogás-kiabálás sorozattal a (3) egyenlőtlenség baloldala közelítőleg 3. Az ACAS légijárművek száma 56 km-en (30 NM) belül elérheti a 26-ot is, a (3) egyenlőtlenség megsértése nélkül.

3.2.6.3 Ha a lekérdezési sebesség vagy a sűrűség egy olyan pontig növekszik, amelynél a korlátozások egyikét megszegik, akkor vagy az A/C-módú, vagy az S-módú normalizált lekérdezési sebességet, vagy mindkettőt csökkenteni kell, hogy az egyenlőtlenség feltételei teljesüljenek. Ha a sűrűség elérné a 0,029 légijármű per km^2-t (0,1 légijármű per NM^2) egyenletesen 56 km-re (30 NM) kiterjedően, akkor az 56 km (30 NM) sugarú körön belül 283 légijármű tartózkodna. Ha ezeknek 10 százaléka ACAS-al van felszerelve, akkor n_a=28. Az (1) és (3) egyenlőtlenségek jobboldali korlátjai akkor 9,66 és 2,76 megfelelőképpen. Ezeknek az alsó korlátoknak a kielégítéséhez az A/C-módú és S-módú járulékokat az (1) egyenlőtlenség baloldalához egyaránt csökkenteni kell. Ennek eredményeként mind az A/C-módú, mind az S-módú célok felderítési távolsága kisebb lesz.

3.2.3.6.4 Az (1) egyenlőtlenség egy kitevőt tartalmaz, amely az egyenlőtlenségnek a specifikus helyi ACAS légijármű sűrűséghez való illesztését szolgálja úgy, hogy egy "áldozat" válaszjeladó, amely olyan ACAS-ok közelében működik, amelyek a terület szerint egyenletestől a távolság szerint egyenletesig terjedő határokon belül oszlanak meg, sohasem észlel 280-nál több ACAS lekérdezést egy másodperces periódus alatt.

A helyi ACAS eloszlási jellemzőjét a saját ACAS környezeten belül az α értéke határozza meg.

Ez az 56 km-en (30 NM) belül, 11,2 km-en (6 NM) belül, 5,6km-en (3 NM) belül lévő ACAS-ok viszonylagos számain alapszik, ahogyan azokat az ACAS rádióadás lekérdezésekből és ACAS felderítésekből leszármaztatják. Az α értéke a következőknek a minimuma:

a) az 56 km-en (30 NM) belül található ACAS légijárművek n_a számának a 11,2 km-en (6 MN) belül található ACAS légijárművek n_b számához viszonyított arányának a logaritmusa osztva 25 logaritmusával; és

b) a 11,2 km-en (6 MN) belül található ACAS légijárművek n_b számának az 5,6 km-en belül található ACAS légijárművek n_c számához viszonyított arányának az egynegyede.

Az 56 km-en belüli ACAS légijárművek terület szerinti egyenletes eloszlása 1,0 értékű α-t eredményez, és a távolság szerinti egyenletes eloszlása 0,5-ös α értéket eredményez. Mivel α csökkenő értékei növekvő teljesítmény csökkenést, és ennek folytán rövidebb felderítési távolságokat eredményeznek, α minimális értéke 0,5-re zsugorodik, hogy megőrizze adekvát felderítési távolságát a legnagyobb sűrűségű terminál területeken. Az α_1 értékét tovább szűkítik, hogy figyelembe vegyék a különleges helyzeteket, amelyeknél a mért helyi ACAS eloszlás:

1) annyira kis számokon alapszik, hogy azok nem meggyőzőek (n_b=1), amely esetben α_1 egynek megfelelő értékre zsugorodik;

2) ellentmondásos egy viszonylag nagy teljes ACAS számmal ($n_b \leq 4$, $n_c \leq 2$, $n_a > 25$), amely esetben α_1 egynek megfelelő értékre zsugorodik;

3) ellentmondásos egy viszonylag kis teljes ACAS számmal ($n_c > 2$, $n_b > 2\ n_c$, $n_a < 40$) amely esetben α_1 0,5-nek megfelelő értékre zsugorodik.

3.2.3.7 *INTERFERENCIA KORLÁTOZÓ ELJÁRÁSOK*

3.2.3.7.1 Mindegyik felderítés felfrissítési időköz kezdetén, ahogy fentebb mutattuk, n_a-t, n_b-t és n_c-t meg kell határozni. n_a-t ezután az (1) és (3) egyenlőtlenség éppen aktuális jobboldali korlátjainak értékelésére használják. Az S-módú változók kiegyenlített értékeit az egyenlőtlenségekben szintén ki kell számítani.

n_b-t és n_c-t az α_1 értékének kiszámítására használják a következő kifejezésnek megfelelően:

$$\alpha_1=1/4\ [n_b/\ n_c]$$

n_a-t és n_b-t az α_2 értékének kiszámítására használják a következő kifejezésnek megfelelően:

$$\alpha_2 = \frac{Log_{10}[n_a/n_b]}{Log_{10}25}$$

Továbbá:

HA [($n_b \leq 1$) VAGY ($n_b > n_c$) VAGY ($n_b \leq 4$ ÉS $n_c \leq 2$ ÉS $n_a > 25$)] AKKOR $\alpha_1 = 1{,}0$;

HA [($n_b < 2n_c$ VAGY (($n_c > 2$) ÉS ($n_b > 2n_c$) ÉS ($n_a < 40$))] AKKOR $\alpha_1 = 0{,}5$;

HA ($n_a > 25n_b$) AKKOR $\alpha_2 = 1{,}0$;

HA ($n_a < 5n_b$) AKKOR $\alpha_2 = 0{,}5$;

α értéke az α_1 és α_2 minimuma.

3.2.3.7.2 Az összes levegő-levegő koordinációs lekérdezés és megoldási tanácsadás és ACAS rádiós lekérdezések továbbítása teljes teljesítménnyel történik. Levegő-levegő koordinációs lekérdezéseket és megoldási tanácsadást és ACAS rádiós lekérdezéseket nem tartalmazzák az S-módú lekérdezések összegei ezeknek az egyenlőtlenségeknek a baloldalán lévő tagjaiban. Valahányszor egy megoldási tanácsadást elküldenek, felderítési lekérdezéseket ehhez a megközelítő légijárműhöz teljes teljesítménnyel lehet továbbítani a maximális kapcsolat megbízhatóság lehetővé tétele érdekében. Mivel a megoldási tanácsadások frekvenciája nagyon alacsony, ezek a továbbítások nem eredményezik az interferencia mérhető növekedését.

3.2.3.7.3 Ha akár az (1), akár a (2) egyenlőtlenség baloldalának kiegyenlített értéke egyenlő vagy meghaladja az éppen aktuális korlátot, és a saját ACAS légijármű 5490 m (18000 láb) nyomásmagasság alatt repül, akkor mind az S-módú, mind az A/C-módú elderítési paramétereket módosítani kell, hogy kielégítsék az egyenlőtlenségeket. Ha a (3) egyenlőtlenség baloldala meghaladja az éppen aktuális korlátot, és a saját ACAS légijármű 5490 m (18000 láb) nyomásmagasság alatt repül, akkor mind az S-módú, mind az A/C-módú felderítési paramétereket módosítani kell, hogy kielégítsék az egyenlőtlenségeket.

3.2.3.7.4 Az A/C-módú felderítést úgy lehet módosítani, hogy a 3.2.2 szakaszban leírt suttogás-kiabálás sorozat lépéseit egymás után figyelmen kívül hagyják. Mindegyik suttogás-kiabálás lépés egyedileg kapcsolódik egy vevő minimális beindulási szint (MTL) beállításához. Így a vevő érzékenység A/C-módú felderítési periódusokban automatikusan hozzá igazításra kerül, az említett teljesítmény csökkentésekhez való illeszkedés érdekében.

3.2.3.7.5 Az általános felderítési érzékenységet S-módú céloknál a lekérdezési teljesítmény csökkentésével és a vevő minimális beindítási szintjének növelésével lehet csökkenteni az összes S-módú squitter lehallgató periódus alatt. Ez közvetve csökkenti az S-módú lekérdezés sebességét a cél szám csökkentésével. Sok S-módú lekérdezés olyan adatbeszerző lekérdezés, amelyeket ismeretlen távolságú célokhoz továbbítanak. Így ez nem szabályozza az S-módú lekérdezési sebességet egyszerűen a nagy-távolságú célok törlésével a nyomvonal fájlból.

3.2.3.7.6 A levegőben lévő ACAS-nál az A/C-módú és S-módú felderítési teljesítmény csökkentését úgy kell végrehajtani, hogy a felderítési távolságok közötti egyenlőség S-módú és A/C-módú céloknál fennálljanak az előre irányuló sugárban. Hogy egy megbízható 11,2 km (6 NM) távolságot biztosítsanak minden irányban n_b esetén, a maximális megengedett interferencia, amely limitálja a teljesítmény csökkenést bármely irányban, egy levegőben lévő ACAS egységnél 10 dB S-módnál és 7 dB A/C-módnál. Az A/C-módú felderítési teljesítmény és érzékenység csökkentéseket úgy kell végrehajtani, hogy egyenlő suttogás-kiabálás képességet érjenek el minden irányban. Ez megkívánja, hogy az A/C-módú teljesítmény és érzékenység csökkentést addig végezzék, az előre irányuló sugárban, amíg az megegyező lesz az oldalsugarakkal, és azután az előre irányuló és oldalsugarakban, amíg a hátsó sugárral megegyezőek lesznek. Hogy egy megbízható 5,6 km-es (3 NM) ellenőrzési távolságot biztosítsanak minden irányban az indulás előtti ellenőrzéshez, a maximális megengedett interferencia korlátozó teljesítmény csökkentés egy a földön lévő ACAS-nál a következők szerinti:

a) előre irányuló sugár: 13 dB S-módnál, és 10 dB A/C-módnál;

b) oldalsugár: 13 dB S-módnál, és 6 dB A/C-módnál; és

c) hátsó sugár: 13 dB S-módnál, és 6 dB A/C-módnál.

Továbbá az A/C-módú és S-módú felderítési érzékenység csökkentéseket úgy kell végrehajtani, hogy az ACAS berendezés ne legyen idő előtt korlátozott, és képes legyen a három korlátozó egyenlőtlenségben részletezett lehetőség legalább 75 százalékának kihasználására az összes cél-típus összetételnél, és a rendszer maximális sűrűség kapacitásáig minden sűrűségnél. Ha a kiegyenlített korlátok közül valamelyiknek az értékét átlépik, megfelelő akció szükséges az interferencia korlátozására egy felderítés felfrissítési időközön belül. Eszközöknek kell rendelkezésre állniuk a felderítési érzékenység helyreállítására, amikor a környezet eléggé javul ahhoz, hogy az interferencia korlátok feloldhatók legyenek.

3.2.3.7.7 ACAS kereszt-kapcsolat lekérdezéseket az S-módú lekérdezések összege tartalmazza az interferencia korlátozó egyenlőtlenségek baloldalának tagjaiban.

3.2.3.8 *TIPIKUS INTERFERENCIA KORLÁTOZÓ ELJÁRÁS MEGVALÓSÍTÁSA*

3.2.3.8.1 Az alábbiakban következő ismertetés egy interferencia korlátozó eljárás egyik lehetséges megvalósítása. Ez az (1), (2) és (3) egyenlőtlenségekben megjelenő rendszer paramétereket változtatja, hogy maximálja és fenntartsa a közelítő egyenlőséget a számított felderítési távolságok között az S-módú és A/C-módú céloknál. Ezeknek az egyenlőtlenségeknek az értékelésében az S-módú paraméterek 8 másodperces átlagát használják és az A/C-módú paraméterek aktuális vagy várható értékeit használják. Az eljárást az A-4 ábrán lévő folyamat ábra illusztrálja.

3.2.3.8.2 *1. lépés.* Az első lépés a szabályozási folyamatban a használatra próbaképpen ütemezett suttogás-kiabálás lépések számának csökkentése az aktuális pásztázás során, ha:

a) a (3) egyenlőtlenséget megszegik; vagy

b) az (1) vagy (2) egyenlőtlenséget megszegik, és az utolsó pásztázás S-módú ellenőrzési távolsága nem haladja meg az A/C-módú felderítési távolságot, amelyet az ütemezett suttogás-kiabálás sorozat használata eredményez.

Suttogás-kiabálás lépéseket az A/C-módú processzor tervezése által diktált sorrendben elhagyják, és az elhagyott lépések száma éppen elég nagy annak biztosítására, hogy a fenti feltételek egyike se álljon fenn. A felhasználásra kísérleti jelleggel ütemezett suttogás-kibálás lépések számának értéke az utolsó pásztázásnál használt számnál kezdődik.

Az S-módú és A/C-módú felderítési távolságok relatív nagyságát a becsült effektív sugárzási teljesítményből (ERP) határozzák meg, amelyet az ACAS légijárműnek közvetlen az elején található S-módú és A/C-módú válaszjeladókkal ellátott célok látnak. Az ERP-t egy adott irányban az antenna teljesítmény bement és az ezirányú antenna séma nyereség szorzata határozza meg. Ha a válaszjeladó érzékenységek azonosak lennének, az S-módú távolság nagyobb vagy kisebb lenne, mint az A/C-módú távolság, attól függően, hogy az S-módú továbbított teljesítmény nagyobb vagy kisebb, mint az A/C-módú továbbított teljesítmény. Mivel az A/C-módú válaszjeladónak valamivel kisebb érzékenysége lehet, mint az S-módú válaszjeladónak, az A/C-módú távolságról felteszik, hogy akkor és csak akkor nagyobb, mint az S-módú távolság, ha az A/C-módú teljesítmény 3 dB-el meghaladja az S-módú teljesítményt.

3.2.3.8.3 *2. lépés.* A második lépés a szabályozási folyamatban az S-módú adatlekérdezési teljesítmény 1dB-el való csökkentése, és az MTL növelése az S-módú squitter lehallgatásához, 1 dB-el az utoljára használt értékekről, ha az (1) vagy (2) egyenlőtlenség megszegése következik be, és az utolsó pásztázás S-módú felderítési távolsága meghaladja az A/C-módú felderítési távolságot, amelyet az ütemezett suttogás-kiabálás sorozat eredményezne.

Ha egyszer egy ilyen változtatást végrehajtottak, az ezt követő 8 másodperc alatt az egyetlen megengedett változtatás a suttogás-kiabálás lépések számának csökkentése, ha ez szükséges a (3) egyenlőtlenség kielégítéséhez. Ez a 8-másodperces befagyasztás lehetővé teszi az S-módú változtatások hatásának láthatóvá válását, mivel a 8-másodperces átlagokat, amelyeket az (1) és (2) egyenlőtlenségekben használnak, azután a rendszereknek a változtatás pillanata utáni viselkedése fogja meghatározni.

3.2.3.8.4 *3. lépés.* A 3. lépés arra szolgál, hogy hozzá lehessen adni egy suttogás-kiabálás lépést ahhoz a próbaképpen előírányzotthoz, ha ez nem akadályozza meg egy 8-másodperces befagyasztást, és a következő feltételek teljesülnek:

a) az (1), (2) és (3) egyenlőtlenségek teljesülnek, és a lépés hozzáadása után továbbra is teljesülnek; és

b) az utolsó pásztázás S-módú felderítési távolsága meghaladja az A/C-módú felderítési távolságot, amely az ütemezett sorozat használatából ered; és annyi lépést adnak hozzá, amennyit a fenti a) vagy b) megsértése nélkül lehet.

3.2.3.8.5 *4. lépés* Végül, ha a fenti 3.2.3.8.4 alpont a) feltétele teljesül, de a b) feltétel nem teljesül, akkor számítást végeznek az adatbegyűjtési S-módú lekérdezési teljesítmény 1 dB-el való növelése, és az S-módú squitterek MTL-jének 1 dB-el való csökkentésének hatásaira vonatkozóan. Ha a számítás azt mutatja, hogy az (1) és (2) egyenlőtlenségek már nem teljesülnek, az 1 dB-es változtatást nem végzik el. Ha a számítás azt eredményezi, hogy ezek továbbra is teljesülnek, az 1 dB-es változtatást elvégzik, és a következő 8 másodpercben sem az A/C-módú, sem az S-módú paramétereket nem változtatják meg, kivéve a fenti 3.2.3.8.3 pontban ismertetetteket.

3.2.4 LEKÉRDEZÉSI VIBRÁLÁS

Az ACAS berendezéstől jövő A/C-módú lekérdezések szándékosan vibráltatásra kerülnek, hogy elkerüljék a más földi és fedélzeti lekérdezőkkel való szinkron interferencia lehetőségét. Az S-módú felderítések lekérdezéseit nem szükséges vibráltatni az S-módú lekérdezés ütemezési folyamatának megnövekedett véletlenszerű jellege miatt.

3.3 Antennák

3.3.1 IRÁNYÍTOTT LEKÉRDEZÉS HASZNÁLATA

3.3.1.1 Irányantenna ajánlott A/C-módú célok megbízható ellenőrzésére 0,087 légijármű per négyzetkilométer (0,3 légijármű per négyzetmérföld) légijármű sűrűségig. Az ajánlott antenna rendszer egy négysugaras, a légijármű tetejére szerelt antennából és a légijármű aljára szerelt körsugárzó antennából áll. Egy irányantenna is lehet használatos a légijármű aljára szerelt körsugárzó antenna helyett. Az irányantenna sorozatosan generál sugarakat, amelyek előre, hátra, balra és jobbra irányulnak. Ezek együttesen légtér ellenőrzési fedést szolgáltatnak minden azimut szögnél anélkül, hogy közbenső beállítási szögre lenne szükség.

3.3.1.2 Az irány antennának tipikusan 3 dB-es sugárszélessége (BW) van 90 ± 10 fokos azimutban +20 fok és -15 fok közötti összes elevációs szögnél. A lekérdezési sugárszélességet egy mellékhurok elnyomási impulzus korlátozza, amely az egyes P_1 lekérdezési impulzusokat 2 mikromásodperccel követi. A P_2 impulzust egy különálló irányító sugárzási diagramon (amely körsugárzó lehet) továbbítják.

3.3.1.3 Időnként szükség van a kis közeledési sebességgel fentről vagy lentről közelítő légijárművek detektálására is. Az ilyen légijárművek észlelése kielégítő antenna nyereséget tesz szükségessé az ACAS légijármű bólintási síkjához képesti ± 10 fokos elevációs szögön (látóhatár fölötti szögmagasság) belül. Az ACAS irányantennának tipikusan 3 dB névleges függőleges, 30 fokos sugárszélessége van.

3.3.1.4 Az irányantenna sugárzási diagramjának formáját és a P_2 adatátvitelek relatív amplitúdóját úgy szabályozzák, hogy a) bármely 0 és 360 fok közötti azimut szögnél és +20 és -15 fok közötti elevációs szögnél elhelyezett maximális elnyomással rendelkező válaszjeladó válaszoljon a négy iránysugár közül legalább az egyikre, és b) egy minimális elnyomással rendelkező válaszjeladó nem több, mint két szomszédos iránysugárból jövő lekérdezésre válaszoljon. A maximális elnyomással rendelkező válaszjeladót úgy határozták meg, mint olyan válaszjeladót, amely csak akkor válaszol, ha a vett P_1/P_2 arány meghaladja a 3 dB-t. A minimális elnyomással rendelkező válaszjeladót úgy határozták meg, mint olyan válaszjeladót, amely csak akkor válaszol, ha a vett P_1/P_2 arány meghaladja a 0 dB-t.

3.3.1.5 Az egyes antenna sugaraktól (előre, balra, jobbra, hátra, körbe) származó effektív sugárzott teljesítmény (ERP) várhatóan a megfelelő névleges ±2 dB értéken belül marad, ahogyan azt az A-2a ábra mutatja.

3.3.1.6 Egy előreirányuló átvitelnek, amelyre TRP = 49 dBm és BW = 90^0, teljesítmény nyeresége van a sugár közepén, amely közelítőleg

$$PG = \frac{TRP}{BW/360^{\circ}} = 55 \text{ dBm}$$

Ez 1 dB-el nagyobb, mint a névleges, és megfelelő lefedést tesz lehetővé az iránysugarak keresztezési pontjainál. Az oldalsó és hátsó sugarakat csökkentik az elülső sugárhoz képest, hogy figyelembe vegyék a kisebb közeledési sebességeket, amelyek akkor jelennek meg, amikor a légijárművek ezekből az irányokból közelednek. Az A/C-módú ellenőrzés teljesítménye általában javul, ahogyan az irányultság (és ezáltal a sugarak száma) növekszik a tetőre szerelt antennánál. Azonban az alsó irány antenna használata csak marginális javulást eredményezne az észlelőképességben, és ha teljes teljesítménnyel használják, lerontja a berendezés általános teljesítményét a hamis nyomvonal ráta növelésével a földről visszaverődő többszörös nyomvonal miatt.

3.3.2 IRÁNYKERESÉS

A válaszoló válaszjeladóktól jövő átvitelek érkezési szögét 10-fokos RMS pontosságnál nagyobb pontossággal lehet meghatározni néhány egyszerű és praktikus iránykereső eljárással. Ezek az eljárások tipikusan négy vagy öt egypólusú sugárzó elem együttest alkalmaznak, amelyek a légijármű felületén negyed hullámközökkel négyszögekben vannak felszerelve. Az ezektől az elemektől jövő jelek kombinálhatók úgy, hogy 2-4 különálló sugarat generáljanak, amelyek fázisban vagy amplitúdóban egybevethetők, hogy a vett jel érkezési irányának számítását produkálják. Az iránykeresés pontossági szintje kielégítő a repülőgépvezető forgalmi tanácsadással való ellátásával, hogy hatékonyan segítse a megközelítő légijármű vizuális befogását.

3.3.3 IRÁNYÍTOTT ÁTVITEL SZINKRON CSONKÍTÁS SZABÁLYOZÁSHOZ

3.3.3.1 Az irányított lekérdezés használata az egyik eljárási mód a szinkron csonkítás csökkentésére. Az irányított lekérdezés csökkenteni képes a lekérdezési régió méretét. Lefedést az összes irányban biztosítani kell. Ebből kifolyólag többszörös sugarakat használnak válaszok kiváltására az ACAS-al felszerelt légijárművek környezetében lévő összes légijárműtől. Figyelmet kell fordítani arra, hogy a sugarak között átfedés legyen, hogy ne keletkezzen lefedetlen rész közöttük.

3.3.3.2 Az antennának viszonylag egyszerű elrendezési képességgel kell rendelkeznie tipikusan négy vagy nyolc pozícióba való kapcsoláshoz. Négy sugár pozíció esetén az antenna nyaláb szélessége várhatóan 100^0 körüli. Az effektív antenna nyaláb szélességét A/C-módú válaszjeladó lekérdezéseknél 3dB-nél keskenyebbre lehet leszűkíteni az adóberendezés oldalszirom elnyomásával.

3.3.4 ANTENNA ELHELYEZÉS

A légijármű tetejére szerelt irány antennát a légijármű középvonalában, amennyire csak lehet, előre kell helyezni. Az ACAS antennákat és az S-módú válaszjeladó antennákat egymástól a lehető legtávolabb kell felszerelni a légijármű sárkányszerkezeten, hogy minimalizálják az energia átvezetést egyik egységről a másikra. A közök soha nem lehetnek 0,5 m-nél (1,5 láb) kisebbek, mivel ez a térköz elrendezés legalább 20 dB kapcsolási veszteséget eredményez.

3.4 Vevő és processzor

3.4.1 ÉRZÉKENYSÉG

Egy S-módú válaszjeladó érzékenységével (-74 dBm minimális beindítási szintű) ekvivalens érzékenység elegendő kapcsolat tartalékot szolgáltat, hogy közel azonos magasságban vízszintes repülést végző 26 km (14 NM) távolságban lévő légijárművek megbízható észlelését szolgáltassa azoknak a légijárműveknek, amelyek maguk is névleges sugárzási teljesítményű válaszjeladókkal vannak felszerelve.

3.4.2 VEVŐ KÜSZÖB SZABÁLYOZÁS

3.4.2.1 ACAS vevők egy változó (dinamikus) küszöböt használnak a többutas hatások szabályozására. Amikor a válasz első impulzusát veszik, a változó vevőküszöb eljárás a vevőküszöböt a minimális beindítási szintről (MTL) a vett impulzuscsúcs szintje alatt rögzített mennyiséggel (pl. 9 dB-el) lejjebb lévő szintre emeli. A vevő küszöböt ezen a szinten tartják az A/C-módú válasz ideje alatt, ami után ez visszatér az MTL-hez. Amikor a többutas visszaverődések gyengék a közvetlen nyomvonal válaszokhoz képest, a közvetlen nyomvonal válasz első impulzusa a vevő küszöböt elegendően megnöveli ahhoz, hogy a többutas visszaverődéseket ne észleljék.

3.4.2.2 A változó küszöbű vevőket történelmileg mellőzték az A/C módú válasz processzoroknál, mivel az ilyen jellegű küszöbök a gyenge válaszok elleni megkülönböztetéssel élnek. Bár, amennyiben a suttogás-kiabálás jellegű lekérdezéssel együtt használják, akkor az előnyös tulajdonságaik kerekednek felül. A lekérdezési sorrend bármely meghatározott lépésénél lehetőség nyílik a küszöb megemelése érdekében egy erős válaszra és lehetővé válik a gyengébb átfedő válasz visszautasítása. Bár, a suttogás-kiabálás jellegű lekérdezésnél, megközelítőleg azonos amplitudójú átfedő válasz érkezik az összes lekérdezésre, mivel a suttogás-kiabálás módszer a célokat a jel erősség szerinti csoportba sorolja be.

3.4.2.3 Az összes suttogás-kiabálás jellegű lekérdezést követő válasz lehallgatási periódusban használt ACAS vevő minimum beindítási szint (MTL) az előírt módon kapcsolódik a lekérdezési teljesítményhez. Nevezetesen, alacsonyabb lekérdezési teljesítményeknél minél kisebb minimum beindítási szintet használnak, hogy az A/C-módú aszinkron impulzus zavarások sebességének szabályozásával az ACAS vevőben amíg csak lehet egyensúlyt teremtsenek a lekérdezési- és a válasz adatkapcsolatok között, hogy az összes felszínre hozott választ észlelni lehessen.

3.4.3 IMPULZUS FELDOLGOZÁS

3.4.3.1 Egy viszonylag széles dinamikus távolság vevő hűen reprodukálja a vett impulzusokat. Gondoskodás történhet a vett impulzus szélek pontos elhelyezéséről és a hamis keret impulzusok elhagyásáról, amelyeket kód impulzusok szintetizálnak a valós válaszokból. A processzor képes impulzusok feldolgozására olyan szituációkban, ahol átfedett impulzus szélek tisztán megkülönböztethetőek. Megvan a képessége arra is, hogy a rejtett impulzusok pozícióit rekonstruálja, amikor közel azonos amplitúdójú átfedő impulzusok okozzák a következő impulzusok elrejtését. A válasz processzornak megvan a képessége legalább három átlapoló válasz kezelésére és korrekt dekódolására. Megfelelő eszközök gondoskodnak a sávon kívüli jelek elvetéséről, és a 0,5 mikromásodperc felfutási idejű impulzusok (tipikusan DME impulzusok) elvetéséről.

3.4.3.2 Ha egy S-módú válasz egy C-módú lehallgatási priódus alatt érkezik, egy hamis C-módú válasz-lánc generálódhat. Az ACAS berendezéstől elvárható, hogy ezeket a hamis válaszokat kiselejtezze.

3.4.4 HIBA ÉSZLELÉS ÉS KORREKCIÓ

3.4.4.1 Az ACAS elektronika, amely a 260 m/s-nál (500 csomó) nagyobb közeledési sebességgel, és négyzet kilométerenként 0,009 légijárműnél (négyzet tengeri mérföldenként 0,03 légijárműnél) nagyobb sűrűséggel, vagy 260 m/s-nél (500 csomó) kisebb közeledési sebességgel és négyzet kilométerenként 0,04 légijárműnél (négyzet tengeri mérföldenként 014 légijárműnél) nagyobb sűrűséggel jellemzett légtérben való használatra terveztek, S-módú válasz hibakorrekciót igényel. Ezekben a nagysűrűségekben hibakorrekció szükséges, hogy felülmúlja az A/C-módú hatásokat. S-módú hibakorrekció lehetővé teszi az S-módú válaszok sikeres vételét egy átlapoló A/C-módú válasz jelenlétében.

3.4.4.2 Hibakorrekció dekódolást használnak a következő válaszoknál: DF = 11 körhívás válaszok, DF = 0 rövid levegő-levegő ellenőrzési válaszok, és DF = 16 hosszú levegő-levegő ellenőrzési válaszok (adatbegyűjtési és nem adatbegyűjtési egyaránt).

3.4.4.3 Ha kettő vagy több olyan adatbegyűjtési választ vesznek, amely hibakorrekciót kíván az S-módú távolság adat beszerzési ablakon belül, gyakorlatiatlan lehet az első vett válaszon kívül további hibakorrekciót alkalmazni. Adatlekérdezési válaszokat az elsőn kívül nem kell korrigálni, amikor ez megjelenik.

3.4.5 VEVŐ OLDALSZIROM ELNYOMÁS

Az irányítottan lekérdező ACAS berendezés vevő oldalszirom elnyomási eljárást alkalmazhatnak a lekérdezett szektoron kívül lévő közeli légijárművek által generált válaszok elhanyagolására. Ez csökkenti az ellenőrzési felfrissítési periódus alatt feldolgozott válaszok számát.

3.4.6 KETTŐS MINIMÁLIS BEINDÍTÓ SZINTEK

Ha az ACAS által használt vevő minimális beindítási szintjét (MTL) lejjebb veszik, hogy nagyobb távolságú működést nyerjenek kiterjesztett squitterrel, intézkedni kell a squitter vételek címkézésére, amelyeket hagyományos MTL-nél vettek, és amelyeket egy módosítás nélküli ACAS vevő használt volna fel. Squitter vételeket, amelyeket hagyományos MTL-nél vagy magasabban vesznek, az ACAS felderítési tevékenységhez táplálják. Squitter vételeket, amelyeket hagyományos MTL alatt vesznek, nem használnak ACAS felderítésre, de közvetlenül a kiterjesztett squitter alkalmazáshoz irányítják. Ez az MTL általi szűrés szükséges ahhoz, hogy megóvják az ACAS-t attól, hogy olyan légijármű lekérdezést kíséreljen meg, amely túl van az aktív elderítési képességen. Ez megnöveli az ACAS lekérdezési sebességét minden tökéletesített teljesítmény szolgáltatás nélkül. A hagyományos MTL használata az ACAS felderítési tevékenységéhez megőrzi az ACAS éppen zajló felderítési műveletét, amikor egy feljavított MTL-elt használó vevővel üzemel.

3.5 Összeütközés-elhárító algoritmus

Megjegyzés. – Az ACAS II összeütközés elhárító logikájáról szóló útmutató anyag két szakaszba van szervezve. Ez a szakasz az ACAS SARP-okban lévő szabványokkal foglalkozik, és fontos koncepciókat fejt ki, az ACAS logika egy specifikus megvalósításának tervezési sajátságait felhasználva példaként. A 4. Szakasz további részletekkel szolgál ezen adott ACAS alkalmazás által használt algoritmusokról és paraméterekről. Ennek az elrendezésnek a következményeként az ebben a Szakaszban lévő pontok gyakran hivatkoznak a következő Szakaszban lévő pontokra.

3.5.1 ÁLTALÁNOS ISMERTETÉS

3.5.1.1 Az ACAS algoritmus névlegesen másodpercenként egyszer ismétlődő ciklusban működik. A ciklus elején a felderítési közléseket az összes megközelítő légijármű nyomvonalainak felfrissítésére, és ha szükséges, új nyomvonalak beindítására használják. Mindegyik megközelítő légijárművet azután távolságának, távolságváltozási sebességének, magasságának, magasság változási sebességének és esetlegesen iránytengelyének éppen folyó számítása képviseli. A saját légijármű magasságának és magasság változásának számításait is fel kell frissíteni.

3.5.1.2 Miután a nyomvonalakat felfrissítették, a megközelítő légijármű észlelési algoritmusokat annak meghatározására használják, hogy mely megközelítő légijárművek jelentenek potenciális összeütközési veszélyt. Két veszélyeztető légijármű szintet határoznak meg: potenciálisan veszélyeztető légijárművek és veszélyeztető légijárművek. Potenciálisan veszélyeztető légijárművek forgalmi tanácsadást, míg a veszélyeztető légijárművek megoldási tanácsadást indokolnak.

3.5.1.3 A megoldási algoritmusok egy megoldási tanácsadást generálnak, az összes veszélyeztető légijárműtől való függőleges elkülönítés végett, amelyeket a veszélyeztető észlelési algoritmusok azonosítanak. Az egyes felszerelt veszélyeztető légijárművekkel való koordináció a megoldási tanácsadás kiválasztási folyamatának részeként jelenik meg. Páronkénti koordináció az egyes felszerelt veszélyeztető légijárművekkel szükséges ahhoz, hogy megállapítsák, melyik légijárműnek kell a másik felett elhaladnia, és így garantálni olyan elkerülő manővereket, amelyek összeegyeztethetőek.

3.5.2 VESZÉLYEZTETÖ LÉGIJÁRMŰ ÉSZLELÉSE

3.5.2.1 Az összeütközési veszély észlelése a távolságban és magasságban való egyidejű közelségen alapszik. Az ACAS távolság változási és magasság változási adatokat használ a veszélyeztető és a saját légijármű helyzetének extrapolálására. Ha rövid időtartamon belül (pl. 25 másodperc) a megközelítő légijármű távolsága várhatóan "kicsi", és a magasság elkülönülés várhatóan "kicsi", a megközelítő légijárművet veszélyeztetőnek nyilvánítják. Megfordítva, a veszélyeztető légijármű deklarálás azon aktuális távolság és magasság elkülönülésen alapulhat, amelyek "kicsik". Az algoritmus paramétereket, amelyek megállapítják, hogy a jövőbeli helyzeteket milyen mértékben extrapolálják, és amelyek megállapítják a küszöböket annak meghatározásához, hogy az elkülönülések mikor "kicsik", a veszélyeztető észlelési algoritmus működési érzékenységi szintjével összhangban választják ki.

3.5.2.2 Mindegyik érzékelési szint az algoritmusok által felhasznált észlelési paraméterekhez egy különleges értékkészletet határoz meg. Ezek tartalmazzák a küszöbértékeket a legszorosabb megközelítés számított időpontjára, a minimális ferde távolságra és a függőleges elkülönítésre vonatkozóan. Az érzékenységi szint szabályozás folyamatán keresztül ezeknek a paramétereknek különböző értékeket adnak a kisebb légijármű elkülönítések figyelembe vételével, amelyek sűrű terminál légtérben fordulnak elő. Az érzékenységi szintet automatikusan, a saját légijármű magasságának felhasználásával, vagy egy S-módú földi állomástól, vagy egy repülőgépvezető kézi kapcsolástól jövő utasítás által lehet kiválasztani (lásd 3.5.12 Szakasz).

3.5.2.3 A veszélyeztető légijárművet észlelő paraméterekhez használt értékek nem lehetnek optimálisak minden szituációra vonatkozóan, mivel az ACAS hátrányt szenved a megközelítő légijármű szándéka ismeretének hiánya miatt. Az eredmény az, hogy egyensúlyt kell teremteni annak szükséglete, hogy elégséges figyelmeztetést adjanak egy fenyegető összeütközésről és a lehetséges felesleges figyelmeztetések generálása között. Ez utóbbi olyan találkozásokból ered, amelyet a megközelítő légijármű manőverekkel az utolsó pillanatban old meg. Az ACAS egyik tulajdonsága, amely ebben a vonatkozásban segít, a légtér védett térfogatának a változtathatósága. Ez a térfogat méretben automatikusan kapcsolódik a két légijármű közötti viszonylagos sebességhez, és automatikusan a relatív sebességvektorral párhuzamos irányba áll be. A tengelyirány nem játszik szerepet ebben a folyamatban. Mindegyik találkozás növeli a védett térfogatot, amely ehhez a találkozáshoz van szabva. Egy több-légijárműves szituációban egyéni védett térfogat van az ACAS légijármű számára, amely az egyes veszélyeztető légijárművekkel párosul.

3.5.3 VÉDETT TÉRFOGAT

Egy megközelítő légijármű akkor válik veszélyeztetővé, amikor behatol a saját légijárművet körülvevő védett térfogatba. A védett térfogatot távolság vizsgálattal (csak távolság adatot felhasználva) és magasság vizsgálattal (magassági és távolsági adatokat felhasználva) határozzák meg. Ezeknek a vizsgálatoknak az elvégzése pozitív vagy negatív értéket szolgáltat (attól függően, hogy a veszélyeztető légijármű a védett térfogat megfelelő részén kívül vagy belül van). Egy megközelítő légijárművet veszélyeztetőnek nyilvánítanak, ha mindkét vizsgálat pozitív eredményt szolgáltat.

3.5.3.1 *A VÉDETT TÉRFOGAT FOGALMAINAK ISMERTETÉSE*

Collision plane - Összeütközési sík. A távolság vektort és a megközelítő légijárműtől kiinduló pillanatnyi relatív sebesség vektort magában foglaló sík.

Critical cross-sectional area - Kritikus keresztmetszet terület. A védett térfogatnak a főtengelyre merőleges síkban fekvő maximális keresztmetszeti területe.

Instantaneous relative velocity(ies) - Pillanatnyi relatív sebesség(ek). A relatív sebesség aktuális értékének a modulusza.

Linear miss distance (m_a) - Lineáris elkerülési távolság (m_a). Az a minimális érték, amelyet a távolság fel fog venni azon feltételezés mellett, hogy mind a megközelítő, mind a saját légijármű az éppen elfoglalt helyzetéből kiindulva, gyorsulás nélkül mozog.

Linear time to closest approach (t_a) - Lineáris idő a legszorosabb megközelítésig (t_a). Az az idő, amely a legszorosabb megközelítésig telne el, ha mind a megközelítő, mind a saját légijármű az éppen elfoglalt helyzetéből kiindulva, gyorsulás nélkül mozogna.

Feltéve, hogy az ACAS részére a távolság számítások készítéséhez csak a távolság és a távolság változási sebesség becslési információ áll rendelkezésre, mind a lineáris elkerülési távolság, mind a lineáris idő a legszorosabb megközelítésig észlelhetetlen mennyiségek.

Az észlelhetetlen mennyiségek, a lineáris elkerülési távolság és a lineáris idő a legszorosabb megközelítésig, valamint az észlelhető mennyiségek, az r távolság, és az $\dot{r}$ távolság változási sebesség közötti összefüggést a következő egyenlőség fejezi ki:

$$t_a = \frac{(r^2 - m_a{}^2)}{(-r\dot{r})}$$

Major axis - Főtengely. A védett térfogathoz kapcsolódó, az ACAS II légijárművön keresztül haladó vonal, amely párhuzamos a pillanatnyi relatív sebesség vektorral.

Range convergence - Távolság konvergencia. Egy légijárművet távolságban egymáshoz közeledőnek (konvergálónak) tartanak, ha a távolság változási sebesség kisebb vagy egyenlő zérus.

3.5.4 TÁVOLSÁG VIZSGÁLAT

3.5.4.1 A távolság vizsgálatból adódó védett térfogatot, amelyet az ACAS 4. Szakaszban leírt megvalósításában használnak, az A-5 ábrán illusztrált vizsgálat realizálható megvalósításának maximális méretei fogalmaiban határozzák meg. Ez egy védett térfogaton átmenő metszetet mutat, amelyet a távolság vizsgálat a légijárművet és a pillanatnyi relatív sebességet magában foglaló síkban generál. A védett térfogat a folyamatos vonallal ábrázolt görbének az x tengely körüli forgatásával keletkezik. Érdemes megjegyezni, hogy a főtengely hossza az s relatív sebesség függvénye. A realizálható távolság vizsgálatánál a pillanatnyi relatív sebesség vektorra merőleges síkban lévő, a védett térfogaton átmenő maximális keresztmetszet sugara az m_c Ez a maximális elkerülési távolságot mutatja, amelynél figyelmeztetés generálódhat, ha a védett térfogatba belépés idején a meglévő sebesség a legszorosabb megközelítésig fennmarad. A főtengely hossza az az alapvető sajátosság, amely a figyelmeztetési időpontot meghatározza, míg m_c a tervezett elkerülési távolságot szabályozza, amely valószínűleg figyelmeztetést generál. Ideális esetben a figyelmeztetési idő T másodperc lenne, és m_c pedig olyan, hogy csak azok a megközelítő légijárművek minősülnének figyelmeztetés kiadását kiváltónak, amelyek a tervezet szerint D_m-nél (a szaggatott vonallal rajzolt kör az A-5 ábrán) kisebb hiányzó távolsággal bírnak. A D_m jelentése az, hogy amikor mint a 4. Szakaszban leírt ACAS megvalósításban lévőt specifikálják, jó megközelítéssel azt a hosszanti elmozdulást képviseli, amelyet egy légijármű a T. idő után tapasztal, amikor konstans $g/3$ gyorsulással (bedöntési szög = 18°) fordulót hajt végre. Így D_m előretervezett elkerülési távolság esetén, amikor az idő a legszorosabb megközelítésig T, összeütközés következhet be, ha a két légijármű közül az egyik egy $g/3$ gyorsulásos manővert hajt végre. Megfelelő iránytengely változási sebesség és távolság változás sebesség adatok híján az ACAS nem tudja az ideális esetet elérni Az A-6 ábra m_c maximális megengedett értékét mutatja (azaz m_c-t, mint a relatív sebesség és az érzékenységi szint függvényét). Amikor a relatív sebesség nagyon kicsi, ami egy hátulról való közeledés esetén fordulhat elő, a távolság vizsgálat által előállított védett térfogat egy D_m sugarú gömb lesz, amelynek középpontja az ACAS légijármű.

3.5.4.2 Lényegében a távolság vizsgálat pozitív eredményt ad, ha közelítőleg T másodperc marad a legszorosabb megközelítés előtt, a relatív sebesség vektort úgy lehet előre tervezni, hogy áthaladjon egy m_c sugarú körön, amelynek középpontja az ACAS légijárművön van, és a relatív sebesség vektorra merőleges síkban helyezkedik el. Mivel m_c értéke a megfelelő függőleges elkülönülés értékéhez képest nagyon nagy, a vizsgálat önmagában nagyszámú felesleges figyelmeztetést generál. Ezért a távolság vizsgálati védett térfogatot szerényebb arányban kell kiszabni, magassági adatok felhasználásával. Ez elkerülhetetlenül csökkenti a függőleges síkban végrehajtott manőverektől való immunitást.

3.5.4.3 A távolság vizsgálatra vonatkozó korlátozásokat úgy tervezik meg, hogy T másodperc névleges figyelmeztetési időt adjon, amely a relatív sebesség vektorra merőleges D_m elmozdulást létrehozó manővert tesz lehetővé. Ezt demonstrálja az, hogy egy elegendően nagy relatív sebességgel történő találkozásnál a fordulót végző légijármű által létrehozott gyorsulás közel merőleges a relatív sebesség vektorra. Kis relatív sebességnél jelentős, a relatív sebesség vektor irányába mutató gyorsulás komponens léphet fel. A figyelmeztetési idő e komponens miatti erózióját a védett térfogat főtengelyének minimális hossza kompenzálja, amely nagyobb, mint sT.

3.5.5 MAGASSÁG VIZSGÁLAT

3.5.5.1 A magasság vizsgálat célja kiszűrni azokat a megközelítő légijárműveket, amelyek pozitív eredményt adnak a távolság vizsgálatnál, de nincsenek megfelelően elkülönítve a függőleges méretekben. A magassági vizsgálatot a figyelmeztetés mértékének csökkentésére használják annak ismeretében, hogy a szabványos függőleges elkülönítési távolságok a légijárműveknél általában sokkal kisebbek, mint a szabványos vízszintes elkülönítési távolságok. Elkerülhetetlen eredmény az, hogy a gyorsulás védelem, amelyet névlegesen a távolság vizsgálat az összes síkban szolgáltat, nagymértékben korlátozott a vízszintes síkban. Továbbá, még relatív gyorsulás nélkül is, a magasság vizsgálat késleltetheti a figyelmeztetések kiadását, ha valamilyen függőleges elkülönülés létezése a legszorosabb megközelítésnél előrejelzett. Két légijármű relatív mozgásának elevációs (látóhatár fölötti szögmagasság szerinti) nézetét mutatja az A-7 ábra. AOB egy olyan síkot képvisel, amely merőleges a relatív sebesség vektorra és az ACAS légijárművet tartalmazza. A megközelítő légijármű vízszintesen elmozdulhat az ACAS-tól, így nincs szükségszerűen az ábra síkjában. A magasság vizsgálat lényeges tulajdonsága, hogy pozitív eredmény hozását célozza, ha az előretervezett függőleges hiányzó távolság kisebb, mint Z_m. A 4. Szakaszban ismertetett ACAS megvalósításban Z_m 180 m-től (600 láb) 240 m-ig (800 láb) terjedő lépcsőkben változik a magassággal .

3.5.5.2 Mivel a fő érdeklődés a D_m-nél kisebb előretervezett elkerülési távolságú megközelítő légijárművek felé irányul, egy ideális magasság vizsgálat (kombinálva egy ideális távolság vizsgálattal) pozitív eredményt szolgáltat, ha *többek között,* a viszonylagos sebesség vektor úgy tervezett, hogy keresztül halad az A-7 ábrán folytonos vonallal feltüntetett kritikus területen. A gyakorlatban a 3.5.1.2 pontban felvázolt távolsági vizsgálat és a magassági vizsgált teljesül, ha a vektor keresztül halad a szaggatott vonallal meghatározott nagyobb területen. Azok a megközelítő légijárművek, amelyek a vonal közötti területeken haladnak át, valószínűleg növelik a szükségtelen figyelmeztetések számát.

3.5.5.3 A magasság vizsgálat nem eredményesebb a legszorosabb megközelítés idejének előrejelzése szempontjából, mint a távolság vizsgálat. Ez azt jelenti, hogy ha más feltételek nem állnak fenn, a távolság vizsgálat meghatározza a figyelmeztetés idejét. Azonban a 4. Szakaszban leírt ACAS megvalósítás magasság vizsgálatának egy további sajátossága annak a lehetőségnek ellenében törekszik hatni, hogy a légijárművek egyike a másiknál kisebb vagy nagyobb magassági szintre kerüljön, így elkerüljenek egy szoros találkozást. A találkozások két típusa ismeretes: az első, amelyben az éppen meglévő függőleges elkülönülés kisebb, mint Z_t, (lásd 4.3.4.2 alpont) és egy másik, amelyben a meglévő elkülönülés nagyobb, mint Z_t, és a légijárművek magasságban összetartanak (konvergálnak). Az első típusnál az ACAS magasság vizsgálat csak azt igényli, hogy a kritikus terület úgy legyen előre tervezve, hogy abba behatolás történjen. A másodiknál egy pótlólagos feltétel, hogy a közös magasság szint elérési ideje kisebb vagy egyenlő legyen egy időküszöbbel, amely néha kisebb, mint *T,* a névleges figyelmeztetési idő. A hatás az, hogy a figyelmeztetési időt a távolság vizsgálat szabályozza azoknál a megközelítő légijárműveknél, amelyekre magasság kereszteződés van előretervezve a legszorosabb megközelítés előtt, míg későbbi figyelmeztetéseket adnak a legszorosabb megközelítés utáni magasságkereszteződéseknél.

3.5.6 MEGALAPOZOTT VESZÉLYEZTETÉSEK

3.5.6.1 Megalapozott veszélyeztető egy olyan megközelítő légijármű, amelyet veszélyeztetőnek minősítettek és még kiérdemli a megoldási tanácsadást.

3.5.6.2 A követelmény, hogy mind a távolság vizsgálat, mind a magasság vizsgálat ugyanazon működési ciklusban pozitív eredményt adjon, mielőtt egy megközelítő légijárművet veszélyeztetőnek nyilvánítanának (3.5.2.1 alpont), csak új veszélyeztető légijárművekre érvényes. Következésképpen csak a távolság vizsgálatot alkalmazzák, és pozitív eredménynek az a hatása, hogy a veszélyeztető státusz fennmarad. A magasság vizsgálat elhagyásának az oka az, hogy egy gyors repülőgépvezető reagálás, vagy az a tény, hogy a megközelítő légijármű kezdetben még éppen kielégíti a magassági kritériumokat, a veszélyeztető státusz törlését okozhatja a legszorosabb megközelítés elérése előtt.

3.5.7 FIGYELMEZTETÉSI SZINT

3.5.7.1 A figyelmeztetési szintet szabályozó alapvető változók: a relatív sebesség, az elkerülési távolság és a környező légijármű sűrűség. A figyelmeztetési szintet befolyásoló alapvető ACAS paraméterek: *T, D_m és Z_m.* A figyelmeztetési szintet állandó sebességű véletlen forgalom esetére lehet számítani, de a látod-és-elkerülöd hatások és a légiforgalmi irányítás az ilyen számításokat a valódi forgalomra nagyon bonyolulttá teszik. Az A-6 ábra némi iránymutatást ad egy előfordulás néhány sajátosságáról, amely figyelmeztetés kiadását idézheti elő, bár nem ad segítséget a magasság vizsgálat eredményének meggondolásához. Például látható, hogy 5-ös érzékenységi szintnél (50-es és 100-as repülési magasságszint között) nem lehet figyelmeztetés, ha a vízszintes elkülönülés nagyobb, mint 5,5 km (3 NM) és a relatív sebesség kisebb, mint körülbelül 440 m/s (850 csomó).

3.5.7.2. Földi radar felderítési adatokat felhasználó szimulációk és az ACAS berendezésekkel nyert kezdeti tapasztalatok azt mutatták, hogy a figyelmeztetési szint értéke tipikus sűrűségű légtérben 30 repült órában kapott 1 értékű arányszámtól, az 50 repült órában kapott 1 értékű arányszámig terjedő tartományban helyezkedik el.

3.5.8 VESZÉLYEZTETŐ MEGOLDÁS

3.5.8.1 *KOORDINÁCIÓ*

Ha a veszélyeztető státuszú légijármű ACAS II-vel vagy ACAS III-mal van felszerelve, a saját ACAS-tól megkövetelt, hogy koordináljon a veszélyeztető státuszú légijármű ACAS-ával az S-módú adatkapcsolaton keresztül, hogy biztosítsa összeegyeztethető megoldási tanácsadások kiválasztását. A kiválasztott tanácsadás jellegét befolyásolja az a tény, hogy a veszélyeztető ACAS-al felszerelt.

3.5.8.2 *MEGOLDÁSI TANÁCSADÁSOK OSZTÁLYOZÁSA*

3.5.8.2.1 Az ACAS elkerülési manőverek a függőleges síkra korlátozódnak és az értelem (fel vagy le) és az erősség jellemzi őket. Egy felfelé történő elmozdulás értelmű megoldási tanácsadás célja biztosítani, hogy a saját légijármű biztonságosan haladjon el a veszélyeztető légijármű felett. Egy lefelé történő elmozdulás értelmű megoldási tanácsadás célja biztosítani, hogy a saját légijármű biztonságosan haladjon el a veszélyeztető légijármű alatt. A felfelé történő elmozdulás értelmű megoldási tanácsadás erősségekre példák: "korlátozni a függőleges sebességet" (meghatározott célnak süllyedési sebesség), “nem süllyedni” vagy “emelkedni”. Lefelé irányúló értelmű azonos megoldási tanácsadás erősségre példák: “korlátozni a függőleges sebességet” (meghatározott célnak emelkedési sebesség), “nem emelkedni” vagy “süllyedni”. A megoldási tanácsadásoknak két típusa van: “pozitív”, egy kívánságot jelent bizonyos sebességgel történő emelkedésre vagy süllyedésre; és “függőleges sebesség korlátozás” azt jelenti, hogy a függőleges sebesség előírt tartományát kerülni kell. Bármely tanácsadás lehet “helyesbítési” vagy “megelőző”. Helyesbítési tanácsadás a saját légijármű fennálló függőleges sebességének változtatását kívánja, míg a megelőző tanácsadás nem kívánja.

3.5.8.2.2 Elvárás, hogy a generált megoldási tanácsadás ellentmondásmentes legyen a repülési pálya korlátozásokkal bizonyos repülési üzemmódokban a repülési burkológörbe korlátozások és az emelkedő képességet csökkentő légijármű konfigurációk miatt. Elvárható, hogy a légijármű manőver korlátozási kijelzései, amelyek az ACAS részére rendelkezésre állnak, a tényleges légijármű teljesítőképesség konzervatív értékelését ajánlják. Ez különösen igaz az emelkedés gátlására. Abban a ritka és sürgős esetben, amikor egy nagymagasságú lefelé irányuló értelmű megoldási tanácsadást emelkedésbe fordítanak át, várható, hogy nagyon gyakran a légijármű teljesítőképessége, amelyet összhangba kell hozni a megoldás tanácsadással, rendelkezésre fog állni az emelkedés korlátozás dacára. Amikor ilyen képességek nem állnak rendelkezésre, várható, hogy legalább részben a repülőgépvezető mindig képes lesz eleget tenni az irányváltásnak egy azonnali vízszintes repülésbe való átmenettel.

3.5.8.3 *MAGASSÁGI ELKÜLÖNÍTÉSI CÉL*

3.5.8.3.1 Hogy biztosan el lehessen kerülni az összeütközést, az ACAS-nak valódi magassági elkülönítést kell biztosítania a legszorosabb megközelítésnél, amely a légijármű méreteihez és a legrosszabb esethez tartozó iránybeállításához igazodik. Mivel csak mért adatok állnak rendelkezésre, megfelelően figyelembe kell venni a magassági hibákat mindkét légijárműnél. Továbbá, az elkerülési műveletet a legszorosabb megközelítés előtt meg kell kezdeni, így lehetséges, hogy ez a művelet a legszorosabb megközelítésnél előrejelzett magassági elkülönítésen alapul, amely további hibaforrást visz be. Ezek a tényezők egy olyan követelményhez vezetnek, hogy a repülőgépvezető részére szolgáltatott megoldási tanácsadásnak olyannak kell lenni, hogy a kívánt magassági elkülönítést a legszorosabb megközelítésnél a rendelkezésre álló idő alatt elérje. Ez az A_1 magassági elkülönítési cél, a magasságmérési hibák megfelelő kompenzálása érdekében a magasság függvényében kell, hogy változzon. A 4. Szakaszban ismertetett ACAS megvalósításnál A_1 90 m-től (300 láb) 210 m-ig (700 láb) változik.

3.5.8.3.2 A legszorosabb megközelítés időpontját nem lehet pontosan számítani, mivel az elkerülési távolság nem ismert, a veszélyeztető légijármű manővert hajthat végre és a távolság megfigyelések nem tökéletesek. Azonban a hasznosnak és elfogadhatónak talált korlátozások nem mások, mint azok a idők a legszorosabb megközelítésig, feltételezve, hogy az elkerülési távolság felveszi a legnagyobb értéket (D_m) és a zérus értéket és minden más hibaforrás elhanyagolásra került. Ez a tartomány kritikus azoknál a találkozásoknál, amelyeknél a távolság változási sebesség nagyon kis értékeket vesz fel. A magasság szerinti elkülönítés értéknek a teljes időköz alatti fenntartásával a megoldási tanácsadás kiválasztása közömbössé van téve a minimális távolsági idő számításában fellépő potenciálisan nagy hibákkal szemben. Ilyen hibák a távolság változási sebesség számításában fellépő kis abszolút hibákból származnak. Megelőző megoldási tanácsadásoknál a megoldási tanácsadás által ajánlott korláthoz való arány azonnali megváltozásának feltételezése azt fogja eredményezni, hogy a számítás egy határt szolgáltat (felsőt lefelé irányuló értelmű megoldási tanácsadás esetén, alsót felfelé irányuló értelmű megoldási tanácsadás esetén) a saját légijármű magasságára a legszorosabb megközelítésnél.

3.5.8.4. *MINIMÁLIS ELSZAKADÁS*

3.5.8.4.1 Elvileg a nagyobb megkívánt magasság elkülönítéseket élénkebb elkerülési manőverrel el lehet érni, de akadályt jelent az utaskényelem, légijármű képességei és a légiforgalmi irányítás engedélyétől való eltérés. Az alább következő 4. Szakaszban leírt ACAS paraméterek azon a számításon alapulnak, hogy a tipikus magasságváltoztatási sebesség, ami egy összeütközés elkerüléshez szükséges, 1500 láb/perc.

3.5.8.4.2 A tanácsadás irányának és erősségének kezdeti megválasztása, az alább ismertetett kivételektől eltekintve, arra irányul, hogy az ACS légijármű függőleges repülési pályájában a lehető legkisebb változtatást igényelje. És a tanácsadástól elvárják, hogy ha lehetséges, a találkozás későbbi stádiumában megfelelő mértékben legyengített legyen és végképpen megszűnjön, amikor a kívánt elkülönítést a legszorosabb megközelítésnél elérte. Elsődleges szempont a légiforgalmi irányítás engedélyezéseitől való eltérés minimalizálása.

3.5.8.5 *REPÜLŐGÉPVEZETŐ REAGÁLÁS*

Mivel a repülőgépvezető döntő befolyást gyakorol a rendszer hatékonyságára, az ACAS-nál bizonyos feltételezéseket kell tenni a repülőgépvezető reagálására vonatkozóan. A 4. Szakaszban leírt ACAS megvalósítás 5 másodperc reakció időt használ egy új tanácsadásnál, és *g/4* gyorsulást az elkerülési sebesség létrehozásánál. A reakció idő 2,5 másodpercre csökken az ezt követő tanácsadás változásoknál. Az ACAS nem szolgáltathat megfelelő függőleges elkülönítést, ha a repülőgépvezető reakció késése meghaladja a tervezet által feltételezett repülőgépvezető reagálási késést.

3.5.8.6 *VÍZSZINTES REPÜLÉST VÉGZŐ MEGKÖZELÍTŐ LÉGIJÁRMŰVEK*

3.5.8.6.1 A figyelmeztetés idején vízszintes repülést végző és ezt azután is folytató megközelítő légijárművek kevés problémát okoznak az ACAS számára. Ha a saját légijármű is vízszintes repülést végez, nem áll fenn számítási probléma. Amit az összes ACAS légijárműnek csinálni kell az az, hogy abban az irányban kell mozognia, amely növeli a céltól való elkülönülés meglévő értékét. Ennek az egyszerű logikának olyan akadályai lehetnek, hogy az ACAS légijármű esetleg nem képes emelkedni, vagy túl közel lehet a földhöz ahhoz, hogy biztonságosan süllyedni tudna.

3.5.8.6.2 A manőverezés korlátozottsági problémák nagyrészt eltűnnek, amikor az ACAS légijármű emelkedést vagy süllyedést hajt végre, mivel az elkülönítést gyakran el lehet érni a vízszintes repülésbe való átmenettel. És a számítási probléma valószínűleg igen csekély lesz, ha az ACAS-ba nagy feloldású, saját magasságra vonatkozó adatok vannak betáplálva.

3.5.8.7 *EMELKEDÉST/SÜLLYEDÉST VÉGZŐ MEGKÖZELÍTŐ LÉGIJÁRMŰVEK*

Emelkedést, vagy süllyedést végrehajtó megközelítő légijárművek több nehézséget okoznak, mint a vízszintes repülést végzők. Gyakran jelent problémát a magasságváltozási sebességük megállapítása. Az is nyilvánvaló, hogy egy emelkedést vagy süllyedést végrehajtó veszélyeztető légijármű, amely a számítások szerint a saját légijárműhöz közel fog elhaladni, nagyobb valószínűséggel vízszintes repülésbe megy át, mint hogy megtartaná a megfigyelt magasság változtatási sebességét, így kerülve el a szoros találkozást. Ezért az ACAS-nak a megoldási tanácsadás kiválasztásnál figyelembe kell venni azt a lehetőséget, hogy a veszélyeztető légijárművek vízszintes repülésbe mehetnek át, pl. a légiforgalmi irányítás utasítására reagálva. A veszélyeztető légijármű nyomon követett magasság változási sebességének alacsony megbízhatósága azt okozhatja, hogy a megoldási tanácsadás generálás e sebességnek egy jobb becslésére várva késedelmet szenved.

3.5.8.8 *MAGASSÁG KERESZTEZÉS MEGOLDÁS TANÁCSADÁSOK*

3.5.8.8.1 Megközelítő légijárművek, amelyeknél egy ACAS légijármű repülési magasságának keresztezése tervezett, egy teljesen hatékony ACAS tervezését rendkívüli mértékben megnehezíti, mivel az ilyen megközelítő légijárművek vízszintes repülésbe mehetnek át. Néhány magasság keresztező megoldási tanácsadást a repülőgépvezetők intuició ellenesnek találnak. Valóban, az ilyen megoldási tanácsadások kezdetben a repülőgépvezetőtől olyan manővert igényelnek, amely a megközelítő légijármű felé irányul, átmenetileg csökkentve a magasság szerinti elkülönülést. Mindazonáltal megfigyeltek olyan eseteket, amelyekben magasság keresztezési megoldási tanácsadások nyilvánvalóan megfelelőek, és még nem demonstrálták, hogy ezeket kívánatos, vagy lehetséges teljesen elkerülni. A magasság keresztezés megoldási tanácsadások gyakorisága valószínűleg függ a légijármű vezetésétől és viselkedésétől. Ismert, hogy a nagy sebességgel emelkedő, vagy süllyedő légijármű gyakrabban vált ki megoldási tanácsadást, közöttük magasság keresztező megoldás tanácsadást, mint más légijármű. Egy engedélyezett repülési magassághoz nagy sebességgel közeledő és azután egy másik légijármű közelében vízszintes repülésbe átmenő légijármű hatását lentebb ismertetjük. Ezeknek a hatásoknak a mérséklésére szolgáló intézkedéseket a 3.5.8.9 alpont írja le.

3.5.8.8.2 Az A-8 ábrán illusztrált helyzetnél feltételezzük, hogy a figyelmeztetés akkor következik be, amikor a megközelítő légijármű emelkedő repülést végez a vízszintes repülést végző ACAS légijármű irányába. Adottnak vesszük, hogy az emelkedés folytatódik, akkor a legjobb elkerülő stratégia a saját légijármű részére süllyedés a veszélyeztető légijármű felé, amely a veszélyeztető légijármű magasságának keresztezésével jár. Egy elemelkedés esetleg szolgáltathat elegendő függőleges távolságot, de ugyanazon elkerülési sebesség mellett a süllyedés nagyobb távolságot biztosít a veszélyeztető légijárműtől. Ha a saját légijármű süllyed, látható, hogy veszélyes helyzet alakulhat ki, ha a veszélyeztető légijármű vízszintes repülésbe megy át kardinális repülési szinten a saját légijármű alatt. Az ilyen manőverek megszokottak bizonyos ellenőrzött légterekben, mivel ezeket a légiforgalmi irányítók arra használják, hogy a légijárműveket biztonságosan átvigyék a megkívánt függőleges elkülönítésbe olyan helyzetek esetén, amikor a vízszintes elkülönítés kicsi. Az ACAS tervezés, amely az értelem olyan választásán alapszik, amely valószínűleg a legnagyobb magasság szerinti elkülönítést adja, szoros találkozást hozhat létre, amikor ilyen egyébként nem jönne létre. Egy ACAS tervnek intézkedéseket kell tartalmaznia, hogy azt a lehető legnagyobb mértékben immunenssé tegye az ilyen eseményekkel szemben.

3.5.8.9. *Gondoskodás az indukált szoros találkozások elkerüléséről.* A veszélyeztető légijármű szándékaira vonatkozó ismeretek teljes hiányában az ACAS jellege olyan, hogy azt feltételezi, hogy a veszélyeztető légijármű fenn fogja tartani meglévő magasság változtatási sebességét, de olyan megoldási tanácsadást választ, amely csökkenti a veszélyeztető légijármű valószínű manőverének hatását. Egyéb tulajdonságok gondoskodnak annak lehetőségéről, hogy a veszélyeztető légijármű következő manőverét észleljék. Például a 4. Szakaszban ismertetett megvalósítás az alább közölt logikát használja.

3.5.8.9.1 *Az értelem választás eltérítése*. Ha egy pozitív nem-magasság-keresztezési tanácsadásnál előrejelzik, hogy legalább elegendő magasság elkülönítést ad a legszorosabb megközelítésnél (A_l), akkor előnyben részesül az az értelem, amely megakadályozza, hogy a légijármű a legszorosabb megközelítés előtt keresztezze a magasságot, ha a veszélyeztető légijármű nem megy át vízszintes repülésbe. Nyilvánvaló, hogy bizonyos körülmények között a magasság keresztező megoldási tanácsadás rosszabb lehet, mint a nem magasság keresztező megoldás tanácsadás.

3.5.8.9.2 *Növelt sebességű megoldási tanácsadás*. Ha az értelem választása a 3.5.8.9.1 pontban leírt eljárás eredményeképpen valósult meg, azt eredményezi, hogy a saját légijármű eltávolodik a veszélyeztető légijárműtől, a találkozás még nincs megoldva, ha a veszélyeztető légijármű megnöveli a magasság változtatási sebességét. Ilyen esetben az ACAS légijármű repülőgépvezetője arra van késztetve, hogy növelje saját magasság változtatási sebességét abban a törekvésében, hogy megszökjön a veszélyeztető légijármű elől.

3.5.8.9.3 *Magassági elkülönítés vizsgálat.* Az értelem választás eltérítés nem mindig eredményez olyan tanácsadást, hogy távolodjon el a veszélyeztető légijárműtől, és magasság szerinti elkülönítési vizsgálatot is végeznek, hogy tovább csökkentsék egy indukált szoros találkozás esélyét, amely amiatt jönne létre, mert a veszélyeztető légijármű vízszintes repülésbe megy át, vagy csökkenti magasság változtatási sebességét. A vizsgálat a megoldási tanácsadás kiadásának a késleltetését idézi elő, amíg a veszélyeztető légijármű szándékának nagyobb biztonságú kikövetkeztetését el lehet érni. Ez nem mentes attól a kockázattól, hogy az ACAS nem lesz képes a találkozást megoldani. A 4. Szakaszban ismertetett ACAS megvalósítás kiegyenlíti ezeket a konfliktusos kockázatokat az alább ismertetett logikával.

3.5.8.9.3.1 Az A-8 ábrán bemutatott típusú helyzetnél, amely egy jelentős magasságváltoztatási sebességgel rendelkező veszélyeztető légijárművet ábrázol, a figyelmeztetés késleltetés nélkül akkor kerülne kiadásra, amikor a légijárművek magasság szerint még jól elkülönültek. Például, amikor a figyelmeztetési idő 5 másodperc és a magasság változási sebesség 900 m/perc (3000 láb/perc), a kezdeti elkülönülés 380 m (1250 láb). Ha a helyzet olyan, hogy egy magasság keresztezési megoldási tanácsadást igényel, azaz az eltérő értelem választás hatástalan, az ACAS késlelteti a tanácsadás kiadását, amíg a meglévő magassági elkülönülés egy küszöb (A_c) alá esik, azaz kisebb, mint a szabványos IFR elkülönítés. Ha a veszélyeztető légijármű ténylegesen átmegy vízszintes repülésbe valamilyen magasságban, mielőtt átlépi ezt a küszöböt, ami nagyon valószínű, a figyelmeztetést vagy törlik (Z_m-en kívül történő vízszintes repülésbe való átmenetnél), vagy nem magasság keresztezési tanácsadás kerül generálásra. Más esetben, eltekintve attól a lehetőségtől, hogy a veszélyeztető légijármű éppen túllépte az engedélyezett magasságot, minden jele megvan, hogy folytatja a magasság változtató repülést a saját légijármű repülési szintjéig vagy azon túl, és a magasság keresztezési tanácsadás nagyobb megbízhatósággal adható ki. Ha a helyzet olyan, hogy nem magasság keresztező tanácsadást igényel, csökkentett időküszöböt (T_v) használnak a magassági vizsgálathoz. Ez a függőleges küszöb vizsgálat (VTT) azt a célt szolgálja, hogy visszatartsa a megoldási tanácsadást annyi időre, ami éppen elég ahhoz, hogy a megközelítő légijármű által indított vízszintes repülésbe való átmenet észlelhető legyen.

3.5.8.9.3.2 A magasság szerinti elkülönítés vizsgálat alapvetően azt a célt szolgálja, hogy enyhítse a problémákat, amelyeket műszer szerinti repülésnek megfelelő forgalmi környezetben tapasztalnak. Kívánatosnak tűnhet az A_c érték olyan megválasztása, hogy magasság túlszabályozások, vagy még a nem-műszeres repülési szabályok szerinti elkülönítés is lefedett legyen. Azonban az ACAS kockázatát, hogy nem képes a találkozásokat megoldani, gondosan meg kell fontolni.

3.5.8.9.3.3 A vizsgálat két felszerelt légijármű közötti kooperáció előnyét hordozza azáltal, hogy a vízszintes repülést végző légijárművön lévő ACAS-t arra készteti, hogy késleltesse a megoldási tanácsadás kiválasztását, amíg megoldás közlést kap a felszerelt megközelítőtől. Ez utóbbin lévő ACAS-nak csaknem biztosan a magasság változtatási sebességének csökkentését kell választania, és a koordinációs folyamat azt fogja eredményezni, hogy a vízszintes repülést végző légijármű képes fenntartani vízszintes repülési állapotát. A gyakorlatban a késleltetés a találkozás megoldás megkezdésében kicsi lesz, de a kockázat a megoldás elszalasztására kevésbé érzékeny a késleltetésre, mert mindkét légijármű elkerülési műveletet végez. A késleltetés 3 másodpercre van korlátozva, amely normálisan elegendő a veszélyeztető légijárműnek, hogy koordinációt kezdeményezzen.

3.5.8.9.4 *Értelem megfordítás*. Az elővigyázatosság ellenére, amelyet a fent ismertetett indukált szoros találkozások elkerülésére tesznek, még mindig vannak olyan helyzetek, amelyek nincsenek lefedve. Például látás szerinti repülés szabályai szerinti forgalmat tartalmazó légtérben egy veszélyeztető légijármű vízszintes repülésbe való átmenete fordulhat elő 150 m-es (500 láb) névleges elkülönítés mellett. A magassági elkülönítés vizsgálat ilyen körülmények között kevésbé hatékony lehet. Amikor az ACAS megállapítja, hogy a veszélyeztető légijármű manővere semmissé teszi a megoldási tanácsadás kezdeti választását, a tanácsadás értelmét meg lehet fordítani. Azt a követelményt, hogy elérjék a cél magassági elkülönítését a legszorosabb megközelítésnél, fel lehet oldani, amikor ezt a művelet folyamatot végrehajtják.

3.5.8.10 *INDUKÁLT SZOROS TALÁLKOZÁSOK EGYÉB OKAI*

3.5.8.10.1 *Magasságmérési hibák*. Az A_1 elkülönítési célt reprezentáló magasság szerinti elkülönítési paraméternek tartalmaznia kell olyan magasságmérési hiba figyelembe vételét, amely elegendő ahhoz, hogy nagy valószínűségét szolgáltassa annak, hogy nem készteti az ACAS-al felszerelt légijárművet arra, hogy szoros találkozást provokáljon ki, ahol ez reálisan nem áll fenn. Durva magasságmérési hiba esetén azonban kis valószínűsége marad annak, hogy szoros találkozás indukálódik, amikor az eredeti elkülönülés megfelelő. Hasonlóan, kicsi valószínűsége van annak, hogy az ACAS nem lesz képes megoldani egy szoros találkozást magasságmérési hiba miatt.

3.5.8.10.1.1 A Gilham-kódolt adatok használata bármelyik légijárműnél a magasságjelentésben fellépő hibák egy sajátos példája, ami veszélyes közelségeket eredményezett. A saját légijármű esetében az ilyen jellegű hibák megelőzhetők, ha olyan magasságforrást alkalmazunk, amely nem Gilham-kódolt.

3.5.8.10.2 *C-módú hibák*

3.5.8.10.2.1 A veszélyeztető légijármű magasságának a C-módú adatszolgáltatását célzó kódolásban lévő hibák, ha elegendően nagyok, szoros találkozásokat indukálhatnak, nagyjából ugyanolyan módon, mint a durva magasságmérési hibánál. Ilyen találkozások előfordulásának gyakorisága nagyon kicsi olyan légterekben, ahol a légiforgalmi irányítás lépéseket tesz, hogy közölje a repülőgépvezetővel, hogy a légijármű jelentett magassága nem helyes.

3.5.8.10.2.2 A C-módú hiba komolyabb formája akkor fordul elő, amikor a hiba a C-bitekre szorítkozik. Ezeket a légiforgalmi irányítás nem ellenőrzi, amely általában megelégszik azzal, hogy úgy találja, hogy a légijármű a jelentett magasságának előírt tűrésértékén belül van. Egy elakadt vagy hiányzó C bit csak 30 m-es (100 láb) hibát tud létrehozni. Azonban egy ilyen hibának komolyabb hatása lehet a megközelítő légijármű magasság változási sebességének ACAS általi érzékelésére és emiatt indukált szoros megközelítés jöhet létre, vagy elmaradhat a szoros találkozás megoldása.

3.5.8.10.3 *Ellentétes repülőgépvezető reagálás.* A megoldási tanácsadás értelmével ellentétes manőverek a függőleges elkülönülést a veszélyeztető státuszú légijárműtől csökkenthetik, ezért ezeket kerülni kell. Ez különösen igaz egy ACAS-ACAS koordinált találkozás esetén.

3.5.8.11 *TÖBB-LÉGIJÁRMŰVES TALÁLKOZÁSOK*

3.5.8.11.1 Az ACAS számításba veszi három vagy attól több légijármű szoros közelségbe kerülésének lehetőségét és ez megköveteli egy általános megoldási tanácsadás létrehozásának szükségességét, amely ellentmondásmentes a tanácsadások mindegyikével, amelyet az egyes követett veszélyeztető légijárművekkel szemben individuális alapon adnának ki. Ilyen körülmények között nem várható mindig, hogy az ACAS légijármű A_l magassági elkülönítést érjen el az összes veszélyeztető légijárműre vonatkozóan.

3.5.8.11.2 Rögzített földi radar felderítési adatokon alapuló szimulációk és az ACAS berendezésekkel nyert kezdeti tapasztalatok azt mutatták, hogy többszörös légijármű konfliktusok előfordulása ritka. Ugyancsak nincs bizonyíték "domino" hatásra, amelynél az ACAS légijárműnek egy veszélyeztető légijármű elkerülésére irányuló manővere egy harmadik, és azt követően további, felszerelt légijárművel való összeütközését idézné elő. Ilyen esemény várakozás (holding) közben jöhet létre, de a rendelkezésre álló tények ezt nem támasztják alá.

3.5.9 FÜGGŐLEGES SEBESSÉG BECSLÉS

3.5.9.1 Az ACAS függőleges követő algoritmusnak képesnek kell lennie 25 vagy 100 láb kvantált magasságnövekmény információk használatára a légijármű függőleges sebesség becslések végzése céljából. Ennek a követőnek el kell kerülnie a függőleges sebesség fölé becslését, amikor a jelentett magasságban ugrás következik be, mivel egy légijármű kis függőleges sebességgel az egyik kvantált magasság szintről egy másikra emelkedik. De reagálási korlátozás nem érhető el pusztán a követő kiegyenlítettségének növelésével, mivel a követő akkor lassú lenne a tényleges sebesség változásokra való reagálásoknál, 100 lábra kvantált magasság jelentéseknél a magasság követő (4. Szakaszban) különleges nyomvonal adat-felfrissítési eljárásokat használ, amelyek elnyomják egy izolált magasság átmenetre való reagálást (magasság jelentést, amely különbözik a megelőző magasság jelentéstől) a gyorsulásra való reagálás feláldozása nélkül. A követő szintén tartalmaz néhány olyan tulajdonságot, amely hozzájárul a megbízhatósághoz.

3.5.9.2 A függőleges követő algoritmus néhány kulcsfontosságú tulajdonsága a következő:

a) Mielőtt valamilyen magasság jelentést vesznek az adat felfrissítési rutinok általi felhasználás céljára, vizsgálatokat végeznek annak megállapítására, hogy a jelentés elfogadhatónak tűnik-e, feltéve, hogy a jelentés-sorozatot előzőleg vették. Ha a jelentés elfogadhatatlannak tűnik, félreteszik, bár később felhasználásra kerülhet későbbi jelentések hitelességének ellenőrzésénél.

b) A referencia követő által használt algoritmus rekurzíve átlagolja az időt, inkább a magasság átmenetek között, mint a magasság jelentések között.

c) A követő szigorúan az izolált magasság átmenetekre (azaz azokra az átmenetekre, amelyek nem részei valamilyen magassági trendnek) korlátozza a reagálást. Az izolált magasság átmenet a sebesség becslés megkezdését eredményezi egy meghatározott mérsékelt sebességre az átmenet irányában. A sebesség becslése zérus felé tendál minden egymást követő magasság átmenet nélküli pásztázásnál.

d) Amikor egy átmenetről megfigyelték, hogy irányban ellentmondásmentes az előző átmenettel, akkor azt trendnek nyilvánítják. A magasság változtatási sebesség kezdeti értéke ellentmondásmentes két átmenet közötti idővel.

e) A kvantálási hatások miatti sebesség ingadozások elnyomódnak, amikor trend vagy szint követés kinyilvánítása történik. Trend periódus alatt a magasság átmenetet nem jelző jelentéseket megvizsgálja, annak megállapítása érdekében, hogy az átmenet hiánya összhangban van-e irány és idő szerint az előzőleg számított sebességgel. Ha nincs ellentmondás mentesség ezekkel, akkor a sebességet egy alacsonyabb értékre állítják vissza. Ha ellentmondás mentesség áll fenn, a sebesség változatlan marad.

f) Ha trend kinyilvánítás történik és átmenet figyelhető meg, akkor vizsgálatot végez, hogy megnézze, hogy az átmenet irány és időzítés szempontjából ellentmondásmentes-e az előzőleg számított sebességgel. Ha nem ellentmondásmentes a sebességgel, újra beállítják. Ha ellentmondásmentes, a sebességet kiegyenlítéssel felfrissítik. Az átmenet ingadozás miatti lehet, és a valóságban a trend folytatódhat.

g) Minden egyes pásztázás alatt a követő egy nyomvonal megbízhatósági indexet szolgáltat, amely a megbízhatósági fokot jelzi, amelyet a magasság változtatási sebesség számításba lehet behelyezni. "Nagy" megbízhatóságot jelent, ha az utolsó jelentések ellentmondásmentesek a követő által számított magasság és magasság változtatási sebesség számításokkal. "Kicsi" megbízhatóságot jelent, ha a magasság jelentések nem ellentmondásmentesek, egy lehetséges függőleges gyorsulást sejttetve, vagy amikor a magasság jelentések két vagy több cikluson keresztül hiányoznak. A "kicsi" megbízhatóság késleltetést indokolhat a megoldási tanácsadás generálásában.

h) A követő felső és alsó határokat szolgáltat, amelyeken belül fekszik várhatóan a valódi magasság. A magasság változtatási sebesség határokat annak megállapítására használják, hogy késleltetni kell-e a megoldási tanácsadás generálását és egy értelem megfordítás szükségességének értékelésében, ha a magasság változtatási sebesség megbízhatósága "kicsi".

3.5.10 LEVEGŐ-LEVEGŐ KOORDINÁCIÓ

3.5.10.1 *Koordinációs lekérdezések.* Amikor az ACAS egy hasonlóan felszerelt megközelítő légijárművet veszélyeztetőnek nyilvánít, az utóbbihoz lekérdezéseket továbbít az S-módú adatkapcsolaton keresztül megoldási tanácsadási koordinációhoz. Ezeket a lekérdezéseket, amelyek megoldási közléseket tartalmaznak, feldolgozási ciklusonként egyszer végzik addig, amíg a megközelítő légijármű veszélyeztető marad. A felszerelt veszélyeztető légijármű koordinációs válasz küldésével mindig visszaigazolja a megoldás közlés vételét.

3.5.10.2 *KOORDINÁCIÓ LEKÉRDEZÉS FELDOLGOZÁS*

3.5.10.2.1 Az ACAS egy másik ACAS-al felszerelt megközelítő légijárműtől kapott megoldás közlést a megoldási tanácsadás kiegészítésnek a megközelítő részére történő tárolásával és a megoldási tanácsadás kiegészítés rögzítés felfrissítésével dolgozza fel.

3.5.10.2.2 A megoldási tanácsadás egy általános fogalom, amely függőleges megoldási tanácsadás kiegészítést (VRC) és/vagy vízszintes megoldási tanácsadás kiegészítést (HRC) jelent, ahogy éppen megfelel. Speciálisan az S-módú lekérdezésben szolgáltatott információ az ACAS II részére VRC, az ACAS III részére pedig a VRC és/vagy a HRC.

3.5.10.2.3 A megoldás tanácsadás kiegészítés (HRC) rekord az összes éppen aktív megoldás tanácsadás kiegészítések (VRC-k és/vagy HRC-k) együttese, amelyet az ACAS vett. A négy bit a megoldási tanácsadás kiegészítés rekordban megfelel a két VRC értéknek ("ne haladj el alul" és "ne haladj el felül"), amelyet a két HRC érték (" ne fordulj balra" és "ne fordulj jobbra") követ. Ha a RAC rekordban egy bit beállítás történik, az azt jelenti, hogy a megfelelő megoldási tanácsadás kiegészítést egy vagy több ACAS-tól vették. Amikor egy megoldási tanácsadás kiegészítést vesznek egy másik ACAS-tól, a megfelelő bit(ek) beállítása a RAC rekordban megtörténik. Minden alkalommal, amikor egy másik ACAS-tól egy megoldási tanácsadás törlését veszik, a megfelelő bit(ek) törlésre kerül(nek), amíg egy másik ACAS nem idézi elő a bit(ek) beállítását.

3.5.10.3 *KOORDINÁCIÓS SOROZAT*

A koordinációs üzenetek sorozatát és a hozzátartozó feldolgozást az A-9 ábra illusztrálja. A koordináció megvalósításának elmulasztása a veszélyeztető légijármű által nem összeegyeztethető megoldási tanácsadás értelem kiválasztást eredményezhet.

3.5.10.4 *KOORDINÁCIÓ PROTOKOLL*

3.5.10.4.1 Miután egy felszerelt megközelítő légijárművet veszélyeztetőnek nyilvánítottak, az ACAS először ellenőrzi, hogy érkezett-e megoldási tanácsadás ettől a veszélyeztető légijárműtől. Ha igen, akkor az ACAS választ egy megoldási tanácsadást, amely összeegyeztethető a veszélyeztetés függőleges értelmével. Ha nem érkezett megoldási tanácsadás, akkor az ACAS a találkozás geometriájára alapozva kiválaszt egy megoldási tanácsadást (3.5.2 Szakasz). Bármelyik esetben az ACAS elkezdi a függőleges értelemre vonatkozó információ továbbítását a veszélyeztető légijárműnek, pásztázásonként egyszer, megoldási tanácsadás kiegészítés formájában, egy megoldási tanácsban. A megoldási tanácsadás kiegészítés “ne haladj felül”, ha az ACAS a veszélyeztető légijármű feletti elhaladást választotta, “ne haladj alul”, ha az ACAS a veszélyeztető légijármű alatti elhaladást választotta.

3.5.10.4.2 Miután egy ACAS-t veszélyeztetőként észlelnek, a veszélyeztetés összehasonlítási folyamaton megy keresztül. Ha valamilyen oknál fogva a két légijármű ugyanazt az (nem összeegyeztethető) elkülönítési értelmet választja, a magasabb 24-bites légijármű címzéssel rendelkező légijármű megfordítja az értelmet. Ez akkor következhet be, ha a két légijármű egyidejűleg veszélyeztetőnek észleli egymást, vagy egy átmeneti kapcsolat hiány megakadályozza a sikeres kommunikációt.

3.5.10.5 *KOORDINÁCIÓS ADATVÉDELEM*

Az ACAS tárolja az éppen aktuális megoldási tanácsadást és más ACAS-al felszerelt légijármű(vek)től vett aktív megoldás tanácsadás kiegészítés(ek)t, amelyek a saját légijárművet veszélyeztetőnek érzékeli. Annak érdekében, hogy a tárolt információ ne kerüljön módosításra egy vagy több ACAS-ra való reagálásban, amíg azt a saját ACAS általi megoldási tanácsadás kiválasztásra használják, az adatokat védik úgy, hogy azok csak egy ACAS részére álljanak rendelkezésre, vagy csak egy ACAS-ra való reagálásban lehessen módosítani egyidőben. Ezt például koordinációs zárlat állapotba való bemenettel hajtják végre, amikor az adattár a saját ACAS által hozzáférhető, vagy egy veszélyeztető ACAS új adatokat nyújt. Ha megoldás közlés érkezik, mialatt a koordinációs zárlat állapot fennáll, az adatokat megtartják, amíg a fennálló koordináció zárlat állapot véget nem ér. Az adatok különböző folyamatok általi szimultán elérésének lehetősége az ACAS-on belül fennáll, mert a bejövő veszélyeztető megoldási közlések aszinkron módon érkeznek az ACAS adatfeldolgozáshoz, ténylegesen megszakítva ezt a feldolgozást.

3.5.11 FÖLDI KOMMUNIKÁCIÓ

3.5.11.1 *ACAS megoldási tanácsadások jelentése a földnek.* Amikor megoldási tanácsadás létezik, az ACAS jelzi a légijármű S-módú válaszjeladójának, hogy megoldási tanácsadással rendelkezik az S-módú földi állomás számára. Ez a válaszjeladót arra készteti, hogy jelzést állítson be, amely mutatja, hogy egy közlés a földhöz való továbbításra vár. E jelzés vétele után egy S-módú érzékelő kérheti a megoldási tanácsadás továbbítását. Amikor ezt a kérést veszi, a saját S-módú válaszjeladó az üzenetet Comm-B válasz formátumban szolgáltatja. Ezenkívül az ACAS periódikus rádióadásokat generál 8 másodperces időközökben azalatt az idő alatt, amíg a repülőgépvezető részére megoldási tanácsadás jelzés van. A rádióadás megoldási tanácsadás paraméterek utolsó értékeit jelenti, amelyeket az előző 8 másodperces periódusban felvesznek, még ha a tanácsadás be is fejeződött. Ez lehetővé teszi az ACAS megoldási tanácsadás tevékenységének figyelését azokon a területeken, amelyeket földi különleges megoldási tanácsadás rádióadás jel vevők segítségével az S-módú földi állomás felderítése nem fed le,. A megoldási tanácsadás rádióadásokat általában földi berendezéseknek sugározzák, de fedélzetre irányuló adattovábbításnak jellemzik őket.

3.5.11.2 *Veszélyeztető légijármű észlelési paramétereinek felügyelete földi állomásról.* Veszélyeztető légijármű észlelési paramétereit egy vagy több S-módú földi állomás felügyelheti az ACAS légijárműnek küldött érzékenység szint szabályozó (SLC) utasítást tartalmazó lekérdezések továbbításával. Miután egy adott S-módú földi állomástól jövő SLC utasítás közlést vett, az ACAS tárolja az SLC utasítás értéket a földi állomás számának indexével ellátva. Az ACAS a vett legkisebb értékeket használja fel, ha egynél több földi állomás küld ilyen közlést. Az ACAS idő szerint külön értékeli mindegyik hely SLC utasítását és törli azt, ha ugyanerről a helyről egy másik közlés 4 percen belül nem frissíti fel. Az ACAS ugyancsak azonnal töröl egy SLC utasítást, ha ettől az állomástól specifikus törlési kódot kap. SLC utasítások nem használhatók fel kapcsolt Comm-A lekérdezéseken belül.

3.5.12 ÉRZÉKENYSÉGI SZINT SZABÁLYOZÁS

Az ACAS veszélyeztető észlelési paraméterek felügyelete a következők által szolgáltatott SLC utasítások segítségével történik:

a) magasság sávon alapuló belsőleg generált érték;

b) S-módú földi állomástól (lásd 3.5.11.2 alpont); és

c) repülőgépvezető által működtetett kapcsolóról.

Az ACAS által használt érzékenységi szintet ezen három forrás által szolgáltatott legkisebb nem zérus SLC utasítás állítja be. Amikor egy S-módú földi állomás vagy a repülőgépvezető számára nem különösebben érdekes az érzékenységi szint beállítás, akkor ettől a forrástól az ACAS részére zérus értéket kapja és ezt nem veszik figyelembe a kiválasztási folyamatban. Az érzékenységi szintet általában a magasság sávon alapuló belsőleg generált értékek állítják be. A magasság küszöbök körül hiszterézist alkalmaznak, hogy megakadályozza az SLC utasítás értékben az ingadozást, amikor az ACAS légijármű egy magasság küszöb környezetében marad.

3.6 Összeegyeztethetőség fedélzeti S-módú válaszjeladókkal

3.6.1 Az ACAS és az S-módú válaszjeladó összeegyeztethető működését tevékenységüknek a repüléselektronikai elnyomás buszon keresztüli összehangolásával érik el. Az S-módú válaszjeladót az ACAS továbbítás alatt és röviddel utána nyomják el. A tipikus elnyomási periódusok: a) 70 mikromásodperc a felső antennáról és b) 90 mikromásodperc az alsó antennáról. Ezek az elnyomás periódusok megakadályozzák, hogy az ACAS lekérdezés által okozott több-nyomvonal SSR választ provokáljon ki az S-módú válaszjeladótól.

3.6.2 Nem-kívánt teljesítmény korlátozás egy ACAS-al összekapcsolt S-módú válaszjeladónál szigorúbb, mint a 3. fejezet, 3.1.2.10.2.1 pontjában, hogy biztosítsa azt, hogy az S-módú válaszjeladó ne akadályozza meg az ACAS-t vele szemben támasztott követelmények teljesítésében. Egy -70 dBm nem kívánt sugárzási teljesítmény szintű válaszjeladót (4. fejezet, 4.3.11.1 alpont) és egy -20 dBm válaszjeladó ACAS antenna elszigetelést feltételezve, az eredő interferencia szint az ACAS RF portnál -90 dBm alatt lesz.

3.6.3 További összeegyeztethetőségi követelmény, hogy az ACAS adóberendezés átvezetési teljesítményt alacsony szinten kell tartani (lásd 3.2.1 alpont).

3.7 Kijelzések a repülő személyzetnek

3.7.1 VIZUÁLIS KIJELZÉS

3.7.1.1 Az ACAS megvalósítások a megoldás tanácsadási információkat tipikusan egy vagy két vizuális megjelenítőn jelzik ki. A forgalmi tanácsadás kijelzés ellátja a repülőgépvezetőt a közeli forgalomra vonatkozó terv információval. A megoldási tanácsadás kijelzés megismerteti a személyzetet a végrehajtandó vagy elkerülendő manőverekről függőleges síkban. A forgalmi tanácsadás kijelzés és a megoldási tanácsadás kijelzés különálló kijelzőket vagy műszereket használhat az információ átadására a repülőgépvezető felé, vagy a két feladatot egyetlen kijelzőn össze lehet vonni. A kijelzett megoldási tanácsadás információkat vagy integrálni lehet a fedélzeten rendelkezésre álló meglévő kijelzőkkel, vagy egy erre célra szolgáló külön kijelzőn lehet megjeleníteni.

3.7.1.2 *FORGALMI TANÁCSADÁSOK*

3.7.1.2.1 A forgalmi tanácsadás kijelzés képet nyújt a repülőszemélyzetnek a környező forgalomról. Az így nyújtott információ arra szolgál, hogy segítse a repülőszemélyzetet a környező forgalom áttekintésében. Szimulációs vizsgálatok azt mutatták, hogy a forgalom táblázatos, alfanumerikus kijelzését bonyolult a repülőszemélyzetnek leolvasni és összehasonlítani, és a kijelzésnek ez a típusa a forgalmi információ elsődleges kijelzésének használatára nem ajánlott. A forgalmi tanácsadás kijelzés a megközelítő légijárművek vonatkozásában a következő információk kijelzésének képességét szolgáltatja:

a) helyzet (távolság és iránytengely);

b) magasság (relatív vagy abszolút, ha a megközelítő légijármű magasságot jelent); és

c) magasság változtatási sebesség magasságot jelentő megközelítő légijárműnek, (emelkedés vagy süllyedés).

3.7.1.2.2 A forgalmi tanácsadás kijelzés alakokat és színeket használhat az egyes kijelzett megközelítő légijárművek veszélyeztetési szintjének, azaz megoldási tanácsadások, forgalmi tanácsadások és közeli forgalom jelzésére. A forgalmi tanácsadás generálás vizsgálatok és a veszélyeztető észlelés vizsgálatok közötti lényeges különbség a nagyobb figyelmeztetési idő értékek használatában van.

3.7.1.2.3 A közeli forgalom folyamatos kijelzése nem megkövetelt összetevője az ACAS-nak. Azonban a repülőgépvezetőknek szükségük van a közeli forgalommal, valamint a potenciális veszélyeztetésekkel kapcsolatos útmutatásra, hogy helyesen azonosítsák a potenciális veszélyeztetést jelentő légijárműveket. A “display - vizuális kijelzés” szó nem azt jelenti, hogy a vizuális kijelzés az egyetlen elfogadható a megközelítő légijárművek helyzetének a jelzésére.

3.7.1.2.4 Ideális esetben egy megoldási tanácsadást mindig megelőz egy forgalmi tanácsadás, de ez nem mindig lehetséges, pl. a megoldási tanácsadás kritériumok már lehet, hogy ki vannak elégítve, amikor egy nyomvonalat először létrehoznak, vagy a megközelítő légijármű hirtelen és éles manővere előidézheti, hogy a forgalmi tanácsadás vezetési ideje egy ciklusnál kisebb lesz.

3.7.1.3 *MEGOLDÁSI TANÁCSADÁSOK*

A megoldási tanácsadás vizuális kijelzése tájékoztatást ad a repülőszemélyzet részére a függőleges sebességről, amelyet el kell érni, vagy el kell kerülni. A megoldási tanácsadás kijelzést be lehet építeni a pillanatnyi függőleges sebességjelző műszerbe (IVSI) vagy az elsődleges repülési képernyőbe (PFD). A megoldási tanácsadás kijelzője eszközt szolgáltathat a megelőző és a helyesbítő megoldási tanácsadás megkülönböztetésére.

3.7.2 HALLHATÓ ÉS BESZÉDHANG FIGYELMEZTETÉSEK

Hallható figyelmeztetéseket használnak a repülőszemélyzet részére arról, hogy egy forgalmi tanácsadás vagy megoldási tanácsadás kiadásra került. Amikor kiválasztják a szókészletet, amelyet megoldási tanácsadás bejelentésére használnak, figyelmet kell fordítani arra, hogy olyan frázisokat válasszanak, amelyek minimalizálják a félreértett utasítás valószínűségét. Egy hallható bejelentést is kell biztosítani a repülőszemélyzet részére annak jelzésére, hogy az ACAS légijármű konfliktusmentes az összes veszélyeztetést jelentő légijárművel.

3.8 Repülőszemélyzet kezelési feladatai

Minimumként elvárják, hogy a repülőszemélyzet tevékenysége által lehetőség nyíljon vagy egy “AUTOMATIKUS” üzemmód kiválasztására, amelynél az érzékenységi szintek más bemeneteken alapulnak, vagy egy olyan üzemmód kiválasztására, amelyben csak forgalmi tanácsadásokat lehet kiadni, vagy olyan különleges érzékenységi szintek kiválasztására, amelyek legalább az 1-es érzékenységi szintet tartalmazzák. Amikor az 1-es érzékenységi szintet választják, az ACAS berendezés lényegében “tartalék” körülmények között van. A TARTALÉK fogalmat ennek a választásnak a jelölésére lehet használni. A meglévő ACAS érzékenységi szint különbözhet attól, amit a repülőszemélyzet választ. Intézkedéseket kell tenni, hogy a repülőszemélyzet jelzést kapjon arról, hogy az ACAS éppen TARTALÉK állapotban van, vagy amikor csak forgalmi tanácsadást adnak ki. Az ACAS kezelését integrálni lehet az S-módú válaszjeladó kezelésével, vagy a két rendszernek különböző kezelése is lehet. Ha az ACAS és az S-módú kezelések integrálva vannak, olyan eszközt kell biztosítani, amely lehetővé teszi a repülő személyzet számára a kizárólagosan válaszjeladó működési mód kiválasztását.

3.9 Működés figyelése

Az ACAS berendezéstől elvárható, hogy automatikus működés figyelési tevékenységet is foglaljon magában, hogy az összes kritikus ACAS tevékenység műszaki állapotát egy folyamatos bázison meghatározhassa a berendezés normális működésének megzavarása vagy esetleges megszakítása nélkül. Gondoskodni kell arról, hogy a repülő személyzet jelzést kapjon abnormális körülmények fennállásáról, amint ez a figyelési tevékenység ezt meghatározza.

4. Veszély észlelést és tanácsadás generálást szolgáló tipikus algoritmusok és paraméterek

1. *Megjegyzés. – A jellemzők, amelyeket az alábbiakban adunk meg, az ACAS II összeütközés elhárító logikájának egy referencia tervezését írják le. Ez a leírás azonban nem zárja ki egyenlő vagy jobb működés alternatív terveinek használatát.*

2. *Megjegyzés. – Nyomtatott kisbetűs matematikai szimbólumokat használnak változók jelölésére ebben a fejezetben. Nagybetűs szimbólumokat a paraméterek jelölésére használják. A pontozás jelölés, amelyet néhány paraméternél használtak, nem azt mutatja, hogy azok derivált mennyiségek, hanem, hogy a jelölés által meghatározott dimenziója van, pl. távolság/idő a sebesség paraméternél.*

4.1 Követési teljesítmény jellemzők

4.1.1 TÁVOLSÁGI KÖVETÉS

4.1.1.1 Távolság, távolságváltozási sebesség és távolságváltozási gyorsulás, (r, $\dot{r}$, $\ddot{r}$) becslése adaptív α-ß-γ követő segítségével történik, az α, ß és γ tényezőinél olyan értékek felhasználásával, amelyek az összes egymást követő távolság méréseknél folyamatosan csökkennek, amíg megfelelőképpen el nem érik a saját 0,40, 0,10 és 0,01 minimumaikat. A távolság változás gyorsulás becslést az *m* várt elkerülési távolság számítására használják a legszorosabb megközelítésnél, a következő formula felhasználásával:

$$m^2 = r^2 - \frac{r^2}{1 + r\ddot{r}/\dot{r}^2}$$

Ezt a becslést nem számolják ki akkor, amikor további számítások azt jelzik, hogy ez nem lehet megbízható, vagy a becslési hibák nagysága miatt, vagy a légijárművek egyike által a vízszintes síkban végrehajtható manőver lehetősége miatt. Az utóbbi számítások a követés eddigi időszakán, az egymás utáni távolság előrejelzések megfigyelt pontosságán, a távolság változás gyorsulás számítások észlelt azonosságán, az előzőleg számított elkerülési távolsággal megegyező, linearizált repülési pályán alapuló második távolság követésen, és a durva-iránytengely követés megfigyelt azonosságán nyugszanak.

4.1.2 MAGASSÁG KÖVETÉS

4.1.2.1 *Magassági adatforrások.* A megközelítő légijármű magasságát a megközelítő légijármű C-módú vagy S-módú jelentéseiből nyerik. A saját légijármű magasságát abból a forrásból nyerik, amely a saját C-módú vagy S-módú jelentések alapjául szolgál és a legfinomabb elérhető kvantálásra használják fel.

4.1.2.1.1 *Magasság jelentés hitelesség.* Mielőtt bármilyen magasság jelentés vételére sor kerül, vizsgálatot végeznek annak eldöntésére, hogy a jelentés hiteles-e. Egy hitelességi ablakot számolnak ki az előzőekben számított magasság és magasság változási sebesség alapján. A magasság jelentést félreteszik, és a magasság követést felfrissítik, mintha a jelentés hiányozna (4.1.2.3.7 alpont), ha a jelentés kívül esik a hitelességi ablakon.

4.1.2.2 *Saját magasság változási sebesség.* A saját ACAS légijármű magasság változási sebességét olyan forrásból nyerik, amely a lehető legkisebb hibákkal rendelkezik és semmilyen esetben sem nagyobb, mint a 4.1.2.3.6 pontban leírt követő sebesség kimenetének a hibája.

4.1.2.3 *A MEGKÖZELÍTŐ LÉGIJÁRMŰ MAGASSÁGÁNAK KÖVETÉSE*

4.1.2.3.1 *Magasság követés fogalmainak leírása*

Established rate track - Megalapozott sebesség nyomvonal. Egy magasság nyomvonal, amelynél a megközelítő légijárműtől kapott utolsó néhány magassági jelentés sémája arra enged következtetni, hogy ez a megközelítő állandó, zérustól különböző magasság változási sebességgel emelkedik vagy süllyed.

Level track - Vízszintes repülési nyomvonal. Egy magasság nyomvonal, amelynél a megközelítő légijárműtől kapott utolsó néhány jelentés sémája arra enged következtetni, hogy a megközelítő vízszintes repülést végez.

New track - Új nyomvonal. Egy újonnan kezdett magasság nyomvonal.

Oscillating track - Ingadozó nyomvonal. Egy magasság nyomvonal, amelynél a megközelítő légijárműtől kapott utolsó néhány jelentés sémája két vagy több érték között olyan módon ingadozik, amely arra enged következtetni, hogy a megközelítő vízszintes repülést végez.

Transition - Átmenet. Egy nyomvonalra vonatkozó magasság jelentés, amely különbözik az erre a nyomvonalra vonatkozó utolsó hiteles magasság jelentéstől.

Trend. Trend áll fenn a magasság változás sebességére vonatkozóan, ha két legutolsó magasság szint átmenet ugyanabban az irányban ment végbe.

Unconfirmed rate track - Nem-megerősített nyomvonal. Egy magasság nyomvonal, amelynél a megközelítő légijárműtől kapott utolsó néhány magasság jelentés sémája a nyomvonal más módon történő minősítését nem teszi lehetővé.

4.1.2.3.1.1 Bármely követési ciklusra fennáll, hogy mindegyik nyomvonal egy és csakis egy nyomvonal minősítéssel rendelkezik.

4.1.2.3.1.2 Bármely nyomvonal besorolás létrejöhet, amíg más nyomvonal besorolásra vonatkozó feltételeket nem igazolják.

4.1.2.3.2 Az ACAS II követi a megközelítő légijárművek magasságát. A követés a válaszjeladóiktól kapott automatikus nyomásmagasság jelentéseken alapszik, magasság jelentéseket használva fel, amelyeket átvettként kvantálnak. Minden megközelítőről minden ciklusban a követő magasság és magasság változtatási sebesség számításokat szolgáltat.

Megjegyzés. – A C-módú magassági adatokat a nyomvonalakkal összekapcsoló függvényt a 4. fejezet 4.3.2.1 pontja írja le. Az alábbiakban ismertetett magasság követő feltételezi, hogy ez a függvény már működött, mielőtt a követő alkalmazására sor került.

4.1.2.3.2.1 A referencia magasság követő tervezés feltételezi, hogy minden nyomvonalra magasság jelentéseket vesznek egy magasság jelentés per másodperc névleges sebességgel. Azonban ez figyelembe veszi a hiányzó jelentéseket, más szóval azokat az eseteket, amikor nem vettek magasság jelentéseket egy adott nyomvonalra egy követő ciklus előtt.

4.1.2.3.2.2 Egy vagy két fajta megközelítő nyomvonalat hoznak létre és tartanak fenn. Úgynevezett 100-lábas nyomvonalakat nyernek akkor, amikor a magassági jelentéseket 100-lábnak megfelelő egységekben szolgáltatják. Az ilyen nyomvonalakat egy erre a célra szolgáló követővel frissítik fel, amelyet 100-lábas magassági követőnek neveznek. Úgynevezett 25-lábas nyomvonalakat nyernek, amikor a magasság jelentéseket 25-lábas egységekben szolgáltatják. Az ilyen nyomvonalakat egy erre a célra szolgáló követővel frissítik fel, amelyet 25-lábas magasság követőnek neveznek.

4.1.2.3.2.3 Különleges logika automatikusan kapcsolja a megközelítő légijármű magassági nyomvonalait a 100-lábas magasság követő és a 25-lábas magasság követő között az egységekben egy megerősítő változást követve, amely egységekben a magasság jelentéseket szolgáltatják. Egy ilyen változást megerősítettnek tekintenek, ha három egymást követő érvényes magasság jelentést ugyanazon egységben vettek.

4.1.2.3.2.4 Amikor magasság jelentés egység változást észleltek, de még nincs megerősítve, a meglévő nyomvonalat lebegtetik és a magasság jelentést átmenetileg tárolják. Amikor az egységváltozást megerősítik, a nyomvonalat újraindítják az utolsó magasságváltozási sebesség becslést használva, amelyet a változás, valamint az összes ideiglenesen tárolt magasság jelentés előtt számoltak.

4.1.2.3.2.5 A 25-lábas követő egy adaptív alfa-béta követő. Ez a 4.1.2.3.5 pontban kerül rövid ismertetésre.

4.1.2.3.2.6 A 100-lábas követő tervezését az motiválja, hogy szükség van egy stabil magasság változási sebesség becslésre, amikor a veszélyes megközelítő légijármű valódi magasság változási sebessége kisebb, mint 100 láb/s, más szóval, kisebb, mint egy kvantálási köz per követő ciklus. Ez a követő közvetve számítja a magasság változási sebességet az időnek a számításával, amelyet egy kvantálási szint keresztezése igényel. Ennek a tervnek további részleteivel szolgál a 4.1.2.3.6 alpont.

4.1.2.3.3 *Magasság változtatási sebesség megbízhatósága.* Minden megközelítő légijárműre vonatkozóan, minden ciklusban a követő vagy “nagy” vagy “kicsi” megbízhatósági jelzőt szolgáltat a magasság változtatási sebesség becslésben (4.1.3.3.6.9 és 4.1.3.3.6.10 pontok).

4.1.2.3.4 *Magasság változtatási sebesség indokoltsága.* A követés “legjobb becslésű” magasság változtatási sebesség becslést és felső és alsó határokat szolgáltat ehhez a magasság változtatási sebességhez, amely összhangban áll a vett jelentés sorozattal.

4.1.2.3.5 *25-láb értékű kvantálási jelentések*

4.1.2.3.5.1 A 25-láb értékű növekményekre kvantált magassági jelentéseknél egy adaptív α-ß követőt használnak. Ez a követő adaptív abban az értelemben, hogy az α és ß értékek három együttese között választ, amelyek az előrejelzett szabályoktól függnek, azaz az előrejelzett magasság és a jelentett magasság közötti különbségtől, valamint a sebesség becslés nagyságától. Ezek az α és ß értékek a következők:

- α = 0,4 és ß = 0,100, amikor a fennálló magasság változás becslés értéke kisebb, mint 7,0 láb/s; egyébként,
- α = 0,5 és ß 0 0,167, amikor az előrejelzett hiba kisebb, mint 22,5 láb; és egyébként,
- α = 0,6 és ß = 0,257

4.1.2.3.5.2 A követő két különálló magasság és magasság változás sebesség együttest tart fenn. Az elsőt közvetlenül a standard α-ß simulási egyenletekből származtatják. Ez az együttes tisztán belső a követőkhöz viszonyítva. A második együttes tartalmazza a számításokat, amelyek az összeütközés elkerülési logikához illenek. Ez az első együttesből a következőkben különbözik. A logikának juttatott magasság számítás a jelentett magasság kvantálási tartomány egyik felének belsejére korlátozódik (±12,5 láb). A logikának juttatott magasság változás sebesség számítás a zérussal egyenlő együttes, amikor a belső számítás abszolút értékben 2,5 láb/s alá csökken és zérussal egyenlő értékben marad, amíg a belső számítás 5,0 láb/s fölé emelkedik abszolút értékben.

4.1.2.3.5.3 A követő csak az előzőleg definiált két nyomvonal osztályozást használja, vízszintes repülési nyomvonal és megalapozott sebesség nyomvonal (4.1.2.3.1 pont). Egy nyomvonalat vízszintes repülési nyomvonalnak jelentenek, ha legalább két követő ciklus elmúlt az utolsó magasság átmenet óta (4.1.2.3.1 pont). A belső sebesség számítást akkor zérusra állítják vissza. Nyomvonalat megalapozott sebesség nyomvonalnak jelentenek, ha a következő két elegendően szorosan elhelyezkedő magasság átmenetet követően a belső sebesség számítás (és így a logikának átadott sebesség számítás is) 5,0 láb/s fölé emelkedik.

4.1.2.3.5.4 A számítások megbízhatóságát “nagynak” jelentik, amikor a nyomvonal legalább négy követő cikluson keresztül fennállt és az előrejelzési hiba nem volt nagyobb, mint 22,5 láb legalább két egymást követő követési ciklusban. “Kicsire” állítják, ha az előrejelzési hiba nagyobb, mint 22,5 láb. Ugyancsak “kicsire” állítják, ha a magassági jelentés két egymást követő ciklusban hiányzott.

4.1.2.3.6 *100 láb növekmény kvantálási jelentések.* 100 láb növekményekre kvantált magasság jelentéseknél a magasság követő teljesítménye minden vonatkozásban egyenlő, vagy jobb, mint egy referencia követőé, amely úgy állítja be a magasság változtatás sebesség számítást, hogy megfelelő előjele legyen és a nagysága az ebben a paragrafusban ismertetetteknek feleljen meg.

4.1.2.3.6.1 *Követő változók.* A referencia követő a következő változókat használja:

$\dot{z}$	magasság változtatás sebesség becslés m/s (láb/s);
$\dot{Z}_{gu}$	lásd 4.1.3.6.5.1 alpont;
Δz	a jelenlegi jelentés és a legutóbbi hiteles jelentés közötti magasság különbség;
T_n	1 s
Q	30,5 m (100 láb)
t_r	a legutolsó hiteles jelentés óta eltelt idő, *s;*
t_p	a két legutolsó magasságszint átmenet közötti idő, vagy egy cikluson belüli többszörös átmenet esetén, ezen átmenetek közötti átlagos idő*, s;*
t_b	becsült szint elfoglalási idő a legutóbbi átmenet után, *s*
t_{bm}	a szint elfoglalási idő számított alsó határa, *s;*
β	számított kiegyenlítési együttható t_b-re;
β_l	β korlátja t_b alapján;
b_t	a két legutóbbi magasság szint átmenet között keresztezett magasság szintek száma;
$b_{\dot{z}}$	a legutóbbi sebességgel keresztezett magassági szintek száma;
ε	a t_b számítás kiegyenlített hibája, *s;*
d_t	a legutóbbi magasság átmenet előjele (=+1 magasság növekedés esetén, = -1 csökkenés esetén); és
x^*	valamely *x* változó értéke mielőtt egy magasság szint átmenetet követően felfrissítésre kerül

4.1.2.3.6.2 *Jelentés hitelesség.* Egy magasság jelentés hitelesnek tekinthető, ha a következő feltételek egyike teljesül:

a) $\Delta z = 0$

b) $|\Delta z - \dot{z}t_r| - Q\, t_r / T_n - \dot{Z}_{gu}\, t_r \leq 0$

4.1.2.3.6.3 *Nyomvonal minősítési séma*

Megalapozott sebesség nyomvonal. Egy magasság nyomvonalat megalapozott sebesség nyomvonalnak minősítenek, ha két vagy több egymást követő átmenetet észlelnek ugyanabban az irányban és a két átmenet közötti időtartam elegendően rövid ahhoz, hogy a nyomvonal minősítés ne változzon vízszintes repülési nyomvonallá ezalatt az időtartam alatt (lásd vízszintes repülési nyomvonal meghatározását), vagy ha egy észlelt átmenet egy meglévő irányzattal ellentétes irányú és az előző átmenet óta eltelt idő "váratlanul kicsi" (4.1.2.3.6.8.1 alpont).

Vízszintes repülési nyomvonal. Egy magassági nyomvonalat vízszintes repülési nyomvonalnak minősítenek, ha ugyanazon a repülési magasságon a jelentéseket a soronkövetkező várható átmenet, várható idejéhez képest T_1-nél hosszabb idő múlva kapják meg, vagy a jelentéseket T_2 idő múlva kapják meg, függetlenül attól, hogy egy átmenet várható vagy sem (4.1.2.3.6.3.1 alpont).

Új nyomvonal. Egy nyomvonalat újnak minősítenek az első magasság jelentés és az első átmenet közötti időben, vagy pedig T_2 idő elmúlásával (4.1.2.3.6.3.1 pont).

Ingadozó nyomvonal. Egy magasság nyomvonal ingadozó nyomvonalnak minősül, ha a közvetlen megelőző átmenethez képest ellenkező irányú átmenet jelenik meg, csak egy szint keresztezés megy végbe, a két átmenet közötti időköz elegendően rövid ahhoz, hogy a nyomvonal minősítés ne változzon át vízszintes repülési nyomvonallá ezen időtartam alatt (lásd a vízszintes repülési nyomvonal meghatározását, és ha a nyomvonalat megalapozott sebesség nyomvonalnak minősítették, az ezen átmenet óta eltelt idő nem "váratlanul kicsi" (4.1.2.3.6.8.1 alpont).

Nem megerősített sebesség nyomvonal. Egy magasság nyomvonalat nem-megerősített sebesség nyomvonalnak minősítenek, ha egy új vagy egy vízszintes repülési nyomvonalnál átmenet jelenik meg, vagy ha az előző átmenettel ellenkező irányú átmenet jelenik meg és egynél több szint keresztezése ment végbe egy megalapozott, ingadozó vagy nem megerősített sebesség nyomvonalnál.

4.1.2.3.6.3.1 A következő értékeket használják:

$T_1 = 4{,}0$ s

$T_2 = 20$ s

4.1.2.3.6.3.2 Ha egy nyomvonalat már nem megerősített sebesség nyomvonalként minősítettek, és az előző átmenettel ellenkező irányú átmenet jelenik meg, és egynél több szint keresztezése ment végbe, a magasság változtatás sebességét úgy határozzák meg, mintha a nyomvonal éppen most nyert volna nem megerősített sebesség nyomvonal minősítést (4.1.3.3.6.5 alpont).

4.1.2.3.6.3.3 A nyomvonalakat osztályozzák (4.1.2.3.6.3 alpont) és a nyomvonalak közötti átmenetek osztályait az A-10 ábra mutatja. A nyomvonalakat azért osztályozzák, hogy meghatározzák, hogy milyen új méréseket kell használni a magasság változtatási sebesség becslés megújításához.

4.1.2.3.6.4 A sebesség nagyságát zérusra kell állítani, ha a nyomvonal új, vízszintes repülési vagy ingadozó.

4.1.2.3.6.4.1 Az ε és $b_{\dot{z}}$ mennyiségeket zérusra és a t_b-t 100 sec-ra kell állítani.

4.1.2.3.6.4.2 Amikor egy nyomvonalat vízszintes repülésinek minősítenek, az összes előző átmenetet és bármilyen meglévő trendet figyelmen kívül kell hagyni.

4.1.2.3.6.5 A sebesség nagyságát $\dot{Z}_{gu}$-ra kell állítani, amikor a nyomvonal először válik nem megerősített sebesség nyomvonallá és utána lefutóvá mindegyik ciklusban az előző ciklus által megállapított értéktől, amíg egy másik átmenetet nem észlelnek.

4.1.2.3.6.5.1 A $\dot{Z}_{gu}$ értéke 2,4 m/s (480 láb/perc) és a lefutási állandó 0,9.

4.1.2.3.6.5.2 Az ε és $b_{\dot{z}}$ mennyiségeket zérusra és t_b -t $Q/|\dot{z}|$-ra kell állítani.

4.1.2.3.6.6 Megalapozott sebesség nyomvonalaknál a sebességet a számított szint elfoglalási idő által elosztott kvantálási intervallumra kell állítani. A szint elfoglalási időt az átvitelek vétele alapján számítják a trend irányában és állandónak tartják, amíg a következő átmenet vagy megjelenik, vagy érvénytelenné válik (4.1.2.3.6.7 pont).

4.1.2.3.6.6.1 Amikor egy nyomvonalat először hoznak létre, az ε, $b_{\dot{z}}$ és t_b mennyiségeket a következők szerint állítják be:

$\varepsilon = 0$, $b_{\dot{z}} = 1$ és t_b = maximum (t_p , 1,4 s)

4.1.2.3.6.6.2 Hacsak az átmenet nem korai vagy késői (4.1.2.3.6.6.3 alpont), az ε, $b_{\dot{z}}$ és t_b mennyiségeket számítják ki a harmadik és következő átvitelek rekurzív átlagolásával a következők szerint:

$\varepsilon' = 0{,}8\ \varepsilon^* + (t_{tp} - t_b^*)$

$\beta_\int = (t_b^* - T_n)^2 / [(t_b^*)^2 + 64\ T_n^2]$

$b_{\dot{z}} = b_{\dot{z}}^* + b_t$ és

β = maximum $(b_t / b_{\dot{z}}, \beta_\int)$ és

$\varepsilon = \varepsilon'$

$|\varepsilon| \leq 1{,}35$ (vagy 2,85, ha a legutóbbi átmenetet egy vagy több elmaradt jelentést követően észlelték) esetén;

$b_{\dot{z}} = 3$ és

ß = 0,5 és

$\varepsilon = 0{,}3\varepsilon'$ egyébként

és mindkét esetben: $t_b = t_b^* + \beta\,(t_p - t_b)$

4.1.2.3.6.6.3 *Korai vagy késői átmenetek*

Ha $|t_p - t_b^*| > 1{,}5$ s (vagy 3,0 s, ha a legutóbbi átmenetet egy vagy több elmaradt jelentést követően észlelték), vagy b_t a $(t_r/t_b^* + 1{,}1) \geq b_t \geq (t_r/t_b^* - 1{,}1)$ tartományon kívül esik, akkor ε, $b_{\dot{z}}$ és t_b értékeket a következőképpen állítják be:

$b_{\dot{z}} = 1$
$\varepsilon = 0$
t_{bm} = minimum $((0{,}7t_p + 0{,}3t_b^*), 1{,}4$ s)
t_b = maximum $(t_p, , t_{bm})$

A sebességet a következőképpen számolják ki: $\dot{z} = d_tQ / t_b$

4.1.2.3.6.7 *Elévült átmenet.* A sebesség nagysága elhal mindegyik ciklusban az előző ciklusban nyert értéktől, ha ugyanazon szintről érkeznek jelentések legalább T_3 ideig a következő várható továbbítás időpontja után (vagy T_4 ideig, ha a legutóbbi átvitelt egy vagy több elmaradt jelentést követően észlelték. A t_b értéke ilyen körülmények között nem változik.

4.1.2.3.6.7.1 A következő értékeket használják:

$T_3 = 1{,}5$ s

$T_4 = 3{,}0$ s

A következő képletet a sebesség lefutáshoz használják:

$\dot{z} = d_tQ/[t_b + (0{,}3\ t_b + 0{,}5\ T_n)(0{,}7 + (t_l - t_b) / T_n)^2]$

ahol t_l = a legutóbbi átmenet óta eltelt idő, s.

4.1.2.3.6.7.2 A $b_{\dot{z}}$ mennyiséget a maximum (2, $b_{\dot{z}}^* - 1$) -re állítják be.

4.1.2.3.6.8 *Vibrálás miatti átmenetek.* A sebesség nagyságát az előző ciklusban nyert értékre állítják be, ha a trend irányával ellentétes irányú átmenetet észleltek, a közvetlenül megelőző átmenet követte a trendet, csak egy szint keresztezése ment végbe, a közvetlen megelőző átmenet óta eltelt idő "váratlanul kicsi". Az ilyen átmenetet következésképpen mint hiányzót kell kezelni, kivéve a 4.1.2.3.4 és 4.1.2.3.6.10 e) pontokban szereplő követelményeknek megfelelő esetek.

4.1.2.3.6.8.1 A közvetlen megelőző átmenet óta eltelt időt "váratlanul kicsi"-nek deklarálják, amikor $t_p \leq 0{,}24\ t_b^*$.

4.1.2.3.6.8.2 Az ε, $b_{\dot{z}}$ és t_b mennyiségek nem változnak.

4.1.2.3.6.9 *Nyomvonal nagy megbízhatóság deklarálása.* "Nagy megbízhatóságot nyilvánítnak a követett sebességnél, ha az éppen aktuális magasság jelentés hiteles, és a következő feltételek közül egy vagy több teljesül:

a) Új nyomvonalat észleltek T_5-nél hosszabb időn keresztül (4.1.2.3.6.9.1 pont) magasság átmenet nélkül; vagy

b) nem megerősített nyomvonalat észleltek T_6-nál hosszabb időn keresztül (4.1.2.3.6.9.1 pont) magasság átmenet nélkül; vagy

c) a nyomvonalat vízszintes repülésnek jelentik; vagy

d) a nyomvonalat először megalapozott sebesség nyomvonalnak minősítik; vagy

e) megalapozott sebesség nyomvonalnál, amikor átmenet jelent meg, a megfigyelt átmenet idejének a várt átmenet időhöz viszonyított aránya (felfrissítés előtti) R_1 és R_2 közé esik (4.1.2.3.6.9.1 pont); vagy az ezek az idők közötti különbség abszolút értéke kisebb, mint T_8; vagy a legutóbb észlelt és az előző átmenet közötti időkülönbség nagyobb, mint T_8 (4.1.2.3.6.9.1 pont); vagy

f) megalapozott sebesség nyomvonalnál, amikor átmenet fordult elő, az előző jelentés hiányzott,

$$|t_p - t_b^*| \geq T_7,\ t_p/t_b^* \geq 1 \text{ és } -t_p - T_9 \leq (t_b - t_p)\ b_1 \leq T_9 \text{ vagy}$$

g) a nyomvonalat ingadozónak minősítik; vagy

h) megbízhatóságot előzőleg "nagy"-ra állították be, miután az utolsó hiteles magasság jelentést feldolgozták, és az a)-e) feltételek a 4.1.2.3.6.10 pontban "kicsi" megbízhatóság jelentéshez nem teljesülnek.

4.1.2.3.6.9.1 A következő értékek kerülnek felhasználásra

$T_5 = 9$ s
$T_6 = 9$ s

T_7 = 1,1 s
T_8 = 8,5 s
T_9 = 1,25 s
R_1 = 2/3
R_2 = 3/2

4.1.2.3.6.10 *Kis megbízhatóságú nyomvonal bejelentés*. A követett sebességnél "kis" megbízhatóságot jelentenek, ha a következő feltételek közül egy vagy több teljesül:

a) új nyomvonalnál, amíg a 4.1.2.3.6.9 pont a) feltétele teljesül; vagy

b) nem megerősített sebesség nyomvonalnál, amíg a 4.1.2.3.6.9 pont b) feltétele teljesül; vagy

c) amikor egy észlelt átmenet ideje egy megalapozott sebesség nyomvonalnál nem elégíti ki a 4.1.2.3.6.9 pont e) feltételét vagy f) feltételét; vagy

d) amikor egy várt átmenet több mint T_{10} időt (4.1.2.3.6.10 pont) késik;

e) megalapozott sebesség nyomvonalnál, amikor a 4.1.2.3.6.8 pont feltétele teljesül; vagy

f) a megbízhatóság előzőleg "kicsi" volt és a feltételek a "nagy" megbízhatóság jelentéséhez nem teljesültek (4.1.2.3.6.9 pont)

4.1.3.3.6.10.1 A T_{10} = 0,25 s értéket alkalmazzák.

4.1.2.3.7 *Hiányzó magasság jelentések*. Amikor magasság-jelentések hiányoznak:

a) a magasság változtatás sebesség számítás előző értékét fenntartják; és

b) a megbízhatóságot a követett sebességnél "kicsi"-nek jelentik, amikor a magasság jelentések két vagy több egymást követő cikluson keresztül hiányoznak.

4.2 Forgalmi tanácsadások (TA)

4.2.1 TA GENERÁLÁS

4.2.1.1 Forgalmi tanácsadást generálnak egy C-módú magasságot jelentő megközelítő légijármű részére, amikor mind a távolság vizsgálat (4.2.3 pont), mind a magasság vizsgálat (4.2.4 pont) alkalmazása pozitív eredményt szolgáltat ugyanazon működési ciklusban.

4.2.1.2 Forgalmi tanácsadást generálnak egy nem-magasság-jelentő válaszjeladóval felszerelt megközelítő légijármű részére, amikor egy távolság vizsgálat eredménye (4.2.3 pont) pozitív.

4.2.2 TA FIGYELMEZTETÉSI IDŐ

Magasságot jelentő megközelítő légijárműveknél a távolság vizsgálat a forgalmi tanácsadásoknál a következők szerint adja a figyelmeztetési időt:

S	2	3	4	5	6	7
TA figyelmeztetési idő	T + 10	T + 10	T + 10	T + 15	T + 15	T + 13

ahol S = érzékenységi szint

4.2.2.1 A 3-7 érzékenységi szintekhez tartozó értékek *T*-hez azok, amelyek a 4.3.3.3.1 pontban lettek megadva. Az érték *T*-hez a 2-es érzékenységi szintnél 10 s.

4.2.3 TA TÁVOLSÁG VIZSGÁLAT

A forgalmi tanácsadásokhoz tartozó távolság vizsgálatnak ugyanolyan formája van, mint amit a veszélyeztető légijármű észlelésnél használnak (4.3.3 pont). A D_m-hez a 3-7 érzékenységi szinteknél használt értékek azok, amelyek a 4.3.3.1.1 pontban vannak megadva, megnövelve $g(T_w\text{-}T)^2/6$ értékével, ahol T_w a kívánt forgalmi tanácsadás figyelmeztetési idő. A 2-es érzékenységi szintnél a D_m alapértékéhez 0,19 km (0,10 NM) tartozik.

4.2.4 TA MAGASSÁG VIZSGÁLAT

A magasság vizsgálat pozitív eredményt ad, ha a következő feltételek közül valamelyik teljesül:

a) az éppen aktuális magassági elkülönülés “kicsi”; vagy

b) a légijárművek magasság szerint összetartanak és az egy magasságba kerülésig az idő “kicsi”.

Ezek a fogalmak és feltételek a 4.3.4.1, 4.3.4.2, 4.3.4.3 és 4.3.4.5 pontokban vannak definiálva. Az időküszöb az egy magasságba kerülésig a forgalom tanácsadás figyelmeztetési idő lesz (4.2.2 pont) és a Z_t -nél használt értékek a következők:

z_0 repülési magasságszint	300 alatt	300 felett
Z_t m	260	370
(Z_t láb	850	1200)

4.3 Veszélyeztető légijármű meghatározása

4.3.1 VESZÉLYEZTETŐ LÉGIJÁRMŰ ÉSZLELÉSI JELLEMZŐI

4.3.1.1 *Megközelítő légijármű jellemzői.* Egy megközelítő légijármű jellemzői, amelyeket a veszélyeztető légijármű meghatározásához használnak a következők:

a) követett magasság: z_1

b) követett magasság változtatási sebesség: $\dot{z}_1$

c) követett ferde távolság: r

d) követett ferde távolság változás sebesség: $\dot{r}$

e) megközelítő légijármű ACAS-ának érzékenységi szintje: S_i

Egy megközelítő légijárműnél, amely nincs ACAS II-vel vagy ACAS III-mal felszerelve, az S_i-t 1-esre kell állítani.

4.3.1.2 *Saját légijármű jellemzők.* Minimumként a saját légijármű következő jellemzőit használják a veszélyeztető légijármű meghatározásánál:

a) magasság: z_0

b) magasság változtatási sebesség: $\dot{z}_0$

c) saját ACAS érzékenységi szint (4. fejezet 4.3.4.3 alpont): S_0

4.3.1.3 *Magasság-tartomány SLC utasítás.* A referencia logika az SLC utasítást a magasság tartomány alapján az A-1 táblázatban bemutatottak szerint választja ki.

4.3.2 VESZÉLYEZTETŐ LÉGIJÁRMŰVÉ NYILVÁNÍTÁS KRITÉRIUMAI

Egy megközelítő légijármű veszélyeztetővé válik akkor és csakis akkor, ha mindkét alábbi feltétel érvényes ugyanabban a ciklusban:

a) a távolság vizsgálat pozitív eredményt szolgáltat; és

b) vagy

1) a magasság vizsgálat pozitív eredményt szolgáltat; vagy

2) magasság keresztezés megoldási javaslat kiegészítést (RAC) vesznek a veszélyeztető légijárműtől.

4.3.2.1 *Elfogadott veszélyeztetés.* Egy elfogadott veszélyeztetésnek a veszélyeztető légijármű státusza a következő ciklusokban fennmarad, ha minimum a távolság vizsgálat pozitív eredményt szolgáltat.

4.3.3 TÁVOLSÁG VIZSGÁLAT

4.3.3.1 *Távolság összetartás (konvergencia).* Légijárműveket távolságban összetartónak tekintjük, ha a számított távolság változtatási sebesség kisebb, mint $\dot{R}_t$. Ebben az esetben a távolság változtatási sebesség számítási eredmény, amelyet a távolság vizsgáltban használnak, a számított távolság változtatás és $-\dot{R}_t$ közül a kisebbik.

4.3.3.1.1 $\dot{R}_t$-hez a 3 m/s (6 csomó) értéket használják.

4.3.3.2 *Távolság széttartás (divergencia).* Azok a légijárművek, amelyeket nem tekintenek távolságban összetartónak (konvergálónak), távolságban széttartónak (divergálónak) számítanak. A távolság széttartása “lassú”, ha a számított távolság és a számított távolság változás sebesség szorzata kisebb, mint $\dot{P}_m$

4.3.3.2.1 P_m-re a következő értékeket használják:

S	*3*	*4-6*	*7*
$\dot{P}_m$ km^2/s	0,0069	0,096	0,0137
($\dot{P}_m$ NM^2/s	0,0020	0,0028	0,0040)

4.3.3.3 *Távolság vizsgálat kritériumai.* A távolság vizsgálat akkor ad pozitív eredményt, amikor a következő feltételek valamelyike teljesül:

a) együttesen:

1) a légijárművek távolságban összetartanak; és

2) teljesül a következő egyenlőtlenség:

$$(r-D_m^2/r) / |\dot{r}'| < T;$$

ahol $\dot{r}' = \text{minimum}(\dot{r}, -\dot{R}_t)$

b) a légijárművek távolságban széttartanak, de a távolság kisebb, mint D_m és a távolság széttartás "lassú"; vagy

c) nem lehetett egy elkerülési távolságot számítani az éppen aktuális ciklusra, vagy a számított elkerülési távolság kisebb, mint H_m

és az összes többi feltételnél a vizsgálat eredménye negatív.

Megjegyzés. – A fenti a) 2) tételben szereplő képlet gyakorlati szöveget szolgáltat a következő feltételhez: a távolság és távolság változási sebesség számítások azt mutatják, hogy az előfordulás olyan lehet, hogy a lineáris hiányzó távolság kisebb vagy egyenlő D_m-el, és a lineáris idő a legszorosabb megközelítésig kisebb, mint T.

4.3.3.3.1 A T, D_m és H_m paraméterek értékei a következők:

S	*3*	*4*	*5*	*6*	*7*
T s	15	20	25	30	35
D_m (km)	0,37	0,65	1,0	1,5	2,0
(D_m (NM)	0,20	0,35	0,55	0,8	1,1)
H_m (m)	382	648	1019	1483	2083
(H_m (láb)	1251	2126	3342	4861	6683)

4.3.4 MAGASSÁG VIZSGÁLAT

4.3.4.1 *MAGASSÁG VIZSGÁLATI FOGALMAK ISMERTETÉSE*

Altitude divergence rate ($\dot{a}$) - Magasság széttartási sebesség ($\dot{a}$). Az *a* változásának sebessége.

*Current altitude separation (a) - Meglévő magassági elkülönítés (*a*).* Az éppen követett, a saját légijármű és a megközelítő légijármű közötti magassági elkülönítési modulus.

Times to closest approach (τ_μ, τ_m) - Idők a legszorosabb megközelítésig (τ_μ, τ_m). A minimális távolság eléréséhez elvileg szükséges számított idő. τ_μ a maximális érték (egyenesvonalú relatív mozgást és zérus elkerülési távolságot feltételezve), és τ_m a minimális érték (egyenesvonalú relatív mozgást és a maximális elkerülési D_m távolságot feltételezve).

Time to co-altitude (τ_V) - *Idő az azonos magasságba kerülésig* (τ_V). Az a számított idő, amely az azonos magasságba kerülés eléréséhez szükséges.

Vertical miss distance (v_m) *- Függőleges elkerülési távolság* (v_m). Számított alsó határ a tervezett magasság szerinti elkülönítésnél a legszorosabb megközelítés számított időpontjában.

4.3.4.2 *Meglévő magasság szerinti elkülönítés*. Meglévő magasság szerinti elkülönítést "kicsinek" jeleznek, ha $a < Z_t$, ahol Z_t a Z_m-el egyenlő értékre van beállítva (4.3.4.4.2 alpont) a referencia logikánál.

4.3.4.3 *MAGASSÁGI ÖSSZETARTÁS*

4.3.4.3.1 Az $\dot{a}$ -t a következők szerint számítják:

$\dot{a} = \dot{z}_o - \dot{z}_i$ $z_o - z_i \geq 0$ esetén

$\dot{a} = \dot{z}_i - \dot{z}_o$ $z_o - z_i < 0$ esetén.

4.3.4.3.2 A légijárműveket magasság szerint összetartónak minősítik, ha $\dot{a} < - \dot{Z}_c$

4.3.4.3.3 A $\dot{Z}_c$ értéke pozitív és nem nagyobb, mint 0,3 m/s (60 láb/perc)

4.3.4.4 *FÜGGŐLEGES ELKERÜLÉSI TÁVOLSÁG*

4.3.4.4.1 Amikor a légijárművek távolságban összetartanak ($\dot{r} \leq 0$), az időt a legszorosabb megközelítésig és, a függőleges elkerülési távolságot a következők szerint számolják:

$\dot{r}' = \text{minimum}(\dot{r}, -\dot{R}_t)$

$\tau_\mu = \text{minimum}(|r / \dot{r}|, T)$

$\tau_m = |(r - D_m^2/r) / \dot{r}'|$

$r \geq D_m$ esetén

$= 0$ az $r < D_m$ esetén

$v_{m1} = (z_o - z_i) + (\dot{z}_o - \dot{z}_i)\ \tau_u$

$v_{m2} = (z_o - z_i) + (\dot{z}_o - \dot{z}_i)\ \tau_m$

$v_m = 0$ a $v_{m1}\ v_{m2} \leq 0$ esetén, egyébként

$v_m = \text{minimum}(v_{m1}, v_{m2})$ a $v_{m1} > 0$ esetén

$= \text{maximum}(v_{m1}, v_{m2})$ a $v_{m1} < 0$ esetén

4.3.4.4.2 A függőleges elkerülési távolságot "kicsinek" jelzik, ha $|v_m| < Z_m$. A Z_m maximális értékei a következők szerint adódnak:

z_o *repülési szint*	*200 alatt*	*200-420*	*420 felett*
Z_m (m)	183	213	244
(Z_m (láb)	600	700	800)

4.3.4.5 *AZONOS MAGASSÁGRA KERÜLÉSIG TERJEDŐ IDŐ*

4.3.4.5.1 Az $\dot{a}$ esetén, az azonos magasságra kerülésig terjedő idő kisebb, mint -Z_c esetén és a következőképpen számolják:

$\tau_v = - a/\dot{a}$

Megjegyzés. – A τ_v *-t nem használják, ha a légijárművek magasságban és távolságban nem tartanak össze.*

4.3.4.5.2 A τ_v -t "kicsinek" jelzik, ha $\tau_v < T_v$ olyan találkozásoknál, amikor a saját légijármű függőleges sebessége nem nagyobb, mint 600 láb/perc, vagy a saját légijármű függőleges sebességének ugyanolyan előjele van, mint a veszélyeztető légijármű függőleges sebességének, de a nagysága kisebb. Minden más találkozásnál a τ_v -t "kicsinek" jelzik, ha $\tau_v < T$. A T_v paraméter értékei a következők:

S	*3*	*4*	*5*	*6*	*7*
T_vs	15	18	20	22	25

4.3.4.6 *Magasság vizsgálati kritériumok.* A referencia logika magasság vizsgálata pozitív eredményt ad, ha az alábbi három feltétel közül valamelyik teljesül:

a) a légijárművek távolságban összetartanak, a meglévő magassági elkülönítés "kicsi", és a függőleges elkerülési távolság "kicsi"; vagy

b) a légijárművek távolságban és magasságban összetartanak, az idő az azonos magasság eléréséig és a függőleges hiányzó távolság egyaránt "kicsi", vagy az azonos magasságra kerülést a legszorosabb megközelítés előttre jelzik ($\tau_v < \tau_u$); vagy

c) a légijárművek távolságban széttartanak, és a meglévő magasság szerinti elkülönítés "kicsi";

és minden más feltételnél a magasság vizsgálat eredménye negatív.

4.4 Megoldási tanácsadások (RA) generálása

4.4.1 A megoldási tanácsadások fajtáinak meghatározását a 4. fejezet 4.1 Szakasza tartalmazza.

4.4.2 KÉSÉS AZ RA GENERÁLÁSÁBAN

Megjegyzés. – Megoldási tanácsadást minden veszélyeztető légijárműre, kivéve az itt leírt körülményeket, vagy koordinációs célokra generálnak.

A referencia logika nem generál megoldási tanácsadást, vagy módosít egy meglévő megoldási tanácsadást egy új veszélyeztető légijármű részére, ha a következő feltételek valamelyike teljesül:

a) egy magasság-keresztezési megoldási tanácsadás kiegészítés nem érkezett a veszélyeztető légijárműtől; és

b) vagy

1) a magassági elkülönítés vizsgálat (4.4.2.1 alpont) negatív eredményt ad;

2) a megközelítő légijármű követett magasság változtatási sebességénél a meggyőződés “alacsony”, és nincs megoldási manőver, amely legalább A_t előrejelzett elkülönítést szolgáltatna (4.4.2.2 alpont), függetlenül attól, hogy a veszélyeztető légijárműnek akár a felső magasság változtatási sebesség határral, akár az alsó magasság változtatási sebesség határral egyenlő magasság változtatási sebessége, akár e két határ közötti tetszőleges értékkel egyenlő magasság változtatási sebessége van (4.1.2.3.4 alpont); vagy

3) “alacsony” meggyőződés áll fenn a veszélyeztető légijármű által követett magasság változtatási sebességnél, a fennálló elkülönítési magasság nagyobb, mint 46 m (150 láb), és a generált megoldási tanácsadás, amelyet a veszélyeztető légijárművel szemben választanának, ha a többi lehetséges veszélyeztető légijárműtől különállónak tekintenék, magasság keresztező.

4.4.2.1 *MAGASSÁGI ELKÜLÖNÍTÉS VIZSGÁLAT*

4.4.2.1.1 A saját ACAS II légijármű magasság változtatási sebességét “kicsinek” nyilvánítják, ha $|\dot{z}_o| \leq \dot{Z}_l$

4.4.2.1.2 A $\dot{Z}_l$ -ra a 3,0 m/s (600 láb/perc) értéket alkalmazzák

4.4.2.1.3 A veszélyeztető légijárművé nyilvánítás késését ”elfogadhatónak” tekintik, ha ez kisebb, mint 3,0 s.

4.4.2.1.4 A maximális magasság szerinti A_c elkülönítési küszöb 260 m (850 láb) értékre adódik, amikor a saját és a veszélyeztető légijármű függőleges sebessége ellentétes irányú és egyikük sem “kicsi”, és 183 m (600 láb) értékű egyébként.

4.4.2.1.5 A magasság szerinti elkülönítést “minimálisnak” deklarálják, ha 100 lábbal egyenlő.

4.4.2.1.6 Egy találkozást “lassan közeledőnek” nyilvánítanak, ha a távolság változás sebessége nagyobb, mint D_m/T.

4.4.2.1.7 *Vizsgálati feltételek*. A magassági elkülönítés negatív eredményt ad, ha a veszélyeztető légijármű egy új veszélyeztető, és a megoldási tanácsadás, amelyet a többi lehetséges egyidejű veszélyeztető légijárműtől elkülönítve tekintenek, a következő lehet, vagy:

a) magasság keresztező és vagy:

1) a fennálló magasság szerinti elkülönítés meghaladja az A_c-t; vagy

2) a veszélyeztető légijármű felszerelt, érvényes megoldási tanácsadás kiegészítést nem kaptak még tőle, a saját légijármű magasság változtatási sebessége “kicsi”, a veszélyeztető légijármű magasság változtatási sebessége nem “kicsi”, és a késleltetés egy megoldási tanácsadás kiadásában, vagy a fennálló megoldási tanácsadás módosításában “elfogadható”; vagy

b) képtelen legalább “minimális” elkülönítést generálni a kritikus tartomány felett, ha a találkozás nem “lassú közelítő”; vagy

c) képtelen legalább “minimális” elkülönítést generálni a legszorosabb megközelítésnél (τ_u), ha a találkozás “lassan közelítő” és vagy a távolság kisebb, mint D_m, vagy az idő a D_m, τ_m távolsághoz kisebb, mint 5 s.

Egyéb esetben a magasság szerinti elkülönítés vizsgálat eredménye pozitív.

4.4.2.2 Az A_t-re a következő értékeket használják:

z_o	A_t m	(A_t láb)
kisebb, mint a 100-as repülési szint	61	(200)
100-astól a 200-as repülési szintig	73	(240)
201-estől a 420-as repülési szintig	122	(400)
420-as repülési szint felett	146	(480)

4.4.2.2.1 ±500 lábas hiszterézist alkalmaznak a szomszédos magasság rétegek közötti határokhoz.

4.4.3 *Magasság szerinti elkülönítési cél.* A megoldási tanácsadás kezdeti erősségét úgy választják, hogy teljesítse a legszorosabb megközelítésnél legalább A_1 magasság szerinti elkülönítés célkitűzését, kivéve a 4.4.3.2 pontban leírt körülmények fennállásának esetét.

z_o	A_t m	(A_t láb)
kisebb, mint az 50-es repülési szint	91	(300)
50-estől a 100-as repülési szintig	107	(350)
100-astól a 200-as repülési szintig	122	(400)
201-estől a 420-as repülési szintig	183	(600)
420-as repülési szint felett	213	(700)

4.4.3.1.1 ±500 láb értékű hiszterézist alkalmaznak a szomszédos magasság rétegek közötti határokhoz.

4.4.3.2 *Nem megfelelő függőleges elkülönítés*. Ha a megoldás tanácsadásokra vonatkozó korlátozások (4.fejezet, 4.3.5 és 4.4.4 pontok alább) eleve kizárják egy megoldási tanácsadás generálását, amely várhatóan legalább A_1 magasság szerinti elkülönítést szolgáltat a legszorosabb megközelítésnél, a megoldás tanácsadás az, amely várhatóan a legszorosabb megközelítésnél a legnagyobb magasság szerinti elkülönítést szolgáltatja, amely összhangban van az ebben a fejezetben leírt többi előírással.

4.4.3.3 *Kritikus tartomány.* Előrejelzések a legszorosabb megközelítésre vonatkozóan arra az időtartamra szólnak, amely alatt összeütközés következhet be.

4.4.3.3.1 A kritikus tartomány az a $\tau_{m\ell}$ és $\tau_{u\ell}$ közötti idő, amelynél:

$\dot{r}' = \text{minimum}\,(\dot{r}, -\dot{R}_t)$

$\tau_{ul} = \text{minimum}\,(\tau *_{u\ell}, |r / \dot{r}'|, T_e)$

$\tau_{ml} = \text{minimum}\,(\tau *_{m\ell}, |r - D_m^2|/r) / \dot{r}'|)$

$r \geq D_m$ esetén

$T_{m1} = 0$, $r < D_m$ esetén

ahol $\tau *_{u\ell}$ és $\tau *_{m\ell}$ egyaránt T_e-vel egyenlő egy olyan veszélyeztető légijárműnél, amely újonnan esett át a távolság vizsgálaton (4.3.3 Szakasz), máskülönben a τ_{ul} és τ_{ml} előző ciklusbeli értékeit veszi fel.

4.4.3.3.1.1 A következő paraméter értékeket használják:

S	*3*	*4*	*5*	*6*	*7*
T_e, s	25	30	30	35	40

4.4.3.4 *A veszélyeztető légijármű repülési pályája.* A megoldási tanácsadás arra szolgál, hogy olyan magassági elkülönítést szolgáltasson, amely elegendő ahhoz, hogy a veszélyeztető légijárművekkel az összeütközést elkerüljék, amikor is a veszélyeztető légijárművek:

a) megtartják meglévő magasságváltoztatási sebességüket; vagy

b) emelkednek vagy süllyednek, amikor először válnak veszélyeztetőkké, és csökkentik magasságváltoztatási sebességüket, vagy vízszintes repülésbe manővereznek át.

4.4.3.4.1 Az előrejelzett magassági elkülönítés azon a feltevésen alapszik, hogy a veszélyeztető légijármű fenntartja meglévő magasság változtatási sebességét, kivéve a 4.4.4.4 pontban az ACAS-al felszerelt veszélyeztető légijárművekre vonatkozóan leírtakat.

4.4.3.5 *Saját légijármű repülési pályája.* Az előrejelzett magassági elkülönítés a legszorosabb megközelítésnél a következő feltételezéseken alapul, amelyek az ACAS II légijárműnek a megoldási tanácsadásra való reagálásával kapcsolatosak:

a) megelőző megoldási tanácsadásoknál a saját légijármű magasság változtatási sebessége a megoldási tanácsadás által előírt határokon belül marad;

b) helyesbítési megoldási tanácsadásoknál a saját légijármű repülési pályája a következőkből áll: gyorsulás nélküli repülés a meglévő sebességgel $T_p + T_S$ időn keresztül, ezt követi egy állandó gyorsulás ($\ddot{Z}_g$) a függőleges síkban, amíg eléri a választott magasság változtatási sebességet ($\dot{Z}_g$) és ezután gyorsulás nélküli mozgás ezzel a sebességgel.

Megjegyzés. – Az előrejelzett idő a legszorosabb megközelítésig olyan rövid lehet, hogy a kiválasztott $\dot{Z}_g$ *sebességet nem tudja elérni.*

4.4.3.5.1 A T_p paraméter, amely a repülőgépvezető reakció idejét jelenti, az 5 s értéket veszi fel a kezdeti megoldási tanácsadás erősségnél, vagy 2,5 s bármely következő megoldási tanácsadás erősségnél.

4.4.3.5.2 A T_S paraméter értékét úgy választják meg, hogy a rendszer késését modellezi a releváns SSR válasz fogadásától a megoldási tanácsadásnak a repülőgépvezető részére történő bemutatásáig (4. fejezet, 4.3.5.10 alpont).

4.4.3.5.3 A $\ddot{Z}_g$ paraméter a 0,35 g értéket veszi fel egy fordított értelmű megoldási tanácsadás, vagy 0,25 g értéket más esetekben.

4.4.3.5.4 Ha a $\dot{Z}_g$ választott magasság változtatási sebesség meghaladja a légijármű teljesítőképességét, a légijárműnek megfelelő értékkel helyettesítik.

4.4.4 MEGOLDÁSI TANÁCSADÁSOKRA VONATKOZÓ KORLÁTOZÁSOK

4.4.4.1 *A rendelkezésre álló RA erősségek.* A referencia logikának megvan az a képessége, hogy legalább a függőleges megoldási tanácsadás erősség A-2 táblázat szerinti választási lehetőségét nyújtsa a találkozási megoldásoknál.

4.4.4.1.1 *Megnövelt sebesség RA-k.* A referencia logika nem veszi figyelembe a növekedés emelkedés, növekedés süllyedés erősséget, amikor kiválasztja a megoldási tanácsadás kezdő erősségét. Ezeket a megoldási tanácsadásokat csak akkor használják, amikor az előrejelzett elkülönítés a meglévő megoldási tanácsadásnál nem megfelelő, és a megoldási tanácsadás értelmének megfordítása nem elfogadható választás. Ezek a megoldási tanácsadás erősségek arra szolgálnak, hogy átadjanak egy megnövelt sürgetés értelmet a repülőgépvezetőnek. Ezek megfelelnek a $\dot{Z}_g$ kiválasztott magasság változtatási sebesség $\dot{Z}_{clm}$ vagy $\dot{Z}_{des}$ fölé növekedésének, amelyik a megfelelő.

4.4.4.1.1.1 A választott magasság változtatási sebesség 13 m/s-re (2500 láb/perc) növelését generálják, amikor a következő feltételek mindegyike teljesül:

a) ugyanolyan értelmű pozitív megoldási tanácsadás kijelzés van és volt egynél több cikluson keresztül, és vagy

   1) ha a veszélyeztető légijármű felszerelt, vagy a meglévő megoldási tanácsadás nem magasság keresztező, a veszélyeztető légijármű által követett magasság változtatási sebességének bizonyossága “nagy” (4.1.2.3.6.9 alpont), és a meglévő megoldási tanácsadás erőssége várhatóan 61 m-nél (200 láb) kisebb magasság szerinti elkülönítést hoz a legszorosabb megközelítésnél; vagy

   2) a veszélyeztető légijármű nem felszerelt és a meglévő megoldási tanácsadás magasság keresztező és a legszorosabb megközelítésig 10 s vagy kevesebb maradt, és a veszélyeztető légijármű magassága a legszorosabb megközelítésnél előreláthatólag kevesebb, mint 61 m-el (200 ft) a saját légijármű felett, illetve alatt lesz süllyedési, illetve emelkedési megoldási tanácsadás esetén;

b) a legszorosabb megközelítésig hátramaradt idő kevesebb, mint T_{ir} és nagyobb, mint 4 s;

c) saját légijármű vagy süllyed és 1450 láb föld feletti magasság felett van, vagy emelkedik és 1650 láb földfeletti magasság felett van és növekvő emelkedési tanácsadásokat nem akadályozzák a légijármű teljesítmény korlátjai és

d) a Tau_u értéke (4.3.4.4.1 alpont) már nem növekszik, vagy ha van, a veszélyeztető légijárműtől való távolság kisebb, mint 3,2 km (1,7 NM).

T_{ir}-re a következő értékeket használják)

S	*3*	*4*	*5*	*6*	*7*
T_{ir}, *s*	13	18	20	24	26

1. Megjegyzés. – A fenti a) 2) feltétel lehetővé teszi megnövelt sebesség megoldási tanácsadás használatát a vízszintes repülésbe való átmenetet végző nem-felszerelt veszélyeztető légijárművel szemben egy magasság keresztező találkozásban, amely nem teszi képessé értelem felcserélésére (4.4.4.3.1 alpont). Ez a helyzet előállhat, mivel a veszélyeztető légijármű kismértékű lassulással megy át vízszintes repülésbe úgy, hogy várható magassága a legszorosabb megközelítési pontban követi az ACAS II légijármű meglévő magasságát mindegyik rákövetkező ciklusban. Növelt sebesség megoldási tanácsadás további magasság szerinti elkülönítést generálhat.

2. Megjegyzés. – A c) állapot megakadályozza a nem kívánatos együttműködést az összeütközés elhárító logika és a földközelségre figyelmeztető rendszer (GPWS) között.

4.4.4.1.2 Az alapértelmezett értékek Z_{clm}-re és Z_{des}-re 7,6 m/s (1500 láb/perc) és -7,6 m/s (-1500 láb/perc). Ha 7,6 m/s (1500 láb/perc) meghaladja a légijármű emelkedő képességét, alkalmas érték helyettesítésével lehet lehetővé tenni emelkedési megoldás tanácsadások generálását. Ha az emelkedés vagy süllyedés tényleges sebessége meghaladja az alapértelmezett sebességet, a tényleges sebességet helyettesítik be, ha az kisebb, mint a 4400 láb/perc maximális sebesség; más esetben a maximális 4400 láb/perc sebesség használatos.

Megjegyzés. – Emelkedéseket akadályozhatja diszkrét jelzésekre való reagálásban pl. az, hogy a légijármű csúcsmagasságon van. Azonban lehetséges, hogy bizonyos légijárműveknek olyan korlátozott emelkedőképessége lesz, hogy a megoldási tanácsadásokat 7,6 m/s (1500 láb/perc) sebességű emelkedésre folyamatosan korlátozni kell, hogy összhangban legyen a 4. fejezet, 4.3.5.4 pontjával.

4.4.4.1.3. *RA megtartás.* Kielégítve azt a követelményt, hogy süllyedő megoldási tanácsadást nem generálnak kis magasságokon (4. fejezet, 4.3.5.4.1 pont), a megoldási tanácsadást nem módosítják (4. fejezet, 4.3.5.6 alpont), ha a következők közül valamelyik érvényes:

a) a távolság vizsgálat negatív eredményt szolgáltat, de a megközelítő légijármű veszélyeztető marad (4.3.5.1.1 pont); vagy

b) 2,5 s-nál kevesebb marad a legszorosabb megközelítésig: vagy

c) a megközelítő légijármű távolságban széttartó, de a megoldási tanácsadást nem törölték (4.3.5.1.1 pont).

4.4.4.1.4 *Gyengülő RA-k.* Kielégítve azt a követelményt, hogy süllyedési megoldási tanácsadást kis magasságon nem generálnak, (4. fejezet, 4.3.5.4.1 pont), egy megoldási tanácsadás nem gyengül (4. fejezet, 4.3.5.7 pont), ha a következő feltételek közül valamelyik érvényes;

a) pozitív és a meglévő magasság szerinti elkülönülés kisebb, mint $A_{l;}$

b) (bármilyen erősségű is) kevesebb, mint 10 s, vagy megcserélt értelmű megoldási tanácsadás esetén, 5 s volt kijelezve;

c) a veszélyeztető légijármű által követett magasság változtatási sebesség "kis" bizonyosságú;

d) a megoldási tanácsadás egy függőleges sebesség határ megoldási tanácsadás.

Továbbá pozitív megoldás tanácsadások nem gyengülnek egy megoldási tanácsadás erősségen túl, amely lehetővé teszi a visszatérést a vízszintes repüléshez ("ne emelkedj" egy a lefelé irányuló megoldási tanácsadásnál; "ne süllyedj" egy felfelé irányuló megoldási tanácsadásnál).

Megjegyzés. – A gyengülő megoldási tanácsadásnak ez a korlátozása nem érvényes egy légijármű olyanná nyilvánítására, hogy az nem veszélyeztető légijármű (4. fejezet, 4.3.5.1.1 alpont).

4.4.4.2 *Kezdeti ellenállás a magasság keresztezéssel szemben.* Újonnan generált megoldási tanácsadás nem-keresztező, feltéve, ha:

a) egy nem-keresztező megoldási tanácsadás várhatóan egy legalább A_l nagyságú magasság szerinti elkülönítést szolgáltat a legszorosabb megközelítésnél; és

b) egy nem-keresztező megoldási tanácsadásra szabványos válasszal való reagálást (4.4.3.5 pont) jelzik előre, hogy megőrizzék legalább a "minimális" függőleges elkülönítést (4.4.2.1 pont) a legszorosabb megközelítésig terjedő teljes időtartományban.

4.4.4.3 *Értelem megfordulás elfogadott veszélyeztető légijárműnél.* Értelem megfordításokat generálnak, amikor a következő feltételek érvényesek:

a) a nem felszerelt veszélyeztető légijármű, vagy a felszerelt veszélyeztető légijármű, magasabb légijármű címzéssel rendelkezik, és legalább 9 s telt el azóta, mióta veszélyeztetővé vált, és a saját ACAS előzőleg nem fordította meg megoldási tanácsadásának értelmét; és

b) több mint 4 s maradt a legszorosabb megközelítésig;

c) a τ_u érték (4.3.4.4.1 pont) már nem emelkedett addig az ideig, amíg a veszélyeztető légijárműtől való távolság 3,2 km (1,7 NM) volt; és

d) vagy:

1) i) a meglévő megoldási tanácsadás keresztező; és

ii) a meglévő magasság szerinti elkülönítés legalább 61 m (200 láb), vagy 30 m (100 láb), ha több mint 10 s marad a legszorosabb megközelítés előtt;

iii) vagy

- a megoldási tanácsadás generálásának idején azt jelezték előre, hogy a veszélyeztető légijármű keresztezi a saját légijármű kezdeti magasságát, de jelenleg emelkedésnél a veszélyeztető légijármű magasságát a legszorosabb megközelítésnél, a saját légijármű jelenlegi magassága fölé, illetve süllyedés esetén alá jelzik előre; vagy

- a megoldási tanácsadás generálásának idején nem volt előrejelzés arról, hogy a veszélyeztető légijármű keresztezi a saját légijármű kezdeti magasságát, de az emelkedés és süllyedés megoldási tanácsadásoknál a legszorosabb megközelítésnél elérhetőnek jelzett elkülönítésre vonatkozó jelenlegi számítások azt mutatják, hogy fordított értelmű megoldási tanácsadás esetén nagyobb elkülönítést nyernek; és

iv) a legszorosabb megközelítés elérésének idejéig a saját légijármű felcserélt értelemmel képes lesz meghaladni a veszélyeztető légijármű magasságának maximum-határát a legszorosabb megközelítésnél (tervezett a maximum magasság változtatási sebesség határ használata (4.1.2.3.4 pont)); vagy

2) i) a meglévő megoldási tanácsadás nem magasság keresztező, és

ii) a következők közül legalább az egyik:

- a veszélyeztető légijármű keresztezte a saját légijármű magasságát legalább 30 m-el (100 láb) a megoldási tanácsadás értelmének irányában; vagy

- a veszélyeztető légijármű nem felszerelt és a saját légijármű még nem keresztezte a veszélyeztető légijármű magasságát, de függőleges sebessége ellenkező a megoldási tanácsadással, és a megoldási tanácsadás végrehajtására irányuló azonnali manőver nem akadályozná meg a legszorosabb megközelítés előtti magasság keresztezését; vagy

- a veszélyeztető légijármű nem felszerelt és a meglévő elkülönítés nem haladja meg az A_c-t (4.4.2.1.4 alpont), a saját és a veszélyeztető légijármű függőleges sebessége meghaladja az 1000 láb/perc értéket ugyanabban az irányban, a megoldási tanácsadás pozitív volt legalább 9 másodpercen keresztül, a veszélyeztető követett sebességének a bizonyossága nagy, és vagy a legszorosabb megközelítés előtti magasság kereszteződést jeleztek előre, vagy a függőleges elkülönülést a legszorosabb megközelítésnél 30 m-nél (100 láb) kisebbre jelezték előre.

Megjegyzés. – A megoldási tanácsadás értelme egy megalapozott veszélyeztető légijárműnél nem fordítható meg, kivéve a koordinációs célok esetét, vagy ha az előrelátható elkülönítés a legszorosabb megközelítésnél a meglévő értelemnél nem kielégítő (4. fejezet, 4.3.5.5 alpont).

4.4.4.3.1 Emelkedés megoldási tanácsadások, amelyek lefelé irányuló értelmű megoldási tanácsadások megfordítottjaiként jelennek meg, kiadásra kerülnek, tekintet nélkül a manőver korlátozási jelzésekre.

4.4.4.4 *Erős kiválasztás nem-keresztező megoldási tanácsadásoknál ACAS-al felszerelt veszélyeztető légijárművekkel szemben.* Egy ACAS-al felszerelt veszélyeztető légijárművel való konfliktusban, amelyben a referencia logika általában egy nem-keresztező emelkedés vagy süllyedés megoldási tanácsadást generálna, amely ellentétes irányú a saját légijármű fennálló függőleges sebességével, helyette olyan megoldási tanácsadást generál, amely a függőleges sebességet 0 láb/percre limitálja, amennyiben teljesülnek a következő feltételek:

a) a saját légijármű és a veszélyeztető függőlegesen összetartanak;

b) a saját légijármű függőleges sebessége meghaladja a $\dot{Z}_{lo}$-t;

c) a veszélyeztető légijármű függőleges sebessége kisebb, mint $\dot{Z}_{lo}$

d) és a függőleges elkülönítés, amelyet a legszorosabb megközelítésnél érnének el, ha mindkét légijármű vízszintes repülésbe megy át, meghaladva Z_{losep}-t.

4.4.4.4.1 A függőleges sebesség 0 láb/perc limitjét, amelyet a megoldási tanácsadás generál a 4.4.4.4 pontnak megfelelően, megtartják, ha egyik légijármű sem gyorsul függőlegesen a másik felé olyan sebességváltozással, amely meghaladja a $\dot{Z}_l$-t. Ettől eltérő esetben a referencia logika azonnal emelkedés vagy süllyedés megoldási tanácsadást generál, ahogy a megoldási tanácsadás értelmének megfelel.

4.4.4.4.2 A $\dot{Z}_{lo}$ számára 6 m/s (1000 láb/perc) értéket használnak, a Z_{losep}-nél pedig 244 m (800 láb) értéket.

5. Hibrid légtérellenőrzési eljárások ACAS II használata

5.1 Áttekintés

5.1.1 A hibrid légtérellenőrzés olyan eljárás, amelyet az ACAS a kiterjesztett squitteren keresztül rendelkezésre álló passzív helyzet információk előnyeinek kihasználására alkalmaz. A hibrid légtérellenőrzést felhasználva az ACAS érvényesíti a kiterjesztett squitter által közvetlen aktív távolságméréssel szolgáltatott helyzetet. A kezdeti érvényesítést a nyomvonal indításnál végzik. Újraérvényesítést 10 másodpercenként egyszer végeznek, ha a megközelítő légijármű majdnem veszélyeztetővé válik magasság vagy távolság szerint. Végül rendszeres, másodpercenként-egyszer értékű aktív felderítést végeznek a megközelítő légijárműveken, amelyek majdnem-veszélyeztetővé válnak mind magasság, mind távolság szerint. Ilyen módon passzív felderítést (egyszer érvényesített) használnak nem-veszélyeztető megközelítő légijárművekkel szemben, így csökkentve az ACAS lekérdezési gyakoriságot. Aktív felderítést használnak akkor, amikor egy közelítő légijármű majdnem veszélyeztetővé válik, hogy megőrizze az ACAS, mint független biztonsági figyelő rendszer, függetlenségét. A hibrid ellenőrzési algoritmus blokk diagramját az A-11 ábra mutatja be.

5.1.2 A kiterjesztett squitter helyzet jelentésben jelentett magasság az S-módú válaszjeladón belül ugyanazon forrásból táplálkozik, mint amit az ACAS lekérdezésre adott válaszban jelentett magasság szolgáltatásához használnak. A kiterjesztett squitter helyzet jelentésben jelentett magasságot ezért egy aktív felderítés alatt álló nyomvonal magasságának felfrissítésére is lehet használni abban az esetben, amikor a válaszjeladó nem válaszol az aktív lekérdezésekre.

5.2 Hibrid felderítési berendezés jellemzői

5.2.1 KEZDETI ÉRVÉNYESÍTÉS

5.2.1.1 Passzív nyomvonalat egy 24-bites címzésű kiterjesztett squitter vétele indít el, amely nincsen a nyomvonal fájlban és nem is kapcsolódik felderítés alatt álló nyomvonallal. Ez utóbbi eset akkor fordulhat elő, ha az aktív nyomvonalat létrehozott rövid squittert helyzet jelentéseket tartalmazó kiterjesztett squitter előtt veszik.

5.2.1.2 Az ACAS a kiterjesztett squitter adatbegyűjtést ugyanazon a módon kezeli, mint a rövid squitter adatbegyűjtést. Az igényelt squitter vétele után az ACAS MTL-nél (ugyanazon számút, mint amely a rövid squitterekre van előírva a 3. fejezet, 3.1.2.8.5 pontban), kísérletet tesznek aktív felderítésre előírt számú időpontokban. Sikeres válasz nyomvonal adatbegyűjtésekhez vezet. Sikertelen kísérlet az adatbegyűjtés félretevéséhez vezet ennél a légijármű címzésnél, mivel az ADS adatokat nem lehet érvényesíteni. Kiterjesztett squitterek vételének folytatása egy rákövetkező adatbegyűjtési kísérlethez vezet.

5.2.1.3 Kiterjesztett squitter információkat szolgáltató légijármű esetében egy sikeres adatbegyűjtési válasz alkalmat szolgáltat az információk érvényesítésére. De bármelyik esetben (rövid vagy hosszú squitter), ugyanazok a nyomvonal adatbegyűjtésre vonatkozó kritériumok következnek, a korrelációban lévő megkövetelt squitterek számának, és a végrehajtott lekérdezési kísérletek számának fogalmában kifejezve.

5.2.1.4 Kezdeti ADS információ érvényesítést végeznek passzív nyomvonal indításnál annak megállapítására, hogy a nyomvonal fenntartható-e passzív adatokon. Aktív légtérellenőrzést mérést végeznek egy rövid címzett lekérdezés felhasználásával, amely egy ACAS keresztkapcsolat utasítást hordoz a 05{HEX} regiszter tartalmának szolgáltatására (kiterjesztett squitter repülés közbeni helyzet) a válaszban. A válasz erre a lekérdezésre a légijármű sebesség képességét és a jelentett barometrikus magasságot is szolgáltatja az ADS-B repülés közbeni helyzet jelentésen kívül. A saját és megközelítő légijármű jelentett helyzetéből számított viszonylagos távolságot és irányszöget összehasonlítják az aktív lekérdezésből nyert magassággal. Ha a jelentett információk nem egyeznek meg a 4. fejezet 4.5.1.3.2 pontban ajánlott határokon belül az aktív lekérdezés által nyert távolsággal, irányszöggel vagy magassággal, a nyomvonalat aktív nyomvonalnak nyilvánítják és a jövőbeni kiterjesztett squittereket az ACAS elhanyagolja.

5.2.2 ÚJRAÉRVÉNYESÍTÉS ÉS FIGYELÉS

Ha egy relatív magasság ≤ 10000 láb feltételt kielégítő légijárműnél a következő feltételek teljesülnek:

(A megközelítő légijármű magasságkülönbsége ≤ 3000 láb VAGY függőleges TAU 3000 lábra ≤ 60 másodperc) VAGY

(Távolság különbség ≤ 3 NM VAGY távolság TAU 3 NM-re ≤ 60 másodperc)

egy aktív lekérdezést végeznek minden 10 másodpercben, hogy folyamatosan újraérvényesítsék és figyeljék a helyzet jelentéseket. Bármely észlelt különbség azt eredményezi, hogy a légijárművet aktív nyomvonalnak nyilvánítsák.

5.2.3 AKTÍV FELDERÍTÉS

5.2.3.1 Ha egy relatív magasság ≤ 10000 láb feltételt kielégítő légijárműnél, a következő feltételek teljesülnek:

(A megközelítő légijármű magasság különbsége ≤ 3000 láb VAGY függőleges TAU 3000 lábra ≤ 60 másodperc) VAGY

(Távolság különbség ≤ 3 NM VAGY távolság TAU 3 NM-re ≤ 60 másodperc)

a légijárművet aktív nyomvonalnak nyilvánítják, és másodpercenként egyszer aktív távolságmérések alapján frissítik.

5.2.4 VESZÉLYEZTETŐ LÉGIJÁRMŰ ÉRTÉKELÉSÉNEK BEJELENTÉSE

Ha a megközelítő légijárművet veszélyeztetőnek, vagy potenciális veszélyeztetőnek nyilvánítanak, az aktív távolságmérés folytatódik.

6. Az összeütközés elhárító logika működése

6.1 A működési követelmények célja

6.1.1 Az ACAS összeütközés elhárító logika az ACAS része, amely az azonosított megközelítő légijárművekre (azaz bármely légijárműre, amelyre az ACAS nyomvonalat hozott létre) vonatkozó információkat vesz és ezeknek az információknak az alapján összeütközés elkerülési tanácsadásokat generál. Mindegyik ACAS berendezésben egy mikroprocesszorba szoftvert telepítenek és ez a szoftver matematikai algoritmusok együttesét valósítja meg. Ezek az algoritmusok ACAS-ra különbözőek lehetnek, és az összeütközés elhárító logikával szembeni követelmények célja biztosítani azt, hogy a matematikai algoritmusok működése elfogadható legyen.

6.1.2 Az összeütközés elhárító algoritmusok kialakítását és szoftverként való megvalósítását különálló folyamatnak gondolják, és ezek a szabványok az algoritmusokra vonatkoznak, mégis a gyakorlatban a szoftver szokta demonstrálni, hogy az algoritmusok, amelyek kielégítőek, szorosan vonatkoznak arra az ACAS-ra, amellyel telepítik. Az összeütközés elkerülés logikával szemben támasztott működési követelmények nem törekszenek annak garantálására, hogy az összeütközés elkerülés szoftver szoftverként kielégítő legyen, bár ezek egy ilyen garanciának lényeges alkotóelemei. A szoftver kielégítő működését megfelelő szoftver-kezelési gyakorlattal kell elérni, amely biztosítja, hogy az algoritmusokat megbízhatóan megvalósítsák.

6.1.3 Az összeütközés elhárító logikák együttműködési képességét bármely két berendezésben annak biztosításával érik el, hogy megoldás tanácsadásaik összefüggenek és hogy bármelyik megoldási tanácsadás egyedül is elegendő a rendszer, mint egész célkitűzéséhez. A konzisztenciát a koordinációra vonatkozó követelmények biztosítják. (4. fejezet 4.3.5.5.1, 4.3.5.8 és 4.3.6.1.3 pontok). Hogy a kettő közül az egyik megoldási tanácsadás elegendő, azt az összeütközés elhárító logika működési követelményei garantálják és különösen az elegendő teljesítmény követelménye, amikor a másik légijármű ACAS-al felszerelt, de nem együttműködő (4. fejezet 4.4.2.1 j) 2) alpont.

6.1.4 A működési követelmények arra szolgálnak, hogy teljes garanciát nyújtsanak arra vonatkozóan, hogy a szóbanforgó ACAS logikának általános teljesítménye van, amely egyenrangú vele, vagy felülmúlja a többi ACAS logika teljesítményét. Ezek nem írják le a logika működését semelyik adott légtérben. Több okból kifolyólag a legjobb módszer egy ACAS logikának egy adott légtérben való működésének meghatározására vagy tanulmányozására légiforgalmi irányítási földi radar adatokon alapuló szimulációk végzése. Ennek lehetőségét tárgyalja tovább a 6.4.4 alpont.

6.2 Feltételek, amelyek mellett a követelmények érvényesek

6.2.1 ÉSZREVÉTEL

A 4. fejezet, 4.4.2 pontjában adott feltételek úgy lettek meghatározva, hogy megfogalmazzák a rákövetkező követelményeket, de kielégítő működést követelnek meg az összes normál működési feltételnél. Ezt kell alátámasztania a feltételek változásának, amelyben a teljesítmény mértékét számolják olyan módon, amely a várható normál változatokat tükrözi, és biztosítva azt, hogy a számított teljesítmény mértékek robusztusak, azaz nem romlanak le hirtelen, amikor romlanak a feltételek.

6.2.2 FELDERÍTÉSI HIBÁK

6.2.2.1 A felderítési hibák számos formát ölthetnek:

a) nem képződik nyomvonal a megközelítő légijárműre;

b) a nyomvonal későn képződik;

c) a nyomvonalat idő előtt ejtik;

d) nyomvonal képződik, de nem állnak rendelkezésre jelentések mindegyik ciklusra; és

e) a jelentések pl. a távolságról, mérési hibákkal terheltek.

6.2.2.2 Bár az ACAS, mint egész, hatékonysága értékelésének figyelembe kell vennie a nyomvonalak képzésének az a) tétel szerinti elmulasztását, nincs szükség annak bizonyítására, hogy a logika hatékony, amikor nincs adata.

6.2.2.3 A b) tétel szerinti késői nyomvonal képződés késleltetheti a megoldási tanácsadások generálását (talán amiatt, hogy a különböző követők a logikában nem azonos irányba hatnak és a megoldási tanácsadást a kis megbízhatóság késlelteti), vagy nem megfelelő kezdeti megoldási tanácsadást eredményez (esetleg azért, mert a követők kimenetét felhasználták, mielőtt az azonos hatott volna). A legjobb megoldás lenne meghatározni a késői nyomvonal kialakulás gyakoriságát a meglévő felderítési rendszernél, amit a vizsgálatra kerülő logikával használnak.

6.2.2.4 Amikor nyomvonal alakul ki, a hiányzó jelentések leronthatják a nyomvonal pontosságát, vagy a nyomvonal kis megbízhatóságát okozhatják, ezek mindegyike késleltetheti a kezdeti megoldási tanácsadást, nem megfelelő megoldási tanácsadást eredményezhet, vagy késleltetheti a változtatásokat a megoldási tanácsadásban, ha azt már generálták. A legjobb megoldás lenne meghatározni a hiányzó jelentések gyakoriságát a meglévő felderítési rendszernél, amelyet a vizsgálatra kerülő logikánál használnak. Annak valószínűsége, hogy egy jelentés valamely adott ciklusban hiányzik, a megközelítő légijármű távolságának, magasságának és annak a függvénye, hogy egy jelentés az előző ciklusban hiányzott vagy nem.

6.2.2.5 Tényleges iránytengely mérések hibái nagymértékben függnek a légijármű szerkezettől és az ACAS antenna és a többi antenna elhelyezésétől és az ugyanazon légijármű szerkezeten elhelyezett akadálytárgyaktól. Az iránytengely mérések tipikusan annyira gyengék, hogy a korai ACAS tervezések nem használták azokat az összeütközés elhárító logikában. Egy későbbi tervezés, amely tartalmazott egy, a megoldási tanácsadásokat gátoló szűrőt, amikor a távolságmérések sorozata jelentős vízszintes hiányzó távolságot jelzett, felhasználta az iránytengelyre és iránytengely változásának sebességére vonatkozó méréseket annak igazolására, hogy egyik légijármű sem gyorsul; a szűrő alkalmatlan, ha az iránytengelyre vonatkozó mérések nem állnak összhangban a diagnosztizált elkerülési távolsággal. A 4. fejezet 4.4.2 pontjában ismertetett feltételek szolgálnak arra, hogy lefedjék a logikának ezt a fajta tulajdonságát.

6.2.2.6 Nagyon valószínűtlen, hogy valamely ACAS felszerelés olyan iránytengely méréseket szolgáltasson, amelyek elegendő pontosságúak, hogy elsődleges alapként szolgáljanak egy hiányzó távolság szűrőnek, vagy az összeütközés elhárító logika bármely más aspektusának.

6.2.2.7 Távolság és iránytengely méréseket a megközelítő légijármű viszonylagos helyzetének meghatározására is használják a forgalmi kijelzésben való felhasználáshoz. Ennek a felhasználásnak a követelményei sokkal kevésbé szigorúak, mint az összeütközés elhárító logika követelményei és a 4. fejezet 4.4.2.2 és 4.4.2.3 pontjában ismertetett modelleknek nincs ilyen iránytengely felhasználása.

6.2.3 MAGASSÁG KVANTÁLÁS

6.2.3.1 A megközelítő légijármű magassága vagy C-módú vagy S-módú jelentésként és így 100 láb vagy 25 láb kvantumokban kifejezve állhat rendelkezésre. A 4. fejezet, 4.4.2.1 c) pont határozza meg, hogy a 100 láb értékű kvantum hordozza annak megerősítési célját, hogy a működési követelmények teljesülnek. Az összeütközés elhárító logika működésének javulása várható, amikor a megközelítő légijármű magassága 25 láb értékű kvantumokban áll rendelkezésre, és kívánatos megerősíteni, hogy ez az eset áll fenn.

6.2.3.2 A legtöbb esetben a saját légijármű magassága az ACAS részére C-módú vagy S-módú jelentés megformálása előtti mérés formájában áll rendelkezésre és a 4. fejezet 4.4.4.2.1 d) pont határozza meg, hogy ez feltételezés. Olyan felszereléseknél, ahol nem lehetséges az eredeti magasságmérés szolgáltatása az ACAS részére, az összeütközés elhárító logikának a saját légijármű által készített C-módú vagy S-módú jelentéseket kell használni. Ez várhatóan lerontja a logika működési eredményességét, de a 4. fejezet 4.4.2.1.1 pontja megköveteli, hogy ez a romlás még elfogadható legyen. A logika várhatóan nem elégíti ki a működési követelményeket, ha magasság jelentéseket (mint a mérésekkel szembenállókat) saját légijárműnél használják fel. A próba az, hogy a mérési eredményeket elfogadhatónak ítélik-e, amikor ezek olyan telepítésből származnak, ahol szükség volt teljesítmény kompromisszumra olyan bemenet használatának formájában, amely nem illeszkedik a normál szabványokhoz, és hogy ezek jelzik-e, hogy a logika túlzottan érzékeny a saját légijárműre vonatkozó magasság adatok kvantálásával szemben.

6.2.4 SZABVÁNYOS MAGASSÁGMÉRÉSI HIBA MODELL

6.2.4.1 A szabványos magasságmérési hiba modell az ACAS-nak az összeütközés kockázatára gyakorolt hatása számításához szükséges (6.3.2 alpont). Bár ez az üzemelő magasságmérők megfigyelt működésén alapszik, nincs olyan törekvés, hogy a modellt ennek a működésnek a referencia rögzítésére használják. Még kevésbé áll fenn olyan rejtett követelmény a magasságmérővel szemben, hogy illeszkedjen a modellben leírt működéshez, akár felhasználják az ACAS-al kapcsolatban, akár nem. A modellt csupán azon feltételek meghatározási céljára használják, amelyek között az összeütközés elhárító logika működésére vonatkozó követelmények érvényesek.

6.2.4.2 A modell leírja a magasságmérések feltételezett hibaeloszlását. Ez kizárja a kvantálás hatását, amely kvantálás C-módú és S-módú jelentések létrehozásához szükséges. Mindazonáltal az ACAS-nak az összeütközés kockázatára kifejtett hatása számításánál teljes mértékben figyelembe kell venni ezt a kvantálást, és ezt a szimulált magasságmérések kvantálásával kell elérni, és ebből fakadóan szimulált jelentések kialakításával, amelyeket a szimulált ACAS logikának szolgáltatnak.

6.2.4.3 Az ACAS hatásának szimulációi magukban foglalják a légijárművek mért magasságainak ismeretét. A tényleges magasságaik nem ismertek sem a légiforgalmi irányításnál, sem a légijárműnél; ezek a szimulált mérés és a véletlen magasságmérő hiba összegeként adódnak. Minden előfordulásnál, ahol a vízszintes elkerülési távolság nagyon kicsi, van valamilyen kockázata az összeütközésnek és ez egyenlő annak valószínűségével, hogy a két légijármű magasságának tényleges különbsége elég kicsi az összeütközés létrejöttéhez. Így az ACAS-nak az összeütközés kockázatára kifejtett hatásának a számolása (6.3.2 alpont) részt vesz a két légijármű mért magasságkülönbsége hibájára vonatkozó statisztikus eloszlás kialakításában: a két statisztikai eloszlás konvolúciója (spirálmenete), mindegyik légijárműhöz egy.

6.2.4.4 A 4. fejezet, 4.4.2.4 pontjában leírt szabványos magasságmérési hiba modellnél annak valószínűsége, hogy a tényleges függőleges elkülönítés kisebb, mint egy h küszöbérték, (amelyet a 6.3.2 pontban 100 lábnak vettek), a következő lesz:

for $\lambda_1 = \lambda_2$ and $a \geq h$

$$Prob(|d| \leq h) =$$

$$\frac{1}{4\lambda}\exp\left(\frac{-(a+h)}{\lambda}\right)\left[\exp\left(\frac{2h}{\lambda}\right)(2\lambda + a - h) - (2\lambda + a + h)\right]$$

for $\lambda_1 = \lambda_2$ and $a < h$

$$Prob(|d| \leq h) =$$

$$1 - \frac{1}{4\lambda}\exp\left(\frac{-(a+h)}{\lambda}\right)\left[\exp\left(\frac{2a}{\lambda}\right)(2\lambda - a + h) + (2\lambda + a + h)\right]$$

for $\lambda_1 \neq \lambda_2$ and $a \geq h$

$$Prob(|d| \leq h) =$$

$$\frac{\lambda_1^2 \exp\left(\frac{-a}{\lambda_1}\right)\sinh\left(\frac{h}{\lambda_1}\right) - \lambda_2^2 \exp\left(\frac{-a}{\lambda_2}\right)\sinh\left(\frac{h}{\lambda_2}\right)}{\lambda_1^2 - \lambda_2^2}$$

and for $\lambda_1 \neq \lambda_2$ and $a < h$

$$Prob(|d| \leq h) =$$

$$\frac{\lambda_1^2\left[1 - \exp\left(\frac{-h}{\lambda_1}\right)\cosh\left(\frac{a}{\lambda_1}\right)\right] - \lambda_2^2\left[1 - \exp\left(\frac{-h}{\lambda_2}\right)\cosh\left(\frac{a}{\lambda_2}\right)\right]}{\lambda_1^2 - \lambda_2^2}$$

ahol λ_1 és λ_2 a λ értékei a két légijárműnél, míg az a a látszólagos függőleges elkülönítés a 6.3.2 pontban, azaz a függőleges elkülönítés a két légijárművön elhelyezett magasságmérő mérése szerint.

6.2.5 SZABVÁNYOS REPÜLŐGÉPVEZETŐ MODELL

6.2.5.1 A szabványos repülőgépvezető modell a repülőgépvezető megoldási tanácsadásokra való elfogadható reagálását képviseli. Azonban nem fogja át a potenciális reagálások teljes tartományát, például a lassú reagálásokat, amelyek veszélyeztetik az összeütközés elkerülést és a túlságosan heves reakciókat, amelyek az engedélyezettől való nagy eltéréseket okoznak. Néhány reagálásnál, például a reagálás elmulasztása, vagy döntés a következő repülési magasságszintre való átmenetről egy emelkedési megoldási tanácsadásra való reagálásban, nem megfelelő alkalom a logika működésének vizsgálatára, de a szabványos modell következő módosításai jelzést szolgáltatnak, hogy a logika nem függ-e túlságosan a repülőgépvezető pontos reagálásától.

6.2.5.2 A 4. fejezet, 4.4.3 pontjával összefüggésben, az összeütközés kockázatának csökkentése, egy feltételezett hibás repülőgépvezető reagálás:

a) a repülőgépvezető lassan reagál, nevezetesen 8 s-ra rá egy kezdeti megoldási tanácsadásra és 5 s-ra rá egy megváltoztatott megoldási tanácsadásra; és

b) a repülőgépvezető nem megfelelő sebességet valósít meg, nevezetesen 200 láb/perc értékkel kevesebbet, mint a megkívánt sebesség.

6.2.5.3 A 4. fejezet, 4.4.4 pontjával összefüggésben, az ACAS hatása a légiforgalmi áramlásszervezésre (ATM), egy feltételezett reagálás:

a) a repülőgépvezető gyorsan reagál, nevezetesen 3 s-on belül egy kezdeti megoldás tanácsadásra és 1 s-on belül rá egy megváltoztatott megoldási tanácsadásra;

b) a repülőgépvezető túlzott sebességet valósít meg, nevezetesen 500 láb/perc értékkel nagyobbat, mint a megkívánt sebesség; és

c) a repülőgépvezető elmulaszt reagálni a gyengülő megoldási tanácsadásokra.

6.2.5.4 A logikától nem várják el, hogy kielégítse a működési követelményeket, amikor a repülőgépvezető a fentiek szerint reagál, de a teljesítmény mértékek számítása, amely ezeket a nem szabványos repülőgépvezető reagálásokat használja, némi betekintést nyújt a logika a repülőgépvezető reagálásra való érzékenységébe. A próba az, hogy a mértékváltozásokat elfogadhatónak ítélik, amikor ezek egy pontatlan reagálásból erednek, és hogy ezek jelzik-e, hogy a logika túlzottan érzékeny a repülőgépvezető feltételezett reagálására.

6.2.6 SZABVÁNYOS TALÁLKOZÁSI MODELL

6.2.6.1 Ténylegesen két találkozási modell van, egyik a kockázati arány számításaiban való felhasználásra (ahol a vízszintes elkerülési távolság kicsi), és a másikat akkor használják, amikor a logika tervezésének ATM-el való összeegyeztethetőségét értékelik (ahol a vízszintes elkerülési távolság közel egyezést mutat a légiforgalmi irányítási vízszintes elkülönítési minimummal). Ez felülkerekedik egy más esetben elfogadhatatlan egyszerűsítésen: mindkét modell a találkozás vízszintes és függőleges jellemzőit egymástól függetlenül kezeli.

6.2.6.2 A szabványos modell két Államban gyűjtött nagy mennyiségű földi radar-adat analízisének az eredménye. Ez azt jelenti, hogy elvárható, hogy ennek a modellnek a segítségével számított teljesítmény mértékek az üzemelés realitására vannak vonatkoztatva még akkor is, ha a számításoknak nem ez a célja. Az analizált adatok nagyon figyelemreméltó változatosságot tártak fel a légtér jellemzőkben, amely a találkozás modellnek az adatokat szolgáltató radar földrajzi helyétől való függőségében fejeződött ki. A két Államtól származó adatok jellemzői radikális különbséget mutattak. Ez azt jelenti, hogy egy szabványos találkozás modell nem tud olyan előrejelzéseket biztosítani, amelyek bármely adott földrajzi helyre érvényesek. Azonban, elfogadva, hogy egy szabványos modell a szabványos működés meghatározásához lényeges, a szabványosított modellt elegendően komplexnek és reprezentatívnak tekintik.

6.2.6.3 A szabványos találkozás modell paramétereinek meghatározásához (4. fejezet, 4.4.2.6 alpont), például a találkozás osztályok viszonylagos súlyának meghatározásához, a találkozásokat rekonstruálták a földi radar adatokból. Ez a találkozások aspektusainak újraértelmezését kívánta, amelyekre példák lentebb következnek.

6.2.6.3.1 A szabványos találkozás modellhez adott "Magasság réteg" meghatározása (4. fejezet, 4.4.1 alpont) egyszerű, mert ezt csupán az összeütközés elkerülés logika szabványosítása céljára csinálják. Amikor a földi radar adatokban észlelt valós találkozásoknál a talajszint nem felelt meg a 0 láb nyomásmagasságnak, szükséges volt különbséget tenni a földfeletti magasság és a közepes tengerszintre vonatkoztatott nyomásmagasság között. A módszer, amelyet magasság réteg meghatározására használnak, a valós radar adatokban észlelt találkozást az 1 rétegben helyezi el, ha ez 2300 láb földfeletti magasság (AGL) alatt történik, és a közepes tengerszintre MSL vonatkoztatott magasságot használja minden más esetben. Nagy magasságú elhelyezéseknél egy vagy több réteg néha hiányzik.

6.2.6.3.2 Egy légijármű függőleges sebessége egy találkozás elején és végén, $\dot{z}_1$, $\dot{z}_2$ a szabványos találkozás modellben, precíz időpontban fellépő értékek, azaz tca - 35 s-nál és tca + 50 s-nál. Amikor az adatokat a földi radar adatokban megfigyelt valódi találkozásoknál dolgozzák fel, a $\dot{z}_1$ és $\dot{z}_2$ pontoknál használt értékek a találkozó első 10 másodperce feletti azaz [*tca - 40 s, tca - 30s*] feletti, és az utolsó 10 s azaz [*tca, tca + 10*] feletti átlagértékek.

6.2.6.3.3 Hasonló módon, a valóságos találkozásoknál *tca* volt a legszorosabb megközelítés tényleges időpontja és *hmd* volt a tényleges vízszintes elkülönítés a legszorosabb megközelítésnél. A függőleges elkerülési távolság, *vmd* vagy a függőleges elkülönítés a legszorosabb megközelítésnél, olyan találkozásoknál, amelyeknél *hmd* $\geq$ 500 láb, vagy a minimális függőleges elkülönítés az alatt az időperiódus alatt, amelyben a két légijármű vízszintes elkülönítése 500 lábnál kisebb volt.

6.2.6.3.4 A szabványos találkozás modell néhány aspektusa, például a sebességváltozások nagysága a találkozás alatt, nem határozható meg a földi radar adatokból (az adatok jellege miatt) és a légijármű dinamika általános ismeretének felhasználásával kellett ezeket jellemezni.

6.2.6.3.5 Hogy a modell találkozások és a radar megfigyelési adatokból nyert találkozások közötti precíz összefüggés hiányát figyelembe vegyék, nem szabad megfeledkezni arról, hogy a szabványos találkozás modell célja az összeütközés elhárító logika működésének szabványosítása. Míg természetesen minden lehetséges erőfeszítést megtettek annak biztosítására, hogy a modell a lehető leghűbben tükrözze az üzemelés valóságát, a pontos hűség nincs megkövetelve és nem is sikerült elérni. Ez nem ad okot egy másik modell használatára, az egyetlen modell, amely az összeütközés elhárító logika működésének értékelésére érvényes, az itt ismertetett követelmények alapján az a modell, amely erre a célra itt került ismertetésre.

6.2.6.4 A szabványos találkozás modell bármilyen konstrukciója, amelyről bizonyítható, hogy ekvivalens a 4. fejezet 4.4.2.6 pontban ismertetettel, elfogadható. Két ilyen alternatív modellre az alábbiakban adunk két példát.

6.2.6.4.1 A 4. fejezet, 4.4.2.6.1 pontja írja elő, hogy a teljesítmény mértékeket a jellemzők széles körével meghatározott találkozások együttesének létrehozásával lehet kiszámolni (speciálisan: a légijármű címzések rendezése; a magasság réteg; a találkozás osztály; és a függőleges elkerülési távolság közelítő értéke) és az ezektől az együttesektől kapott eredmények kombinálásával, felhasználva a 4. fejezet 4.4.2.6.2 pontjában előírt súlyozásokat. Ez a viszonylag ritka fajtájú szimulációkból, pl. keresztező találkozások, annyit von be, mint amennyit a gyakoribb fajtájú találkozások szimulációiból, pl. nem-keresztező találkozások. Ez a megközelítés biztosítja, hogy az egyes együtteseken belül a lehetőségek teljes skálája megfelelően meg legyen vizsgálva. Azonban ugyanoda lehet jutni bizonyos számú találkozás megalkotásával mindegyik együttesnél, amelyek arányosak a fajlagos súlyukkal és az összes találkozást egyetlen nagyobb készletbe való összekombinálásával. Az egyetlen kifogás ezen alternatív megközelítés ellen az lehet, hogy a találkozások teljes számának elég nagynak kell lennie ahhoz, hogy biztosítsa, hogy a legkisebb együttestől származó eredmények, amelyet elszigetelten vesznek figyelembe, statisztikailag megbízható legyen.

6.2.6.4.2 Minden egyes függőleges sebességhez tartozó statisztikai eloszlást azzal a követelménnyel határozták meg, hogy először kiválasztanak egy tartományt, amelyen belül kell esnie a végső értéknek és azután választják ki a végső értéket egy olyan eloszlás felhasználásával, amely a tartományon belül egyenletes. Ez csupán egy eszköz, amelyet a 4. fejezet, 4.4.2.6.3.2.4 pontjában lévő táblázatok világos bemutatása kedvéért fogadtak el. Ez ekvivalens azzal a módszerrel, amikor az értéket közvetlenül a tartományokon belül lineáris statisztikai eloszlás felhasználásával választják ki, és amelyekre a kumulatív valószínűség mindegyik tartományon keresztül az erre a tartományra meghatározott valószínűséggel egyenlő mennyiséggel növekszik.

6.2.6.5 A szabványos találkozás modellben lévő találkozásokat egy képzeletbeli legszorosabb megközelítésből kifelé konstruálják. Ennek az elképzelt legszorosabb megközelítésnek az időpontja rögzített és *"tca"*-ként van leírva a 4. fejezet, 4.4.2.6 pontban. A függőleges síkban kiválasztják a *tca* előtt 35 s-hoz és a *tca* után 5 s-hoz tartozó függőleges sebességeket és ha szükséges, gyorsulási periódussal egyesítik őket, és azután a magasságokat rögzítik a repülési pályán azzal a követelménnyel, hogy a függőleges elkülönítés *tca*-nál egyenlő a *hmd*-re választott értékkel. A vízszintes síkban a *"hmd"*-re választott érték, a megközelítési szög és a légijármű sebességek meghatározzák a két légijármű viszonylagos repülési pályáit a *tca* időpontban. A légijármű fordulók és sebesség változások módosítják a repülési pályákat *tca* előtt és után. Ennek a folyamatnak a következményeként a legszorosabb megközelítés időpontja csak megközelíti a *tca*-t.

6.2.7 A MEGKÖZELÍTŐ LÉGIJÁRMŰ ACAS FELSZERELÉSE

6.2.7.1 A szabványok a megközelítő felszerelésével foglalkozó feltételek három együttesét határozzák meg és a megközelítő légijármű következő viselkedési módját feltételezik:

a) az egyes találkozásokban résztvevő másik légijármű nem-felszerelt;

b) a másik légijármű fel van szerelve ACAS-al, de egy olyan repülési pályát követ, amely azonos a nem-felszerelt találkozásban követettel; és

c) a másik légijármű fel van szerelve ACAS-al, amely a saját ACAS-ával megegyező összeütközés elhárító logikával rendelkezik.

6.2.7.2 Az a) körülmény biztosítja, hogy a logika kielégítően működik felszereletlen megközelítő légijárművel történő találkozásoknál. A másik két körülmény az összeütközés elhárító logikát vizsgálja, amikor a másik légijármű felszerelt, de ezt különböző szempontból végzi. A b) körülmény biztosítja, hogy a logika kifogástalanul működik a koordinációs folyamat korlátozásai közepette, míg a c) körülmény biztosítja, hogy kihasználják annak előnyeit, ami elvárt akkor, amikor mindkét légijármű felszerelt.

6.2.7.3 A b) körülmények között érvényes feltételek arra szolgálnak, hogy lehetővé tegyék a saját ACAS részére kezdeti megoldási tanácsadás kiválasztását, de azután a legpesszimistább elfogadható feltételezéseket kell alkalmazni a saját ACAS logika működésére vonatkozó koordinálás szükségességének hatásáról. Amikor a saját légijárműnek alacsonyabb légijármű címzése van, a vizsgálat feltételei magukban foglalják, hogy a megoldási tanácsadás értelmét nem lehet megfordítani. Továbbá, a megközelítő légijármű nem generál sem megoldási tanácsadást, sem megoldási tanácsadás kiegészítést, amíg a saját ACAS megoldási tanácsadás be van jelentve, mert egy korai terv egy kezdeti koordináció késleltetést tartalmaz (amelynek célja az volt, hogy lehetővé tegye a koordináció elvégzését és elkerülje, hogy a repülőgépvezető gyors változásokat észleljen a megoldási tanácsadásokban); a követelmény arra szolgál, hogy a teljesítmény kielégítő voltát biztosítsák, bármiféle késleltetés káros hatása ellenére.

6.2.7.4 A c) körülmények azt követelik meg, hogy a két légijármű viselkedése teljes mértékben együttműködő legyen, de az a tény, hogy mindkét ACAS tárgyi logikát használja, biztosítja, hogy a teljesítmény mérték a tárgyi logikára vonatkozzon, és a tárgyi logika hatékony legyen.

6.2.7.5 A fenti okfejtésnek megfelelően, a teljesítmény követelmények arra szolgálnak, hogy a logika kielégítő működését biztosítsák és nem a rendszernek, mint egésznek a működését. Olyan kiterjesztéshez, hogy ezek a rendszerek, mint egész előnyeinek szélesebb értelmezésére legyenek alkalmasak üzemelési körülmények között, a c) körülményről elgondolható, hogy hitelesebb teljesítmény mértéket szolgáltat ACAS-ACAS találkozásoknál. A logika részletezett teljesítménye a b) körülménynél rosszabb, mint amikor a megközelítő légijármű nincs felszerelve, mert a b) körülmény csak a koordináció általi korlátozásokat tartalmazza. Azonban az a tény, hogy egy megközelítő légijármű együttműködése nem garantálható, és hogy egyes repülőgépvezetők néha elmulasztják a reagálást a megoldási tanácsadásokra, azt jelenti, hogy mindhárom mértéknek üzemelési relevanciája van.

6.3 Az összeütközés kockázatának csökkentése

6.3.1 A LOGIKAI KOCKÁZATI ARÁNY STÁTUSZA

6.3.1.1 A 4. fejezet, 4.4.3 alpont céljaira számított kockázati arány a logika teljesítményének mértéke és nem az ACAS-é, mint egészé. Például az ACAS megakadályozhat egy összeütközést a repülőgépvezető ösztönzésével a megközelítő légijármű egy sikeres vizuális keresésének kivitelezésére és ez elmaradhat, mert nem létesült nyomvonal, vagy a repülőgépvezető figyelmen kívül hagyja a megoldási tanácsadást; ezek a teljes rendszer szempontjai, amelyek nem tükröződnek a 4. fejezet 4.4.3 pontjában megkövetelt számításokban.

6.3.1.2 A "logikai kockázati arány" helytállósága a 4. fejezet 4.4.3 pontja szerint számolt számainak az üzemelési vagy stratégiai döntésekhez való figyelembevételénél hasznos lehet ezeket csupán megbízhatóságnak tekinteni, amelyet a megoldási tanácsadásokhoz illesztenek. Ezek azt a hatást fejezik ki, amely egy megoldási tanácsadást követően az összeütközés közvetlen kockázatára kifejtődik, ha a kiadás időpontjában a repülőgépvezetőnek nincs más információja, mint a megoldási tanácsadás, amire azt a döntését alapozná, hogy kövesse vagy figyelmen kívül hagyja a megoldási tanácsadást. Durva iránymutatásként, az ACAS által létrehozott összeütközés kockázat a megoldási tanácsadás követéséből ered, így a logikai kockázati arány eltúlozza ezt az "indukált" kockázati arányt; másrészt pedig eltúlozza az ACAS-nak a képességét az összeütközések megelőzésére a teljes rendszerben lévő sok más hibázási mód miatt.

6.3.1.3 A 4. fejezet 4.4.3 paragrafusának céljaira kiszámolt számok nem alkalmazhatók meggondolási iránymutatókként az ACAS-nak az összeütközés teljes kockázatára kifejtett hatását illetően egy légtérben, vagy mint olyan kockázatra vonatkozóan, amellyel egy légijárműnek kell szembenéznie.

6.3.2 A LOGIKAI KOCKÁZATI ARÁNY SZÁMÍTÁSA

6.3.2.1 Az R kockázati arány a következőképpen írható fel:

$$R = \frac{\sum \textit{probability of a collision with ACAS}}{\sum \textit{probability of a collision without ACAS}}$$

ahol az összegezés az összes találkozásra vonatkozik, vagy gyakorlatiasabban, az összes olyan találkozásra, amely hozzájárul az összeütközés teljes kockázatához ACAS-al vagy anélkül. Ami a találkozások jellemzőihez és statisztikájához az üzemelési realitások reprezentálásához szükséges, a 4. fejezet, 4.4.2.6 pontjában lett szabványosítva és a 6.2.6 pontban került tárgyalásra.

6.3.2.2 Az összeütközés becsült kockázata az "összeütközés" szó értelmezésétől függ. Míg ezt a problémát messze elkerüli az összeütközési kockázat ACAS-al és ACAS nélkül közötti arány fogalmaiban kifejezett követelmény, nagyon fontos, hogy reálisan veszi figyelembe a legnagyobb légijármű méretét. Ésszerű lenne a két légijármű középpontja közötti 100 lábnál kisebb függőleges elkülönülést úgy kezelni, mint amely elegendő egy összeütközés lehetővé válásához. Nem lenne tanácsos jelentősen nagyobb elkerülési távolságokat használni összeütközések közelítéseként, mert azt találnák, hogy a számított kockázati arány érzékeny az "összeütközés" definíciójára még akkor is, ha ez egy arány.

6.3.2.3 Ha azt a közelítést tesszük, hogy egy összeütközés akkor következik be, amikor $|d| < 100$ láb, ahol d a tényleges függőleges elkülönítés, akkor:

$$R = \frac{\sum \text{prob}(|d| < \mathit{100\ ft\ with\ ACAS})}{\sum \text{prob}(|d| < \mathit{100\ ft\ without\ ACAS})}$$

ahol most az összegezés az összes zérus vagy rendkivül kicsi vízszintes elkerülési távolságú találkozásra terjed ki.

6.3.2.4 Most vezessük be e-t, a magasságmérő hibáját, és a t-t, a látszólagos függőleges elkülönítést, és jegyezzük meg, hogy

$$a = d + e$$

a fogalmilag a magasság szerinti elkülönítés, ahogyan a magasságmérő méri. Nincs szükség kvantálási hibákra vonatkozó megfontolásokra, mert a modellezett magasságmérő leolvasások tetszőleges pontossággal ismertek lehetnek a számítógépes szimulációban. Ezek kvantálva vannak, mielőtt az ACAS számára szolgáltatják őket modellezett C-módú jelentésekként, amelyek ACAS nyomvonalak. Ez az, amiért a 4. fejezet, 4.4.2 pontjának szabványa kizárja a kvantálási hatásokat.

6.3.2.5 Fogadjuk el, hogy az a_{with} a nyilvánvaló függőleges elkülönítés ACAS megléte esetén, és az $a_{without}$ a nyilvánvaló függőleges elkülönítés ACAS megléte nélkül. Ekkor

$|d| < 100$ láb ACAS-al

akkor és csakis akkor, ha $|a_{with} - e| < 100$ láb

azaz a_{with} -100 láb $< e < a_{with}$ + 100 láb

és hasonlóan

$|d| < 100$láb ACAS nélkül

akkor és csakis akkor, ha $a_{without}$ -100 láb $< e < a_{without}$ + 100 láb

6.3.2.6 A kockázati arányra így a következőképpen adódik:

$$R = \frac{\sum \text{prob}(a_{with} - 100\,ft < e < a_{with} + 100\,ft)}{\sum \text{prob}(a_{without} - 100\,ft < e < a_{without} + 100\,ft)}$$

Hogy ez a képlet használható legyen a kockázati arány számításához a_{with} és $a_{without}$ értékeket meg kell határozni a találkozások egy olyan együttesénél, amely teljes mértékben képviseli az összes potenciális tényleges találkozást, amelyekben jelen van az összeütközési kockázat ACAS nélkül és a kockázat, hogy az ACAS fog indukálni egy összeütközést. Amikor ezek a hipotetikusan mért magasság szerinti elkülönítések ismertek, a magasság mérési hibák ismerete teljessé teszi a számításokat.

6.3.3 INDUKÁLT ÉS MEGOLDATLAN KOCKÁZAT

6.3.3.1 Nem elegendő demonstrálni, hogy az ACAS megelőzi az összeütközéseket, amelyek nélküle bekövetkezhetnek. A kockázatot, hogy az ACAS logika összeütközéseket okozhat egyébként biztonságos körülmények között, teljesen végig kell gondolni, nem kis mértékben azért, mert ellenőrzött légtérben azoknak a találkozásoknak a száma, amelyek potenciálisan egy indukált kockázatot viselnek, jelentősen felülmúlják a majdnem összeütközések számát.

6.3.3.2 A 4. fejezet, 4.4.3 pontnál szabványosított logikai kockázati arány felső határa ténylegesen egy felső határt helyez el az ACAS indukált összeütközési kockázaton. Bár néhány más hibázás késztetheti az ACAS-t összeütközés indukálására, pl. repülőgépvezetők manőverezése egy forgalmi tanácsadásra vagy megoldási tanácsadásra, amely a légijárművet egy nem látható harmadik fél repülési pályájára irányítja, az indukált kockázat nagymértékben tulajdonítható a következő megoldási tanácsadásoknak. Üzemi feltételek között egy megoldási tanácsadás létrehozásának vagy követelésének az elmulasztása csökkenti egy indukált összeütközés kockázatát (még ha növeli is az abszolút kockázatot).

6.3.3.3 Követelmény az, hogy a logikát az összeütközés kockázat csökkentésére tervezzék és ne legyen különbségtétel a logika által indukált kockázat és a megoldásképtelen kockázat között. Lehetséges ilyen különbségi határt meghúzni és még fel is lehet osztani a kockázatot magasságmérő hiba miatti és a logika nem megfelelő működése miatti kockázatra, de számításba kell venni, hogy ennek a gyakorlatnak nincs nagy értéke a logika tervezése szempontjából.

6.3.4 FÖLDI RADAR ADATOK FELHASZNÁLÁSA KOCKÁZATI ARÁNY SZÁMÍTÁSHOZ

6.3.4.1 Lehetőség van földi radar adatokban észlelt találkozások felhasználására a 6.3.2 pontban leírt biztonsági számítások alapjaként. Azonban nehéz az eredményeket értelmezni, mert a számítás rendkívülien ritka eseményekkel foglalkozik még akkor is, ha több hónapon át gyűjtött adatokat használ fel, a repülési pályákat módosítani kell, hogy bekerüljön olyan összeütközési kockázat, amely hiányzott a tényleges találkozásokból. Sokkal ésszerűbb a radar adatokat a súlyozások választásához információként felhasználni, amely súlyozásokat a különböző találkozási osztályoknak tulajdonítanak a találkozási modellben és így létrehozzák az idealizált találkozási modellnek egy változatát, amely jóval reprezentatívabb a szóbanforgó légtérre vonatkozóan, mint az itt bemutatott modell.

6.4 Összeegyeztethetőség az ATM-mel

6.4.1 ZAVARÓ FIGYELMEZTETÉSI ARÁNY

6.4.1.1 Az ACAS-tól megkövetelik a fenyegető összeütközés diagnosztizálását hiányos információk alapján. Továbbá, ezeknek az információknak függetleneknek kell lenniük azoktól, amelyek a légijármű elkülönítés elsődleges alapját szolgáltatják. Ebből következően figyelmeztetések fordulnak majd elő a találkozásoknál, ahol üzemelési szempontból nézve úgy tűnik, hogy nincs összeütközési kockázat. A 4. fejezet, 4.4.4.1 pontjában közölt szabvány megköveteli, hogy ezek a zavaró figyelmeztetések a lehető legritkábban forduljanak elő.

6.4.1.2 A zavaró megoldási tanácsadás 4. fejezet, 4.4.4.1.2 pontjában megadott követelményeket olyan szempontból készítették el, hogy egy megoldási tanácsadás akkor zavaró, ha a szokásos szabvány elkülönítés nincs tisztán elveszítve. Ezen kívül ez azt szolgálja, hogy a vízszintes elkülönítési küszöb elegendően szigorú legyen ahhoz, hogy vízszintes elkerülési távolság szűrő használatát követelje meg. A vízszintes elkülönítési küszöböt a szokásos elkülönítés 40 százalékára állították be, és a függőleges elkülönítési küszöböt az engedélyezett magasságtól 200 láb eltérésnek megfelelő légiforgalmi irányítási tűrésen alapuló számra állították be.

6.4.2 ÖSSZEEGYEZTETHETŐ ÉRTELEM KIVÁLASZTÁS

6.4.2.1 A 4. fejezet, 4.4.4.2 pontnál leírt követelmény nem szándékozik korlátozni a módot, amelyben veszélyes találkozásokat oldanak meg, hanem inkább annak méltánylásán alapul, hogy a megoldási tanácsadások többségét valószínűleg olyan találkozásoknál generálják, ahol összeütközés veszélye nem áll fenn. Ez statisztikai korlátot képez a gyakoriságra, amellyel az ACAS megszakítja a légiforgalmi irányítást vagy a légijármű normál üzemelését a két légijármű függőleges elkülönítésének megfordításával.

6.4.3 AZ ACAS ÁLTAL OKOZOTT ELTÉRÉSEK

6.4.3.1 Az eltérések korlátai, amelyeket a 4. fejezet, 4.4.4.3 pontja szerinti megoldási tanácsadások követése okozhat, limitálják a normál légijármű üzemeltetés, valamint a légiforgalmi irányítás megszakítását. Míg a magasság engedélyektől való eltérések a legnyilvánvalóbb megszakításai a légiforgalmi irányításnak, más eltéréseket, mint például azokat, amit az emelkedésre szóló megoldási tanácsadás okoz, amikor a légijármű éppen süllyed, a légiforgalmi irányítás éppen olyan súlyosnak tekint.

6.4.4 A FÖLDI RADAR ADATOK VAGY A SZABVÁNYOS TALÁLKOZÁS MODELL HASZNÁLATA

6.4.4.1 Az ATM-el való összeegyeztethetőség követelményének betartását legkényelmesebben a légiforgalmi irányítási földi radarok lefedésén belül előforduló tényleges üzemelési találkozások rekonstruálásán alapuló szimulációk felhasználásával lehet vizsgálni, feltéve, hogy az így megfigyelt légijárműveknek csak kis hányada van ACAS-al felszerelve. Azonban a tényleges adatokon alapuló ilyen szimulációk a légtér (vagy légterek) egyedi tulajdonságait tükrözik, amely(ek)ben ezeket az adatokat gyűjtötték, és amennyire az összeütközés elkerülési logika ezeket az adatokat felhasználta. Így jelentős gyakorlati nehézségek lépnek fel valóságos találkozási adatok felhasználásával összeütközés elkerülési logika érvényesítésére, és a 4. fejezet, 4.4.4 pontjában közölt rendelkezések feltételezik a 4. fejezet, 4.4.4.2.6 pontjában ismertetett szabványos találkozási modellen alapuló mesterséges találkozások felhasználását.

6.4.4.2 A szabványos találkozási modell használata az összeütközés elkerülési logika működését leíró teljesítmény mértékek nyeréséhez csak közvetett bizonyítékot szolgáltat, amely valamely adott légtérben való üzemelésre vonatkozik. Azoknak a hatóságoknak, amelyeknek hozzáférésük van a földi radar adatokhoz és meg akarják ismerni az ACAS kölcsönhatását a helyi légiforgalmi irányítási gyakorlattal, azt tanácsolják, hogy inkább a földi radar adatain alapuló szimulációkat használják, mint a szabványos találkozási modellt. Így cselekedve, meg kell jegyezniük, hogy az eredmények fordítottak lehetnek, ha a megfigyelt légijárművek már ACAS-al felszereltek. Arra is szükség lesz, hogy elegendő adatokat gyűjtsenek össze annak biztosításához, hogy ezen adatokból származtatott megoldás tanácsadások statisztikailag reprezentatívak legyenek; például nagyon kevés példát tartalmaznának a megoldási tanácsadás néhány típusára.

6.5 Konfliktusba kerülő célok relatív értéke

Az ACAS összeütközés elhárító logika tervezésének egy üzemelési szempontból elfogadható egyensúlyt kell teremteni az összeütközés kockázatának csökkentése és az ACAS figyelmeztetések által okozott megszakítások között. Az összeütközési kockázatra (4. fejezet, 4.4.3 pont) és a légiforgalmi irányítás megszakítására (4. fejezet, 4.4.4 pont) vonatkozó követelmények minimális előírások, amelyek mint elérhetők ismertek egy prototípus rendszerrel végzett működtetésből. Más tervezések csak akkor elfogadhatók, ha bemutatható, hogy az összeütközés kockázata és a légiforgalmi irányítás megszakítása egyaránt minimalizált, amennyire megvalósítható a másik minimalizálásnak szükségessége vonatkozásában.

TÁBLÁZATOK

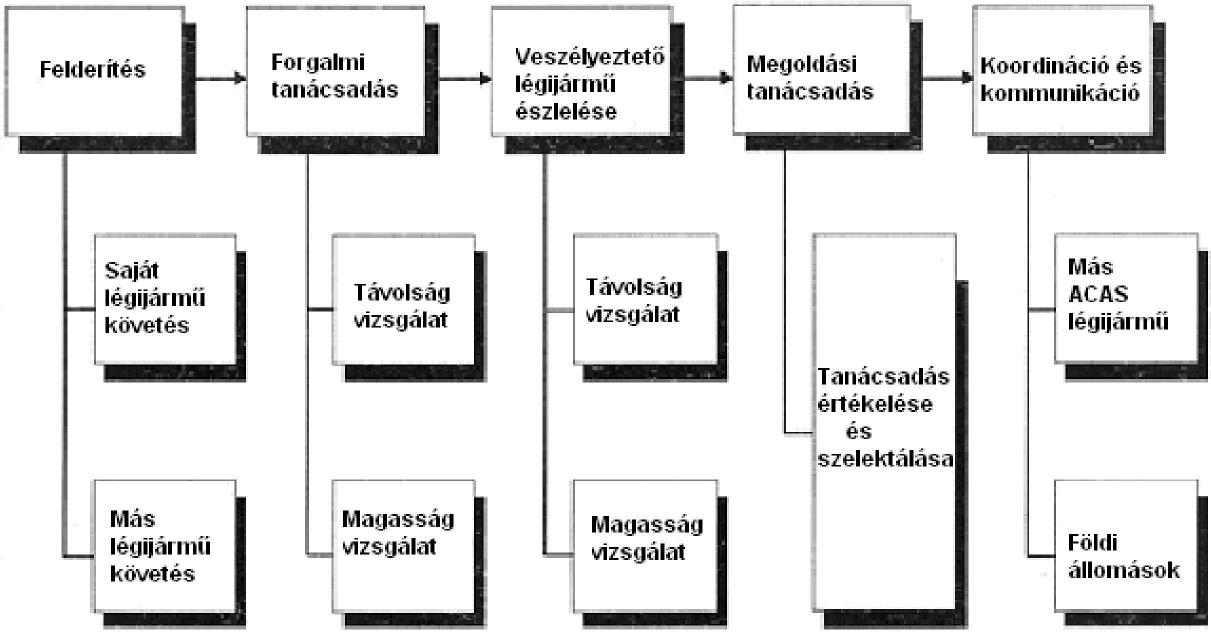
A-1 táblázat

Névleges magasság tartomány	*SLC utasítás*	*Magasságküszöb, amelynél az érzékenységi szint értéke változik*	*Hiszterézis értékek*
0-tól 1000 láb földfeletti magasság	2	1000 láb földfeletti magasság	±100 láb
1000 lábtól 2350 láb földfeletti magasság	3	2350 láb földfeletti magasság	±200 láb
2350 láb földfeletti magasságtól 50-es repülési szintig	4	50-es repülési szint	±500 láb
50-es repülési szinttől 100-as repülési szintig	5	100-as repülési szint	±500 láb
100-as repülési szinttől 200-as repülési szintig	6	200-as repülési szint	±500 láb
200-as repülési szint felett	7		

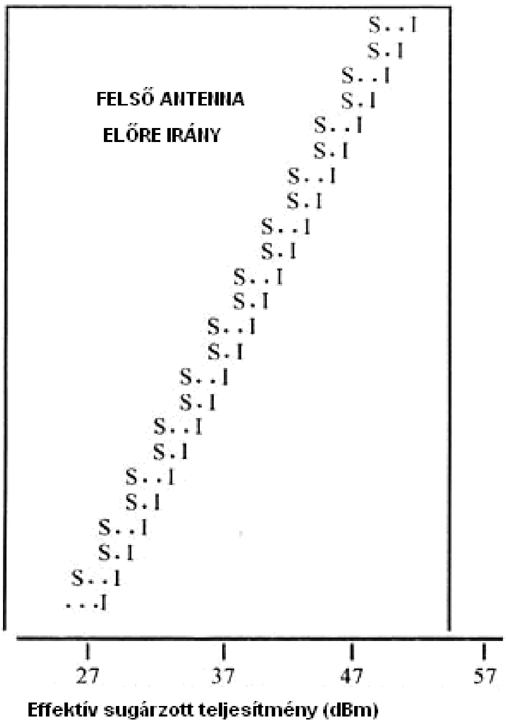
A-2 táblázat. RA erősség választék

Korlátozás	Típus	$\dot{Z}_g$
Felfelé irányuló értelmű RA		
Megnövelt emelkedés	Pozitív	$>\dot{Z}_{clm}$
Emelkedés	Pozitív	$\dot{Z}_{clm}$
Ne süllyedj	VSL	0
Ne süllyedj gyorsabban, mint 2,5 m/s	VSL	-2,5 m/s (-5000 láb/perc)
Ne süllyedj gyorsabban, mint 5,1 m/s	VSL	-5,1 m/s (-1000 láb/perc)
Ne süllyedj gyorsabban, mint 10 m/s	VSL	-10 m/s (-2000 láb/perc)
Lefelé irányuló értelmű RA		
Megnövelt emelkedés	Pozitív	$< \dot{Z}_{des}$
Süllyedés	Pozitív	$\dot{Z}_{des}$
Ne emelkedj	VSL	0
Ne emelkedj gyorsabban mint 2,5 m/s	VSL	+2,5 m/s (+500 láb/perc)
Ne emelkedj gyorsabban, mint 5,1 m/s	VSL	+5,1 m/s (+1000 láb/perc)
Ne emelkedj gyorsabban mint 10 m/s	VSL	+10 m/s (+200 láb/perc)

ÁBRÁK



A-1. ábra ACAS feladatok ábrázolása



LÉPÉSSZÁM	MINIMÁLIS EFFEKTÍV SUGÁRZOTT TELJESÍTMÉNY (dBm)	INTERFERENCIA KORLÁTOZÁSI PRIORITÁS	MTL (-dBm)
1	52	1	74
2	51	5	74
3	50	9	74
4	49	13	74
5	48	17	74
6	47	21	74
7	46	25	74
8	45	29	73
9	44	33	72
10	43	37	71
11	42	41	70
12	41	45	69
13	40	49	68
14	39	53	67
15	38	57	66
16	37	61	65
17	36	64	64
18	35	67	63
19	34	70	62
20	33	73	61
21	32	76	60
22	31	77	59
23	30	78	58
24	29	79	57

MEGJEGYZÉSEK.
"I" jelöli a P1, P3 és P4 lekérdezési impulzusok effektív sugárzott teljesítményét.
"S" jelöli az SI elnyomó impulzus effektív sugárzott teljesítményét.
"S.I" azt jelenti, hogy az SI effektív sugárzott teljesítmény 2dB-el kisebb, mint a lekérdezés SI effektív sugárzott teljesítmény.
"S..I" azt jelenti, hogy az SI effektív sugárzott teljesítmény 3dB-el kisebb, mint a lekérdezés SI effektív sugárzott teljesítmény.
A 24., 63., 64., 79. és 83. lépésekben SI impulzusokat nem továbbítanak.

A-2a ábra. Példa nagysűrűségű suttogás-kiabálás sorozatra

LÉPÉSSZÁM		MINIMÁLIS EFFEKTÍV SUGÁRZOTT TELJESÍTMÉNY (dBm)	INTERFERENCIA KORLÁTOZÁSI PRIORITÁS	MTL (-dBm)
	FELSŐ ANTENNA BAL ÉS JOBB IRÁNYOK			
25, 26	S..I	48	2, 3	74
27, 28	S.I	47	6, 7	74
29, 30	S..I	46	10, 11	74
31, 32	S.I	45	14, 15	73
33, 34	S..I	44	18, 19	72
35, 36	S.I	43	22, 23	71
37, 38	S..I	42	26, 27	70
39, 40	S.I	41	30, 31	69
41, 42	S..I	40	34, 35	68
43, 44	S.I	39	38, 39	67
45, 46	S..I	38	42, 43	66
47, 48	S.I	37	46, 47	65
49, 50	S..I	36	50, 51	64
51, 52	S.I	35	54, 55	63
53, 54	S..I	34	58, 59	62
55, 56	S.I	33	62, 63	61
57, 58	S..I	32	65, 66	60
59, 60	S.I	31	68, 69	59
61, 62	S..I	30	71, 72	58
63, 64	I	29	74, 75	57
	FELSŐ ANTENNA HÁTRA IRÁNY			
65	S.I	43	4	71
66	S..I	42	8	70
67	S.I	41	12	69
68	S..I	40	16	68
69	S.I	39	20	67
70	S..I	38	24	66
71	S.I	37	28	65
72	S..I	36	32	64
73	S.I	35	36	63
74	S..I	34	40	62
75	S.I	33	44	61
76	S..I	32	48	60
77	S.I	31	52	59
78	S..I	30	56	58
79	I	29	60	57
	ALSÓ KÖRSUGÁRZÓ ANTENNA			
80	S..I	34	80	62
81	S..I	32	81	60
82	S..I	30	82	58
83	..I	28	83	56

27 37 47 57

EFFEKTÍV SUGÁRZOTT TELJESÍTMÉNY (dBm)

MEGJEGYZÉSEK

”I” jelöli a P_1, P_3 és P_4 lekérdezési impulzusok effektív sugárzott teljesítményét.

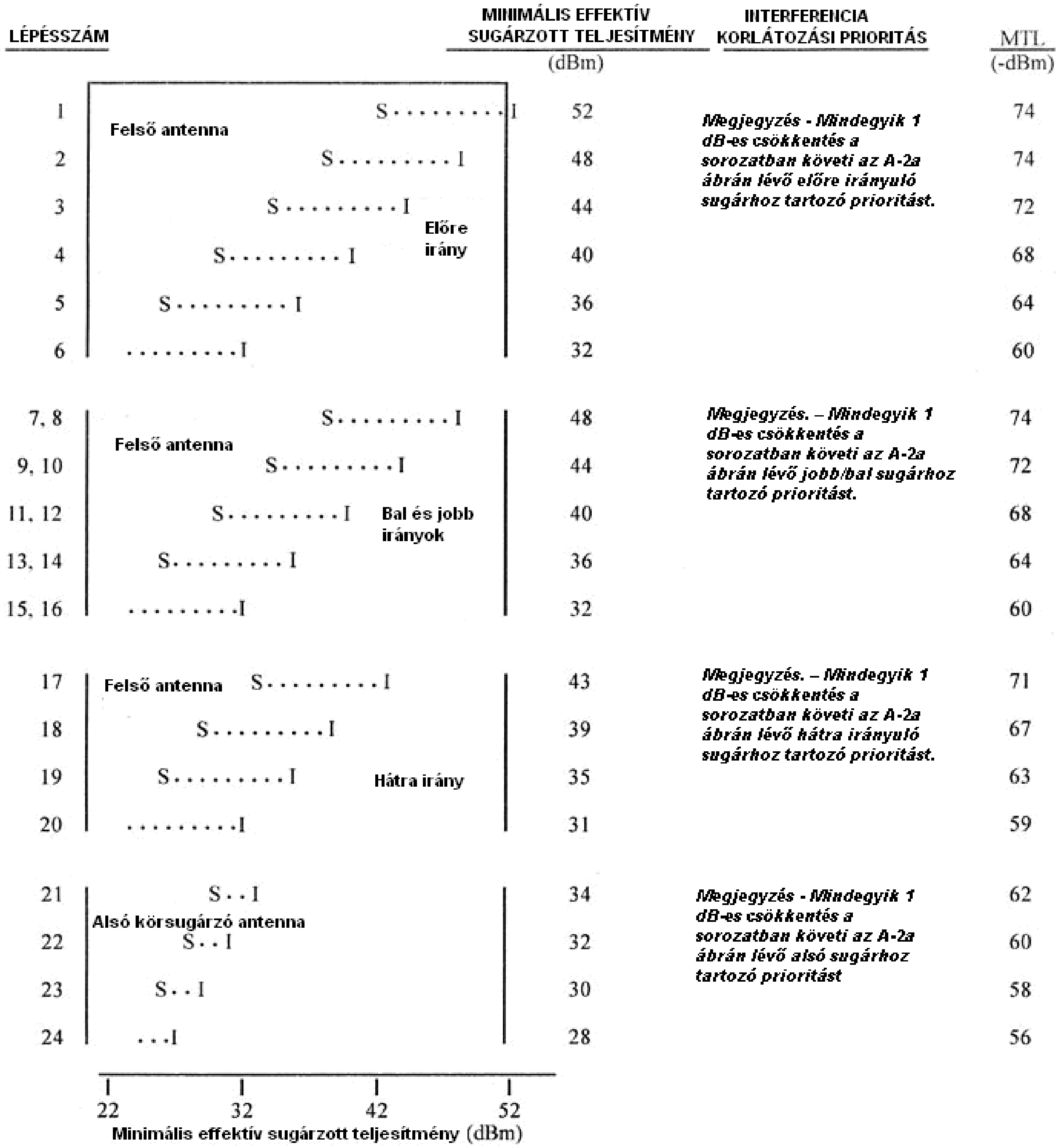
”S” jelöli az S_1 elnyomó impulzus effektív sugárzott teljesítményét.

”S.I” azt jelenti, hogy az S_1 effektív sugárzott teljesítmény 2 dB-el kisebb, mint a lekérdezés S_1 effektív sugárzott teljesítmény.

”S..I” azt jelenti, hogy az S_1 effektív sugárzott teljesítmény 3 dB-el kisebb, mint a lekérdezés S_1 effektív sugárzott teljesítmény.

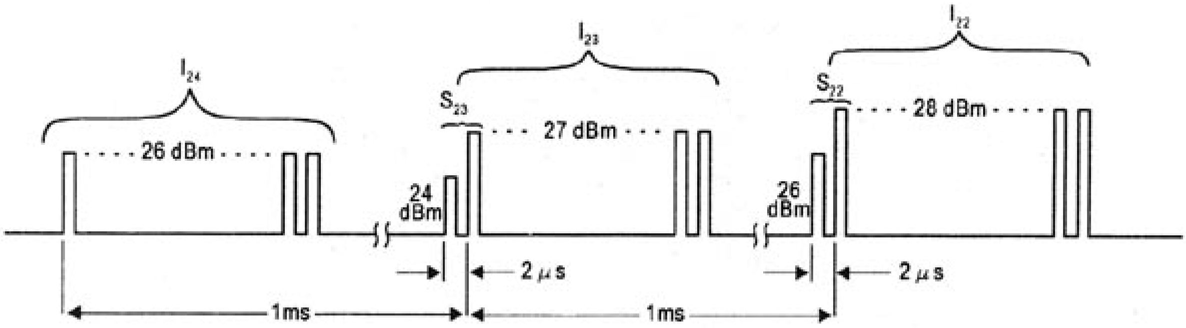
A 24, 63, 64, 79, és 83. lépésekben S1 impulzusokat nem továbbítanak.

A-2a ábra. Példa nagysűrűségű suttogás-kiabálás sorozatra (folyt.)

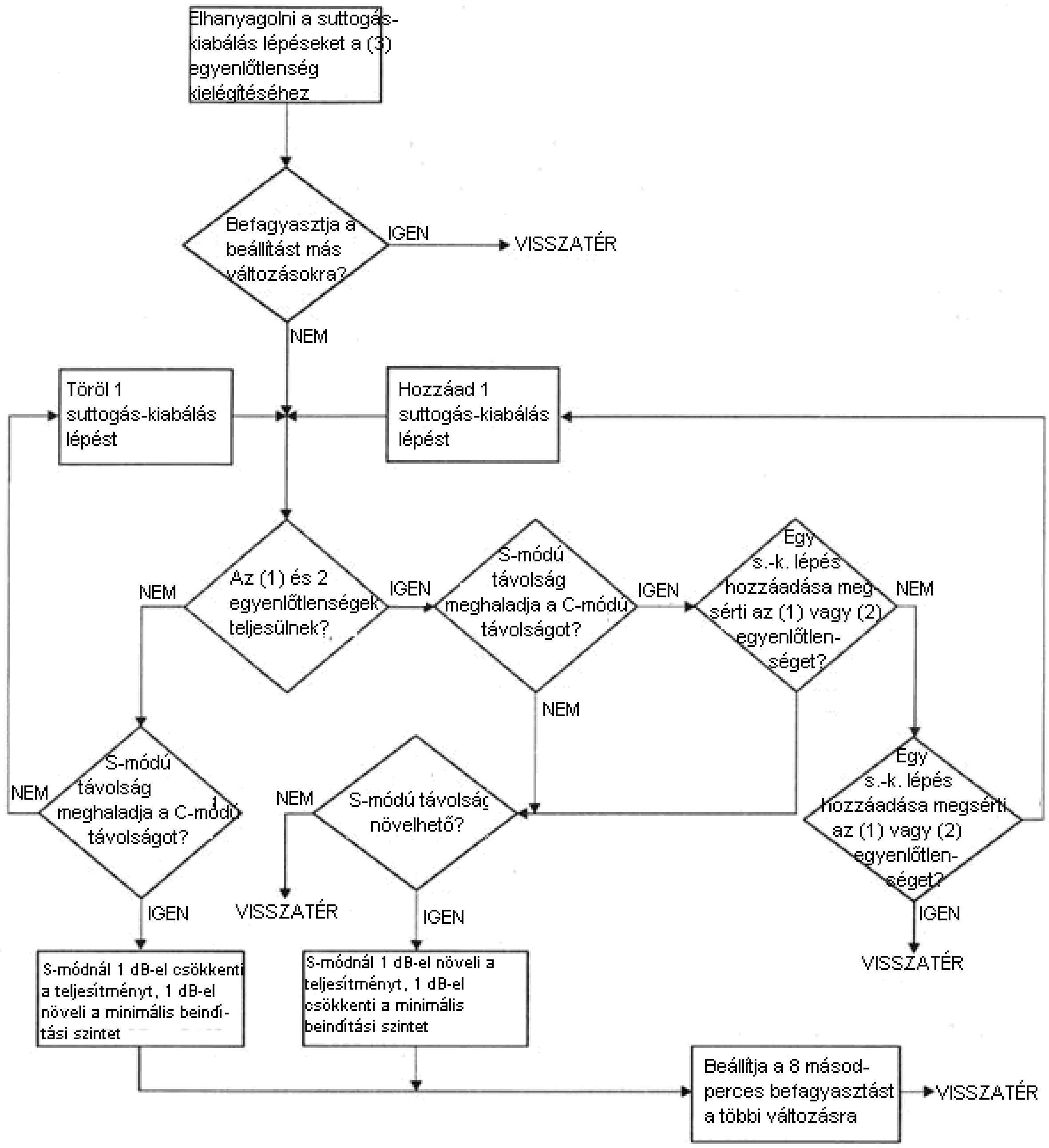


MEGJEGYZÉSEK
"I" jelöli a P_1, P_3 és P_4 lekérdezési impulzusok effektív sugárzott teljesítményét.
"S" jelöli az S_1 elnyomó impulzus effektív sugárzott teljesítményét.
"S..I" azt jelenti, hogy az S_1 effektív sugárzott teljesítmény 3 dB-el kisebb, mint a lekérdezés S_1 effektív sugárzott teljesítmény.
"S………I" azt jelenti, hogy az S_1 effektív sugárzott teljesítmény 10 dB-el kisebb, mint a lekérdezés S_1 effektív sugárzott teljesítmény.
Minden egyes körnegyed utolsó lépésében S1 impulzusokat nem továbbítanak

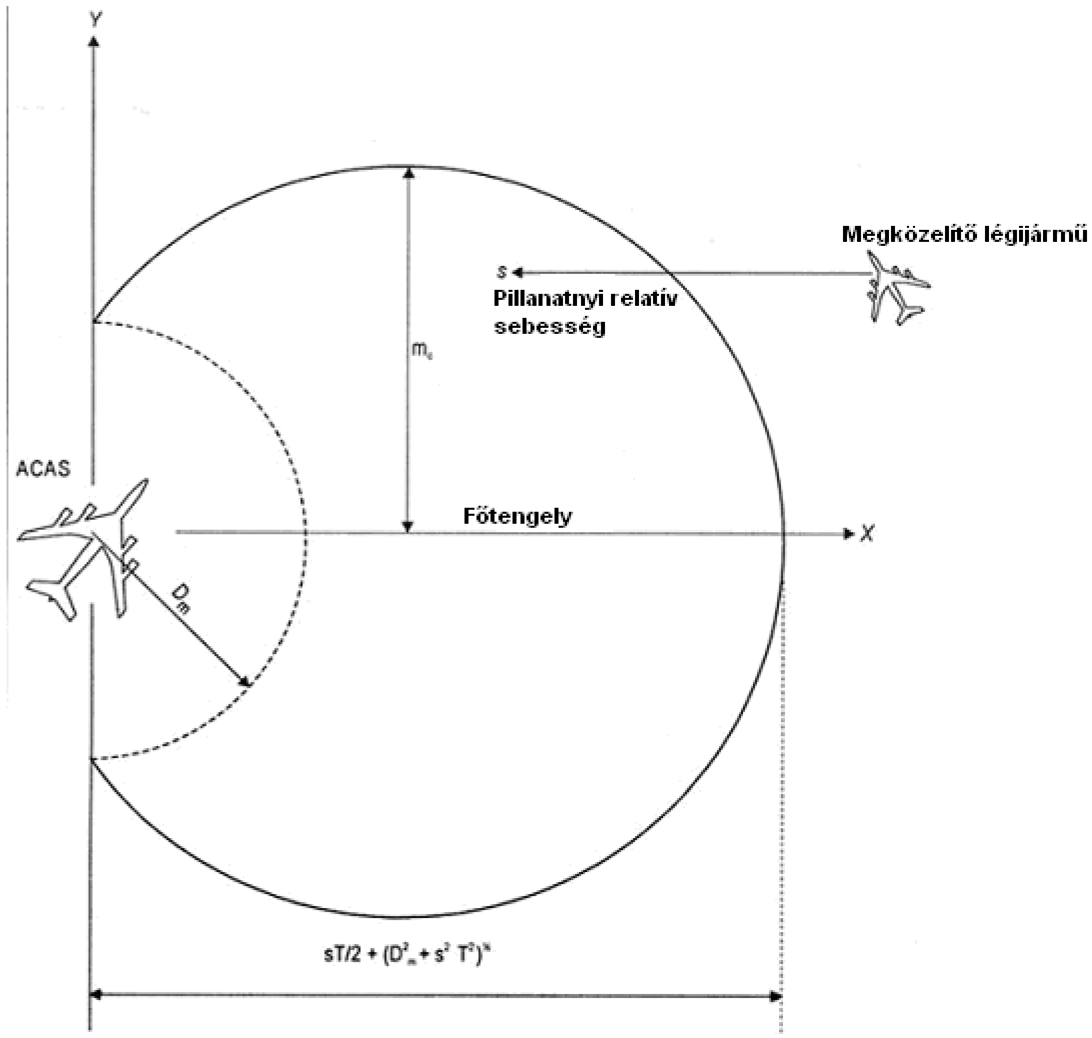
A-2b ábra. Példa kissűrűségű suttogás-kiabálás sorozatra



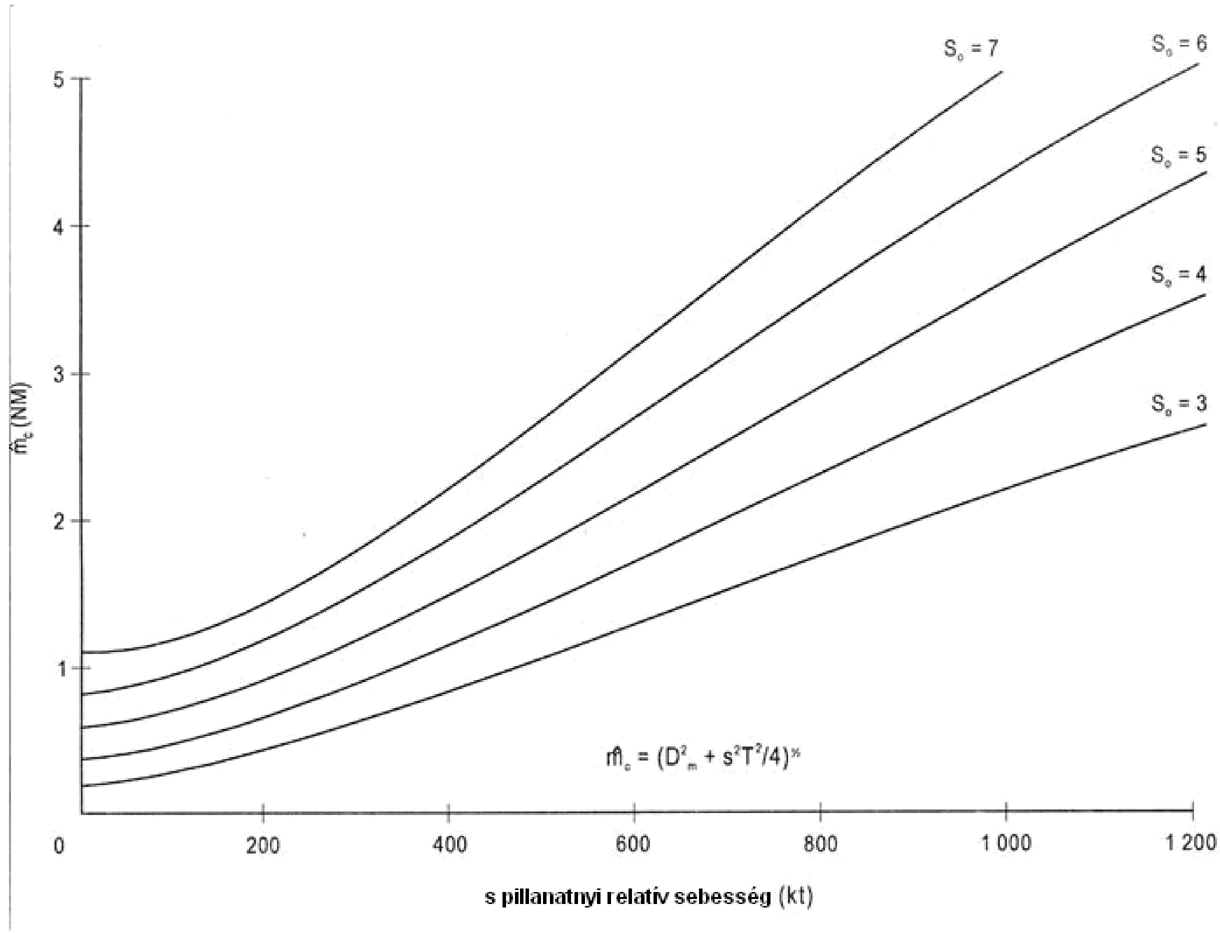
A-3 ábra. A legalacsonyabb teljesítmény lépcsők időábrája körsugárzó suttogás-kiabálás sorozatban



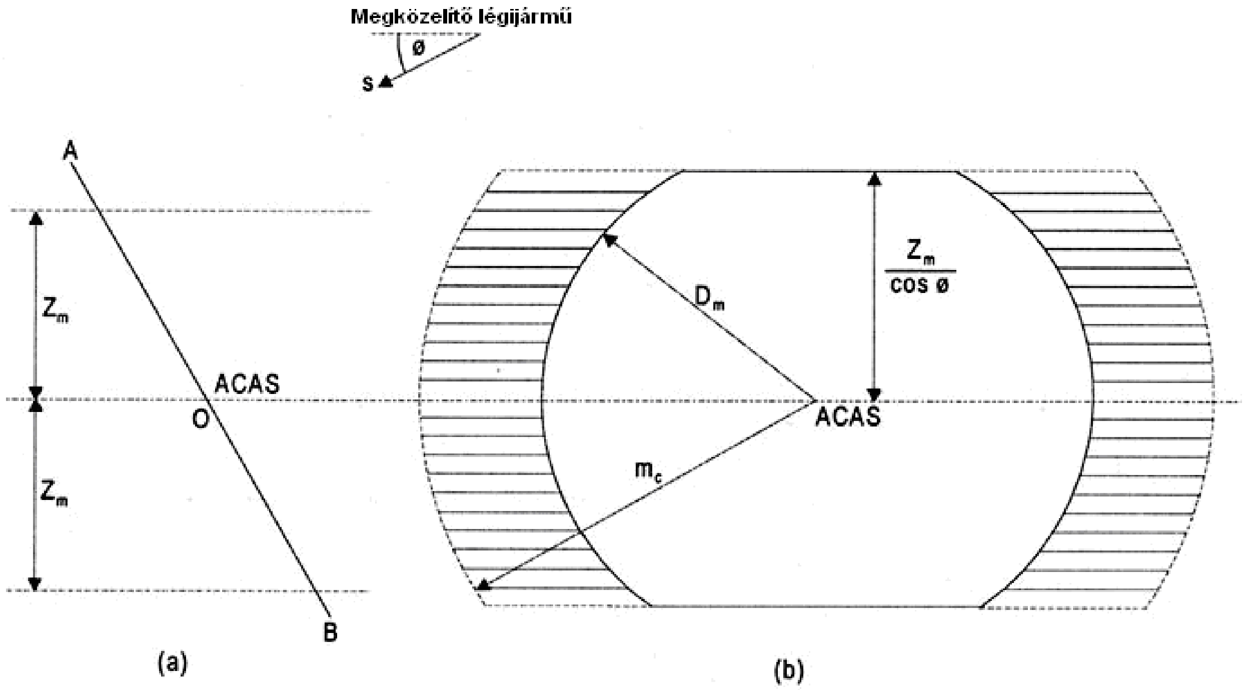
A-4 ábra. Interferencia határolás folyamat ábra



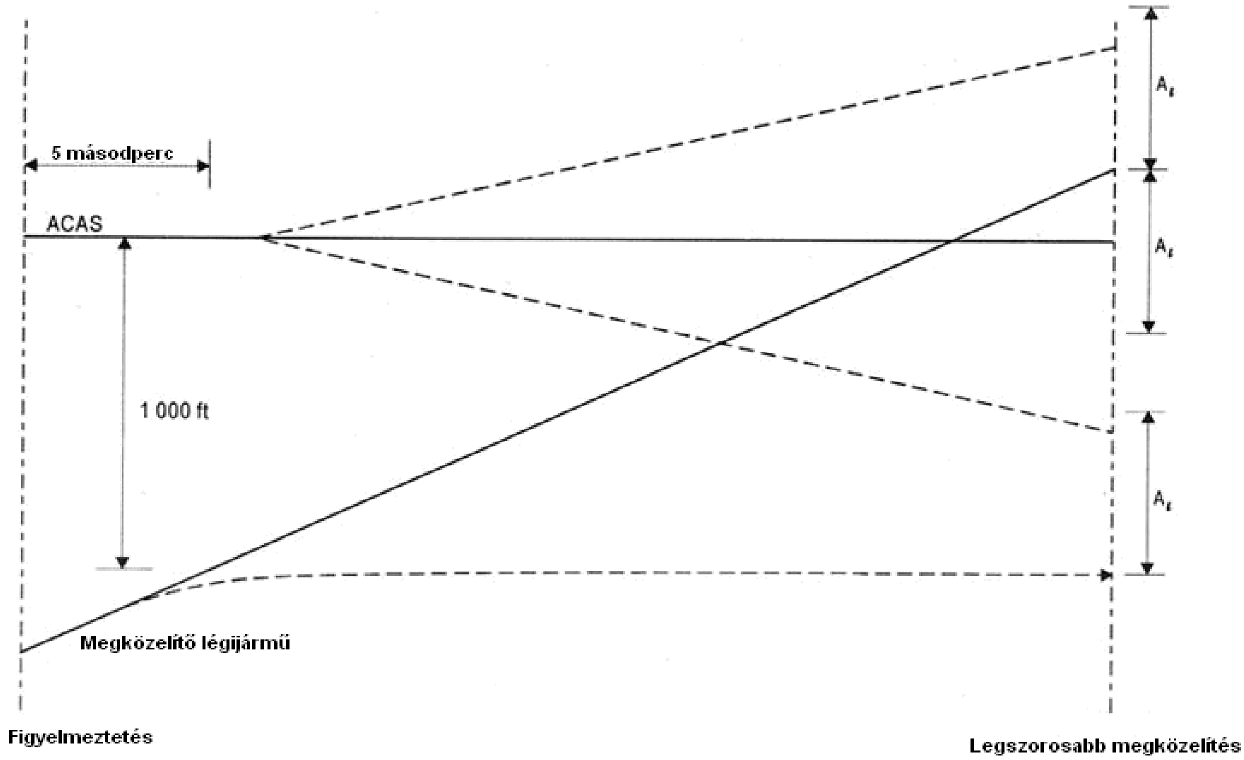
A-5 ábra. A védett térfogaton keresztüli metszet a pillanatnyi összeütközési síkban



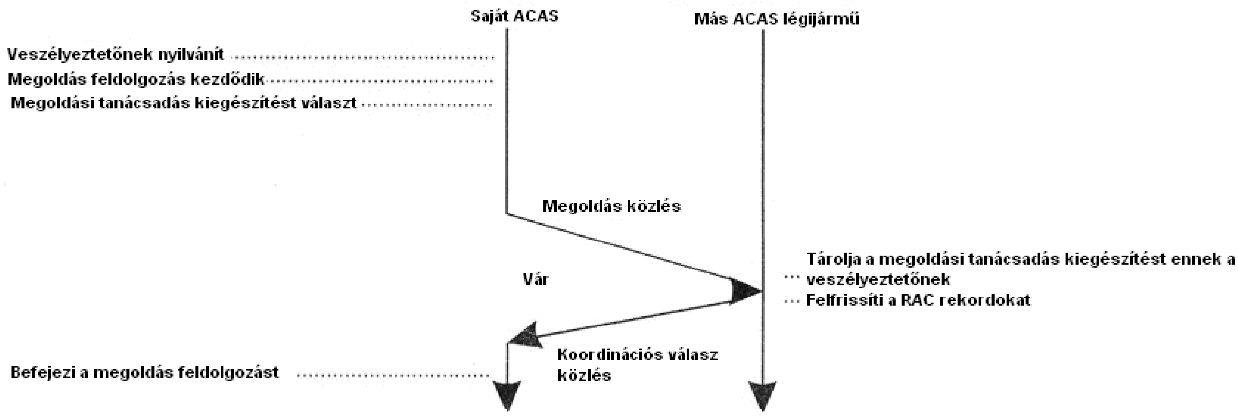
A-6 ábra. Kritikus elkerülési távolság



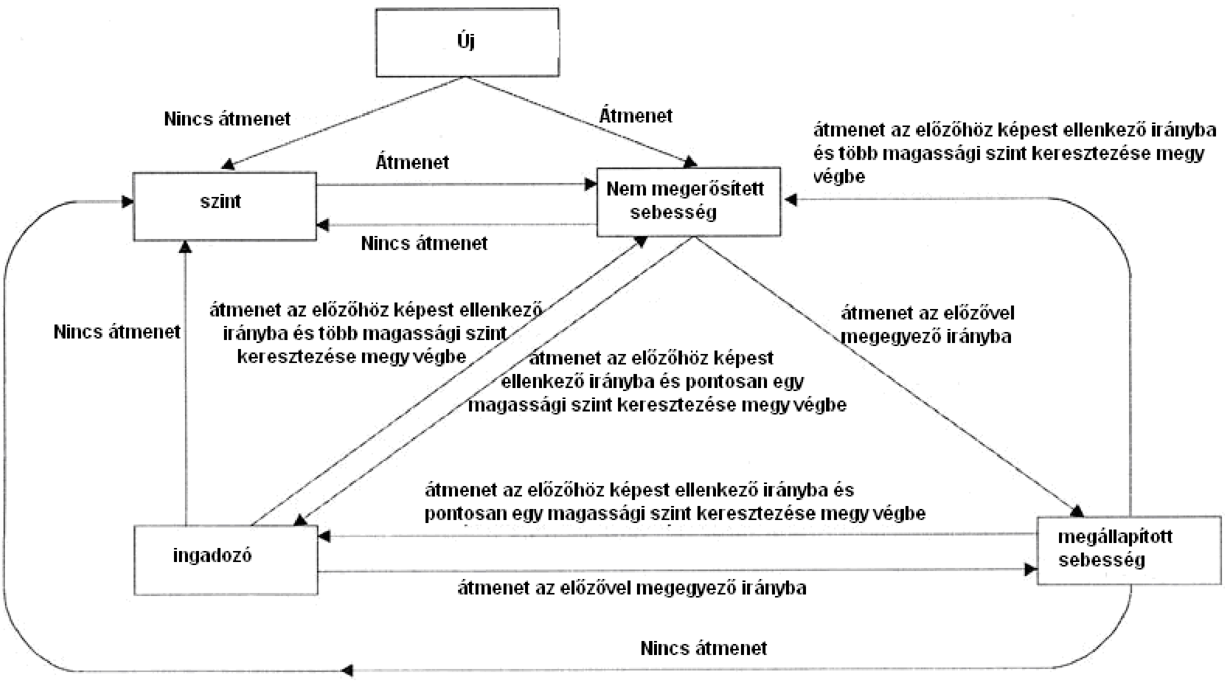
A-7 ábra. Kritikus terület ideális magasság vizsgálatnál



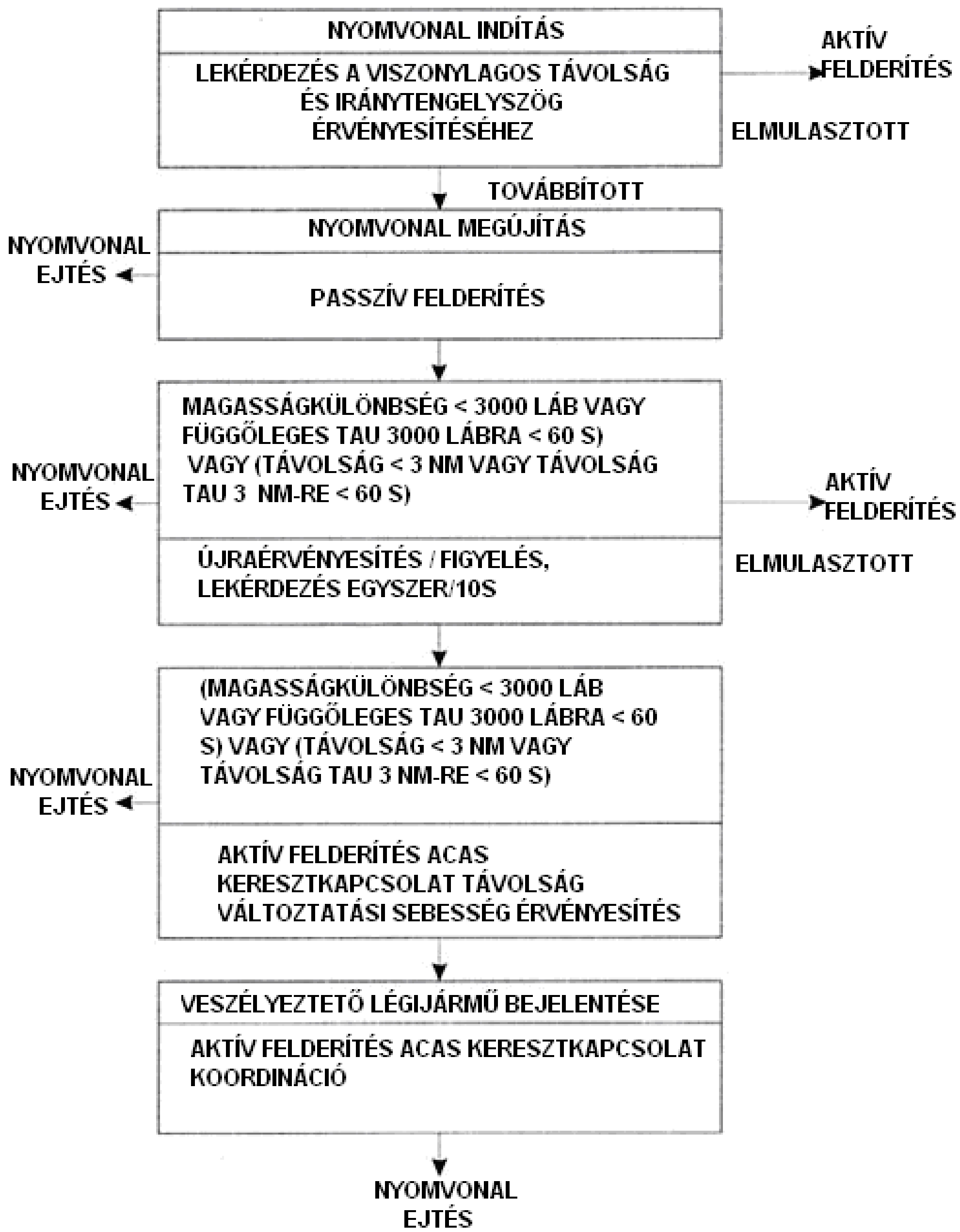
A-8 ábra. Indukált szoros találkozás



A-9 ábra. Koordinációs sorozat



A-10. ábra Átmenetek a repülési nyomvonal osztályozások között



A-11 ábra. ACAS hibrid felderítés algoritmusa

ANNEX 10/V.
Légiforgalmi távközlés: Légiforgalmi rádió frekvencia spektrum használata

V. kötet 2. kiadás – 2001. július
82. módosítással

(vii)

A. táblázat — A 10. Annex V. kötetének módosításai

módosítás	*forrás(ok)*	*tárgy*	*elfogadva/ hatályos/ alkalmazható*
71	Léginavigációs Bizottság tanulmányai; SP COM/OPS/95 Területi ülése; Légiforgalmi Mozgó Távközlési Munka-csoport harmadik ülése (AMCP)	Új V. kötet kiadása, amely tartalmazza a meglevő Annex anyagait továbbá előírásokat tartalmaz a frekvencia csatornák közötti 8.33 kHz-es csatorna hullámsáv felosztás távolság különbségről (elkülönítés) és az URH hullámsávban működő levegő-föld távközlési összeköttetések védelméről.	1996. március12. 1996. július 15. 1996. november 7.
72	Léginavigációs Bizottság; A Légiforgalmi Mozgó Távközlési Munka-csoport (AMCP) negyedik ülése	URH digitális adat-összeköttetés meghatározás; a 4-1. (b) táblázat módosítása.	1997. március 12. 1997. július 21. 1997. november 6.
73	—	Nincs változás	—
74	Léginavigációs Bizottság	a) repülőgépvezetők közötti levegő-levegő távközlési csatorna bevezetése; b) a vészhelyzeti helyjeladó berendezésre vonatkozó előírások változása.	1999. március 18. 1999. július 19. 1999. november 4.
75	Léginavigációs Bizottság; A légiforgalmi mozgó távközlési szolgálatok munkabizottságának (AMCP) hatodik ülése	A VDL interferencia védettség mértékére vonatkozó tájékoztató anyag tisztázása	2000. március 13. 2000. július 17. 2000. november 2.
76 (Második kiadás)	A légiforgalmi mozgó távközlési szolgálatok munkabizottságának (AMCP) hetedik ülése	Az integrált hang és adatátviteli rendszer (VDL Mode 3); a légtér-felderítési alkalmazásoknak megfelelő adatátvitel (VDL Mode 4); az ITU rádió szabályzatot érintő részek felülvizsgálata.	2001. március 12. 2001. július 16. 2001. november 1.

77	Titkárság	A 108 — 117.975 MHz frekvencia tartomány GBAS adattovábbításra történő felhasználására vonatkozó GNSS nemzetközi előírások és ajánlott gyakorlati eljárások módosítása miatt szükséges változtatások.	2002. február 27. 2002. július 15. 2002. november 28.
78	--	Nincs változás.	
79	--	Nincs változás.	
80	--	Nincs változás.	
81	--	Nincs változás.	
82	--	Nincs változás.	

ANNEX 11.
Légiforgalmi Szolgálatok

13. kiadás – 2001. július
45. módosítással
Légiforgalmi Irányító Szolgálat
Repüléstájékoztató Szolgálat
Riasztó Szolgálat
A jelen kiadvány magába foglalja a 11. Annex 2001. március 13. előtt elfogadott összes módosítását és 2001. november 1.-től hatálytalanítja a 11. Annex összes korábbi kiadásait.
A nemzetközi előírások és ajánlott gyakorlati eljárások alkalmazhatóságával kapcsolatosan lásd az Előszót.

Módosítások

A módosítások kiadásáról az ICAO Journal valamint az egyéb ICAO kiadványok és audiovizuális képzési segédanyagok havi katalógusa rendszeres tájékoztatást biztosítanak. A fenti kiadványok figyelemmel kísérendők, a módosítások az alábbi rovatokba bevezetendők:

Módosítás			
száma	kiadás időpontja	alkalmazhatóság időpontja	bevezette
Tizenharmadik kiadás (1 - 40. módosítás)	2001. július 16.	2001. november 1.	
41. módosítás (a Tanács 2002. február 21.-én fogadta el)	2002. július 15.	2002. november 28.	
42. módosítás (a Tanács 2003. március 7.-én fogadta el)	2003. július 14.	2003. november 27.	
43. módosítás (a Tanács 2005. március 2.-án fogadta el)	2005. július 11.	2005. november 24.	
44. módosítás (a Tanács 2006. március 14.-én fogadta el)	2006. július 17.	2006. november 23.	
45. módosítás (a Tanács 2007. február 26.-án fogadta el) a (III), (XIII), 1-1 – 1-7, 2-2 – 2-12, 3-4, 3-6, 6-1 – 6-4, 7-1 – 7-3, APP 1-1, APP 2-1 – APP 2-3, APP 3-1, ATT A-1, ATT A-4, ATT A-5, ATT B-1, ATT B-3 és ATT B-4 oldalak cseréje	2007. július 16.	2007. november 22.	

Kiegészítés			
száma	kiadás időpontja	alkalmazhatóság időpontja	bevezette

Előszó

Történeti háttér

A Repülési és Légiforgalmi Irányítási Szabályok (RAC) munkacsoport első ülésszakán, 1945 októberében, ajánlásokat tett a légiforgalmi irányító szolgálatok előírásaira és ajánlott gyakorlati eljárásaira. Ezeket az akkor működő Léginavigációs Bizottság áttanulmányozta, majd 1946. február 25.-én a Tanács jóváhagyta a nemzetközi előírásokat és ajánlott gyakorlati eljárásokat. Ezeket az 1946 februárjában kiadott Doc 2010. kiadvány második részében „Előírások és ajánlott gyakorlati Eljárások — *Légiforgalmi Irányítás*" címen tették közzé.

A Repülési és Légiforgalmi Irányítási Szabályok (RAC) munkacsoport második ülésszakán – 1946 decemberétől 1947 januárjáig -- felülvizsgálta a Doc. 2010-et és javaslatokat tett a légiforgalmi irányítás nemzetközi előírásaira és ajánlott gyakorlati eljárásaira. Nem tűnt azonban lehetségesnek, hogy ezek a szabályok véglegesíthetők legyenek, mielőtt a munkacsoport kidolgozza az alapelveket a vonatkozó szolgálatok megszervezésére.

1948. április-májusban a harmadik ülésszakon azután kidolgozták az alapelveket, majd az Annex tervezetét benyújtották az Államok részére. A 11. Annex — Nemzetközi előírások és ajánlott gyakorlati eljárások — *Légiforgalmi Szolgálatok* — szövegét a Tanács először a Nemzetközi Polgári Légiközlekedési Egyezmény (Chicago, 1944.) 37. cikkelyének rendelkezései alapján 1950. május 18.-án fogadta el. Az előírások 1950. október 1.-én léptek hatályba. A nemzetközi előírások és ajánlott gyakorlati eljárások így megkülönböztetett új címét, azaz a *Légiforgalmi Szolgálatok* kifejezést a *Légiforgalmi Irányítás* kifejezéssel szemben azért részesítették előnyben, hogy világosan jelezzék: a 11. Annexben ismertetett szolgálatoknak csak egy része a légiforgalmi irányító szolgálat, a kiadvány vonatkozik a repüléstájékoztató, valamint a riasztó szolgálatokra is.

Az A. táblázat a vonatkozó fontosabb témakörök felsorolásával és az időpontok megjelölésével mutatja a módosításokat, amely időpontokban azokat a Tanács elfogadta, azok érvénybe léptek valamint alkalmazhatóvá váltak.

Alkalmazhatóság

A 11. Annexben található nemzetközi előírások és ajánlott gyakorlati eljárások a 2. Annex rendelkezéseivel együttesen szabályozzák a „Légiközlekedési Szolgálatok Eljárásai — *Repülési szabályok és Légiforgalmi szolgálatok*" valamint a „Körzeti Kiegészítő Eljárások — *Repülési szabályok és Légiforgalmi szolgálatok*" alkalmazását, amely utóbbi kiadványban a körzeti alkalmazáshoz szükséges kiegészítő eljárásokat teszik közzé.

A 11. Annex azoknak a légtereknek, egységeknek és szolgálatoknak a kijelölésével foglalkozik, amelyek a légiforgalom gyors, rendezett és biztonságos áramlásának elősegítéséhez szükségesek. Világos különbséget tesz a légiforgalmi irányító szolgálat, a repüléstájékoztató szolgálat valamint a riasztó szolgálat között azzal a céllal, hogy a nemzetközi légi útvonalakon a 2. Annex-el együttesen biztosítsa a repülések olyan, egységes körülmények között történő végrehajtását, amelyek a légiüzemeltetés biztonságának és hatékonyságának fenntartása és növelése érdekében szükségesek.

A 11. Annex nemzetközi előírásai és ajánlott gyakorlati eljárásai érvényesek a szerződő Állam fennhatósága alá tartozó azon légtérszakaszokra, amelyekben légiforgalmi szolgálatokat létesítettek, továbbá olyan nemzetközi nyílt vizek felett illetve nem meghatározott állami hovatartozású légterekben, amelyeknél a szerződő Állam elfogadja és vállalja a légiforgalmi szolgálatok biztosításának felelősségét. Az a szerződő Állam, amely elfogadja és vállalja ezt a felelősséget, a nemzetközi előírásokat és ajánlott gyakorlati eljárásokat ezen légterekben a fennhatósága alá tartozó saját légterekhez hasonló formában alkalmazhatja.

A szerződő Államok tevékenysége

Az eltérések jelentése

Felhívjuk a szerződő Államok figyelmét az Egyezmény 38. cikkelyéből adódó azon kötelezettségükre, hogy a szerződő Állam értesítse a Szervezetet bármely eltérésről, amely saját országos előírásai és gyakorlata illetve a jelen Annex nemzetközi előírásai és ennek bármely módosítása között fennáll. Felkérjük továbbá a szerződő Államokat, hogy az ilyen értesítést terjesszék ki valamennyi olyan eltérésekre is, amely a jelen Annex-ben található ajánlott gyakorlati eljárásokat és ezek bármely módosítását érintik, amennyiben ezen eltérések a légiközlekedés biztonsága szempontjából lényegesek. Ezen felül kérjük, hogy a szerződő Államok folyamatosan tájékoztassák a Szervezetet bármilyen jövőbeni eltérésről valamint a korábbiakban jelzett eltérés megszűnéséről. A jelen Annex minden egyes módosításának elfogadása után külön az eltérésekről szóló értesítést kérő levelet küldünk majd minden szerződő Államnak.
Felhívjuk a szerződő Államok figyelmét a 15. Annex rendelkezéseire, amelynek alapján saját országos szabályaik és gyakorlatuk, valamint a vonatkozó ICAO előírások és ajánlott gyakorlati eljárások közötti eltérésekről szóló tájékoztatásaikat az Egyezmény 38. cikkelyében előírt kötelezettségük mellett a Légiforgalmi Tájékoztató Szolgálat útján is tegyék közzé.

A tájékoztatások továbbítása és közzététele

A jelen Annex-ben ismertetett nemzetközi előírások és ajánlott gyakorlati eljárások alapján biztosított, a légijárművek üzemeltetését érintő létesítmények, szolgálatok és eljárások létrehozását illetve megszüntetését a 15. Annex előírásainak megfelelően jelentsék be.
Az Annex szövegének alkalmazása a nemzeti előírásokban
A Tanács 1948. április 13.-án elfogadta azt a határozatot, amelyben felhívják a szerződő Államok figyelmét saját országos, nemzeti előírásaikban a szabályozó jellegű ICAO előírások pontos nyelvezetének lehetőség szerint **azonos** alkalmazásának kívánatosságára, továbbá hogy az Államok jelezzék a nemzetközi előírásoktól és ajánlott gyakorlati eljárásoktól való eltéréseket, ismertetve azokat a nemzeti előírásokat, amelyek a légiközlekedés biztonsága és rendezettsége szempontjából fontosak. Ahol ez lehetséges, a jelen Annex előírásait úgy fogalmaztuk meg és tettük közzé, hogy ezzel megkönnyítsük az országos jogszabályokba lényeges szövegi módosítás nélkül történő átvételüket.

Az Annex részeinek jogállása

Az Annex a következő részekből áll, de nem feltétlenül szükséges, hogy minden rész megtalálható legyen minden egyes Annexben.
Az egyes részek jogállása a következő:
1.— Az Annex anyaga:
a) *Nemzetközi előírások és ajánlott gyakorlati eljárások*, amelyeket az Egyezmény rendelkezései szerint a Tanács fogad el. Ezek meghatározása a következő:
Előírás vagy Szabvány: Bármilyen fizikai jellemzőre, kialakításra, anyagra, teljesítményre, személyzetre vagy eljárásra vonatkozó követelmény, amelynek egységes alkalmazását a nemzetközi légiközlekedés biztonsága és menetrendszerű fenntartása érdekében szükségesnek tartják és amellyel kapcsolatban az Egyezmény alapján a Szerződő Államok megállapodnak. Amennyiben a teljes megállapodás nem lehetséges, az eltérést az Egyezmény 38. cikkelyében foglaltak alapján az érintett Államoknak a Tanács felé jelenteniük kell.
Ajánlott gyakorlati eljárás: Bármilyen fizikai jellemzőre, kialakításra, anyagra, teljesítményre, személyzetre vagy eljárásra vonatkozó követelmény, amely egységes alkalmazását a nemzetközi légiközlekedés biztonsága, menetrendszerű és hatékony lebonyolítása érdekében kívánatosnak minősítenek, és amelyek alkalmazására a Szerződő Államok az Egyezmény értelmében törekszenek.
b) *Függelék:* A célszerűség érdekében külön csoportosított anyagok, amelyek azonban a Tanács által

elfogadott nemzetközi előírások és ajánlott gyakorlati eljárások szerves részét képezik.
c) *Meghatározások:* A nemzetközi előírások és az ajánlott gyakorlati eljárások ismertetésénél alkalmazott azon fogalmak pontos magyarázata, amelyek elfogadott szótári jelentés hiányában nem maguktól értetődőek. A meghatározás külön jogállással nem rendelkezik, azonban szerves részét képezi azon nemzetközi előírásnak vagy ajánlott gyakorlati eljárásnak, amelyben előfordul, mert a meghatározás értelmének megváltoztatása az előírást befolyásolja.
d) *Táblázatok és ábrák:* Ezek egy nemzetközi előírást vagy ajánlott gyakorlati eljárást egészítenek ki vagy szemléltetnek, és amelyekre egy adott nemzetközi előírásban vagy ajánlott gyakorlati eljárásban utalnak. A táblázatok és az ábrák az adott nemzetközi előírás vagy ajánlott gyakorlati eljárás részét képezik és jogállásuk ezekkel megegyező.
Megjegyzendő, hogy a jelen Annex egyes előírásai olyan követelményeket is tartalmaznak, melyek jogállása ajánlott gyakorlati eljárás. Az ilyen esetekben a Szerződő Államok az Egyezmény értelmében törekszenek ezek alkalmazására.
2.— A nemzetközi előírásokkal és az ajánlott gyakorlati eljárásokkal együtt, a Tanács egyetértésével kiadott egyéb anyagok:
a) Előszó: Történeti áttekintés és magyarázat a Tanács tevékenysége alapján. Tartalmazza továbbá az Államok kötelezettségeit, illetve az ezekre vonatkozó magyarázatokat a nemzetközi eljárások és gyakorlati eljárások alkalmazására, az Egyezmény és a Bevezetési Határozat előírásainak megfelelően.
b) Bevezető: Az Annex egyes köteteinek, részeinek vagy fejezeteinek elején található magyarázó szöveg, amely segítséget nyújt a vonatkozó szöveg megértéséhez, illetve alkalmazásához.
c) Megjegyzések: Szükség szerint a szövegbe iktatott anyag, amely tényszerű tájékoztatást vagy utalást tartalmaz a szóban forgó nemzetközi előírásra vagy ajánlott gyakorlati eljárásra vonatkozóan, azonban nem képezi ezek szerves részét.
d) Mellékletek: A nemzetközi előírást és ajánlott gyakorlati eljárást kiegészítő anyagot tartalmaznak, vagy azok alkalmazásához szükséges tájékoztatással szolgálnak.

Az alkalmazandó nyelv kiválasztása

A jelen Annex-et hat nyelven — angolul, arabul, franciául, kínaiul, oroszul és spanyolul — fogadták el. Minden egyes szerződő Államot felkérünk, hogy ezek közül válasszon ki egy nyelvet az országos bevezetés céljára vagy bármely egyéb, az egyezményben előirt ténykedés végrehajtására akár az adott nyelv közvetlen felhasználásával, akár saját nemzeti nyelvére történő lefordításával. Erről kérjük, értesítsék a Szervezetet.
Szerkesztői gyakorlat
Annak érdekében, hogy minden egyes szerkezeti anyag jogállását az első pillantásra jelezhessük, az alábbi szerkesztői gyakorlatot követjük: A nemzetközi előírásokat vékony álló, az *ajánlott gyakorlati eljárásokat* vékony *dőlt* betűkkel nyomtatjuk. Ez utóbbiak jogállását ***„Ajánlás”*** felirattal is jelezzük. A vékony dőlt betűvel szedett megjegyzéseket a „*Megjegyzés:* „ felirat egészíti ki.
Az írásmód / stílus szempontjából az angol szövegben az előírásokat „shall – kell” kifejezéssel és az ajánlott gyakorlati eljárásokat „should – szükséges” kifejezéssel jelezzük. Mindazonáltal a magyar fordítás alkalmával ezt a gyakorlatot nem minden esetben alkalmazzuk, mert a jelzett jogállás és a nyelvi sajátosságok ezt szükségtelenné teszik. Ha ez szükséges, a fordításban nyomatékos (kell) felszólító módot alkalmazunk.
A jelen kiadványban alkalmazott mértékegységek a nemzetközi polgári légiközlekedésről szóló Egyezmény 5. Annex előírásainak megfelelően a nemzetközi mértékegység rendszerrel /SI/ összhangban állnak. Ahol az 5. Annex lehetővé teszi a nem SI, alternatív mértékegységek alkalmazását, ott az alapegységet követően ezen mértékegységek zárójelben szerepelnek. Ahol az anyagban két mértékegység-fajtát alkalmazunk, ott nem szabad azt feltételezni, hogy a mértékegységek értékei egyenlőek és azok egymással korlátlanul felcserélhetők. Mindazonáltal lehetséges, hogy azonos biztonsági szint érhető el bármelyik mértékegység kizárólagos alkalmazásával. A jelen kiadvány bármelyik részére történő hivatkozás -- akár számmal, akár címmel vagy mindkettővel - vonatkozik az adott rész minden egyes

alpontjára is.

A. táblázat — A 11. Annex módosításai

(módosítás — forrás — tárgy — elfogadva/ hatályos/ alkalmazható)

Első kiadás
Repülési és Légiforgalmi Irányítási Szabályok (RAC) munkacsoport 3. ülése (1948.)
Nemzetközi előírások és ajánlott gyakorlati eljárások — Légiforgalmi Szolgálatok
1950. május 18. 1950. október 1. 1951. június 1.

1-6) — Második kiadás — Repülési és Légiforgalmi Irányítási Szabályok (RAC) munkacsoport 4. ülése (1950.)
Repülőtéri forgalom; irányítás átadása; engedély tartalma; kényszerhelyzeti állapot; összeköttetési előírások és követelmények; magaslégtéri repüléstájékoztató körzetek és magaslégtéri irányítási körzetek; függőleges elkülönítés.
1951. november 27. 1952. április 1. 1952. szeptember 1.

7) — Léginavigációs Bizottság
Az ATS egységeknek szóló tájékoztatások szétosztására vonatkozó útmutató anyag törlése.
1956. február 22.

8) — Harmadik kiadás — Második Léginavigációs Konferencia (1955.)
Meghatározások; illetékesség meghatározása; légterek megjelölése; légijárművek elkülönítése; összeköttetési előírások; meteorológiai tájékoztatásokra vonatkozó előírások; ellenőrzött légterek meghatározása és kijelölése; összeköttetési diagrammok.
1956. május 11. 1956. szeptember 15. 1956. december 1.

9) — Negyedik kiadás — Repülési és Légiforgalmi Irányítási Szabályok (RAC) valamint a Kutatás és Mentés (SAR) munkacsoportok (1958.)
Meghatározások; légiforgalmi szolgálatok feladatai; légterek és ellenőrzött repülőterek kijelölése; légtér meghatározások; légiforgalmi irányító szolgálat; összeköttetési követelmények; ellenőrzött légterek meghatározása és kijelölése; jelentőpontok elnevezése; légiforgalmi irányítás automatizálása.
1959. december 8. 1960. május 1. 1960. augusztus 1.

10) — A repülési műveletekre vonatkozó tájékoztatások egyeztetett kiadásával kapcsolatos szakbizottsági ülés (1959.)
SIGMET tájékoztatás; repüléstájékoztató szolgálat alkalmazása és annak átruházása; meteorológiai tájékoztatásokra vonatkozó előírások.
1960. december 2. 1961. április 1. 1961. július 1.

11) — Léginavigációs Bizottság
A légiforgalmi szolgálatok tájékoztató térképeire vonatkozó útmutató anyag törlése.
1961. június 26.

12) — Léginavigációs Bizottság
Az ellenőrzött légtérben létesített útvonalak megjelölésének kiválasztására vonatkozó útmutató anyag kiadása.
1961. december 15.

13) — Léginavigációs Bizottság
A mentést koordináló központok értesítése a bizonytalanság, a riasztás és a vészhelyzet állapotokban.
1962. április 13. 1962. augusztus 1. 1962. november 1.

14) — Léginavigációs Bizottság
A kényszerhelyzetben levő légijármű közelében tartózkodó egyéb légijárművek értesítésének szükségessége a kényszerhelyzet típusáról.
1964. június 19. 1964. november 1. 1965. február 1.

15) — Ötödik kiadás — Repülési szabályok és Légiforgalmi szolgálatok munkacsoport ülés (1963.)
Függőleges elkülönítés alkalmazása a FL290 feletti repülések esetében; légiforgalmi irányító szolgálat biztosítása VFR repülések számára; légtérhatárok kijelölése; repüléstájékoztató körzetek felső határa;

légiforgalmi szolgálati útvonalak és jelentőpontok megjelölése; együttműködés a járatókkal; elkülönítések típusai; összeköttetési követelmények; az ellenőrzött légtér létesítésére és meghatározására vonatkozó útmutató anyag kiadása.
1965. március 17. 1966. március 29. 1966. augusztus 25.

16) — Légiforgalmi irányítás automatizálása munkacsoport 5. ülése (1966.)
Az irányítás átadásának felelőssége; a légiforgalom áramlásának szabályzása.
1967. június 7. 1967. október 5. 1968. február 8.

17) — Ötödik Léginavigációs Konferencia (1967.)
Légiforgalmi szolgálatok bejelentő irodája és összeköttetési követelmények; engedélyek és elkülönítés; repüléstájékoztató szolgálat működési területe; a repülőtér területén működő járművek irányítására használatos összeköttetések; a légiforgalmi irányító szolgálatok követelményei a meteorológiai tájékoztatásokra vonatkozóan; tájékoztatások a repülőtér állapotáról és a navigációs segédeszközök működéséről.
1969. január 23. 1969. május 23. 1969. szeptember 18.

18) — Hatodik kiadás — Hatodik Léginavigációs Konferencia (1969.) — Léginavigációs Bizottság
Meghatározások; ellenőrzött légterek meghatározásának kifejezései; légiforgalmi szolgálati légterek függőleges határai; legalacsonyabb repülési magasságok; elkülönítési minimumok meghatározása és alkalmazása; engedélyek és elkülönítés; szabvány indulási és érkezési útvonalak kijelölése és azonosítása; repüléstájékoztató szolgálat biztosítása IFR repülések számára nyílt vizek felett; levegő-föld összeköttetés létesítése ATS célokra.
1970. május 25. 1970. szeptember 25. 1971. február 4.

19) —Léginavigációs Bizottság
Nemzetközi vizek felett üzemelő légijárművek felügyelete; SIGMET tájékoztatások.
1972. november 15. 1973. március 15. 1973. augusztus 16.

20) — Hetedik Léginavigációs Konferencia (1972)
Meghatározások; területi navigáció (RNAV); ATS útvonalak és jelentőpontok elnevezése.
1973. március 23. 1973. július 30. 1974. május 23.

21) — A Tanács határozata az A17/10 és A18/10 ajánlások bevezetésére
A jogellenes beavatkozás alatt álló légijárművel kapcsolatosan követendő eljárások a légiforgalmi szolgálati egységek számára.
1973. április 7. 1973. december 7. 1974. május 23.

22) — Hangsebesség feletti légi-szállítási munkacsoport (SSTP) 4. ülése (1973) — Léginavigációs Bizottság
Hangsebesség feletti repülések hangsebességre történő gyorsítására és lassítására vonatkozó engedélyek; együttműködés a katonai hatóságok és a légiforgalmi szolgálatok között; összeköttetésekre vonatkozó követelmények.
1975. február 4. 1975. június 4. 1975. október 9.

23) — Léginavigációs Bizottság
A 7500-as másodlagos radar-kód használata jogellenes beavatkozás esetén; a légiforgalmi szolgálati egységek és a meteorológiai hivatalok közötti összeköttetésekre vonatkozó követelmények.
1975. december 12. 1976. április 12. 1976. augusztus 12.

24) — Léginavigációs Bizottság
Meghatározások; az időmérés pontossága.
1976. április 7. 1976. augusztus 7. 1976. december 30.

25) — Hetedik kiadás — Léginavigációs Bizottság
Meghatározások; VOR átkapcsolási pontok; ATS útvonalak megjelölése; fontos pontok kijelölése és megjelölése; repüléstájékoztató szolgálat; a légiforgalmi szolgálatok tájékoztatási követelményei.
1977. december 7. 1978. április 7. 1978. augusztus 10.

26) — Léginavigációs Bizottság
Szabvány érkezési és indulási útvonalak megjelölése.

1979. december 3. 1980. április 3. 1980. november 27.
27) — Léginavigációs Bizottság
A polgári légijárművek repülésére tényleges veszélyt jelentő műveletek egyeztetése; személyzet nélküli szabad léggömbök.
1981. március 4. 1981. július 4. 1981. november 26.
28) — Léginavigációs Bizottság
A légiforgalmi szolgálati egységek és a katonai szervek közötti kapcsolattartásra vonatkozó előírások.
1981. április 1. 1981. augusztus 1. 1981. november 26.
29) — Léginavigációs Bizottság — Repüléstájékoztató szolgálat üzemeltetési munkacsoport (OPIS) második ülése (1980.) — Elkülönítési munkacsoport általános elveinek felülvizsgálatával foglalkozó negyedik ülés (1980.)
AIS/ATS/MET és egyéb vonatkozó tájékoztatások repülés közben levő légijármű részére történő továbbítása; összetett elkülönítés; radar adatok automatikus rögzítése; légijármű által adott forgalmi tájékoztatás.
1982. április 2. 1982. augusztus 2. 1982. november 25.
30) — Léginavigációs Bizottság — Légiforgalmi szolgálatok adattovábbítási és adat-feldolgozási munkacsoport (ADAPT) harmadik ülése (1981.) — AGA részleg ülés (1981.)
Az összeköttetésekre vonatkozó ATS előírások; a felszíni szélkijelzők jelölése; földi mozgás irányító és ellenőrző rendszerek; mértékegységek; meghatározások.
1983. március 16. 1983. július 29. 1983. november 24.
31) — Tanács — Léginavigációs Bizottság
Polgári és katonai együttműködés; repülés közben bekövetkező, az eltévedt vagy azonosítatlan légijárművekre és/vagy polgári légijárművek elfogására vonatkozó különleges helyzetek és intézkedések; összeköttetési előírások; légijármű által adott forgalmi tájékoztatás.
1986. március 12. 1986. július 27. 1986. november 20.
32) — Nyolcadik kiadás — Elkülönítési munkacsoport általános elveinek felülvizsgálatával foglalkozó ötödik ülés (1985.) — Léginavigációs Bizottság
Meghatározások; Egyetemes egyeztetett világidő (UTC); vulkáni hamuról szóló figyelmeztetések; VOR berendezéssel kijelölt és meghatározott légiforgalmi szolgálati útvonalak; az alábbi Mellékletek törlése: A B C D F és G.
1987. március 18. 1987. július 27. 1987. november 19.
33) — Kilencedik kiadás — Titkárság — VFR üzemelési munkacsoport harmadik ülése (1986.) — Léginavigációs Bizottság: módosítások a 6. Annex módosításainak elfogadása miatt
Légijármű látvarepülési és műszerrepülési szabályok szerint történő vegyes üzemeltetése; a NOTAM kiadványok kiadásával kapcsolatos légiforgalmi szolgálati előírások; földi mozgás irányító és ellenőrző rendszerek; a légiforgalmi szolgálat felelőssége a jogtalan beavatkozás eseteiben.
1990. március 12. 1990. július 30. 1991. november 14.
34) — A Másodlagos radarberendezések továbbfejlesztésével, valamint az Összeütközés elkerülését biztosító rendszerekkel foglalkozó munkacsoportok negyedik ülése (SICASP/4)
Meghatározások; a légiforgalmi szolgálatok a fedélzeti összeütközés-elkerülő rendszerek (ACAS) működésétől független biztosítása.
1993. február 26. 1993. július 26. 1993. november 11.
35) — Elkülönítési munkacsoport (RGCSP) általános elméletének módosítását célzó hatodik, hetedik és nyolcadik ülés (1988., 1990., 1993.) — Automatikus légtérfelderítési munkacsoport (ADSP) második ülése (1992.) — Léginavigációs Bizottság
Meghatározások; 1000 láb (300 méter) csökkentett függőleges elkülönítési minimum FL 290 felett; a forgószárnyas légijármű forgalom beillesztése a hagyományos légijármű forgalomba; a VOR berendezéssel kijelölt, valamint RNAV berendezéssel felszerelt légijárművek által használható ATS útvonalak; előírt navigációs teljesítmény; automatikus légtérfelderítés; az egész világon egységesen alkalmazható földrajzi hely megjelölési rendszer (WGS-84) alapadat bevezetésével kapcsolatos előírások;

tájékoztatások továbbítása légijárművek részére radioaktív anyagokról és mérgező kémiai felhőkről.
1994. március 18. 1994. július 25. 1994. november 10.

36) — Másodlagos radarberendezések továbbfejlesztésével, valamint az Összeütközés elkerülését biztosító rendszerekkel foglalkozó munkacsoportok negyedik ülése (SICASP/4) — Időjárási körülmények alapján történő üzemeltetés (AWOP) munkacsoportjának tizenharmadik és tizennegyedik ülése; Akadály korlátozási munkacsoport tizedik ülése
A nyomásmagasság-adó másodlagos válaszjeladók; mikrohullámú leszállító rendszer; útvonal akadály korlátozási követelmények.
1996. március 8. 1996. július 15. 1996. november 7.

37) — Léginavigációs Bizottság — A 3. Annex 70. módosítása
Léginavigációs adatbázisok; AIRMET tájékoztatások, szélnyírás.
1997. március 20. 1997. július 21. 1997. november 6.

38) — Automatikus légtérfelderítés munkacsoport negyedik ülése (1996.), Az elkülönítés általános elméletével foglalkozó munkacsoport kilencedik ülése (1996.), a 3. Annex 71. módosítása; Léginavigációs Bizottság.
Meghatározások; automatikus légtér-felderítési rendszerek és eljárások; automatizált légiforgalmi szolgálati rendszerek közötti adatcsere; levegő-föld adatösszeköttetés alkalmazása az ATS területén; légijárművek elkülönítése; RNP és RNAV az útvonal-repülés végrehajtása során; az OPMET tájékoztatás továbbítása a levegőben repülő légijármű részére; vulkáni hamuval kapcsolatos tanácsadás; emberi tényezők.
1998. március 19. 1998. július 20. 1998. november 5.

39) — Léginavigációs Bizottság
ATS légiforgalmi szolgálati légterek osztályozása; látás utáni időjárási körülmények (VMC); legalacsonyabb biztonságos tengerszint feletti magasság figyelmeztető jelzés
1999. március 10. 1999. július 19. 1999. november 4.

40) — Tizenharmadik kiadás — Léginavigációs Bizottság — Automatikus légtérfelderítés munkacsoport ötödik ülése (ASDP/5) — Európai Léginavigációs Tervező Munkacsoport 39. ülése (EANPG/39)— Akadálymentességi Munkacsoport 12. ülése (OCP/12) — a 6. Annex I/25, II/20 és III/7 módosításainak elfogadása miatt szükséges változások — Titkárság
Meghatározások; légiforgalmi szolgálatok biztonságszervezési rendszere; légijármű kényszerhelyzet jelzése az automatikus légtér-felderítési rendszerben; a légtér rugalmas felhasználása; legalacsonyabb repülési magasságok; biztonságos elkülönítés a talajfelszíntől radar irányítás (irányvezetés) alkalmával; előzetes engedély továbbítási rendszer; az irányítási felelősség átadása; a légiforgalmi irányítói engedélyek visszaolvasása; légiforgalmi áramlásszervezés; automatikus közelkörzeti tájékoztató szolgálat; VOLMET; D-VOLMET; RVR értékek kijelzői és azok előírásai az ATS egységeknél; szerkesztői változtatások.
2001. március 12. 2001. július 16. 2001. november 1.

41) — Az elkülönítés általános elméletével foglalkozó munkacsoport tizedik ülése (RGCPS/10); Veszélyes áruk munkacsoport tizenhetedik ülése (DGP/17).
Párhuzamos területi navigációs útvonalak közötti elkülönítési távolság; a veszélyes árukról szóló tájékoztatások továbbítása a mentést koordináló központok (RCC) felé.
2002. február 21. 2002. július 15. 2002. november 28.

42) — Lézersugár kibocsátás és Repülésbiztonsági munkacsoport; Titkárság; Általános angol nyelvismereti munkacsoport; Léginavigációs Bizottság
Lézersugár kibocsátás; Idegen nyelvismeretre vonatkozó előírások; Légiforgalmi szükség-intézkedések.
2003. március 7. 2003. július 14. 2003. november 27.

Nemzetközi előírások és ajánlott gyakorlati eljárások

43) – Titkárság; Légiforgalmi Tájékoztató Szolgálatok/Légiforgalmi Térképek (AIS/MAP) részleg ülése (1998)
Meghatározások; felszíni mozgásellenőrző radar használata; ATS kommunikációs követelmények;

meteorológiai tájékoztatás; légijárművek magasságtartási teljesítménye; ATS repülésbiztonság-irányítás; elektronikus domborzati és akadályadatok; szerkesztői módosítások.

2005. március 2.	2005. július 11.	2005. november 24.

44) – Az ICAO Közgyűlés 35. ülése; Tizenegyedik Léginavigációs Konferencia; Léginavigációs Bizottság ATS repülésbiztonság-irányítás; felvételkészítő eszközök.

2006. március 14.	2006. július 17.	2006. november 23.

45) – Léginavigációs Bizottság
Meghatározások és kapcsolódó eljárások ADS-B-hez, ADS-C-hez és RCP-hez; kooridnációs eljárások az ATS és egyéb szervezetek között; névkód jelölések; szélnyírás-riasztások bevezetése.

2007. február 26.	2007. július 16.	2007. november 22.

1. fejezet
Meghatározások

1. Megjegyzés: A jelen Annex szövegében a „szolgálat” kifejezés mindvégig a feladatkörök vagy biztosított szolgáltatások megjelölésre vonatkozó elvont fogalom, míg az „egység” kifejezés egy szolgálatot ellátó kollektív testület megjelölésére szolgál.
2. Megjegyzés: A meghatározásokban szereplő (RR) jelzés azt jelenti, hogy a kifejezést a Nemzetközi Távközlési Szervezet (ITU) Rádiószabályzatából vettük át. (lásd *Rádió Frekvencia Tartomány Előírások a Polgári Légiközlekedés Részére, az ICAO előírások jóváhagyásával* — Doc 9718)
A jelen Annex szövegében a nemzetközi előírások és ajánlott gyakorlati eljárások esetében használt kifejezések jelentése a következő:

Vonatkozási alapadat – Datum
Bármely mennyiség vagy mennyiségi halmaz, amely egyéb mennyiségek kiszámításának alapjául szolgál (ISO19104*[*]).

Adat minőség — Data quality
Megbízhatósági fok vagy szint, amely azt mutatja, hogy a megadott adat pontosság, felbontás és megbízhatóság[1] Szerk. Megjegyzés: A léginavigációs adat és értékei megbízhatóságának és pontosságának foka, amely jelzi, hogy az a meghatározás vagy az elfogadott módosítás óta nem változik vagy veszik el.
1 szempontjából megfelel az adatfelhasználó igényeinek.

Adathálózati összeköttetések — Data link communications
Távközlési összeköttetés, amely a közleményeket adathálózaton keresztül továbbítja.

ADS-C megállapodás – ADS-C agreement
Jelentéstételi terv, amely meghatározza az ADS-C adatjelentés körülményeit (azaz a légiforgalmi szolgálati egység által követelt adatokat és az ADS-C jelentések gyakoriságát, amelyek az ADS-C a légiforgalmi szolgálatok nyújtása során történő használatát megelőzően állapítandók meg).
Megjegyzés – A megállapodás feltételei a földi rendszer és a légijárművek közötti címzett kapcsolat, vagy kapcsolatok sorozata útján valósulnak meg.

AIRMET tájékoztatás — AIRMET information
A meteorológiai hivatal figyelőszolgálata által kiadott tájékoztatás azon időjárási jelenségek várható vagy tényleges bekövetkezéséről, amelyek befolyásolhatják az alacsony repülési magasságon üzemelő légijárművek biztonságát, és amelyeket az érintett repüléstájékoztató körzetre vagy ennek részterületére kiadott alacsony repülési magasságra vonatkozó előrejelzés nem tartalmaz.

Akadály – Obstacle
Valamennyi rögzített (akár ideiglenes, akár állandóhelyű) és mozgó tárgy vagy annak részei, amely a légijárművek földfelszíni mozgására kijelölt területen helyezkedik el, vagy amely túlnyúlik egy, a légijárművek repülés közbeni védelmére kijelölt felületen.

Alapforduló — Base turn

[*] Valamennyi ISO szabvány a jelen fejezet végén kerül felsorolásra.

Az a forduló, amit a légijármű a kezdeti megközelítés során a kirepülési útirány vége és a közbenső vagy végső megközelítési útirány kezdete között hajt végre. Az útirányok nem reciprok irányok.
Megjegyzés: Az alapforduló az adott egyedi eljárásnak megfelelő módon szinttartással vagy süllyedés közben is kijelölhető.
ALERFA
A „riasztás állapota" megjelölésére használt kód-név.
Állomás mágneses elhajlás — Station declination
Egy VOR állomás nulla fokos radiálja és a földrajzi észak közötti, a VOR állomás kalibrálásának időpontjában meghatározott iránykülönbség.
Átadó egység — Transferring unit
Az a légiforgalmi irányító szolgálati egység, amely a légijármű irányításával kapcsolatos felelősségét a repülés útvonala mentén soron következő légiforgalmi irányító szolgálati egységnek adja át.
Átkapcsolási pont — Change over point
Az a pont, ahol a VOR berendezéssel kijelölt ATS útvonalszakaszon üzemelő légijárműtől elvárják, hogy a már átrepült berendezés — mint elsődleges navigációs referencia hely — követéséről átálljon az előtte levő berendezés követésére.
Megjegyzés: Az átkapcsolási pontokat azért jelölik ki, hogy a jelek erőssége és minősége a legmegfelelőbb egyensúlyban legyen a navigációs berendezések között minden használatos szinten, továbbá hogy azonos berendezéstől származó irányszög vezetést biztosítsanak az azonos útvonalszakaszon üzemelő összes légijármű számára.
Átvevő egység — Accepting Unit
Egy légijármű irányításának átvételére következő légiforgalmi irányító szolgálati egység.
Automatikus közelkörzeti tájékoztató szolgálat — Automatic terminal information service (ATIS)
Az érkező és induló légijárművek számára napi 24 órán vagy meghatározott részidőtartamon keresztül az érvényes és az állandó jellegű tájékoztatások automatikus biztosítása:
Adathálózati automatikus közelkörzeti tájékoztató szolgálat —Data link automatic terminal information service (D-ATIS)
Adathálózaton keresztül továbbított tájékoztatás.
Beszéd-üzemű automatikus közelkörzeti tájékoztató szolgálat — Voice-automatic terminal information service (Voice-ATIS)
Folyamatos és ismétlődő szóbeli rádióközleménnyel továbbított tájékoztatás.
Berendezésfüggő automatikus légtérfelderítés – általános adás (ADS-B) — Automatic dependent surveillance – broadcast (ADS-B)
Technológia, amelynek segítségével légijárművek, repülőtéri járművek és egyéb eszközök automatikusan képesek adatkapcsolaton történő, általános adás keretében olyan adatok adására és/vagy vételére, mint például azonosítójel, helyzet -, és egyéb kiegészítő tájékoztatás.

Berendezésfüggő automatikus légtérfelderítés – címzett adás (ADS-C) – Automatic dependent surveillance – contract (ADS-C)
Technológia, amellyel az ADS-C megállapodások feltételei adatkapcsolat útján egyeztetésre kerülnek a földi rendszer és a légijármű között, hogy mely körülmények között kezdeményeznek ADS-C jelentéseket, és milyen adatokat tartalmazzanak a jelentések.
Megjegyzés: Az „ADS elektronikus protokollegyeztetés" olyan gyűjtőfogalom, mely felváltva jelenthet ADS esemény alapú protokollegyeztetést, kérést tartalmazó ADSprotokollegyeztetést, időszakos ADS protokollegyeztetést, vagy egy kényszerhelyzeti módot.
Légiközlekedési baleset — Accident

A repülés tartalma alatt bekövetkezett esemény, attól az időponttól számítva, amikor bármilyen személy repülési céllal a légijármű fedélzetére lép, illetve addig az időpontig tart, amikor az összes ilyen személy el nem hagyja a légijármű fedélzetét, és amely során:

a) valamely személy halálos kimenetelű, vagy súlyos sérülést szenvedett el annak következtében, hogy:

- a személy a légijármű fedélzetén tartózkodott; vagy
- a légijármű bármely részével közvetlen érintkezésbe került – beleértve légijárműről levált alkatrészeket is, vagy
- annak következtében, hogy a sugárhajtómű kiáramló gázsugarának közvetlenül volt kitéve,

kivéve, ha sérülései természetes okoknak tulajdoníthatók, vagy azokat maga, vagy más személy okozza, vagy ha olyan jogellenesen utazó személy sérüléséről van szó, aki az utasok és a személyzet számára rendesen hozzáférhető területeken kívül rejtőzködik, vagy

b) a légijármű olyan károsodást, vagy szerkezeti hibát szenved, amely:

- a légijármű szerkezeti szilárdságát, teljesítményét vagy repülési jellemzőit hátrányosan befolyásolja, és
- rendes körülmények között a károsodott alkotórész nagyjavítását vagy cseréjét igényelné,

kivéve, a hajtóműhiba vagy –károsodás esetét, amikor a károsodás csak a hajtóműre, annak burkolatára, vagy tartozékaira korlátozódik, illetve ha a károsodás kizárólag a légcsavarokra, a szárnyvégekre, antennákra, kerékgumikra, a fékekre, áramvonalazó burkolatra vagy a légijármű borításán történt kisebb horpadásokra és apró átlyukadásokra korlátozódik; vagy

c) a légijármű eltűnt, vagy teljesen hozzáférhetetlen.

1. Megjegyzés.- Az egységes statisztika érdekében az ICAO akkor tekinti halálos kimenetelűnek az elszenvedett sérülést, amikor az elhalálozás a légiközlekedési balesettől számított harminc napon belül következik be.

2. Megjegyzés.- Egy légijárművet akkor tekintenek eltűntnek, ha a hivatalos keresést beszüntették és a roncsot nem találták meg.

Bevezető irányító egység — Approach control unit
Egy vagy több repülőtér érkező vagy induló ellenőrzött forgalma számára történő légiforgalmi irányító szolgálat biztosítása céljából létesített egység.
Bevezető irányító szolgálat — Approach control service
Az érkező vagy induló ellenőrzött repülések irányítására létesített légiforgalmi irányító szolgálat.
Bizonytalanság állapota — Uncertainty phase
Olyan helyzet, amelyben egy légijármű és annak fedélzetén tartózkodó személyek biztonságával kapcsolatosan bizonytalanság áll fenn.

CRC matematikai képlet ellenőrzés[2] Szerk. Megjegyzés: A teljes adatblokkra kiterjedő rendszeres időszaki paritás ellenőrzés a rendszerben a küldő és fogadó állomáson — ellenőrző adat összevetése és paritásos felülvizsgálata (adatvesztéssel és adatváltozással szemben) illetve az eredetileg meghatározott adat és a felhasznált adat azonosságának biztosítása.
2 **Ciklikus Redundancia Ellenőrzés — Cyclic Redundancy check (CRC)**
Az adatok digitális kifejezéséhez használt matematikai algoritmus, amely megfelelő biztonsági szintet nyújt az adat vesztéssel vagy változással szemben.
DETRESFA
A „veszély állapot” megjelölésére használt kód-név.
Ellenőrzött légtér — Controlled airspace
Meghatározott kiterjedésű légtér, amelyen belül a légtér osztályozásnak megfelelő légiforgalmi irányító szolgálatot biztosítanak.
Megjegyzés: Az ellenőrzött légtér olyan gyűjtőfogalom, amelybe beletartoznak a 2.6 pontban ismertetett A, B, C, D valamint E osztályú légiforgalmi szolgálati légterek.
Ellenőrzött repülés — Controlled flight
Bármely repülés, amely légiforgalmi irányítói engedély függvénye.
Ellenőrzött repülőtér — Controlled aerodrome
Olyan repülőtér, amelyen a repülőtéri forgalom számára légiforgalmi irányító szolgálatot biztosítanak.

Megjegyzés: Az „ellenőrzött repülőtér” kifejezés azt jelzi, hogy a repülőtéri forgalom számára légiforgalmi irányító szolgálatot biztosítanak, azonban ez nem jelenti szükségszerűen azt, hogy ott repülőtéri irányítói körzet is van.
Előírt kommunikációs teljesítmény (RCP) – Required communication performance (RCP)
Az egyes ATM funkciókat támogató operatív kommunikáció teljesítmény-követelményeinek meghatározása.
Előírt kommunikációs teljesítmény (RCP) típus – RCP type
Egy, a kommunikációs adás ideje, folyamatossága, elérhetősége és integritása alapján meghatározott RCP paraméterekhez fűzött értéket jelölő címke (pl. RCP 240).
Előírt navigációs pontosság — Required navigation performance (RNP)
Egy meghatározott légtérben történő repülés-végrehajtáshoz szükséges navigációs teljesítmény pontossági szintje.
Megjegyzés: A navigációs pontosság és teljesítmény előírásokat egy adott RNP típus és/vagy feladat-végrehajtás vonatkozásában határozzák meg.
Előírt navigációs pontosság / teljesítmény szint típus — Required navigation performance type (RNP type)
Tengeri mérföldben kifejezett távolság érték, azaz pontossági határérték. A repülés-végrehajtás során a repülőgép tervezett repülési helyzetéhez viszonyítva a repülési idő legalább 95 %-ában ezen határértéken belül repüljön.
Például: RNP 4 olyan navigációs pontosság határértéket jelent, amelynek alapján az adott repülőgép repülési idejének legalább 95 %-ában mindenkori tervezett repülési helyzetéhez viszonyítva plusz/minusz 4 tengeri mérföld (7.4 km) távolságon belül repül.
Előrejelzés — Forecast
Várható időjárási körülmények megállapítása meghatározott időpontra vagy időtartamra valamint meghatározott területre vagy légtér szakaszra.
Előzetes engedély — Downstream clearance
A légijármű részére olyan légiforgalmi irányító szolgálati egység részéről kiadott engedély, amely nem azonos a légijárművet jelenleg irányító egységgel.
Emberi teljesítmény és teljesítőképesség — Human performance
Az emberi egyéni képességek és korlátozó tényezők, amelyek hatással vannak a légiközlekedés üzemeltetésének biztonságára és hatékonyságára.
Emberi tényezők alapelvei — Human Factors principles
A légiközlekedési tervezés, jogosítás, kiképzés, üzemeltetés és karbantartás vonatkozó alapelvei, amelyek célja az emberi teljesítmény és teljesítőképesség tényezőinek teljes mértékű figyelembevételével biztonságos kapcsolat kialakítása a személyek és a rendszer egyes (műszaki) egységei között.
Engedélyhatár — Clearance limit
Az a pont, ameddig a légijármű részére légiforgalmi irányítói engedélyt adtak ki.
Esemény — Incident
A légijármű üzemeltetésével összefüggő, nem baleset kategóriába tartozó esemény, amely hatással van vagy lehet az üzemeltetés biztonságára.
Megjegyzés: Az ICAO baleset megelőzési tanulmányai szempontjából legfontosabb esemény típusok felsorolása a *Baleset és Esemény Jelentési Kézikönyv*ben (Doc 9156) található.
Fontos pont — Significant point
Meghatározott földrajzi hely, amelyet valamely légiforgalmi szolgálati útvonal vagy egy légijármű repülési útvonalának meghatározására, valamint egyéb navigációs és légiforgalmi szolgálati célokra használnak.
Forgalmi előtér — Apron
A szárazföldi repülőtéren kijelölt terület, amely az utasok, posta vagy teheráru küldemények be- és kirakodására, valamint a légijármű üzemanyaggal történő feltöltésére, parkírozására vagy karbantartására szolgál.
Forgalmi előtér ügyeleti szolgálat — Apron management service

A forgalmi előtér légijármű és gépjármű forgalmának szabályzására és ellenőrzésére biztosított szolgálat.
Forgalmi tájékoztatás — Traffic information
A légiforgalmi szolgálati egységtől származó, az adott légijármű közelében vagy annak tervezett útvonalán előforduló ismert vagy észlelt légi forgalomról szóló tájékoztatás, annak érdekében, hogy a repülőgépvezető figyelmének felkeltésével segítséget nyújtson számára az összeütközés elkerüléséhez.
Forgalom elkerülésére adott tanács — Traffic avoidance advice
Repülési műveletek végrehajtására vonatkozó tanács a légiforgalmi szolgálati egységtől annak érdekében, hogy segítséget nyújtson a repülőgépvezető számára az összeütközés elkerülésére.
Geodéziai alaprendszer — Geodetic datum
Olyan adatok összessége, amelyek a globális referenciarendszerhez képest a helyi referenciarendszer tájolásának és helyzetének meghatározásához minimálisan szükségesek.
Futópálya — Runway
Egy szárazföldi repülőtéren meghatározott négyszögletű terület, amelyet a légijármű le és felszállására alakítottak ki.
Futópályamenti látástávolság — Runway visual range (RVR)
Az a távolság, ameddig a futópálya középvonalán álló légijármű vezetője látja a futópálya felületi jelöléseket vagy a futópálya szélét kijelölő, illetve középvonalát azonosító fényeket.
Gergely-naptár – Gregorian calendar
Az általánosan használt naptár, amelyet először 1582-ben vezettek be az egy év időtartam meghatározására, és amely pontosabban megközelíti a tropikus évet, mint a Juliánus naptár (ISO 19108[*]).
Megjegyzés: A Gergely-naptárban egy év 365 napból, míg egy szökőév 366 napból áll, amelyek 12 egymást követő hónapokra tagolódnak.
Gurulás — Taxiing
A légijármű mozgása a repülőtér területén saját hajtóművei segítségével, a fel és leszállás eseteit kivéve.
Hajózószemélyzeti tag — Flight crew member
Szakszolgálati engedéllyel rendelkező személyzeti tag, akinek munkája a repülési szolgálati időtartam alatt nélkülözhetetlen a légijármű üzemeltetéséhez.
IFR — Instrument Flight Rules
A műszerrepülési szabályok jelzésére alkalmazott rövidítés.
IFR repülés — IFR flight
A műszerrepülési szabályok szerint végrehajtott repülés.
Illetékes légiforgalmi szolgálati hatóság — Appropriate ATS authority
Az adott légtérben a légiforgalmi szolgálatok biztosításáért felelős, az állam által kijelölt megfelelő hatóság.
IMC — Instrument Meteorological Conditions
A műszeres időjárási körülmények jelzésére alkalmazott rövidítés.
INCERFA
A „bizonytalanság állapota" megjelölésére használt kód-név.
Irányítás átadási pont — Transfer of control point
A légijármű repülési útvonalán levő azon meghatározott pont, amelynél a légijármű részére biztosított légiforgalmi irányító szolgálat ellátásának felelősségét az egyik irányítói egységtől vagy irányítói munkahelytől átadják a következőnek.
Irányítói terület — Control area
A földfelszín felett meghatározott határtól felfelé terjedő ellenőrzött légtér.
Irányítói körzet — Control zone
A földfelszíntől egy meghatározott felső magasság határig terjedő ellenőrzött légtér.
Járató — Operator
Valamely személy, szervezet vagy vállalat, amely légijárműveket üzemeltet vagy ilyen tevékenység végzésére jelentkezik.

[*] Valamennyi ISO szabvány a jelen fejezet végén kerül felsorolásra.

Jelentőpont — Reporting point
Meghatározott földrajzi hely, amelyhez viszonyítva egy légijármű helyzete jelenthető.
Kényszerhelyzet (állapot) — Emergency phase
Általános kifejezés, amely bizonytalanság, riasztás vagy veszély állapotokat jelenthet.
Kitérő repülőtér — Alternate aerodrome
Olyan repülőtér, amelyre a légijármű abban az esetben folytathatja az útját, ha a tervezett célállomás repülőtere felé történő repülés folytatása vagy az oda történő leszállás végrehajtása lehetetlenné válik vagy nem tanácsos. A kitérő repülőterek köze tartoznak az alábbiak:
Felszálló kitérő — Take-off alternate
Olyan kitérő repülőtér, amelyen a légijármű leszállhat, ha ez röviddel a felszállás után szükségessé válik és erre az indulási repülőtér nem használható.
Útvonal kitérő — En-route alternate
Olyan kitérő repülőtér, amelyen egy légijármű leszállhat, ha az útvonal-repülés közben a hajózószemélyzet rendkívüli vagy kényszerhelyzetet tapasztal.
Megnövelt hatótávolságú üzemeltetés útvonal kitérő — ETOPS en-route alternate
Olyan alkalmas és megfelelő kitérő repülőtér, amelyen egy légijármű leszállhat, ha a megnövelt hatótávolságú üzemeltetés közben egy hajtómű leáll vagy a hajózószemélyzet egyéb rendkívüli vagy kényszerhelyzetet tapasztal.
Célállomás kitérő — Destination alternate
Olyan kitérő repülőtér, amely felé a légijármű folytathatja az útját, ha a tervezett célállomás repülőterén történő leszállás végrehajtása lehetetlenné válik vagy nem tanácsos.

Megjegyzés: Az a repülőtér, amelyről a járat elindult, az adott járat számára útvonal vagy célállomás kitérőként is megjelölhető.
Konferencia összeköttetés — Conference communications
Olyan távközlési létesítmények, amelyek segítségével közvetlen szóbeli közleményváltás folytatható egyidejűleg három vagy több hely között.
Körzeti irányító központ — Area control centre
Az illetékessége alá tartozó irányítói területeken üzemelő ellenőrzött forgalom számára légiforgalmi irányító szolgálat biztosítása céljából létesített egység.
Körzeti irányító szolgálat — Area control service
Az irányítói körzetekben üzemelő ellenőrzött repülések számára létesített légiforgalmi irányító szolgálat.
Közelkörzet — Terminal control area
Egy vagy több nagyobb repülőtér közelében, rendszerint a légiforgalmi szolgálati útvonalak találkozási pontjánál létesített irányítói terület.
Közzétett kapacitás — Declared capacity
Légiforgalmi irányító rendszer, annak bármely alrendszere vagy munkahelye által légijárművek részére nyújtott szolgáltatás képességének mértéke általános üzemeltetési körülmények között. Ezt a mértéket egy adott légtérbe egy meghatározott időszakon belül belépő légijárművek számával fejezik ki, figyelembe véve az időjárási körülményeket, a légiforgalmi irányító szolgálati egység aktuális elrendezését, a rendelkezésre álló személyzetet és berendezéseket, valamint bármely olyan tényezőt, amely befolyásolhatja a légtérért felelős légiforgalmi irányító munkaterhelését.
Különleges VFR repülés — Special VFR flight
A repülőtéri irányítói körzeten belül, a látási meteorológiai körülményeknél rosszabb időjárási helyzetben a légiforgalmi irányító szolgálat által engedélyezett VFR repülés.
Látás utáni időjárási körülmények — Visual meteorological conditions (VMC)
Látástávolsággal, felhőzettől mért távolsággal és felhőalappal kifejezett időjárási körülmények, ha azok a látás utáni időjárási körülményekre meghatározott minimum értékeknél jobbak.
Megjegyzés: A látás utáni időjárási körülményekre meghatározott minimum értékeket a 2. Annex tartalmazza.
Levegő-föld összeköttetés — Air-ground communication
A légijárművek valamint a földi állomások vagy létesítmények közötti kétirányú összeköttetés.

Légi gurulás — Air-taxiing
A forgószárnyas vagy VTOL légijármű mozgása a repülőtér felszíne felett, rendszerint földpárna-hatás mellett és 37 km/h (20 csomó) értéknél kisebb földfelszín feletti sebességgel.
Megjegyzés: A tényleges magasság változhat, valamint bizonyos forgószárnyas légijárművek a földpárna-hatás turbulencia csökkentése vagy felfüggesztett teheráru rakományok védelme érdekében 25 lábnál (8 méter) AGL nagyobb magasságot igényelhetnek.
Légi útvonal — Airway
Folyosó formájában kijelölt irányítói terület vagy ennek egy része.
Légiforgalmi állandó helyű szolgálat — Aeronautical fixed service (AFS)
Meghatározott állandó helyek között létesített távközlési szolgálat, amelyet elsősorban a léginavigáció biztonsága illetve a légiforgalom rendezett, hatékony és gazdaságos működésének elősegítése érdekében létesítettek.
Légiforgalmi állomás — Aeronautical station (RR S1.81)
A légiforgalmi mozgó szolgálat földi állomása. Bizonyos esetekben a légiforgalmi állomás például hajó fedélzetén vagy vízfelszínen létesített építményen is elhelyezhető.
Légiforgalmi áramlásszervezés — Air traffic flow management (ATFM)
A légiforgalom biztonságos, rendezett és folyamatos áramlásának elősegítésére létrehozott szolgálat, amely biztosítja a rendelkezésre álló légiforgalmi irányítói kapacitás lehető legnagyobb mértékű kihasználását valamint azt, hogy a forgalom nagysága megfeleljen az illetékes ATS hatóság részéről közzétett kapacitás értékeknek.
Légiforgalmi irányító és légijármű-vezető közötti adatcsere — Controller - pilot data link communications (CPDLC)
A légiforgalmi irányító és a légijármű-vezető közötti távközlési módszer, amely az légiforgalmi irányítói szolgálati közleményeket adatátviteli összeköttetéssel továbbítja.
Légiforgalmi irányító szolgálat — Air traffic control service
A következő célokra létesített szolgálat:
a) összeütközés megelőzése:
1) a légijárművek között;
2) a mozgási területen üzemelő légijárművek és az akadályok között;
b) a légiforgalom rendezett és folyamatos áramlásának elősegítése.
Légiforgalmi irányító szolgálati egység — Air traffic control unit
Különböző, körzeti irányító, közelkörzeti irányító vagy repülőtéri irányító egységeket magába foglaló gyűjtőfogalom.
Légiforgalmi irányítói engedély — Air traffic control clearance
Felhatalmazás a légijármű részére ahhoz, hogy valamely légiforgalmi irányító szolgálati egység által meghatározott feltételek szerint üzemeljen.
1. Megjegyzés: A légiforgalmi irányítói engedély kifejezést, megfelelő szövegkörnyezetben gyakran engedélyre rövidítik.
2. Megjegyzés: A rövidített engedély kifejezést gyakran megelőzhetik a következő — „gurulási", „felszállási", „indulási", „útvonal", „megközelítési" vagy „leszállási" — szavak, amelyek a repülés azon szakaszát jelzik, amelyre az engedély vonatkozik.
Légiforgalmi mozgó szolgálat — Aeronautical mobile service (RR S1.32)
Légiforgalmi állomások és légijármű állomások illetve légijármű állomások közötti mozgó-szolgálat, amelyek közé tartozhatnak mentőtutajok is. A szolgálathoz sorolhatók továbbá a kijelölt segélykérő és kényszerhelyzeti frekvenciákon üzemelő kényszerhelyzeti helyzetjeladó állomások is.
Légiforgalmi szolgálat — Air traffic service
Különböző, repüléstájékoztató, riasztó, tanácsadó és légiforgalmi irányító (körzeti irányító, közelkörzeti irányító vagy repülőtéri irányító) szolgálatokat magába foglaló gyűjtőfogalom.
Légiforgalmi szolgálati egység — Air traffic services unit
Különböző, légiforgalmi irányító egységet, repüléstájékoztató központot vagy a légiforgalmi szolgálatok bejelentő irodáját magába foglaló gyűjtőfogalom.

Légiforgalmi szolgálati légterek — Air traffic services airspaces
Meghatározott kiterjedésű, az ABC betűivel azonosított légterek, amelyeken belül adott típusú repülések üzemelhetnek és amelyek számára légiforgalmi szolgálatokat, valamint üzemeltetési előírásokat jelöltek ki.
Megjegyzés: Az A — G osztályokba tartozó légiforgalmi szolgálati légterek a 4. Függelékben találhatók.
Légiforgalmi szolgálati útvonal — ATS route
A légiforgalmi szolgálatok biztosítására, a forgalom áramlásának megfelelő szabályozására kijelölt repülési útvonal.
1. Megjegyzés: A „légiforgalmi szolgálati (ATS) útvonal" kifejezés általános megnevezés, amely többek között légiútvonal, tanácsadói, ellenőrzött vagy nem ellenőrzött, érkezési vagy indulási útvonalat is jelenthet.
2. Megjegyzés: A légiforgalmi szolgálati (ATS) útvonalat útvonal leírással határozzák meg, amely tartalmazza az ATS útvonal jelzést, a jelentős pontok (útvonal pontok) közötti rárepülési vagy kirepülési irányszöget, a helyzetjelentési előírásokat valamint, az illetékes légiforgalmi szolgálati hatóság által megállapított legalacsonyabb biztonságos tengerszint feletti repülési magasságot.
Légiforgalmi szolgálatok bejelentő irodája — Air traffic services reporting office
A légiforgalmi szolgálatokat érintő jelentések, valamint az indulás előtt a légiforgalmi szolgálati egységeknek benyújtott repülési tervek átvételére létesített egység.
Megjegyzés: A légiforgalmi szolgálatok bejelentő irodája különálló vagy egy már meglevővel — mint például egy másik légiforgalmi szolgálati egység vagy a légiforgalmi tájékoztató szolgálat irodája — együtt kialakított egység is lehet.
Légiforgalmi tájékoztató Kiadvány — Aeronautical Information Publication (AIP)
A léginavigáció szempontjából fontos és tartós jellegű légiforgalmi tájékoztatásokat tartalmazó kiadvány, amelyet az érintett Állam vagy annak megbízott szervezete tesz közzé.
Légiforgalmi tanácsadó szolgálat — Air traffic advisory service
A tanácsadói légtéren belül nyújtott szolgálat, amely a lehetséges mértékben elkülönítést biztosít IFR repülési tervek szerint üzemelő légijárművek között.
Légiforgalmi távközlési állomás — Aeronautical telecommunication station
A légiforgalmi távközlési szolgálat állomása.
Légiforgalom — Air traffic
A levegőben levő valamint a repülőtér munkaterületén üzemelő légijárművek összessége.
Légijármű — Aircraft
Minden olyan szerkezet, amelynek levegőben maradását olyan aerodinamikai reakcióerők biztosítják, amelyek nem azonosak a földfelszínre ható aerodinamikai reakcióerőkkel.
Légijármű parancsnoka — Pilot-in-command
A repülés biztonságos végrehajtásáért felelős, a járató vagy az általános célú légiközlekedés esetében a légijármű tulajdonosa részéről parancsnoknak kijelölt repülőgépvezető.
Magasság - Height
Egy pontként értelmezett szint, tárgy vagy pont valamint egy meghatározott vonatkozási alap (alapadat) közötti függőleges távolság.
Megbízhatóság — Integrity (aeronautical data)
A léginavigációs adat és értékei megbízhatóságának és pontosságának foka, amely jelzi, hogy az a meghatározás vagy az elfogadott módosítás óta nem változik vagy nem veszik el.
Mentést koordináló központ — Rescue Co-ordination Centre
Egy kutatási és mentési körzeten belül a kutató és mentő szolgálat hatékony megszervezésére valamint a kutató és mentő tevékenység elősegítésére és egyeztetésére létesített egység.
Meteorológiai hivatal — Meteorological office
A nemzetközi légiközlekedés részére meteorológiai szolgálat nyújtására kijelölt hivatal.
Mozgási terület — Movement area
Egy repülőtérnek a légijárművek fel és leszállására valamint gurulására használandó része, amely a munkaterületet és a forgalmi előtere(ke)t foglalja magába.

Munkaterület — Manoeuvring area
Egy repülőtérnek a légijárművek fel és leszállására valamint gurulására használandó része a forgalmi előterek kivételével.
Műszeres időjárási körülmények — Instrument meteorological conditions (IMC)
Látástávolsággal, felhőzettől mért távolsággal és felhőalappal kifejezett időjárási körülmények, amelyek a látás utáni időjárási körülményekre meghatározott minimum értékeknél alacsonyabbak.
Megjegyzés: A látás utáni időjárási körülményekre meghatározott minimum értékeket a 2. Annex tartalmazza.
Naptár – Calendar
Meghatározott időbeli vonatkozási rendszer, amely valamely időpont egynapos pontossággal történő meghatározásához szolgál alapul (ISO19108*).
Nemzetközi NOTAM iroda — International NOTAM office
Egy Állam által a NOTAM értesítések nemzetközi cseréjére kijelölt iroda.
NOTAM
Bármely légiforgalmi berendezés, szolgálat, eljárás állapotáról, változásáról, létrehozásáról vagy veszély fennállásáról szóló távközléssel közzétett értesítés, amelynek időben való ismerete a légijármű üzemeltetésével foglalkozó személyek részére alapvetően szükséges.
Nyomtatott formájú közleményváltás — Printed communications
Olyan közleményváltás, ahol a rendszerbe tartozó egységek mindegyik terminálján automatikus nyomtatott feljegyzés készül a rendszeren áthaladó összes közleményről.
Összeütközés elkerülését biztosító fedélzeti rendszer — Airborne collision avoidance system (ACAS)
A másodlagos légtérfelderítő radar berendezés válaszjeladó egysége jeleinek alapján működő fedélzeti rendszer, amely a földi berendezésektől függetlenül működve tájékoztatja a légijármű vezetőjét az SSR válaszjeladóval felszerelt, összeütközési veszélyt jelentő egyéb légijárművekről.
Pontosság — Accuracy
A számított vagy mért, valamint a tényleges érték egyezésének mértéke.
Megjegyzés: A mért helyzetadatok esetében a pontosságot általában a jelzett helyzethez viszonyított távolság értékben fejezik ki és a tényleges helyzet meghatározott valószínűséggel ezen belülre esik.
Rádió-távbeszélés — Radiotelephony
Olyan rádió-távközlési módszer, amelynek során az információcsere elsősorban szóbeli közleményváltással történik.
Repülésbiztonság-irányítási rendszer – Safety management system
A repülésbiztonság irányításának szisztematikus megközelítése, beleértve a szükséges szervezeti struktúrákat, felelősségre vonhatóságokat, irányelveket és eljárásokat.
Repülésbiztonsági program – Safety programme
A repülésbiztonság növelését célzó egységes szabályozások és tevékenységek összessége.
Repülési szint — Flight level
Meghatározott 1013.2 hectopascal (hPa) alap-nyomás értékhez viszonyított állandó atmoszférikus légnyomású felület, amely más ilyen felületektől meghatározott légnyomáskülönbséggel különül el.
1. Megjegyzés: Az egyezményes nemzetközi műlégkörnek megfelelően kalibrált nyomásmagasság-mérő:
a) QNH beállításra állítva tengerszint feletti magasság;
b) QFE beállításra állítva a QFE földfelszín feletti magasság;
c) 1013.2 hectopascal (hPa) beállításra állítva a repülési szint (FL) kijelzésére használható.
2. Megjegyzés: A fenti 1. megjegyzésben használt tengerszint és földfelszín feletti magasság kifejezések inkább barometrikus, azaz nyomásmagasságot, mint geometrikus, azaz földméréssel számított terepmagasságot jelentenek.
Repülési terv — Flight plan
A légiforgalmi szolgálati egységek rendelkezésére bocsátott, a légijármű tervezett repülésére vagy a repülés egy szakaszára vonatkozó meghatározott tájékoztatás.

* Valamennyi ISO szabvány a jelen fejezet végén kerül felsorolásra.

Megjegyzés: A repülési tervre vonatkozó előírások a 2. Annexben találhatók. A „repülési terv űrlap" kifejezés a PANS-ATM 2. Függelékében található repülési terv mintát jelzi.
Repüléstájékoztató körzet — Flight information region
Meghatározott kiterjedésű légtér, amelyen belül repüléstájékoztató és riasztó szolgálatot biztosítanak.
Repüléstájékoztató központ — Flight information centre
Repüléstájékoztató és riasztó szolgálat biztosítására létrehozott egység.
Repüléstájékoztató szolgálat — Flight information service
A repülések biztonságos és eredményes végrehajtásához hasznos tanácsok és tájékoztatások nyújtása céljából biztosított szolgálat.
Repülőtér — Aerodrome
Szárazföldön vagy vízfelszínen kijelölt terület (beleértve bármely épületet, létesítményt és berendezést), amelyet egészében vagy részben a légijárművek érkezésére, indulására és felszíni mozgására kívánnak felhasználni.
Repülőtéri forgalom — Aerodrome traffic
A repülőtér munkaterületén üzemelő összes légijármű és egyéb járművek valamint a repülőtér körzetében repülő összes légijármű forgalma.
Megjegyzés: A repülőtér körzetében repülő légijárművökön a repülőtér forgalmi körén működő, az oda besoroló és az onnan kilépő légijárművek értendők.
Repülőtéri irányító szolgálat — Aerodrome control service
A repülőtéri forgalom számára létesített légiforgalmi irányító szolgálat.
Repülőtéri irányító torony — Aerodrome control tower
A repülőtéri forgalom számára légiforgalmi irányító szolgálat biztosítása céljából létesített egység.
Riasztás állapota — Alert phase
Olyan helyzet, amelyben egy légijármű és annak fedélzetén tartózkodó személyek biztonságával kapcsolatosan kétség áll fenn.
Riasztó szolgálat — Alerting service
A kutatásra és mentésre szoruló légijárművek vonatkozásában a megfelelő szervek értesítésére és szükség esetén az ezekkel történő együttműködésre létesített szolgálat.
SIGMET tájékoztatás — SIGMET information
A meteorológiai hivatal figyelő szolgálata által kiadott olyan meghatározott, az útvonalon várható vagy ténylegesen előforduló időjárási jelenségekről szóló tájékoztatás, amelyek befolyásolhatják a légijárművek üzemeltetésének biztonságát.
Szint — Level
A levegőben levő légijármű függőleges helyzetére vonatkozó általános kifejezés, amely jelenthet földfelszín feletti vagy tengerszinthez viszonyított magasságot, illetve repülési szintet.
Tanácsadói légtér — Advisory airspace
Meghatározott kiterjedésű légtér vagy kijelölt útvonal, amelyen belül légiforgalmi tanácsadói szolgálat áll rendelkezésre.
Tanácsadói útvonal — Advisory route
Kijelölt légiútvonal, amelyen légiforgalmi tanácsadói szolgálat áll rendelkezésre.
Tengerszint feletti magasság — Altitude
Egy szint, egy pont vagy egy tárgy a közepes tengerszinthez viszonyított függőleges magassága.
Területi navigáció — Area navigation (RNAV)
Olyan navigációs módszer, amely lehetővé teszi, hogy a légijármű a földi állomásokon alapuló navigációs berendezések fedésterületén belül vagy saját önálló navigációs eszközei lehetőségeinek határain belül illetve ezek kombinációjával bármely kívánt repülési pályát kövessen.
Területi navigációs útvonal — Area navigation route
Területi navigáció végrehajtására képes légijárművek részére kijelölt légiforgalmi szolgálati útvonal.
Utazómagasság — Cruising level
Az a repülési szint, amelyet a légijármű a repülés jelentős szakasza során tart.
Útirány — Track

A légijármű repülési útvonalának vetülete a föld felületén, amelynek földrajzi irányát bármely adott pontban általában északhoz (földrajzi, mágneses vagy földrajzi hálózati) viszonyítva határozzák meg.
Útvonal pont — Way-point
Meghatározott földrajzi hely, amelyet valamely területi navigációs útvonal vagy egy területi navigációt alkalmazó légijármű repülési útvonalának meghatározására használnak. Az útvonal pont lehet:
Oldalirányú érintésű útvonal pont (fly-by way-point) — Olyan útvonal pont, ahol a következő útvonal vagy eljárás szakasz érintő menti eléréséhez előzetesen számított forduló szükséges.
Ténylegesen átrepült útvonal pont (flyover way-point) — Olyan útvonal pont, amelynél a következő útvonal vagy eljárás szakasz eléréséhez fordulót kezdenek.
Végső megközelítés — Final approach
A műszeres megközelítési eljárás azon szakasza, amely a kijelölt végső megközelítési pontnál, vagy ahol ilyen pontot nem jelöltek ki:
a) az utolsó eljárás-forduló, az alap forduló vagy a lóversenypálya alakú várakozási eljárás rárepülési fordulójának végén, ha ilyet kijelöltek; vagy
b) a megközelítési eljárásban meghatározott utolsó földrajzi útirány elérési pontjánál
kezdődik; és a repülőtér közelében ott ér véget, ahonnan:
1) a leszállás végrehajtható; vagy
2) megszakított megközelítési eljárás kezdeményezhető.
Veszély állapota — Distress phase
Olyan tényleges helyzet, amelyben okkal feltételezhető, hogy egy légijárművet és annak fedélzetén tartózkodó személyeket súlyos és közvetlen veszély fenyegeti, vagy azonnali segítségre szorul(nak).
VFR
A látvarepülési szabályok szerint történő üzemeltetés jelzésére használt rövidítés.
VFR repülés — VFR flight
A látvarepülési szabályok szerint végrehajtott repülés.
VMC — Visual Meteorological Conditions
A látás utáni időjárási körülmények jelzésére alkalmazott rövidítés.

* ISO szabványok
19104 – *Földrajzi tájékoztatás – Terminológia*
19108 – *Földrajzi tájékoztatás – Időbeli minták*

2. Fejezet
Általános rész

2.1 Az illetékesség meghatározása

2.1.1 A szerződő Államok a jelen Annex előírásai alapján és a joghatóságuk alá tartozó területekre vonatkozóan határozzák meg azokat a légtérszakaszokat és azokat a repülőtereket, ahol légiforgalmi szolgálatokat biztosítanak. Ezt követően a jelen Annex előírásainak megfelelően intézkedjenek ezen szolgálatok létesítéséről és fenntartásáról, hacsak közös megegyezés alapján az egyik Állam a másik Államra át nem ruházza a légiforgalmi szolgálatok létesítésének és biztosításának felelősségét azokban a repüléstájékoztató körzetekben, irányítói körzetekben vagy repülőtéri irányítói körzetekben, amelyek a saját felségterülete felett helyezkednek el.
Megjegyzés: Ha egy Állam saját területe felett egy másik Államra ruházza át a légiforgalmi szolgálatok biztosításának felelősségét, azt a saját nemzeti szuverenitásának megsértése nélkül teszi. Hasonlóképpen, a légiforgalmi szolgálatokat biztosító Állam felelőssége műszaki és üzemeltetési szempontokra korlátózódik, és nem terjed túl az érintett légteret használó légijárművek biztonságának és hatékony

működésének biztosításán. Továbbá, a légiforgalmi szolgálatokat biztosító Államnak ezen szolgálatok ellátásakor a felelősséget átruházó Állam területén érvényes követelményeknek megfelelően kell eljárnia és az átruházó Államtól elvárják, hogy olyan berendezéseket és szolgáltatásokat biztosítson a légiforgalmi szolgálatokat ellátó ország számára, amelyek szükségességében kölcsönösen megegyeztek. Ezeken felül, az is elvárt, hogy a felelősséget átruházó Állam ne vonja meg, szüntesse be vagy ne módosítsa ezeket a berendezéseket és szolgáltatásokat a szolgáltatásokat biztosító Állammal történő előzetes egyeztetés nélkül. Mind a felelősséget átruházó, mind a légiforgalmi szolgálatokat biztosító Állam bármikor felbonthatja a kettőjük közötti megállapodást.
2.1.2 A nyílt tengerek feletti légterek vagy a nem meghatározott állami hovatartozású légterek azon részeit, ahol légiforgalmi szolgálatokat biztosítanak, a körzeti légiközlekedési egyezmények alapján határozzák meg. A légterek ilyen részein a légiforgalmi szolgálatok biztosításának felelősségét elfogadó szerződő Állam a szolgálatok létesítéséről és biztosításáról a jelen Annex előírásai szerint intézkedjen.
1. Megjegyzés: A „körzeti légiközlekedési egyezmények" kifejezés azokra az egyezményekre utal, amelyeket az ICAO Tanácsa rendszerint a Körzeti Légiközlekedési Értekezletek javaslatára fogad el.
2. Megjegyzés: A jelen Annex előszavának elfogadása alkalmával a Tanács jelezte, hogy az a szerződő Állam, amely a nyílt tengerek, vagy meg nem határozott állami hovatartozású légterek felett a légiforgalmi szolgálatok biztosításának felelősségét elfogadta, a nemzetközi előírásokat és ajánlott gyakorlati eljárásokat a saját illetékességi területe feletti légtérnél elfogadottakkal megegyezően alkalmazhatja.
2.1.3 Amennyiben úgy határoztak, hogy légiforgalmi szolgálatokat biztosítanak, az érintett államok jelöljék ki az ilyen szolgálatok biztosításáért felelős hatóságot.
1. Megjegyzés: A szolgálatok létesítéséért és üzemeltetéséért felelős hatóság lehet állami szervezet vagy erre alkalmas vállalat is.
2. Megjegyzés: Azok a lehetőségek, amelyek egy nemzetközi repülés egy részére vagy teljes egészére vonatkozóan a légiforgalmi szolgálatok létesítésére és üzemeltetésére vonatkoznak, a következők:
Első lehetőség: *Az útvonal vagy útvonalszakasz olyan Állam fennhatósága alá tartozó légtéren belül van, amelyen belül az saját légiforgalmi szolgálatokat alakít ki és tart fenn.*
Második lehetőség: *Az útvonal vagy útvonalszakasz olyan Állam fennhatósága alá tartozó légtéren belül van, amelyen belül ez az Állam közös megegyezés alapján egy másik Államra ruházta át a légiforgalmi szolgálatok kialakításának és fenntartásának felelősségét.*
Harmadik lehetőség: *Az útvonalszakasz nyílt tenger vagy olyan meg nem határozott nemzeti hovatartozású légtéren belül van, amelyre vonatkozóan egy Állam elfogadta a légiforgalmi szolgálatok kialakításának és fenntartásának felelősségét.*
A jelen Annex alkalmazásában az Állam, amely kijelöli a légiforgalmi szolgálatok létesítéséért és biztosításáért felelős hatóságot:
— az első esetben *az az Állam, amely fennhatósággal rendelkezik adott légtérszakasz felett;*
— a második esetben *az az Állam, amelyre a légiforgalmi szolgálatok létesítésének és biztosításának felelősségét átruházták;*
— a harmadik esetben *az az Állam, amely elfogadta a légiforgalmi szolgálatok létesítésének és biztosításának felelősségét.*
2.1.4 Ahol légiforgalmi szolgálatokat létesítettek, erről szükség szerint tegyenek közzé tájékoztatást, hogy lehetővé tegyék a szolgálatok igénybevételét.

2.2 A légiforgalmi szolgálatok céljai

A légiforgalmi szolgálatok céljai a következők:

a) összeütközések megelőzése a légijárművek között;

b) összeütközések megelőzése munkaterületeken a légijárművek valamint az ott található akadályok között;

c) a légiforgalom rendezett áramlásának elősegítése és fenntartása;

d) a repülések biztonságos és hatékony lebonyolításához hasznos tanácsok és tájékoztatások adása;

e) az illetékes szervezetek értesítése a kutatási és mentési segítségre szoruló légijárműről, továbbá szükség szerint segítség-nyújtás ezen szervezetek számára.

2.3 A légiforgalmi szolgálatok felosztása

A légiforgalmi szolgálatok a következő három szolgálatot foglalják magukba:
2.3.1 A *légiforgalmi irányító szolgálat* a 2.2 pont a), b) és c) alpontjában ismertetett feladatok ellátására, amely a következő három egységre tagolódik;

a) Körzeti irányító szolgálat

ellenőrzött repülések részére légiforgalmi irányítás nyújtása céljából létesített szolgálat a 2.2 pont a) és c) feladatainak ellátására, kivéve ezeknek a repüléseknek az alábbi b) és c) alpontokban meghatározott szakaszait;

b) Bevezető irányító szolgálat

ellenőrzött repülések érkezési és indulási szakaszaiban légiforgalmi irányítás nyújtása céljából létesített szolgálat a 2.2 pont a) és c) feladatainak ellátására,

c) Repülőtéri irányító szolgálat

repülőtéri forgalom részére légiforgalmi irányítás nyújtása céljából létesített szolgálat, a 2.2 pont a), b) és c) feladatainak ellátására, a fenti 2.3.1 b) alpontban ismertetett repülési szakaszok kivételével.

2.3.2 *Repüléstájékoztató szolgálat* a 2.2 pont d) alpontjában ismertetett feladatok ellátására.

2.3.3 *Riasztó szolgálat* a 2.2 pont e) alpontjában ismertetett feladatok ellátására.

2.4 Légiforgalmi szolgálatok szükségességének meghatározása

2.4.1 A légiforgalmi szolgálatok biztosításának szükségességét az alábbiak figyelembevételével határozzák meg:
a) a terület felett üzemelő légiforgalom típusai;
b) a légiforgalom sűrűsége;
c) az időjárási körülmények;
d) egyéb, lényeges tényezők.
Megjegyzés: A figyelembe veendő tényezők nagy száma miatt a légiforgalmi szolgálatok egy adott területen vagy helyen történő biztosításának szükségességére vonatkozóan általánosan meghatározott adatokat megállapítani nem lehetséges. Például:

a) a különböző típusokkal üzemelő légiforgalom összetétele, különböző repülési sebességű légijárművek (hagyományos, sugárhajtású, stb.), szükségessé tehetik a légiforgalmi szolgálatok biztosítását ott, ahol egy viszonylag nagyobb sűrűségű, azonban csak egy üzemeltetési típusú forgalom ezt nem tenné szükségessé;

b) az időjárási körülmények hatása nagy jelentőségű lehet olyan területeken, ahol a légiforgalom áramlása állandó jellegű (például menetrendszerű forgalom), míg hasonló vagy rosszabb meteorológiai körülmények viszonylag kevésbé lehetnek fontosak olyan területen, ahol a repülés ilyen körülmények között megszakítható (például helyi VFR repülések);

c) a nagy kiterjedésű vízfelületek, hegyes, lakatlan vagy sivatagos területek szükségessé tehetik légiforgalmi szolgálatok biztosítását még akkor is, ha repülések gyakorisága rendkívül ritka.

2.4.2 Egy adott területen belül a légiforgalmi szolgálatok szükségességének meghatározása alkalmával nem lehet tényezőként figyelembe venni a légijárművek összeütközés elkerülését biztosító fedélzeti rendszerrel (ACAS) történő felszerelését.

2.5 Azon légtérszakaszok és ellenőrzött repülőterek minősítése, amelyekben légiforgalmi szolgálatokat biztosítanak

2.5.1 A légtér adott szakaszaiban vagy egyes repülőtereken légiforgalmi szolgálat biztosításáról szóló döntés meghozatala után, a légterek ezen szakaszait vagy a repülőtereket a létesítendő légiforgalmi szolgálatoknak megfelelően minősíteni kell.
2.5.2 A légtér meghatározott szakaszai vagy az adott repülőterek a következők alapján minősítendők:

2.5.2.1 *Repüléstájékoztató körzetek* — A légtér azon szakaszait, amelyekben repüléstájékoztató és riasztó szolgálat biztosítását határozták el, repüléstájékoztató körzetnek minősítsék.
2.5.2.2 *Ellenőrzött légterek és irányítói körzetek*
2.5.2.2.1 A légtér azon szakaszait, amelyekben a műszerrepülési szabályok szerint üzemeltetett légijárművek részére légiforgalmi irányító szolgálat biztosítását határozták el, irányítói körzeteknek vagy repülőtéri irányító körzetnek minősítsék.
Megjegyzés: Az irányítói körzetek és a repülőtéri irányító körzetek közötti különbséget a 2.10 pontban ismertetjük.
2.5.2.2.1.1 Az ellenőrzött légtér azon szakaszait, amelyekben a látvarepülési szabályok szerint üzemeltetett légijárművek részére is elhatározták a légiforgalmi irányító szolgálat biztosítását, „B”, „C” vagy „D” osztályú légtérnek minősítsék.
2.5.2.2.2 Egy repüléstájékoztató körzeten belül kijelölt ellenőrzött légterek és irányító körzetek ennek a repüléstájékoztató körzetnek a részét képezzék.
2.5.2.3 *Ellenőrzött repülőterek* — Azokat a repülőtereket, amelyeken a repülőtéri forgalom részére légiforgalmi irányító szolgálat biztosítását határozták el, ellenőrzött repülőtérnek minősítsék.

2.6 A légterek osztályozása

2.6.1 Az légiforgalmi szolgálat légtereit az alábbiak szerint osztályozzák és jelöljék ki:
A. osztály — A légtérben csak IFR repüléseket engedélyeznek, az összes légijármű részére légiforgalmi irányító szolgálatot biztosítanak és az összes légijárművet elkülönítik egymástól.
B. osztály — A légtérben IFR és VFR repüléseket engedélyeznek, az összes légijármű részére légiforgalmi irányító szolgálatot biztosítanak és az összes légijárművet elkülönítik egymástól.
C. osztály — A légtérben IFR és VFR repüléseket engedélyeznek, az összes légijármű részére légiforgalmi irányító szolgálatot biztosítanak és az IFR légijárműveket elkülönítik egymástól, valamint a VFR légijárművektől; a VFR légijárműveket elkülönítik az IFR légijárművektől továbbá a VFR légijárművek tájékoztatást kapnak a többi VFR légijárműről.
D. osztály — A légtérben IFR és VFR repüléseket engedélyeznek, az összes légijármű részére légiforgalmi irányító szolgálatot biztosítanak. Az IFR légijárműveket elkülönítik egymástól és azok tájékoztatást kapnak a VFR légijárművekről. A VFR légijárművek tájékoztatást kapnak az összes egyéb légijárműről.
E. osztály — A légtérben IFR és VFR repüléseket engedélyeznek, az IFR légijárművek részére légiforgalmi irányító szolgálatot biztosítanak és elkülönítik azokat a többi IFR légijárműtől. Amennyire ez gyakorlati szempontból lehetséges, minden légijármű forgalmi tájékoztatást kap. A repülőtéri irányítói körzetek esetében az E osztály nem használható.
F. osztály — A légtérben IFR és VFR repüléseket engedélyeznek, minden IFR légijármű részére légiforgalmi tanácsadói szolgálatot és kérésre minden légijármű részére repüléstájékoztató szolgálatot biztosítanak.
Megjegyzés: Ahol légiforgalmi tanácsadó szolgálatot létesítenek, ezt általában a légiforgalmi irányító szolgálattal történő felváltásig csak ideiglenes intézkedésnek tekintik. (Lásd még PANS-ATM 9. fejezet).
G. osztály — A légtérben IFR és VFR repüléseket engedélyeznek és kérésre minden légijármű részére repüléstájékoztató szolgálatot biztosítanak.
2.6.2 Az Államok válasszanak ki igényeiknek megfelelő osztályú légtereket.
2.6.3 Az egyes légtérosztályokban történő repülésekre vonatkozó előírásokat a 4. Függelékben található táblázatban mutatjuk be.
Megjegyzés: Ahol az ATS légterek függőlegesen határosak, azaz egymás felett helyezkednek el, a közös magasságon végrehajtott repülések a kevésbé szigorú légtérosztály követelményeinek tegyenek eleget és részükre a kevésbé szigorú légtérben nyújtott szolgálatot biztosítsák. Így ezen követelmények alkalmazásakor a B osztályú légteret kevésbé szigorúnak tekintik az A osztályúhoz viszonyítva; a C osztályú légteret kevésbé szigorúnak tekintik a B osztályúhoz viszonyítva és így tovább.

2.7 Előírt navigációs teljesítmény (RNP) útvonalrepülésnél

2.7.1 Az RNP típusokat az Államok határozzák meg. Amikor lehetséges, a kijelölt területek, földrajzi

útirányok vagy légiforgalmi szolgálati útvonalak RNP típusait a körzeti légiközlekedési egyezmények alapján írják elő.
2.7.2 ***Ajánlás*** *— A repülés útvonalrepülési szakaszára az RNP1, RNP4, RNP 10, RNP12.6 valamint az RNP20 típusok a lehető legrövidebb időn belül kerüljenek bevezetésre.*
2.7.3 Az előírt navigációs teljesítmény (RNP) típusa feleljen meg az érintett légtérben biztosított távközlési, léginavigációs és légiforgalmi szolgálatok színvonalának.
Megjegyzés: Az alkalmazható RNP típusok és a hozzájuk kapcsolódó eljárások az *Előírt Navigációs Teljesítmény (RNP) Kézikönyvben* (Doc 9613) találhatók.

2.8 Előírt kommunikációs teljesítmény (RCP)

2.8.1 Az RCP típusokat az Államok határozzák meg. Amikor lehetséges, az RCP típus(oka)t a körzeti légiközlekedési egyezmények alapján írják elő.
2.8.2 Az előírt kommunikációs teljesítmény (RCP) típusa feleljen meg az érintett légtérben biztosított légiforgalmi szolgálatok színvonalának.
Megjegyzés Az alkalmazható RCP típusok és a hozzájuk kapcsolódó eljárások az *Előírt Kommunikációs Teljesítmény (RCP) Kézikönyvben* (Doc 9869) lesznek megtalálhatók (kidolgozás alatt).

2.9 A légiforgalmi szolgálatokat biztosító egységek létesítése és kijelölése

A légiforgalmi szolgálatokat a következők alapján létrehozott és kijelölt egységek biztosítják:
2.9.1 A repüléstájékoztató körzeteken belül a repüléstájékoztató és riasztó feladatok ellátására létesítsenek repüléstájékoztató központokat, kivéve, ha egy repüléstájékoztató körzetben ezen szolgálatok ellátásának felelősségét egy olyan légiforgalmi irányító szolgálati egységre ruházták át, amely az ilyen feladatok ellátására megfelelő felszereltséggel rendelkezik.
Megjegyzés: Ez nem zárja ki annak lehetőségét, hogy a repüléstájékoztató szolgálat bizonyos feladatainak ellátását más egységekre ruházzák át.
2.9.2 Az ellenőrzött légtereken és irányító körzeteken belül, továbbá az ellenőrzött repülőtereken a légiforgalmi irányítói, a repüléstájékoztató és riasztó szolgálatok ellátására létesítsenek légiforgalmi irányító egységeket .
Megjegyzés A különböző légiforgalmi irányító egységek által biztosított szolgálatokat a 3.2 pontban ismertetjük.

2.10 Repüléstájékoztató körzetekre, irányítói körzetekre és repülőtéri irányító körzetekre vonatkozó előírások

2.10.1 ***Ajánlás*** *— Azon légtér határainak kijelölése, amelyben légiforgalmi szolgálatokat biztosítanak, inkább az útvonalszerkezet természete és a hatékony szolgálat biztosításának követelményei, mint a nemzeti (ország) határok szerint történjen.*
1. Megjegyzés: Amennyiben ez a légiforgalmi szolgálatok biztosítását megkönnyíti, tanácsos olyan egyezményeket kötni, amelyek tartalma lehetővé teszi egy légtér nemzeti határokon átnyúló kijelölését (lásd 2.1.1). Azon egyezmények például, amelyek lehetővé teszik a légtérhatárok egyenes vonallal történő meghúzását, nagyon kedvezőek az adatfeldolgozási módszereket alkalmazó légiforgalmi szolgálati egységek esetében.
2. Megjegyzés: Ahol a légtér határainak kijelölése az országhatárok szerint történik, szükség van megfelelő helyen levő átadási pontok közös megegyezéssel történő meghatározására is.
2.10.2 Repüléstájékoztató körzetek
2.10.2.1 A repüléstájékoztató körzeteket úgy jelöljék ki, hogy azok fedjék az ilyen körzetek által meghatározott teljes útvonalszerkezetet.
2.10.2.2 A repüléstájékoztató körzet oldalsó határain belül az egész légteret foglalja magába, kivéve, ha azt felülről egy magaslégtéri repüléstájékoztató körzet határolja.
2.10.2.3 Ahol a repüléstájékoztató körzetet magaslégtéri repüléstájékoztató körzet határolja, a

magaslégtéri repüléstájékoztató körzet alsó határa legyen azonos a repüléstájékoztató körzet felső függőleges határával és essen egybe a 2. Annex 3. Függelék táblázataiban ismertetett VFR utazómagasságok egyikével.
Megjegyzés: Azokban az esetekben, amikor magaslégtéri repüléstájékoztató körzetet létesítettek, az ott alkalmazandó eljárásoknak nem szükségesek azonosnak lenniük magaslégtéri repüléstájékoztató körzet alatt elhelyezkedő repüléstájékoztató körzetben alkalmazandó eljárásokkal.
2.10.3 Irányítói körzetek
2.10.3.1 A *többek között* útvonalakat, valamint közelkörzeteket magukba foglaló irányítói körzetek határait úgy jelöljék ki, hogy azok olyan megfelelő nagyságú légtérrel rendelkezzenek, amelyek magukba foglalják azokat a műszerrepülési szabályok szerint végrehajtott repülések számára kijelölt útvonalakat vagy útvonal szakaszokat, melyek a területen általában alkalmazott navigációs berendezések lehetőségeit figyelembe véve, a légiforgalmi irányító szolgálatok megfelelő egységeinek működéséhez kívánatosak.
Megjegyzés: Abban az irányítói körzetben, amelyet nem útvonalrendszer alapján alakítottak ki, létesíthetnek olyan útvonalrendszert, amely lehetővé teszi a légiforgalmi irányító szolgálat biztosítását.
2.10.3.2 Az irányítói körzet alsó határát talaj vagy vízfelszín felett legalább 200 méter (700 láb) magasság felett jelöljék ki.
Megjegyzés: Ez nem jelenti azt, hogy egy adott irányító körzeten belül az alsó határt egységesen kell kijelölni (lásd a *Légiforgalmi Szolgálatok Tervezési Kézikönyve* (Doc 9426) I. Rész, 2. Kötet, 3. Fejezet: A-5 ábra).
2.10.3.2.1 ***Ajánlás** — Amikor lehetséges és kívánatos, hogy az irányítói körzet alatt a VFR repülések számára szabad működést biztosítsanak, az ellenőrzött légtér alsó határát a 2.10.3.2 pontban meghatározott minimumnál magasabban jelöljék ki.*
2.10.3.2.2 ***Ajánlás** — Amikor az irányítói körzet alsó határa 900 m (3000 láb) közepes tengerszint feletti magasság felett van, akkor az a 2. Annex 3. Függelékben ismertetett VFR utazómagasságok egyikével essen egybe.*
Megjegyzés: Ebből következik, hogy olyan VFR utazómagasságot válasszanak ki, amelynél a várható helyi atmoszférikus nyomásváltozások ne okozzák ennek a magasságnak talaj vagy vízfelszín felett 200 méter (700 láb) értéknél alacsonyabbra történő csökkenését.
2.10.3.3 Az irányító körzet felső határát akkor határozzák meg, ha:
a) ezen felső határ felett légiforgalmi irányító szolgálatot nem biztosítanak; vagy
b) az irányítói körzet magaslégtéri irányítói körzet alatt helyezkedik el, amely esetben a felső határ essen egybe a magaslégtéri irányítói körzet alsó határával.
Amennyiben ilyen felső határt jelöltek ki, az essen egybe a 2. Annex 3. Függelékben ismertetett VFR utazómagasságok egyikével.
2.10.4 Magaslégtéri repüléstájékoztató vagy irányító körzetek
***Ajánlás** —Ahol kívánatos azon repüléstájékoztató körzetek vagy irányítói körzetek számának korlátozása, amelyeken a nagyobb repülési magasságon üzemelő légijárműveknek egyébként át kellene repülniük, a repüléstájékoztató körzet vagy irányítói körzet határát úgy jelöljék ki, hogy az több, alatta elhelyezkedő repüléstájékoztató körzetet vagy irányítói körzetet fedjen.*
2.10.5 Repülőtéri irányító körzetek
2.10.5.1 A repülőtéri irányító körzetek oldalsó határai foglalják magukba legalább a légtér nem irányító körzeten belül eső azon szakaszait, amelyek fedik a repülőtéren műszeres időjárási körülmények között műszerrepülési szabályok szerint üzemeltetett érkező és induló légijárművek repülési pályáját.
Megjegyzés: A repülőterek közelében várakozó légijárművek érkezőnek tekintendők.
2.10.5.2 A repülőtéri irányító körzetek oldalsó határai az adott repülőtér vagy repülőterek középpontjától legalább 9.3 km (5 tmf) távolságra terjedjenek azokba az irányokba, amelyekből a megközelítések végrehajthatók.
Megjegyzés: Egy repülőtéri irányító körzet két vagy több, egymáshoz közel elhelyezkedő repülőteret is magába foglalhat.
2.10.5.3 Ha a repülőtéri irányító körzetet az irányító körzet oldalsó határain belül létesítették, akkor az függőlegesen a talaj szintjétől legalább az irányító körzet alsó határáig terjedjen.

Megjegyzés: Amennyiben ez kívánatos, a repülőtéri irányító körzet felső határa a felette elhelyezkedő irányító körzet alsó határánál magasabban is kijelölhető.
2.10.5.4 ***Ajánlás*** *— Ha a repülőtéri irányító körzet az irányító körzet oldalsó határain kívül helyezkedik el, jelöljenek ki felső határt.*
2.10.5.5 ***Ajánlás*** *— Amennyiben kívánatos, hogy a repülőtéri irányító körzet felső határát magasabban jelöljék ki, mint a felette elhelyezkedő irányító körzet alsó határa, vagy ha a repülőtéri irányító körzet az irányító körzet oldalsó határán kívül fekszik, annak felső határát úgy határozzák meg, hogy az a repülőgép-vezetők számára jól azonosítható legyen. Ha ez a határ 900 m (3000 láb) közepes tengerszint feletti magasság felett van, akkor lehetőleg essen egybe a 2. Annex 3. Függelékben ismertetett VFR utazómagasságok egyikével.*
Megjegyzés: Ezen pont alkalmazása esetén olyan VFR utazómagasságot válasszanak, amelynél a várható helyi atmoszférikus nyomásváltozások ne eredményezzék ennek a magasságnak talaj vagy vízfelszín felett 200 méter (700 láb) értéknek alacsonyabbra történő csökkenését.

2.11 A légiforgalmi szolgálati egységek és légterek elnevezése

2.11.1 ***Ajánlás*** *— A körzeti irányító központot vagy repüléstájékoztató központot egy közeli városról vagy földrajzi jellegzetességről nevezzék el.*
2.11.2 ***Ajánlás*** *— A repülőtéri irányítótornyot vagy bevezető irányító egységet arról a repülőtérről nevezzék el, ahol azt létesítették.*
2.11.3 ***Ajánlás*** *— A repülőtéri irányító körzetet, az irányító vagy repüléstájékoztató körzetet az adott légtér felett felügyeletet gyakorló egység nevével azonosítsák.*

2.12 A légiforgalmi szolgálati útvonalak létesítése és elnevezése

2.12.1 Amikor légiforgalmi szolgálati útvonalakat jelölnek ki, minden egyes ATS útvonal mentén határozzanak meg védett (biztonsági) légtereket és biztosítsák a szomszédos ATS útvonalak közötti megfelelő elkülönítést.
2.12.2 ***Ajánlás*** *— Amikor a légiforgalom sűrűsége, összetettsége vagy természete indokolja, az alacsony repülési magasságon üzemelő légiforgalom részére — beleértve a nyílt vizeken létesített helikopter leszállóhelyekre/ről üzemelő forgószárnyas légijárműveket is — jelöljenek ki különleges útvonalakat. Az ilyen útvonalak közötti oldalirányú távolság meghatározása alkalmával vegyék figyelembe a forgószárnyas légijármű fedélzetén elhelyezett navigációs berendezéseket és rendelkezésre álló navigációs eszközöket is.*
2.12.3 Az ATS útvonalakat elnevezéssel azonosítsák.
2.12.4 Az ATS útvonalak elnevezését a szabvány indulási és érkezési útvonalak kivételével az 1. Függelék alapelvei szerint határozzák meg.
2.12.5 A szabvány indulási és érkezési útvonalakat valamint az azokkal kapcsolatos eljárásokat a 3. Függelék alapelvei szerint azonosítsák.
1. Megjegyzés: A légiforgalmi szolgálati útvonalak létesítésével kapcsolatos útmutató a *Légiforgalmi Szolgálati Tervezési Kézikönyvben* (Doc 9426) található.
2. Megjegyzés: A VOR berendezéssel meghatározott ATS útvonalak létesítésével kapcsolatos útmutató az A. Mellékletben található.
3. Megjegyzés: Az olyan párhuzamos útirányok vagy ATS útvonal középvonalak közötti oldaltávolság, amelyeknél előírt navigációs teljesítmény típus kijelölése szükséges, a meghatározott RNP típustól függ. A területi navigációs berendezéssel (RNAV) felszerelt légijárművek számára kijelölt ATS útvonalakra valamint az RNP típus alapján meghatározott útvonalak közötti elkülönítésre vonatkozó tájékoztató anyag a B. Mellékletben található.

2.13 Átkapcsolási pontok kijelölése

2.13.1 ***Ajánlás*** *—Azokon a VOR berendezésekkel kijelölt légiforgalmi szolgálati útvonal szakaszokon, ahol ez az adott útvonal szakasz mentén segítheti a pontos navigációt, jelöljenek ki átkapcsolási pontokat. Az átkapcsolási pontok kijelölését kívánatos 110 km-es (60 tmf) vagy ennél hosszabb útvonalszakaszokra*

korlátozni, kivéve ha az ATS útvonalak bonyolultsága, a navigációs berendezések sűrűsége vagy más műszaki illetve üzemeltetési szempontok az átkapcsolási pontok rövidebb útvonalszakaszokon történő kijelölését is indokolják.
2.13.2 ***Ajánlás*** *— Amennyiben a navigációs berendezések teljesítménye vagy a rádió frekvencia tartományok védelme mást nem tesz szükségessé, az útvonalszakaszon az átkapcsolási pontot a két berendezés között egyenes útvonalszakasznál félúton, illetve olyan VOR radiálok esetében, ahol az útvonal iránya megváltozik, azok kereszteződésénél jelöljék ki.*
Megjegyzés: Az átkapcsolási pontok kijelölésével kapcsolatos tájékoztatót az A. Melléklet tartalmazza.

2.14 Fontos pontok kijelölése és elnevezése

2.14.1 A légiforgalmi szolgálati útvonalak meghatározására és/vagy a légiforgalmi szolgálatok azon igényeinek kielégítésére, hogy azok a levegőben levő légijármű mozgásáról megfelelő tájékoztatásokat szerezhessenek be, jelöljenek ki fontos pontokat.
2.14.2 A fontos pontokat elnevezéssel azonosítsák.
2.14.3 A fontos pontokat 2. Függelék alapelvei szerint jelöljék ki és nevezzék el.

2.15 Szabvány útvonalak kijelölése és elnevezése guruló légijárművek számára

2.15.1 ***Ajánlás*** *— Ahol ez szükséges, a guruló légijárművek részére szabvány útvonalakat határozzanak meg egy repülőtéren a futópályák, a forgalmi előterek és a karbantartási területek között. Ezek az útvonalak legyenek közvetlenek és egyszerűek, továbbá amennyiben lehetséges, ezeket úgy jelöljék ki, hogy a forgalmi konfliktusokat elkerüljék.*
2.15.2 ***Ajánlás*** *— A gurulást végző légijárművek részére meghatározott szabvány útvonalakat olyan azonosítóval lássák el, amelyek jól megkülönböztethetők a futópályák és a légiforgalmi szolgálati útvonalak megnevezéseitől.*

2.16 Együttműködés a járató és a légiforgalmi szolgálatok között

2.16.1 A légiforgalmi szolgálati egységek saját feladataik ellátása mellett vegyék figyelembe a járatóknak a 6. Annex-ben meghatározott kötelezettségeiből származó igényeit és kérésre a járatók vagy kijelölt képviselőik számára adják meg azokat a rendelkezésre álló tájékoztatásokat, amelyek lehetővé teszik ezen kötelezettségeik teljesítését.
2.16.2 Amennyiben a járató ezt kéri, a légiforgalmi szolgálati egységek az elfogadott helyi együttműködési eljárás alapján, a gyakorlati lehetőségek határain belül azonnal adják meg a járató vagy kijelölt képviselője számára azon légijármű üzemeltetésére vonatkozóan vett tájékoztatásokat (beleértve a helyzetjelentéseket is), amelynek a járató repülésüzemi irányítást biztosít.
Megjegyzés: A jogellenes beavatkozás alatt álló légijárművekre vonatkozókat lásd a 2.23.3 pontban.

2.17 Együttműködés a katonai hatóságok és a légiforgalmi szolgálatok között

2.17.1 A légiforgalmi szolgálatok hatóságai alakítsanak ki és tartsanak fenn szoros együttműködést azokért a tevékenységekért felelős katonai hatóságokkal, amelyek befolyásolhatják a polgári légijárművek repülését.
2.17.2 A polgári légijárművekre gyakorlati veszélyt jelentő tevékenységek egyeztetését a 2.18 pontban előírtaknak megfelelően végezzék.
2.17.3 Foganatosítsanak intézkedéseket annak érdekében, hogy a légiforgalmi szolgálati és az illetékes katonai egységek között azonnal kicserélhessék a polgári légijárművek repülésének biztonságos és hatékony lebonyolításához szükséges vonatkozó információkat.
2.17.3.1 A légiforgalmi szolgálati egységek, az elfogadott helyi együttműködési eljárásoknak megfelelően, a szokásos munkamenet részeként, vagy kérésre adják meg az illetékes katonai egységek számára a polgári légijárművek repülésére vonatkozó repülési terv- és egyéb adatokat. A polgári légijárművek elfogása szükségességének csökkentése vagy kiküszöbölése érdekében a légiforgalmi szolgálati hatóságok jelöljék ki azokat a területeket vagy útvonalakat, amelyeken a 2. Annex repülési

tervekre, kétirányú rádió-összeköttetés fenntartásra valamint a helyzetjelentésekre vonatkozó előírásai minden repülésre vonatkoznak, hogy a polgári légijárművek azonosítása érdekében minden szükséges adat az illetékes légiforgalmi szolgálati egységek rendelkezésére álljon.
Megjegyzés: A jogellenes beavatkozás alatt álló légijárművekre vonatkozókat lásd a 2.23.3 és 2.24.1.3 pontokban.
2.17.3.2 Vezessenek be különleges eljárásokat annak biztosítására, hogy:

a) a légiforgalmi szolgálati egységek kapjanak tájékoztatást arról, ha a katonai egység olyan ténylegesen vagy valószínűsíthetően polgári légijárművet figyel meg, amely egy olyan légteret közelít meg vagy lép be oda, amelyben elfogás válhat szükségessé;

b) tegyenek meg minden lehetséges intézkedést a kérdéses légijármű azonosítására és adják meg számára az elfogás elkerüléséhez szükséges összes navigációs tájékoztatást.

2.18 A polgári légijárművekre gyakorlati veszélyt jelentő tevékenységek egyeztetése

2.18.1 A polgári légijárművekre gyakorlati veszélyt jelentő tevékenységre vonatkozó intézkedéseket — függetlenül attól, hogy azok egy Állam területe vagy nyílt vizek felett történnek-e — egyeztessék az illetékes légiforgalmi szolgálati hatósággal. Az egyeztetést időben végezzék el ahhoz, hogy a vonatkozó tájékoztatásokat a 15. Annex előírásainak megfelelően időben közzétehessék.

2.18.1.1 ***Ajánlás*** *— Ha az illetékes légiforgalmi szolgálati hatóság nem annak az Államnak hatósága, ahol a tevékenységet tervező szervezet van, az előzetes egyeztetést azon légiforgalmi szolgálati hatóság útján végezzék el, amely azért a légtérért felelős, ahol a szervezet működik.*

2.18.2 Az egyeztetés célja a lehatásosabb intézkedések végrehajtása, amelyekkel elkerülhető a polgári légijármű veszélyeztetése és biztosítható az ilyen légijármű általános jellegű üzemeltetésének lehető legkisebb mértékű megzavarása illetve korlátozása.

2.18.2.1 ***Ajánlás*** *— Az ilyen intézkedések meghatározásánál a következőket hajtsák végre, illetve vegyék figyelembe:*

a) a tevékenység helyszíne(i) vagy területe(i), időpontjai valamint időtartama, amelyeket úgy válasszanak meg, hogy elkerüljék a légiforgalmi szolgálati útvonalak lezárását vagy átirányítását, a leginkább használatos repülési szintek használatának korlátozását vagy a menetrendszerű légiforgalom késleltetését, kivéve ha más lehetőség nincs;

b) a tevékenység végrehajtására kijelölt légtér méretét korlátozzák a lehető legkisebbre;

c) létesítsenek közvetlen összeköttetést az illetékes légiforgalmi szolgálati hatóság vagy egység valamint a tevékenységet végrehajtó szervezet vagy egység között arra az esetre, ha polgári légijárművek kényszerhelyzete vagy más, előre nem látható események miatt a tevékenység(ek) megszakítása válik szükségessé.

2.18.3 Az illetékes légiforgalmi szolgálati hatóságok felelősek a veszélyt jelentő tevékenységekkel kapcsolatos tájékoztatások közzétételéért.

2.18.4 ***Ajánlás*** *— Amennyiben a polgári légijárművekre tényleges veszélyt jelentő tevékenységek rendszeresek vagy folyamatosan ismétlődnek, szükség szerint hozzanak létre külön bizottságokat annak érdekében, hogy az együttműködés az összes érdekelt fél igényeinek megfelelően biztosítható legyen.*

2.18.5 *Foganatosítsanak megfelelő intézkedéseket a repülési üzemeltetést hátrányosan befolyásoló lézersugár kibocsátás megelőzésére.*

1. Megjegyzés: A repülési üzemeltetést hátrányosan befolyásoló lézersugár kibocsátásra vonatkozó tájékoztató anyag a Lézersugár Kibocsátás és Repülésbiztonság Kézikönyvben (Doc 9815) található.

2. Megjegyzés: Lásd továbbá 14. Annex — Repülőterek, I. kötet — Repülőtér tervezés és üzemeltetés 5. fejezetét.

2.18.6 **Ajánlás** — *A légtérkapacitás növelése, valamint a légijármű üzemeltetés hatékonyságának és rugalmasságának biztosítása érdekében az Államok dolgozzanak ki eljárásokat a katonai vagy más különleges tevékenységekre fenntartott légterek rugalmas felhasználására. Az eljárások tegyék lehetővé az összes légtérfelhasználó biztonságos belépését az ilyen fenntartott légtérbe.*

2.19 Léginavigációs adatok

2.19.1 A légiforgalmi szolgálatokra vonatkozó léginavigációs adatok meghatározását és közzétételét az 5. Függelék 1. — 5. táblázataiban található pontossági és megbízhatósági előírások szerint, a kidolgozott minőségbiztosítási eljárások figyelembevételével végezzék. A léginavigációs adatok pontossága 95 %-os megbízhatósági szintű legyen és ebben a vonatkozásban három típusú helyzetadatot azonosítsanak az alábbiak szerint: földméréssel felmért pontok (pl. a navigációs berendezések helyzete); számított pontok (a térben felmért pontok alapján matematikai számítással meghatározott állandó pontok); kijelölt és közzétett pontok (pl. repüléstájékoztató körzet határpontok).

Megjegyzés: A minőség-biztosítási rendszerre vonatkozó előírások a 15. Annex 3. fejezetében találhatók.

2.19.2 A szerződő Államok biztosítsák, hogy a léginavigációs adatok megbízhatósága az adatfeldolgozás során, a felméréstől vagy első számítástól a várható felhasználóig folyamatosan állandó legyen. A léginavigációs adatok megbízhatósági követelményeit az adat felhasználás során bekövetkező, lehetséges változását valamint az adatra vonatkozó felhasználói igényeket jelző kockázati tényező alapján határozzák meg. Ennek megfelelően a következő osztályozás és adat megbízhatósági szint alkalmazandó:

a) kritikus adat — megbízhatósági szint 1×10^{-8}*:* a hibás vagy pontatlan kritikus adat felhasználásánál nagy valószínűsége van annak, hogy egy légijármű biztonságos repülésének folytatása és a leszállás végrehajtása komoly veszélybe kerül, kockáztatva akár a légikatasztrófa lehetőségét is;

b) alapvető adat — megbízhatósági szint 1×10^{-5}*:* a hibás vagy pontatlan alapvető adat felhasználásánál csekély valószínűsége van annak, hogy egy légijármű biztonságos repülésének folytatása és a leszállás végrehajtása komoly veszélybe kerül, kockáztatva akár a légikatasztrófa lehetőségét is;

c) általános felhasználású adat — megbízhatósági szint 1×10^{-3}*:* a hibás vagy pontatlan általános adat felhasználásánál nagyon csekély valószínűsége van annak, hogy egy légijármű biztonságos repülésének folytatása és a leszállás végrehajtása komoly veszélybe kerül, kockáztatva akár a légikatasztrófa lehetőségét is.

2.19.3 Az elektronikus léginavigációs adatok tárolása és átvitele alkalmával azokat teljes egészében rendszeres időszakos felülvizsgálattal (CRC1) ellenőrizzék. A fenti 2.19.2 pont szerint osztályozott kritikus és alapvető léginavigációs adatok megbízhatóságának védelméhez 32 illetve 24 bites CRC algoritmust használjanak.

2.19.4 ***Ajánlás*** *— A fenti 2.19.2 pont szerint osztályozott általános felhasználású léginavigációs adatok megbízhatóságának a védelméhez 16 bites CRC algoritmust használjanak.*

Megjegyzés: A léginavigációs adatminőségi követelményeket (pontosság, felbontás, megbízhatóság, adatvédelem és eredetvizsgálat) az *Egész világon egységesen alkalmazható földrajzi hely meghatározási rendszer (WGS-84) Kézikönyv* (Doc 9674) tartalmazza. Az 5. Függelék a léginavigációs adatok pontossági és megbízhatósági előírásaira vonatkozó kiegészítő tájékoztatás az RTCA DO-201A és az Európai Polgári Légiközlekedési Berendezések EUROCAE ED-77 *A Léginavigációs Tájékoztatás Ipari Előírásai* kiadványokban található.

2.19.5 A szélességi és hosszúsági fokokat jelző földrajzi koordinátákat az egész világon egységesen alkalmazható földrajzi hely meghatározási rendszer (World Geodetic System — WGS-84) alapadat formátumban határozzák meg és jelentsék a légiforgalmi tájékoztató szolgálat hatósága számára, külön megjelölve azokat a földrajzi koordinátákat, amelyeket matematikai módszerrel a fenti WGS-84 alap-adattá számoltak át, és amelyeknél az eredeti földmérési adatok nem felelnek meg az 5. Függelék 1. táblázat előírásainak.

2.19.6 A tényleges földmérési munka, valamint az ebből meghatározott és számított adatok pontossága olyan legyen, hogy a kapott üzemeltetési navigációs adatok legnagyobb eltérései a repülés végrehajtásának szakaszaiban az adott koordináta rendszer jellegét figyelembe véve az 5. Függelék táblázataiban jelzett értékeken belül legyenek.

1. Megjegyzés: A megfelelő alkalmas koordináta rendszer az, amely lehetővé teszi az adott hely minden szükséges földrajzi adatának WGS-84 alapján történő felmérését.

2. Megjegyzés: A WGS-84 koordináta rendszer alapján meghatározott koordináták közzétételével kapcsolatos előírásokat a 4. Annex 2. fejezete, valamint a 15. Annex 3. fejezete tartalmazza.

3. Megjegyzés: A kettős célt szolgáló helyek vagy pontok, mint például a várakozási pont és megszakított megközelítés pontja esetében a nagyobb pontossági értéket alkalmazzák.

2.20 Együttműködés a meteorológiai és a légiforgalmi szolgálati hatóságok között

2.20.1 Annak érdekében, hogy a légijármű az üzemeltetéséhez szükséges legfrissebb időjárási tájékoztatásokat kapja, szükség szerint hozzanak intézkedéseket a meteorológiai és a légiforgalmi szolgálati hatóságok között, hogy a légiforgalmi szolgálatok személyzete:

a) a kijelző műszerek használatán túlmenően, a megállapodásoknak megfelelően jelentse a légiforgalmi szolgálati egységek személyzete által megfigyelt vagy a légijárművektől kapott tájékoztatás alapján tudomására jutott időjárási tényezőket (elemeket);

b) a lehető a lehető legrövidebb időn belül jelentse a társított meteorológiai hivatalnak a légiforgalmi szolgálati egység személyzete által megfigyelt vagy a légijárművek által jelentett, az üzemeltetés szempontjából lényeges időjárás-jelenségeket, amelyek a repülőtéri időjárás jelentésbe nem kerültek be;

c) a lehető legrövidebb időn belül jelentse a társított meteorológiai hivatalnak a vulkán kitörés bekövetkezésére utaló előjeleket, a vulkán kitöréseket valamint a vulkánikus hamufelhőre vonatkozó tájékoztatásokat. Ezen kívül a körzeti irányító valamint a repüléstájékoztató központok továbbítsák a tájékoztatást a társított időjárás észlelő hivatalnak és a vulkáni tevékenység (hamu) tanácsadói központoknak (VAAC) is.

1. Megjegyzés: A vulkáni tevékenység (hamu) tanácsadói központokat (VAAC) a 3. Annex 3.6.1 pontja alapján a körzeti légiközlekedési egyezményekben jelölik ki.

2. Megjegyzés: A rendkívüli légi jelentések továbbítására vonatkozóan lásd a 4.2.3 pontot.

2.20.2 Tartsanak fenn szoros együttműködést a körzeti irányító központok, a repüléstájékoztató központok valamint a társított időjárás észlelő hivatalok között annak biztosítása érdekében, hogy a NOTAM és SIGMET közleményekben jelzett vulkáni hamuról szóló tájékoztatások egymással megegyezők legyenek.

2.21 Együttműködés a légiforgalmi tájékoztató szolgálatok és a légiforgalmi szolgálati hatóságok között

2.21.1 Annak érdekében, hogy a légiforgalmi tájékoztató szolgálati egységek beszerezzék azokat a tájékoztatásokat, amelyek lehetővé teszik, hogy a légijármű számára megadják a legfrissebb repülés előtti tájékoztatásokat és kielégítsék a repülés közbeni tájékoztatásokra vonatkozó igényeket is, szükség szerint hozzanak intézkedéseket a légiforgalmi tájékoztató szolgálatok és a légiforgalmi szolgálati hatóságok között, hogy a légiforgalmi szolgálatok személyzete a felelős légiforgalmi tájékoztató szolgálati egységnek a lehető legkisebb késéssel jelentse:

a) a repülőtér állapotára vonatkozó tájékoztatásokat;

b) az illetékességi területükön elhelyezett navigációs berendezések, létesítmények és szolgálatok működési állapotát;

c) a légiforgalmi szolgálati egység személyzete által megfigyelt vagy a légijárművek által jelentett vulkáni tevékenységet; és

d) bármely más, az üzemeltetés szempontjából lényegesnek ítélt tájékoztatást.

2.21.2 A léginavigációs rendszer megváltoztatásának bevezetése előtt az ilyen változtatásért felelős szolgálatok vegyék figyelembe azt az időtartamot, amely a légiforgalmi tájékoztató szolgálatnak a tájékoztató anyagok kidolgozásához, elkészítéséhez és kiadásához szükséges. Ezért az érintett szervezetek szoros együttműködése szükséges annak biztosítása érdekében, hogy a légiforgalmi tájékoztató szolgálat a vonatkozó tájékoztatásokat időben megkapja.

2.21.3 Különösen fontosak azok a térképeket és/vagy a számítógépes navigációs rendszereket érintő léginavigációs tájékoztatások, amelyek változásáról a 15. Annex 6. fejezete és 4. Függeléke előírásai szerint az AIRAC — léginavigációs tájékoztató szabályozó és ellenőrző rendszer — tájékoztatást kell, hogy biztosítson. A felelős légiforgalmi szolgálatok a légiforgalmi tájékoztató szolgálat számára benyújtandó tájékoztató anyagok és adatok továbbításánál a meghatározott és nemzetközileg elfogadott AIRAC hatálybalépési időpontokat a 14 napos postai átfutási idővel együtt vegyék figyelembe.

2.21.4 A légiforgalmi tájékoztató szolgálatok számára szükséges tájékoztató anyagok és adatok biztosításáért felelős légiforgalmi szolgálatok a jelen Annex 5. Függelékében meghatározott léginavigációs adatpontossági és -megbízhatósági követelmények figyelembevételével végezzék ezt a feladatot.

1. Megjegyzés: A NOTAM, SNOWTAM és ASHTAM kiadására vonatkozó előírások a 15. Annex 5. fejezetében találhatók.

2. Megjegyzés: A vulkáni tevékenységre vonatkozó jelentések a 3. Annex 4. fejezetében részletesen

ismertetett tájékoztatásokból álljanak.
3. Megjegyzés: Az AIRAC tájékoztatást a légiforgalmi tájékoztató szolgálat legalább 42 nappal az AIRAC hatálybalépési időpontja előtt ossza szét azzal a céllal, hogy az anyag legalább a hatálybalépés előtt 28 nappal eljusson az érintettekhez (címzettekhez).
4. Megjegyzés: A meghatározott és nemzetközileg elfogadott AIRAC hatálybalépési időpontok tervezett 28 napos beosztását, -- 1997. november 6.-ával együtt -- valamint az AIRAC felhasználásra vonatkozó tájékoztatót az *AIS Légiforgalmi Tájékoztató Szolgálati Kézikönyv* (Doc 8126, 2. fejezet 2.6 pont) tartalmazza.

2.22 Legalacsonyabb repülési magasságok

Minden szerződő Állam jelölje ki és tegye közzé a legalacsonyabb repülési magasságokat minden egyes olyan légiforgalmi szolgálati útvonalon és irányítói körzetben, amely területe felett helyezkedik el. A meghatározott legalacsonyabb repülési magasságok tartsanak biztonságos elkülönítést az érintett területen levő mérvadó akadály felett.
Megjegyzés: A legalacsonyabb repülési magasságok meghatározására és a szerződő Államok általi közzétételére vonatkozó előírásokat a 15. Annex 1. Függeléke tartalmazza. Az akadálymentességi előírások részletezése a PANS-OPS (Doc 8168) kiadvány II. kötetében található.

2.23 Kényszerhelyzetben levő légijármű részére biztosított szolgálat

2.23.1 Ha egy légijárműről ismert, vagy feltételezett, hogy kényszerhelyzetben van — beleértve a jogellenes beavatkozás esetét is — más légijárművekkel szemben a legnagyobb figyelmet, segítséget és elsőbbséget kell biztosítani, ahogy azt a körülmények szükségessé teszik.
Megjegyzés: A megfelelő adathálózati összeköttetési egységgel és/vagy másodlagos radar válaszjeladóval felszerelt légijármű a kényszerhelyzet állapotának jelzésére berendezését a következők szerint üzemeltetheti:
a) A módban 7700-as kód; vagy
b) A módban 7500-as kód annak külön jelzésére, hogy jogellenes beavatkozás alatt áll; vagy
c) ADS-B vagy ADS-C egységét a megfelelő kényszerhelyzeti és/vagy sürgősségi üzemmódba kapcsolja; vagy
d) a légiforgalmi irányító és repülőgépvezető közötti adat-távközlési összeköttetésen (CPDLC) keresztül megfelelő kényszerhelyzeti közleményt ad.
2.23.1.1 ***Ajánlás*** *— Kényszerhelyzet esetén a légiforgalmi szolgálati egység és a légijármű közötti közleményváltásoknál az Emberi Tényezők Alapelveit vegyék figyelembe.*
Megjegyzés: Az Emberi Tényezők Alapelveivel kapcsolatos útmutatás az *Emberi Tényezők Kiképzési Kézikönyv*ben (Doc 9683) található.
2.23.2 Amikor egy légijármű jogellenes beavatkozás alatt áll, vagy azt feltételezik, hogy jogellenes beavatkozás alatt állhat, a légiforgalmi szolgálati egységek azonnal vegyék figyelembe a légijármű kéréseit. Folytassák a repülés biztonságos lebonyolításához szükséges lényeges tájékoztatások megadását és hajtsák végre azokat a szükséges intézkedéseket, amelyekkel a repülés egyes szakaszait — különös tekintettel a légijármű biztonságos leszállására — meggyorsíthatják.

2.23.3. Amikor egy légijármű jogellenes beavatkozás alatt áll, vagy azt feltételezik, hogy jogellenes beavatkozás alatt állhat, az ATS egységeknek a helyi előírásoknak megfelelően azonnal értesíteni kell az Állam által kijelölt megfelelő hatóságot, és meg kell adniuk a járatónak, vagy kijelölt képviselőjének a szükséges tájékoztatásokat.

1. Megjegyzés: Az útvonalától eltért vagy azonosítatlan légijárműről feltételezhető, hogy jogellenes beavatkozás alatt áll. Lásd 2.24.1.3 pont.
2. Megjegyzés: Az útvonalától eltért vagy azonosítatlan légijárművek kezelésére vonatkozó eljárások a 2.24.1 pontban találhatók.
3. Megjegyzés: A jogellenes beavatkozással kapcsolatos részletesebb eljárások a PANS-ATM (Doc 4444)

15. fejezet, 15.1.3 pontban találhatók.

2.24 Repülés közben bekövetkező váratlan események

2.24.1 Útvonalától eltért vagy azonosítatlan légijármű

1. Megjegyzés: A jelen pontban az „útvonalától eltért” és az „azonosítatlan” légijármű kifejezések az alábbi jelentéssel rendelkeznek:

Útvonalától eltért légijármű: Olyan légijármű, amely tervezett útvonalától jelentősen eltért vagy jelentette, hogy eltévedt.

Azonosítatlan légijármű: Olyan légijármű, amelynek működését egy adott légtéren belül megfigyelték, vagy ezt jelentették, azonban azonosságát nem állapították meg.

2. Megjegyzés: Ugyanabban az időben ugyanazt a légijárművet az egyik egység „útvonalától eltért légijárműként” míg egy másik egység „azonosítatlan légijárműként” tekintheti.

3. Megjegyzés: Az útvonalától eltért vagy azonosítatlan légijárműről feltételezhető, hogy jogellenes beavatkozás alatt áll.

2.24.1.1 Amint egy légiforgalmi szolgálati egység egy útvonalától eltért légijárműről szerez tudomást, a légijármű segítése és repülésének biztosítása érdekében hajtsa végre a 2.24.1.1.1 és 2.24.1.1.2 alpontokban előírt összes szükséges intézkedést.

Megjegyzés: Különösen fontos a légiforgalmi szolgálati egység részéről nyújtott navigációs segítség abban az esetben, ha az egység olyan légijárműről szerez tudomást, amely egy olyan légtérbe tévedt be vagy nagy valószínűséggel be fog tévedni, ahol fennáll az elfogás lehetősége vagy a légijármű biztonsága más okból veszélybe kerülhet.

2.24.1.1.1 Amennyiben a légijármű helyzete nem ismert, a légiforgalmi szolgálati egység:

a) kíséreljen meg kétirányú rádió-összeköttetést létesíteni a légijárművel, kivéve, ha az ez összeköttetés már fennáll;

b) minden rendelkezésre álló eszközt és módszert használjon fel a légijármű helyzetének meghatározására;

c) tájékoztassa azokat a légiforgalmi szolgálati egységeket, amelyek területére a légijármű betévedt vagy betévedhet, figyelembe véve mindazokat a tényezőket, amelyek a légijármű navigációját az adott körülmények között befolyásolhatják;

d) az elfogadott helyi együttműködési eljárásoknak megfelelően tájékoztassa az illetékes katonai egységeket és adja meg részükre a repülési terv vonatkozó adatait, valamint az útvonalától eltért légijárművet érintő más tájékoztatást;

e) kérje fel a c) és d) alpontokban jelzett egységeket valamint a levegőben levő többi légijárművet, hogy adjanak meg minden segítséget a légijárművel történő összeköttetés felvételére és helyzetének meghatározására.

Megjegyzés: A d) és e) alpontok előírásai a c) alpont szerint értesített légiforgalmi szolgálati egységekre is vonatkoznak.

2.24.1.1.2 Amikor a légijármű helyzetét megállapították, a légiforgalmi szolgálati egységek:

a) a légijárművet tájékoztassák helyzetéről és a szükséges végrehajtandó tevékenységről; valamint

b) a többi légiforgalmi szolgálati és katonai egységnek szükség szerint adják meg az útvonalától eltért légijárműre vonatkozó tájékoztatásokat és a légijármű részére adott bármely tanácsot.

2.24.1.2 Amint egy légiforgalmi szolgálati egység tudomást szerez egy, a területén levő azonosítatlan légijárműről, kísérelje meg a légijármű azonosságát megállapítani, ha ez a légiforgalmi szolgálat ellátásához szükséges vagy ezt az illetékes katonai hatóságok az elfogadott helyi együttműködési eljárás alapján kérik. Ennek érdekében a légiforgalmi szolgálati egység, a körülmények figyelembevételével:

a) kíséreljen meg kétirányú rádió-összeköttetést létesíteni a légijárművel,;

b) a repüléstájékoztató körzeten belül levő többi légiforgalmi szolgálati egységnél érdeklődjön a légijárműről és kérje segítségüket a légijárművel történő kétirányú rádió-összeköttetést létesítésére;

c) a szomszédos repüléstájékoztató körzetekben levő légiforgalmi szolgálati egységeknél érdeklődjön a légijárműről és kérje segítségüket a légijárművel történő kétirányú rádió-összeköttetést létesítésére;

d) kíséreljen meg tájékoztatást beszerezni a területén üzemelő többi légijárműtől.
2.24.1.2.1 A légiforgalmi szolgálati egység szükség szerint tájékoztassa az illetékes katonai egységet, amint a légijármű azonosságát megállapították.
2.24.1.3 Amennyiben a légiforgalmi szolgálati egység úgy ítéli meg, hogy egy, az útvonalától eltért légijármű jogellenes beavatkozás alatt áll, a helyi együttműködési eljárások szerint haladéktalanul értesítse az Állam által kijelölt illetékes hatóságot.
2.24.2 Polgári légijármű elfogása
2.24.2.1 Amint egy légiforgalmi szolgálati egység tudomást szerez arról, hogy illetőségi területén belül egy légijárművet elfogtak, a körülményeknek megfelelően foganatosítsa az alábbi intézkedéseket:
a) kíséreljen meg kétirányú rádió-összeköttetést létesíteni a légijárművel minden rendelkezésre álló rádió frekvencián , beleértve a 121.1 Mhz-es kényszerhelyzeti frekvenciát is kivéve, ha az ez összeköttetés már fennáll;
b) tájékoztassa az elfogott légijármű vezetőjét az elfogásról;
c) vegye fel az összeköttetést az elfogó légijárművel kétirányú rádió-összeköttetést fenntartó elfogást irányító egységgel és adja meg részére a légijárműre vonatkozó összes rendelkezésére álló információt;
d) szükség szerint közvetítse a közleményeket az elfogó légijármű vagy az elfogást irányító egység és az elfogott légijármű között;
e) az elfogást irányító egységgel szorosan együttműködve tegyen meg minden szükséges intézkedést az elfogott légijármű biztonsága érdekében;
f) amennyiben úgy látszik, hogy a légijármű a szomszédos repüléstájékoztató körzetekből tévedt be, az elfogásról tájékoztassa a szomszédos repüléstájékoztató körzetek légiforgalmi szolgálati egységeit.
2.24.2.2 Amint egy légiforgalmi szolgálati egység tudomást szerez arról, hogy illetékességi területén kívül egy légijárművet elfogtak, a körülményeknek megfelelően alábbi intézkedéseket foganatosítsa:
a) tájékoztassa azt a légiforgalmi szolgálati egységet, amelynek területén az elfogás megtörtént, megadva részére azokat a rendelkezésére álló tájékoztatásokat, amelyek segíthetik a légijármű azonosítását és kérje fel azt a 2.24.2.1 pontban foglaltak végrehajtására;
b) szükség szerint közvetítse a közleményeket az elfogott légijármű valamint az illetékes légiforgalmi szolgálati egység, az elfogást irányító egység vagy az elfogó légijármű között.

2.25 Óra idő a légiforgalmi szolgálatoknál

2.25.1 A légiforgalmi szolgálati egységek az éjféllel kezdődő 24-órás nap órában, percben és szükség szerint másodpercben történő kifejezésére az Egyeztetett Világidőt (UTC) használják.
2.25.2 A légiforgalmi szolgálati egységeket olyan órával lássák el, amely az időt az érintett egység minden egyes munkahelyről jól látható módon órában, percben és másodpercben jelzi.
2.25.3 A légiforgalmi szolgálati egységek óráit és egyéb időrögzítő berendezéseit szükség szerint ellenőrizzék annak biztosítása érdekében, hogy azok mindenkor az UTC idő plusz/minusz 30 másodperces határértékén belül működjenek. Ahol egy légiforgalmi szolgálati egység adatátviteli összeköttetést alkalmaz, óráikat és egyéb időrögzítő berendezéseit szükség szerint úgy ellenőrizzék, hogy ezek pontossága 1 másodperc UTC értéken belül legyen.
2.25.4 A pontos időt szabványos időjelző állomástól, vagy ha ez nem lehetséges, más olyan egységtől szerezzék be, amely a pontos időt ilyen állomástól kapta.
2.25.5 A légijármű felszálláshoz történő gurulásának megkezdése előtt a repülőtéri irányító torony a repülőgépvezető részére adja meg a pontos időt kivéve, ha más intézkedések révén a repülőgépvezető azt egyéb forrásból megkapja. A légiforgalmi szolgálati egységek a légijármű részére kérésre ezen kívül is adják meg a pontos időt. A pontos időt a legközelebbi fél percre kerekítve adják meg.

2.26 A nyomásmagasság-adó másodlagos radar válaszjeladók szállítására és üzemeltetésére vonatkozó előírások kidolgozása és kiadása

Az Államok vezessenek be előírásokat a nyomásmagasság-adó másodlagos radar válaszjeladóknak a légtér meghatározott szakaszain, illetve területein belül történő szállítására és üzemeltetésére.

Megjegyzés: Ennek az előírásnak célja a légiforgalmi szolgálatok hatékonyságának valamint az összeütközést elkerülő fedélzeti rendszerek hatékonyságának fejlesztése.

2.27 Repülésbiztonság-irányítási rendszer

2.27.1 Az Államok dolgozzanak ki repülésbiztonság-irányító programot annak érdekében, hogy a légiforgalmi szolgálatok biztosítása során elérjék az elfogadható repülésbiztonsági szintet.
2.27.2 Az elérendő elfogadható repülésbiztonsági szintet az érintett Állam(ok) határozzák meg.
Megjegyzés: A repülésbiztonsági programokra és az elfogadható repülésbiztonsági szintre vonatkozó útmutató az E Mellékletben, valamint a Repülésbiztonság-irányítási Kézikönyvben (SMM) (Doc 9859) található.
2.27.3 A szerződő Államok repülésbiztonsági programjuk keretein belül követeljék meg, hogy a légiforgalmi szolgáltatók olyan, az Állam számára elfogadható repülésbiztonság-irányítási rendszert vezet be, amely legalább:
a) azonosítja a repülésbiztonságra veszélyes tényezőket;
b) biztosítja, hogy az elfogadható repülésbiztonsági szint fenntartásához szükséges javító intézkedés bevezetésre kerül;
c) biztosítja az elért repülésbiztonsági szint folyamatos nyomon követését, valamint rendszeres értékelését; valamint
d) célja az általános repülésbiztonsági szint folyamatos javítása.
2.27.4 A repülésbiztonság-irányítási rendszer jól értelmezhetően határozza meg a repülésbiztonsági felelőségi viszonyokat a légiforgalmi szolgáltatón belül, beleértve a felső vezetés a repülésbiztonságért történő közvetlen felelősségre-vonhatóságát is.
Megjegyzés: A repülésbiztonság-irányítási rendszerekre vonatkozó útmutató a *Repülésbiztonság-irányítási Kézikönyv*ben (SMM) Doc 9859), valamint az azzal kapcsolatos eljárások a *PANS-ATM*-ben (Doc 4444) találhatók.
2.27.5 A légiforgalmi szolgálatok rendszerében bevezetett bármely, a repülésbiztonságot érintő változtatás, beleértve egy csökkentett elkülönítési minimum vagy egy új eljárás bevezetését, csak akkor hajtható végre, ha a repülésbiztonsági elemzés kimutatta, hogy fennmarad az elfogadható repülésbiztonsági szint és egyeztettek a felhasználókkal. Amennyiben szükséges, a felelős hatóság biztosítsa, hogy megfelelő intézkedéseket hoztak a bevezetést követő nyomon követésre annak ellenőrzésére, hogy továbbra is fennmarad a meghatározott repülésbiztonsági szint.
Megjegyzés: Amennyiben a változtatás természetéből adódóan az elfogadható repülésbiztonsági szint mennyiségi fogalmakkal nem kifejezhető, a repülésbiztonsági elemzés operatív értékelésen is alapulhat.

2.28 Egységes vonatkozási-rendszerek

2.28.1 Vízszintes vonatkozási rendszer
A léginavigációban vízszintes (geodéziai) vonatkozási-rendszerként a Geodéziai Világrendszer-1984-et (World Geodetic System – 1984 (WGS-84) kell használni. A jelentett légiforgalmi földrajzi koordinátákat (a szélesség és hosszúság megadásával) a WGS-84 -ben kell megadni.
Megjegyzés: A WGS-84-re vonatkozó átfogó útmutató anyag az *ICAO Geodéziai Világrendszer – 1984 (WGS-84) Kézikönyv*ben (Doc 9674) található.
2.28.2 Függőleges vonatkozásirendszer
A léginavigációban függőleges referencia-rendszerként a közepes tengerszint feletti magasság (MSL) alkalmazandó. Az MLS a gravitációval összefüggő tengerszinthez viszonyított magasság (elevation) és a geoid földfelszin közötti viszonyt adja meg.
Megjegyzés: A geoid világszinten leginkább az MLS-vel azonosnak tekinthető. Ez azt jelenti, hogy a Föld azonos tömegvonzási erővel rendelkező pontjai egybeesnek a nyugalmi állapotú, a kontinensekre összefüggően kiterjedő MLS-vel.
2.28.3 Időbeli vonatkozásirendszer
2.28.3.1 A léginavigációban időbeli vonatkozásirendszerként a Gergely-naptár, valamint Egyeztetett Világidő (UTC) alkalmazandó.

2.28.3.2 Amennyiben ettől eltérő időbeli vonatkozásirendszert alkalmaznak, azt a Légiforgalmi Tájékoztató Kiadvány (AIP) GEN 2.1.2 részében fel kell tüntetni.

2.29 Nyelvismeret ellenőrzése

2.29.1 A légiforgalmi szolgálatot ellátó szervezet biztosítsa, hogy a légiforgalmi irányítók értsék és beszéljék a rádió-távbeszélő összeköttetéseknél használt nyelve(ke)t, ahogy az az 1. Annexben meghatározásra került.
2.29.2 A légiforgalmi irányító egységek közötti összeköttetések esetében egyéb nyelvre vonatkozó közös megállapodás hiányában az angol nyelvet használják.

2.30 Rendkívüli helyzetekre vonatkozó előírások

A légiforgalmi szolgálati hatóságok dolgozzanak ki és tegyenek közzé megfelelő a rendkívüli helyzetekre vonatkozó terveket a légforgalmi szolgálatok és az ezekhez szükséges kiegészítő szolgáltatások tényleges, illetve lehetséges megszakadása esetére azon légterek vonatkozásában, amelyekben a szolgáltatások biztosításáért felelősek. A rendkívüli helyzetekre vonatkozó terveket szükség szerint az ICAO segítségével, a szomszédos légterekében légiforgalmi szolgálatok biztosításáért felelős hatóságokkal, valamint az érintett légtérfelhasználókkal szoros együttműködésben dolgozzák ki.
1. Megjegyzés: A rendkívüli helyzetekre vonatkozótervek kidolgozására, közzétételére és bevezetésére vonatkozó útmutató a D. Mellékletben található.
2. Megjegyzés: A rendkívüli helyzetekre vonatkozó tervek tartalmazhatnak ideiglenes eltéréseket az elfogadott helyi körzeti légiközlekedési előírásoktól; ezeket az eltéréseket szükség szerint a Tanács nevében az ICAO Tanácsának elnöke hagyja jóvá.

3. fejezet
Légiforgalmi irányító szolgálat

3.1 Alkalmazás

Légiforgalmi irányító szolgálat biztosítandó:
a) az A, B, C, D és E osztályú légterekben valamennyi műszerrepülési szabályok (IFR) szerint végrehajtott repülés részére;
b) a B, C és D osztályú légterekben valamennyi látvarepülési szabályok (VFR) szerint végrehajtott repülés részére;
c) valamennyi különleges VFR repülés részére;
d) az ellenőrzött repülőtéren a teljes repülőtéri forgalom részére.

3.2 A légiforgalmi irányító szolgálat biztosítása

A 2.3.1 pontban ismertetett légiforgalmi irányító szolgálat egyes részeit az alábbiakban ismertetett különböző egységek lássák el:
a) *Körzeti irányító szolgálatot:*
1) egy körzeti irányító központ; vagy
2) ahol körzeti irányító központot nem létesítettek, a repülőtéri irányítói körzetben, vagy egy elsődlegesen bevezető irányító szolgálat ellátására kijelölt korlátozott kiterjedésű irányító körzetben a bevezető irányító szolgálatot ellátó egység;
b) *Bevezető irányító szolgálatot:*
1) a repülőtéri irányító torony vagy a körzeti irányító központ, ha szükséges vagy kívánatos a bevezető irányító szolgálatnak egy egység felelősségi körbe történő összevonása a repülőtéri irányító torony vagy a körzeti irányító központ feladataival;
2) a bevezető irányító szolgálat, ha szükséges vagy kívánatos egy különálló egység kijelölése;
c) *Repülőtéri irányító szolgálatot:* a repülőtéri irányító torony.

Megjegyzés: A forgalmi előtéren meghatározott szolgálatok ellátására, azaz a forgalmi előtér ügyeleti szolgálat feladataira kijelölhető a repülőtéri irányító torony vagy egy másik önálló egység.

3.3 Légiforgalmi irányító szolgálat működése

3.3.1 A légiforgalmi irányító szolgálat ellátása érdekében egy légiforgalmi irányító egység:

a) kapja meg minden egyes légijármű tervezett mozgására vagy az ezektől való eltérésekre, valamint az egyes légijárművek tényleges haladására vonatkozó tájékoztatásokat;

b) a kapott tájékoztatások segítségével határozza meg az ismert légijárművek egymáshoz viszonyított helyzetét;

c) az irányítása alatt álló légijárművek közötti összeütközések megelőzése valamint a légiforgalom rendezett áramlásának elősegítése és fenntartása érdekében adjon ki légiforgalmi irányítói engedélyeket és tájékoztatásokat;

d) az engedélyeket szükség szerint egyeztesse a többi egységgel:

1) amennyiben egy légijármű ennek hiányában konfliktushelyzetbe kerülhet más ilyen egység irányítása alatt álló forgalommal;

2) a légijármű irányításának más egység számára történő átadása előtt.

3.3.2 A légijárművek mozgására vonatkozó tájékoztatásokat valamint a légijárművek számára kiadott légiforgalmi irányítói engedélyeket úgy tartsák nyilván és jelenítsék meg, hogy ez lehetővé tegye a forgalmi helyzet azonnali áttekintését annak érdekében, hogy a légijárművek közötti megfelelő elkülönítések segítségével fenntartsák a forgalom áramlását.

3.3.3 **Ajánlás.** – *A légiforgalmi irányító egységeket szereljék fel olyan eszközökkel, amelyek a légiforgalmi irányító munkahelyeken felveszik a háttérben zajló kommunikációt és a hallható környezetet, és amelyek képesek legalább a működés utolsó huszonnégy órájában felvett információ tárolására.*

*Megjegyzés. – A légiforgalmi irányító egységeknél készült felvételek és ezen felvételek átiratainak titkosítására vonatkozó rendelkezések a 13. Annex 5.12 szakaszában találhatók.*3.3.4 A légiforgalmi irányító egységek által kiadott engedélyek biztosítsanak elkülönítést:

a) az A és B osztályú légterekben üzemelő valamennyi légijármű között;

b) a C, D és E osztályú légterekben a műszerrepülési szabályok (IFR) szerint végrehajtott repülések között;

c) a C osztályú légterekben a műszerrepülési szabályok (IFR) és a látvarepülési szabályok (VFR) szerint végrehajtott repülések között;

d) a műszerrepülési szabályok (IFR) szerint és a különleges VFR szerint végrehajtott repülések között;

e) a különleges VFR szerint végrehajtott repülések között, amennyiben az illetékes légiforgalmi szolgálati hatóság így rendelkezik; kivéve, amikor a fenti b) alpontban jelzett D és E osztályú légterek esetében egy légijármű kéri és ha az illetékes légiforgalmi szolgálati hatóság így írja elő, a repülést egy meghatározott, látás utáni időjárási körülmények között végrehajtandó szakaszon elkülönítés fenntartása nélkül is engedélyezhetik.

3.3.5 A légiforgalmi irányító egység az elkülönítést legalább a következők egyikével biztosítsa:

a) függőleges elkülönítés a különböző repülési szintek kijelölésével:

1) a 2. Annex 3. Függelékében található utazómagasság táblázatokból; vagy

2) a módosított utazómagasság táblázatból, amennyiben a FL 410 feletti repülés esetében a 2. Annex 3. Függelékének megfelelően így írják elő;

kivéve, ha a fentiekben jelzett repülési szintek nem az útirányszögnek megfelelően alkalmazandók, és ezt a vonatkozó légiközlekedési tájékoztató kiadványokban vagy a légiforgalmi irányítói engedélyben jelzik;

Megjegyzés: A függőleges elkülönítéssel kapcsolatos tájékoztatót a *300 méter (1000 láb) Csökkentett Függőleges Elkülönítési Minimum FL290 és FL410 Között Bevezetési Kézikönyv* (Doc 9574) tartalmazza.

b) vízszintes elkülönítés, amely:

1) időben vagy távolságban kifejezett térköz tartásával hosszirányú elkülönítést biztosít az azonos, összetartó vagy szembetartó útirányon haladó légijárművek között;

2) a légijárművek különböző útvonalakon vagy földrajzi területeken történő tartásával oldalirányú elkülönítést biztosít azok között;
c) összetett elkülönítés, amely a függőleges valamint a fenti b) alpontban jelzett egyéb elkülönítési változatok kombinációjával biztosít elkülönítést a légijárművek között úgy, hogy felhasznál minden egyes minimumot, azonban ez nem lehet kevesebb, mint az egyedileg alkalmazott elkülönítés változatok minimumának fele. Az összetett elkülönítést csak a helyi körzeti légiközlekedési egyezmények alapján lehet alkalmazni.
Megjegyzés: Az összetett függőleges és oldalirányú elkülönítés bevezetésével kapcsolatos tájékoztató anyagot a *Légiforgalmi Szolgálatok Tervezési Kézikönyve* (Doc 9426) tartalmazza.

3.4 Elkülönítési minimumok

3.4.1 Egy adott légtérszakaszban alkalmazott elkülönítési minimum kiválasztása az alábbiak szerint történjen:
a) az elkülönítési minimumot a PANS-ATM és a helyi *Körzeti Kiegészítő Eljárások* előírásaiban meghatározottakból, a helyi uralkodó körülmények alapján válasszák ki, kivéve ha olyan berendezéseket használnak vagy olyan körülmények uralkodnak, amelyekre a jelenleg érvényes ICAO előírások nem terjednek ki, mert ezekben az esetekben az alábbiak szükség szerint más elkülönítési minimumot határozzanak meg:
1) az illetékes légiforgalmi szolgálati hatóság, a járatókkal történő egyeztető megbeszélések után az állam fennhatósága alá tartozó útvonalakra vagy útvonalszakaszokra;
2) helyi körzeti légiközlekedési egyezményben, a nyílt vizek feletti vagy nem meghatározott állami fennhatóság alá tartozó útvonalakra vagy útvonal szakaszokra.
Megjegyzés: A jelenleg érvényes ICAO elkülönítési minimumok részletes ismertetését a PANS-ATM (Doc 4444) valamint a *Helyi Kiegészítő Eljárások* (Doc 7030) 1. része című kiadványok tartalmazzák.
b) az elkülönítési minimumot a szomszédos légterekben légiforgalmi szolgálatok biztosításáért felelős illetékes légiforgalmi szolgálati hatóságok közötti egyeztetéssel válasszák ki, amennyiben:
1) a forgalom két szomszédos légtér egyikéből a másikba lép be;
2) az útvonalak közelebb vannak a szomszédos légterek közös határához, mint az adott körülmények között alkalmazható elkülönítési minimum.
Megjegyzés: Ezen rendelkezés célja annak biztosítása, hogy először: a forgalom átadása mindkét fél szempontjából egyeztethető legyen és másodszor: kielégítő elkülönítést biztosítsanak a közös határ két oldalán üzemelő légijárművek között.
3.4.2 A választott elkülönítési minimumról és alkalmazási területéről adjanak részletes tájékoztatást:
a) az érintett légiforgalmi szolgálati egységeknek; és
b) a légiforgalmi tájékoztató kiadványok segítségével a légijármű-vezetőknek és járatóknak ott, ahol az elkülönítést a légijármű meghatározott navigációs berendezéseinek felhasználása vagy bizonyos navigációs módszerek alkalmazása alapján biztosítják.

3.5 Az irányítás felelőssége

3.5.1 Az egyes repülések irányításának felelőssége
Egy ellenőrzött repülés egy időben csak egy légiforgalmi irányító egység irányítása alatt állhat.
3.5.2 Egy adott légtérszakaszon belüli irányítás felelőssége
Egy adott légtérszakaszon belül az összes légijármű irányításának felelősségét egyetlen légiforgalmi irányító egységre ruházzák. Mindazonáltal egy légijármű, vagy légijármű csoport irányítását átadhatják más légiforgalmi irányító egység számára, feltéve, hogy biztosítják a koordinációt az összes érintett légiforgalmi irányító egység között.

3.6 Az irányítás felelősségének átadása

3.6.1 Az átadás helye vagy időpontja
A légijármű irányításának felelősségét az egyik légiforgalmi irányító egységtől a másiknak a következők szerint adják át:

3.6.1.1 *Két körzeti irányító szolgálatot ellátó egység között* — A légijármű irányításának felelősségét az egyik irányító körzetben körzeti irányító szolgálatot ellátó egységtől a szomszédos irányító körzetben körzeti irányító szolgálatot ellátó egységnek abban az időpontban adja át, amikorra a légijárművet irányító körzeti irányító központ a közös irányító körzethatár átlépését számítja illetve más olyan helyen vagy időpontban, amelyben a két egység megegyezett.
3.6.1.2 *Körzeti irányító szolgálatot és bevezető irányító szolgálatot ellátó egységek között* — A légijármű irányításának felelősségét a körzeti irányító szolgálatot ellátó egységtől a bevezető irányító szolgálatot ellátó egységnek és viszont olyan helyen illetve időpontban adják át, amelyben a két egység megegyezett.
3.6.1.3 *Bevezető irányító szolgálatot ellátó egység és a repülőtéri irányító torony között*
3.6.1.3.1 *Érkező légijármű* — A leszálláshoz közeledő légijármű irányításának felelősségét a bevezető irányító szolgálatot ellátó egység akkor adja át a repülőtéri irányító toronynak, amikor:
a) a légijármű a repülőtér közelében van és:
1) úgy ítélik meg, hogy a megközelítést és leszállást föld-látással végre tudja hajtani; vagy
2) folyamatos látás utáni időjárási körülmények közé került; vagy
b) elér az együttműködési megállapodásban vagy a légiforgalmi szolgálati egység utasításaiban meghatározott helyet vagy magasságot; vagy
c) leszállt.
Megjegyzés: Bizonyos repülések irányítását közvetlenül át lehet adni a körzeti irányító központtól a repülőtéri irányító toronynak és viszont még akkor is, ha bevezető irányítást létesítettek, amennyiben az érintett egységek olyan előzetes megállapodást kötöttek, hogy a bevezető irányító szolgálat megfelelő részét a körzeti irányító központ illetve a repülőtéri irányító torony ellátja.
3.6.1.3.2 *Induló légijármű* — Az induló légijármű irányításának felelősségét a repülőtéri irányító torony akkor adja át a bevezető irányító szolgálatot ellátó egységnek, amikor:
a) *amikor a repülőtér környékén látás utáni időjárási körülmények uralkodnak:*
1) mielőtt a légijármű elhagyja a repülőtér környékét; vagy
2) mielőtt a légijármű műszeres időjárási körülmények közé kerül; vagy
3) a légijármű elér egy meghatározott helyet vagy magasságot;
az együttműködési megállapodásban vagy a légiforgalmi szolgálati egység utasításaiban előírtak szerint;
b) *mikor a repülőtér környékén műszeres időjárási körülmények uralkodnak:*
1) közvetlenül a légijármű felszállása után; vagy
2) amikor a légijármű elér egy meghatározott helyet vagy magasságot;
az együttműködési megállapodásban vagy a légiforgalmi szolgálati egység utasításaiban előírtak szerint.
Megjegyzés: Lásd a 3.6.1.3.1 pont után következő megjegyzést.
3.6.1.4 *Azonos légiforgalmi irányító egységen belüli irányító szektorok vagy munkahelyek között*
A légijármű irányításának felelősségét az azonos légiforgalmi irányító egységen belüli irányító szektorok vagy munkahelyek között a légiforgalmi szolgálati egység utasításaiban előírtak szerint egy adott helyen, magasságon vagy időpontban adják át.
3.6.2 Az átadás egyeztetése
3.6.2.1 Egy légijármű irányításának felelősségét az egyik légiforgalmi irányító egység a másiknak ne adja át az átvevő irányító egység beleegyezése nélkül, amelyet a 3.6.2.2, 3.6.2.2.1, 3.6.2.2.2 és 3.6.2.3 pontok előírásainak megfelelően szerezzen be.
3.6.2.2 Az átadó irányító egység tájékoztassa az átvevő irányító egységet az érvényes repülési terv vonatkozó részleteiről és adjon meg minden, az átadásra vonatkozó kért irányítói tájékoztatást.
3.6.2.2.1 Ahol az irányítás átadását radar vagy automatikus légtérfelderítési ADS-B adatok felhasználásával hajtják végre, az átadásra vonatkozó irányítói tájékoztatás tartalmazza a légijármű közvetlenül az átadás előtt radaron vagy berendezésfüggő automatikus felderítési ADS-B-n megfigyelt helyzetét valamint kérés alapján annak repülési útirányát és sebességét is.
3.6.2.2.2 Ahol az irányítás átadását berendezésfüggő automatikus felderítési (ADS-C) adatok felhasználásával hajtják végre, az átadásra vonatkozó irányítói tájékoztatás tartalmazza a légijármű négydimenziós helyzetét és szükség szerint más tájékoztatásokat is.
3.6.2.3 Az átvevő irányító egység:

a) jelezze, ha az átadó irányító egység feltételei szerint képes a légijármű irányításának elfogadására, kivéve ha a két érintett egység közötti előzetes megállapodás alapján az ilyen jelzés elmaradását úgy értelmezik, hogy elfogadják a megadott feltételeket vagy jelzik a bármely szükséges vonatkozó módosítást; és

b) közölje a repülés következő szakaszára vonatkozó bármely egyéb tájékoztatást vagy légiforgalmi irányító engedélyt, amelyet a légijárműnek az átadás időpontjában ismernie kell.

3.6.2.4 Az átvevő irányító egység tájékoztassa az átadó irányító egységet, ha kétirányú beszéd-üzemű és/vagy adathálózati összeköttetést létesített az érintett légijárművel és átvette annak irányítását, kivéve, ha a két érintett egység közötti megállapodás mást ír elő.

3.6.2.5 Az alkalmazható egyeztetési eljárásokat, beleértve az irányítás átadási pontokat, az együttműködési megállapodás vagy a légiforgalmi szolgálati egység utasításai tartalmazzák.

3.7 Légiforgalmi irányító engedélyek

A légiforgalmi irányító engedélyek kizárólag a légiforgalmi irányító szolgálat biztosításának követelményein alapuljanak.

3.7.1 A légiforgalmi irányító engedélyek tartalma

3.7.1.1 Egy légiforgalmi irányító engedély a következőket tartalmazza:

a) a légijármű repülési tervében meghatározott azonosító jele;

b) az engedély határa;

c) a repülés útvonala;

d) a repülés teljes útvonalára vagy annak egy szakaszára engedélyezett repülési szint(ek) és ha szükséges, ennek változásai;

Megjegyzés: Ha a 2. Annex 3.6.5.2.2 a) alpont előírása értelmében szükséges és a repülési szintekre vonatkozó engedély az útvonalnak csak egy részére érvényes, fontos, hogy a légiforgalmi irányító egység meghatározza azt a pontot, ameddig a légiforgalmi irányító engedély repülési szintekre vonatkozó része érvényes.

e) bármely olyan egyéb szükséges utasítás vagy tájékoztatás, amely a megközelítési vagy indulási eljárásokra és repülési műveletekre, rádióösszeköttetésekre, az engedély lejárati idejére vagy egyéb körülményre vonatkozhat.

Megjegyzés: Az engedély lejárati ideje azt az időpontot jelzi, amely után az engedély automatikusan érvényét veszti, ha a repülést még nem kezdték meg.

3.7.1.2 ***Ajánlás*** *— Dolgozzanak ki szabvány érkezési és indulási útvonalakat és kapcsolatos eljárásokat, amikor a következők elősegítésére van szükség:*

a) a légiforgalom biztonságos, rendezett és gyors áramlása;

b) a légiforgalmi irányító engedélyekben kiadott útvonalak és eljárások ismertetése.

Megjegyzés: A szabvány érkezési és indulási útvonalak és eljárások kidolgozásával kapcsolatos útmutató a *Légiforgalmi Szolgálati Tervezési Kézikönyvben* (Doc 9426), a tervezéssel kapcsolatos követelmények a PANS-OPS II. kötetben (Doc 8168) található.

3.7.2 Engedélyek hangsebességgel történő repülések részére

3.7.2.1 A szuperszonikus repülés hangsebességet elérő gyorsítási szakaszára vonatkozó légiforgalmi irányító engedély legalább ezen szakasz végéig terjedjen.

3.7.2.2 ***Ajánlás*** *— A szuperszonikus légijármű hangsebesség alatti sebességre történő lassulására, valamint a szuperszonikus utazó repülésről hangsebesség alatti repülésre történő süllyedésére vonatkozó légiforgalmi irányító engedély legalább a hangsebesség alatti repülési szakaszig biztosítson folyamatos süllyedést.*

3.7.3 Az engedélyek visszaolvasása és a repülésbiztonságot érintő tájékoztatások

3.7.3.1 A hajózószemélyzet olvassa vissza a légiforgalmi irányítótól szóban kapott ATC engedély és utasítás azon részét, amely közvetlenül a repülésbiztonságot érinti. A következő elemeket mindig vissza kell olvasni:

a) légiforgalmi irányító útvonal engedélyek;

b) engedélyek és utasítások bármely futópályára történő belépésre, leszállásra, felszállásra, futópálya keresztezésre és közeli várakozásra valamint a futópályán történő visszagurulásra; valamint
c) használatos futópálya, magasságmérő beállítási értékek, másodlagos válaszjeladó kódok, repülési szint és magasság utasítások, repülési irány és sebesség utasítások valamint az átváltási szint, amikor azt a légiforgalmi irányító közli vagy a légiforgalmi irányítás ATIS közleménye tartalmazza.
3.7.3.1.1 Az egyéb engedélyeket vagy utasításokat, beleértve a feltételes engedélyeket úgy olvassák vissza vagy nyugtázzák, hogy ezzel egyértelműen jelezzék azok megértését és végrehajtásának szándékát.
3.7.3.1.2 A légiforgalmi irányító hallgassa meg a visszaolvasást, hogy megbizonyosodjon arról, hogy a légiforgalmi irányító engedélyt vagy utasítást a hajózószemélyzet helyesen olvasta vissza és a visszaolvasás alkalmával tapasztalt eltérések és ellentmondások tisztázása érdekében azonnal intézkedjen.
3.7.3.2 Amennyiben az illetékes ATS hatóság másképpen nem rendelkezik, a légiforgalmi irányító és légijármű-vezető közötti digitális adat-összeköttetési (CPDLC) közlemények szóbeli visszaolvasása nem szükséges.
Megjegyzés: A légiforgalmi irányító és légijármű-vezető közötti digitális adat-összeköttetési (CPDLC) közleményekre vonatkozó eljárásokat és előírásokat a 10. Annex II. kötete és a PANS-ATM 14. fejezete tartalmazza.
3.7.4 Az engedélyek koordinálása
A légiforgalmi irányító szolgálati egységek egymás között a légijármű egész repülési útvonalára vagy annak meghatározott részére vonatkozó légiforgalmi irányító engedélyt az alábbiak szerint egyeztessék.
3.7.4.1 Egy légijármű részére engedélyezzék a tervezett első leszállási (célállomás) repülőtérig tartó repülést, amennyiben:
a) még az indulás előtt lehetséges volt az engedély egyeztetése valamennyi olyan egységgel, amely a légijárművet irányítani fogja; vagy
b) megfelelő biztosíték van arra, hogy az előzetes egyeztetés megvalósítható azon egységek között, amelyek a légijárművet egymást követően irányítani fogják.
Megjegyzés: Amikor a légiforgalmi irányító engedélyt az induló forgalom gyorsítása érdekében csak a repülés kezdeti szakaszára adják ki, az ezt követő útvonal engedélyt a fentiekben meghatározottak szerint adják ki még akkor is, ha az első tervezett leszállási repülőtér nem az útvonal engedélyt kiadó körzeti irányító központ illetékessége alá tartozik.
3.7.4.2 Amennyiben a 3.7.4.1 pontban meghatározott egyeztetés nem történt meg vagy nem várható, a légijárműnek az engedély csak addig a pontig adható ki, ameddig a koordináció biztosított. Ezen pont elérése előtt vagy ezen pont elérésekor a légijármű a helyzetnek megfelelő további engedélyt vagy várakozási utasításokat kap.
3.7.4.2.1 Amikor az illetékes légiforgalmi szolgálati hatóság ezt írja elő, a légijármű az irányítás átadási pont elérése előtt az előzetes engedély beszerzése érdekében vegye fel a kapcsolatot a repülési útvonalán következő légiforgalmi irányító egységgel.
3.7.4.2.1.1 A légijármű az előzetes engedély beszerzése során tartsa fenn a szükséges kétoldalú rádiókapcsolatot az irányítást végző légiforgalmi irányító egységgel.
3.7.4.2.1.2 Az előzetes engedélyként kiadott légiforgalmi irányító engedély mint olyan a repülőgépvezető számára pontosan azonosítható legyen.
3.7.4.2.1.3 A megfelelő egyeztetés esetét kivéve az előzetes engedély csak abban a légtérben érintse a légijármű eredeti repülési útvonalát és magasságát, amelyért az ilyen engedélyt kiadó légiforgalmi irányító egység felelős.
Megjegyzés: Az előzetes engedély kiadásával, továbbításával és alkalmazásával kapcsolatos előírásokat a 10. Annex II kötet, a tájékoztató anyagot a *Légiforgalmi Szolgálatok Adathálózati Összeköttetéseinek Alkalmazása Kézikönyv* (Doc 9694) tartalmazza.
3.7.4.2.1.4 ***Ajánlás*** *— Ahol ez gyakorlati szempontból alkalmazható és ahol az előzetes engedély továbbításának megkönnyítésére adathálózati összeköttetést használnak, a repülőgépvezető és az előzetes engedélyt kiadó légiforgalmi irányító egység között álljon kétoldalú beszédüzemű összeköttetés rendelkezésre.*
3.7.4.3 Amikor egy légijármű az egyik irányító körzeten levő olyan repülőtérről kíván indulni, amely egy

másik irányító körzethez 30 perc vagy az érintett körzeti irányító központok által közösen elfogadott más repülési időtartamon belül van, a következő körzeti irányító központtal való egyeztetés még az indulási engedély kiadása előtt történjen meg.
3.7.4.4 Amikor egy légijármű irányító körzetből nem ellenőrzött légtérbe kíván kilépni és ezt követően ugyanabba vagy egy másik irányító körzetbe tér vissza, az engedély az indulási repülőtértől az első tervezett leszállási helyig kiadható. Az ilyen engedély vagy annak módosítása csak a repülés azon szakaszaira vonatkozik, amelyet ellenőrzött légtérben hajtanak végre.
3.7.5 A légiforgalom áramlásának szervezése
3.7.5.1 Az olyan légtér esetében, ahol a légiforgalom időnként meghaladja vagy várhatóan meghaladja az érintett légiforgalmi irányító szolgálatok közzétett kapacitását, létesítsenek légiforgalmi áramlásszervező (ATFM) szolgálatot.
Megjegyzés: Az érintett légiforgalmi irányító szolgálatok kapacitását rendszerint az illetékes légiforgalmi szolgálati hatóság határozza meg és teszi közzé.
3.7.5.2 ***Ajánlás*** *— Az ATFM szolgálatot a helyi körzeti légiközlekedési egyezmények vagy esetenként többoldalú megállapodások alapján létesítik. Az ilyen egyezmények tartalmazzanak megfelelő közös eljárásokat és módszereket a kapacitás megállapítására is.*
3.7.5.3 Amikor egy légiforgalmi irányító szolgálati egység számára nyilvánvalóvá válik, hogy a már elfogadotton kívül egy adott helyen vagy meghatározott területen a meghatározott időperióduson belül további forgalmat nem tud vagy csak bizonyos ütemben képes elfogadni, az egység erről értesítse az ATFM egységet -- ha ilyet létrehoztak -- valamint szükség szerint a többi érintett légiforgalmi szolgálati egységet. Értesítsék az adott helyre vagy területre tartó légijárművek személyzetét és az érdekelt járatókat a várható késésekről vagy az alkalmazott korlátozásokról.
Megjegyzés: Ahol lehetséges, az érintett járatókat általában előre értesítsék a légiforgalmi áramlásszervező (ATFM) szolgálat által életbe léptetett korlátozásokról, ahol ilyen szolgálatot létesítettek.

3.8 Személyek és járművek mozgásának irányítása repülőtéren

3.8.1 A repülőtéri irányító torony szükség szerint irányítsa a személyek vagy járművek — beleértve a vontatott légijárműveket is — mozgását a repülőtér munkaterületén annak érdekében, hogy azok ne kerüljenek veszélyhelyzetbe és elkerüljék a leszálló, guruló vagy felszálló légijárművek veszélyeztetését is.
3.8.2 Amikor a repülőtéren rossz látási körülmények között történő üzemeltetésre kidolgozott eljárásokat alkalmaznak:
a) a személyek és járművek működését a repülőtér munkaterületén korlátozzák a lehető legkisebbre és II. vagy III. kategóriás precíziós műszeres üzemeltetés esetén különösen ügyeljenek az ILS/MLS érzékeny területek védelmére vonatkozó előírások betartására;
b) a 3.8.3 pont előírásai mellett, a járművek és a guruló légijármű közötti minimális elkülönítés feleljen meg az illetékes légiforgalmi szolgálati hatóság által a rendelkezésre álló berendezések jellemzői alapján meghatározott előírásainak;
c) amennyiben ugyanazon a futópályán folyamatosan vegyes II. vagy III. kategóriás ILS és MLS precíziós műszeres üzemeltetés történik, a szigorúbb feltételek szerinti ILS vagy MLS kritikus és érzékeny területek védelme biztosítandó.
Megjegyzés: A rossz látási körülményekre kidolgozott eljárások alkalmazásának időszakát a légiforgalmi szolgálati egységek utasításainak megfelelően határozzák meg. A repülőtér rossz látási körülmények között történő üzemeltetésére vonatkozó útmutatást a *Felszíni Mozgás Ellenőrzése és Irányítása (SMGCS) Kézikönyv* (Doc 9476) tartalmazza.
3.8.3 A kényszerhelyzetben levő légijármű segítségére siető mentő járművek számára biztosítsanak elsőbbséget minden egyéb földi forgalommal szemben .
3.8.4 A fenti 3.8.3 pont előírása mellett a munkaterületen működő járművek tartsák be a következő előírásokat:
a) a járművek és légijárművet vontató járművek adjanak elsőbbséget a leszálló, felszálló vagy guruló légijárműveknek;

b) a járművek adjanak elsőbbséget a légijárművet vontató másik járműveknek;
c) a járművek a légiforgalmi szolgálati egység utasításai alapján adjanak elsőbbséget másik járműveknek;
d) a fenti a), b) és c) alpontoktól függetlenül a járművek és légijárművet vontató járművek tartsák be a repülőtéri irányító torony utasításait.

3.9 Radarberendezés és berendezésfüggő automatikus felderítés (ADS-B) biztosítása

Ajánlás *— A radar- és ADS-B földi rendszerek tegyék lehetővé a repülésbiztonságot érintő riasztások és figyelmeztető jelzések, közöttük a konfliktus előrejelzés és riasztás, a legalacsonyabb biztonságos tengerszint feletti magasság megsértése valamint a nem szándékos másodlagos radar válaszjeladó (SSR) kódkiosztás kettőzés jelzések megfelelő megjelenítését.*

3.10 Felszíni mozgást ellenőrző radarberendezés használata (SMR — gurítóradar)

Ajánlás *— Amennyiben a repülőtér munkaterülete vagy egy része szemmel nem látható, vagy a szemmel történő ellenőrzés kiegészítésére a 14. Annex I. kötetének rendelkezései alapján biztosított felszíni mozgást ellenőrző radar (SMR – gurítóradar) vagy egyéb megfelelő felderítő berendezés alkalmazandó:*
a) légijárművek- és járművek munkaterületen történő mozgásának nyomon követésére ;
b) szükség esetén iránymutatás adása a légijármű- és járművezetőknek; valamint
c) tanácsadás és segítségnyújtás a légijárművek- és járművek munkaterületen való biztonságos és hatékony mozgásának elősegítésére .
Megjegyzés – A felszíni mozgást ellenőrző radarberendezés használatáról lásd még a *Felszíni Mozgást Támogató és Irányító Rendszerek (SMGCS) Kézikönyv*et (Doc 9476), a *Fejlett felszíni mozgást Támogató és Irányító Rendszerek (A-SMGCS) Kézikönyv*et (Doc 9830), valamint a *Légiforgalmi Szolgálati Tervezési Kézikönyv*et (Doc 9426).

6. fejezet
A légiforgalmi szolgálatok távközlési követelményei

6.1 Légiforgalmi mozgó szolgálat (levegő-föld összeköttetések)

6.1.1 Általános rész
6.1.1.1 A légiforgalmi szolgálatok céljaira használt levegő-föld összeköttetések esetében közvetlen rádió-távbeszélő és/vagy digitális adathálózati összeköttetés alkalmazandó.
Megjegyzés: A légiforgalmi szolgálati egységek vészhelyzeti 121.5 MHz frekvencia csatornával történő felszerelésére és ezen frekvencia állandó figyelésének fenntartására vonatkozó előírás a 10. Annex II. és V. köteteiben található.
6.1.1.2 Ahol az Államok az ATM funkciókra kommunikációs teljesítmény RCP típust írnak elő, a légiforgalmi szolgálati egységeket a 6.1.1.1 pontban előírt követelményeken túlmenően olyan kommunikációs eszközökkel kell ellátni, amely lehetővé teszi, hogy a légiforgalmi szolgálatokat az előírt RCP típus(ok)nak megfelelően nyújtsák.
Megjegyzés: Az RCP-re és kapcsolódó eljárásokra vonatkozó információk, valamint a jóváhagyási folyamatra vonatkozó útmutató az *Előírt Kommunikációs Teljesítmény (RCP) Kézikönyv*ben (Doc 9869) lesz megtalálható (előkészítés alatt). Ezen dokumentum továbbá referenciákat tartalmaz egyéb, az Államok és nemzetközi testületek által a kommunikációs rendszerekre és RCP-re vonatkozó dokumentumokra.
6.1.1.3 Amikor a légiforgalmi irányító szolgálat biztosítására közvetlen, a repülőgépvezető és a légiforgalmi irányító közötti kétirányú rádiótávbeszélőt és/vagy digitális adathálózati összeköttetést alkalmaznak, az összes ilyen levegő-föld távközlési csatornát adatrögzítő berendezéssel lássanak el.
Megjegyzés: A légiforgalmi irányító szolgálatnál készített automatikus hangfelvételek megőrzésének követelményeit a 10. Annex, II. Kötet 3.5.1.5 pont tartalmazza.

6.1.1.4 A kommunikációs csatornákról a 6.1.1.3 pontban meghatározottak szerint készített felvételeket legalább harminc napig meg kell őrizni.
6.1.2 A repüléstájékoztató szolgálat esetében
6.1.2.1 A levegő-föld távközlési berendezés tegyen lehetővé kétirányú összeköttetést a repüléstájékoztató szolgálatot ellátó egység és a repüléstájékoztató körzetben bárhol repülő, megfelelően felszerelt légijárművek között.
6.1.2.2 ***Ajánlás** — A repüléstájékoztató szolgálat rendelkezésére álló levegő-föld távközlési berendezések lehetőség szerint közvetlen, gyors, folyamatos és légköri rádiózavar mentes kétirányú összeköttetést tegyenek lehetővé.*
6.1.3 Körzeti irányító szolgálat esetében
6.1.3.1 A levegő-föld távközlési berendezés tegyen lehetővé kétirányú összeköttetést a körzeti irányító szolgálatot ellátó egység és az irányítói terület(ek)en belül bárhol repülő, megfelelően felszerelt légijárművek között.
6.1.3.2 ***Ajánlás** — A körzeti irányító szolgálat rendelkezésére álló levegő-föld távközlési berendezések lehetőség szerint közvetlen, gyors, folyamatos és légköri rádiózavar mentes kétirányú összeköttetést tegyenek lehetővé.*
6.1.3.3 ***Ajánlás** — Ahol a körzeti irányító szolgálat céljaira levegő-föld beszédüzemű távközlési csatornákat használnak és ezeket rádiótávbeszélő kezelők üzemeltetik, hozzanak megfelelő intézkedéseket arra, hogy amikor és ahogy ez szükséges, közvetlen légijármű vezető — légiforgalmi irányító közötti összeköttetés alakulhasson ki.*
6.1.4 Bevezető irányító szolgálat esetében
6.1.4.1 A levegő-föld távközlési berendezés tegyen lehetővé közvetlen, gyors, folyamatos és légköri rádiózavar mentes kétirányú összeköttetést a bevezető irányító szolgálatot ellátó egység és az irányítása alatt álló, megfelelően felszerelt légijárművek között.
6.1.4.2 Ahol a bevezető irányító szolgálatot ellátó egység különállóan működik, a levegő-föld távközlési összeköttetést kizárólag ezen egység használatára biztosított távközlési csatornákon tartsák fenn.
6.1.5 Repülőtéri irányító szolgálat esetében
6.1.5.1 A levegő-föld távközlési berendezés tegyen lehetővé közvetlen, gyors, folyamatos és légköri rádiózavar-mentes kétirányú összeköttetést a repülőtéri irányító torony és az érintett repülőtér 45 km-es (25 tmf) körzetén belül bárhol üzemelő, megfelelően felszerelt légijárművek között.
6.1.5.2 ***Ajánlás** — Ahol a körülmények ezt indokolják, a repülőtér munkaterületein működő forgalom irányítására biztosítsanak külön távközlési csatornát.*

6.2 Légiforgalmi állandóhelyű szolgálat (föld-föld összeköttetések)

6.2.1 Általános rész
6.1.1.1 A légiforgalmi szolgálatok céljaira használt föld-föld összeköttetések esetében közvetlen beszéd-üzemű és/vagy digitális adathálózati összeköttetés alkalmazandó.
1. Megjegyzés: Az összeköttetés létrehozásának sebességére utaló jelzés a távközlési szolgálatok számára elsősorban a szükséges távközlési összeköttetés jellegének meghatározása céljából adott útmutatás; például az „azonnali” minősítés olyan összeköttetésre vonatkozik, amely biztosítja az azonnali kapcsolatfelvételt a légiforgalmi irányítók között; a „tizenöt másodperc” azt jelzi, hogy elfogadható a kapcsolótáblás üzem; míg az „öt perc” olyan összeköttetést jelez, amely magába foglalja a hívástovábbítást is.
2. Megjegyzés: A légiforgalmi irányító szolgálatnál készített automatikus hangfelvételek megőrzésének követelményeit a 10. Annex, II. Kötet 3.5.1.5 pont tartalmazza.
6.2.1.2 Ahol az Államok az ATM funkciókra kommunikációs teljesítmény RCP típust írnak elő a légiforgalmi szolgálati egységeket a 6.2.1.1 pontban előírt követelményeken túlmenően olyan kommunikációs eszközökkel kell ellátni, amely lehetővé teszi, hogy a légiforgalmi szolgálatokat az előírt RCP típus(ok)nak megfelelően nyújtsák.
Megjegyzés: Az RCP-re és kapcsolódó eljárásokra vonatkozó információk, valamint a jóváhagyási folyamatra vonatkozó útmutató az *Előírt Kommunikációs Teljesítmény (RCP) Kézikönyv*ben (Doc 9869)

lesz megtalálható (előkészítés alatt). Ezen dokumentum továbbá referenciákat tartalmaz egyéb, az Államok és nemzetközi testületek által a kommunikációs rendszerekre és RCP-re vonatkozó dokumentumokra.

6.2.2 Összeköttetés egy repüléstájékoztató körzeten belül

6.2.2.1 Összeköttetés a légiforgalmi szolgálati egységek között

6.2.2.1.1 A repüléstájékoztató központ rendelkezzen berendezésekkel az illetékességi területén belül szolgálatot ellátó következő egységekkel történő összeköttetéshez:

a) körzeti irányító központ, ha azzal nem közös elhelyezésű;

b) bevezető irányító egységek;

c) repülőtéri irányítótornyok.

6.2.2.1.2 A körzeti irányító központ a repüléstájékoztató központtal való, a 6.2.2.1.1 pontban előírt összeköttetés mellett rendelkezzen berendezésekkel az illetékességi területén belül szolgálatot ellátó következő egységekkel történő összeköttetéshez:

a) bevezető irányító egységek;

b) repülőtéri irányítótornyok;

c) légiforgalmi szolgálatok bejelentő irodája, ha ilyet külön létesítettek.

6.2.2.1.3 A bevezető irányító egység a repüléstájékoztató valamint a körzeti irányító központtal való, a 6.2.2.1.1 és 6.2.2.1.2 pontokban előírt összeköttetés mellett rendelkezzen berendezésekkel a vele együttműködő repülőtéri irányítótoronnyal vagy -tornyokkal, továbbá ha ilyet külön létesítettek, a légiforgalmi szolgálatok bejelentő irodájával történő összeköttetéshez.

6.2.2.1.4 A repülőtéri irányítótorony a repüléstájékoztató valamint a körzeti irányító központtal és a bevezető irányító egységgel való, a 6.2.2.1.1, 6.2.2.1.2 és 6.2.2.1.3 pontokban előírt összeköttetés mellett rendelkezzen berendezésekkel a légiforgalmi szolgálatok bejelentő irodájával történő összeköttetéshez, ha ilyet külön létesítettek.

6.2.2.2 Összeköttetés a légiforgalmi szolgálati egységek és más egységek között

6.2.2.2.1 A repüléstájékoztató és a körzeti irányító központ rendelkezzen berendezésekkel a saját illetékességi területén belül szolgálatot ellátó következő egységekkel történő összeköttetéshez:

a) az illetékes katonai egységek;

b) a központot kiszolgáló meteorológiai hivatal;

c) a központot kiszolgáló légiforgalmi távközlési állomás;

d) a megfelelő járatók hivatalai;

e) a mentést koordináló központ, vagy ennek hiányában bármely más megfelelő mentőszolgálat;

f) a központot kiszolgáló nemzetközi NOTAM iroda.

6.2.2.2.2 A bevezető irányító egység és a repülőtéri irányítótorony rendelkezzen berendezésekkel a saját illetékességi területén belül szolgálatot ellátó következő egységekkel történő összeköttetéshez:

a) az illetékes katonai egységek;

b) a kutató és mentő szolgálatok (beleértve a mentőszolgálatot, tűzoltóságot, stb.);

c) az érintett egységet kiszolgáló meteorológiai hivatal;

d) az érintett egységet kiszolgáló légiforgalmi távközlési állomás;

e) a forgalmi előtér-ügyeleti szolgálatot ellátó egység, ha ilyet külön létesítettek.

6.2.2.2.3 A 6.2.2.2.1 a) és 6.2.2.2.2 a) alpontokban előírt távközlési berendezések biztosítsanak gyors és megbízható összeköttetést az érintett légiforgalmi szolgálati egység és a légiforgalmi szolgálati egység felelősségi területén belül az elfogás irányításáért felelős katonai szervek között.

6.2.2.3 Az összeköttetési berendezések ismertetése

6.2.2.3.1 A 6.2.2.1, 6.2.2.2.1 a) és 6.2.2.2.2 a), b) és c) alpontokban előírt távközlési berendezések biztosítsanak:

a) közvetlen beszédüzemű összeköttetést vagy összetett beszédüzemű és digitális adathálózati összeköttetést ott, ahol a radarirányítás vagy ADS-B irányítás átadásának céljából szükséges összeköttetést azonnal, míg az egyéb célokból szükséges összeköttetést általában tizenöt másodpercen belül lehet létrehozni; és

b) nyomtatott formájú közleményváltásra szolgáló összeköttetést, ahol az írott szövegek tárolása

szükséges; a közlemények továbbítási ideje öt percnél hosszabb ne legyen.
6.2.2.3.2 ***Ajánlás** — A 6.2.2.3.1 pontban nem jelzett összes többi esetben a távközlési berendezések biztosítsanak:*
a) közvetlen beszédüzemű vagy összetett beszédüzemű és digitális adathálózati összeköttetést ott, ahol az összeköttetést általában tizenöt másodpercen belül lehet létrehozni; és
b) nyomtatott formájú közleményváltásra szolgáló összeköttetést, ahol az írott szövegek tárolása szükséges; a közlemények továbbítási ideje öt percnél hosszabb ne legyen.
6.2.2.3.3 Minden olyan esetben, amikor a légiforgalmi szolgálatok számítógépei felé és/vagy a számítógépeitől származó automatikus adattovábbítás szükséges, biztosítsanak megfelelő berendezést az automatikus adatrögzítésre.
6.2.2.3.4 ***Ajánlás** — A 6.2.2.1 és 6.2.2.2 pontokban előírt összeköttetést — ahogyan és ahol szükséges — egyéb vizuális vagy audio-összeköttetést biztosító berendezéssel, például zárt láncú televíziós hálózattal vagy külön információ-feldolgozó rendszerrel egészítsék ki.*
6.2.2.3.5 A 6.2.2.2.2 a), b) és c) alpontokban előírt távközlési berendezések biztosítsák a közvetlen beszédüzemű konferencia összeköttetés lehetőségét.
6.2.2.3.6 ***Ajánlás** — A 6.2.2.2.2 d) alpontban előírt távközlési berendezések biztosítsák a közvetlen beszédüzemű konferencia összeköttetés lehetőségét, ahol az összeköttetést általában tizenöt másodpercen belül lehet létrehozni.*
6.2.2.3.7 Valamennyi, a 6.2.2.2.1 és a 6.2.2.2.2 pontokban előírt, a légiforgalmi szolgálati egységek, valamint légiforgalmi szolgálati egységek és egyéb egységek közötti közvetlen beszédüzemű vagy digitális adathálózati összeköttetésről automatikus felvételt kell készíteni.
6.2.2.3.8 Az adatokról és összeköttetésekről a 6.2.2.3.3 és 6.2.2.3.7 pontokban előírt felvételt legalább harminc napig meg kell őrizni.
6.2.3 Összeköttetés a repüléstájékoztató körzetek között
6.2.3.1 A repüléstájékoztató központok és a körzeti irányító központok rendelkezzenek berendezésekkel az összes szomszédos repüléstájékoztató és a körzeti irányító központtal történő összeköttetéshez.
6.2.3.1.1 Ezek az összeköttetési berendezések megőrzés céljából minden esetben tegyék lehetővé a közlemények megfelelő formában történő rögzítését, továbbá a közlemények továbbítási ideje feleljen meg a körzeti légiközlekedési egyezményekben előírtaknak.
6.2.3.1.2 Ha a körzeti légiközlekedési egyezmények alapján mást nem írnak elő, a szomszédos irányítói körzeteket kiszolgáló körzeti irányító központok közötti összeköttetési berendezések a fentieken túl biztosítsák a közvetlen beszédüzemű és -- ahol ez alkalmazható -- a digitális adathálózati összeköttetést automatikus rögzítéssel, amellyel a radar- vagy ADS-B és ADS-C segítségével történő irányítás átadásának céljából szükséges összeköttetést azonnal, míg az egyéb célokból szükséges összeköttetést általában tizenöt másodpercen belül lehet létrehozni.
6.2.3.1.3 Amikor a kijelölt útvonaltól való eltérés esetében az elfogás szükségességének kiküszöbölése vagy csökkentése érdekében az érintett Államok közötti megállapodás így írja elő, a 6.2.3.1.2 pontban nem jelzett egyéb szomszédos repüléstájékoztató vagy körzeti irányító központok közötti összeköttetési berendezések közvetlen beszédüzemű összeköttetést vagy összetett beszédüzemű és digitális adathálózati összeköttetést tegyenek lehetővé. A berendezéseket megfelelő automatikus rögzítő egységgel lássák el.
6.2.3.1.4 ***Ajánlás** — A 6.2.3.1.3 pontban jelzett összeköttetési berendezések általában tizenöt másodpercen belül tegyék lehetővé az összeköttetés létrehozását.*
6.2.3.2 ***Ajánlás** — A szomszédos ATS egységek között minden olyan esetben alakítsanak ki összeköttetést, amikor különleges körülmények állnak fenn.*
Megjegyzés: A különleges körülményeket a forgalom sűrűsége, az üzemelő légijárművek típusai és/vagy a légtér szervezésének módjai okozhatják és ezek akkor is fennállhatnak, ha az ellenőrzött légterek és/vagy irányító körzetek nem közvetlenül határosak vagy (még) nem kerültek kijelölésre.
6.2.3.3 ***Ajánlás** — Ahol a helyi körülmények olyanok, hogy egy légijármű belépési engedélyét a szomszédos irányító körzetbe az indulás előtt kell megadni, a bevezető irányító egységet és/vagy a repülőtéri irányító tornyot kössék össze a szomszédos területet kiszolgáló körzeti irányító központtal.*
6.2.3.4 ***Ajánlás** — A 6.2.3.2 és 6.2.3.3 pontokban jelzett összeköttetési berendezések biztosítsák a*

közvetlen beszédüzemű vagy összetett beszédüzemű és digitális adathálózati összeköttetést, amellyel a radar- vagy ADS-B és ADS-C adatok segítségével történő irányítás átadásának céljából szükséges összeköttetést azonnal, míg az egyéb célokból szükséges összeköttetést általában tizenöt másodpercen belül lehet létrehozni, valamint annak automatikus rögzítését.

6.2.3.5 Minden olyan esetben, amikor a légiforgalmi szolgálatok számítógépei között automatikus adatcsere szükséges, biztosítsanak megfelelő berendezést az automatikus adatrögzítésre.

6.2.3.6 A 6.2.3.5 pontban meghatározott adatokról és összeköttetésekről készített felvételeket legalább harminc napig meg kell őrizni.

6.2.4 Eljárások a közvetlen beszédüzemű összeköttetésekre

***Ajánlás** — Olyan eljárásokat dolgozzanak ki közvetlen beszédüzemű összeköttetésre, amelyek a légijármű biztonságát érintő nagyon sürgős hívások esetén lehetővé teszik az azonnali kapcsolatfelvételt és -- ha szükséges -- az éppen folyó kevésbé fontos (beszédüzemű) kapcsolatok megszakítását.*

6.3 Földi mozgást irányító szolgálat

6.3.1 Az ellenőrzött repülőterek munkaterületein üzemelő járművek irányítására — a légjárművek kivételével — alkalmazott összeköttetések
6.3.1.1 A repülőtéri irányító szolgálat számára biztosítsanak kétirányú rádió-távbeszélő berendezés(eke)t a munkaterületen üzemelő járművek irányítására, kivéve, ahol a látjelek útján tartott összeköttetést elégségesnek ítélik.
6.3.1.2 Ahol ezt a körülmények indokolják, a munkaterületen üzemelő járművek irányítására külön távközlési csatornákat alkalmazzanak. Minden ilyen csatornát lássanak el automatikus hangrögzítő berendezéssel.
6.3.1.3 A 6.3.1.2 pontban meghatározott összeköttetésekről készített felvételeket legalább harminc napig meg kell őrizni.
Megjegyzés: Lásd még 10. Annex. II. Kötet, 3.5.1.5.

6.4 Légiközlekedési rádiónavigációs szolgálat

6.4.1 A légtér-felderítési adatok automatikus rögzítése
6.4.1.1 Az elsődleges és másodlagos radarberendezésektől származó vagy egyéb rendszerek (pl. ADS-B, ADS-C) útján beszerzett és a légiforgalmi szolgálatok céljaira használt légtérfelderítési adatokat automatikusan rögzítsék légiközlekedési baleset- és repülőesemény kivizsgálás, kutató és mentő feladatok, légiforgalmi szolgálat és a légtérfelderítési rendszer értékelése, valamint kiképzés céljaira.
6.4.1.2 Az automatikusan rögzített adatokat legalább harminc napig őrizzék meg. Amennyiben a rögzített adatok a légiközlekedési baleset és repülő esemény kivizsgáláshoz szükségesek, azokat hosszabb ideig őrizzék meg egészen addig, amíg azokra a továbbiakban nem lesz szükség.

7. fejezet
A légiforgalmi szolgálatok tájékoztatásokra vonatkozó előírásai

7.1 Időjárásról szóló tájékoztatás

7.1.1 Általános rész
7.1.1.1 A légiforgalmi szolgálati egységeket feladataik ellátásához szükséges mértékben lássák el az észlelt tényleges és előrejelzett időjárási körülményekről szóló tájékoztatással, amelyet olyan formában adjanak meg, amely a légiforgalmi szolgálatok személyzete részéről a lehető legkevesebb értelmezést (dekódolást) igényli és olyan gyakorisággal, amely kielégíti az érintett légiforgalmi szolgálati egységek igényeit.
7.1.1.2 ***Ajánlás** — A légiforgalmi szolgálati egységek számára adják meg a repülőtér közelében, különösen az emelkedési és megközelítési területeken tapasztalható, a légijármű üzemeltetés szempontjából veszélyt jelentő időjárási jelenségek elhelyezkedéséről, függőleges kiterjedéséről, haladási irányáról és mozgási sebességéről szóló részletes tájékoztatásokat.*
Megjegyzés: Az ilyen időjárási jelenségek felsorolása a 3. Annex 4. fejezet 4.12.1 pontjában található.
7.1.1.3 ***Ajánlás** — Amikor a számítógéppel feldolgozott magaslégtéri időjárási adatokat a légiforgalmi szolgálati egységek számítógépeivel történő felhasználás céljából digitális formátumban a légiforgalmi szolgálati egységek rendelkezésére bocsátják, azok tartalma, formátuma és az adattovábbítás módja a meteorológiai és az illetékes légiforgalmi szolgálati hatóság közötti megállapodásnak megfelelő legyen.*
7.1.2 Repüléstájékoztató és körzeti irányító központok
7.1.2.1 A repüléstájékoztató és körzeti irányító központokat a lehető leghamarabb lássák el a 3. Annex 9. Melléklet 1.3 pontjában részletezett időjárási körülményekről szóló tájékoztatásokkal, külön kihangsúlyozva az időjárás romlását vagy várható romlását, amint ez megállapítható. Ezek a jelentések és előrejelzések terjedjenek ki a repüléstájékoztató vagy irányító körzetre, továbbá minden más légtérre, amelyet a körzeti légiközlekedési egyezmények alapján meghatároztak.

Megjegyzés: Ezen előírás teljesítése céljából bizonyos időjárás-változásokat időjárás-romlásnak értelmeznek annak ellenére, hogy ezek rendes körülmények között nem így értékelendők. A hőmérséklet növekedése például kedvezőtlenül befolyásolhatja bizonyos légijármű-típusok üzemeltetését.
7.1.2.2 A repüléstájékoztató és körzeti irányító központok számára megfelelő rendszeres időközönként adják meg a magasságmérő beállítás céljára szolgáló, az érintett repüléstájékoztató és körzeti irányító központok által meghatározott helyekre vonatkozó érvényes légnyomás adatokat.
7.1.3 Bevezető irányító szolgálatot ellátó egységek
7.1.3.1 A bevezető irányító szolgálatot ellátó egységeket lássák el az illetékességük alá tartozó légterekre és repülőterekre vonatkozó észlelt tényleges, valamint az előre jelzett, a 3. Annex 9. Melléklet 1.2 pontban meghatározott időjárási körülményekről szóló tájékoztatással. A különleges jelentéseket valamint az időjárás előrejelzések módosításait a lehető legrövidebb időn belül adják meg a bevezető irányító szolgálatot ellátó egységek számára, akkor, amikor azok a meghatározott előírások szerint szükségessé válnak és ne várják meg a következő időjárás jelentés vagy előrejelzés rendes időpontját. Ahol egyszerre több szélmérőt alkalmaznak, azok kijelzőjén azonosítás céljából egyértelműen jelöljék meg, hogy az adott szélmérő melyik futópályára és futópálya szakaszra vonatkozik.
Megjegyzés: Lásd a 7.1.2.1 pontot követő megjegyzést.
7.1.3.2 A bevezető irányító szolgálatot ellátó egységek számára adják meg a magasságmérő-beállítás céljára szolgáló, az érintett bevezető irányító szolgálatot ellátó egység által meghatározott helyekre vonatkozó érvényes légnyomásadatokat.
7.1.3.3 A végső megközelítés, leszállás és felszállás során bevezető irányító szolgálatot ellátó egységeket szereljék fel talajszél-kijelző berendezéssel (berendezésekkel). A kijelző berendezés (berendezések) a repülőtéri irányító torony és -- ha ilyet létesítettek -- a meteorológiai állomás hasonló kijelzőivel együtt ugyanarról a talajszél mérőműszerről (mérőműszerekről) működjön (működjenek).
7.1.3.4 Azokon a repülőtereken, amelyeken a futópályamenti látástávolság értékeket műszerekkel mérik, a végső megközelítés, leszállás és felszállás során bevezető irányító szolgálatot ellátó egységeket szereljék fel kijelző berendezéssel, amely lehetővé teszi az aktuális futópályamenti látástávolság értékek leolvasását. A kijelző berendezés (berendezések) a repülőtéri irányító torony és -- ha ilyet létesítettek -- a meteorológiai állomás hasonló kijelzőivel együtt ugyanarról a futópályamenti látástávolság érték mérőműszerről (mérőműszerekről) működjön (működjenek).
7.1.3.5 ***Ajánlás*** *– Azokon a repülőtereken, ahol a felhőalap magasságát műszeres eszközökkel mérik, a végső megközelítés, leszállás és felszállás során bevezető irányító szolgálatot ellátó egységeket szereljék fel kijelző berendezéssel (berendezésekkel) amely (amelyek) lehetővé teszi (teszik) az aktuális felhőalap-magasság érték leolvasását. A kijelző berendezés (berendezések) a repülőtéri irányító torony és -- ha ilyet létesítettek -- a meteorológiai állomás hasonló kijelzőivel együtt ugyanazon (ugyanazokon) a megfigyelési ponton (pontokon) elhelyezett mérőműszerről (mérőműszerekről) működjön (működjenek).*
7.1.3.6 A végső megközelítés, leszállás és felszállás során bevezető irányító szolgálatot ellátó egységeket lássák el a megközelítési és felszállási útvonalakon közlekedő vagy a körözéses megközelítést végző légijárművek működését hátrányosan befolyásoló szélnyírásra vonatkozó tájékoztatással.
Megjegyzés: A szélnyírás figyelmeztetés kiadására valamint a meteorológiai tájékoztatásokra vonatkozó ATS előírásokat a 3. Annex 7. fejezete, valamint 6. és 9. Melléklete tartalmazza.
7.1.4 Repülőtéri irányítótorony
7.1.4.1 A repülőtéri irányítótornyokat lássák el az illetékességük alá tartozó repülőtérre vonatkozó, a 3. Annex 9 Melléklet 1.1 pontban meghatározott időjárási körülményekről szóló tájékoztatással. A különleges jelentéseket valamint az időjárás előrejelzések módosításait a lehető legrövidebb időn belül adják meg a repülőtéri irányítótornyok számára, akkor, amikor azok a meghatározott előírások szerint szükségessé válnak, és ne várják meg a következő időjárás-jelentés vagy -előrejelzés rendes időpontját.
Megjegyzés: Lásd a 7.1.2.1 pontot követő megjegyzést.
7.1.4.2 A repülőtéri irányítótornyok számára adják meg a magasságmérő-beállítás céljára szolgáló, az adott repülőtérre vonatkozó érvényes légnyomásadatokat.
7.1.4.3 A repülőtéri irányítótornyokat szereljék fel talajszél kijelző berendezéssel (berendezésekkel). A kijelző berendezés (berendezések) a meteorológiai állomás — ha ilyet létesítettek — hasonló kijelzőivel

együtt ugyanarról a talajszél mérőműszerről (mérőműszerekről) működjön (működjenek). Ahol egyszerre több szélmérőt alkalmaznak, azok kijelzőjén azonosítás céljából egyértelműen jelöljék meg, hogy az adott szélmérő melyik futópályára és futópálya szakaszra vonatkozik.
7.1.4.4 Azokon a repülőtereken, amelyeken a futópályamenti látástávolság értékeket műszerekkel mérik, a repülőtéri irányító tornyokat szereljék fel kijelző berendezéssel (berendezésekkel), amely (amelyek) lehetővé teszi (teszik) az aktuális futópályamenti látástávolság értékek leolvasását. A kijelző berendezés (berendezések) a meteorológiai állomás — ha ilyet létesítettek — hasonló kijelzőivel együtt ugyanarról a futópályamenti látástávolság érték mérőműszerről (mérőműszerekről) működjön (működjenek).
7.1.4.5 ***Ajánlás*** *– Azokon a repülőtereken, ahol a felhőalap magasságát műszeres eszközökkel mérik, a repülőtéri irányítótornyot szereljék fel kijelző berendezéssel (berendezésekkel) amely (amelyek) lehetővé teszi (teszik) az aktuális felhőalap-magasság érték leolvasását. A kijelző berendezés (berendezések) a meteorológiai állomás -- ha ilyet létesítettek -- hasonló kijelzőivel együtt ugyanazon (ugyanazokon) a megfigyelési ponton (pontokon) elhelyezett mérőműszerről (mérőműszerekről) működjön (működjenek).*
7.1.4.6 A repülőtéri irányítótornyokat lássák el a megközelítési és felszállási útvonalakon közlekedő vagy körözéses megközelítést, valamint a futópályán felszálláshoz történő nekifutást illetve leszállás utáni kigurulást végző légijárművek működését hátrányosan befolyásoló szélnyírásra vonatkozó tájékoztatással.
7.1.4.7 ***Ajánlás*** *— A repülőtéri irányítótornyokat és/vagy más illetékes egységeket lássák el a földön levő — beleértve a parkoló — légijárműveket, továbbá a repülőtéri létesítményeket és szolgálatokat hátrányosan érintő időjárási körülményekre vonatkozó tájékoztatással.*
Megjegyzés: Az időjárási körülmények felsorolása a 3. Annex 6. Melléklet 5.1.3 pontjában található.
7.1.5 Távközlési állomások
Ahol ez a repüléstájékoztatás céljai érdekében szükséges, a távközlési állomásokat lássák el az észlelt tényleges, valamint az előrejelzett időjárási körülményekről szóló tájékoztatással. A tájékoztatás egy példányát továbbítsák a repüléstájékoztató vagy a körzeti irányító központnak.

7.2 A repülőtér állapotára valamint a berendezések működésére vonatkozó tájékoztatás

A repülőtéri irányítótornyokat és a bevezető irányító szolgálatot ellátó egységeket rendszeresen tájékoztassák a repülőtér mozgási területének az üzemeltetés szempontjából lényeges állapotáról, beleértve az időszakos veszélyeket is. Adjanak továbbá rendszeres tájékoztatást a repülőteret kiszolgáló bármely berendezés üzemi állapotáról.

7.3 A navigációs berendezések működésére vonatkozó tájékoztatás

7.3.1 A légiforgalmi szolgálati egységeket rendszeresen tájékoztassák a felelősségi területükön belül található nem látás utáni navigációs berendezések, a felszállási, indulási, megközelítési és leszállási eljárásokhoz nélkülözhetetlen látás utáni segédeszközök, továbbá a felszíni mozgáshoz szükséges látás utáni és nem látás utáni berendezések üzemi állapotáról.
7.3.2 ***Ajánlás*** *— A 7.3.1 pontban jelzett látás utáni és nem látás utáni berendezések üzemi állapotáról és ennek változásáról szóló tájékoztatásokat az illetékes légiforgalmi szolgálati egység(ek) megfelelő időben kapja(k) meg, az érintett berendezés igénybevételéhez szükséges idő figyelembevételével.*
Megjegyzés: Az ATS egységeknek a látás utáni és nem látás utáni berendezésekről szóló tájékoztatásával kapcsolatos útmutatót a *Légiforgalmi Szolgálati Tervezési Kézikönyv* (Doc 9426), a látás utáni segédeszközök ellenőrzésére vonatkozó előírásokat a 14. Annex I. kötete, a kiegészítő útmutatót a *Repülőtér Tervezési Kézikönyv* 5. része (Doc 9157) tartalmazza. A nem látás utáni berendezések ellenőrzésére vonatkozó előírásokat a 10. Annex I. kötete tartalmazza.

7.4 Személyzet nélküli szabad léggömbökről szóló tájékoztatás

A személyzet nélküli szabad léggömbök üzemeltetői a 2. Annex előírásainak megfelelően folyamatosan tájékoztassák az illetékes légiforgalmi szolgálati egységeket a személyzet nélküli szabad léggömbök repülésének részleteiről.

7.5 A vulkáni tevékenységről szóló tájékoztatás

7.5.1 A légiforgalmi szolgálati egységeket a helyi megállapodásoknak megfelelően tájékoztassák a vulkánkitörés előtti vulkáni tevékenységről, a vulkánkitörésről és a vulkáni hamufelhőről, amelyek hatással lehetnek a felelősségi területükön belül a légijárművek által igénybe vett légtérre.
7.5.2 A körzeti irányító és repüléstájékoztató központokat lássák el a társított vulkáni tevékenység tanácsadó központok (VAAC) által kiadott vulkáni hamuról szóló tanácsadói tájékoztatásokkal.
Megjegyzés: A vulkáni tevékenység (hamu) tanácsadó központokat (VAAC) a 3. Annex 3.5.1 pontja alapján a körzeti légiközlekedési egyezményben jelölik ki.

7.6 A radióaktív anyagokról és mérgező kémiai „felhőkről" szóló tájékoztatás

A légiforgalmi szolgálati egységeket a helyi megállapodásoknak megfelelően tájékoztassák a légtérbe jutott radioaktív vagy mérgező kémiai anyagokról, amelyek hatással lehetnek a felelősségi területükön belül a légijárművek által igénybe vett légtérre.

1. Függelék
Az előírt navigációs teljesítmény (RNP) típusai azonosításának, valamint a szabvány indulási és érkezési útvonalaktól eltérő légiforgalmi szolgálati útvonalak elnevezésének alapelvei

(A 2. fejezet 2.7 és 2.12 ponthoz)

Megjegyzés: A szabvány indulási és érkezési útvonalak azonosításával és a vonatkozó eljárásokkal kapcsolatban lásd a 3. Függeléket. Az ezen útvonalak és eljárások kijelölésével kapcsolatos útmutatót a *Légiforgalmi Szolgálatok Tervezési Kézikönyve* (Doc 9426) tartalmazza.

1. ATS útvonalak és RNP típusok elnevezése

1.1 A meghatározott légiforgalmi szolgálati útvonal szakaszokra, útvonalakra vagy légterekre alkalmazható útvonal megnevezés és előírt navigációs teljesítmény típus meghatározás rendszerének célja, hogy az automatizálás követelményeinek figyelembe vétele mellett a repülőgépvezető és a légiforgalmi szolgálatok:

a) egyértelműen hivatkozhassanak bármely légiforgalmi szolgálati útvonalra anélkül, hogy annak leírásához földrajzi koordinátákat vagy más módszert kellene igénybe venniük;

b) egy légiforgalmi szolgálati útvonalat szükség szerint a légtér meghatározott függőleges szerkezetére vonatkoztassák;

c) a légiforgalmi szolgálati útvonal mentén vagy egy meghatározott légtérben történő üzemelés esetén jelezzék a navigációs pontosság előírt szintjét; és

d) jelezzék, hogy az útvonalat elsősorban vagy kizárólagosan bizonyos légijármű típusok veszik igénybe.

1. Megjegyzés: Az előírt navigációs teljesítmény (RNP) egész világra kiterjedő általános bevezetése előtt a jelen függelékben található, az RNP-re vonatkozó összes utalás a területi navigációs (RNAV) útvonalakra is érvényes, ahol navigációs teljesítmény pontossági előírást is meghatároztak.
2. Megjegyzés: Az RNP típusok közzétételére vonatkozó előírások a 4. Annex 7. fejezetében és a 15. Annex l. Függelékében találhatók.
3. Megjegyzés: Az előírt navigációs teljesítmény szint (RNP) típus a jelen függelék vonatkozásában valamint repülés tervezési célokra nem tekintendő az ATS útvonal megnevezés szerves részének.
1.2 A fenti célok elérése érdekében a megnevezési rendszer:
a) tegye lehetővé bármely légiforgalmi szolgálati útvonal egyszerű és egyedi azonosítását;
b) kerülje a felesleges elemeket;
c) legyen használható úgy a földi, mint a fedélzeti automatikus berendezések számára;
d) a gyakorlati alkalmazás során legyen a lehető legtömörebb; és
e) biztosítsa a bővítés megfelelő lehetőségét, hogy az alapvető változtatások szükségessége nélkül

megfeleljen a jövőbeli követelményeknek.
1.3 Az ellenőrzött, tanácsadói és nem ellenőrzött ATS útvonalakat a szabványos műszeres indulási és érkezési útvonalak kivételével a következőkben ismertetett eljárás alapján azonosítsák.

2. Az útvonal megnevezés összeállítása

2.1 A légiforgalmi szolgálati útvonal megnevezés egy alapjelzésből áll, amelyet szükség szerint a következők egészítenek ki:
a) egy előtag a 2.3 pont előírása szerint; és
b) egy további betű a 2.4 pont előírása szerint.
2.1.1 A megnevezés összeállításhoz szükséges tagok száma ne haladja meg a hatot.
2.1.2 A megnevezés összeállításhoz szükséges tagok számát lehetőség szerint legfeljebb ötre korlátozzák.
2.2 Az alap megnevezés az ABC egy betűjéből álljon, amelyet 1 és 999 között egy szám követ.
2.2.1 Az alkalmazott betűt az alábbiakból válasszák ki:
a) A, B, G, R olyan útvonalak esetén, amelyek a helyi körzeti légiforgalmi szolgálati útvonalak részét képező nem területi navigációs útvonalak;
b) L, M, N, P olyan útvonalak esetén, amelyek a helyi körzeti légiforgalmi szolgálati útvonalak részét képező területi navigációs útvonalak;
c) H, J, V, W olyan útvonalak esetén, amelyek a nem helyi körzeti légiforgalmi szolgálati útvonalak részét képező és nem területi navigációs útvonalak;
d) Q, T, Y, Z olyan területi navigációs útvonalak esetén, amelyek nem képezik a helyi körzeti légiforgalmi szolgálati útvonalak részét.
2.3 Ahol ez alkalmazható, az alap megnevezést a következőknek megfelelően előtagként egy betűvel egészítsék ki:
a) K az elsősorban forgószárnyas légijárművek számára létesített alacsony repülési magasságú útvonal jelölésére;
b) U annak jelölésére, hogy az útvonalat vagy annak egy szakaszát a magaslégtérben létesítették;
c) S annak jelölésére, hogy az útvonalak kizárólag szuperszonikus légijárművek gyorsítására, lassítására valamint hangsebesség feletti repülésére létesítették.
2.4 Amennyiben az illetékes légiforgalmi szolgálati hatóság vagy a körzeti légiközlekedési egyezmény úgy írja elő, a kérdéses ATS útvonal alap megnevezés után a következőknek megfelelően egy kiegészítő betű alkalmazható az adott ATS útvonalon biztosított szolgálat típusának vagy az útvonalon szükséges forduló teljesítmény meghatározásának jelzésére:
a) az RNP 1 útvonalak esetén, FL 200 repülési szinten vagy felette a „Y” betű jelzi, hogy az útvonalon az összes 30 és 90 fok közötti fordulót az egyenes szakaszok között 22.5 tmf sugárral meghatározott érintő ív engedélyezett RNP tűrési határértékén belül kell végrehajtani (például: A123Y{1});
b) az RNP 1 útvonalak esetén, FL 190 repülési szinten vagy alatta a „Z” betű jelzi, hogy az útvonalon az összes 30 és 90 fok közötti fordulót az egyenes szakaszok között 15 tmf sugárral meghatározott érintő ív engedélyezett RNP tűrési határértékén belül kell végrehajtani (például: G246Z{1});
c) az „F” betű azt jelzi, hogy az útvonalon vagy annak egy szakaszán csak tanácsadó szolgálatot biztosítanak;
d) a „G” betű azt jelzi, hogy az útvonalon vagy annak egy szakaszán csak repüléstájékoztató szolgálatot biztosítanak.
1. Megjegyzés: A légijármű fedélzetén elhelyezett megjelenítő berendezések korlátozásai miatt az „F”, „G”, „Y” vagy „Z” betűk a repülőgépvezető számára esetleg nem jeleníthetők meg.
2. Megjegyzés: A 4. és a 15. Annex előírásainak megfelelően kidolgozott és közzétett repülési térképek és légiforgalmi tájékoztató kiadványok jelzik, hogy az útvonal vagy annak egy szakasza ellenőrzött, tanácsadói vagy repüléstájékoztató útvonal.
3 Megjegyzés: Azokat a feltételeket, amelyek alapján az Államok a 2.4 a) és b) alpontokban ismertetett ellenőrzött forduló teljesítményt meghatározhatják, az *Előírt Navigációs Teljesítmény Kézikönyv*ben (Doc 9613) tárgyaljuk.

3. Az alap megnevezések kidolgozása

3.1 A légiforgalmi szolgálati útvonal alap megnevezéseket a következő alapelvek szerint dolgozzák ki.
3.1.1 Egy fő távolsági útvonal teljes hosszában, függetlenül az átrepült közelkörzeti irányító légterektől, körzetektől vagy Államoktól, ugyanazt az alap megnevezést alkalmazzák.
Megjegyzés: Ez különösen fontos ott, ahol automatikus ATS adatfeldolgozást és számítógépes fedélzeti navigációs berendezéseket illetve számítógépes navigációs rendszert használnak.
3.1.2 Ahol két vagy több távolsági útvonal közös szakasszal rendelkezik, a kérdéses szakaszt lássák el mindkét érintett útvonal megnevezésével, kivéve, ha ez a légiforgalmi szolgálat biztosításánál nehézséget okoz, amely esetben közös megegyezés alapján csak egy megnevezést alkalmazzanak.
3.1.3 Egy útvonalhoz már felhasznált alap megnevezés másik útvonalnál nem alkalmazható.
3.1.4 Az Államok az útvonal megnevezésére vonatkozó igényeiket egyeztetés céljából nyújtsák be az ICAO körzeti irodáinak.

4. A megnevezések használata közleményváltásokban

4.1 A nyomtatott formájú összeköttetések esetében a megnevezést minden esetben legalább kettő, de nem több mint hat taggal adják meg.
4.2 A szóbeli összeköttetések esetében a megnevezés alapbetűjét az ICAO kiejtési ABC szerint mondják ki.
4.3 Ahol a 2.3 pontban meghatározott K, U vagy S előtagokat használják, azokat a szóbeli összeköttetések esetében a következők szerint mondják ki:
K — KOPTER
U — UPPER
S — SUPERSONIC
A „kopter” szó kiejtése mint a „helicopter”-nél, az „upper” és „supersonic” szavak kiejtése az angol nyelvi kiejtés szerint történik.
4.4 Amennyiben a 2.4 pontban meghatározott „F”, „G”, „Y” vagy „Z” előtagokat használják, nem lehet elvárás, hogy azokat a hajózószemélyzet tagjai a szóbeli összeköttetések esetében használják.

2. Függelék
Fontos pontok kijelölésének és elnevezésének alapelvei

(A 2. fejezet 2.14 ponthoz)

1. Fontos pontok kijelölése

1.1 A fontos pontokat -- amikor csak lehetséges -- földi rádiónavigációs berendezésekre, lehetőleg URH vagy magasabb frekvencián üzemelő berendezésekre vonatkoztatva jelöljék ki.
1.2 Ahol ilyen földi rádiónavigációs berendezések nem állnak rendelkezésre, a fontos pontokat olyan helyeken jelöljék ki, amelyek önálló fedélzeti navigációs berendezéssel vagy -- ahol földi látjelek útján történő navigációt alkalmaznak -- talajfelszín látással meghatározhatók illetve azonosíthatók. Egyes egyedi pontok az érintett szomszédos légiforgalmi irányító szolgálati egységek vagy irányítói munkahelyek közötti megállapodás alapján „irányítás átadási pont”-ként jelölhetők ki.

2. A rádiónavigációs berendezés helyével kijelölt fontos pontok elnevezése

2.1 A rádiónavigációs berendezés helyével kijelölt fontos pontok nyílt nyelven történő megnevezése
2.1.1 Amikor az lehetséges, a fontos pontokat azonosítható és lehetőleg jellegzetes földrajzi helyre vonatkoztatva nevezzék el.
2.1.2 A fontos pontok megnevezése alkalmával gondoskodjanak a következő feltételek teljesítéséről:
a) a név kiejtése ne jelentsen nehézséget a repülőgépvezetők vagy a légiforgalmi szolgálatok személyzete számára, amikor azok az ATS kommunikációban használatos nyelvet alkalmazzák. Ahol a jelentős pont

elnevezésére kiválasztott földrajzi hely az adott nemzeti nyelvű neve kiejtési nehézségeket okoz, a megnevezés rövidített vagy összevont változatát válasszák ki, amely a lehető legnagyobb mértékben megtartja az eredeti földrajzi név jelentését;

Például: FUERSTENFELDBRUCK = FURSTY

b) a beszédüzemű közleményváltások alkalmával a megnevezés legyen könnyen felismerhető és ne legyen összetéveszthető az azonos területen levő más fontos pontok neveivel. Ezen felül a név a légiforgalmi szolgálatok és a repülőgépvezetők közötti egyéb közleményváltások alkalmával se okozzon zavart;

c) a megnevezés lehetőség szerint legalább hat betűből és kettő, de lehetőleg nem több mint három szótagból álljon;

d) a fontos pont és az azt jelölő rádiónavigációs berendezés kiválasztott neve legyen azonos.

2.2 A rádiónavigációs berendezés helyével kijelölt fontos pontok kódolt megnevezésének összeállítása

2.2.1 A fontos pont kódolt megnevezése és az azt jelölő rádiónavigációs berendezés rádió azonosítója legyen azonos. Ha lehetséges, azt úgy állítsák össze, hogy megkönnyítse a nyílt nyelvű megnevezéssel történő vonatkoztatást.

2.2.2 Az érintett rádiónavigációs berendezés elhelyezkedésének 1100 km-es (600 tengeri mérföldes) körzetén belül a kódolt megnevezés — az alábbi eset kivételével — ne ismétlődjön.

Megjegyzés: Amikor két rádiónavigációs berendezés azonos telepítési hellyel rendelkezik, azonban eltérő frekvencia-sávban üzemelnek, rádióazonosító jelük általában azonos.

2.3 A kódolt megnevezésre vonatkozó állami igényeket egyeztetés céljából nyújtsák be az ICAO körzeti irodáknak.

3. A nem rádiónavigációs berendezés helyével kijelölt fontos pontok elnevezése

3.1 Ahol a fontos pont kijelölésére olyan helyen van szükség, amelyet nem jelöl rádiónavigációs berendezés, a fontos pontot kiejthető, egyedi összeállítású, ötbetűs „név-kód”-dal jelöljék meg. Ezt követően a név-kód lesz a fontos pont megnevezése, valamint annak kódolt jelölése is.

3.2 Ezt a név-kód megnevezést úgy válasszák ki, hogy elkerüljék kiejtési nehézségeket a repülőgépvezetők vagy a légiforgalmi szolgálatok személyzete számára, amikor azok az ATS közleményváltásokban használatos nyelvet alkalmazzák.

Például: ADOLA, KODAP

3.3 A beszédüzemű közleményváltások alkalmával a név-kód megnevezés legyen könnyen felismerhető és ne legyen összetéveszthető az azonos területen levő más fontos pontok név-kódjaival.

3.4 A fontos pont név-kód megnevezését ne adják ki más fontos pontnak. Amennyiben egy fontos pont áthelyezése válik szükségessé, új név-kód megnevezést kell választani. Olyan esetekben, amikor egy Állam meg kíván tartani bizonyos név-kód megnevezéseket más helyszínen történő újbóli felhasználás céljából, a név-kód megnevezés legalább hat hónap időtartamig nem használható újra.

3.5 A név-kód megnevezésre vonatkozó állami igényeket egyeztetés céljából nyújtsák be az ICAO körzeti irodáknak.

3.6 Olyan területeken, amelyeken állandó útvonal rendszert nem határoztak meg vagy ahol a légijárművek által követett útvonalak az üzemeltetési szempontok alapján nagy mértékben változnak, a fontos pontokat az egész világon egységesen alkalmazható földrajzi hely meghatározási rendszer (WGS-84) koordinátáival jelöljék ki és így tegyék közzé, kivéve az ilyen területek be és/vagy kilépési pontjaként szolgáló állandó fontos pontokat, amelyeket a 2. vagy 3. szakasz megfelelő előírásai szerint jelöljék ki.

4. Jelölések alkalmazása közleményváltások során

4.1 A beszédüzemű közleményváltások alkalmával általában a 2. vagy 3. szakasz alapján kiválasztott nevet használják a fontos pont megjelölésére. Ha egy rádiónavigációs berendezéssel jelölt fontos pont 2.1 pont szerint meghatározott nyílt nyelvű megnevezését nem használják, azt kódolt névvel helyettesítsék, amelyet a beszédüzemű közleményváltások alkalmával az ICAO betűzési előírásnak megfelelő módon ejtsenek ki.

4.2 A nyomtatott vagy kódolt közleményváltások esetében csak a kódolt megnevezést vagy a kiválasztott kód-nevet alkalmazzák a fontos pont megjelölésére.

5. A fontos pontok felhasználása jelentési célokra

5.1 Annak érdekében, hogy a légiforgalmi szolgálatok tájékoztatásokat szerezhessenek be a légijárművek repülésének előrehaladásáról, szükséges lehet a kiválasztott fontos pontok jelentő-pontnak történő kijelölése.

5.2 Az ilyen pontok kijelölésnél a következő tényezőket vegyék figyelembe:

a) a biztosított légiforgalmi szolgálat típusa;

b) az általában várható forgalom nagyságrendje;

c) az a pontosság, amellyel a légijárművek be tudják tartani az érvényes repülési tervet;

d) a légijármű sebessége;

e) az alkalmazott elkülönítési minimumok;

f) a légtérszerkezet összetettsége;

g) az alkalmazott irányítási módszer(ek);

h) egy repülés fontos szakaszainak kezdete vagy vége (emelkedés, süllyedés, irányváltoztatás, stb.);

i) irányítás-átadási eljárások;

j) biztonsági valamint kutatás-mentési szempontok;

k) légijármű fedélzeti és a levegő-föld közötti összeköttetés leterheltsége.

5.3 A jelentőpontokat „kötelező” vagy „kérésre” típusúként jelöljék meg.

5.4 A „kötelező” jelentőpontok kijelölésénél a következő alapelveket alkalmazzák:

a) a kötelező jelentőpontok számát a légiforgalmi szolgálati egységeknek a levegőben lévő légijárművek előrehaladásáról szóló tájékoztatás igényével összhangban a lehető legkisebbre korlátozzák, szem előtt tartva a fedélzeti és légiforgalmi irányítói munkaterhelés valamint a levegő-föld közleményváltások számának lehető legalacsonyabb szinten tartásának szükségességét;

b) egy adott helyen rendelkezésre álló rádiónavigációs berendezés nem teszi alapvetően szükségessé annak kötelező jelentőpontként történő kijelölését;

c) a repüléstájékoztató vagy irányító körzet határain nem kell szükségszerűen kötelező jelentőpontokat kijelölni.

5.5 A „kérésre” típusú jelentőpontokat a légiforgalmi szolgálatok kiegészítő helyzetjelentések iránti igényei alapján jelölhetik ki, amennyiben ezt a forgalmi körülmények szükségessé teszik.

5.6 A „kötelező” valamint „kérésre” típusú jelentőpontokat a légiforgalmi szolgálatok hatékony működéséhez szükséges helyzetjelentések számának minimális szinten tartására vonatkozó követelmény figyelembevételével rendszeresen vizsgálják felül.

5.7 A „kötelező” jelentő-pontok jelentését ne tegyék minden repülés számára minden körülmények között kötelezővé. Ezen alapelv alkalmazása során fordítsanak különös figyelmet a következőkre:

a) a nagy sebességgel és nagy repülési magasságon üzemelő légijárműveket ne utasítsák rendszeres helyzetjelentések adására minden olyan jelentőpontnál, amely a kis sebességű és alacsony repülési magasságon üzemelő légijárművek számára kötelező;

b) a közelkörzeten átrepülő légijárműveket ne utasítsák rendszeres helyzetjelentések adására olyan gyakran, mint az érkező és induló légijárműveket.

5.8 Olyan területeken, ahol a jelentőpontok kijelölésére a fenti alapelvek gyakorlati szempontokból nem alkalmazhatók, olyan jelentési rendszert lehet kialakítani, amelynek alapját az egész fokokban kifejezett földrajzi hosszúsági vagy szélességi körök képezik.

3. Függelék
A szabvány indulási és érkezési útvonalak elnevezésének alapelvei valamint az azokkal kapcsolatos eljárások

(lásd 2. fejezet 2.12.3 pont)

Megjegyzés: A szabványos indulási és érkezési útvonalak kijelölésének alapelveire, valamint az azokkal kapcsolatos eljárásokra vonatkozó útmutató a *Légiforgalmi Szolgálati Tervezési Kézikönyv*ben (Doc 9426) található.

1. A szabvány indulási és érkezési útvonalak jelölése, valamint az azokkal kapcsolatos eljárások

Megjegyzés: A következő szövegben az „útvonal és a kapcsolatos eljárások”-ra az „útvonal” szót alkalmazzuk.

1.1 A megnevezés rendszere:

a) egyszerűen és egyértelműen tegye lehetővé minden egyes útvonal azonosítását;

b) világosan különböztesse meg egymástól:

— az indulási és érkezési útvonalakat;

— az indulási vagy érkezési, valamint más légiforgalmi szolgálati útvonalakat;

— azokat az útvonalakat, amelyeken a navigációhoz földi rádióberendezésekre vagy önálló fedélzeti berendezésekre van szükség, valamint azokat, amelyeken a navigáció földlátással történik;

c) feleljen meg a légiforgalmi szolgálatok és a légijárművek adat-feldolgozási és adat-megjelenítési követelményeinek;

d) a gyakorlati alkalmazás során a lehető legtömörebb legyen;

e) kerülje a felesleges elemeket;

f) biztosítsa a bővítés lehetőségét, hogy a rendszer a későbbi bővítés igényeinek alapvető változtatás nélkül megfeleljen.

1.2 Minden egyes útvonalat nyílt nyelvű megnevezéssel és megfelelő kód jelzéssel azonosítsanak.

1.3 A beszédüzemű közleményváltások során könnyen felismerhető legyen, hogy a megnevezés melyik szabványos indulási vagy érkezési útvonalra vonatkozik, továbbá a kiejtése ne okozzon nehézséget a repülőgépvezetők és a légiforgalmi szolgálatok személyzete számára.

2. Jelölések összeállítása

2.1 Nyílt nyelvű megnevezés

2.1.1 A szabvány indulási vagy érkezési útvonal nyílt nyelvű megnevezése a következőkből álljon:

a) alap-azonosító; amit követ

b) az érvényességi jelzés; amit követ

c) az útvonal jelzés, ahol szükséges; amit követ

d) az indulás („departure”) vagy érkezés („arrival”) kifejezések; amit követ

e) a látás utáni („visual”) kifejezés, amennyiben az útvonalat a látvarepülési szabályok (VFR) szerint üzemeltetett légijárművek részére jelölték ki.

2.1.2 Az alap-azonosító annak a fontos pontnak neve vagy név-kódja legyen, amelynél a szabvány indulási útvonal véget ér, vagy amelynél a szabvány érkezési útvonal kezdődik.

2.1.3 Az érvényességi jelzés 1 — 9 közötti szám legyen.

2.1.4 Az útvonal jelzés az ABC egy betűje legyen, azonban az „I” és „O” betűk nem alkalmazhatók.

2.2 Kódolt megjelölés

A műszeres vagy látás utáni szabvány indulási vagy érkezési útvonal kódolt jelölése a következőkből álljon:

a) a 2.1.1 a) alpontban meghatározott fontos pont kód jelzése vagy név-kódja; amit követ

b) a 2.1.1 b) alpontban meghatározott érvényességi jelzés; amit követ

c) a 2.1.1 c) alpontban meghatározott útvonal jelzés, ahol ez szükséges.

Megjegyzés: Ha a jelölés öt betűből álló név-kód, például KODAP, a légijármű fedélzetén levő megjelenítő berendezés korlátozott lehetőségei miatt szükséges lehet az alap-azonosító jelzés rövidítése. Az ilyen jelölés rövidítésének módját és formáját a járatók határozzák meg.

3. Jelölések kiosztása

3.1 Minden egyes útvonalra külön megnevezést jelöljenek ki.

3.2 Ugyanarra a fontos pontra vonatkozó két vagy több útvonal megkülönböztetése érdekében (ahol így az alap-azonosító ugyanaz) minden egyes útvonalra a 2.1.4 alpont szerint külön útvonal jelzést osszanak ki.

4. Érvényességi jelzések kiosztása

4.1 Minden egyes útvonalra osszanak ki érvényességi jelzést annak megjelölése érdekében, hogy az útvonal jelenleg érvényben van-e.

4.2 A kiosztott első érvényességi jelzés az „1" szám legyen.

4.3 Amennyiben az útvonalat módosították, a következő érvényességi jelzés a sorrendben következő nagyobb szám legyen. A „9" szám után ismét az „1" szám következik.

5. Példák a nyílt nyelvű és a kódolt jelölésekre

5.1 1. példa

Szabvány műszeres indulási útvonal

a) Nyílt nyelvű megnevezés: BRECON ONE DEPARTURE

b) Kódolt jelölés: BCN 1

5.1.1 *Értelmezés*

A megnevezés olyan szabvány műszeres indulási útvonalat azonosít, amely a BRECON (alap-azonosító) elnevezésű fontos pontnál végződik. BRECON egy rádiónavigációs berendezés, amelynek azonosítója BCN (a kódolt jelölés alap-azonosítója). Az érvényességi jelzés ONE azaz egyes (a kódolt jelölésben „1"), amely azt jelzi, hogy az útvonal eredeti változata van érvényben vagy változás történt az előző NINE azaz kilences változathoz képest és most az új ONE azaz egyes jelzésű változat van érvényben (lásd 4.3). Az útvonal jelzés hiánya (lásd 2.1.4 és 3.2) azt jelzi, hogy a BRECON rádiónavigációs berendezésre csak egy útvonalat, a jelen esetben egy indulási útvonalat dolgoztak ki.

5.2 2. példa

Szabvány műszeres érkezési útvonal

a) Nyílt nyelvű megnevezés: KODAP TWO ALPHA

b) Kódolt jelölés: KODAP 2 A

5.2.1 *Értelmezés*

A megnevezés olyan szabvány műszeres érkezési útvonalat azonosít, amely a KODAP (alap-azonosító) elnevezésű fontos pontnál kezdődik. KODAP egy rádiónavigációs berendezés helyével nem kijelölt fontos pont és ezért a 11. Annex 2. Függeléke alapján meghatározott öt-betűs név-kóddal rendelkezik. Az érvényességi jelzés TWO, azaz kettes, amely azt jelzi, hogy változás történt az előző ONE, azaz egyes változathoz képest és most az új TWO, azaz kettes jelzésű változat van érvényben. Az ALPHA (A) útvonal jelzés a KODAP fontos ponthoz kidolgozott több útvonal változat közül az egyiket jelzi, mint az ahhoz megállapított külön egyedi jelzés.

5.3 3. példa

Szabvány látás utáni indulási útvonal

a) Nyílt nyelvű megnevezés: ADOLA FIVE BRAVO DEPARTURE VISUAL

b) Kódolt jelölés: ADOLA 5 B

5.3.1 *Értelmezés*

A megnevezés az ellenőrzött VFR repülések számára kidolgozott olyan szabvány látás utáni indulási útvonalat azonosít, amely az ADOLA (alap-azonosító) elnevezésű fontos pontnál végződik, amely rádiónavigációs berendezés helyével nem kijelölt fontos pont. Az érvényességi jelzés FIVE, azaz ötös, amely azt jelzi, hogy változás történt az előző FOUR, azaz négyes változathoz képest és most az új FIVE, azaz ötös jelzésű változat van érvényben. A BRAVO (B) útvonal jelzés az ADOLA fontos ponthoz kidolgozott több útvonal változat közül az egyiket jelzi, mint az ahhoz megállapított külön egyedi jelzés.

6. MLS/RNAV megközelítési eljárások jelöléseinek összeállítása

6.1 Nyílt nyelvű megnevezés
6.1.1 Az MLS/RNAV megközelítési eljárások nyílt nyelvű megnevezése a következőkből álljon:
a) „MLS” betűk; amit követ
b) alap-azonosító; amit követ
c) az érvényességi jelzés; amit követ
d) az útvonal jelzés; amit követ
e) az „approach”, azaz megközelítés kifejezés; amit követ
f) azon futópálya azonosítója, amelyre az eljárást tervezték.
6.1.2 Az alap-azonosító annak a fontos pontnak neve vagy név-kódja legyen, amelynél a megközelítési eljárás kezdődik.
6.1.3 Az érvényességi jelzés 1 — 9 közötti szám legyen.
6.1.4 Az útvonal jelzés az ABC egy betűje legyen, azonban az „I” és „O” betűket ne alkalmazzák.
6.1.5 A futópálya azonosítóját a 14. Annex I. kötet 5.2.2 pontja alapján határozzák meg.
6.2 Kódolt jelölés
6.2.1 Az MLS/RNAV megközelítési eljárás kódolt jelölése a következőkből álljon:
a) „MLS” betűk; amit követ
b) a fontos pont kód jelzése vagy név-kódja a 6.1.1 b) alpont szerint; amelyet követ
c) az érvényességi jelzés a 6.1.1 c) alpont szerint; amelyet követ
d) az útvonal jelzés a 6.1.1 d) alpont szerint; amelyet követ
e) a futópálya azonosító a 6.1.1 f) alpont szerint.
6.3 A megnevezések kiosztása
6.3.1 Az MLS/RNAV megközelítési eljárások megnevezéseinek kiosztását a 3. szakasszal összhangban végezzék el. Az azonos repülési útvonalat követő, azonban egymástól eltérő repülési pályával rendelkező eljárásokat külön útvonal jelöléssel azonosítsák.
6.3.2 Az MLS/RNAV megközelítési eljárás jelölésének betűje egy adott repülőtéren minden megközelítésre legyen egyedi egészen addig, amíg az összes betűt felhasználják. Az útvonal jelölésének betűjét csak ezt követően ismételjék. Azonos MLS földi berendezést felhasználó két útvonal esetében ugyanazon útvonaljelzés használata tilos.
6.3.3 A megközelítési eljárás érvényességi jelzését a 4. ponttal összhangban végezzék el.
6.4 Példa a nyílt nyelvű megnevezésre és a kódolt jelölésekre
6.4.1 *Példa*
a) Nyílt nyelvű megnevezés: MLS HAPPY ONE ALPHA APPROACH RUNWAY ONE EIGHT LEFT
b) Kódolt jelölés: MLS HAPPY 1 A 18L
6.4.2 Értelmezés
A megnevezés olyan MLS/RNAV megközelítési eljárást azonosít, amely a HAPPY (alap-azonosító) elnevezésű fontos pontnál kezdődik. HAPPY egy rádiónavigációs berendezéssel nem kijelölt fontos pont és ezért a 11. Annex 2. Függeléke alapján meghatározott ötbetűs névkóddal rendelkezik. Az érvényességi jelzés ONE azaz egyes, amely azt jelzi, hogy az útvonal eredeti változata van érvényben vagy változás történt az előző NINE azaz kilences változathoz képest és most az új ONE azaz egyes jelzésű változata van érvényben. Az ALPHA (A) útvonal jelzés a HAPPY fontos ponthoz kidolgozott több útvonal változat közül az egyiket jelzi, mint az ehhez megállapított külön egyedi jelzés.

7. A jelölések használata közleményváltások során

7.1 A beszédüzemű közleményváltások alkalmával csak a nyílt nyelvű megnevezést használják.
Megjegyzés: Az útvonalak azonosítása céljából a 2.1.1 d) és 2.1.1 e) alpontokban ismertetett indulási

(departure), érkezési (arrival) valamint látás utáni (visual) kifejezések a nyílt nyelvű megnevezések elválaszthatatlan részét képezik.
7.2 A nyomtatott vagy kódolt összeköttetéseknél csak a kódolt jelölést használják.

8. Az útvonalak és eljárások megjelenítése a légiforgalmi irányító szolgálat számára

8.1 Azokon a munkahelyeken, amelyeken a légijárművek számára a légiforgalmi irányítói engedély részeként ilyen útvonalakat vagy eljárásokat adnak ki vagy azok bármely más kapcsolatban vannak a légiforgalmi irányító szolgálat biztosításával, helyezzék el minden egyes érvényes szabványos indulási és/vagy érkezési és/vagy megközelítési eljárás részletes leírását, beleértve annak nyílt nyelvű megnevezését, valamint kódolt jelölését is.
8.2 Amikor lehetséges, a munkahelyeken helyezzék el az útvonalak vagy eljárások grafikus (térképes) ismertetését is.

4. Függelék

A légiforgalmi szolgálatok légtereinek osztályozása

Biztosított szolgálatok és repülés végrehajtási előírások

(lásd 2. Fejezet — 2.6 pont)

Magyarázat:

* Amennyiben az átváltási magasság 3050 méter (1000 láb) AMSL alatt van, a 10000 láb tengerszint közepes feletti magasság helyett FL 100 alkalmazandó.

Megjegyzés:

AMSL	*közepes tengerszint feletti magasság felett*
IAS	*műszer szerinti repülési sebesség*
IFR	*műszerrepülési szabályok*
VFR	*látvarepülési szabályok*

5. Függelék

A léginavigációs adatok minőségi előírásai

1. táblázat

Földrajzi szélesség és hosszúság

Szélesség és hosszúság	*Pontosság* *Adat típus*	*Osztályzás* *Megbízhatóság*
Repüléstájékoztató körzet határpontjai	2 km (1 tmf) közzétett	általános 1×10^{-3}
P, R, D területek határpontjai (CTA/CTZ határokon kívül)	2 km (1 tmf) közzétett	általános 1×10^{-3}
P, R, D területek határpontjai (CTA/CTZ határon belül)	100 méter számított	alapvető 1×10^{-5}
CTA/CTZ határpontjai	100 méter számított	alapvető 1×10^{-5}

Útvonal navigációs berendezések és pontok, várakozási helyek, STAR/SID pontok	100 méter földmérési/ számított	alapvető 1×10^{-5}
Akadályok az útvonalon	100 méter földmérési	általános 1×10^{-3}
Végső megközelítési pontok és helyek, műszeres megközelítési eljáráshoz tartozó egyéb alapvető fontosságú pontok és helyek	3 méter földmérési/ számított	alapvető 1×10^{-5}

2. Táblázat
Tengerszint és földfelszín feletti magasság

tengerszint feletti magasság és földfelszín feletti magasság	*Pontosság Adat típus*	*Osztályzás Megbízhatóság*
Futópálya küszöb földfelszín feletti átrepülési magassága precíziós megközelítéseknél	0.5 méter vagy 1 láb számított	kritikus 1×10^{-8}
akadálymentes tengerszint feletti magasság akadálymentes földfelszín feletti magasság	PANS-OPS szerint (Doc 8168)	alapvető 1×10^{-5}
Akadályok az útvonalon, tengerszint feletti magasságok	3 méter vagy 10 láb földmérési	általános 1×10^{-3}
DME távolságmérő berendezés, tengerszint feletti magasság	30 méter vagy 100 láb földmérési	alapvető 1×10^{-5}
Műszeres megközelítési eljárás tengerszint feletti magassága	PANS-OPS szerint (Doc 8168)	alapvető 1×10^{-5}
Legalacsonyabb tengerszint feletti repülési magasságok	50 méter vagy 100 láb számított	általános 1×10^{-3}

3. táblázat
Mágneses elhajlás és mágneses változás

Elhajlás és változás	*Pontosság Adat típus*	*Osztályzás Megbízhatóság*
Műszaki beméréshez használt URH rádiónavigációs berendezés állomás elhajlás	1 fok földmérési	alapvető 1×10^{-5}
NDB rádiónavigációs berendezés mágneses elhajlás	1 fok földmérési	általános 1×10^{-3}

4. táblázat
Irányszög

Irányszög	*Pontosság Adat típus*	*Osztályzás Megbízhatóság*
Légiútvonal szakasz	1/10 fok számított	általános 1×10^{-3}

Útvonal és közelkörzeti pont csoportok kijelölése	1/10 fok számított	általános 1×10^{-3}
Közelkörzeti érkezési és indulási útvonal szakaszok	1/10 fok számított	általános 1×10^{-3}
Műszeres megközelítési eljárás pont csoportok kijelölése	1/100 fok számított	alapvető 1×10^{-5}

5. táblázat
Hosszúság — Távolság — Méretek

Hosszúság — Távolság — Méretek	*Pontosság* *Adat típus*	*Osztályzás* *Megbízhatóság*
Légiútvonal szakasz hossza	1/10 km vagy 1/10 tmf számított	általános 1×10^{-3}
Útvonal és közelkörzeti pont csoportok távolsága	1/10 km vagy 1/10 tmf számított	általános 1×10^{-3}
Közelkörzeti érkezési és indulási útvonal szakaszok hossza	1/100 km vagy 1/100 tmf számított	alapvető 1×10^{-5}
Közelkörzeti és műszeres megközelítési eljárás pont csoportok távolsága	1/100 km vagy 1/100 tmf számított	alapvető 1×10^{-5}

Nemzetközi előírások és ajánlott gyakorlati eljárások

A. Melléklet

VOR berendezéssel kijelölt ATS útvonalak meghatározásának módszereire vonatkozó útmutató
(Lásd 2.7.1 pont és 2.12 szakasz)

1. Bevezető

1.1 A jelen mellékletben található útmutató anyag az 1972-ben Európában és 1978-ban az Egyesült Államokban elvégzett átfogó vizsgálatok alapján készült, melyek megállapításai általánosságban egymással azonosak.
Megjegyzés: Az európai vizsgálat részleteit a 120. számú ICAO körlevél — *A légiforgalmi szolgálati útvonal hálózatokban kijelölt egymással párhuzamos repülési útvonalak közötti elkülönítési távolság minimum számítási eljárása* — tartalmazza.
1.2 Az útmutató 3. és 4. pontjában leírtak alkalmazásakor vegyék figyelembe, hogy a felhasznált adatok olyan VOR berendezés segítségével végrehajtott navigáción alapulnak, amelyek teljes mértékben megfelelnek a Doc 8071 — *Rádiónavigációs Berendezések Ellenőrzési Kézikönyve* — I. kötet előírásainak. Vegyenek továbbá figyelembe olyan tényezőket is, mint például a légijárművek útvonal-keresztezésének gyakorisága különleges üzemeltetési körülmények között vagy a rendelkezésre álló tájékoztatás a légijármű tényleges útirány tartási képességéről bizonyos légtérszakaszokon belül.
1.3 Felhívjuk a figyelmet a 4.2 pontban levő alapfeltételezésre valamint arra a tényre, hogy a 4.1 pontban megadott értékek hagyományos és óvatos számítási módszer alapján kerültek meghatározásra. Ezért ezek alkalmazása előtt vegyék figyelembe a kérdéses légtérre vonatkozó gyakorlati tapasztalatokat, valamint a légijármű általános navigációs teljesítménye fejlődésének lehetőségét.
1.4 Felkérjük az Államokat, hogy részletesen tájékoztassák az ICAO-t a jelen útmutató anyag

alkalmazásának eredményeiről.

2. A VOR rendszer teljesítmény értékeinek meghatározása

A teljes VOR rendszert alkotó egyes tényezőkkel kapcsolatos értékek valószínű nagyfokú változékonysága, valamint mindezen hatások egyedi és a kívánt pontossággal történő méréséhez rendelkezésre álló jelenlegi korlátozott módszerek arra a következtetésre vezetnek, hogy a VOR rendszer teljesítmény értékeinek meghatározása céljából valószerűbb módszer a teljes rendszer hiba felmérése. Az útmutató 3. és 4. pontjában található tájékoztatót csak a 120. számú ICAO körlevél megfelelő tanulmányozása után és a helyi környezeti körülmények fokozott figyelembevételével alkalmazzák.
Megjegyzés: A teljes VOR rendszer pontosságával kapcsolatos tájékoztatót a 10. Annex I. kötet C. Melléklete tartalmazza.

3. A VOR berendezéssel kijelölt útvonalak mentén elhelyezkedő védett légtér meghatározása

1. Megjegyzés: A jelen rész anyagát nem az összeütközési veszély kockázati — kívánatos repülésbiztonsági szint módszer alapján készítettük el.
2. Megjegyzés: A „védettség mértéke” kifejezés a jelen részben azt kívánja jelezni, hogy a forgalom a teljes igénybevételi idő (azaz az összes légijármű teljes repülési ideje) 95%-ában a kérdéses útvonal mentén kialakított védett légtéren belül fog működni. Például ahol 95%-os védettséget biztosítanak, feltételezzük, hogy a forgalom a teljes igénybevételi idő 5%-ában a védett légtéren *kívül* repül majd. Ilyen forgalom vonatkozásában nem lehetséges pontos távolsággal meghatározni, hogy ez a forgalom milyen mértékben repül ki a védett légtérből.
3.1 Az alábbi útmutatást azokra a VOR berendezéssel meghatározott útvonalakra vonatkozóan adjuk meg, amelyeken nem használnak radarberendezést vagy berendezésfüggő automatikus felderítés (ADS-B) annak elősegítésére, hogy a légijármű a védett légtérben maradjon. Mindazonáltal amikor a légijármű oldalirányú eltéréseit radar légtérfigyelés vagy berendezésfüggő automatikus felderítés (ADS-B) segítségével ellenőrzik, a gyakorlati tapasztalatok szerint az adott légtér vonatkozásában szükséges védett légtér mérete csökkenthető.
3.2 Az útvonalak melletti légtérben folyó műveletektől legalább 95%-os védettséget biztosítsanak.
3.3 A 120. számú ICAO körlevélben található anyag szerint a VOR rendszer teljesítménye 95%-os védettségi mérték mellett az útvonal középvonala mentén a lehetséges eltérések miatt a következő védett légterek kialakítását teszi szükségessé:
• Olyan VOR útvonalakon, amelyeken a VOR berendezések közötti távolság 93 km (50 tmf) vagy kevesebb: ± 7.4 km (4 tmf)
• Olyan VOR útvonalakon, amelyeken a VOR berendezések közötti távolság legfeljebb 278 km (150 tmf): a VOR berendezéstől számított 46 km (25 tmf) távolságig ± 7.4 km (4 tmf); ezt követően a védett légtér a VOR berendezéstől számított 139 km (75 tmf) távolságban legfeljebb ± 11.1 km-re (6 tmf) szélesedik ki.

A-1. ábra

VOR berendezések közötti távolság legfeljebb 278 km (150 tmf)

3.4 Amennyiben az illetékes légiforgalmi szolgálati hatóság véleménye szerint, például a tiltott, korlátozott vagy veszélyes légterek közelsége, a katonai légijárművek emelkedési és süllyedési repülési útvonalai vagy egyéb okok miatt ennél nagyobb védelem szükséges, magasabb szintű védettség biztosítását határozhatja el. A védett légtér kijelölésére ebben az esetben a következő értékeket alkalmazzák:
• Olyan útvonalszakaszok esetében, amelyeken a VOR berendezések közötti távolság 93 km (50 tmf) vagy kevesebb, az alábbi táblázat „A” sorában levő értékeket használják;
• Olyan útvonalszakaszok esetében, amelyeken a VOR berendezések közötti távolság több mint 93 km (50 tmf) de legfeljebb 278 km (150 tmf), a VOR berendezéstől számított 46 km (25 tmf) távolságig a táblázat „A” sorában levő értékeket használják, ez után egyenes vonallal kössék össze a VOR berendezéstől

számított 139 km (75 tmf) távolságig a táblázat „B” sorában levő, értékkel.

	Védettség százalékos értéke (%)					
	95	*96*	*97*	*98*	*99*	*99.5*
A (km)	± 7.4	± 7.4	± 8.3	± 9.3	± 10.2	± 11.1
A (tmf)	± 4.0	± 4.0	± 4.5	± 5.0	± 5.5	± 6.0
B (km)	± 11.1	± 11.1	± 12.0	± 12.0	± 13.0	± 15.7
B (tmf)	± 6.0	± 6.0	± 6.5	± 6.5	± 7.0	± 8.5

Egy olyan útvonal esetében például, amelyen a VOR berendezések közötti távolság 222 km (120 tmf) és a szükséges védelem mértéke 99.5 %, az útvonal alakja az A-2. ábrának megfelelő lesz.

A-2. ábra

Az ábrázolt VOR berendezések közötti távolság 2 x 111 km (60 tmf)

3.5 Amennyiben egy VOR berendezéssel kijelölt légiforgalmi szolgálati útvonal két szakasza több mint 25 fokos szöget zár be egymással, a forduló külső és szükség szerint belső oldalán is további védett légtér alakítandó ki. Ez a további légtér védőterületként szolgál a légijármű repülési irány 25 fokot meghaladó megváltoztatásakor a gyakorlatban megfigyelt megnövekedett oldalirányú eltérés számára. A kiegészítő légtér nagysága a forduló szögével változik, azaz minél nagyobb a forduló szöge, annál nagyobb a kiegészítő légtér is. Az útmutató a legfeljebb 90 fokos fordulókhoz szükséges védett légtérre vonatkozik. Azokban a különleges esetekben, amikor az ATS útvonalon 90 fokosnál nagyobb forduló szükséges, az Államok biztosítsák a megfelelő védett légtér kijelölését az ilyen forduló úgy belső, mint külső oldalán is.

3.6 A következő példák két olyan Állam gyakorlatának összegzéséből származnak, amelyek a tervezéshez a légtér kijelölés felvázolására sablonokat használnak.

A forduló terület sablon megtervezésekor olyan tényezőket vettek figyelembe, mint a légijármű sebessége, a forduló bedöntési szöge, a valószínű szélsebesség, a helyzet-megállapítás pontatlansága, a repülőgépvezető cselekvési késése és egy legalább 30 fokos közelítő irány felvétele az új repülési pálya elérése előtt. A sablonok legalább 95 %-os védettséget biztosítanak.

3.7 Azon kiegészítő légtér meghatározása érdekében, amely a 30, 45, 60, 75 és 90 fokos fordulót végrehajtó légijármű számára a forduló külső oldalán a védettség fenntartásához szükséges, sablont használtak. Az egyszerűsített ábrák a légtér külső határát legömbölyítés nélkül jelzik és ezzel lehetővé teszik az egyszerű megrajzolást. A kiegészítő légtér minden esetben a nyíllal jelzett irányba repülő légijármű részére került megállapításra. Ahol az útvonalat mindkét irányba használják, a másik irány külső oldalán is jelöljék ki ugyanazt a kiegészítő légteret.

3.8 Az A-3. ábra a VOR berendezés felett egymáshoz 60 fokos szögben csatlakozó útvonal szakaszokat ábrázol.

A-3. ábra

Az irányváltoztatás szöge 60 fok, a repülési irányt a nyíl jelzi

3.9 Az A-4. ábra a VOR berendezés felett olyan, egymáshoz 60 fokos szögben csatlakozó útvonalszakaszokat ábrázol, amelynél a légtér határát a 3.3 pont és az A-1. ábra előírásainak megfelelően ki kellett szélesíteni.

A-4. ábra

3.10 A következő táblázat a példákban szereplő esetekben alkalmazandó távolság értékeket ismerteti, amikor FL 450 repülési szinten vagy ez alatt a VOR berendezés felett vagy az egyes VOR berendezésektől számított legfeljebb 139 km (75 tmf) távolságban a csatlakozó útvonal szakaszokhoz kiegészítő védett légtér kijelölése szükséges.

Megjegyzés: Lásd az A-3. és A-4. ábrákat.

Az útvonalak csatlakozási szöge	*30°*	*45°*	*60°*	*75°*	*90°*
VOR berendezés					
„A” távolság * (km)	5	9	13	17	21

„A” távolság * (tmf)	3	5	7	9	11
„B” távolság * (km)	46	62	73	86	92
„B” távolság * (tmf)	25	34	40	46	50
Csatlakozás					
„A” távolság * (km)	7	11	17	23	29
„A” távolság * (tmf)	4	6	9	13	16
„B” távolság * (km)	66	76	88	103	111
„B” távolság * (tmf)	36	41	48	56	60

** = a távolságok a következő egész km vagy tmf értékre felkerekítve.*

Megjegyzés: A fordulóban levő légijárművek működésére vonatkozóan lásd a 120. számú ICAO körlevél 4.4 pontját.

3.11 Az A-5. ábra egy olyan módszert mutat be, amelynek segítségével a 90 fokos vagy ennél kisebb mértékű forduló belső ívén szükséges kiegészítő védett légtér szerkeszthető meg:

A repülési útvonal középvonalán jelöljenek ki egy pontot, amelynek a névleges forduló pont előtti távolsága megegyezik a forduló sugár és az útvonal menti tűrési határértékek összegével.

Ettől a ponttól húzzanak merőleges egyenest, amely a forduló belső oldalánál keresztezi a repülési útvonal szélét.

A repülési útvonal belső szélén így kijelölt pontból húzzanak egyenest, amely a forduló után a forduló szög érték felének megfelelő szögben metszi az útvonal középvonalát.

A szerkesztés eredményeképpen kapott háromszög a forduló belső oldalán lesz az irányváltáshoz szükséges kiegészítő védett légtér. Minden 90 fokos vagy ennél kisebb mértékű forduló esetén a belső oldalon elhelyezkedő kiegészítő légtér megfelelő lesz mindkét irányból a fordulóhoz érkező légijármű számára.

1. Megjegyzés: Az útvonal mentén szükséges tűrési határérték kiszámításra vonatkozó követelmények a *Léginavigációs Szolgálatok Eljárásai* — Légijármű üzemeltetés — (PANS-OPS Doc 8168) II. kötet III. rész 31. fejezet Függelékében található.

A-5. ábra

Egy forduló sugár

2. Megjegyzés: A forduló sugár kiszámításhoz szükséges útmutató a 7. részben található.

3.12 A VOR berendezés csatlakozásnál végrehajtott fordulók esetében a forduló belső szélén elhelyezkedő kiegészítő védett légtér kialakításához a 3.11 pont alapelvei alkalmazhatók. Az egyik vagy mindkét VOR berendezés és a csatlakozási pont közötti távolságtól függően az egyik vagy mindkét repülési útvonal megfelelő területe kiszélesedhet. Az adott helyzet alapján a kiegészítő légtér a 95 %-os védettségen belül, részben belül vagy ezen kívül helyezkedhet el. Amennyiben az útvonalat mindkét irányba használják, a légtér kialakítást külön végezzék el mindkét irányba.

3.13 A VOR berendezések között 278 km-nél (150 tmf) hosszabb repülési útvonalakra vonatkozóan mért adatok még nem állnak rendelkezésre. A VOR berendezéstől 139 km-nél (75 tmf) távolabbra elhelyezkedő védett légtér kidolgozásához a valószínű rendszer teljesítményt jelző 5 fok körüli szögérték látszik alkalmazhatónak. Az A-6. ábra ezt a módszert mutatja be.

A-6. ábra

4. A VOR berendezésekkel kijelölt párhuzamos útvonalak közötti távolság

Megjegyzés: A jelen rész anyagát az összeütközési veszély kockázati — kívánatos repülésbiztonsági szint módszer felhasználásával kapott mért adatok alapján készítettük el.

4.1 Az 1.1 pontban jelzett európai vizsgálat adataival végzett összeütközési veszély kockázati — kívánatos repülésbiztonsági szint számítás a vizsgált körülmények között azt az eredményt adta, hogy az útvonalak középvonalai közötti távolság (az A-7. ábrán **„S”**) általában legalább az alábbi érték legyen:

a) azokon a párhuzamos útvonalakon, amelyeken a légijárművek egymással ellentétes irányba repülnek, 33.3 km (18 tmf); és
b) azokon a párhuzamos útvonalakon, amelyeken a légijárművek ugyanabba az irányba repülnek, 30.6 km (16.5 tmf).
Megjegyzés: Két repülési útvonal szakasz akkor tekintendő párhuzamosnak, ha:
⇒ *irányuk körülbelül azonos, azaz a közöttük levő irányszög különbség nem haladja meg a 10 fokot;*
⇒ *egymást nem keresztezik, azaz a csatlakozástól vagy keresztezéstől meghatározott távolságban más fajta elkülönítésnek kell fennállnia;*
⇒ *a légiútvonalak forgalma független egymástól, azaz az egyik forgalom nem vezet a másik korlátozásához.*
4.2 A párhuzamos útvonalak közötti ilyen távolság feltételezi, hogy:
a) a légijárművek a két útvonalon az emelkedés, a süllyedés vagy a szinttartó repülés közben ugyanazon a repülési szinten lehetnek;
b) a forgalom sűrűsége egy nagy forgalmú két hónapos időszak alatt 25 - 50 ezer járat között van;
c) az ICAO Doc 8071 — *Rádiónavigációs Berendezések Ellenőrzési Kézikönyve* — I. kötet előírásai alapján rendszeres légi ellenőrzéssel vizsgált VOR adások az adott útvonalon meghatározott navigációs eljárásoknak megfelelően működnek; és
d) valós idejű radar-, vagyberendezésfüggő automatikus felderítés (ADSD-B) megfigyelést vagy az oldalirányú eltérések ellenőrzését el nem végzik.

A-7. ábra

VOR berendezések közötti távolság 278 km (150 tmf) vagy kevesebb

4.3 Az előzetes vizsgálatok azt jelzik, hogy az alábbi a) — c) alpontokban ismertetett körülmények között az útvonalak közötti legkisebb távolság lecsökkenthető. Mindazonáltal a megadott értékeket nem pontosan számították ki és az egyedi körülmények részletes vizsgálatára minden esetben szükség van:
a) amennyiben a szomszédos repülési útvonalakon működő légijárművek részére nem adják ki ugyanazt a repülési szintet, az útvonalak közötti távolság lecsökkenthető; a csökkentés mértéke a szomszédos útvonalakon működő légijárművek közötti függőleges elkülönítéstől, valamint az emelkedő és süllyedő légijárművek százalékos arányától függ, azonban nem valószínű, hogy ez meghaladja az 5.6 km (3 tmf) értéket;
b) amennyiben a forgalom jellemzői jelentős mértékben eltérnek a 120. számú ICAO körlevélben közöltektől, a 4.1 pontban ismertetett minimum módosításra szorulhat. Például ha a forgalom sűrűsége a nagy forgalmú két hónapos időszak alatt tízezer járat körül van, 900 méter és 1850 méter (0.5 — 1.0 tmf) közötti távolság csökkentés lehetséges;
c) a két repülési útvonalat kijelölő VOR berendezések elhelyezkedése és az azok közötti távolság befolyásolja az útvonalak közötti távolságot, azonban ennek mértékét nem határozták meg.
4.4 A radar megfigyelés vagy a berendezésfüggő automatikus felderítés (ADS-B) alkalmazása és a légijármű oldalirányú eltéréseinek ellenőrzése az útvonalak közötti megengedhető legkisebb távolságot nagymértékben befolyásolhatja. A radar megfigyelés hatásaival foglalkozó vizsgálatok azt mutatják, hogy:
⇒ a teljes mértékben megfelelő matematikai modell kidolgozásához további vizsgálatok szükségesek;
⇒ az elkülönítési távolság bármely csökkentése szoros összefüggésben van a következőkkel:
∗ a forgalom (mennyisége és jellemzői);
∗ a radar lefedettség és adatfeldolgozás, az automatikus riasztás lehetősége;
∗ a radarellenőrzés (légtérfigyelés) folyamatossága;
∗ a szektor munkaterhelése; valamint
∗ a rádiótávbeszélő működésének minősége.
Ezen vizsgálatok szerint, továbbá figyelembe véve egyes Államoknak a párhuzamos útvonal rendszerek folyamatos radar ellenőrzése és irányítása során szerzett több éves gyakorlati tapasztalatait, 15 — 18.5 km (8 — 10 tmf) nagyságrendű csökkentés feltételezhető, azonban ez minden valószínűség szerint nem lesz

13 km-nél (7 tmf) kevesebb feltéve, hogy a radarellenőrzéssel járó munkaterhelés a csökkentés következtében nem növekszik jelentős mértékben. Az ilyen csökkentett oldalirányú távolsági elkülönítéssel rendelkező rendszerek tényleges alkalmazásával szerzett tapasztalatok azt jelzik, hogy:

⇒ nagyon fontos az átkapcsolási pontok meghatározása és közzététele (lásd még a 6. pont);

⇒ lehetőség szerint kerüljék a nagyobb mértékű fordulókat; valamint

⇒ ahol ezeket a nagyobb fordulókat nem lehet elkerülni, a 20 fokosnál nagyobb fordulók esetében határozzák meg az előírt forduló profilt.

Még abban az esetben is gondoljanak a teljes radarberendezés vagy a berendezésfüggő automatikus felderítés (ADS-B) meghibásodása esetén alkalmazandó eljárásokra, ha ennek a valószínűsége nagyon csekély.

5. A VOR berendezésekkel kijelölt szomszédos, nem párhuzamos útvonalak közötti távolság

1. Megjegyzés: Ezen rész anyagának célja útmutatás biztosítása olyan esetekre, ahol a VOR berendezésekkel kijelölt, egymást nem keresztező, nem párhuzamos szomszédos útvonalak irányszög különbsége a 10 fokot meghaladja.

2. Megjegyzés: A jelen rész anyagát nem az összeütközési veszély kockázati — kívánatos repülésbiztonsági szint módszer felhasználásával készítettük el.

5.1 Az összeütközési veszély kockázati — kívánatos repülésbiztonsági szint modell jelen fejlettségi állapotában a VOR berendezésekkel kijelölt, egymást nem keresztező, nem párhuzamos szomszédos útvonalak esetére nem teljesen megfelelő. Ezért alkalmazzák a 3. szakaszban ismertetett anyagot.

5.2 Az ilyen útvonalak között levő védett légtér ne legyen kisebb, mint amely átfedés nélkül biztosítja a 3.4 pont táblázatában szereplő 99.5 %-os védettség mértéket (lásd az A-8. ábra példáját).

5.3 Ahol az útvonal szakaszok közötti irányszög különbség több, mint 25 fok, a 3.5 — 3.10 pontok szerint további kiegészítő védett légtér biztosítandó.

A-8. ábra

Egymás mellett elhelyezkedő nem párhuzamos repülési útvonalak

6. VOR berendezések átkapcsolási pontjai

6.1 A VOR berendezéssel kijelölt légiforgalmi szolgálati útvonalak átkapcsolási pontjai kijelölésének tervezésekor, ahol a légijármű az elsődleges navigációs irányvezetés biztosításához az egyik VOR berendezésről a másikra kapcsol át, az Államok a következőket vegyék figyelembe:

a) az átkapcsolási pontok kijelölése az érintett VOR állomások teljesítménye alapján történjen, beleértve az interferencia védelemre vonatkozó előírások értékelését is. Az eljárást repülőgépes légi ellenőrzéssel is erősítsék meg (lásd Doc 8071, I. kötet, II. rész);

b) ahol a frekvenciasáv védelme igen lényeges tényező, a légi ellenőrzést azon a legnagyobb repülési magasságon végezzék, amelyen az adott berendezés frekvencia védelmet élvez.

6.2 A 6.1 pont tartalmából semmi sem értelmezendő úgy, hogy a 10. Annex I. kötet 3.3 szakasz előírásainak megfelelő VOR létesítmény üzemi hatótávolságát azok korlátoznák.

7. A forduló sugár kiszámítása

7.1 A forduló sugár kiszámításának módszere és az alábbiakban jelzett forduló sugár érték állandó forduló értéket tartó légijárművekre alkalmazható. Az anyagot az RNP1 ATS útvonal forduló sugár teljesítmény előírásra dolgozták ki és ez használható a forduló belső oldalán szükséges kiegészítő védett légtér megtervezéséhez a nem VOR berendezéssel kijelölt ATS útvonalak esetében is.

7.2 A forduló teljesítmény két tényezőtől, a légijármű földhöz viszonyított sebességétől és a bedöntéstől függ. Az állandó sugarú forduló során a repülési irányszög változása következtében fellépő szélirány összetevő változás miatt a földhöz viszonyított sebesség és ezzel együtt a bedöntés szöge is változni fog. Mindazonáltal a körülbelül 90 fokosnál nem nagyobb fordulók valamint az alábbiakban vizsgált sebesség értékek esetében az elérhető állandó forduló sugár érték számításához a következő képlet alkalmazható, amelyben a légijármű földhöz viszonyított sebessége a tényleges repülési sebesség és a szélsebesség összege:

$$\textit{Forduló sugár} = \frac{(\textit{földhöz viszonyított sebesség})^2}{\textit{„G” állandó * TAN (bedöntés szöge)}}$$

7.3 Minél nagyobb a légijármű földhöz viszonyított sebessége, annál nagyobb lesz a szükséges bedöntés mértéke. Annak biztosítása érdekében, hogy a forduló sugár minden előre látható körülmény esetére jellemző legyen, szélsőséges értékeket szükséges figyelembe venni. A magasabb repülési szinteken valószínűleg előforduló legnagyobb tényleges (levegőhöz viszonyított) repülési sebesség 1020 km/h (550 csomó). Ez a közepes és magas repülési szinteken várható 370 km/h (200 csomó) legnagyobb szélsebességgel {99.5 százalékos érték a meteorológiai adatok alapján} együtt maximálisan 1400 km/h (750 csomó) földhöz viszonyított sebességnek felel meg. A legnagyobb bedöntési szög értéke elsősorban a légijármű egyedi repülési tulajdonságaitól függ. A nagy szárny-terhelésű, a legmagasabb engedélyezett repülési szintjén vagy ehhez közeli magasságon repülő légijárművek a nagy bedöntéseket rendkívül rosszul viselik. A legtöbb szállító légijármű légialkalmassági bizonyítványa alapján a kormányművek bármely beállítása mellett nem repülhet átesési sebességének 1.3-szeresénél alacsonyabb sebességgel. Mivel az átesési sebesség a bedöntési szöggel (TAN) növekszik, számos járató törekszik arra, hogy a széllökések és a turbulencia elleni védelem érdekében a légijármű utazósebessége ne legyen alacsonyabb, mint az átesési sebesség 1.4-szerese. Ugyanebből az okból a legtöbb szállító légijármű utazó repülés közben csökkentett maximális forduló bedöntést alkalmaz. A fentiek alapján feltételezhetjük, hogy az összes légijármű típus részéről elfogadható legnagyobb bedöntési szög érték 20 fok körül van.
7.4 A számítás szerint az 1400 km/h (750 csomó) földhöz viszonyított sebességgel repülő, 20 fokos bedöntést alkalmazó légijármű forduló sugara 22.51 tmf (41.69 km). A célszerűség érdekében ezt az értéket 22.5 tmf-re (41.6 km) csökkentettük.
Az alacsony légtér esetében ugyanezt a logikát követve megállapították, hogy FL 200 (6100 m) repülési szintig a várható tényleges repülési sebesség 740 km/h (400 csomó) és a hátszél értéke 370 km/h (200 csomó). Ha a legnagyobb bedöntési szög értékét 20 fokon tartják és ugyanezt a számítást végzik el, a forduló 14.45 tmf (26.76 km) forduló sugárral határozható meg. A célszerűség érdekében ez az érték 15 tmf-re (27.8 km) kerekíthető fel.
7.5 A fentiek alapján a két földhöz viszonyított repülési sebesség jellemző legvalószínűbb választó pontja FL 190 (5800 m) és FL 200 (6100 m) között van. Annak érdekében, hogy a jelenleg alkalmazott repülésvezérlő rendszerekben (FMS) használt forduló-számítási képletek minden előre látható körülményre érvényesek legyenek, FL 200 repülési szinten és felette 22.5 tmf (41.6 km) illetve FL 190 repülési szinten és alatta 15 tmf (27.8 km) forduló sugarat határozzanak meg.

B. Melléklet

A területi navigációs (RNAV) berendezéssel felszerelt légijárművek általi használatra kijelölt ATS útvonalak meghatározásának módszere

(Lásd 2.7.1 pont és 2.12 szakasz)

1. Bevezető

1.1 A jelen mellékletben található útmutató anyag több országban elvégzett átfogó vizsgálatok eredményei alapján készült. Az anyag tükrözi továbbá a számos Államban már régóta létező és alkalmazott RNAV követelményrendszert is. Meg kell jegyeznünk, hogy a jelen részben található egyes értékeket nem az összeütközési veszély kockázati — kívánatos repülésbiztonsági szint módszer alapján számítottuk ki. Ezt a megfelelő helyen külön jelezzük.

1.2 Felkérjük az Államokat, hogy részletesen tájékoztassák az ICAO-t a jelen útmutató anyag alkalmazásának eredményeiről.

2. Az RNP 4 alapján kialakított területi navigációs útvonalak gyakorlati felhasználása

2.1 Általános rész

2.1.1 Ez az útmutató anyag olyan területi navigációs útvonalakhoz történő felhasználásra készült, amelyek földi elektronikus navigációs berendezések fedésterületén belül kerültek kialakításra és ezek a berendezések teszik lehetővé a szükséges felülvizsgálati ellenőrzések végrehajtását, így megfelelő védelmet biztosítanak az RNAV helymeghatározási hibákkal szemben.
2.1.2 A jelen anyaggal összhangban kialakított RNAV útvonalakon csak azoknak a légijárműveknek nyújtanak légiforgalmi szolgálatot, amelyek számára a légialkalmassági bizonyítványt — üzemeltetési engedélyt az *Előírt Navigációs Teljesítmény (RNP) Kézikönyv* (Doc. 9613) 5.5 és 5.6 szakaszainak megfelelően adták ki.
2.1.3 A VOR berendezéssel kijelölt légiforgalmi szolgálati útvonalakon történő navigációhoz engedélyezzék a területi navigációs berendezések használatát. Ezen kívül ott, ahol ez gyakorlati szempontból szükséges és az RNAV lehetőséget igénybe vevő légijárművek száma indokolja, ilyen területi navigációs útvonalakat is kijelölhetnek. Ezek az útvonalak lehetnek:
a) állandó RNAV útvonalak;
b) feltételes, szükség szerint igénybe vehető RNAV útvonalak; és
c) eseti jelleggel igénybe vehető RNAV útvonal szakaszok.
2.1.4 Az ilyen RNAV berendezésre előírt navigációs teljesítmény az útvonal repülés esetében olyan navigációs pontossági szintet jelöl meg, amely alapján a területi navigációs berendezést használó minden légijármű útirány tartási pontossága a repülési idejének legalább 99.5%-ában ± 11.1 km (6 tmf) vagy jobb. Ez a fajta navigációs teljesítmény várhatóan olyan pontosságnak felel meg, mely alapján a területi navigációs berendezést használó minden légijármű útirány repülési pálya tartási pontossága a repülési idejének legalább 95%-ában ± 7.4 km (4 tmf). Ez a pontossági teljesítmény szint azonos azzal, amit az a területi navigációs képességgel nem rendelkező légijármű képes tartani, amelyik meglevő VOR vagy VOR/DME berendezésekkel kijelölt olyan útvonalon repül, ahol a VOR berendezések közötti távolság kevesebb mint 93 km (50 tmf).

2.2 Az RNP 4. alapján kialakított RNAV ATS útvonalak védett légtere

2.2.1 Az RNAV légiforgalmi szolgálati útvonalak esetében biztosítsanak legalább 11.1 km (6 tmf) védett légteret a tervezett repülési pálya mindkét oldalán, amelyen belül a területi navigációs (RNAV) berendezéssel felszerelt légijárművek várhatóan a repülési idejük legalább 99.5%-ában repülni fognak. Mielőtt az ebből az elméletből származó értékeket alkalmaznák, vegyenek figyelembe a kérdéses légtérre vonatkozó minden gyakorlati tapasztalatot, valamint a légijárművek általános navigációs teljesítménye fejlődésének lehetőségét is. Ebben az összefüggésben, amennyiben a területi navigációs útvonaltól történő oldalirányú eltéréseket radar-berendezés segítségével ellenőrzik, a szükséges védett légtér a következők szerint lecsökkenthető:

	Védettség százalékos értéke (%)					
	95	*96*	*97*	*98*	*99*	*99.5*
km	± 7.4	± 7.4	± 8.3	± 9.3	± 10.2	± 11.1
tmf	± 4.0	± 4.0	± 4.5	± 5.0	± 5.5	± 6.0

2.2.2 A radarberendezéssel végrehajtott légtérellenőrzést érintő vizsgálatok azt jelezték, hogy a védett légtér bármely tervezett és lehetséges csökkentése szoros összefüggésben van a forgalom jellemzőivel, a légiforgalmi irányító számára rendelkezésre álló tájékoztatásokkal és az irányítói szektor munkaterhelésével. Végül érdemes azon elgondolkodni, hogy néhány európai Államban elvégzett, a

útvonaltartás mértékében kifejezett RNAV pontossági elemzés azt mutatta, hogy a területi navigációra képes járatok RNAV pontossága a repülési idő 99.5%-ában az útvonal középvonalától számított 5 tmf értéken belül volt *(hiv.: EUR Doc 001, RNAV/4)*. Amennyiben az illetékes légiforgalmi szolgálati hatóság véleménye szerint, például a tiltott, korlátozott vagy veszélyes légterek közelsége, a katonai légijárművek emelkedési és süllyedési repülési útvonalai vagy egyéb okok miatt ennél nagyobb védelem szükséges, további biztonsági védő légtereket alakíthatnak ki.
2.2.3 Amennyiben két útvonalszakasz között a repülési irányszög különbség több mint 25 fok, az A. Melléklet 3.5 — 3.12 pontjainak valamint 7. részének megfelelően további védett légtér biztosítandó.
Megjegyzés: Az RNAV berendezésekkel felszerelt légijárművek üzemeltetésére az Államok különböző navigációs pontossági szintet írhatnak elő. A jelen útmutató ezekkel az előírásokkal nem foglalkozik, azonban ezek a védett biztonsági légterekre vonatkozó követelmények bizonyos változtatásait tehetik szükségessé.

2.3 Az RNP4 alapján kialakított párhuzamos RNAV útvonalak közötti távolság

Amikor a 2.2 pont alapján kialakított védett légteret alkalmazzák, az útvonal középvonalak úgy helyezkedjenek el, hogy a 99.5 %-os útvonaltartás értéken belül elhelyezkedő légterek egymást ne fedjék. Amikor olyan oldaltávolságot alkalmaznak, amely kevesebb, mint a fenti 99.5%-os útvonaltartási értéknek megfelelő távolság, a forgalom radar ellenőrzése szükséges.

3. A párhuzamos útvonal szakaszok vagy RNAV útvonal középvonalak közötti távolság az RNP típus alapján

3.1 Meg kell jegyeznünk, hogy az alábbiakban ismertetett oldaltávolságok ott, ahol ezt jeleztük, egy adott útvonalszakasz vagy útvonalhálózat egyedi repülésbiztonsági értékelése alapján kerültek meghatározásra. Ennek megfelelően az értékelt forgalmi jellemzők esetleg az adott útvonalhálózat vonatkozásában egyediek lehetnek. Ezek közé tartozik például a forgalom sűrűsége, az alkalmazható legkisebb elkülönítéssel átrepülő légijárművek száma, illetve az ilyen elkülönítések gyakorisága, a távközlési és légtérfelderítési berendezések és létesítmények. A biztonsági felmérésre és értékelésre vonatkozó további tájékoztató a *Légtér Tervezési Módszer az Elkülönítési Minimumok Meghatározásához Kézikönyv*ben (Doc. 9689) található.
3.2 Amikor a párhuzamos útvonal szakaszok vagy ATS útvonalak (a továbbiakban rendszer) közötti oldaltávolságot határozzák meg, az előzetes repülésbiztonsági értékelést a legalacsonyabb elfogadható repülésbiztonsági szinthez viszonyítva a fenti 3.1 pontban jelzettekhez hasonló jellemzők vizsgálatával végezzék el.
3.2.1 Ahol a „végzetes balesetek számát repülési óránként” megfelelő értékelési egységnek tekintik, a 2000. év után üzembe állítandó jövőbeni útvonalrendszer elfogadhatóságának megállapítására $\mathbf{5 \times 10^{-9}}$ számú végzetes baleset értéket alkalmazzák kívánatos biztonsági szintként (TLS). A fenti időpont előtt repült óránként $\mathbf{2 \times 10^{-8}}$ számú végzetes baleset érték alkalmazható TLS szintként.
3.2.2 Mindazonáltal, ahol a „végzetes balesetek számát repülési óránként” nem tekintik megfelelő értékelési egységnek, olyan megfelelő módon indokolható és igazolható értékelési módot és érték egységet használjanak, amely az Állam légterében elfogadható biztonsági szintet nyújt és amit a körzeti légiközlekedési egyezményekbe szükség szerint fel lehet venni.
3.3 Ha a rendszer kialakításának és üzembe állásának időpontjában vagy bármely későbbi repülésbiztonsági értékelés alkalmával megállapítják, hogy a rendszer nem elégíti ki az értékelési mód alapján meghatározott megfelelő biztonsági szintet, vegyék fontolóra az ismételt ellenőrzés és értékelés végrehajtását, amelyet a Doc. 9689-al összhangban végezzenek el annak megállapítása érdekében, hogy tartani tudják-e a legalacsonyabb vagy ennél magasabb elfogadható repülésbiztonsági szintet.
3.4 Az alábbiakban az RNP típus alapján példákkal mutatjuk be az egyes meghatározott légterek vagy körzetek útvonal-rendszerei közötti biztonsági távolságot. Ahol ezek egy adott légtér vagy körzet egyedi jellemzői alapján kerültek meghatározásra, más Államok vagy körzetek saját rendszereiket ennek megfelelő módon vizsgálják felül.

3.4.1 Eljárás-irányítási körülmények között:

a) **RNP 20**

Oldaltávolság: 185 km (100 tmf);

Értékelés alapja: Régóta fennálló, hosszú időszak alatt beszerzett gyakorlati üzemeltetési tapasztalatok alapján használatos rendszer; valamint

Minimális ATS követelmények:

NAV — A lerepülendő útvonalakra vagy útvonal szakaszokra minden légijármű rendelkezzen RNP 20 jogosítással;

COM — Közvetett, harmadik félen keresztül fenntartott beszédüzemű összeköttetés;

SUR — Repülőgépvezető helyzetjelentések az eljárások szerint.

b) **RNP 12.6**

Oldaltávolság: 110 km (60 tmf);

Értékelés alapja: Összeütközési veszély kockázati modell a NAT repülési útvonalhálózathoz (*Jelentés a Korlátozott/Észak-atlanti Körzeti Légiközlekedési Értekezlet Számára (1976)* Doc. 9182); valamint

Minimális ATS követelmények:

NAV — A lerepülendő útvonalakra vagy útvonal szakaszokra minden légijármű rendelkezzen RNP 12.6 jogosítással;

COM — Közvetett, harmadik félen keresztül fenntartott beszédüzemű összeköttetés;

SUR — Repülőgépvezető helyzetjelentések az eljárások szerint.

Egyéb — A rendszer biztonságát időszakosan felül kell vizsgálni.

Megjegyzés: Bizonyos, mint például ismert kedvezőtlen időjárású légterekben a légiforgalmi irányító és repülőgépvezető közötti közvetlen összeköttetés lehet kívánatos.

c) **RNP 10**

Oldaltávolság: 93 km (50 tmf);

Értékelés alapja: Az Egyesült Államok Szövetségi Légügyi Igazgatóságának az észak-atlanti útvonalhálózatra (annak jellemzői alapján) elvégzett összeütközési veszély kockázati — repülésbiztonsági szint modellje; valamint

Minimális ATS követelmények:

NAV — A lerepülendő útvonalakra vagy útvonal szakaszokra minden légijármű rendelkezzen RNP 10 jogosítással;

COM — Közvetett, harmadik félen keresztül fenntartott beszédüzemű összeköttetés;

SUR — Repülőgépvezető helyzetjelentések az eljárások szerint.

Egyéb — A rendszer biztonságát időszakosan felül kell vizsgálni.

Megjegyzés: Bizonyos, mint például ismert kedvezőtlen időjárású légterekben a légiforgalmi irányító és légijárművezető közötti közvetlen összeköttetés alkalmazásakívánatos lehet.

d) **RNP 5 (vagy RNP 4 vagy jobb)**

Oldaltávolság: egyirányú rendszer esetében 30.6 km (16.5 tmf); kétirányú rendszer esetében 33.3 km (18 tmf);

Értékelés alapja: Az A. Mellékletben leírt nagy forgalomsűrűségű szárazföldi rendszerrel (VOR alapján kialakított oldaltávolság) történő összevetés; valamint

Minimális ATS követelmények:

NAV — A lerepülendő útvonalakra vagy útvonal szakaszokra minden légijármű rendelkezzen RNP 5 jogosítással és az ilyen üzemeltetéshez szükséges megfelelő léginavigációs berendezéseket és létesítményeket kell biztosítani;

COM — Közvetlen légiforgalmi irányító és repülőgépvezető közötti ultrarövidhullámú (URH) beszédüzemű összeköttetés;

SUR — Repülőgépvezető helyzetjelentések az eljárások szerint.

1. Megjegyzés: Az RNP 5 felhasználásra vonatkozó útmutató anyag az *Előírt Navigációs Teljesítmény (RNP) Kézikönyv*ben (Doc. 9613) található.

2. Megjegyzés: Ezt az oldaltávolságot nem a lakott területektől távol eső és/vagy óceáni légterekre dolgozták ki, ahol a megfelelő VOR rendszer nem áll rendelkezésre.

e) **RNP 4**

Oldaltávolság: 55.5 km (30 tmf);

Értékelés 1. alapja: Az Egyesült Államok Szövetségi Légügyi Igazgatóságának az 55.5 km (30 tmf) oldaltávolságú párhuzamos útvonal rendszer általános oldalirányú eltérés hibák jellemzői alapján, a repült óránként **5 x 10^{-9}** számú végzetes baleset kívánatos repülésbiztonsági szint (TLS) érték fenntartásával elvégzett biztonsági vizsgálata;

Értékelés 2. alapja: Az alábbiakban felsorolt minimális távközlési és légtér-felderítési előírások, amelyek gyakorlati szempontból szükségesek az 55.5 km (30 tmf) oldaltávolságú útvonal rendszer sürgősségi és kényszerhelyzeti eseményeinek kezeléséhez.

Megjegyzés: Az elvégzett repülésbiztonsági elemzésre vonatkozó további információ a *Légtér Tervezési Módszer az Elkülönítési Minimumok Meghatározásához Kézikönyv*ben (Doc. 9689) található.

Minimális ATS követelmények:

NAV — A kijelölt területekre, útvonalakra vagy légiforgalmi szolgálati útvonal szakaszokra RNP 4 jogosítást írjanak elő;

COM — Közvetlen légiforgalmi irányító és a légijárművezető közötti ultrarövidhullámú (URH) beszédüzemű vagy légiforgalmi irányító és légijárművezető közötti adatátviteli (CPDLC) összeköttetés;

SUR — Olyan ADS-C rendszer, amely olyan, esemény alapú ADS protokollegyeztetést tartalmaz, amely jelentést küld olyan esetekben, ha egy légijármű oldalirányban több, mint 9.3 km (5 tmf) távolságra eltér az útvonalszakasz középvonalától.

Egyéb — A bevezetés előtt végezzék el a rendszer időbeni és fizikai sértetlenségének vizsgálatát annak bizonyítására, hogy a 27.8 km (15 tmf) vagy nagyobb mértékű oldalirányú eltérések legnagyobb elfogadható aránya nem haladja meg a B-1. táblázatban található értékeket, valamint a rendszer eleget tesz az üzemeltetési és műszaki követelményeknek. A bizonyító vizsgálatot a fenti minimális navigációs, távközlési és légtérfigyelési előírások teljesítése után végezzék. A bevezetés után rendszer-felügyeleti programot kell fenntartani annak időszakonkénti rendszeres ellenőrzésére, hogy a 27.8 km (15 tmf) vagy nagyobb mértékű oldalirányú eltérések tényleges aránya nem haladja meg a B-1. táblázatban található értékeket. A repülésbiztonsági rendszer-felügyeletre vonatkozó további tájékoztató a *Légtér Tervezési Módszer az Elkülönítési Minimumok Meghatározásához Kézikönyv* (Doc. 9689) 8. fejezetében található.

1. Megjegyzés: A légtértervező először állapítsa meg, hogy a kérdéses légtérre a négy rendszerleírás közül melyik alkalmazható. Amennyiben a B-1. táblázatban található négy eset közül egyik sem vonatkozik az adott rendszerre, a légtértervező azt a két esetet válassza ki, amelyik kettő a leginkább hasonlít a rendszerhez és az alacsonyabb oldalirányú eltérési arányt használja fel. Ezt követően az első oszlopból válassza azt az oldalirányú útvonaltartási értéket, amelyet a rendszer a tervezéshez figyelembe vett időtartamon belül várhatóan nem lép túl. A táblázat megfelelő sorának és oszlopának leolvasásával a légtértervező ezután megkapja azt az oldalirányú eltérési arány értéket, amellyel a rendszer a repült óránként 5 x 10^{-9} számú végzetes baleset kívánatos repülésbiztonsági szint (TLS) értéket nem haladja meg.

2. Megjegyzés: A rendszer biztonságának értékelése céljából figyelembe vett oldalirányú eltérések az útvonal középvonaltól számított bármely 27.8 km (15 tmf) vagy nagyobb mértékű eltérések, amelyek nem kapcsolódnak a jóváhagyott kényszerhelyzeti eljárásokhoz.

3. Megjegyzés: Az ADS-C és CPDLC használatára vonatkozó eljárásokat a PANS-ATM (Doc 4444) 13. és 14. fejezet tartalmazza. A CPDLC-re és ADS-C-re vonatkozó követelményeket megfelelő repülésbiztonsági vizsgálat alapján kell meghatározni. A repülésbiztonsági vizsgálatra vonatkozó tájékoztató a *Légtér Tervezési Módszer az Elkülönítési Minimumok Meghatározásához Kézikönyv*ben (Doc. 9689) található.

4. Megjegyzés: Ezt az oldaltávolságot a lakott területektől távol eső és/vagy óceáni légtérhez dolgozták ki, ahol a megfelelő VOR rendszer nem áll rendelkezésre.

5. Megjegyzés: A jelen anyagban az oldalirányú útvonaltartás a légijárművek teljes számának valamint az oldalirányban egymást mellett elhaladó légijármű párok számának hányadosának kétszeresét jelenti.

Az összeütközési veszély kockázati — kívánatos repülésbiztonsági szint modell esetére használt kifejezések *részletes magyarázata a Légiforgalmi Szolgálat Tervezési Kézikönyv (Doc 9426) II. rész, 4. fejezet A és C. függelékében található.*

3.4.2 Radarirányítási körülmények között:

a) **RNP 4**

Oldaltávolság: 14.8 — 22.2 km (8 — 12 tmf);

Értékelés alapja: a referencia-rendszerrel történő összevetés (a fenti 2.2.1 pont szerint meghatározott biztonsági területek nem fedik egymást); valamint

Minimális ATS követelmények:

NAV — A lerepülendő útvonalakra vagy útvonal szakaszokra minden légijármű rendelkezzen legalább RNP 4 jogosítással és az ilyen üzemeltetéshez szükséges megfelelő léginavigációs berendezéseket és létesítményeket kell biztosítani;

COM — Közvetlen légiforgalmi irányító és repülőgépvezető közötti ultrarövidhullámú (URH) beszédüzemű összeköttetés;

SUR — A jelenlegi szabványoknak megfelelő radarberendezés;

Egyéb — Ki kell értékelni a rendszer biztonságát, beleértve a légiforgalmi irányító munkaterhelését is.

b) **RNP 5**

Oldaltávolság: 18.5 — 27.8 km (10 — 15 tmf);

Értékelés alapja: a referencia-rendszerrel történő összevetés (a fenti 2.2.1 pont alapján az RNP 5 igényeire átalakított biztonsági területek nem fedik egymást); valamint

Minimális ATS követelmények:

NAV — A lerepülendő útvonalakra vagy útvonal szakaszokra minden légijármű rendelkezzen legalább RNP 5 jogosítással és az ilyen üzemeltetéshez szükséges megfelelő léginavigációs berendezéseket és létesítményeket kell biztosítani;

COM — Közvetlen légiforgalmi irányító és repülőgépvezető közötti ultrarövidhullámú (URH) beszédüzemű összeköttetés;

SUR — A jelenlegi szabványoknak megfelelő radarberendezés;

Egyéb — Ki kell értékelni a rendszer biztonságát, beleértve a légiforgalmi irányító munkaterhelését is.

B-1. táblázat A 27.8 km (15 tmf) vagy nagyobb mértékű oldalirányú eltérések legnagyobb elfogadható aránya

Útvonal rendszer legnagyobb várható útvonal-tartási értéke	*Kettő azonos irányú útvonal*	*Négy azonos irányú útvonal*	*Hét azonos irányú útvonal*	*Kettő ellentétes irányú útvonal*
0.1	1.99×10^{-4}	1.75×10^{-4}	1.52×10^{-4}	3.14×10^{-5}
0.2	1.06×10^{-4}	9.39×10^{-5}	8.27×10^{-5}	2.23×10^{-5}
0.3	7.50×10^{-5}	6.70×10^{-5}	5.95×10^{-5}	1.92×10^{-5}
0.4	5.95×10^{-5}	5.35×10^{-5}	4.79×10^{-5}	1.77×10^{-5}
0.5	5.03×10^{-5}	4.55×10^{-5}	4.10×10^{-5}	1.68×10^{-5}
0.6	4.41×10^{-5}	4.01×10^{-5}	3.64×10^{-5}	1.62×10^{-5}
0.7	3.97×10^{-5}	3.62×10^{-5}	3.30×10^{-5}	1.58×10^{-5}
0.8	3.64×10^{-5}	3.34×10^{-5}	3.06×10^{-5}	1.55×10^{-5}
0.9	3.38×10^{-5}	3.11×10^{-5}	2.86×10^{-5}	1.52×10^{-5}
1.0	3.17×10^{-5}	2.93×10^{-5}	2.71×10^{-5}	1.50×10^{-5}

1.1	3.00×10^{-5}	2.79×10^{-5}	2.58×10^{-5}	1.48×10^{-5}
1.2	2.86×10^{-5}	2.66×10^{-5}	2.48×10^{-5}	1.47×10^{-5}
1.3	2.74×10^{-5}	2.56×10^{-5}	2.39×10^{-5}	1.46×10^{-5}
1.4	2.64×10^{-5}	2.47×10^{-5}	2.31×10^{-5}	1.45×10^{-5}
1.5	2.55×10^{-5}	2.39×10^{-5}	2.25×10^{-5}	1.44×10^{-5}
1.6	2.48×10^{-5}	2.33×10^{-5}	2.19×10^{-5}	1.43×10^{-5}
1.7	2.41×10^{-5}	2.27×10^{-5}	2.14×10^{-5}	1.42×10^{-5}
1.8	2.35×10^{-5}	2.22×10^{-5}	2.09×10^{-5}	1.42×10^{-5}
1.9	2.29×10^{-5}	2.17×10^{-5}	2.05×10^{-5}	1.41×10^{-5}
2.0	2.24×10^{-5}	2.13×10^{-5}	2.01×10^{-5}	1.41×10^{-5}

C. Melléklet
A légijárművek által adott forgalmi tájékoztató rádióadások (TIBA) és az ezekkel kapcsolatos gyakorlati eljárások

(Lásd 4. fejezet 4.2.2 pont 2. Megjegyzést)

1. Bevezető és a tájékoztató rádióadások alkalmazhatósága

1.1 A légijárművek által rádión adott forgalmi tájékoztatások célja, hogy a repülőgépvezetők számára lehetővé tegye a tájékoztató jellegű jelentések és az ezekkel kapcsolatos kiegészítő tájékoztatások rádióberendezés segítségével történő megadását a közelben tartózkodó más légijárművek repülőgépvezetőinek tájékoztatására egy kijelölt ultrarövidhullámú rádió-távbeszélő (VHF - RTF) frekvencián.

1.2 A légijármű részéről adott forgalmi tájékoztató rádióadások (TIBA) csak szükség esetén és ideiglenes intézkedésként alkalmazhatók.

1.3 A tájékoztató rádióadás eljárások olyan kijelölt légtérben alkalmazhatók, ahol:

a) az ellenőrzött légtéren kívül a légiforgalmi szolgálatok részéről az összeütközési veszélyről megadott tájékoztatások kiegészítésére van szükség; vagy

b) a rendszeres légiforgalmi szolgálatban ideiglenes jellegű fennakadás van.

1.4 Az ilyen légtereket az adott légtéren belül légiforgalmi szolgálat biztosításáért felelős Állam -- szükség esetén az ICAO helyi irodájával együtt -- jelölje ki és a légiforgalmi tájékoztató kiadványaiban vagy NOTAM-ban tegye közzé. Ebben jelölje meg az ultrarövidhullámú rádiótávbeszélő frekvenciát (VHF - RTF), a közlemény formátumot valamint az alkalmazandó eljárásokat is. Ahol az 1.3 a) pont esetében egynél több Állam érintett, a légteret a körzeti légiközlekedési egyezmény alapján határozzák meg és a Doc. 7030 előírásainak megfelelő módon tegyék közzé.

1.5 Amennyiben ilyen kijelölt légteret alakítanak ki, az illetékes légiforgalmi szolgálati hatóságok állapodjanak meg a légtér alkalmazhatóságának felülvizsgálati időpontjában, azonban ez a 12 hónap időtartamot ne haladja meg.

2. Az adások részletei

2.1 Használandó ultrarövidhullámú rádiótávbeszélő (VHF - RTF) frekvencia

2.1.1 A használandó ultrarövidhullámú rádiótávbeszélő (VHF - RTF) frekvenciát a helyi körülményeknek megfelelően jelöljék ki és tegyék közzé. Mindazonáltal az ellenőrzött légtérben bekövetkező ideiglenes zavar esetében a felelős államok — az adott légtér határain belül igénybe veendő ultrarövidhullámú rádiótávbeszélő (VHF - RTF) frekvenciaként — közzétehetnek egy olyan rádió frekvenciát, amelyet általában ezen a légtéren belül a légiforgalmi irányító szolgálat biztosítására használnak.

2.1.2 Ahol a légiforgalmi szolgálattal történő kapcsolattartásra a levegő-föld összeköttetések során ultrarövidhullámú (VHF) frekvenciát használnak és egy légijármű csak két üzemképes URH készülékkel rendelkezik, az egyiket a megfelelő ATS frekvenciára, a másikat pedig a TIBA frekvenciára állítsák be.

2.2 Rádió-figyelés

A TIBA frekvencián a kijelölt légtérbe történő belépést megelőző tíz perctől ezen légtér elhagyásáig tartsanak fenn rádió-figyelést. Egy olyan légijármű, amely a kijelölt légtér oldalhatárain belül elhelyezkedő repülőtérről száll fel, a rádió-figyelést a felszállás után a lehető legrövidebb időn belül kezdje meg és a légtér elhagyásáig tartsa fenn.

2.3 A rádióadások időpontja

Az adás kezdeményezendő:

a) kijelölt légtérbe történő belépés előtt tíz perccel vagy egy olyan repülőgépvezető esetében, aki a kijelölt légtér oldalhatárain belül elhelyezkedő repülőtérről száll fel, a felszállás után a lehető legrövidebb időn belül;

b) tíz perccel a jelentőpont átrepülése előtt;

c) tíz perccel az légiforgalmi szolgálati útvonal keresztezése vagy az arra történő belépés előtt;

d) az egymástól távol elhelyezkedő jelentő pontok között 20 perces időközönként;

e) ahol lehetséges, a repülési szint megváltoztatásának megkezdése előtt 2 — 5 perccel;

f) a repülési szint megváltoztatásának időpontjában; és

g) bármely más időpontban, amikor a repülőgépvezető ezt szükségesnek ítéli.

2.4 A rádióadás formátuma

2.4.1 A repülési szint megváltoztatását jelző adások kivételével a 2.3 a), b), c), d) és g) alpontokban jelzett rádióadások esetén a következő formátumot alkalmazzák:

ALL STATIONS — ÁLTALÁNOS ADÁS (a forgalmi tájékoztató rádióadás meghatározása szükséges)
(a légijármű hívójele)

FLIGHT LEVEL — REPÜLÉSI SZINT (szám) vagy

CLIMBING * A 2.3 a) alpontban jelzett adás esetén, ha a légijármű a kijelölt légtér oldalhatárain belül elhelyezkedő repülőtérről száll fel.

* TO FLIGHT LEVEL (szám) — EMELKEDEK

* A (szám) REPÜLÉSI SZINTRE

(a légijármű repülési iránya)

(ATS útvonal) vagy (DIRECT FROM/TO — KÖZVETLENÜL -TÓL/-IG)

POSITION — HELYZET (helyzet meghatározás ** Olyan adások esetén, amikor a légijármű nincs kijelölt ATS jelentőpont közelében, a repülési helyzetét a lehető legpontosabban, minden esetben legalább a legközelebbi 30 szélességi és hosszúsági fok-perc pontossággal adja meg.

**) AT — IDŐ (időpont)

ESTIMATING — VÁRHATÓ (következő jelentőpont vagy a kijelölt légiforgalmi szolgálati útvonal keresztezésének vagy elérésének időpontja) AT — IDŐ (időpont)
(a légijármű hívóneve)

FLIGHT LEVEL — REPÜLÉSI SZINT (szám)
Elméleti példa:

„ALL STATIONS WINDAR 671 FLIGHT LEVEL 350 NORTHWEST BOUND DIRECT FROM PUNTA SAGA TO PAMPA POSITION 5040 SOUTH 2010 EAST AT 2358 ESTIMATING CROSSING ROUTE LIMA THREE ONE AT 4930 SOUTH 1920 EAST AT 0012 WINDAR 671 FLIGHT LEVEL 350 NORTHWEST BOUND OUT"

2.4.2 A repülési szint megváltoztatása előtt a 2.3 e) alpontban jelzett rádióadás esetén a következő formátumot alkalmazzák:

ALL STATIONS — ÁLTALÁNOS ADÁS
(a légijármű hívójele)
(a légijármű repülési iránya)
(ATS útvonal) vagy (DIRECT FROM/TO — KÖZVETLENÜL -TÓL/-IG)

LEAVING FLIGHT LEVEL (szám) FOR FLIGHT LEVEL (szám) — ELHAGYOM A (szám) REPÜLÉSI SZINTET A (szám) REPÜLÉSI SZINTRE

2.4.3 A 2.4.4 pont előírása kivételével a repülési szint megváltoztatásának időpontjában a 2.3 f) alpontban jelzett rádióadás esetén a következő formátumot alkalmazzák:

ALL STATIONS — ÁLTALÁNOS ADÁS
(a légijármű hívójele)
(a légijármű repülési iránya)
(ATS útvonal) vagy (DIRECT FROM/TO — KÖZVETLENÜL -TÓL/-IG)

LEAVING FLIGHT LEVEL (szám) NOW FOR FLIGHT LEVEL (szám) — MOST ELHAGYOM (szám) A REPÜLÉSI SZINTET A (szám) REPÜLÉSI SZINTRE
majd ezt követően:

ALL STATIONS — ÁLTALÁNOS ADÁS
(a légijármű hívójele)

MAINTAINING FLIGHT LEVEL (szám) — TARTOM A (szám) REPÜLÉSI SZINTET

2.4.4 A közvetlen összeütközési veszély elhárítása céljából végrehajtott ideiglenes repülési szint változtatást bejelentő rádióadás esetén a következő formátumot alkalmazzák:

ALL STATIONS — ÁLTALÁNOS ADÁS
(a légijármű hívójele)
(a légijármű repülési iránya)

LEAVING FLIGHT LEVEL NOW (szám) FOR FLIGHT LEVEL (szám) — MOST ELHAGYOM A (szám) REPÜLÉSI SZINTET A (szám) REPÜLÉSI SZINTRE
majd ezt követően a lehető legrövidebb időn belül:

ALL STATIONS — ÁLTALÁNOS ADÁS
(a légijármű hívójele)

RETURNING TO FLIGHT LEVEL (szám) NOW — MOST VISSZATÉREK A (szám) REPÜLÉSI SZINTRE

2.5 A rádióadások nyugtázása

Az általános adásokat nem szükséges nyugtázni, hacsak nincs közvetlen összeütközési veszély.

3. Az adásokkal kapcsolatos gyakorlati eljárások

3.1 Az utazómagasság megváltoztatása

3.1.1 A kijelölt légtéren belül ne változtassák az utazómagasságot, kivéve ha ezt a repülőgépvezetők a forgalmi konfliktusok elkerülése, időjárási képződmények kikerülése vagy egyéb tényleges légijármű-üzemeltetési okok érdekében szükségesnek ítélik.

3.1.2 Amikor az utazómagasság megváltoztatása elkerülhetetlen, a magasságváltás idejére kapcsolják be a légijármű láthatóságát növelő összes rendelkezésre álló fényt.

3.2 Az összeütközés elkerülése

Amennyiben egy másik légijármű által adott forgalmi tájékoztatás vételét követően a repülőgépvezető a közvetlen összeütközési veszély elkerülése érdekében azonnali intézkedést ítél szükségesnek és ezt nem lehet a 2. Annex útirány jogra vonatkozó előírása szerint végrehajtani, a repülőgépvezető:

a) kivéve ha más repülési művelet végrehajtása célszerűbbnek látszik, azonnal süllyedjen 150 métert (500 láb) vagy ha FL 290 felett repül olyan légtérben, ahol 600 méteres (2000 láb) függőleges elkülönítési minimumot alkalmaznak, 300 métert (1000 láb);

b) kapcsolja be a légijármű láthatóságát növelő összes rendelkezésre álló fényt;

c) a lehető legrövidebb időn belül válaszoljon a rádióadásra, tájékoztatást adva a végrehajtott repülési műveletről;

d) a megfelelő légiforgalmi szolgálati frekvencián közölje a végrehajtott repülési műveletet; valamint

e) amint lehetséges, térjen vissza az eredeti repülési szintre és a megfelelő légiforgalmi szolgálati frekvencián adjon tájékoztatást a végrehajtott repülési műveletről.

3.3 Általános helyzetjelentési eljárások

Minden esetben folytassák a rendszeres helyzetjelentések adását függetlenül attól, hogy az általános forgalmi tájékoztató adás kezdeményezésére vagy nyugtázására bármilyen intézkedés történt.

D. Melléklet
Útmutató a légiforgalmi szükségintézkedések tervezéséhez

(Lásd 2.28 pont)

1. Bevezető

1.1 A légiforgalmi szolgálatok és a kiegészítő szolgáltatások megszakadása esetén foganatosítandó szükség-intézkedésekre vonatkozó irányelveket a Léginavigációs Bizottság tanulmánya után, az érintett Államokkal és szervezetekkel folytatott megbeszéléseket követően, a határozati előírásoknak megfelelően a Tanács először 1984. június 27.-én kelt A23-12 Közgyűlési Határozatával fogadta el. Az irányelveket azután a világ különböző részein és különböző körülmények között a szükségintézkedések alkalmazása során szerzett gyakorlati tapasztalatok alapján felülvizsgálták és módosították.

1.2 Az irányelvek és útmutató anyagok célja a nemzetközi légiforgalom biztonságos és rendezett áramlásának fenntartása a légiforgalmi szolgálatok és a kiegészítő szolgáltatások megszakadása esetén, ilyen körülmények között is biztosítva a világ fő légiközlekedési útvonalainak igénybevételét, illetve ennek lehetőségét.

1.3 Az irányelvek annak a ténynek figyelembevételével kerültek kidolgozásra, hogy a nemzetközi légiközlekedés számára biztosított szolgáltatások megszakadását előidéző események előtt és alatt a körülmények igen változatosak lehetnek és a szükségintézkedéseket, beleértve a kijelölt repülőterek humanitárius célra történő igénybevételének biztosítását is, az egyedi eseményekhez és körülményekhez kell alkalmazni. A szükségintézkedések tervezése, valamint az ilyen tervek alkalmazásának kidolgozása és megvalósítása során szükséges intézkedések meghatározásának felelősségét meg kell osztani az Államok és az ICAO között.

1.4 Az irányelveket a tapasztalatok alapján dolgoztuk ki, amelyek a többek között azt jelezték, hogy a szolgáltatások megszakadása egy adott légtéren belül valószínűleg jelentős mértékben befolyásolják majd a szomszédos légtérben biztosított szolgáltatásokat is. Ezért nemzetközi együttműködésre van szükség, esetenként az ICAO közreműködésével, így az irányelvek és útmutató elkészítésénél a szükségintézkedések kidolgozása és egyeztetése területén vázoltuk az ICAO szerepét is. Az irányelvek azt a gyakorlati tapasztalatot is tükrözik, hogy az ICAO szerepe a légiközlekedési rendszerbe tartozó fő légiútvonalak fenntartása érdekében elvégzendő szükségintézkedési tervek kidolgozása alkalmával az egész világra kiterjedő kell, hogy legyen, nem korlátozódhat kizárólag a nyílt vizek és a nem meghatározott felségterületű területek feletti légterekre. Végül az irányelvek az érintett nemzetközi szervezetek közreműködését is tükrözik, amelyek -- mint a IATA[1] és az IFALPA[2] -- értékes tanácsokkal járultak hozzá a tervek valamint azok egyes elemeinek gyakorlati kidolgozásához.

2. A szükségintézkedési tervek jogi helyzete

A szükségintézkedési tervek célja alternatív szolgáltatások és berendezések biztosítása a körzeti léginavigációs tervben előírt szolgálatok helyett, amikor azok ideiglenesen nem állnak rendelkezésre. Ezért a szükségintézkedések ideiglenes természetűek és csak addig érvényesek, ameddig a körzeti léginavigációs tervben biztosított szolgálatok és berendezések ismét rendelkezésre nem állnak. Ennek megfelelően a szükségintézkedések nem jelentik a körzeti terv kiegészítését vagy módosítását, amelynél a „Jóváhagyott Körzeti Tervek Módosításának Előírásai” szerint kell eljárni. Azokban az esetekben, amikor a szükségintézkedési terv ideiglenesen eltér a jóváhagyott körzeti léginavigációs tervektől, az eltéréseket szükség szerint a Tanács részéről az ICAO Tanács elnökének kell jóváhagyni.

3. A szükségintézkedési tervek kidolgozásának, közzétételének és alkalmazásának felelőssége

3.1 Egy meghatározott légtérben a légiforgalmi szolgálatok és a kiegészítő szolgáltatások biztosításáért felelős Állam(ok) azért is felelősséggel tartoznak, hogy ezen szolgálatok működésének, illetve a szolgáltatások megszakadása vagy ennek lehetőségének esetére kidolgozott intézkedésekkel fenntartsák a nemzetközi polgári légiközlekedés biztonságát, továbbá amennyiben ez lehetséges, alternatív szolgáltatásokat nyújtsanak. Ezért az Állam(ok) dolgozzanak ki, tegyenek közzé és vezessenek be megfelelő szükségintézkedési terveket. Amennyiben a szolgáltatások megszakadása hatással lehet a szomszédos légtérben biztosított szolgáltatásokra, a terveket az érintett Államokkal és légtérfelhasználókkal, valamint szükség szerint az ICAO-val végzett egyeztetés alapján dolgozzák ki.

3.2 A nyílt vizek feletti légtereket érintő megfelelő szükségintézkedések vonatkozásában a felelősség továbbra is azokra az Államokra hárul, amelyek a légtér eléréséig biztosították a szolgáltatásokat, kivéve ha a felelősséget ideiglenesen az ICAO egy másik Államra vagy Államokra hárítja át.

3.3 Ehhez hasonlóan egy olyan légtér vonatkozásában, amelyben a szolgáltatás biztosításának felelősségét egy másik Államra hárították, a megfelelő szükségintézkedések iránti felelősség továbbra is erre az államra hárul, ameddig a felelősséget áthárító Állam ezt ideiglenesen vagy véglegesen vissza nem veszi. Ezt követően az áthárító Állam veszi át a szükségintézkedések kidolgozásának és végrehajtásának felelősségét.

3.4 Az ICAO kezdeményezi és egyezteti a nemzetközi polgári légiközlekedést érintő légiforgalmi szolgálatok működésének és a kiegészítő szolgáltatások biztosításának megszakadása alkalmával szükséges intézkedéseket, amennyiben az Állam, illetve hatósága valamilyen okból nem tudja teljesíteni a 3.1 pontban ismertetett felelősségét. Ezekben az esetekben az ICAO együttműködik a szomszédos légterekért felelős Államokkal és az érintett nemzetközi szervezetekkel. Az ICAO az Államok kérésére is kezdeményezi és egyezteti a megfelelő szükségintézkedéseket .

4. Előkészítő tevékenység

4.1 A szükségintézkedések tervezésénél az idő alapvető fontosságú tényező, amennyiben a légiközlekedést érintő kockázatok az intézkedésekkel megelőzhetők. A szükségintézkedések időben történő bevezetéséhez határozott kezdeményezés és végrehajtás szükséges, amelynek alapján kidolgozzák, az érintett felek jóváhagyják és megfelelő módon és időben közzéteszik a szükségintézkedési terveket, mielőtt bekövetkezik az az esemény, amely a végrehajtást szükségessé teszi.

4.2 A fenti 4.1 pontban ismertetett okból az Államok szükség szerint végezzék el az előkészítést, hogy ezzel megkönnyítsék a szükségintézkedések időben történő közzétételét. Az előkészítés feladatai közé tartoznak az alábbiak:

a) az általános szükségintézkedési tervek elkészítése a légiforgalmi szolgálatok és/vagy a kiegészítő szolgáltatások biztosítását érintő előrelátható eseményekre, mint például érdekvédelmi (szakszervezeti) megmozdulások, munkabeszüntetések. Elfogadva azt a tényt, hogy a világ légiközlekedési közössége nem résztvevő fél az ilyen esetekben, a nyílt vizek és nem meghatározott felségterületű területek feletti légterekben szolgáltatásokat biztosító Államok hozzanak megfelelő intézkedéseket annak érdekében, hogy a nemzetközi polgári légiközlekedés számára a felségjoggal nem rendelkező légtérben továbbra is megfelelő légiforgalmi szolgálatot nyújtsanak. Ugyanebből az okból a saját felségterületek feletti vagy számukra más állam(ok) részéről átadott légtérben légiforgalmi szolgálatot nyújtó államok is hozzanak megfelelő intézkedéseket a légiforgalmi szolgálatok biztosítására a nemzetközi polgári légiközlekedés számára, amely azonban nem vonatkozik érdekvédelmi (szakszervezeti) megmozdulásokban érintett Állam(ok) területén történő le és felszállások végrehajtására;

b) mérjék fel a harci cselekmények vagy a polgári légiközlekedést érintő jogellenes beavatkozások kockázati tényezőit a polgári légiforgalom vonatkozásában, valamint a természeti katasztrófák valószínűségét és lehetséges hatásait is. Az előkészítés terjedjen ki a természeti katasztrófák, harci cselekmények vagy a polgári légiközlekedést érintő jogellenes beavatkozások miatti különleges szükségintézkedések előzetes kidolgozására, amely események valószínűleg befolyásolni fogják a polgári légijárművek üzemeltetésére rendelkezésre álló légteret, a légiforgalmi szolgálatok és/vagy kiegészítő szolgáltatások biztosítását. Vegyék figyelembe, hogy egy adott légtér előzetes értesítés nélkül történő azonnali elkerülése különleges feladatok elé állítja a szomszédos légterekért vagy légtérszakaszokért felelős Államokat és nemzetközi légijármű-üzemeltetőket, mivel alternatív útvonalakat és szolgáltatásokat kell tervezniük. Ezért az Államok légiforgalmi szolgálati hatóságai a lehetőségek szerint előre mérjék fel az ilyen alternatív tevékenységek szükségességének lehetőségét és valószínűségét;

c) kísérjék figyelemmel mindazokat a fejleményeket, amelyek a szükségintézkedések foganatosítását megkövetelő eseményekhez vezetnek. Az Államok gondolják át az ilyen feladathoz, valamint szükség szerint a hatékony intézkedések megkezdéséhez megfelelő személy vagy szervezeti egység kijelölésének lehetőségét; valamint

d) egy központi szervezet kijelölése vagy kialakítása, amely a légiforgalmi szolgálatok megszakadása és a szükségintézkedések bevezetése esetén éjjel-nappal pontos tájékoztatást tud nyújtani a kialakult helyzetről és a vonatkozó szükségintézkedésekről egészen addig, amíg a rendszer rendes működése helyreáll. A központi szervezeten belül vagy e mellett a szolgáltatások megszakadása alkalmával szükséges tevékenységek összehangolására jelöljenek ki egyeztető munkacsoportot.

4.3 Az ICAO rendelkezésre áll mindazon fejlemények figyelemmel kísérésére, amelyek a szükségintézkedések kidolgozását és foganatosítását megkövetelő eseményekhez vezetnek, továbbá szükség szerint segítséget nyújt az intézkedések kidolgozásához. A tényleges kényszerhelyzet esetén az érintett körzeti irodá(k)ban és az ICAO montreáli székhelyén egyeztető csoportot alakítanak és intézkednek, hogy éjjel-nappal szakértő személyzet álljon rendelkezésre vagy legyen elérhető. A csoportok feladata a bármely forrásból származó tájékoztatások folyamatos értékelése, az állami légiforgalmi tájékoztató szolgálat állandó és rendszeres tájékoztatása, az érintett nemzetközi szervezetekkel és helyi szerveivel történő kapcsolattartás, az érintett, valamint a szükségintézkedésekben résztvevő valamennyi Állammal történő közvetlen, aktuális és naprakész információ-csere. A rendelkezésre álló összes adat elemzése alapján a körülményeknek megfelelő tevékenység vagy intézkedés kezdeményezésének jogát a csoport beszerzi az érintett Állam(ok)tól.

5. Egyeztetés

5.1 A szükségintézkedési terv legyen egyaránt elfogadható a szolgálatokat biztosítók és igénybevevők részére, azaz a szolgáltatók legyenek képesek végrehajtani a részükre kijelölt feladatokat, ugyanakkor a körülményeknek megfelelően biztosítani lehessen az üzemeltetés biztonságát valamint a tervben jelzett forgalom kapacitást is.

5.2 Ezért azok az Államok, amelyek feltételezik vagy tapasztalják a légiforgalmi szolgálatok és/vagy a kiegészítő szolgáltatások megszakadását, a lehető leghamarabb tájékoztassák az illetékes ICAO körzeti irodát és azokat az Államokat, amelyek szolgálatait az esemény érintheti. A tájékoztatás tartalmazza a szükségintézkedéseket vagy segítség kérést a szükségintézkedési terv kialakításához.

5.3 Az egyeztetésre vonatkozó részletes követelményeket a fentiek alapján az Államok és/vagy az ICAO határozza meg. Abban az esetben, ha a szükségintézkedések érdemben nem érintik a légtér-felhasználókat vagy az érintett Állam saját légterén kívül szolgáltatást biztosító szervezeteket, természetesen nincs vagy alig van szükség ilyen egyeztetésre, azonban a vélemények szerint az ilyen eset igen ritka.

5.4 Több országot érintő kockázat esetén a szükségintézkedési terv végső kialakításához vezető részletes egyeztetésre van szükség minden egyes érintett állam között. A részletes egyeztetés terjedjen ki azokra az Államokra, amelyek szolgálatait a terv -- például a forgalom átirányítása miatt -- jelentős mértékben érintheti, valamint az érintett nemzetközi szervezetekre is, amelyek komoly üzemeltetési tapasztalatokkal és ismeretekkel rendelkeznek.

5.5 Amikor a szükségintézkedések szabályos és zökkenőmentes alkalmazásához erre szükség van, a fentiekben ismertetett egyeztetés terjedjen ki az általános és pontos NOTAM szövegre is, amelyet a közösen megállapított hatálybalépési időpontban tesznek közzé.

6. A szükségintézkedési tervek kidolgozása, közzététele és alkalmazása

6.1 A teljes értékű szükségintézkedési terv az egyedi körülményektől függ, melyek közé tartozik az is, hogy a korlátozó körülmények érintenek-e a nemzetközi polgári légiközlekedés számára rendelkezésre álló légteret vagy sem. Független légteret csak az érintett Államok hatóságainak kezdeményezése alapján vagy megállapodásban rögzített engedélyével lehet használni. Ellenkező esetben a szükségintézkedéseknek ki kell terjedniük az adott légtér elkerülésére és az intézkedéseket a szomszédos államokkal vagy ezek részéről az ICAO-val történő együttműködéssel dolgozzák ki. A nyílt vizek és a nem meghatározott felségterületek feletti légtér vonatkozásában a szükségintézkedési terv a körülményektől függően, többek között az alternatív szolgáltatások minőségi csökkenésének megfelelően tartalmazhatja az ICAO részéről a légiforgalmi szolgálatok biztosítása felelősségének ideiglenes áthárítását az érintett légtérben.

6.2 A szükségintézkedési terv feltételezi, hogy a lehető legtöbb tájékoztatás áll rendelkezésre a következőkről:

jelenleg rendelkezésre álló és alternatív útvonalak; a légijármű navigációs képessége; a földi berendezések segítségével teljes mértékben vagy részlegesen rendelkezésre álló navigációs irányvezetés; a szomszédos légiforgalmi szolgálati egységek légtérfelderítési és távközlési berendezései vagy képességei; a kiszolgált légijárművek típusai, mérete és a forgalom nagyságrendje; a légiforgalmi szolgálatok, távközlési, meteorológiai és légiközlekedési tájékoztató szolgálatok tényleges üzemi állapota.

Az alábbiakban ismertetjük a szükség-intézkedések tervezésénél a körülményektől függően figyelembe veendő fő tényezőket:

a) a forgalom átirányítása az érintett légtér teljes vagy részleges elkerülése érdekében, általában a kiegészítő útvonalak vagy útvonalszakaszok kijelölésével és használatuk feltételeivel;

b) amennyiben lehetséges, egyszerűsített útvonalhálózat kialakítása az érintett légtérben, az oldalirányú és függőleges elkülönítést biztosító repülési szint kiosztási rendszerrel együtt, továbbá olyan eljárás, amellyel a szomszédos területek irányító központjai a belépési pontokra létrehozzák és a légtérben fenntartják a hosszirányú elkülönítést;

c) a légiforgalmi szolgálatok biztosítása felelősségének átadása a nyílt vizek feletti vagy az erre átadott légtérben;

d) a megfelelő levegő-föld távközlési, AFTN és közvetlen légiforgalmi szolgálati beszédüzemű összeköttetések biztosítása és fenntartása, beleértve az időjárási tájékoztatás valamint a navigációs berendezések üzemi állapotáról szóló információk biztosítására vonatkozó felelősség átadását a szomszédos Államoknak;

e) különleges intézkedések a légijárműtől származó, repülés közbeni és repülés utáni jelentések összegyűjtésére és szétosztására;

f) előírás a légijármű számára a folyamatos rádiófigyelés fenntartására a meghatározott repülőgépvezető-repülőgépvezető közötti URH frekvencián olyan kijelölt légterekben, ahol a levegő-föld összeköttetés bizonytalan vagy ilyen összeköttetés nem létezik; továbbá a tényleges és számított helyzet-információk továbbítása lehetőleg angol nyelven, beleértve az emelkedés valamint süllyedés megkezdését és befejezését;

g) előírás minden légijármű számára, hogy a kijelölt légterekben mindig üzemeltessék az összes navigációs és összeütközés elleni fényeiket;

h) előírás és eljárás a légijárművek számára, hogy azonos utazómagasságon közlekedő légijárművek között nagyobb hosszirányú elkülönítést tartson;

i) előírás a légijárművek számára, hogy az emelkedést és a süllyedést a külön azonosított légiútvonal középvonalától jóval jobbra hajtsa végre;

j) a szükségintézkedések által érintett légtérbe történő belépés szabályozását célzó intézkedések, hogy elkerüljék a szükségintézkedési rendszer túlterhelését; valamint

k) előírás a szükségintézkedés légterében működő összes forgalom számára, hogy IFR szabályok szerint üzemeljen, beleértve a terület légiforgalmi szolgálati útvonalaihoz az IFR repülési szintek kijelölését a 2. Annex 3. Függelék megfelelő utazómagasság táblázataiból.

6.3 A légiforgalmi szolgálatok és/vagy a kiegészítő szolgáltatások várható vagy tényleges megszakadásáról szóló NOTAM tájékoztatást a gyakorlati szempontból lehető leghamarabb továbbítsák a léginavigációs szolgálatok illetve szolgáltatások felhasználói számára. A NOTAM tartalmazza a megfelelő szükségintézkedéseket is. Az előre várható szolgáltatás megszakadás esetében az előzetes értesítés semmi esetre se legyen később, mint 48 órával a várható esemény előtt.

6.4 A szükségintézkedések megszüntetéséről és a szolgálatok illetve szolgáltatások eredeti, a körzeti léginavigációs tervben megállapított szintjének visszaállításáról szóló NOTAM közleményt a lehető leghamarabb továbbítsák az érintettek részére, biztosítva ezzel a szükségintézkedésekről a rendes üzemi körülményekre történő átállás folyamatosságát és rendezettségét.

E. Melléklet

Elfogadható repülésbiztonsági szint

1. Bevezetés

1.1 Az elfogadható repülésbiztonsági szint fogalmának bevezetése azon igényre válaszol, hogy a jelenleg uralkodó, a szabályozónak történő megfelelésen alapuló repülésbiztonság-irányítási szemlélet egy, az általános repülésbiztonsági szint folyamatos javulását célzó, teljesítmény-alapú szemlélettel egészüljön ki.

1.2 Az elfogadható repülésbiztonsági szint egy felügyelő hatóság, egy járató vagy egy szolgáltató repülésbiztonsági céljait fejezi ki. A felügyelő hatóság és a járatók/szolgáltatók közötti viszony szemszögéből kijelöli a járatók/szolgáltatók elsődleges üzleti tevékenységük végzése közben elérendő, a felügyelő hatóság által még elfogadható minimum repülésbiztonsági cél(oka)t. Ez egy olyan vonatkozási pont, ami alapján a felügyelő hatóság mérni képes a repülésbiztonsági teljesítményt.

1.3 Az elfogadható repülésbiztonsági szint(ek) a repülésbiztonsági program céljából történő meghatározása nem helyettesíti a törvényi, szabályozói vagy egyéb fennálló követelményeket, valamint nem menti fel az Államokat a Nemzetközi Polgári Légiközlekedési Egyezményben és kapcsolódó rendelkezéseiben foglalt kötelezettségeik alól.

1.4 Az elfogadható repülésbiztonsági szint(ek) a repülésbiztonság-irányítási rendszer céljából történő meghatározása nem menti fel a járatókat/szolgáltatókat a vonatkozó nemzeti szabályozások és a Nemzetközi Polgári Légiközlekedési Egyezmény általi kötelezettségeik alól.

2. Hatály

2.1 Az egyes Államokban a felügyelő hatóság és az egyes járatók/szolgáltatók részére különböző elfogadható repülésbiztonsági szintek állapíthatók meg.

2.2 Az egyes meghatározott repülésbiztonsági szintek legyenek arányosak az egyes járatók/szolgáltatók üzemelési körülményeinek összetettségével, valamint azzal a szinttel, ameddig a repülésbiztonsági hiányosságok tolerálhatók és azokra reálisan fel lehet készülni.

3. Végrehajtás

3.1 Az elfogadható repülésbiztonsági szint fogalmát repülésbiztonsági teljesítmény-mutatókban és repülésbiztonsági teljesítménycélokban határozzák meg és repülésbiztonsági követelmények útján hajtják végre.

3.2 Az elfogadható repülésbiztonsági szint, repülésbiztonsági teljesítmény-mutatók, repülésbiztonsági teljesítménycélok és repülésbiztonsági követelmények közötti összefüggések az alábbiak: az elfogadható repülésbiztonsági szint az átfogó fogalom; a repülésbiztonsági teljesítmény-mutatók azok a mérőeszközök vagy mértékek, amelyekkel meghatározható, hogy elérték-e az elfogadható repülésbiztonsági szintet, a repülésbiztonsági teljesítménycélok az elfogadható repülésbiztonsági szintre vonatkozó minősített célkitűzések, míg a repülésbiztonsági követelmények a repülésbiztonsági teljesítmény-mutatók eléréséhez szükséges eszközök vagy erőforrások.

3.3 Egy elfogadható repülésbiztonsági szint repülésbiztonsági teljesítmény-mutatói lehetőleg legyenek egyszerűek és kapcsolódjanak egy Állam repülésbiztonsági programjának vagy egy járató/szolgáltató repülésbiztonság-irányítási rendszerének (SMS) főbb alkotóelemeihez. A repülésbiztonsági teljesítmény-mutatókat általában számokkal fejezik ki.

3.4 Egy elfogadható repülésbiztonsági szint repülésbiztonsági teljesítménycéljait lehetőleg annak felmérése után határozzák meg, hogy mi kívánatos és mi reálisan elvárható az egyes járatóktól/szolgáltatóktól. A repülésbiztonsági teljesítménycélok lehetőleg legyenek mérhetők, az érintett felek számára elfogadhatók, valamint az elfogadható repülésbiztonsági szinttel megegyezők.

3.5 Az elfogadható repülésbiztonsági szint repülésbiztonsági teljesítménycéljainak eléréséhez szükséges repülésbiztonsági követelményeket lehetőleg operatív eljárásokban, technológiában és rendszerekben, programokban, előre nem látott eseményekre kidolgozott intézkedésekben, stb. fejezzék ki, amelyekhez hozzáadhatók a megbízhatóságra, rendelkezésre-állásra és/vagy pontosságra vonatkozó mértékek.

3.6 Egy elfogadható repülésbiztonsági szintet lehetőleg több kisebb repülésbiztonsági teljesítmény-mutatóval fejezzenek ki és több repülésbiztonsági teljesítménycélra fordítsanak le, ne egy nagyobb fogalomra.

-- -- VÉGE -- --

ANNEX 12.
Kutatás és mentés

Nyolcadik Kiadás – 2004. Július
17. módosítással
A jelen kiadás magába foglalja a Tanács által 2004. február 24. előtt elfogadott összes módosítást, és 2004. november 25-én hatálytalanítja a 12. Annex összes korábbi kiadását.
A szabványok és ajánlott gyakorlatok alkalmazhatóságára vonatkozó tájékoztatást lásd az Előszóban.
Nemzetközi Polgári Repülési Szervezet
KISÉRŐ JEGYZET
A Nemzetközi Polgári Repülésről Szóló Egyezmény Annexeinek új kiadásai
Tudomásunkra jutott, hogy új Annex kiadás közzétételekor a használók az Annex előző kiadásával együtt kidobják a korábbi kiadáshoz tartozó Kiegészítő (Supplement) részeket is.
Kérjük jegyezzék meg, hogy az előző kiadás Kiegészítő (Supplement) részét mindaddig meg kell őrizni, amíg új Kiegészítő részt teszünk közzé.

MÓDOSÍTÁSOK

A módosítások kiadását az ICAO Bulletin és az ICAO Kiadványok és Audio-vizuális Kiképzési segédletek Katalógusának havi kiegészítései rendszeresen közlik, a jelen Kiadvány tulajdonosai kísérjék ezeket figyelemmel.
Az alábbi táblázat a módosítások nyilvántartására szolgál.

A MÓDOSÍTÁSOK ÉS HELYESBÍTÉSEK NYILVÁNTARTÁSA

Módosítások				Helyesbítések			
Sor szám	Alkalmazhatóság dátuma	Bevezetés dátuma	Bevezette	Sor szám	Kiadási dátum	Bevezetés dátuma	Bevezette
1-17	A jelen kiadásba bedolgozva						
18	22/11/07	08/08/08	MJ				

ELŐSZÓ

Történeti háttér

1946 decemberében, a Kutatási és Mentési Osztály a második ülésén a kutatás és mentési szabványokra és ajánlott gyakorlatokra vonatkozó eljárásokra tett javaslatokat. Ezeket a Titkárság és az akkori Légi-navigációs Bizottság dolgozta ki, és megfelelő módon a Tanács elé terjesztette. A Tanács a benyújtott formában nem fogadta el a javaslatokat és 1948. április 20-án visszautalta a Légi-navigációs Bizottsághoz további megfontolás céljából.
Ezután újabb Annex tervezetet dolgoztak ki a Körzeti Légi-navigációs Értekezletek tapasztalatának figyelembevételével és ezt a Légi-navigációs Bizottság végül is elvben jóváhagyta és köröztette az államok között véleményezés céljából. Ezt a Légi-navigációs Bizottság az államok véleménye alapján továbbfejlesztette és az így készült ajánlásokat 1950 május 25-én a Tanács elfogadta és a nemzetközi polgári repülésről szóló egyezmény 12. Annex-ének nevezték el. 1950. december 1-jén lépett hatályba és 1951. március 1-jén vált kötelező érvényűvé.
Az A Táblázat a soron következő módosítások eredetét mutatja az érintett fő témák jegyzékével együtt, és azokat az időpontokat, amikor a Tanács az Annexet, illetve módosításait elfogadta, illetve amikor hatályba

léptek, valamint amikortól alkalmazandókká váltak.

Alkalmazhatóság

Az e dokumentumban lévő szabványok és ajánlott gyakorlatok a Doc 7030-ban tartalmazott Körzeti Kiegészítő Eljárások - Kutatás és Mentés - alkalmazását szabályozzák, amely dokumentumban a körzeti alkalmazás kiegészítő eljárásai találhatók.
A 12. Annex alkalmazandó a kutató és mentő szolgálatok létesítéséhez, fenntartásához és működéséhez a szerződő államok területén, valamint a nyílt vizeken, illetve e szolgálatok államok közötti összehangolásához.

A szerződő államok kötelezettségei:

Eltérések jelentése. Felhívjuk a szerződő állam figyelmét az Egyezmény 38. cikkelyéből fakadó kötelezettségére, mely értelmében a Szerződő Állam köteles a szervezet számára bejelenteni minden olyan eltérést, amely nemzeti szabályai és gyakorlatai, illetve a jelen Annexben szereplő Nemzetközi szabványok, illetve ezek bármiféle módosítása között fennállnak. Felkérjük a szerződő államot arra, hogy tegyen ilyen bejelentést minden olyan eltéréssel kapcsolatban is, amely a jelen Annexben és bármely módosításában szereplő ajánlott gyakorlat között fennáll, amennyiben az utóbbi eltérésekre vonatkozó bejelentés lényeges a Légi-navigáció biztonsága szempontjából.
Felkérjük továbbá a szerződő államot arra, hogy folyamatosan tájékoztassa a Szervezetet a jövőben esetleg keletkező minden eltérésről, illetve a korábban már bejelentett bármely eltérés megszűnéséről. A szerződő államhoz a jelen Annex módosításainak elfogadását követően az eltérések bejelentéséhez külön felszólítást juttatunk el.

Az állam figyelmét felhívjuk a 15. Annex rendelkezésére is, miszerint az Egyezmény 38. cikkelyéből fakadó kötelezettségén felül a nemzeti szabályzat és gyakorlat, illetve a vonatkozó ICAO szabványok és ajánlott gyakorlatok közötti eltéréseket Légiforgalmi Tájékoztató Szolgálata révén közzé kell tenni.

A Tájékoztatás közzététele. A jelen Annexben meghatározott szabványok és ajánlott gyakorlatok szerint létesített, légi-járművek üzemeltetését befolyásoló berendezések, szolgálatok és eljárások bevezetéséről, megszüntetéséről, vagy megváltoztatásáról szóló tájékoztatást a 15. Annexnek megfelelően kell közölni és életbe léptetni.

Az Annex szövegének használata a nemzeti szabályozásban. A Tanács 1948. április 13-án elfogadott egyik határozatában felhívja a szerződő állam figyelmét annak szükségességére, hogy saját nemzeti szabályzataiban a megoldható legteljesebb mértékben használja a szabályozó jellegű ICAO szabványok szabatos nyelvezetét, továbbá annak szükségességére, hogy jelezze a szabványoktól való eltéréseket, beleértve mindazon kiegészítő nemzeti előírást, amely a Légi-navigáció biztonságára és rendszerességére nézve lényeges. Jelen Annex előírásainak megszövegezése a lehető legteljesebb mértékben olyan, hogy a nemzeti szabályokba átültetésük szövegbeli lényegesebb változtatás nélkül váljék lehetővé.

Az Annex részeinek jogállása

Egy Annex a következő összetevő részekből áll, de nem szükségszerű, hogy mindegyikük mindegyik Annexben megtatálható legyen. Ezen összetevők a következő jogállás bírnak:

1. *Az Annex alapjait képező anyag:*

a) Szabvány és ajánlott eljárás, melyet az Egyezmény rendelkezése szerint a Tanács fogad el. Ezek meghatározása a következő:
Szabvány (standard): A szabvány fizikai jellemzőre, kialakításra, anyagra, teljesítményre, személyzetre, vagy eljárásra vonatkozó bármely követelmény, amelynek egységes alkalmazása szükséges a nemzetközi légi-közlekedés biztonsága, vagy menetrendszerűsége érdekében és amelyet a szerződő állam az Egyezmény értelmében betart; ha nem tartható be, akkor a 38. cikkely értelmében erről a Tanácsot köteles értesíteni.
Ajánlott eljárás (recommended practice): bármely fizikai jellemzőre, kialakításra, anyagra, teljesítményre, személyzetre vagy eljárásra vonatkozó olyan előírás, amely egységes alkalmazása a nemzetközi légi-

közlekedés biztonsága, menetrendszerűsége, vagy hatékonysága szempontjából kívánatos és amely alkalmazására a szerződő állam az Egyezmény értelmében törekszik.

b) *Függelék (Appendices):* A célszerűség érdekében külön csoportosított, de a Tanács által elfogadott szabványok és ajánlott eljárások szerves részét képező szöveg.

c) *Meghatározás (Definitons).* A szabványokban és ajánlott eljárásokban alkalmazott, önmagát elfogadott saját szótári jelentés híján nem magyarázó kifejezés meghatározása. A meghatározás külön jogállással nem rendelkezik, de lényeges része minden szabványnak és ajánlott eljárásnak, amelyben előfordul, tekintve, hogy a meghatározás értelmének megváltoztatása az előírás tartalmát befolyásolhatja.

2. A Tanács által a szabványokkal és ajánlott eljárásokkal kapcsolatban közzétételre jóváhagyott anyag

a) *Előszó (Foreword).* A Tanács ténykedésére alapozott történeti és magyarázó anyagot foglal magába, ismerteti, magyarázza a szabványok és ajánlott eljárások alkalmazásával kapcsolatban az állam mindazon kötelességét, amely az Egyezményből és az Elfogadó határozatból ered.

b) *Bevezető rész (Introduction).* Az Annex részei, fejezetei, vagy szakaszai előtt található, a szöveg alkalmazásának megértését segítő magyarázó anyag.

c) *Megjegyzés (Notes).* Ez a szükséges helyeken a kérdéses szabványra, vagy ajánlott eljárásra vonatkozó tényszerű információt, vagy hivatkozást tartalmaz, de a szabvány, vagy ajánlott eljárás részét nem képezi.

d) *Melléklet (Attachments).* A szabványt és ajánlott eljárást kiegészítő anyagot tartalmaz, vagy azok alkalmazásához nyújt útmutatást.

Nyelv kiválasztás

Ezt az Annexet hat nyelven fogadták el - angolul, arabul, kínaiul, franciául, oroszul és spanyolul. Felkérjük a szerződő államot, hogy a nemzeti bevezetés céljára, illetve az egyezményben előírt egyéb feladatok megvalósítására ezek közül egyet válasszon ki közvetlen használatra, vagy a nemzeti nyelvére történő lefordítás alapjául és, hogy a szervezetet ennek megfelelően értesítse.

Szerkesztői gyakorlat

Annak érdekében, hogy mindegyik kijelentés jogállása első pillantásra felismerhető legyen, a következő gyakorlatot alkalmaztuk. A *szabványokat* vékony álló betűkkel nyomtattuk; az *Ajánlott gyakorlatokat* vékony dőlt betűkkel szedtük, jogállásukat félkövér **Recommendation** kitétellel jeleztük; a *Megjegyzés*eket vékony dőlt betűkkel nyomtattuk, jogállásukat a *Megjegyzés* kitétel mutatja.
Megjegyzendő, hogy az angol szövegben a követelmények leírásánál az alábbi szerkesztői gyakorlatot követtük: a szabványok esetében a kell (shall), és az ajánlott eljárásokban pedig a szükséges (should) szavakat alkalmaztuk.
E dokumentumban végig
a) a mértékegységek metrikus rendszerben szerepelnek, melyeket zárójelben követ a megfelelő láb-font rendszerben kifejezett érték
b) az alkalmazott hímnemű személyes névmást úgy kell tekinteni, mint amely egyaránt vonatkozik a nőnemű és a hímnemű személyekre is.
Jelen dokumentum bármelyik részére számmal és/vagy címmel való hivatkozás magába foglalja az adott rész valamennyi alpontját is.

"A" táblázat - a 12. Annex módosításai

Módosítás	Forrása(i)	Tárgya(i)	Jóváhagyva Hatályba lépés Alkalmazandó
1. Kiadás	Kutatás és Mentés Osztály második (1946) ülése, Légi-navigációs Bizottság	Nemzetközi szabványok és ajánlott gyakorlatok - Kutató és Mentő Szolgálatok	1950. máj. 25. 1950. dec. 1. 1951. márc. 1.

1 (2. Kiadás)	Kutatás és Mentő Osztály, harmadik (1951) ülés	Kutató és Mentő szervezet; kommunikáció; a kutató és mentő tevékenység értékelése; kutató és mentő eljárások; levegő-föld jelzések;	1952. márc. 31. 1952. szept. 1. 1953. jan. 1.
2 (3. Kiadás)	Második Léginavigációs Konferencia (1955)	Mentő alközpontok; Más szerződő állam mentő egységeinek kiszolgálása és ellátása üzemanyaggal.	1956. máj. 8. 1956. szept.1. 1956. dec. 1.
3	Harmadik Léginavigációs Konferencia (1956). A 6. Annex 6. Fejezetének 140. módosítása	A törzs átvágásra alkalmas területeinek megjelölése	1957. jún. 13. 1957. okt. 1. 1957. dec. 1.
4 4. Kiadás)	Légiforgalmi szabályok, Légiforgalmi Szolgálatok és Kutatás és Mentés Osztály (1958)	államok közötti együttműködés; vész helyzetekre vonatkozó tájékoztatások; a mentés koordináló központok eljárásai.	1959. dec. 8. 1960. máj. 1. 1960. aug. 1.
5.	A 11. Annex 13. módosítása	A mentést koordináló központok értesítése a légiforgalmi szolgálati egységek részéről	1962. ápr.13. - 1962. nov. 1.
6	9. Annex 4. módosítása	Más szerződő államok mentőegységeinek ideiglenes belépése	1964. júl. 1
7	11. Annex 5. Fejezetének 14. módosítása	Felszíni vízi járművek és úton lévő légi-járművek riasztása veszélyben lévő légi-járműnek nyújtandó segítség érdekében	1964. jún. 19. 1964. nov. 1. 1965. febr. 1.
8	Életbiztonság a tengeren tárgyú nemzetközi egyezmény A 11. Annex 15. módosítása	Az utalások naprakésszé tétele; riasztószolgálat.	1965. dec. 10. 1966. aug. 25.
9 (5. kiadás)	A Körzeti Kiegészítő Eljárások Légi-navigációs Bizottság általi felülvizsgálata	A szerződő államok közötti együttműködés; Más szerződő államok mentő egységeinek kiszolgálása és üzemanyag pótlása; kutató és mentő hírközlő létesítmények próbája; további egységek, vagy szolgálatok segítség nyújtása a kutató és mentő tevékenység során.	1970. máj. 25. 1970. szept. 25. 1971. febr. 4.
10	Légi-navigációs Bizottság	Nemzetközi jelkulcs rendszeresítése a kutató és mentő légi-járműveken; kutató és mentő légi-járművek felszerelése 2182 kHz frekvenciájú berendezéssel; kereskedelmi hajók tartózkodási helyéről nyújtott tájékoztatás	1972. dec. 11. 1973. ápr. 11. 1973. aug. 16.

11 (6. kiadás)	Az Annex teljes felülvizsgálata a Légi-navigációs Bizottság által	Új jelzések felszíni járművek számára; 24 órás kutató és mentő szolgálat biztosítása; kereskedelmi hajók tartózkodási helyéről nyújtott tájékoztatás szétosztása; kutató és mentő műveletek értékelése; a szomszédos államok közötti együttműködés javítása; mentőegységek felszerelése; a légiforgalmi szolgálati egységekről szóló információhoz való hozzáférés; ledobható létfenntartó eszközök telephelye; eljárások veszélyben lévő és vízre szállni kényszerülő légi-jármű segítésére, hogy felszíni vízi járművel találkozzon; segítség nyújtási eljárások kutató és mentő, vagy más légi-járműveknek abból a célból, hogy ezek a kényszerhelyzetben lévő légi-járművel találkozzanak.	1974. nov. 25. 1975. márc. 25. 1975. okt. 9.
12	A 3. Annex 60. módosítása	Meteorológiai állomások és kutató mentő egységek közötti kiegészítő hírközlő berendezések	1975. dec. 8. 1976. ápr. 8. 1976. aug. 12.
13	Légi-navigációs Bizottság	Túlélők által használt föld-levegő látjelek	1980. dec. 15. 1981. ápr. 15. 1981. nov. 26.
14	Légi-navigációs Bizottság	A mentést koordináló központ (RCC) előkészítő intézkedésekkel kapcsolatos felelőssége a jogellenes cselekmény tárgyát képező légi-jármű esetében.	1990. márc. 12. 1990. júl. 30. 1990. nov. 15.
15	Légi-navigációs Bizottság	A kutató mentő légi-jármű meghatározása; a mentés koordináló központokra (RCC) vonatkozó kommunikációs követelmények és a kutató mentő (SAR) légi-járművek felszerelései; SAR kapcsolat pont (SPOC).	1993. márc. 12. 1993. júl. 26. 1993. nov. 11.
16 (7. Kiadás)	A 6. Annex I., II. és III. Részeinek 25., 20. és 7. módosítása -a sorrendnek megfelelően-; Légi-navigációs Bizottság	A "parancsnok pilóta" meghatározás módosítása; szerkesztői módosítások.	2001. márc. 12. 2001. júl. 16. 2001. nov. 01.

17	ICAO Titkárság/Légi Navigációs Bizottság	Naprakésszé tétel, a rendelkezések lehetséges mértékű összehangolására az IMO Alapokmánnyal; A légiforgalmi és a tengerészeti kutató-mentő dokumentumok fogalmainak összehangolása; a SAR rendszer létrehozásának körzeti alapú megközelítése; Irányelv megállapodás az államok között és a légiforgalmi, illetve a tengerészeti kutató-mentő szolgálatok operatív együttműködése; lényeges adatok azonnali elérhetősége a kutató-mentő központ részéről.	2004. febr. 23 2004. júl. 12 2004. nov. 25
18	Légi-navigációs Bizottság	A mentést koordináló központ (RCC) felelőssége	2007. márc. 16 2007. júl. 16 2007. nov. 22

NEMZETKÖZI SZABVÁNYOK ÉS AJÁNLOTT GYAKORLATOK

Megjegyzés.- Ez az Annex kiegészült a Nemzetközi Légiforgalmi és Tengeri Kutató-Mentő (IAMSAR) Kézikönyv I. kötetével – Szervezés és Vezetés, a II. kötetével – Művelet összehangolás és a III. kötetével - Mobil Létesítmények (Doc 9731). A kiegészítés célja az államok segítése kutatás és mentési (SAR) igényeik teljesítésében, illetve a Nemzetközi Polgári Repülési Egyezmény értelmében vállalt kötelmeik teljesítésében. Eme – a kutató és mentőszolgálat biztosításával összefüggő – kötelmek a jelen Annexben szabványok és ajánlott eljárások formájában lettek előírva. Az IAMSAR Kézikönyv három kötete a kutató és mentő szolgálatok megszervezésének és biztosításának közös, repülési és tengerészeti megközelítéséhez szolgál útmutatóul. Az államokat bátorítjuk, hogy a kézikönyv használatával alakítsák ki, illetve javítsák kutató és mentő szolgálataikat, illetve, hogy a szomszédos államokkal működjenek együtt.

4. FEJEZET - ELŐKÉSZÍTŐ INTÉZKEDÉSEK

4.1 Információ igény

4.1.1 A mentés koordináló központ mindenkor rendelkezzen a kutató mentő körzetére vonatkozó, alábbiakkal kapcsolatos naprakész információkkal:

a) mentőegységek, mentési alközpontok és riasztó állomások;
b) légiforgalmi szolgálati egységek;
c) a kutató és mentési műveletekben alkalmazható összeköttetést biztosító eszközök;
d) a körzetben működő minden üzemeltető, vagy kijelölt képviselőik címe és telefonszáma;
e) bármely más, köz- és magán segélyforrás, beleértve azokat az orvosi és szállító eszközöket, amelyek a kutatás és mentés során valószínűleg hasznosak bizonyulhatnak.

4.1.2 **Ajánlás**. - *Minden mentés koordináló központ rendelkezzen minden egyéb, a kutatás és mentés szempontjából hasznos információval, beleértve az alábbiakra vonatkozókat is:*

a) minden olyan rádióállomás helye, hívójele, figyelési ideje és frekvenciája, amelyet valószínűleg felhasználnak a kutatás és mentés során;
b) azon szolgálatok helye és figyelési ideje, amelyek rádiófigyelést tartanak és, hogy mely frekvenciákon tartanak figyelést;
c) a ledobható vésztartalékok és mentőfelszerelések tárolási pontjai;

d) ismert olyan tárgyak, amelyek - különösen a levegőből nézve - be nem jelentett, vagy a fel nem lelt ronccsal összetéveszthetők.

4.1.3 **Ajánlás**. - *A tengerre is kiterjedő kutató-mentő területtel rendelkező minden mentés koordináló központnak, álljon módjában egyszerűen hozzáférni az ezen területen belül tartózkodó és vészhelyzetben lévő légi-járműnek segítséget nyújtani képes hajók helyzetét, tényleges útvonalát, sebességét és a kapcsolatba lépés módját tartalmazó információhoz.*

Megjegyzés. - Eme információ a mentés koordináló központban legyen tárolva, vagy közvetlen hozzáférés legyen biztosított.

4.1.4 **Ajánlás**. - *A tengereken végzett kutató mentő műveletek támogatása érdekében a szerződő állam önállóan, vagy más államokkal együttműködve és a tengerészeti hatóságokkal kooperálva hozzanak létre hajókövető rendszert, avagy intézkedjenek az Amver, illetve a körzeti hajókövető rendszerhez kommunikációs (adat) kapcsolat létrehozásáról.*

Megjegyzés. – Az Amver egy világfedéssel rendelkező és a létező összes mentés koordináló központ által lekérdezhető együttműködéses nemzetközi hajókövető rendszer. A szerződő államok körzeti hajókövető rendszereket is üzemeltetnek.

4.2 Műveleti terv

4.2.1 Minden mentés koordináló központ készítsen részletes tervet a kutató és mentő körzetén belüli kutató és mentő műveletek végrehajtására.

4.2.2 **Ajánlás. -** *A kutató mentő műveleti terveket az üzemeltetők és egyéb olyan közszolgálati-, vagy magán szolgálatok képviselőivel közösen kell kidolgozni, amelyek a kutató mentő szolgáltatás biztosításában segíthetnek, vagy amelyek révén előnyök szerezhetők, tekintetbe véve, hogy a túlélők száma magas is lehet.*

4.2.3 A műveleti terv - a lehetséges mértékig - tartalmazzon megállapodásokat a kutatásban és mentésben alkalmazandó légi-járművek, hajók, gépjárművek kiszolgálására, üzemanyaggal való utántöltésére vonatkozóan, beleértve a más államok által rendelkezésre bocsátott eszközöket is.

4.2.4 *A kutatás mentés műveleti terv részletesen tartalmazza a kutatásban és mentésben résztvevők feladatait, beleértve:*

a) a kutató és mentő körzeten belüli kutató és mentő munkák végrehajtásának módját;

b) a rendelkezésre álló távközlési rendszerek és létesítmények használatát;

c) a többi mentés koordináló központtal közösen végrehajtandó tevékenységeket;

d) az úton lévő légi-járművek és tengeren lévő hajók riasztásának módját;

e) a kutatásra és mentésre kijelölt személyzet kötelességeit és kiváltságait;

f) meteorológiai, vagy más körülmények miatt szükségessé váló esetleges eszköz átcsoportosítási lehetőségeket;

g) a kutató és mentő műveletekhez lényeges információ (például időjárási jelentések és előrejelzések, vonatkozó NOTAM-ok stb.) beszerzési módját;

h) szükségessé váló segítség (légi-jármű, hajó, személyzet, vagy felszerelés) igénylési módja másik mentő központtól;

i) a vészhelyzetben lévő és vízre szállni kényszerülő légi-jármű vízi járműhöz vezetésének módjai;

j) a kutató és mentő, vagy más légi-jármű vészhelyzetben lévő légi-járműhöz vezetésének módjai;

k) a légiforgalmi szolgálati egységekkel és egyéb érdekelt hatóságokkal együttműködésben teendők a tudottan, vagy feltételezetten jogellenes cselekmény tárgyát képező légi-jármű segítésére.

4.2.5 **Ajánlás.** – A *kutató mentő műveleti terv legyen összehangolva a repülőtéri vészhelyzeti tervvel, hogy a kutató mentő szolgáltatás biztosított legyen a repülőterek környezetében, beleértve a parti repülőtereket és a vízzel borított területeket is.*

4.3 Kutató mentőegységek

4.3.1 Minden kutató-mentőegység:

a) ismerje a 4.2 pontban leírt műveleti terv saját feladata eredményes végrehajtásához szükséges minden részletét; és

b) készenléti szintjéről a mentést koordináló központot tartsa naprakészen;
4.3.2 A szerződő állam
a) köteles a szükséges számú kutató mentő létesítményt készenlétben tartani; és
b) köteles megfelelő mennyiségű élelmiszeradagot, gyógyszer készletet, jelzőeszközt és egyéb más túlélési és mentő felszerelést ellátmányként tárolni;

4.4 Kiképzés és gyakorlatozások

A kutatás és mentés legmagasabb fokú hatékonyságának elérése és fenntartása céljából a szerződő állam kutató és mentő személyzeteit részesítse rendszeres kiképzésben és tartasson megfelelő kutató és mentő gyakorlatokat.

4.5 A repülőgép roncs

Ajánlás. – *A szerződő állam gondoskodjon róla, hogy a területén belül, vagy a felelőssége alá tartozó kutatási és mentési körzetekben a nyílt tengeren, vagy a meg nem határozott felségjogú területeken bekövetkezett repülőbalesetekből származó roncsokat a baleset kivizsgálását követően eltávolítsák, vagy megsemmisítsék, illetőleg térképen feltüntessék, ha jelenléte veszélyes, vagy a későbbi kutató mentő műveletekben zavart okozhat.*

ANNEX 13.
Légijármű balesetek és események kivizsgálása

9. kiadás – 2001. július
10. módosítással
A jelen kiadás magába foglalja a Tanács által 2001. február 27. előtt elfogadott összes módosítást, és 2001. november 1-jén hatálytalanítja a 13. Annex összes korábbi kiadását.
A szabványok és ajánlott gyakorlatok alkalmazhatóságára vonatkozó információkat lásd a 2. Fejezetben és az Előszóban.
Kilencedik Kiadás - 2001. július
Nemzetközi Polgári Repülési Szervezet

MÓDOSÍTÁSOK

A módosítások kiadását az ICAO Bulletin és az ICAO Kiadványok és Audio-vizuális Kiképzési segédletek Katalógusának havi kiegészítései rendszeresen közlik, a jelen Kiadvány tulajdonosai kísérjék ezeket figyelemmel.
Az alábbi táblázat a módosítások nyilvántartására szolgál.

A MÓDOSÍTÁSOK ÉS HELYESBÍTÉSEK NYILVÁNTARTÁSA

Módosítások				**Helyesbítések**			
Sor szám	Alkalmazhatóság Dátuma	Bevezetés dátuma	Bevezette	Sor szám	Kiadási dátum	Bevezetés dátuma	Bevezette
1-10	Belefoglalva a jelen kiadásba			3.	15/11/06	08/08/08	

8. FEJEZET - BALESETMEGELŐZŐ INTÉZKEDÉSEK

Megjegyzés.- Az itt közölt rendelkezések célja a balesetmegelőzés elősegítése a baleseti és esemény adatok elemzésével, illetve az információk haladéktalan cseréjével.
Eseményjelentő rendszer
8.1 Az állam alakítson ki kötelező eseményjelentő rendszert a tényleges, vagy a lehetséges biztonsági hiányosságokról szóló információk összegyűjtéséhez.
8.2 **Ajánlás**.- *A kötelező eseményjelentő rendszer által esetleg napvilágra nem kerülő információk összegyűjtése érdekében az állam alakítson ki önkéntes eseményjelentő rendszert.*
8.3 Az önkéntes eseményjelentő rendszer nem lehet büntető célzatú és az információforrás számára védelmet kell, hogy biztosítson.
1. Megjegyzés.- Az önkéntes jelentéstétel tekintetében alapvető a büntetésmentes környezet.
2. Megjegyzés.- Az államokat bátorítjuk, hogy vonatkozó jogszabályaik, törvényeik és irányelveik szükség szerinti módosításával segítsék elő és támogassák a repülésbiztonságot befolyásoló események önkéntes jelentését.
3. Megjegyzés.- Az ICAO Safety Management Manual (Doc 9859) közöl útmutatást mind az önkéntes, mind a kötelező eseményjelentő rendszerről.
4. Megjegyzés. – Az adatgyűjtő- és feldolgozó rendszerekből nyert információ védelmére az E Melléklet

tartalmaz jogi útmutatást.

Adatnyilvántartó rendszer

8.4 **Ajánlás**.- *Az információ –beleértve a saját eseményjelentő rendszer révén nyert információt is- hatékony elemzésének elősegítése érdekében az állam alakítson ki baleset és esemény adatnyilvántartó rendszert.*

8.5 **Ajánlás**.- A*z adatcsere elősegítése érdekében az adatnyilvántartó rendszer szabványosított formátumot alkalmazzon.*

1. Megjegyzés.- Az ICAO az államok kérésére útmutató anyagot biztosít az ilyenfajta adatnyilvántartó rendszerek jellemzőiről.

2. Megjegyzés.- A 8.4 megvalósítása terén az államokat bátorítjuk, hogy törekedjenek regionális megállapodásokra, amikor azt célszerűnek tartják.

Az adatok elemzése – megelőző intézkedések

8.6 A baleset és esemény adatnyilvántartó rendszert, illetve eseményjelentő rendszert kialakító állam elemezze a baleset/eseményjelentésekben és az adatnyilvántartásban szereplő információkat, hogy megállapítsa, szükséges-e megelőző intézkedés kiadása.

Megjegyzés.- A kivizsgált balesetek és események zárójelentései tartalmazhatnak további olyan információkat, amelyekre megelőző intézkedések alapozhatók.

8.7 **Ajánlás**.- *Ha az adatnyilvántartásában szereplő információ elemzése során az állam megítélése szerint más államok érdeklődésére számot tartó biztonsági témára bukkan, az ilyen biztonsági információkat az állam a lehető leggyorsabban továbbítsa a többi állam részére.*

8.8 **Ajánlás**.- *A baleset és esemény kivizsgálásból származó biztonsági ajánlások mellett biztonsági ajánlások egyéb forrásokból is eredhetnek, ideértve a biztonsági tanulmányokat is. Más állam bármely szervezetének küldött biztonsági ajánlást az illető állam kivizsgáló hatósága részére is meg kell küldeni.*

Biztonsági információ cseréje

8.9 **Ajánlás**.- *Az államok támogassák a légiközlekedési rendszer minden felhasználóját összekötő biztonsági információelosztó hálózat felállítását és segítsék elő a tényleges és lehetséges biztonsági hiányosságokról szóló információk szabad cseréjét.*

1. Megjegyzés.- Az adatcsere elősegítéséhez szabványosított meghatározások, besorolások és formátumok szükségesek. Az ICAO az államok kérésére útmutató anyagot biztosít az ilyenfajta információelosztó hálózat jellemzőiről.

ANNEX 15.
Légiforgalmi tájékoztató szolgálatok

12. kiadás – 2004. július
34. módosítással
TIZENKETTEDIK KIADÁS – 2004 JÚLIUS
Ez a Kiadás magában foglalja a Tanács által 2004. február 24-e előtt elfogadott összes módosítást, és 2004. november 25-től helyettesíti a 15. Annex minden korábbi kiadását.
A Szabványok és az Ajánlott Gyakorlati Eljárások felhasználását érintő információkat *lásd* az Előszóban.
NEMZETKÖZI POLGÁRI REPÜLÉSI SZERVEZET - ICAO
A módosítások kiadását rendszeresen közlik az ***ICAO Journal-***ban és a havonta megjelenő ***Supplement to the Catalogue of ICAO Publications and Audio-visual Training Aids (Melléklet, Kiegészítés az ICAO Kiadványok és Audio-vizuális Segédeszközök Listájához)***, melyeket ezen kiadvány tulajdonosai kísérjenek figyelemmel. Az alább biztosított táblázat a módosítások, kiegészítések nyilvántartására szolgál.
Az Annex 15 módosításainak, kiegészítéseinek ellenőrző jegyzéke.

MÓDOSÍTÁSOK, KIEGÉSZÍTÉSEK

A módosítások kiadását rendszeresen közlik az ***ICAO Journal-***ban és a havonta megjelenő ***Supplement to the Catalogue of ICAO Publications and Audio-visual Training Aids (Melléklet, Kiegészítés az ICAO Kiadványok és Audio-vizuális Segédeszközök Listájához)***, melyeket ezen kiadványok tulajdonosai kísérjenek figyelemmel. Az alább biztosított táblázat ezen módosítások, kiegészítések nyilvántartására szolgál.

	A hatályosság dátuma	Az alkalmazhatóság dátuma
Tizenkettedik Kiadás (tartalmazza az 1-33. Módosításokat)	2004. július 12.	2004. november 25. 2008. november 8. 2010. november 18.
34. Módosítás (a Tanács 2007. március 2-án fogadta el)	2007. július 16.	2007. november 22.

ELŐSZÓ

Történelmi háttér

A Légiforgalmi Tájékoztató Szolgálatokra vonatkozó Szabványokat és Ajánlott Gyakorlati Eljárásokat a Tanács először 1953. május 15-én fogadta el, a Nemzetközi Polgári Repülési Egyezmény (Chicago, 1944) 37. Cikkelyének előírásai szerint, amelyeket az Egyezmény 15. Annex-ének nevezett el.
A 15. Annex jelenleg érvényes formáját az alábbiakban részletezett fejlődési folyamaton keresztül nyerte el. Az első követelményeket a Körzeti Repülési Értekezletek (*Regional Air Navigation Meetings*) ajánlásai alapján a Repülési Bizottság (*Air Navigation Committee*) alakította ki és ezt a Tanács hatáskörében, mint a "Hajózók Értesítésének Nemzetközi Eljárásai"-t (PANS-NOTAM, PICAO Doc 2713) 1947. januárjában adták ki. Az 1949-ben megtartott Rendkívüli NOTAM Értekezlet ezt felülvizsgálta, és módosításokat, kiegészítéseket javasolt ezekhez az eljárásokhoz, amelyeket később "A Légiforgalmi Szolgálatok Eljárásai" (*Procedures for Air Navigation Services*) (PANS-AIS, Doc 71O6) címen adtak ki, amely 1951. augusztus 1-én vált alkalmazhatóvá. 1952-ben a PANS-AIS-t a Légiforgalmi Tájékoztató Szolgálatok Osztályának (*Aeronautical Information Services Division*) Első Ülése felülvizsgálta, majd a Szabványok

és Ajánlott Gyakorlati Eljárások (SARPS) elfogadását ajánlotta. Valamennyi Szerződő Tagállam figyelmes vizsgálata után, ezeket az ajánlásokat, javaslatokat a Repülési Bizottság felülvizsgálta, majd a Tanács a Szabványok és Gyakorlati Ajánlások első gyűjteményét 1953. május 15-én, a Repülési Egyezmény 15. Annex-eként hagyta jóvá. Ez az Annex 1954. április l-én vált alkalmazhatóvá.
Az "A" Táblázat az egymást követő módosítások forrását, valamint a legfontosabb érintett témák listáját, és azokat az időpontokat tartalmazza, amikor az Annex-et és annak módosításait a Tanács elfogadta, amikor azok érvénybe léptek és alkalmazhatóvá váltak.

A Szerződő Államok tennivalói

Eltérések bejelentése. A Szerződő Államok figyelmét felhívják az Egyezmény 38. Cikkelyében előírt kötelezettségeikre, amelyek értelmében a Szerződő Államokat felkérik arra, hogy értesítsék a Szervezetet minden olyan eltérésről, amely a nemzeti jogszabályaik és gyakorlati eljárásaik, és az ebben az Annex-ben szereplő Nemzetközi Szabványok, illetve a hozzá tartozó bármely módosítás között fennáll. A Szerződő Tagállamokat felkérik arra, hogy a jelen Annex-ben, illetve az annak módosításaiban található Gyakorlati Eljárásoktól való minden eltérésre terjesszék ki az ilyen bejelentéseiket akkor, ha az ilyen eltérések bejelentése fontos a repülés, a légiközlekedés biztonsága érdekében. A továbbiakban felkérik a Szerződő Tagállamokat arra, hogy folyamatosan tájékoztassák a Szervezetet azokról az eltérésekről, amelyek a későbbiek során keletkezhetnek, vagy bármely, korábban bejelentett eltérés megszűnéséről. Ezen Annex minden módosításának elfogadása után azonnal külön kérést küldenek a Szerződő Államok felé az eltéréseik bejelentését kérve.

Az Annex részeinek státusza

Egy Annex az alábbi részekből épül fel, azonban ezek nem mindegyike található meg szükségszerűen minden egyes Annex-ben; ezek a jelzett státusszal rendelkeznek:
1.- *Az Annex állandó részét alkotó anyagok* :
a) *Szabványok és Ajánlott Gyakorlati Eljárások (SARPS)*, amelyeket a Tanács fogadott el, az Egyezmény előírásainak megfelelően.
Ezek az alábbiak szerint kerültek meghatározásra:
Szabvány: Fizikai jellemzőkre, kialakításra, anyagra, teljesítményre, személyekre, vagy eljárásokra vonatkozó bármely előírás, amelynek egységes alkalmazását szükségesnek ítélik a nemzetközi légiközlekedés biztonsága, vagy rendszerességének fenntartása szempontjából és amelyhez a Szerződő Államok az Egyezménynek megfelelően alkalmazkodni fognak; ezek teljesítésének lehetetlensége esetén a Tanácsot a 38. Cikkely értelmében kötelezően értesíteni kell.
Ajánlott Gyakorlati Eljárások: Fizikai jellemzőkre, kialakításra, anyagra, teljesítményre, személyekre, vagy eljárásokra vonatkozó bármely előírás, amelynek egységes alkalmazását kívánatosnak ítélik meg a nemzetközi légiközlekedés biztonsága, rendszeressége, vagy hatékonysága érdekében és amelyekhez a Szerződő Államok igyekeznek alkalmazkodni az Egyezmény értelmében.
b) *Függelékek:* kényelmi okokból külön csoportosított anyagokat tartalmaznak, azonban a Tanács által elfogadott Szabványok és Ajánlott Gyakorlati Eljárások részét képezik.
c) *Meghatározások:* Azoknak a Szabványokban és az Ajánlott Gyakorlati Eljárásokban használt fogalmaknak az értelmezése, amelyek nem nyilvánvalóak, mivel nincs elfogadott szótári meghatározásuk. A meghatározásnak nincs önálló státusza, de nélkülözhetetlen részét képezi azoknak a Szabványoknak és Ajánlott Gyakorlati Eljárásoknak, amelyekben az adott fogalmat használják, mivel a kifejezés értelmezésének megváltozása kihatással lenne magára a meghatározásra is.
d) *Táblázatok és Ábrák:* amelyek kiegészítik, vagy illusztrálják a Szabványokat vagy az Ajánlott Gyakorlati Eljárásokat és azokban hivatkoznak rájuk, a velük kapcsolatos Szabványoknak, vagy Ajánlott Gyakorlati Eljárásoknak részét képezik, valamint a státuszuk is megegyezik vele.
Meg kell jegyezni, hogy ebben az Annex-ben található néhány olyan Szabvány, amelyek utalás formájában olyan más meghatározásokat is tartalmaznak, amelyek státuszukat tekintve Ajánlott Gyakorlati Eljárások. Ilyen esetekben az Ajánlott Gyakorlati Eljárás szövege az adott Szabvány részévé válik.

2.- *A Szabványokkal és az Ajánlott Gyakorlati Eljárásokkal kapcsolatosan a Tanács által kiadásra jóváhagyott anyag*:
a) *Előszó:* a Tanács tevékenységén, intézkedésein alapuló történeti áttekintést és magyarázatot tartalmazó anyag, mely tartalmazza az Államok Egyezményből és Elfogadási Határozatból eredő, a Szabványok és Ajánlott Gyakorlati Eljárások alkalmazásával kapcsolatos kötelezettségeinek magyarázatát is.
b) *Bevezetés:* Magyarázó anyag az Annex egyes részeinek, fejezeteinek, vagy szakaszainak elején, hogy segítséget adjon a szöveg alkalmazásának megértéséhez.
c) *Megjegyzések:* melyek, ahol szükséges, a szövegben találhatók, hogy tárgyszerű tájékoztatást nyújtsanak, vagy utalást tartalmazzanak a kérdéses Szabványok vagy Ajánlott Gyakorlati Eljárások vonatkozásában, de maguknak a Szabványoknak vagy Ajánlott Gyakorlati Eljárásoknak nem képezik részét.
d) *Mellékletek:* Kiegészítő anyagokat tartalmaznak a Szabványokhoz és Ajánlott Gyakorlati Eljárásokhoz, vagy ezek alkalmazásához útmutatóként mellékelték.

A nyelv kiválasztása

Ez az Annex hat nyelven - angolul, arabul, kínaiul, franciául, oroszul és spanyolul - került elfogadásra. Minden egyes Szerződő Tagállamot felkérnek arra, hogy válasszon ki ezen változatok közül egy szöveget, nemzeti alkalmazásra és egyéb, az Egyezmény által biztosított célra, akár a közvetlen adott nyelvű felhasználásra, akár a saját nemzeti nyelvükre lefordítva és erről értesítse a Szervezetet.

A szerkesztés gyakorlati eljárásai

A szerkesztők a következő gyakorlatot követték, hogy az egyes meghatározások státuszát már ránézésre is fel lehessen ismerni: a *Szabványokat* normál vastagságú antikva (egyenes) betűtípussal (*light face roman*) nyomtatták; az *Ajánlott Gyakorlati Eljárásokat* normál vastagságú dőlt betűkkel (*light face italics*) nyomtatták, míg a státuszt eközben az **Ajánlás (Recommendation)** előtaggal jelezték;
A *Megjegyzéseket* normál vastagságú dőlt betűkkel (*light face italics*) nyomtatták, a státuszát pedig *Megjegyzés* (*Note*) előtaggal jelezték.
Az alábbi szerkesztési gyakorlatot használták a részletes, pontos meghatározások esetén: a Szabványok esetében a "*shall*" (nyomatékosító "kell"; "szükséges") szót, az Ajánlott Gyakorlati Eljárásoknál pedig a "*should*" (a kevésbé nyomatékos "kellene"; "szükséges volna") szavakat használták.
Az ebben a dokumentumban használt mértékegységek megfelelnek a International System of Units (SI) - Nemzetközi Mértékegységrendszer előírásainak úgy, ahogy az a Nemzetközi Polgári Repülésügyi Egyezmény 5. Annex-ében található. Ahol az 5. Annex megengedi más, nem SI szabvány szerinti alternatív mértékegység használatát, ott ezek zárójelben követik az alap mértékegységet. Ahol két mértékegység szerepel, ezt az értékpárt nem szabad egyenlőnek és egymással felcserélhetőnek gondolni. Azonban az bizonyítható, hogy bármelyik mértékegység típus kizárólagos használata esetén is a biztonság ugyanolyan szintje valósul meg.
A dokumentum számmal és/vagy címmel jelzett valamely részére való bármely hivatkozás egyben az adott rész minden alpontjára is vonatkozik.

"A" Táblázat. A 15. Annex módosításai, kiegészítései

Módosítás	Forrás/ok/	Téma/ák/, tárgya/i/	Elfogadás Hatályos Alkalmazható
1. Kiadás	A Légiforgalmi Tájékoztató Szolgálatok Részlegének 1. Ülése		1953.05.15. 1953.09.01. 1954.04.01.

1	Konzultációk az Államokkal	Szerkesztési módosítások a szaknyelv egységes alkalmazása érdekében	1955.05.27. 1955.10.01. 1955.10.01.
2	Konzultációk az Államokkal	Szerkesztési módosítások a szaknyelv egységes alkalmazása érdekében	1956.05.15. 1956.09.15. 1956.12.01.
3	Konzultációk az Államokkal	Tiltott, korlátozott és veszélyes légterek meghatározása és azonosítása.	1957.04.16. 1957.09.01. 1957.12.01
4	Konzultációk az Államokkal	Tájékoztató anyag a tiltott, korlátozott és veszélyes légterek, területek meghatározásainak alkalmazására	1958.11.14. -- 1958.11.14.
5	Konzultációk az Államokkal	Szerkesztési módosítások, kiegészítések a szaknyelv egységes alkalmazása érdekében; a helységnév rövidítések helyett szabványos helységnév kódrendszer világméretű alkalmazásának bevezetése	1959.03.24. 1959.09.01. 1959.10.01.
6	Légiforgalmi Tájékoztató szolgálatok és Légiforgalmi Térképek Részlege	Légiforgalmi Tájékoztató kiadványok (AIP) tartalma; Légiforgalmi Tájékoztató Körlevelekre vonatkozó előírások és NOTAM kódok.	1960.07.20. 1960.10.01. 1961.01.01.
7	Légiforgalmi Tájékoztató szolgálatok és Légiforgalmi Térképek Részlege	A tájékoztató anyag törlése	1960.12.02. -- 1961.01.01.
8	Az új "*ABC - ICAO Rövidítések és Kódok*" (Doc 8400) Tanács általi jóváhagyásával kapcsolatos levelezés és tevékenységek.	Az AIRAC - A Légiforgalmi Tájékoztató Közlemények Meghatározott Kiadási Rendje; a "NOTAM kód" és a "Légiforgalmi Tájékoztató Szolgálatok által felhasználandó rövidítések" törlése; az 1. Függelék kisebb módosításai	1964.03.25. 1964.08.01. 1964.11.01.
9	A Repülési Szabályok és a Légiforgalmi Szolgálatok/ Üzemeltetés Részleg Értekezlete	Veszélyes, tiltott és korlátozott légterek, területek meghatározásai.	1965.12.10. 1966.04.10. 1966.08.25.
10	Légiforgalmi Tájékoztató Szolgálatok és Légiforgalmi Térképek Részlege (1966)	Snowplan (Hóeltakarítási Terv) előírások; SNOWTAM (a repülőtér mozgási területein található v. eltakarítás alatt lévő hó, jég, latyak, vagy ezzel kapcsolatos állóvíz miatti veszélyes körülményekről szóló különleges NOTAM sorozat megjelölése) meghatározása és formai leírása; az I. osztályú NOTAM szövege; az AIP tartalma; korlátozott légterek azonosítása és ábrázolása; Légiforgalmi tájékoztató Körlevelek	1967.07.13. 1967.10.08. 1968.09.18.
11	Ötödik Légiközlekedési Konferencia	Repülés előtti tájékoztató szolgálat; tájékoztatás a futópálya menti látástávolság (RVR) mérő rendszerekről.	1969.01.23. 1969.05.23. 1969.09.18.

12	Hatodik Légiközlekedési Konferencia és áttérés a Körzeti Kiegészítő Eljárásokról	Tájékoztatás kiadása a Légiforgalmi Szolgálatok rendszereiről, azaz a jelen- tőpontokról és a minimális tengerszint feletti repülési magasságokról; NOTAM tájékoztatás a kutatási és mentési műveletek lebonyolításáról	1970.05.15. 1970.09.15. 1971. 02.04.
13	Légiforgalmi Tájékoztató szolgálatok és Légiforgalmi Térképek Részlege, Hatodik Légiközlekedési Konferencia	Az I. osztályú NOTAM-ok előre meghatározott elosztási rendszere, a NOTAM összeállítása, a nemzetközi légiközlekedés rendelkezésére álló légiforgalmi meteorológiai berendezésekről és szolgálatokról szóló tájékoztatások.	1971.03.19. 1971.09.06. 1972.01.06.
14	Körzeti Léginavigációs Értekezlet Ajánlásai világméretű felhasználásra. CAR IV RAN értekezlet 19/29 számú ajánlása (1966); SAM/SAT/III RAN Értekezlet 19/10 ajánlása (1967); MID/SEA RAN Értekezlet 19/4 és 19/5 számú ajánlásai (1968); NAT/V RAN Értekezlet 17/5 számú ajánlása (1970).	Légiforgalmi Tájékoztató Szolgálat alkalmazhatósága ott, ahol nem biztosítanak 24 órás folyamatos szolgálatot; NOTAM-ok dekódolása a repülés előtti tervezés során; tájékoztatás közzététele arról, hogy nem adtak ki II. osztályú NOTAM-ot; légijárműveket üzemeltető valamennyi állami szolgálat által biztosított tájékoztatások a Légiforgalmi Tájékoztató Szolgálatok számára; a légiforgalmi mozgó szolgálatot és /vagy légiforgalmi navigációs szolgálatot ellátó állomások antenna koordinátáinak közzététele az AIP-ben, legalább 1/10 perc pontossággal.	1971.12.15. 1972.04.15. 1972.12.07.
15	A 4. Annex - *Légiforgalmi Térképek* - 43. számú Módosítása; a PANS-RAC (Doc 4444) 10. kiadásának 1. módosítása; a 6. EUM RAN Értekezlet 16/3, 16/8, 16/10 b) és 16/15 számú Ajánlásai; a 14. Annex - *Repülőterek* - 28. számú Módosítása; a 10. Annex - *Légiforgalmi Távközlés* - 51. számú Módosítása	A repülőtéri VOR és INS ellenőrző pontok helyének AIP-ben való közzététele; ATS útvonalak meghatározó fontos pontok nevének, kódjelzésének és földrajzi koordinátáinak, és a repülőterek környezetében tapasztalható madárcsapatok és madárvándorlás AIP-ben történő közzététele; NOTAM-ba nem illő tájékoztatások típusainak felsorolása; a Légiforgalmi Tájékoztató Körlevelekhez alkalmas tájékoztatástípusok; a talaj felszínén lévő hóra vonatkozó terminológia egyeztetése a 14. Annex-ben található meghatározásokkal.	1973.03.19. 1973.07.30. 1974.05.23.

16	A Tanács kérése (78-14), mely arra vonatkozik, hogy egyeztessék az államokkal az Annex-ektől és a PANS-tól való eltérések AIP-ben való közzétételét; a PANS-RAC 6. Módosítása.	Egy Állam nemzeti előírásai és gyakorlati eljárásai, valamint a vonatkozó ICAO Szabványok, Ajánlott Gyakorlatok és Eljárások közötti eltérések AIP-ben való közzététele; az 1. Függelék követelményei és az Annex-ben található eredeti, forrás előírások közötti ellentmondások megszüntetése; az ATIS-ra vonatkozó tájékoztatásokat érintő követelmények áthelyezése a MET részből az AIP RAC fejezetébe.	1974.06.25. 1974.10.25. 1975.02.27.
17	A Műszaki Bizottság Hangsebesség Feletti Szállítás Üzemeltetésével foglalkozó Negyedik Értekezletének 2/6 Ajánlása; A Léginavigációs Bizottság légijárművek elfogásával foglalkozó tanulmánya	A napból származó kozmikus sugárzás előrejelzésének (ha ez biztosított) NOTAM formájában történő terjesztése; az alkalmazott elfogási eljárások és látás utáni jelzések közzététele az AIP-ben.	1975.02.04. 1975.06.04. 1975.10.09.
18	Körzeti Léginavigációs Értekezletek (EUM 6 Rec 9/4, AFI/5 Rec 6/2 c) d) és ASIA/PAC Rec 6/3 c)) ajánlásai, és a IATA kérése, hogy módosítsák a 14. Annex-et; a 14. Annex teljes felülvizsgálata.	A repülőtereken a mozgásképtelenné vált légijárművek eltávolítására vonatkozó tájékoztatás AIP-ben való közzététele; a repülőtereken rendelkezésre álló mentő és tűzoltó szolgálatok státuszának bejelentése a készenléti szint jelentős mértékű változásairól; a munkaterület és a mozgási terület meghatározása; a "Magasságmérő Ellenőrzési Hely" kifejezés megváltoztatása "Magasságmérő Ellenőrzési Pont"-ra.	1976.02.05. 1976.06.05. 1976.12.30.
19	A 7. Léginavigációs Konferencia 3/16 Ajánlása; a 3. Annex - *Meteorológiai Szolgálat a Nemzetközi Léginavigáció számára* - felülvizsgálata (60. számú Módosítás).	ILS berendezés telepítése esetén a 10. Annex előírásaival összhangban az iránysávadó és a siklópálya sugárzási adatainak és az ILS referencia pont magasságának közzététele az AIP-ben; a 4. Rész - Meteorológia - módosítása a 3. Annex 60. számú Módosításában bevezetett új előírásoknak és szakkifejezéseknek megfelelően.	1977.06.27. 1977.10.27. 1978.02.23.
20	9. Léginavigációs Konferencia	ATS útvonalak leírásának közzététele az AIP-ben; az Északi irány vonatkoztatása (mágneses, földrajzi és koordináta háló szerinti) útirányokra, vagy irányszögekre.	1977.12.09. 1978.04.09. 1978.08.10.
21	A Német Szövetségi Köztársaság (az Egyesült Királyság nevében is) és a Szovjetunió által benyújtott javaslatok.	I. osztályú NOTAM formátum és az AIP módosítások közzététele.	1980.03.31. 1980.07.31. 1980.11.27.

22	A Léginavigációs Bizottság tanulmányából származtatott javaslat és a Titkárság által benyújtott javaslat.	Olyan tevékenységek, melyek potenciális veszélyt jelentenek a polgári légijárművek repülésére és az AIRAC NOTAM vétele az érvénybelépés előtt 28 nappal.	1981.03.13. 1980.07.13. 1981.11.26.
23	A Titkárság és az Egyesült Királyság által benyújtott javaslatok.	Nyílt szövegű repülés előtti tájékoztató bulletinek, polgári légijárművek elfogása és az AIRAC NOTAM "Nincs Értesítés"-e.	1982.04.02. 1982.08.02. 1982.11.25.
24	A Repülőterek, Légiútvonalak és Földi Segédberendezések Részlege Értekezletének (1981) 7/5, 7/8 és 10/2 javaslatai.	Felülvizsgált SNOWTAM formanyomtatvány; a nedves futópálya-felület fékhatás értékeinek és egy akadálymentes zóna meglétének közzététele az AIP-ben.	1982.11.17. 1983.03.17. 1983.11.24.
25	A Repülőterek, Légiútvonalak és Földi Segédberendezések Részlege Értekezletének (1981) 7/7 javaslata.	Dátum/idő hivatkozási módszer.	1985.03.25. 1985.07.29. 1985.11.21.
26	Különféle források, beleértve az Európai Léginavigációs Tervező Csoport (EANPG) 22/24 és 24/20 Határozatai; az Időjárástól Független Repülő üzemeltetés kérdésével foglalkozó Bizottság (AWOP) 9. Javaslata; az Akadálymentesség kérdésével foglalkozó Bizottság (OCP) 1/4 Javaslata; a 3. 4. és 14. Annex-eknek a 64-es, 47-es és 38-as Módosítása; az Egyesült Királyság és a Titkárság által benyújtott javaslatok.	Az A-4es méretű AIP lapok alkalmazására vonatkozó előírások korszerűbbé tétele; a NOTAM és az AIC kiadása és szétosztása; a légiforgalmi tájékoztatás és a Légiforgalmi Tájékoztató Közlemények Meghatározott Kiadási Rendjének (AIRAC) alkalmassága és hitelessége; változások az I. osztályú NOTAM-ok előre meghatározott elosztási rendszerében; a rövidített fejrész bevezetése és változások a SNOWTAM formanyomtatványban, útmutató a kitöltéséhez; a DME zéró-távolság kijelölő pontja helyének közzététele az AIP-ben; az AIP részét képező térképsorozatok jegyzékének korszerűsítése; szabványos légijármű gurulási útvonalakra, precíziós megközelítésű futópályák földetérési zónája legmagasabb pontjának tengerszint feletti magasságára és a küszöbök és légijármű állóhelyek földrajzi koordinátáira vonatkozó további üzemeltetési adatok közzététele az AIP-ben; a címjelzések hetedik és nyolcadik betűjére vonatkozó utalások beépítése az előre meghatározott elosztási rendszerben; és a vulkáni hamufelhőkkel kapcsolatos előzetes figyelmeztetések.	1987.03.06. 1987.07.27. 1987.10.22.

27	Különféle források, beleértve az Európai Léginavigációs Tervező Csoport (EANPG) 30/15 Határozatát; a Léginavigációs Bizottság Annex-felülvizsgálatai; a Látvarepülési Szabályok szerinti Üzemeltetéssel foglalkozó Bizottság (VFOP) 3/3 javaslata; néhány európai állam által benyújtott javaslat; a 14. Annex 39. Módosítása.	Az Integrált Légiforgalmi Tájékoztató Egységcsomag és a felülvizsgált NOTAM Formátum bevezetése; a tájékoztatás közzététele azokról a körzetekről, vagy útvonalakról, ahol fennáll az elfogás lehetősége, tájékoztatások közzététele a nemzetközi polgári repülés jogellenes beavatkozással szemben való védelmére vonatkozóan; új ATS légtér-osztályozás bevezetése; a madárveszély csökkentése; a burkolt felületek fékhatásának mérésére alkalmazott eszközök jegyzékének és az alkalmazott szakkifejezéseknek a pontosítása, frissítése; helikopter repülőterekkel kapcsolatos adatok bevezetése.	1991.03.04. 1991.07.28. 1991.11.14.
28	Különféle források, beleértve az Európai Léginavigációs Tervező Csoport (EANPG) 34/12 Határozatát; a Tanács a WGS-84-et (World Geodetic System) fogadja el, mint szabványos geodéziai vonatkoztatási rendszert a nemzetközi repülés számára; az RGCSP/8 javaslata; a Titkárság.	A helikopter repülőterekre és az Integrált Légiforgalmi Tájékoztató egységcsomagra vonatkozó új és felülvizsgált meghatározások bevezetése az 2. Fejezetben; a légiforgalmi tájékoztatás kölcsönös cseréjével kapcsolatos módosítások és a WGS-84-gyel kapcsolatos földrajzi koordináták közzétételére vonatkozó új előírások beillesztése a 3. Fejezetbe; a 4. fejezet módosítása és átrendezése az AIP átszerkesztett tartalmát és általános előírásait, az AIP Módosítás és az AIP Melléklet előírásait és azok szétosztását illetően; az 5. fejezet módosításai a NOTAM kiadás és szétosztás, és egy olyan új előírás bevezetésének vonatkozásában, amely szabályozza az atmoszférába kerülő radioaktív anyagok és mérgező kémiai anyagok megjelenésével kapcsolatos tájékoztatás közzétételét; a 6. Fejezet szabványos előírás szerinti korszerűsítése az AIRAC dátumoknak a kartográfiai munkát igénylő változások közzétételében és a navigációs adatbázisok korszerűsítésében történő felhasználás vonatkozásában; a repülés előtti tájékoztató bulletinek formátumáról szóló Ajánlott Gyakorlati Eljárás törlése a 8. Fejezetből; a 9. Fejezetben a "Légiforgalmi Állandóhelyű Távközlési Hálózat (AFTN)" szakkifejezés helyettesítése a "Légiforgalmi Állandóhelyű Szolgálat (AFS)" általános kifejezéssel; az AIP teljesen átszerkesztett tartalmának bevezetése az 1. Függelékbe.	1994.02.28. 1994.06.28. 1994.11.10. 1996.04.25. 1998.01.01.
29 (Tizedik Kiadás)	Léginavigációs Bizottság és Vulkanikus Hamu Riasztásokat Tanulmányozó Csoport (VAWSG)	Léginavigációs (légiforgalmi) adatbázisok, humanitárius repülések, a NOTAM-ok egy különleges sorozata, mely a vulkanikus jelenségekkel foglalkozik, és a WGS-84 (World Geodetic System 1984 - Világszintű Geodéziai Rendszer 1984) függőleges komponense	1997.03.20. 1997.07.21. 1997.11.06. 1998.01.01. 1998.11.05.

30	A Légiforgalmi Tájékoztató Szolgálatok/ Légiforgalmi Térképek (AIS/MAP) Körzeti Értekezletének 1.2/1, 3.3/2 és 4.1/2 Ajánlásai (1998); Léginavigációs Bizottság	A léginavigációs adatok, a légiforgalmi tájékoztatások és a Légiforgalmi Tájékoztató Szolgálatok, az ADIZ (Légvédelmi Azonosítási Körzet), az AIS termékek, az Emberi Elem (tényező) Alapelemei, minőségirányítás új fogalmainak, meghatározásainak beillesztése a 2. Fejezetbe; a 3. Fejezetben a minőségbiztosítási rendszerrel, a léginavigációs (légiforgalmi) Információkkal/adatokkal, a szerzői jogokkal (copyright) a költségek fedezetével, az Emberi Elem (Tényező) tekintetbevételével kapcsolatos új rendelkezések; a 6. Fejezetben új és átszerkesztett rendelkezések, melyek az AIRAC információk elektronikus formában történő biztosításával foglalkoznak; és az ADIZ-zal kapcsolatos rendelkezések bevezetése az 1. Függelékben.	2000.02.21 2000.07.17 2000.11.02
31	Titkárság	A 8. Fejezetben új rendelkezések az automatizált légiforgalmi tájékoztató rendszerek és az összehangolt Légiforgalmi Tájékoztató Szolgálatok/Meteorológia (AIS/MET) repülés előtti eligazításának vonatkozásában, valamint az 1. Függelék módosítása a veszélyes természetű és egyéb potenciális veszélyt okozó tevékenységekről szóló információk biztosításával kapcsolatban.	2001.03.07. 2001.07.16. 2001.11.01.
32. (Tizen-egyedik Kiadás)	Különféle források, beleértve az Európai Léginavigációs Tervező Csoport (EANPG) 40/51 b) Határozatát; az AFI Tervező és Megvalósító Körzeti Csoport (APIRG) 13/51 Határozatát; Léginavigációs Bizottság (ANC); és a Titkárság	A 2. Fejezetben a módosított meghatározások bevezetése az Integrált Légiforgalmi Tájékoztató Csomag részére; A 3. Fejezetben az angol nyelvű szöveg használatára vonatkozó előírás átminősítése Szabvánnyá; a 4. Fejezet módosítása az AIP Módosításaira és Mellékleteire vonatkozó előírásokkal; az 5. Fejezet és a 6. Függelék előírásainak újraszerkesztése és kiegészítése; a váratlan eseményekre vonatkozó intézkedések nyilvánosságra hozása NOTAM útján; új előírások a 8. Fejezetben a repülőtereken/helikopter repülőtereken a légijárművek üzemeltetésére veszélyt jelentő madarak jelenléte esetén az információk gyűjtésére; valamint az 1. Függelék összehangolása a 3. Annex előírásaival.	2003. 02. 28. 2003. 07 14. 2003. 11. 27.
33 (12. Kiadás)	Az Akadálymentesség kérdésével foglalkozó Bizottság (OCP)/12 4/6 Ajánlása; Az Akadálymentesség kérdésével foglalkozó Bizottság (OCP)/13 5.3/2 Ajánlása; A GNSSP/4 - 3/1 Ajánlása; A Léginavigációs Bizottság; és a Titkárság	A fogalom meghatározásokkal kapcsolatban új rendelkezések; a függőleges referencia rendszer és az időbeli referencia rendszer a nemzetközi polgári repülés számára; elektronikus terep és akadály adatok; léginavigációs adatok minőségi követelményei; a GNSS-től származó elemek csatolása a léginavigációs adatokhoz; a Radar Vektorálás Minimális Tengerszint feletti Magasságainak Térképe – ICAO; a WGS-84-el (World Geodetic System 1984 - Világszintű Geodéziai Rendszer 1984-el) és a Légiforgalmi Tájékoztató Kiadványokkal (AIP-vel) kapcsolatos, érvényben lévő rendelkezések, utasítások frissítése.	2004. 02. 23. 2004. 07 12. 2004. 11. 25; 2008.11.20; 2010.11.18.

34	Különféle források, beleértve az Európai Léginavigációs Tervező Csoport (EANPG) 44/19 Határozatát; A Légiforgalmi Tájékoztató Szolgálatok/ Légiforgalmi Térképek (AIS/MAP) Körzeti Értekezletének 2.3/2, Ajánlása (1998); és az IAWVOPSG/1, az Akadálymentesség kérdésével foglalkozó Bizottság (OCP)/14, valamint az OPLINKP/1 értekezletek Ajánlásai	Egy új Repülőtér Terep és Akadály Térképének meghatározásai és bevezetése – ICAO (Elektronikus). A vulkanikus tevékenységgel kapcsolatos NOTAM szétosztásához kapcsolódó érvényben lévő rendelkezések frissítése; az AIRAC rendszer használata; a repülés előtti tájékoztatókban lévő információ; és a Légiforgalmi Tájékoztató Kiadványokban (AIP) közzéteendő információ	2007. 03. 02. 2007. 07 16. 2007 11. 22

NEMZETKÖZI SZABVÁNYOK ÉS AJÁNLOTT GYAKORLATI ELJÁRÁSOK

1. FEJEZET - BEVEZETÉS

A Légiforgalmi Tájékoztató Szolgálat célja a nemzetközi léginavigáció biztonsága, rendszeressége és hatékonysága szempontjából szükséges tájékoztatás áramlásának folyamatos biztosítása. A légiforgalmi tájékoztatások/adatok szerepe és fontossága jelentősen megváltozott a Területi Navigáció (RNAV - Area Navigation), a Megkövetelt Navigációs Teljesítőképesség (RNP - Required Navigation Performance), a fedélzeti számítógépes navigációs rendszerek és az adatkapcsolati rendszerek bevezetésével. A sérült, vagy hibás légiforgalmi tájékoztatások/adatok potenciálisan befolyásolhatják a légiközlekedés, a léginavigáció biztonságát.
Hogy a légiforgalmi tájékoztatások/adatok biztosítása érdekében kielégíthessék az egységesség és a következetesség követelményét, mely elengedhetetlen a számítógépen alapuló navigációs rendszerek üzemeltetéséhez, az Államok, amennyire csak lehetséges, el ***kell*** kerüljék azon Szabványoknak és Eljárásoknak felhasználását, melyeket nem a nemzetközi alkalmazásra állítottak össze.
Ezeket a Szabványokat és Ajánlott Gyakorlati Eljárásokat a Légiforgalmi Szolgálatok Eljárásai – ICAO Rövidítések és Kódokkal *(Procedures for Air Navigation Services – ICAO abbreviations and Codes - PANS-ABC, Doc 8400)* egyetértésben kell felhasználni.
Elfogadott tény, hogy bizonyos esetekben Kiegészítő Eljárásokra lehet szükség, hogy ezzel az ICAO Körzetek bizonyos követelményeit kielégíthessék.
A Légiforgalmi Tájékoztató Szolgálatok megszervezésére és üzemeltetésére vonatkozó tájékoztató anyag a *Légiforgalmi Tájékoztató Szolgálatok Kézikönyve* (Aeronautical Information Services Manual - Doc 8126) című kiadványban található.

2. FEJEZET - MEGHATÁROZÁSOK

Amikor az alábbi fogalmakat használják a Légiforgalmi Tájékoztató Szolgálatok számára készült Szabványok és Gyakorlati Eljárásokban, azok az alábbi jelentéssel rendelkeznek:
Pontosság *(Accuracy)*. A számított, vagy mért érték és a valós érték közötti megegyezőség mértéke.
Megjegyzés: A mért helyzetadatok számára a pontosságot rendes körülmények között távolságban fejezik ki a megállapított helyzettől számítva, melyen belül a valós pozíció meghatározott bizonyossággal megtalálható.
Léginavigációs adat *(Aeronautical Data)*. A léginavigációs tények, fogalmak, vagy utasítások megjelenítése olyan formátumban, amely megfelel a kommunikáció, a kiértékelés, vagy feldolgozás követelményeinek.
Légiforgalmi tájékoztatás *(Aeronautical information)*. Olyan információ, mely a léginavigációs adatok összegyűjtéséből, elemzéséből és megfelelő formába rendezéséből származik.
Légiforgalmi Tájékoztató Körlevél *(Aeronautical Information Circular /AIC/)*. Olyan közlemények, melyek nem teszik szükségessé, hogy miattuk NOTAM-ot adjanak ki, vagy azt, hogy őket az AIP-be illesszék, azonban a repülés biztonságára, a légiforgalomra, műszaki, igazgatási, vagy jogi ügyekre vonatkoznak.
Légiforgalmi Tájékoztató Kiadvány *(Aeronautical Information Publication - AIP)*. Olyan tartósan érvényben maradó Légiforgalmi Tájékoztatásokat tartalmazó kiadvány, mely alapvető fontosságú a légiközlekedés számára, és amelyet az Állam maga, vagy meghatalmazottja útján ad ki.
Légiforgalmi tájékoztató szolgálat *(Aeronautical Information Service - AIS).*
A légi navigáció biztonsága, rendszeressége és hatékonysága számára szükséges légiforgalmi tájékoztatások/léginavigációs adatok biztosításáért felelős szolgálat, melyet egy bizonyos területi egységen belül hoztak létre.
Az AIP Módosítása *(AIP Amendment)*. Az AIP-ben található információk állandó jellegű változtatásai.

Az AIP Kiegészítése *(AIP Supplement)*. Az AIP-ben található információk ideiglenes jellegű változtatásai, melyeket különálló lapok formájában adnak ki.
AIRAC *(Aeronautical Information Regulation And Control - A Légiforgalmi Tájékoztató Közlemények Meghatározott Kiadási Rendje)*. Betűszó - jelentése egy közösen meghatározott időpontokon alapuló olyan rendszer, melynek célja az előzetes tájékoztatás kiadása azokról a körülményekről, melyek az üzemeltetési eljárásokban jelentős változások bevezetését teszik szükségessé.
Légvédelmi Azonosítási Körzet *(ADIZ – Air Defence Identification Zone)*. Egy különlegesen kijelölt légtér, meghatározott fizikai méretekkel, melyen belül a légijárműveknek az ATS (Légiforgalmi Szolgálatok) biztosításával összefüggőkön kívül, más különleges azonosítási és/vagy jelentési eljárásokat is be kell tartaniuk.
AIS termék *(AIS product)*. Az Integrált Légiforgalmi Tájékoztatási Csomag elemeként biztosított Légiforgalmi Tájékoztatás, beleértve a légiforgalmi térképeket is, vagy az olyan légiforgalmi tájékoztatásokat, melyeket megfelelő elektronikus adathordozó segítségével nyújtanak, (kivéve a NOTAM-okat és a Repülés Előtti Bulletineket /PIB/).
Alkalmazás *(Application)* A felhasználó követelményeinek kielégítése érdekében végzett adatkezelés és adatfeldolgozás (ISO 19104[1]*)
ASHTAM *(ASHTAM)*. A NOTAM-ok egy speciális sorozata, mely meghatározott formátumával információkat ad egy vulkán aktivitásának változásáról, egy vulkáni kitörésről és/vagy egy vulkáni hamufelhőről, melyek jelentős hatással lehetnek a légijárművek üzemeltetésére.
Összeállítás *(Assemble)*. A Légiforgalmi Tájékoztatások többféle forrásból egy adatbázisba való összeállításának folyamata, valamint a későbbi feldolgozás alapjának létrehozása.
Megjegyzés.— Az összeállítás fázisa tartalmazza az adatok ellenőrzését és annak biztosítását, hogy a felismert hibák és hiányosságok kijavításra kerülnek.
ATS légtérellenőrző szolgálat *(ATS surveillence service)* A szakkifejezést egy, az ATS légtérellenőrző rendszer segítségével közvetlenül biztosított szolgálat jelzésére használják.
ATS légtérellenőrző rendszer *(ATS surveillence system)*. Általános szakkifejezés, olyan különböző ADS-B, PSR, SSR, vagy más hasonló földi telepítésű rendszert jelent, mely a légijármű azonosítását lehetővé teszi.
Megjegyzés. – A hasonló földi telepítésű rendszer az, melynél összehasonlító értékeléssel, vagy más módszertannal bizonyították, hogy azonos, vagy jobb biztonsági szinttel és teljesítőképességgel rendelkezik, mint a mono (egy) impulzusos SSR Szekunder Légtérellenőrző Radar.
Automatikus függőségen alapuló légtérellenőrzés – sugárzásos *(ADS-B - Automatic dependent surveillance – broadcast)*. Olyan eszköz, aminek segítségével a légijármű, a repülőtéri járművek és más tárgyak sugárzásos módban egy adatvonalon keresztül automatikusan tudnak olyan, szükség szerinti adatot adni és/vagy venni, mint azonosító, pozíció és kiegészítő adat.
Automatikus függőségen alapuló légtérellenőrzés – szerződéses *(ADS-C - Automatic dependent surveillance – contract)*. Olyan eszköz, aminek segítségével egy ADS-C szerződés (kétoldalú kapcsolat) épül ki egy adatvonalon keresztül a légijármű és a földi rendszer között, meghatározva, hogy milyen feltételekkel kezdeményezzenek ADS-C jelentéseket és milyen adat legyen a jelentésekben.
Megjegyzés. – Az "ADS szerződés" rövidített szakkifejezés egyaránt utal az ADS esemény szerződésre, az ADS kényszerített szerződésre, az ADS időszakos szerződésre, vagy egy vészhelyzet módra.
Automatikus Közelkörzeti Tájékoztató Szolgálat - ATIS *(Automatic Terminal Information Service – ATIS)*. Aktuális, rutin információ automatikus biztosítása az érkező és induló légijárműveknek folyamatosan, 24 órán keresztül, vagy egy meghatározott része a következőknek:

> ***Adatvonalas automatikus közelkörzeti tájékoztató szolgálat – D-ATIS*** *(Data link-automatic terminal information service – D-ATIS)*. ATIS információ biztosítása adatvonalon keresztül.
> ***Hang alapú automatikus közelkörzeti tájékoztató szolgálat – Voice-ATIS*** *(Voice-automatic terminal information service – Voice-ATIS)*. ATIS információ biztosítása folyamatos és ismétlődő hang kisugárzásának a segítségével.

Csupasz, kopár földterület *(Bare Earth).* A Föld felszíne, beleértve a felszíni vizeket és állandó jég-, és hómezőket, a vegetáció és ember által létrehozott tárgyak, akadályok kivételével.
Naptár *(Calendar)* Pontosan meghatározott időbeli referencia rendszer, amely alapul szolgál egy időpont meghatározásához, napi felbontással (ISO 19108[2]*).
A lombozat felszíne *(Canopy)* A csupasz, kopár földfelszín kiegészítve a vegetáció magasságával.
Légiforgalmi irányító – pilóta adatkapcsolati összeköttetés *(CPDLC – Controller - pilot data link communication).* A légiforgalmi irányító és a pilóta közötti, adatátviteli kapcsolatot használó összeköttetés az ATC kommunikáció számára.
Műtárgyak *(Culture)* Minden, ember által készített tereptárgy, amely a föld felszínén található, mint például települések, vasútvonalak és csatornák.
CRC *(Cyclic Redundancy Check - Ciklikus Redundancia Vizsgálat).* A digitális formában tárolt adatok ellenőrzésére használt olyan matematikai algoritmus, mely gondoskodik az adatvesztés, vagy a nem szándékos adatváltozás elleni garancia meghatározott szintjéről.
Veszélyes légtér *(Danger area).* Meghatározott kiterjedésű légtér, melyen belül a repülésekre veszélyt jelentő tevékenységeket folytathatnak egy adott időszakban.
Adatbázis *(Database).* Az adatok egy, vagy több állománya olyan módon tárolva, hogy megfelelő alkalmazások (programok) segítségével az adatok visszanyerhetők és frissíthetők legyenek.
Megjegyzés. - Ez elsődlegesen inkább az elektronikus formában tárolt, számítógép segítségével elérhető adatokra vonatkozik, mint a hagyományos nyomtatott formában, dossziéban tároltakra.
Adattermék *(Data product)* Olyan adatállomány, vagy az adatállomány olyan sorozata, amely megfelel az "Adattermék" ISO 19131[3]*-ben található specifikációnak.
Adattermék specifikációja *(Data product specification)* Az adatállomány, vagy az adatállomány sorozatának részletes leírása, további információkkal együtt, amely lehetővé teszi, hogy létrehozzák és egy másik fél számára használatra átadják (ISO 19131[4]*).
Megjegyzés. – Az adattermék specifikációja részletesen leírja a teljes adattartományt, valamint a teljes adattartomány adatkészletté való leképezését. Felhasználhatják az előállítás, eladás, végfelhasználás és egyéb célokra is.
Adatminőség *(Data quality).* A bizonyosságnak az a foka, vagy szintje, hogy a biztosított adatok a pontosság, a felbontóképesség és az integritás tekintetében megfelelnek az adatfelhasználó követelményeinek.
Adatkészlet *(Data set)* Az adatok azonosítható, meghatározható gyűjteménye (ISO 19101[5]*)
Adatkészlet sorozat *(Data set series)* Olyan adatkészletek kollekciója, melyeknek azonos a termék specifikációja (ISO19115[6]*).
Alapadat *(Datum)* Bármely mennyiség, vagy mennyiségek sorozata, amely referenciaként, vagy kiindulási alapként használható fel más mennyiségek kiszámításához. (ISO19104[7]*).
Digitális Közepes Tengerszint Feletti Magassági Modell *(Digital Elevation Model - DEM)* A domborzat felszínének ábrázolása egy meghatározott koordinátaháló valamennyi metszéspontjában folyamatos közepes tengerszint feletti magasságokkal megadva, melyeket egy közös alapadathoz viszonyítanak.
Megjegyzés.- Néha a DTM-re (Digital Terrain Model – Digitális Domborzat Modellre), mint DEM-re hivatkoznak.
Közvetlen Tranzit Megállapodások *(Direct transit arrangements).* Az érintett állami hatóságok által jóváhagyott különleges megállapodások, melyek alapján a Szerződő Államon való áthaladása során, az útját rövid időre megszakító forgalom közvetlen ellenőrzésük alatt maradhat.
Ellipszoid magasság /Geodéziai magasság/ *(Ellipsoid height /Geodetic height/)* - A referencia ellipszoidhoz mért magasság, az ellipszoid külsejére állított, a kérdéses ponton áthaladó merőleges vonalon mérve.
Jellemző tulajdonság, sajátosság *(Feature)* A valós világ jelenségeinek absztrakciója (ISO19101[8]*)
A jellemző tulajdonság, sajátosság attribútuma *(Feature attribute)* A jellemző tulajdonság sajátosságai (ISO19101[9]*).

Megjegyzés.- A jellemző tulajdonság, sajátosság attribútumának van egy hozzá kapcsolt neve, egy adattípusa és egy adattartománya.

A jellemző tulajdonsággal, sajátossággal elvégzett művelet *(Feature operation)* - Olyan művelet, amelyben a jellemző tulajdonság, sajátosság valamennyi példánya szerepelhet (ISO19110[10]*).

Megjegyzés.- Amikor megemelik a duzzasztógát magasságát, az egy a jellemző tulajdonságú duzzasztógáttal végzett művelet. Ennek a műveletnek az eredménye az, hogy a víztározóban lévő víz szintje megemelkedik.

A jellemző tulajdonságok közötti viszony *(Feature relationship)* Kölcsönhatás, amely kapcsolatot teremt a jellemző tulajdonság típusának egyedei és ugyanazon, vagy más jellemző tulajdonság típus egyedei között. (ISO19101[11]*)

A jellemző tulajdonság típusa *(Feature type)* Közös tulajdonságokkal rendelkező valós világbéli jelenségek osztálya (ISO19110[12]*).

Megjegyzés.- A jellemző tulajdonságok valamely jegyzékében az osztályzás alapszintje a jellemző tulajdonság típusa.

Geodéziai távolság *(Geodesic distance)*. A matematikailag meghatározott ellipszoid felületén található két pont közötti legkisebb távolság.

Geodéziai alapadat / földrajzi alappont *(Geodetic datum)*. Egy lokális referenciarendszer helymeghatározása és tájolása során a szükséges paraméterek minimális készlete, a globális referencia rendszer/keret figyelembevételével.

Geoid - Földalak. *(Geoid)* A Föld gravitációs mezejében található equipotenciális felület, mely megegyezik a nyugodt tenger felszínével (MSL = Mean Sea Level), melyet a szárazföldek fölé folytatólagosan kiterjesztenek.

Megjegyzés: - A geoid formája szabálytalan a helyi gravitációs zavarok következtében (szél, árapály, sótartalom, áramlások, stb.) és a gravitáció iránya a geoidra minden pontban merőleges.

A Geoid (földalak) hullámossága, egyenetlensége *(Geoid undulation)*. A geoid távolsága a matematikai referencia ellipszoid felett (pozitív) és alatt (negatív).

Megjegyzés. - A WGS-84 (World Geodetic System – 1984 - Világszintű Geodéziai Rendszer – 1984) által meghatározott ellipszoid tekintetében a WGS-84 ellipszoid magassága és az orthometrikus magasság közötti eltérés adja meg a WGS-84 geoid hullámosságát.

Gergely-naptár (*Gregorian calendar*) Általánosan használt naptár; melyet először 1582-ben alkalmaztak az év meghatározására, amely jobban megközelíti a tropikus évet, mint a Julián-féle naptár (ISO19108[13]*).

Megjegyzés.- A Gergely-naptárban az átlagos évek 365 nap hosszúak, míg a szökőév 366 napos, melyeket 12 egymást követő hónapra osztanak fel.

Magasság *(Height)* Egy szint, pont, vagy egy pontként figyelembe vett tárgy, akadály függőleges távolsága egy meghatározott alapadattól mérve.

Helikopter repülőtér *(Heliport)*. Egy repülőtér, vagy egy szerkezeten, építményen, épületen található meghatározott terület, melyet teljes egészében, vagy részben helikopterek érkezésére, felszállására és földi mozgására szándékoznak felhasználni.

Az Emberi Tényező (Ergonómia) alapelvei *(Human Factors Principles)* Olyan alapelvek, melyeket a léginavigációs, légiforgalmi tervezés, hitelesítés, képzés, üzemeltetés és karbantartás kapcsán alkalmaznak és amelyek biztonságos kapcsolódási, érintkezési felületre törekszenek az emberi és más rendszer komponensek közötti kölcsönhatásban úgy, hogy megfelelő módon veszik figyelembe az emberi teljesítőképesség jellemzőit.

Integrált Légiforgalmi Tájékoztató Csomag *(Integrated Aeronautical Information Package)*. Egy (szolgáltatás)csomag, amely az alábbi elemeket tartalmazza:

· AIP, beleértve az AIP módosítások szolgáltatását (*Amendment*);
· AIP kiegészítések, mellékletek (*Supplement*);
· NOTAM-ok és a repülés előtti Bulletinek *(PIB - pre-flight information bulletins)*;
· AIC - *(Aeronautical Information Circular)* - Légiforgalmi Tájékoztató Körlevél; és

· Az érvényben lévő NOTAM-ok ellenőrző jegyzékei és összesítői;
Integritás /léginavigációs adatok/ *(Integrity /aeronautical data/).* Annak a garanciának a mértéke, hogy a léginavigációs adatok és értékük nem veszett el és nem változott meg, mióta az adat keletkezett, vagy jogosult módon kiegészítésre, frissítésre került.
Nemzetközi Repülőtér *(International airport)*. Bármely repülőtér, melyet a Szerződő Állam saját területén nemzetközi légiforgalom érkezésére és indulására jelöl ki, ahol a vámmal, bevándorlással, közegészségüggyel, állat és növény karanténnal kapcsolatos formaságokat, és ennek megfelelő eljárásokat biztosítanak.
Nemzetközi NOTAM Iroda *(NOF - International NOTAM office)*. Egy Állam által a NOTAM-ok nemzetközi cseréjére kijelölt iroda.
Bejelentkezési Cím *(Logon address)*. Egy meghatározott kód egy ATS egységre adatkapcsolathoz történő bejelentkezésre.
Munkaterület *(Manoeuvring area).* A repülőtér azon része, melyet a légijárművek felszállására, leszállására és gurulására használnak, az előterek kivételével.
Meta-adatok *(Metadata)* Adatok az adatokról (ISO 19115[14]*).
Megjegyzés.- Adatok, melyek adatokat írnak le és adatokat dokumentálnak.
Legkisebb útvonalrepülési magasság *(MEA – Minimum en-route altitude)*. Egy útvonalrepülési szegmenshez tartozó tengerszint feletti magasság, mely a vonatkozó navigációs berendezések és ATS kommunikáció megfelelő vételét biztosítja, eleget tesz a légtér szerkezetnek és biztosítja a szükséges akadálymentes magasságot.
Legkisebb akadálymentes magasság *(MOCA – Minimum obstacle clearance altitude)*. A repülés meghatározott szegmensének legkisebb tengerszint feletti magassága, mely biztosítja a szükséges akadálymentes magasságot.
Mozgási terület *(Movement area)*. A repülőtér azon része, melyet a légijárművek felszállására, leszállására és gurulására használnak, amely a munkaterületből és az előtér(ek)ből áll.
NOTAM *(NOTAM)* Távközlési eszközök segítségével terjesztett tájékoztatás, mely bármely légiforgalmi berendezés, szolgálat, eljárás, vagy veszély létesítéséről, keletkezéséről, állapotáról és változásáról olyan információkat tartalmaz, melyek kellő időben történő ismerete alapvető fontosságú a repülésben érintett személyzet számára.
Akadály *(Obstacle)* Valamennyi rögzített helyű (akár időszakos, vagy állandó) és mozgatható tárgy, vagy azok részei, amelyek olyan területen találhatók, ahol légijárművek földi mozgása történik, vagy amelyek egy a légijárművek repülés közbeni védelmére meghatározott felület fölé nyúlnak.
Akadály/terep adatok gyűjtési felülete *(Obstacle/terrain data collection surface)* Egy meghatározott felület, mely akadály/terep adatok gyűjtésére szolgál.
Orthometrikus magasság *(Orthometric height)*. Egy pont magassága a geoidhoz (földalakhoz) vonatkoztatva, rendszerint tengerszint (MSL) feletti magasságként megadva.
Leírás *(Portrayal)* Információk nyújtása emberek számára (ISO 19117[15]*)
Helyzet /földrajzi/ *(Position /geographical/)* A matematikai referencia ellipszoidra vonatkoztatott olyan koordinátapár (szélesség és hosszúság), amely egy pont helyzetét határozza meg a Föld felszínén.
Jelzőpontok közötti távolság *(Post spacing)* Szögbeli, vagy egyenes irányú távolság két szomszédos magassági pont között.
Ábrázolási pontosság *(Precision)*. Az a legkisebb eltérés, amit még megbízhatóan meg lehet különböztetni egy mérési folyamat során.
Megjegyzés. - A geodéziai terepfelvétel esetében a pontosság a tökéletesség mértéke egy művelet végrehajtásakor, vagy a mérés folyamán az eszközök és módszerek hibátlanság mértéke.
Repülés Előtti Tájékoztató Bulletin *(Pre-flight information bulletin /PIB/)*. A repülés végrehajtása előtt készített összesítés, mely az üzemeltetésre fontos érvényes NOTAM információkat tartalmazza.
Tiltott légtér *(Prohibited area)*. Meghatározott kiterjedésű légtér egy Állam területe, vagy felségvizei felett, amelyben tiltott a légijárművek repülése.
Minőség *(Quality)*. Egy bizonyos dolog, entitás azon hozzátartozó, elválaszthatatlan jellemzőinek összessége, melyek arra a képességére vonatkoznak, hogy az előírt, vagy azokból következő igényeket

mennyiben képes kielégíteni (ISO-9000[16]*)
Megjegyzés 1: - A "minőség" meghatározást együtt lehet használni olyan melléknevekkel, mint gyenge, jó, vagy kiváló.
Megjegyzés 2: - Az "elválaszthatatlan", szemben a „ "kijelölt"-el, valaminek a meglétét jelenti, annál is inkább, mert egy folyamatos jellemző.
Minőségbiztosítás *(Quality assurance)*. A minőségi rendszeren belül megvalósított minden tervezett és rendszeres tevékenység, amelyeket szükségesnek tekintenek, hogy megfelelő bizonyosságról gondoskodjanak arról, hogy egy bizonyos dolog (entitás) kielégítse a minőségre vonatkozó követelményeket (ISO-9000[17]*).
Minőség-ellenőrzés, minőségszabályozás *(Quality control)* A minőségirányítás része, a minőségi követelmények kielégítésére összpontosít (ISO-9000[18]*).
Minőségirányítás *(Quality Management)* Összehangolt tevékenységek, melyek egy szervezet, a minőségi elvárásoknak megfelelően történő irányítására szolgálnak (ISO-9000[19]*).
Domborzat *(Relief)* A Föld felszínének magassági egyenetlenségei, melyeket a léginavigációs térképeken magassági kontúrvonalakkal, magassági (hipszometrikus) színezéssel, árnyalással, vagy magassági pontokkal ábrázolnak.
Követelmény *(Requirement)*. Meghatározott igénynek, vagy valószínűségnek a megfogalmazása, általánosan beleértendő, vagy kötelező (ISO 9000[20]*)
Megjegyzés 1. – Az "általánosan beleértendő" azt jelenti, hogy szokás, vagy együttes gyakorlat a szervezet, a fogyasztói és más érdekelt résztvevők számára, hogy a figyelembevett igény, vagy valószínűség beleértendő.
Megjegyzés 2. – Egy minőségjelző használható a követelmény specifikus típusának megjelölésére, például termék követelmény, minőségirányítási követelmény, fogyasztói követelmény.
Megjegyzés 3. – Egy specifikus követelmény az, ami meg van határozva, például egy dokumentumban.
Megjegyzés 4. – A követelményeket eltérő érdekelt felek állapíthatják meg.
Felbontóképesség *(Resolution)*. A mértékegységek, vagy számjegyek számossága, amellyel a mért, vagy számított adatot kifejezik és használják.
Korlátozott légtér *(Restricted area)*. Meghatározott kiterjedésű légtér, egy Állam területe, vagy felségvizei felett, melyben a légijárművek repülése bizonyos meghatározott feltételek szerint korlátozva van.
Utazási szakasz *(Route stage)*. Útvonal, vagy egy útvonal része, melyet közbülső leszállás nélkül repülnek le.
SNOWTAM *(SNOWTAM)*. Különleges NOTAM sorozat, amely a mozgási területen levő hó, jég, latyak, vagy hóval, latyakkal és jéggel kapcsolatos állóvíz által okozott veszélyes állapotokról és megszüntetésükről tájékoztat kötött, meghatározott formai követelmények szerint.
Telepítési hely mágneses deklinációja *(Station declination)*. Egy VOR állomás nulla fokos radiálja és a földrajzi észak közötti beállított eltérés, melyet a VOR állomás kalibrálásakor határoznak meg.
Terep *(Terrain)*. A Föld felszíne, melyen megtalálhatóak a természetes módon előforduló sajátosságok, jellemző tulajdonságok, amilyenek a hegyek, dombok, hegyláncok, völgyek, víztömegek, állandó jéggel és hóval borított felületek, kivéve a mesterséges akadályokat (*obstacle*).
Megjegyzés - A gyakorlati használatban az alkalmazott adatgyűjtés módjától függően a terep a csupasz földön lévő folyamatos felszínt, a lombozat tetejét, vagy a közöttük lévő valamit jelenti, ami az 'első visszaverő felületként' ismeretes.
Nyomon követhetőség *(Traceability)*. Egy figyelembevett dolog (entitás) időbeli előzményeinek, felhasználásának, elhelyezkedésének nyomon követhetőségi képessége rögzített azonosítók segítségével (ISO 9000[21]*).
Megjegyzés: – Termék figyelembe vételekor a nyomon követhetőség a következőkre vonatkozik:
- *Anyagok és részegységek eredete;*
- *Feldolgozási folyamat; és*
- *A termék szállítás utáni elosztása és elhelyezése.*

Érvényesítés *(Validation)*. Vizsgálat segítségével annak megerősítése és objektív bizonyítása, hogy az adott tervezett felhasználás meghatározott követelményeit teljesítették. (ISO 9000[22]*).

Hitelesítés *(Verification)*. Vizsgálat segítségével annak megerősítése és objektív bizonyítása, hogy a meghatározott követelményeket teljesítették. (ISO 9000[23]*).

Megjegyzés 1: - A "hitelesített" kifejezést használják a megfelelő státusz jelzésére.

Megjegyzés 2: - A megerősítés a következő tevékenységeket foglalhatja magába:

- *alternatív számítások elvégzése;*
- *egy új terv részletezéseinek összehasonlítása egy hasonló, már bizonyított terv részleteivel;*
- *ellenőrzések és szemléltetések elvégzése; és*
- *dokumentumok átnézése a kibocsátás előtt.*

VOLMET. Meteorológiai jelentés a levegőben lévő légijárművek számára.

Adatkapcsolat-VOLMET (D-VOLMET - Data link VOLMET). Aktuális repülőtéri rutin meteorológiai jelentések (METAR), repülőtéri speciális meteorológiai jelentések (SPECI), repülőtéri előrejelzések (TAF), SIGMET, a SIGMET által le nem fedett speciális légi jelentések biztosítása, és ahol rendelkezésre áll, az AIRMET az adatkapcsolaton keresztül.

VOLMET sugárzás (VOLMET broadcast). A megfelelő aktuális METAR, SPECI, TAF és SIGMET biztosítása folyamatos és ismétlődő hang alapú sugárzás segítségével.

4. FEJEZET - LÉGIFORGALMI TÁJÉKOZTATÓ KIADVÁNYOK (AIP)

1. Megjegyzés.- Az AIP elsődleges célja a légiforgalom szempontjából lényeges, tartós jellegű tájékoztatások cseréjére megállapított nemzetközi követelmények kielégítése. Ha lehetséges, a kiadványt olyan formában kell összeállítani, amely elősegíti repülés közbeni használatát.
2. Megjegyzés.- Az AIP a tartós jellegű tájékoztatások és a hosszabb érvényességű ideiglenes változások alapvető információs forrásául szolgál.

4.1. Tartalom

4.1.1. Egy Légiforgalmi Tájékoztató Kiadványnak tartalmaznia kell, három részben, fejezeteket és alfejezeteket, melyekben egységes formában szerepelnek az utalások, hivatkozások, hogy ilyen módon lehetségessé váljon az érvényes információk szabványos elektronikus adattárolása és visszakeresése, azokra a témákra vonatkozóan, melyek az 1. Függelékben antikva betűtípussal (*Roman type*) lettek részletesen felsorolva, kivéve azt az esetet, amikor az AIP, vagy az AIP kötet alapvetően a repülés közbeni használatot támogatva készült, akkor ugyanis a pontos formátum és az elrendezés kérdése az állam önálló megítélésére bízható, feltéve, hogy a kiadvány tartalmaz egy megfelelő formátumú tartalomjegyzéket.
4.1.1.1. **Ajánlás.-** *A Légiforgalmi Tájékoztató Kiadványoknak lehetőség szerint aktuális, naprakész tájékoztatást kell nyújtaniuk azokra a témákra vonatkozóan is, amelyek az 1. Függelékben dőlt betűvel (Italic type) szerepelnek.*
4.1.2. A Légiforgalmi Tájékoztató Kiadványoknak a következőket kell tartalmazniuk az 1. Részben (GEN - Általános Tájékoztatások);
a) az AIP-ben közölt légiforgalmi berendezésekért, szolgálatokért, vagy eljárásokért felelős illetékes hatóság megjelölését;
b) azokat az általános feltételeket, amelyek alapján a szolgálatok, vagy a berendezések nemzetközi használatra igénybe vehetőek;
c) egy listát azokról a jelentős eltérésekről, amelyek az Állam nemzeti szabályozása és gyakorlati eljárásai, valamint a vonatkozó ICAO Szabványok, Gyakorlati Ajánlások és Eljárások között fennállnak; ez a lista olyan formában készüljön, amely lehetővé teszi a felhasználó számára, hogy azonnal különbséget tehessen az Állam követelményei és a kapcsolódó ICAO előírások, rendelkezések között;
d) az Állam választását minden jelentős esetben, ahol az ICAO Szabványok, Gyakorlati Ajánlások és Eljárások alternatív lépések lehetőségét kínálják.
4.1.3. Ha a kijelölt nemzetközi repülőterek/helikopter repülőterek alábbi , ABC sorrendben felsorolt légiforgalmi térképei rendelkezésre állnak, akkor ezek az AIP részét kell képezzék, vagy külön kell kiosztani azok között, akik megkapják az AIP kiadványt:
a) Repülőtér/Helikopter Repülőtér Térkép - ICAO;
b) Repülőtéri Földi Mozgások Térképe;
c) Repülőtéri Akadályok Térképe - ICAO A típus;
d) Repülőtéri Terep és Akadály Térkép – ICAO (Elektronikus);
e) Légijármű Parkolási/Beállítási Térkép - ICAO;
f) Körzeti Térkép - ICAO;
g) Minimális Tengerszint Feletti Magasság ATC Légtérellenőrzési Radar Térkép – ICAO
h) Műszeres Megközelítési Térkép - ICAO;
i) Precíziós Megközelítés Térkép - ICAO;
j) Szabványos Érkezési Útvonalak Térképe - Műszeres /STAR/ - ICAO;
k) Szabványos Indulási Útvonalak Térképe - Műszeres /SID/ - ICAO;
l) Látvamegközelítési Térkép - ICAO;
Megjegyzés. – Az AIP-ben egy oldalzseb használható, benne a Repülőtéri Terep és Akadály Térkép – ICAO (Elektronikus formában), megfelelő elektronikus adathordozón.
4.1.4. Ha alkalmasak rá, térképeket, térképvázlatokat, vagy diagramokat kell alkalmazni arra, hogy

kiegészítsék, vagy helyettesítsék a Légiforgalmi Tájékoztató Kiadvány (AIP) táblázatait, vagy szövegét.
Megjegyzés.- Értelemszerűen, a 4. Annex (Légiforgalmi Térképek) előírásai szerint készített térképeket lehet felhasználni az előző követelmény kielégítésére. A Légiforgalmi Tájékoztató Kiadványokban található index térképek és diagramok pontos leírására vonatkozó segédanyag a Légiforgalmi Tájékoztató Szolgálatok Kézikönyvében található (Aeronautical Information Services Manual - Doc 8126).

4.2. Általános előírások

4.2.1. Minden Légiforgalmi Tájékoztató Kiadványnak önállónak kell lennie, és külön tartalomjegyzékkel kell rendelkeznie.
Megjegyzés.- Ha egy AIP-nek - a nagy terjedelem okán, vagy kényelmi szempontok miatt - szükségessé válik két, vagy több részben, vagy kötetben történő megjelentetése, ezek mindegyikében jelezni kell azt, hogy a fennmaradó információk a másik rész(ek)ben, vagy kötet(ek)ben találhatók.
4.2.1.1. Valamennyi AIP esetén el kell kerülni az információk ismétlését, úgy az AIP-n belül, úgy más forrásokból is.
4.2.1.2. Amikor két, vagy több Állam közösen, egyesített AIP kiadványt ad ki, akkor ezt a borítón és a tartalomjegyzékben is egyértelműen fel kell tüntetni.
4.2.2. **Ajánlás.-** *Az AIP-t lehetőség szerint cserelapos formában kell kiadni, kivéve, ha rövid időközönként az egész kiadványt újra kiadják.*
4.2.3. Minden Légiforgalmi Tájékoztató Kiadványt el kell látni időpont megjelölésével. Ha a Légiforgalmi Tájékoztató Kiadványt cserelapos formátumban adták ki, akkor minden oldalon szerepelnie kell az időpontnak. A dátum, amely tartalmazza a napot, a hónapot (névvel) és az évet, vagy a kiadás időpontja, vagy az információ hatálybalépésének időpontja legyen.
4.2.4. A Légiforgalmi Tájékoztató Kiadvány sorozat összes oldalának, aktuális dátumát tartalmazó ellenőrzőjegyzékét gyakori időközönként, ismételten ki kell adni, ezzel segítve a felhasználót, hogy a Kiadványt naprakészen tarthassa. Az oldalszámot/a táblázat/a térkép megnevezését és az ellenőrző jegyzék kiadási dátumát magán az ellenőrző jegyzéken is fel kell tüntetni.
4.2.5. Minden bekötött, könyv formátumban kiadott Légiforgalmi Tájékoztató Kiadványt, valamint a cserelapos formátumban kiadott Légiforgalmi Tájékoztató Kiadvány minden oldalát úgy kell feliratozni, hogy az egyértelműen jelezze:
a) A Légiforgalmi Tájékoztató Kiadvány azonosítását;
b) a lefedett, érintett területet, és ahol szükséges, annak felosztásait;
c) a kiadó Állam és az előállító szervezet (hatóság) megnevezését;
d) oldalszámokat/táblázat/térkép megnevezéseket;
e) a megbízhatóság fokát, ha a tájékoztatás bizonytalan.
4.2.6. **Ajánlás.-** *A lapok mérete lehetőség szerint ne haladja meg a 210x297 mm-es (szabványos A4-es) méretet, azonban nagyobb lapokat is fel lehet használni, feltéve, ha azokat ilyen méretre hajtják össze.*
4.2.7. Az AIP összes változását, vagy egy újra kiadott oldalon szereplő új tájékoztatást egyértelmű jelöléssel, vagy magyarázó jegyzettel kell meg jelölni.
4.2.8. Az AIP üzemeltetési szempontból jelentős változtatásait az AIRAC (*Aeronautical Information Regulation and Control Cycle* – Légiforgalmi Tájékoztató Közlemények Meghatározott Kiadási Rendje) eljárásaival összhangban kell kiadni, valamint ezt egyértelműen jelezni kell az AIRAC betűszóval.
4.2.9. Az AIP-t olyan rendszeres időközönként kell módosítani, vagy újra kiadni, mely ahhoz lehet szükséges, hogy megőrizzék naprakész állapotát. A kézi módosítások, vagy magyarázó jegyzetek alkalmazásának számát a minimálisra kell visszaszorítani. A módosítás szokásos, elfogadott módszerének a cserélhető lapot kell használni.
4.2.9.1. A 4.2.9. pontban említett rendszeres időközöket az AIP 1. Részében - (GEN - Általános rész) kell közölni.
*Megjegyzés.- Az AIP Módosítások kiadási időpontjai közötti időintervallumok megállapítására vonatkozó útmutató anyag a Légiforgalmi Tájékoztató Szolgálatok Kézikönyvében (*Aeronautical Information Services Manual - *Doc 8126) található.*

4.3. Az AIP Módosításaira (*Amendments*) érvényes előírások

4.3.1. Az AIP- tartós jellegű változásait AIP Módosítások formájában kell közzétenni.
4.3.2. Minden AIP Módosítást sorszámmal kell ellátni, melyek folytatólagosak legyenek.
4.3.3. Az AIP Módosítás minden lapját, beleértve a borítót is, el kell látni a kiadás dátumával.
4.3.4. AZ AIRAC (Légiforgalmi Tájékoztató Közlemények Meghatározott Kiadási Rendje) AIP Módosítás minden lapján, beleértve a borítólapot is, fel kell tüntetni a hatálybalépés dátumát.
4.3.5. Amikor egy AIP Módosítást kiadnak, annak utalást kell tartalmaznia az Integrált Légiforgalmi Tájékoztatási Csomag azon elemeinek sorszámára (ha vannak ilyenek), melyeket beépítettek a Módosításba.
4.3.6. Az AIP Módosítás borítóján röviden jelezni kell a módosítás által érintett témákat.
4.3.7. Ha egy AIP Módosítás nem kerül közzétételre a meghatározott időintervallumban, vagy a tervezett kiadási időpontban, akkor egy NIL tájékoztatást kell összeállítani és szétosztani az érvényben lévő NOTAM-okról készített, nyomtatott formájú, nyílt szövegű havi NOTAM összesítőben az 5.2.13.3. pont előírásai szerint.

4.4. Az AIP Kiegészítésekre (*Supplements*) érvényes előírások

4.4.1. A hosszú ideig érvényben (három hónapig, vagy tovább) maradó ideiglenes változásokat, valamint a rövid ideig érvényes tájékoztatásokat, melyek terjedelmes szöveges részt és/vagy ábrákat tartalmaznak, AIP Kiegészítések formájában kell közzétenni.
*Megjegyzés: - Az AIP Kiegészítések használatára vonatkozó útmutató anyag, valamint a Kiegészítések ilyen használatára példák a Légiforgalmi Tájékoztató Szolgálatok Kézikönyvében (*Aeronautical Information Services Manual - *Doc 8126) találhatók.*
4.4.2. Minden AIP Kiegészítést sorszámmal kell ellátni, melyek folytatólagosak és az adott naptári évre vonatkoznak.
4.4.3. Az AIP Kiegészítés lapjait addig kell az AIP-ben tartani, amíg a teljes tartalmuk, vagy annak egy része érvényben van.
4.4.4. Amikor egy NOTAM helyettesítésére egy AIP kiegészítést küldenek, akkor annak a NOTAM sorszámára vonatkozóan utalást kell tartalmaznia.
4.4.5. Az érvényben lévő AIP Kiegészítésekről legalább havi gyakorisággal ellenőrző jegyzéket kell kiadni. Ezt a tájékoztatást az 5.2.13.3. pont előírásai szerint, az érvényben lévő NOTAM-okról készülő nyomtatott formájú, nyílt szövegű havi NOTAM összesítő útján kell közzétenni.
4.4.6. **Ajánlás.-** *Az AIP Kiegészítés lapjait a jól láthatóság kedvéért, lehetőség szerint, feltűnő sárgára színezzék.*
4.4.7. **Ajánlás.-** *Az AIP Kiegészítések lapjait lehetőleg az első helyen kell tartani az AIP részekben.*

4.5. Szétosztás

Az AIP-t, az AIP Módosításokat és az AIP Kiegészítéseket a lehető leggyorsabb, leghatékonyabb módon kell szétosztani.

5. FEJEZET - NOTAM

5.2.5. A NOTAM összeállítója minden NOTAM számára meg kell, hogy határozzon egy sorfolytonos azonosítót, amely egy betűből és egy négyjegyű számból áll, amit egy törtvonal és az év jelzésére 2 további számjegy követ. A négyjegyű számoknak folytatólagosnak kell lenniük, és a naptári éven kell alapulniuk.
Megjegyzés.- A NOTAM sorozatok azonosítására az ABC betűit használhatják, A-tól Z-ig, az S és a T betű kivételével.
5.2.6. Ha egy NOTAM-ban hibák fordulnak elő, egy új sorszámmal azonosított NOTAM-ot kell kiadni, hogy a hibás NOTAM-ot lecserélje.
5.2.7. Amikor kiadnak egy olyan NOTAM-ot, amely töröl, vagy lecserél egy korábban kiadott NOTAM-

ot, akkor a korábbi NOTAM sorozatát és számát meg kell adni. Mindkét NOTAM sorozatának, helységnév azonosítójának és tárgyának azonosnak kell lennie. Egy NOTAM-mal csak egyetlen egy NOTAM-ot lehet törölni, vagy lecserélni.
5.2.8. Minden egyes NOTAM csak egyetlen tárggyal, és annak egyetlen jellemzőjével foglalkozhat.
Megjegyzés.- A NOTAM-ok Kiválasztási Feltételeivel egyetértésben, a NOTAM tárgya és a tárgy jellemzőinek kombinációjára vonatkozó útmutató anyag a Légiforgalmi Tájékoztató Szolgálatok Kézikönyvében (Aeronautical Information Services Manual - Doc 8126) *található.*
5.2.9. Minden egyes NOTAM-nak a lehető legrövidebbnek kell lennie, és úgy kell összeszerkeszteni, hogy jelentése, más okmányokra való hivatkozás nélkül is világos legyen.
5.2.10. Minden egyes NOTAM-ot önálló távközlési közleményként kell továbbítani.
5.2.11. Egy NOTAM, amely állandó, vagy hosszan tartó ideiglenes információkat tartalmaz, megfelelő AIP, vagy AIP Melléklet, Kiegészítés referenciákat, hivatkozásokat kell, hogy tartalmazzon.
5.2.12. A NOTAM-ok szövegében található helységnév azonosító kódoknak meg kell egyezniük azokkal, melyek a *Helységnév Azonosító Kódok* kiadványban (Location Indicators – *DOC 7910*) szerepelnek.
5.2.12.1. Semmi esetre sem szabad ezen azonosítók rövidített változatát használni.
5.2.12.2. Amennyiben egy helységnek nincs kijelölt ICAO helységnév azonosítója, akkor a helység nevét a 3.6.2 pontban előírt helyesírási követelményeknek megfelelően leírva kell a nyílt szövegbe beilleszteni.
5.2.13. Az érvényes NOTAM-okról legalább havonta egyszer egy ellenőrzőjegyzéket kell kiadni NOTAM formájában, a Légiforgalmi Állandóhelyű Szolgálaton keresztül (*Aeronautical Fixed Service - AFS*), a 6. Függelékben meghatározott NOTAM formátumot használva. Minden NOTAM sorozathoz egy NOTAM-ot kell kiadni.
5.2.13.1. A NOTAM ellenőrzőjegyzéknek hivatkoznia kell a legújabb AIP Módosításokra, AIP Mellékletekre, Kiegészítésekre és legalább a nemzetközi szétosztású AIC-ékre (*Aeronautical Information Circulars* - Légiforgalmi Tájékoztató Körlevelekre).
5.2.13.2. A NOTAM ellenőrzőjegyzéket ugyanazon címekre kell kiosztani, mint akik azt a tájékoztatás sorozatot kapták, amire az ellenőrzőjegyzék vonatkozik és ezt a tájékoztatást egyértelműen ellenőrzőjegyzéknek kell nevezni.
5.2.13.3. A lehető legkisebb késéssel havonta kinyomtatott nyílt szövegű összesítőt kell készíteni az érvényben lévő NOTAM-okról, melynek tartalmaznia kell az utolsó kiadott AIP Módosításokat, az AIC-k megjelölését, az AIP Mellékletek, Kiegészítések ellenőrző jegyzékét, majd ezt az összesítőt a lehető leggyorsabb eszközt felhasználva el kell juttatni azokhoz, akik az Integrált Légiforgalmi Tájékoztató Csomagot megkapják.

5.3. Szétosztás

5.3.1. A NOTAM-okat kérés alapján kell kiosztani.
5.3.2. A NOTAM-ot az ICAO távközlési eljárások idevonatkozó előírásainak megfelelően kell összeállítani.
5.3.2.1. Amikor csak lehetséges, a NOTAM-ok szétosztásához a Légiforgalmi Állandóhelyű Szolgálatot (*AFS - Aeronautical Fixed Service*) kell alkalmazni.
5.3.2.2. Ha a NOTAM-ok cseréje az 5.3.4. pont alapján nem a Légiforgalmi Állandóhelyű Szolgálat (AFS) segítségével történik, akkor a szöveget megelőzően a NOTAM kiadás dátumát és időpontját hat számjegyből álló dátum/idő csoporttal kell jelölni, és használni kell a kiadó azonosítóját.
5.3.3. A kibocsátó Államnak kell kiválasztania azokat a NOTAM-okat, melyeket nemzetközi szétosztásra szánnak.
5.3.3.1. **Ajánlás.-** *Amennyiben megvalósítható, lehetőleg szelektív kiosztási listákat kell alkalmazni.*
Megjegyzés.- Ezek a listák a tájékoztatások felesleges szétosztásának megelőzésére szolgálnak. Az erre vonatkozó útmutató anyag a Légiforgalmi Tájékoztató Szolgálatok Kézikönyvében (Aeronautical Information Services Manual - *Doc 8126*) *található.*
5.3.4. A NOTAM-ok nemzetközi cseréje csak az érintett nemzetközi NOTAM irodák közötti kölcsönös megegyezés alapján történhet. Az ASHTAM (lásd 5.2.4.) nemzetközi cseréjébe, valamint azokban az Államokban, ahol a vulkánok aktivitásával kapcsolatos tájékoztatások szétosztására továbbra is a

NOTAM közleményt használják, a NOTAM közlemények nemzetközi cseréjébe be kell vonni a Vulkáni Hamufelhők Tanácsadói Központjait (*Vulcanic Ash Advisory Centre*s), a regionális léginavigációs egyezmény alapján az AFS műholdas elosztó rendszerek működéséhez kijelölt központokat (műholdas elosztó rendszer a léginavigációhoz (SADIS) és a nemzetközi műholdas kommunikációs rendszerhez (ISCS) kapcsolódó információ számára), valamint figyelembe kell vennie a nagy hatósugarú üzemeltetés követelményeit is.
Megjegyzés.- A repülőterek / helikopter repülőterek közötti közvetlen SNOWTAM (lásd a 2. Függeléket) cserére egyezményeket lehet kötni.
5.3.4.1. A nemzetközi NOTAM irodák között az ilyen NOTAM cseréket, amennyire csak gyakorlatilag lehetséges, a tájékoztatást fogadó érintett Államok követelményeire kell korlátozni, legalább a nemzetközi és a belföldi járatok számára készített külön sorozatok biztosításával.
5.3.4.2. Az 5.3.4. pontban leírt követelményeknek megfelelően, amikor csak lehetséges, az 5. Függelékkel összhangban, a Légiforgalmi Állandóhelyű Szolgálat segítségével (AFS) továbbított NOTAM közleményekhez egy előre meghatározott szétosztási rendszert kell használni.

6. FEJEZET - A LÉGIFORGALMI TÁJÉKOZTATÓ KÖZLEMÉNYEK MEGHATÁROZOTT KIADÁSI RENDJE (AIRAC)

6.1. Általános előírások

6.1.1. A 4. Függelék - 1. részében felsorolt körülményekre vonatkozó tájékoztatásokat az AIRAC meghatározott rendje szerint kell szétosztani, azaz az alapok létrehozását, a visszavonást és a jelentős módosításokat a hatálybalépési időpontok szokásos 28 naponkénti sorozata szerint kell végrehajtani, az 1998. január 29-ei naptól kezdődően. Az ilyen módon közölt információkat, tájékoztatásokat a hatálybalépés utáni további 28 napig nem változtathatják meg, kivéve, ha a közölt körülmény ideiglenes jellegű és így nem tart a teljes időszak végéig.
Megjegyzés.- Az AIRAC rendszerrel kapcsolatosan alkalmazható eljárásokra vonatkozó útmutató anyag a Légiforgalmi Tájékoztató Szolgálatok Kézikönyvében (Aeronautical Information Services Manual - Doc 8126) *található.*
6.1.2. **Ajánlás.-** *Lehetőleg az AIRAC szabályozott rendszerét kell használni a 4. Függelék 2. Részében felsorolt körülmények bevezetésével, megszüntetésével és előre megfontolt jelentős változtatásával kapcsolatos tájékoztatások kiadására is.*
6.1.3. Ha az AIRAC időpontjára a kiadandó tájékoztatást még nem nyújtották be, egy NIL értesítést kell összeállítani és NOTAM, vagy más alkalmas eszköz útján szétosztani, legalább egy ciklussal korábban, mint amelyre az AIRAC hatálybalépési dátuma vonatkozik.
6.1.4. Az AIRAC hatálybalépési dátumától eltérő bevezetési dátumokat nem szabad használni az olyan előre tervezett, üzemeltetést jelentősen érintő változások esetén, melyek térképészeti munkákat igényelnek, és/vagy melyek navigációs adatbázisokat aktualizálnak.
6.1.5. **Ajánlás.-** *Az AIRAC rendszer szerinti jelentős változások bevezetésének hatálybalépési dátumaként az AIRAC ciklusban lehetőleg kerülendő a december 21-e és január 17-e közötti időpontok használata, ezeket a napokat is beleértve.*

6.2. Tájékoztatások biztosítása papír másolat formájában

6.2.1. Az AIRAC rendszer szerint szétosztott tájékoztatásokat minden esetben meg kell jelentetni papír másolat formájában és azt az AIS-nek (Légiforgalmi Tájékoztató Szolgálat) legalább 42 nappal a hatálybalépés dátuma előtt ki kell adnia abból a célból, hogy a tájékoztatás a hatálybalépési dátum előtt legalább 28 nappal korábban eljusson a címzettekhez.
6.2.2. **Ajánlás.-** *Amikor jelentősebb változásokat terveznek és ahol az előzetes értesítés kívánatos lehet és használható, a kiadás dátuma lehetőség szerint legalább 56 nappal előzze meg a hatálybalépés dátumát.*
Megjegyzés. – Azzal kapcsolatos útmutató anyag, hogy mi tartozik a jelentősebb változás alá, a

Légiforgalmi Tájékoztató Szolgálatok Kézikönyvében (Aeronautical Information Services Manual - Doc 8126) *található.*

6.3. Tájékoztatások biztosítása elektronikus formátumban

6.3.1. Azoknak az Államoknak, melyek létrehoztak egy légiforgalmi adatbázist, amikor annak tartalmát a 4. Függelék - 1. Részben felsorolt körülményekre vonatkozóan frissítik, garantálniuk kell, hogy az adatok hatálybalépési időpontjai megegyezzenek azon AIRAC hatálybalépési időpontokkal, melyeket a papír másolat formájában biztosított tájékoztatások számára használtak fel.
6.3.2. A 4. Függelék - 1. Részben felsorolt körülményekre vonatkozó, elektronikus formátumban nyújtott tájékoztatásokat az AIS-nek (Légiforgalmi Tájékoztató Szolgálatnak) oly módon kell kiadnia/hozzáférhetővé tennie, hogy a tájékoztatás az AIRAC hatálybalépési dátuma előtt legalább 28 nappal korábban eljusson a címzettekhez.
6.3.3. **Ajánlás.-** *Amikor jelentősebb változásokat terveznek és ahol az előzetes értesítés kívánatos lehet és használható, az elektronikus formátumban nyújtott tájékoztatásokat, lehetőség szerint, a hatálybalépési dátumot megelőzően legalább 56 nappal korábban kell kiadni/hozzáférhetővé tenni.*
Megjegyzés. – Azzal kapcsolatos útmutató anyag, hogy mi tartozik a jelentősebb változás alá, a Légiforgalmi Tájékoztató Szolgálatok Kézikönyvében (Aeronautical Information Services Manual - Doc 8126) *található.*

7. FEJEZET - LÉGIFORGALMI TÁJÉKOZTATÓ KÖRLEVELEK (AIC)

7.1. A körlevelek összeállítása

7.1.1. Egy AIC-t kell kiadni, amikor egy olyan légiforgalmi tájékoztatás közzététele szükséges, ami nem minősül:
a) a 4.1. pont előírásai értelmében olyannak, hogy azt egy Légiforgalmi Tájékoztató Kiadványban (AIP) kellene kiadni; vagy
b) az 5.1. pont előírásai értelmében olyannak, hogy azt egy NOTAM-ban kellene kiadni.
7.1.1.1. Egy AIC-t kell kiadni, amikor az alábbiak közzététele kívánatos:
a) jogszabályokkal, rendelkezésekkel, eljárásokkal és berendezésekkel kapcsolatos bármely fontosabb változás hosszú távú előrejelzése;
b) pusztán csak magyarázó, vagy tanácsadó jellegű tájékoztatások, melyek hatással lehetnek a repülés biztonságára;
c) műszaki, jogi, vagy tisztán adminisztratív ügyekre vonatkozó magyarázó, vagy tanácsadó jellegű tájékoztatások, vagy értesítések;
Ezeknek tartalmaznia kell az alábbiakat:
1. a biztosított léginavigációs eljárások, szolgálatok és berendezések fontos változásainak előrejelzését;
2. az új navigációs rendszerek létesítésének előrejelzését;
3. légijármű baleset/esemény kivizsgálása során feltárt olyan fontos tájékoztatásokat, amelyek összefüggnek a repülés biztonságával;
4. tájékoztatásokat a nemzetközi polgári légiközlekedés jogellenes beavatkozás elleni védelmével összefüggő szabályozásokról, rendelkezésekről;
5. tanácsokat a légijármű-vezetőket különösen érintő orvosi kérdésekkel kapcsolatban;
6. a pilóták részére olyan figyelmeztetéseket, hogy hogyan kerüljék el az egészségükre leselkedő veszélyeket;
7. bizonyos időjárási rendellenességeknek a légijárművek üzemeltetésére gyakorolt hatását;
8. tájékoztatást az újabb veszélyekről, melyek a légijármű kiszolgálási módszereket, tevékenységeket érintik;
9. korlátozás alá eső árucikkek légi szállítására vonatkozó rendszabályokat;

10. utalást a nemzeti törvényalkotás követelményeire és bekövetkezett változások közzétételére;
11. a hajózószemélyzet szakszolgálati képesítésével kapcsolatos megállapodásokat, egyezményeket;
12. a légiközlekedésben foglalkoztatott személyek képzését, oktatását;
13. a nemzeti törvényhozás követelményeinek alkalmazását, vagy az azok alóli mentességet;
14. meghatározott, bizonyos típusú berendezések használatára és karbantartására vonatkozó tanácsokat;
15. a légiforgalmi térképek új, vagy átdolgozott kiadásának pillanatnyi, vagy tervezett elérhetőségét;
16. kommunikációs berendezések szállítását a fedélzeten;
17. a zajcsökkentési eljárásokra vonatkozó magyarázó tájékoztatásokat;
18. kiválasztott légialkalmassági irányelveket;
19. NOTAM sorozatokban, vagy szétosztásukban bekövetkezett változásokat, az AIP új kiadásait, vagy az AIP tartalmának, jogkörének, vagy formátumának jelentősebb változásait;
20. előzetes tájékoztatást a hóeltakarítási tervről (lásd 7.1.1.2. pontot);
21. hasonló jellegű, egyéb tájékoztatásokat.

Megjegyzés.- Egy AIC kiadása nem mentesít a 4. és 5. Fejezetben ismertetett kötelezettségek alól.

7.1.1.2. Az 1. Függelék AD 1.2.2. pontja szerint kiadott hóeltakarítási tervet idényjellegű tájékoztatásokkal kell kiegészíteni, és még jóval valamennyi téli időszak kezdete előtt kell kiadni - nem később, mint egy hónappal a téli körülmények szokásos beállta előtt. A hóeltakarítási tervnek az alábbi tájékoztatásokat kell tartalmaznia:

a) azoknak a repülőtereknek/helikopter repülőtereknek a jegyzékét, amelyeken az elkövetkező téli időszakban várhatóan hóeltakarítást fognak végezni;

1) a futópálya- és gurulóút-rendszereknek megfelelően; vagy[24]*

2) a tervezett hóeltakarítást, a futópálya rendszertől eltérően (futópályák hosszúsága, szélessége és száma, az érintett gurulóutak és forgalmi előterek, vagy ezek részei);[25]*

b) [26]*tájékoztatást bármely kijelölt központról, amelyet kijelöltek, hogy koordinálja a hóeltakarítás menetének pillanatnyi állapotával, a futópályák, gurulóutak és forgalmi előterek pillanatnyi állapotával kapcsolatos tájékoztatásokat.

c) a repülőterek/helikopter repülőterek felosztását SNOWTAM kiosztási listákra, hogy elejét vegyék a túlzott mértékű, felesleges SNOWTAM kiosztást.

d) [27]*szükség szerint az érvényes hóeltakarítási terv kisebb módosításairól szóló információt.

e) [28]*a hóeltakarítás eszközeinek részletes leírását tartalmazó jegyzékét;

f) [29]*egy listát arról, hogy mit tekintenek majd a hópad legkisebb jelentendő magasságának, minden repülőtéren/helikopter repülőtéren, ahol a jelentést el fogják kezdeni.

7.2. Általános előírások

7.2.1. Az AIC-t nyomtatott formában kell kiadni.

Megjegyzés.- A kiadott anyag szöveget és ábrákat egyaránt tartalmazhat.

7.2.1.1. A kiadó Államnak kell kiválasztania azt az AIC-t, melyet nemzetközi szétosztásra szánnak.

7.2.1.2. Minden AIC-nek egy sorszámot kell adni, mely sorszámoknak folytatólagosaknak kell lenniük, és a naptári éven kell alapuljanak.

7.2.1.3. Ha az AIC-ket több, mint egy sorozatban osztják szét, minden sorozatot egyedi betűjelzéssel kell ellátni.

7.2.1.4**. Ajánlás.-** *Ahol az érvényben lévő AIC-k nagy száma elegendő ahhoz, hogy az azonosításra ilyen formában kerüljön sor, az egyes AIC témakörök tárgy szerinti megkülönböztetésére és azonosítására lehetőség szerint szín szerinti kódolást kell alkalmazni.*

Megjegyzés.- Az AIC- k tárgy szerinti szín-kódolására vonatkozó tájékoztató anyag a Légiforgalmi Tájékoztató Szolgálatok Kézikönyvében (Aeronautical Information Services Manual - *Doc 8126*) *található.*

7.2.2. Legalább évente egyszer, az AIC-kkel azonos címekre történő kiosztással, ellenőrző jegyzéket kell kiadni az érvényben lévő AIC-kről.

7.3. Szétosztás, kiosztás

A nemzetközi szétosztásra szánt AIC-k számára az Államoknak ugyanazt a kiosztást kell biztosítaniuk, mint az AIP-jük esetén.

8. FEJEZET - A REPÜLÉS ELŐTTI ÉS REPÜLÉS UTÁNI TÁJÉKOZTATÁS / ADATOK

8.1. Repülés előtti tájékoztatás

8.1.1. Minden olyan repülőtéren/helikopter repülőtéren, amelyet rendes körülmények között nemzetközi légiforgalom üzemeltetésére vesznek igénybe, a repülés biztonsága, rendszeressége és hatékonysága szempontjából lényeges, és az adott repülőtérről/helikopter repülőtérről kiinduló repülési útvonalszakaszokra vonatkozó légiforgalmi tájékoztatásokat a repülési tevékenységeket végző személyzet rendelkezésére kell bocsátani, beleértve a hajózó személyzeteket és a repülés előtti tájékoztatásokért felelős szolgálatokat is.

8.1.2. A 8.1.1. pontban említett repülőtereken/helikopter repülőtereken a repülés előtti tervezés céljaira biztosított légiforgalmi tájékoztatásoknak magukba kell foglalniuk az alábbi lényeges összetevőket:

a) az Integrált Légiforgalmi Tájékoztató Csomag elemeit;

b) térképeket és navigációs térképvázlatokat.

Megjegyzés: - Az a) és b) pontokban felsorolt dokumentációt korlátozhatják a nemzeti kiadványokra és amikor ez megoldható, a közvetlenül szomszédos Államok kiadványaira, feltéve, hogy a légiforgalmi tájékoztatások teljes könyvtára rendelkezésre áll egy központi helyen, valamint, hogy a közvetlen kommunikáció eszközei használhatók a repülőtér AIS egysége és ezen könyvtár között.

8.1.2.1. Kiegészítő naprakész tájékoztatásokat kell biztosítani az indulási repülőtérre vonatkozóan az alábbiakról:

a) építési, vagy karbantartási munkálatok a munkaterületen, vagy közvetlenül a munkaterület mellett;

b) a munkaterület bármely egyenetlen része, függetlenül attól, hogy megjelölték, vagy nem, pl. ilyenek a futópályák és gurulóutak felszínének töredezett részei;

c) hó, jég és víz jelenléte és vastagsága a futópályán és a gurulóutakon, beleértve hatását a felület fékhatására;

d) összefújt, vagy felhalmozódott hó a futópályákon és gurulóutakon, vagy mellettük;

e) parkoló légijármű, vagy más akadályok a gurulóutakon, vagy közvetlenül mellettük;

f) más ideiglenes veszély jelenléte;

g) madarak jelenléte, amely potenciális veszélyt jelent a légijárművek üzemeltetésére;

h) a repülőtér fényrendszere egy részének, vagy egészének meghibásodása, vagy szabálytalan működése, beleértve a bevezető -, a küszöb -, a futópálya -, a gurulóút -, akadály - és a munkaterületek használaton kívüli részeit jelölő fényeket, valamint a repülőtér energiaellátását.

i) az ILS (markerekkel együtt), MLS, az alap GNSS, SBAS (Satellite Based Augmentation Systems - Műholdas Alapú, Megnövelt Területen Működő Szolgáltatás), GBAS (Ground Based Augmentation System - Földi Telepítésű Kiterjesztő Rendszer), SRE, PAR, DME, SSR, VOR, NDB berendezések, VHF légiforgalmi mozgószolgálati csatornák, RVR észlelő rendszerek és a másodlagos energia rendszer meghibásodása, vagy szabálytalan működése és üzemeltetési státuszának változása; és

j) humanitárius segélyezési feladatok, küldetések jelenléte és műveletei, mint amilyeneket az ENSZ védnöksége alatt folytatnak, az alkalmazott eljárásokkal és/vagy az okozott korlátozásokkal együtt.

8.1.3. Az érvényes NOTAM-ok és más sürgős jellegű tájékoztatások ismételt összefoglalását nyílt szöveges repülés előtti tájékoztató bulletin (PIB) formájában kell hozzáférhetővé tenni a repülő személyzet számára.

Megjegyzés.- a PIB (Pre-flight Information Bulletins - Repülés Előtti Tájékoztató Bulletin) összeállítására vonatkozó útmutató anyag a Légiforgalmi Tájékoztató Szolgálatok Kézikönyvében (Aeronautical Information Services Manual - *Doc 8126*) *található.*

8.2. Automatizált légiforgalmi tájékoztató rendszerek

8.2.1. Ott, ahol a polgári légügyi hatóság, vagy az az ügynökség, melyre a 3.1.1. c) pontban leírtaknak megfelelően a szolgáltatás felügyeletét átruházták, automatizált repülés előtti légiforgalmi tájékoztató rendszereket használ, hogy segítségével a légiforgalmi tájékoztatásokat/léginavigációs adatokat hozzáférhetővé tegyék az üzemeltetést végző személyzet részére, beleértve a hajózó-személyzet tagjait is, a repülésük előtti önálló eligazítás, repülés tervezés és a repülés tájékoztató szolgálat céljaira, a rendelkezésre bocsátott tájékoztatások/adatok meg kell feleljenek a 8.1.2. és 8.1.3. pontban leírt rendelkezéseknek.

8.2.2. **Ajánlás.-** *A repülés előtti automatizált légiforgalmi tájékoztató rendszereket, melyek az üzemeltetést végző személyzet részére, beleértve a hajózó-személyzet tagjait, és más érintett légiforgalmi személyzeteket is, egy összehangolt, közös hozzáférési lehetőséget biztosítanak a légiforgalmi tájékoztatásokhoz - a 8.2.1. pontban leírtaknak megfelelően - valamint a meteorológiai tájékoztatásokhoz - a* Meteorológiai Szolgálat a Nemzetközi Légiközlekedés Számára *– 3. Annex – 9.5.1. pontja alapján - lehetőség szerint a polgári légügyi hatóság, vagy az az ügynökség - melyre a 3.1.1. c) pontban leírtaknak megfelelően a szolgáltatás felügyeletét átruházták - és az illetékes meteorológiai hatóság között kötött egyezményben foglaltak szerint kell felállítani.*

8.2.3. Ahol repülés előtti automatizált légiforgalmi tájékoztató rendszereket használnak összehangolt, közös hozzáférési lehetőségként az üzemeltetést végző személyzet részére, beleértve a hajózó-személyzet tagjait, és más érintett légiforgalmi személyzeteket is, a légiforgalmi tájékoztatásokhoz/adatokhoz, valamint a meteorológiai tájékoztatásokhoz, a polgári légügyi hatóság, vagy az az ügynökség, melyre a 3.1.1. c) pontban leírtaknak megfelelően a szolgáltatás felügyeletét átruházták, továbbra is felelősséggel tartozik az ilyen rendszerek segítségével biztosított légiforgalmi tájékoztatások/adatok minőségéért és időszerűségéért.

Megjegyzés – Az érintett meteorológiai hatóság tartozik felelősséggel az ilyen rendszerek segítségével biztosított meteorológiai tájékoztatások minőségéért, a 3. Annex – 9.5.1. pontja alapján.

8.2.4. Egy automatizált légiforgalmi tájékoztató rendszer repülés előtti saját-eligazítási eszközeinek szükség szerint hozzáférést kell biztosítaniuk a légiforgalmi tájékoztató szolgálatokkal történő konzultáció lehetőségéhez telefon, vagy más alkalmas telekommunikációs eszköz segítségével az üzemeltetést végző személyzet részére, beleértve a hajózószemélyzet tagjait is és más érintett légiforgalmi személyzeteket is. Az ilyen eszközök ember/gép közötti kapcsolatot megvalósító műszaki megoldásainak könnyű, segítségről is gondoskodó hozzáférést kell biztosítaniuk minden vonatkozó tájékoztatáshoz/adathoz.

8.2.5. **Ajánlás.-** *A repülés előtti saját-eligazítás, repülés tervezés és repülés tájékoztató szolgálat céljaira légiforgalmi tájékoztatásokat/adatokat biztosító automatizált légiforgalmi tájékoztató rendszereknek lehetőség szerint:*

a) gondoskodniuk kell a rendszer adatbázisának folyamatos és megfelelő időben történő frissítéséről és a tárolt légiforgalmi tájékoztatások érvényességének és minőségének figyelemmel kiséréséről;

b) lehetővé kell tegyék az üzemeltetést végző személyzet részére, beleértve a hajózó-személyzet tagjait és más érintett légiforgalmi személyzeteket és légiforgalmi felhasználókat is, hogy megfelelő telekommunikációs eszközökön keresztül hozzáférjenek a rendszerhez;

c) biztosítaniuk kell, hogy a megtekintett légiforgalmi tájékoztatások/adatok szükség szerint papírmásolat formájában is rendelkezésre álljanak;

d) olyan hozzáférési és lekérdezési eljárásokat kell használniuk, melyek rövidített nyílt szövegen és ICAO helységnév-azonosítókon alapulnak, értelemszerűen, vagy egy menüvezérelt felhasználói felületen, vagy más alkalmazható struktúrán keresztül, ahogy abban a polgári légügyi hatóság és az érintett üzemeltetők megegyeztek; és

e) egy tájékoztatást igénylő felhasználói kérés esetén gyors válaszadásról kell gondoskodniuk.

Megjegyzés.- Az ICAO rövidítések és kódok, valamint helységnév-azonosítók a Légiforgalmi Szolgálatok Eljárásai – ICAO Rövidítések és Kódok *(Procedures for Air Navigation Services – ICAO abbreviations and Codes - PANS-ABC, Doc 8400), illetve a* Helységnév-azonosítók *(Locations Indicators - Doc 7910) alapján kerülnek megadásra.*

8.3. Repülés utáni tájékoztatás

8.3.1 Az Államoknak biztosítaniuk kell, hogy intézkedéseket tegyenek a repülőtereken/helikopter repülőtereken, a légijárművek személyzetétől kapott, a léginavigációs berendezések állapotáról és működéséről szóló tájékoztatások átvételére, valamint gondoskodniuk kell arról, hogy az ilyen tájékoztatások a légiforgalmi tájékoztató szolgálat rendelkezésére álljanak olyan szétosztás céljára, ahogy azt a körülmények szükségessé teszik.
8.3.2. Az Államoknak biztosítaniuk kell, hogy intézkedéseket tegyenek a repülőtereken/helikopter repülőtereken a légijárművek személyzetétől kapott, az általuk megfigyelt madarak jelenlétéről szóló információ átvételére, valamint gondoskodniuk kell arról, hogy az ilyen tájékoztatások a légiforgalmi tájékoztató szolgálat rendelkezésére álljanak olyan szétosztás céljára, ahogy azt a körülmények szükségessé teszik.
Megjegyzés.- Lásd a 14. Annex – I. Kötet – 9. Fejezet – 9.4. bekezdését!

1. FÜGGELÉK - A LÉGIFORGALMI TÁJÉKOZTATÓ KIADVÁNY (AIP) TARTALMA

(lásd a 4. Fejezetet)

1. RÉSZ - ÁLTALÁNOS TUDNIVALÓK (GEN)

Abban az esetben, ha egy AIP egynél több kötetben készül el, és kerül kibocsátásra, valamint mindegyik kötethez külön módosító és kiegészítő szolgáltatás tartozik, akkor minden egyes kötetnek tartalmaznia kell egy külön bevezetést (előszót), az AIP Módosítások (*Amendments*) jegyzékét, az AIP Mellékletek, Kiegészítések (*Supplements*) jegyzékét, az AIP lapok ellenőrző jegyzékét és a legutóbbi, kézzel bevezetett érvényes módosítások listáját.

GEN 0.1. - Előszó

A Légiforgalmi Tájékoztató Kiadvány (AIP) rövid leírása, mely tartalmazza:
1) a kiadó hatóság nevét;
2) az alkalmazható ICAO dokumentumokat;
3) az AIP felépítését és a rendszeres módosítások meghatározott időszakait; és
4) az AIP-ben lévő hibák, vagy hiányosságok észlelése esetén értesítendő szolgálat megnevezését.

GEN 0.2. - Az AIP Módosítások Nyilvántartása

Módosítások *(Ammendments)* nyilvántartása
Az AIP Módosítások és az AIRAC AIP Módosítások (melyeket az AIRAC rendszer szabályai szerint adtak ki) nyilvántartása a következőket tartalmazza:
1) a módosítás számát;
2) a kiadás dátumát;
3) a beillesztés dátumát (az AIRAC AIP Módosítás esetén a hatálybalépés dátuma); és
4) annak a tisztviselőnek a kézjegye, aki beillesztette a Módosítást.

GEN 0.3. - Az AIP Kiegészítések, Mellékletek Nyilvántartása

Mellékletek (*Supplements*) Nyilvántartása
A kiadott AIP Kiegészítések, Mellékletek jegyzéke a következőket tartalmazza:
1) a Kiegészítés, Melléklet számát;
2) a Kiegészítés, Melléklet tárgyát;
3) az érintett AIP bekezdés(eke)t, fejezeteket;
4) az érvényesség időtartamát; és
5) érvénytelenítési bejegyzést.

GEN 0.4. - Az AIP oldalak Ellenőrzőjegyzéke

Az AIP lapok Ellenőrzőjegyzéke a következőket tartalmazza:
1) oldalszám / térkép megnevezését; és
2) a légiforgalmi tájékoztatás közzétételének, vagy hatálybalépésének dátumát (nap, hónap – névvel megadva, és az év).

GEN 0.5. - Az AIP kézi módosításainak nyilvántartása

Az AIP-be kézzel bevezetett érvényes módosítások nyilvántartása a következőket tartalmazza:
1) az érintett AIP oldal(aka)t;
2) a módosítás szövegét; és
3) annak az AIP Módosításnak a számát, amely értelmében a kézzel végzett módosítást bevezették.

GEN 0.6. - Az 1. Rész tartalomjegyzéke

A 1. Általános részben – (GEN) található fejezetek és alfejezetek listája.
Megjegyzés: - Az alfejezeteket ABC sorrendben is fel lehet sorolni.

GEN 1. - NEMZETI ELŐÍRÁSOK ÉS KÖVETELMÉNYEK

GEN 1.1. - Kijelölt hatóságok

A nemzetközi légiforgalom érdekében dolgozó, annak támogatásában érintett, kijelölt hatóságok (polgári repülési, meteorológiai, vámügyi, bevándorlási, egészségügyi, útvonal - és repülőtéri / helikopter repülőtéri díjakkal, mezőgazdasági karantén ügyekkel foglalkozó, valamint légijármű-baleseteket kivizsgáló) címei, melyek minden egyes hatóságról az alábbiakat tartalmazzák:
1) kijelölt hatóságot;
2) a hatóság nevét;
3) a hatóság postai címét;
4) a telefonszámát;
5) a telefax számát;
6) a telex számát; és
7) a légiforgalmi állandóhelyű szolgálat (AFS) címét.

GEN 1.2. - Légijárművek beléptetése, tranzitálása és kiléptetése

A nemzetközi légiforgalomban résztvevő légijárművek beléptetésével, tranzitálásával és kiléptetésével kapcsolatos előzetes bejelentés és engedélykérés szabályai és követelményei.

GEN 1.3. - Utasok és légijármű személyzetek beléptetése, tranzitálása és kiléptetése

A nem bevándorló utasok és a személyzetek beléptetésével, tranzitálásával és kiléptetésével kapcsolatos rendszabályok (beleértve a vám-, bevándorlási- és karantén szabályokat, valamint az előzetes bejelentés és engedélykérés követelményeit).

GEN 1.4. - Áruszállítmány beléptetése, tranzitálása és kiléptetése

Az áruszállítmányok beléptetésével, tranzitálásával és kiléptetésével kapcsolatos rendszabályok (beleértve a vámszabályokat, valamint az előzetes bejelentés és engedélykérés követelményeit).
Megjegyzés: - a GEN 3.6. (Kutatás és mentés) fejezetben találhatóak részletesen a kutatás, mentés, mentési munkálatok, kivizsgálás, javítás és az eltűnt, vagy sérült repülőgépekkel kapcsolatos mentési munkálatok céljára belépni, vagy indulni szándékozók támogatására szolgáló intézkedések.

GEN 1.5. - Légijármű műszerek, berendezések és repülési dokumentumok.

A légijárművek műszerezettségének, berendezéseinek és repülési dokumentumainak rövid leírása, az alábbiakat beleértve:
1) Műszerezettség, berendezések (ide tartoznak a légijármű kommunikációs és navigációs berendezései), valamint a repülési okmányok, melyeket egy légijármű fedélzetén kell tartani, beleértve minden további szükséges speciális követelményt, az Annex 6 - I. Rész - 6. és 7. Fejezeteiben pontosan meghatározottakon felül; és
2) Vészrádió, Vészjeladó Rádióállomás (Emergency Locator Transmitter – ELT), jelzőkészülékek és életmentő berendezések, ahogy az Annex 6 - I. Részének - 6.6. pontja és II. Részének - 6.4. pontja tartalmazza ezeket, ha így határoztak a körzeti légiforgalmi értekezleteken a kijelölt szárazföldi területek fölött közlekedő járatok vonatkozásában.

GEN 1.6. - A légiközlekedésre vonatkozó nemzeti jogszabályok és a nemzetközi megállapodások/egyezmények összefoglalása

A légiközlekedésre kihatással bíró nemzeti jogszabályok címeinek, megnevezéseinek és hivatkozásainak listája, valamint ahol alkalmazható összegzésük, együttesen az állam által ratifikált nemzetközi megállapodások / egyezmények, szerződések listájával.

GEN 1.7. - Eltérések az ICAO Szabványoktól, Gyakorlati Ajánlásoktól és Eljárásoktól

Az Állam nemzeti jogszabályai és gyakorlata, valamint a vonatkozó ICAO rendelkezések között mutatkozó jelentős eltérések listája, beleértve az alábbiakat:
1) az érintett jogszabály /az Annex és a kiadás száma, paragrafus/; és
2) az eltérés, részletes szöveggel.
Ebben az alfejezetben az összes jelentős eltérést fel kell sorolni. Szám szerinti sorrendben kell felsorolni az összes Annex-et még akkor is, ha valamely Annex-el kapcsolatban nincs eltérés – ebben az esetben NIL jelzésről kell gondoskodni. A körzeti kiegészítő eljárásoktól /SUPPS/ való nemzeti eltéréseket, vagy az alkalmazásuktól való eltérés mértékét, közvetlenül azt az Annex-et követően kell közzétenni, mellyel a kiegészítő eljárás összefügg.

GEN 2. - TÁBLÁZATOK ÉS KÓDOK

GEN 2.1. – Mérési rendszer, légijárművek jelzései, ünnepnapok

GEN 2.1.1 – Mértékegységek
Az alkalmazott mértékegységek leírása, beleértve a mértékegységek táblázatát.
GEN 2.1.2. – Időbeli referencia rendszer
Az alkalmazott időbeli vonatkozási rendszer leírása (naptár és időrendszer), valamint annak jelzése, hogy alkalmaznak-e, vagy sem nyári időszámítást a nappali órák számának növelésére, és annak feltüntetése, hogy az időbeli referencia rendszert milyen módon mutatták be az AIP anyagaiban.
GEN 2.1.3. – Vízszintes referencia rendszer
A felhasznált vízszintes (geodéziai) vonatkozási rendszer rövid leírása, beleértve az alábbiakat:
1) a referencia rendszer megnevezése/meghatározása;
2) a projekció azonosítása;
3) a felhasznált ellipszoid azonosítása;
4) a felhasznált alapadat (*datum*) azonosítása
5) az alkalmazás területe(i); és
6) ha alkalmazható, akkor magyarázat azoknak a koordinátáknak csillaggal való jelölésére, melyek nem elégítik ki a 11. Annex, és 14. Annex pontossági követelményeit.
GEN 2.1.4 – Függőleges referencia rendszer

A használatban lévő függőleges referencia rendszer rövid leírása, beleértve a következőket:
1) a referencia rendszer megnevezése/meghatározása;
2) a felhasznált geoid (földalak) modell meghatározása, mellékelve azokat a paramétereket, amelyek a felhasznált modell és az EGM-96 közötti magassági transzformációhoz szükségesek; és
3) magyarázat, amennyiben alkalmazható, azoknak a tengerszint feletti magasság / geoid egyenetlenségek csillaggal való jelölésére, melyek nem elégítik ki a 14. Annex pontossági követelményeit.
GEN 2.1.5. - Légijárművek nemzeti hovatartozásának és lajstromozásának jelzései
A légijármű nemzeti hovatartozásának és lajstromozásának az adott Állam által elfogadott jelzései.
GEN 2.1.6. - Hivatalos Ünnepnapok
A hivatalos munkaszüneti napok listája, valamint annak feltüntetése, hogy ez mely szolgálatokat érinti.

GEN 2.2. – Az AIS kiadványokban használt rövidítések

Az Állam által kiadott Légiforgalmi Tájékoztató Kiadványokban és a szétosztásra kerülő légiforgalmi tájékoztatásokban/adatokban használt rövidítésekből ABC sorrendben összeállított lista, a jelentésükkel, megfelelő magyarázatokkal ellátva azokkal a nemzeti rövidítésekkel, amelyek eltérnek a "Légiforgalmi Szolgálatok Eljárásai – ICAO Rövidítések és Kódok *(Procedures for Air Navigation Services – ICAO abbreviations and Codes - PANS-ABC, Doc 8400)*" című kiadványban leírtaktól.
Megjegyzés.- Ezt ki lehet még egészíteni egy ABC sorrendbe szedett meghatározások listájával / szakkifejezések magyarázatos szójegyzékével.

GEN 2.3. – A térképeken használt jelek

A térképeken használt jelek listája, azon térkép-sorozatok alapján sorba rendezve, amelyeken a jeleket alkalmazták.

GEN 2.4. - Helységnév azonosítók

A légiforgalmi állandóhelyű állomások helymeghatározására kijelölt helységnév-azonosítók ABC sorrendbe szedett listája kódolás és dekódolás céljára. Biztosítani kell a Légiforgalmi Állandóhelyű Szolgálattal /AFS-el/ összeköttetésben nem álló helységnév-azonosítókra való hivatkozást.

GEN 2.5. – Rádiónavigációs berendezések felsorolása

A rádiónavigációs berendezések ABC sorrendbe szedett listája, mely az alábbiakat tartalmazza:
1) azonosító;
2) az állomás neve;
3) a létesítmény/berendezés típusa;
4) hogy a berendezés milyen célokat szolgál: útvonal (E), repülőtér (A), vagy mindkettő (AE).

GEN 2.6. – Átszámítási táblázatok

Átszámításra használt táblázatok az alábbi mértékegységek között:
1) tengeri mérföldről kilométerre, és viszont;
2) lábról méterre, és viszont;
3) decimális ívpercek és ívmásodpercek, oda-vissza;
4) más átszámítási táblázatok, értelemszerűen.

GEN 2.7. – Napkelte / napnyugta táblázatok

A napkelte/napnyugta táblázatokban megadott időpontok meghatározására felhasznált kritériumok rövid, vázlatos leírása, azoknak a helyeknek ABC sorrendbe szedett listájával, melyekre az időpontokat megadták a táblázatban, hivatkozással a vonatkozó oldalakra, valamint a kiválasztott állomások/helyek

számára a napkelte/napnyugta táblázatok, beleértve:
1) az állomás nevét;
2) az ICAO helységnév azonosítót;
3) a földrajzi koordinátákat fokokban és percekben megadva;
4) az(ok) a dátum(ok), amely(ek)re az időpontokat megadták;
5) a hajnali polgári szürkület kezdetének időpontja;
6) a napkelte időpontja;
7) a napnyugta időpontja; és
8) az esti polgári szürkület végének időpontja;

GEN 3. – SZOLGÁLATOK

GEN 3.1. – Légiforgalmi Tájékoztató Szolgálat

GEN 3.1.1. – Felelős, illetékes szolgálat
A rendelkezésre bocsátott Légiforgalmi Tájékoztató Szolgálat (AIS) és a főbb összetevőinek leírása, beleértve:
1) a szolgálat/egység nevét;
2) postai címét;
3) telefonszámát;
4) telefax-számát;
5) telex-számát;
6) AFS címét;
7) azoknak az ICAO dokumentumoknak a megnevezését, melyekre a szolgálat munkáját alapozták, és utalást arra az AIP részre, ahol, ha vannak, felsorolták az eltéréseket; és
8) annak jelzése, ha a szolgálat nem folyamatos (H24) üzemű;
GEN 3.1.2. Illetékesség, hatáskör
A Légiforgalmi Tájékoztató Szolgálat illetékessége, hatásköre.
GEN 3.1.3 – Légiforgalmi Kiadványok
Az Integrált Légiforgalmi Tájékoztatási Csomag (*Integrated Aeronautical Information Package*) elemeinek leírása, beleértve az alábbiakat:
1) AIP és a hozzá kapcsolódó módosító (*amendment*) szolgálat;
2) AIP Kiegészítések (*Supplements*);
3) AIC (Légiforgalmi Tájékoztató Körlevél - *Aeronautical Information Circular*);
4) NOTAM és repülés előtti tájékoztató bulletin (PIB – *Pre-flight Information Bulletins*);
5) az érvényben lévő NOTAM-ok ellenőrző listái és összesítései;
6) hogyan lehet ezeket beszerezni.
Amikor egy AIC-t használnak arra, hogy a kiadványok árát közzétegyék, akkor ezt az AIP ezen fejezetében kell jelezni.
GEN 3.1.4. - AIRAC (A Légiforgalmi Tájékoztató Közlemények Meghatározott Kiadási Rendje – *Aeronautical Information Regulation and Control*) rendszer
Az adott AIRAC rendszer rövid leírása, mellékelve egy táblázatot a jelenlegi és a közeljövőre vonatkozó AIRAC kiadási dátumokkal.
GEN 3.1.5. - Repülés előtti tájékoztató szolgálat a repülőtereken / helikopter repülőtereken
Azoknak a repülőtereknek / helikopter repülőtereknek a listája, amelyeken a repülés előtti tájékoztatás rutinszerűen rendelkezésre áll, beleértve az alábbi lényeges dolgok feltüntetését:
1) az Integrált Légiforgalmi Tájékoztató Csomag rendelkezésre álló elemei;
2) a rendelkezésre álló térképek és részletes navigációs térképek; és
3) az ilyen jellegű adatok általános érvényességi területe.
GEN 3.1.6. - Elektronikus terep és akadály adat
Az elektronikus terep és akadály adat beszerzésének részletei, tartalmazva a következőket:
1) a felelős személy, szolgálat, vagy szervezet nevét;

2) a felelős személy, szolgálat, vagy szervezet postai címét és internet (e-mail) címét;
3) a felelős személy, szolgálat, vagy szervezet telefax számát;
4) a felelős személy, szolgálat, vagy szervezet elérhetőségi telefonszámát;
5) a szolgálat elérhetőségének idejét (idő tartam, beleértve az időzónát, amikor a kapcsolatot fel lehet venni);
6) folyamatos (on-line) tájékoztatás, ami felhasználható a személy, a szolgálat, vagy a szervezet felé történő kapcsolatfelvételre; és
7) kiegészítő információ, ha szükséges, annak érdekében, hogy hogyan és mikor lehet a személlyel, a szolgálattal, vagy a szervezettel a kapcsolatot felvenni.

GEN 3.2. – Légiforgalmi térképek

GEN 3.2.1. – Felelős szolgálat(ok)
A légiforgalmi térképek előállításáért felelős szolgálat(ok) leírása, beleértve:
1) a szolgálat nevét;
2) postai címét;
3) telefonszámát;
4) telefax-számát;
5) telex-számát;
6) az AFS-címét;
7) azoknak az ICAO dokumentumoknak a megnevezését, melyekre a szolgálat munkáját alapozták és utalást arra az AIP részre, ahol, ha vannak, felsorolták az eltéréseket; és
8) annak jelzése, ha a szolgálat nem folyamatos (H24) üzemű;
GEN 3.2.2. – A térképek naprakészen tartása, karbantartása
Rövid leírása annak, hogy a navigációs térképeket hogyan vizsgálják felül, és hogyan módosítják.
GEN 3.2.3. – A beszerzés lehetőségei
Részletes ismertetése annak, hogy a térképeket hogyan lehet beszerezni, mely az alábbiakat tartalmazza:
1) a szolgálat(ok)at / az árusítással megbízott szervezet(ek)et;
2) postai címeket;
3) telefonszámot;
4) telefax-számot;
5) telex-számot; és
6) AFS címet.
GEN 3.2.4. – A rendelkezésre álló légiforgalmi térkép sorozatok
A rendelkezésre álló légiforgalmi térkép sorozatok listája, továbbá minden egyes sorozat általános leírása és a lehetséges felhasználás megjelölése.
GEN 3.2.5. – A rendelkezésre álló légiforgalmi térképek listája
A rendelkezésre álló légiforgalmi térképek listája, mely az alábbiakat tartalmazza:
1) a térképsorozat címe;
2) a térképsorozat léptéke;
3) egy sorozat minden egyes térképének, vagy a sorozat minden egyes lapjának az elnevezése és/vagy a száma;
4) az ár, laponként számítva; és
5) a legutóbbi módosítás dátuma.
GEN 3.2.6. – A World Aeronautical Chart (WAC) – A Léginavigációs Világtérkép indextérképe ICAO – 1 : 1 000 000 léptékben
Ez egy indextérkép, mely egy Állam által kiadott WAC 1 : 1 000 000 térkép fedésterületét és lapjainak beosztását, tördelését mutatja be.
Ha ICAO – 1: 500 000-es Léginavigációs Térképet adnak ki a WAC –1 : 1 000 000-as helyett, akkor az ICAO – 1: 500 000-es Léginavigációs Térkép fedésterületét és lapjainak beosztását, tördelését kell az indextérképen bemutatni.

GEN 3.2.7. – Topográfiai térképek
Annak részletes ismertetése, hogy hogyan lehet hozzájutni a topográfiai térképekhez. A következőket tartalmazza:
1) a szolgálat(ok)/szervezet(ek) megnevezését;
2) postai címet;
3) telefonszámot;
4) telefax számot;
5) telex számot; és
6) AFS címet.
GEN 3.2.8. – Az AIP-ben nem szereplő navigációs térképek javítása
Az AIP-ben nem szerepeltetett navigációs térképeken végrehajtott javítások felsorolása, vagy annak közlése, hogy hol lehet az ilyen információkat beszerezni.

GEN 3.3. – ATS - Légiforgalmi Szolgálatok

GEN 3.3.1. – Felelős szolgálat
A légiforgalmi szolgálat és annak nagyobb részeinek leírása, beleértve:
1) a szolgálat megnevezését;
2) postai címét;
3) telefonszámát;
4) telefax-számát;
5) telex-számát;
6) AFS-címét;
7) azoknak az ICAO dokumentumoknak a megnevezését, melyekre a szolgálat munkáját alapozták, és utalást arra az AIP részre, ahol, ha vannak, felsorolták az eltéréseket; és
8) annak jelzése, ha a szolgálat nem folyamatos (H24) üzemű;
GEN 3.3.2. – Illetékesség, hatáskör
A légiforgalmi szolgálatok illetékességének, hatáskörének rövid leírása, amiért a szolgálatokat létesítették.
GEN 3.3.3. – A szolgálatok típusai
A biztosított légiforgalmi szolgálatok főbb típusainak rövid leírása.
GEN 3.3.4. – A járatók (üzemeltetők) és az ATS közötti koordinálás
Általános feltételek, melyek mellett a járatók (üzemeltetők) és az ATS szolgálatok közötti koordináció létrejön.
GEN 3.3.5. – Minimális tengerszint feletti repülési magasságok
A minimális tengerszint feletti repülési magasságok meghatározásához használt kritériumok.
GEN 3.3.6. – ATS egységek címjegyzéke
Az ATS egységek és címük listája ABC sorrendbe szedve, mely az alábbiakat tartalmazza:
1) az egység megnevezését;
2) postai címét;
3) telefonszámát;
4) telefax-számát;
5) telex-számát; és
6) AFS-címét;

GEN 3.4. – Hírközlési Szolgálatok

GEN 3.4.1. – Illetékes szolgálat
A hírközlési és a navigációs berendezések biztosításáért felelős szolgálat leírása, beleértve az alábbiakat:
1) a szolgálat megnevezését;
2) postai címet;
3) telefonszámot;
4) telefax-számot;

5) telex-számot;
6) AFS- címet;
7) azoknak az ICAO dokumentumoknak a megnevezését, melyekre a szolgálat munkáját alapozták, és utalást arra az AIP részre, ahol, ha vannak, felsorolták az eltéréseket; és
8) annak jelzése, ha a szolgálat nem folyamatos (H24) üzemű;
GEN 3.4.2. – Illetékesség, hatáskör
Annak a hatáskörnek a rövid leírása, melynek számára a Hírközlési Szolgálatot biztosítják.
GEN 3.4.3. – A szolgálatok típusai
A szolgálat és szolgáltatások, berendezések főbb típusainak rövid leírása, beleértve:
1) rádiónavigációs szolgálatokat;
2) hang alapú és/vagy adatkapcsolati szolgálatot;
3) rádióadó / sugárzó szolgálatot;
4) a felhasznált nyelve(ke)t; és
5) annak közlését, hogy hol szerezhető be részletes információ.
GEN 3.4.4. – Követelmények és feltételek
Azoknak a követelményeknek és feltételeknek a rövid leírása, melyek alapján a hírközlési szolgálat rendelkezésre áll.

GEN 3.5. – Meteorológiai szolgálatok

GEN 3.5.1. – Illetékes szolgálat
A meteorológiai szolgálat biztosításáért felelős meteorológiai szolgálat rövid leírása, beleértve az alábbiakat:
1) a szolgálat megnevezését;
2) postai címét;
3) telefonszámát;
4) telefax-számát;
5) telex-számát;
6) AFS-címét;
7) azoknak az ICAO dokumentumoknak a megnevezését, melyekre a szolgálat munkáját alapozták, és utalást arra az AIP részre, ahol, ha vannak, felsorolták az eltéréseket; és
8) annak jelzése, ha a szolgálat nem folyamatos (H24) üzemű;
GEN 3.5.2. – Illetékesség, hatáskör
Annak a körzetnek és/vagy útvonalaknak a rövid leírása, melyek számára a meteorológiai szolgálatot biztosítják.
GEN 3.5.3. – Meteorológiai megfigyelések és jelentések
A nemzetközi légiforgalom számára biztosított meteorológia megfigyelések és jelentések részletes leírása, beleértve az alábbiakat:
1) az állomás neve és ICAO helységnév azonosítója;
2) a megfigyelés típusa és gyakorisága, az automatikus megfigyelő berendezés megnevezésével együtt;
3) a meteorológiai jelentések típusai (pl. METAR) és a "trend" típusú leszállási előrejelzés hozzáférhetősége;
4) A talaj menti szél, a látástávolság, a futópálya menti látástávolság, a felhőalap, a hőmérséklet és ahol alkalmazható a szélnyírás (pl. *anemometer* /szélsebességmérő/ a futópályák kereszteződésében, *transmissometer* /látástávolság-mérő/ a földetérési pont közelében, stb.) megfigyelésére, észlelésére és jelentésére használt megfigyelési rendszer meghatározott típusa és a megfigyelési pontok száma;
5) a szolgálat üzemideje; és
6) a rendelkezésre álló légiforgalmi klimatológiai tájékoztatások megjelölése.
GEN 3.5.4. A szolgálatok típusai
A biztosított szolgálatok, szolgáltatások főbb típusainak rövid leírása, részletesen ismertetve az eligazítást, a szaktanácsadást (konzultációt), a meteorológiai információk bemutatását, az üzemeltetők és a hajózó

személyzetek számára rendelkezésre álló repülési dokumentációt, valamint azokat a módszereket és eszközöket, amelyeket a meteorológiai információ szolgáltatására alkalmaznak és használnak.
GEN 3.5.5. – A járatóktól (üzemeltetőktől) megkövetelt értesítések
Az a minimális mennyiségű előzetes értesítés, bejelentés, amit a meteorológiai hatóság megkíván az üzemeltetőktől az eligazítás, a szaktanácsadás (konzultáció) és a repülési dokumentáció tekintetében, és egyéb olyan meteorológiai információ, amit megkövetelnek, vagy kicserélnek.
GEN 3.5.6. – Légijárművektől származó jelentések
Szükség szerint a meteorológiai hatóság követelményei a légijárművekről származó jelentések összeállításáról és továbbításáról.
GEN 3.5.7. – VOLMET szolgálat
A VOLMET szolgáltatás leírása, az alábbiakat beleértve:
1) az adó állomás neve:
2) hívójel, vagy azonosító és a rádióadásban használt rövidítések;
3) az sugárzásra használt frekvencia, vagy frekvenciák;
4) az adási időszakok;
5) üzemidő;
6) azoknak a repülőtereknek/helikopter repülőtereknek a listája, amelyek számára a jelentéseket és/vagy előrejelzéseket kiadják; és
7) a kiadott jelentések, előrejelzések, valamint a SIGMET tájékoztatások és a megjegyzések.
GEN 3.5.8. – SIGMET és AIRMET szolgálat
A légiforgalmi szolgálattal ellátott Repüléstájékoztató Körzeten, vagy irányítói körzeten belül biztosított meteorológiai megfigyelések leírása, beleértve a meteorológiai megfigyelő állomások listáját, az alábbiakkal:
1) meteorológiai megfigyelő állomás neve és ICAO helységnév azonosítója;
2) üzemidő;
3) a kiszolgált Repüléstájékoztató Körzet(ek), vagy irányítói körzet(ek);
4) a kiadott SIGMET tájékoztatások érvényességi időszakai;
5) a SIGMET tájékoztatással kapcsolatban alkalmazott meghatározott eljárások (pl. vulkáni hamu, trópusi ciklon);
6) az AIRMET tájékoztatás eljárásai (a vonatkozó körzeti légiforgalmi egyezményekkel, megállapodásokkal összhangban);
7) a SIGMET és AIRMET tájékoztatásokkal ellátott légiforgalmi szolgálati egység(ek); és
8) kiegészítő információk (pl. a szolgáltatás bármilyen jellegű korlátozását illetően, stb.).
3.5.9. – Egyéb automatizált meteorológiai szolgáltatások
A rendelkezésre álló, meteorológiai információkat biztosító, automatizált szolgáltatások leírása (pl. telefon és/vagy számítógépes modem útján elérhető automatizált repülés előtti tájékoztató szolgáltatás), amely az alábbiakat tartalmazza:
1) a szolgálat nevét;
2) a rendelkezésre álló tájékoztatásokat;
3) az érintett körzeteket, útvonalakat és repülőtereket; és
4) telefon-, telex - és fax számo(ka)t.

GEN 3.6. – Kutatás és mentés

GEN 3.6.1. – Illetékes szolgálat(ok)
A kutatás és mentés (SAR – *Search and Rescue*) biztosításáért felelős szolgálat(ok) rövid leírása, amely tartalmazza az alábbiakat:
1) a szolgálat/egység nevét;
2) postai címet;
3) telefonszámot;
4) telefax számot;

5) telex számot;
6) AFS címet; és
7) azoknak az ICAO dokumentumoknak a megnevezését, melyekre a szolgálat munkáját alapozták, és utalást arra az AIP részre, ahol, ha vannak, felsorolták az eltéréseket;
GEN 3.6.2. – Illetékesség, hatáskör
Annak az illetékességi területnek a rövid leírása, amelyen belül kutató és mentő szolgálatot biztosítanak.
GEN 3.6.3. – A szolgálat típusai
Ahol alkalmazható, a biztosított szolgálat és szolgáltatások, eszközök rövid leírása és földrajzi ábrázolása, beleértve annak jelzését, hogy a SAR szolgálat légi fedésterülete hol függ a légijárművek jelentős mértékű letelepítésétől.
GEN 3.6.4. – SAR megállapodások, egyezmények
A pillanatnyilag érvényben lévő SAR megállapodások, egyezmények rövid leírása, beleértve azokat az előkészületeket, melyeket, akár csak a felszállást követő közvetlen bejelentéssel, vagy a repülési terv benyújtása után, más Államok légijárművei kutatás, mentés, anyagi javak mentése, elveszett, vagy megsérült légijárművel kapcsolatos javítás, vagy anyagi javak, rakomány mentése céljából történő belépésének és indulásának elősegítésére tettek.
GEN 3.6.5. – A felhasználhatóság feltételei
A kutatással és mentéssel kapcsolatos előkészületek, intézkedések rövid leírása. Tartalmazza azokat az általános feltételeket, melyek alapján a szolgálat és eszközei a nemzetközi légiforgalom számára hozzáférhető. Tartalmazza annak jelzését is, hogy vajon a kutatás, mentés részére rendelkezésre bocsátott eszközök, szolgáltatások a SAR feladatokra és szerepekre specializáltak, vagy egyébként más célra használatosak, de kiképzéssel és megfelelő eszközök, felszerelés segítségével alkalmassá tették SAR célokra is, vagy csak alkalomszerűen állnak rendelkezésre és nem képezték ki, vagy készítették fel az adott SAR munkára.
GEN 3.6.6. – Alkalmazott eljárások és jelzések
A mentésben résztvevő légijármű által alkalmazott eljárások és jelzések rövid leírása és egy táblázat, amely a túlélők által használandó jelzéseket mutatja be.

GEN4. – REPÜLŐTEREK / HELIKOPTER REPÜLŐTEREK ÉS LÉGINAVIGÁCIÓS SZOLGÁLATOK HASZNÁLATI DÍJAI

Ha ebben a fejezetben nem szerepelnek részletesen, akkor itt adhatják meg, hogy hol található a pillanatnyi díjak részletes ismertetése.

GEN 4.1. – R epülőtereken / helikopter repülőtereken fizetendő díjak

A nemzetközi forgalomban használható repülőtereken / helikopter repülőtereken alkalmazható díjak típusainak rövid leírása, beleértve az alábbiakat:
1) *a légijármű leszállását;*
2) *légijármű parkolását, hangárban történő elhelyezését és hosszú ideig tartó tárolását;*
3) *utasokkal kapcsolatos szolgáltatások díjait;*
4) *a biztonsággal kapcsolatos díjakat;*
5) *zajjal kapcsolatos díjakat;*
6) *egyéb díjakat (vám, egészségügy, bevándorlás, stb.);*
7) *kivételeket / engedményeket; és*
8) *fizetési módozatokat.*

GEN 4.2. – A léginavigációs / légiforgalmi szolgálatokért fizetendő díjak

A nemzetközi használatra biztosított léginavigációs / légiforgalmi szolgálatokért kiróható díjak rövid leírása, beleértve az alábbiakat:
1) *a bevezető irányítást;*
2) *az útvonalon biztosított léginavigációs / légiforgalmi szolgálatokat;*

3) *a léginavigációs / légiforgalmi szolgálatok költség alapját, valamint a kivételeket / engedményeket; és*
4) *a fizetési módozatokat.*

2. RÉSZ - ENR (EN-ROUTE) ÚTVONALREPÜLÉS

Abban az esetben, ha egy AIP egynél több kötetben készül el, és kerül kibocsátásra, valamint mindegyik kötethez külön módosító és kiegészítő szolgáltatás tartozik, akkor minden egyes kötetnek tartalmaznia kell egy külön bevezető részt (előszót), az AIP Módosítások (*Amendments*) jegyzékét, az AIP Kiegészítések (*Supplements*) jegyzékét, az AIP lapok ellenőrző jegyzékét és a legutóbbi, kézzel bevezetett érvényes módosítások listáját. Abban az esetben, ha az AIP-t egyetlen kötetben adták ki, a "Nem alkalmazható" jelzéssel kell ellátni az előbb felsorolt összes alfejezetet.
A megfelelő alfejezetben jelezni kell, ha a nemzeti szabályozás, valamint az ICAO SARP-ok (Nemzetközi Szabványok és Gyakorlati Ajánlások) és eljárások között eltérés áll fenn, és hogy ezek részletes ismertetése a GEN 1.7 részben található.

ENR 0.6. - A 2. Rész tartalomjegyzéke

A 2. Részben (*En-route* - Útvonalrepülés) található fejezetek és alfejezetek jegyzéke.
Megjegyzés: - Az alfejezetek felsorolását ABC sorrendben is meg lehet adni.

ENR 1. - ÁLTALÁNOS SZABÁLYOK ÉS ELJÁRÁSOK

ENR 1.1. - Általános szabályok

Az általános szabályok közzétételét úgy követelik meg, ahogy azt az Államon belül alkalmazzák.

ENR 1.2. – VFR – Látvarepülési Szabályok

A Látvarepülési Szabályok közzétételét úgy követelik meg, ahogy azt az Államon belül alkalmazzák.

ENR 1.3. – IFR – Műszerrepülési Szabályok

A Műszerrepülési Szabályok közzétételét úgy követelik meg, ahogy azt az Államon belül alkalmazzák.

ENR 1.4. – ATS légterek osztályozása

Az ATS légtér osztályok leírása, a 11. Annex, 4. Függelékében található ATS légtér osztályba-sorolási táblázat formájában, megfelelő módon megjelölve azokat a légtér osztályokat, melyeket az Állam nem használt fel.

ENR 1.5. – Várakozási, megközelítési (érkezési) és indulási eljárások

ENR 1.5.1. – Általános szabályok
Azokat a kritériumokat kell ebben a pontban nyilvánosságra hozni, melyekre a várakozási, megközelítési (érkezési) és indulási eljárásokat kidolgozták. Ha ezek eltérnek az ICAO által előírtaktól, akkor táblázatos formában kell közzétenni a felhasznált kritériumokat.
ENR 1.5.2. – Érkező légijárművek
Azoknak az eljárásoknak (hagyományos, vagy területi navigációs, vagy mindkettő) a közzétételét követelik meg az érkező légijárművek számára, melyek közösek az azonos típusú légtérbe belépő, vagy az abban a légtérben repülő légijárművek számára. Ha eltérő eljárásokat alkalmaznak a Közelkörzetben, ezt a tényt jelezni kell, utalással arra, hogy az adott eljárásokat hol lehet megtalálni.
ENR 1.5.3. – Induló légijárművek
Az induló légijárművek számára azoknak az eljárásoknak (hagyományos, vagy területi navigációs, vagy

mindkettő) a közzétételét követelik meg, melyek közösek bármely repülőtérről / helikopter repülőtérről felszálló légijármű számára.

ENR 1.6. – ATS légtérellenőrző / Radar szolgálatok és eljárások

ENR 1.6.1 – Elsődleges radar
Az elsődleges radar szolgálatok és eljárások leírása, beleértve az alábbiakat:
1) kiegészítő, pótlólagos szolgálatok;
2) a radar irányító szolgálat alkalmazása;
3) radar - és rádióhiba esetén alkalmazandó eljárások;
4) hang alapú és CPDLC pozíció jelentési követelmények; és
5) a radar fedésterületének grafikus ábrázolása.
ENR 1.6.2. – Másodlagos Légtérellenőrző Radar (SSR)
A Másodlagos Légtérellenőrző Radar üzemeltetési eljárásainak részletes leírása, az alábbiakat beleértve:
1) kényszerhelyzeti eljárások;
2) rádióhiba és jogellenes beavatkozás esetén követendő eljárások;
3) a másodlagos kód kijelölésének rendszere;
4) hang alapú és CPDLC pozíció jelentési követelmények; és
5) az SSR radar fedésterületének grafikus ábrázolása;
Megjegyzés.- A Másodlagos Ellenőrző Radar eljárások leírása különös fontossággal bír azokon a területeken, vagy útvonalakon, ahol az elfogás lehetősége fennáll.
ENR 1.6.3. – Automatikus függőségen alapuló légtérellenőrzés – sugárzásos (ADS-B)
Az Automatikus függőségen alapuló légtérellenőrzés – sugárzásos (ADS-B) üzemeltetési eljárásainak részletes leírása, az alábbiakat beleértve:
1) kényszerhelyzeti eljárások;
2) rádióhiba és jogellenes beavatkozás esetén követendő eljárások;
3) légijármű azonosításának követelményei;
4) hang alapú és CPDLC pozíció jelentési követelmények; és
5) az ADS-B fedésterületének grafikus ábrázolása;
Megjegyzés.- Az ADS-B eljárások leírása különös fontossággal bír azokon a területeken, vagy útvonalakon, ahol az elfogás lehetősége fennáll.

ENR 1.7. – Magasságmérő beállítási eljárások

Megkövetelik az alkalmazott magasságmérő beállítási eljárások közzétételét, az alábbiakat beleértve:
1) rövid bevezetés azoknak az ICAO dokumentumoknak a bemutatásával, melyekre az eljárásokat alapozták, valamint az ICAO előírásaitól való eltérések, ha vannak ilyenek;
2) alapvető magasságmérő beállítási eljárások;
3) magasságmérő beállítási körzet(ek) leírása;
4) A járatók (üzemeltetők) (beleértve a pilóták) által alkalmazható eljárások; és
5) az utazómagasságok táblázata;

ENR 1.8. – Regionális kiegészítő eljárások

Megkövetelik a teljes illetékességi területet érintő körzeti kiegészítő eljárások (SUPPS) közzétételét, kiegészítve a pontosan bemutatott nemzeti eltérésekkel, ha vannak ilyenek.

ENR 1.9. – Légiforgalmi áramlásszervezés

A Légiforgalmi áramlásszervezés (ATFM) rendszerének rövid ismertetése, az alábbiakat beleértve:
1) Az ATFM felépítése, a szolgálat illetékességi területe, a biztosított szolgálatok, az egység(ek) helye és az üzemidejük;

2) az áramlásszervezésben használatos üzenetek típusai, valamint a formátumok leírása; és
3) az induló légijárművek számára alkalmazandó eljárások, az alábbiakat tartalmazva:
  a) az alkalmazott ATFM intézkedésekkel kapcsolatos információ biztosításáért felelős szolgálat;
  b) repülési tervvel kapcsolatos követelmények; és
  c) résidő kiosztás.

ENR 1.10. – Repülés tervezés

Megkövetelik a repülés tervezési szakaszához kapcsolódó minden olyan megszorítás, korlátozás, vagy tanácsadó információ közzétételét, amely a felhasználó segítségére lehet a tervezett repülés bejelentésében, beleértve az alábbiakat:
1) a repülési terv benyújtásának eljárásai;
2) az ismétlődő repülési terv rendszere; és
3) a benyújtott repülési tervben szereplő adatok megváltoztatása.

ENR 1.11. – A repülési terv közlemények címzése

Megkövetelik a repülési tervekben alkalmazható címek közzétételét táblázatos formában, bemutatva az alábbiakat:
1) a repülés kategóriája (IFR, VFR, vagy mindkettő);
2) útvonal (a FIR-be, vagy a FIR-en keresztül és/vagy a TMA-ba, vagy azon keresztül);
3) közlemény címe;

ENR 1.12. – Polgári légijárművek elfogása

Megkövetelik az alkalmazandó elfogási eljárások és vizuális jelzések maradéktalan közzétételét, valamint egyértelműen jelezni kell, hogy alkalmazzák-e az ICAO rendelkezéseket, ha nem, akkor az eltéréseket részletesen be kell mutassák.

ENR 1.13. – Jogellenes beavatkozás

Megkövetelik a jogellenes beavatkozás esetén alkalmazandó, megfelelő eljárások közzétételét.

ENR 1.14. – Légiforgalmi váratlan események

A légiforgalmi események jelentési rendszerének leírása, mely az alábbiakat tartalmazza:
1) a légiforgalmi események részletes leírása;
2) a "Légiforgalmi események jelentésére használt formanyomtatvány", ("*Air Traffic Incident Reporting Form*") használata;
3) az események jelentésének eljárásai (beleértve a repülés közbeni eljárásokat is); valamint
4) a jelentés célját és a formanyomtatvány kezelését.

ENR 2. – A LÉGIFORGALMI SZOLGÁLATOK LÉGTEREI

ENR 2.1. – FIR, UIR, TMA

A repüléstájékoztató körzetek (*FIR - Flight Information Region*), magaslégtéri repüléstájékoztató körzetek (*UIR - Upper Flight Information Region*), közelkörzetek (*TMA - Terminal Control Area*) részletes leírása, beleértve az alábbiakat:
1) a FIR/UIR neve, oldalhatárainak földrajzi koordináta pontjai fokokban, percekben, a TMA oldalhatárai fokokban, percekben és másodpercekben megadva, függőleges határaik és a légterek osztályba sorolása;
2) a szolgálatot biztosító egység azonosítása;
3) az egységet kiszolgáló légiforgalmi állomás hívójele, a használatos nyelv(ek), a terület és a feltételek

pontos meghatározása, hogy mikor és hol használandó, ha alkalmazható;
4) a frekvenciák, kiegészítve a konkrét célok megjelölésével; és
5) megjegyzések.
A katonai légitámaszpontok körül található, az AIP-ben egyébként más módon le nem írt repülőtéri irányítói körzeteket (*Control Zone*) ebben az alfejezetben kell megadni. Azokon a területeken, ahol a 2. Annex a repülési tervekkel, a kétirányú összeköttetéssel és a helyzetjelentéssel kapcsolatos követelményei az összes járatra vonatkoznak, annak érdekében, hogy kiküszöböljék, vagy csökkentsék az elfogások szükségességét, és/vagy ahol az elfogás lehetősége fennáll és szükséges a folyamatos figyelés a 121.5 MHz kényszerhelyzeti frekvencián, akkor ezt a tényt a vonatkozó terület(ek)ről, vagy azoknak részé(i)ről itt kell közölni.
Azon kijelölt területek részletes leírása, amelyek felett szükséges egy kényszerhelyzeti Vészjeladó Rádióállomás megléte a fedélzeten (*ELT - Emergency Locator Transmitter*), és ahol a légijárművek személyzeteinek folyamatosan figyelniük kell a 121.5 MHz kényszerhelyzeti URH frekvencián, kivéve azokat az időszakokat, amikor a légijármű személyzete más URH csatornákon kommunikál, vagy amikor a fedélzeti berendezésekre érvényes korlátozások, vagy a pilótafülkében elvégzendő feladatok nem teszik lehetővé a két csatorna egyidejű figyelését.
Megjegyzés.- A repülőterek / helikopter repülőterek körüli más légtér-típusok leírása, mint amilyenek a repülőtéri irányító körzetek és a repülőtéri forgalmi körzetek, a vonatkozó repülőtéri, vagy helikopter repülőtéri fejezetben található.

ENR 2.2. – Egyéb, szabályozott légterek

Ahol ilyeneket létesítettek, a szabályozott légtér egyéb típusainak részletes leírása, valamint a légtér osztályozása.

ENR 3. - ATS ÚTVONALAK

Megjegyzés 1.- A rádióirányszögeket, az útirányszögeket és a radiálokat általában a mágneses északhoz viszonyítva adják meg. Az egyenlítőtől távolabb található területek esetében, ahol az illetékes hatóság megállapítása szerint a mágneses északhoz való viszonyítás gyakorlatilag nem alkalmazható, más alkalmas vonatkozatást, pl. a földrajzi északot, vagy a koordináta-háló szerinti északi irányt lehet használni.
Megjegyzés 2.- Két rádiónavigációs berendezés közötti távolság felénél kijelölt, vagy olyan útvonal esetében, amelynek iránya a navigációs berendezések között módosul, a két radiál kereszteződésénél kijelölt átkapcsolási pontot nem kell feltüntetni minden egyes útvonalszakasz vonatkozásában, amennyiben ezen pontok létezését általános formában közlik.

ENR 3.1. – Alacsony légtéri ATS útvonalak

Az alacsony légtéri ATS útvonalak részletes leírása, beleértve az alábbiakat:
1) az útvonal megjelölése, a meghatározott útvonalszakaszo/ko/n alkalmazható Megkövetelt Navigációs Teljesítőképesség (RNP – *Required Navigation Performance*) típus(ok), az útvonalat meghatározó valamennyi fontos pont neve, kódolt megjelölése vagy név-kódja, és földrajzi koordinátái fokokban, percekben és másodpercekben megadva, beleértve a "kötelező" és "kérésre közlendő" jelentőpontokat is;
2) útirányszögek, vagy VOR radiálok, kerekítve a legközelebbi fokra, geodetikus távolságok (*geodesic distance*)[30]* a legközelebbi 1/10 kilométerre, vagy tengeri mérföldre kerekítve, minden egymást követő kijelölt fontos pont között, valamint a VOR radiálok esetén az átkapcsolási pontok között;
3) felső és alsó határok, vagy a minimális tengerszint feletti repülési magasságok kerekítve a következő felette lévő 50 méterre, vagy 100 lábra, valamint a légtér osztályba-sorolása;
4) oldalhatárok és a legkisebb akadálymentes magasságok;
5) az utazó magasságok (repülési szintek) iránya; és
6) megjegyzések, beleértve az irányító egység megjelölését, valamint üzemi frekvenciáját.
Megjegyzés.- a 11. Annex, 1. Függelékével összefüggésben és repüléstervezési célokra, a meghatározott

RNP (Megkövetelt Navigációs Teljesítőképesség) típust nem tekintik az útvonal megnevezés szerves részének.

ENR 3.2. – Felső légtéri ATS útvonalak

A felső légtéri ATS útvonalak részletes leírása, beleértve az alábbiakat:
1) az útvonal megjelölése, a meghatározott útvonalszakaszo/ko/n alkalmazható Megkövetelt Navigációs Teljesítőképesség (RNP – *Required Navigation Performance*) típus(ok), az útvonalat meghatározó valamennyi fontos pont neve, kódolt megjelölése vagy név-kódja, és földrajzi koordinátái fokokban, percekben és másodpercekben megadva, beleértve a "kötelező" és "kérésre közlendő" jelentőpontokat is;
2) útirányszögek, vagy VOR radiálok, kerekítve a legközelebbi fokra, geodetikus távolságok (*geodesic distance*)[31]* a legközelebbi 1/10 kilométerre, vagy tengeri mérföldre kerekítve, minden egymást követő kijelölt fontos pont között, valamint a VOR radiálok esetén az átkapcsolási pontok között;
3) felső és alsó határok, valamint a légtér osztályba-sorolása;
4) oldalhatárok;
5) az utazó magasságok (repülési szintek) iránya; és
6) megjegyzések, beleértve az irányító egység megjelölését, valamint üzemi frekvenciáját és ha rendelkezésre áll, a bejelentkezési címét.
Megjegyzés.- a 11. Annex, 1. Függelékével összefüggésben és repüléstervezési célokra, a meghatározott RNP (Megkövetelt Navigációs Teljesítőképesség) típust nem tekintik az útvonal megnevezés szerves részének.

ENR 3.3. – Területi navigációs útvonalak

A területi navigációs útvonalak (RNAV) részletes leírása, beleértve az alábbiakat:
1) az útvonal megjelölése, a meghatározott útvonalszakaszo/ko/n alkalmazható Megkövetelt Navigációs Teljesítőképesség (RNP – *Required Navigation Performance*) típus(ok), az útvonalat meghatározó valamennyi fontos pont neve, kódolt megjelölése, vagy név-kódja és földrajzi koordinátái fokokban, percekben és másodpercekben megadva, beleértve a "kötelező" és "kérésre közlendő" jelentőpontokat is;
2) egy VOR/DME területi navigációs útvonalakat kitűző, meghatározó útvonalpontok tekintetében, kiegészítésképpen:
a) a referencia VOR/DME állomás azonosítója;
b) irányszöge a legközelebbi fokra kerekítve, valamint a referencia VOR/DME-től való távolsága a legközelebbi 1/10 kilométerre, vagy tengeri mérföldre kerekítve, ha az útvonalpont nem ugyanabban a pontban található; és
c) a DME adó-antennájának tengerszint feletti magassága a legközelebbi 30 méterre (100 lábra) kerekítve;
3) geodetikus távolságok (*geodesic distance*)[32]* a legközelebbi 1/10 kilométerre, vagy tengeri mérföldre kerekítve, a meghatározott végpontok, valamint az összes egymást követő kijelölt fontos pont között;
4) felső és alsó határok és légtér osztályba-sorolása;
5) az utazó magasságok (repülési szintek) iránya; és
6) megjegyzések, beleértve az irányító egység megjelölését, valamint üzemi frekvenciáját és ha rendelkezésre áll, a bejelentkezési címét.
Megjegyzés.- a 11. Annex, 1. Függelékével összefüggésben és repüléstervezési célokra, a meghatározott RNP (Megkövetelt Navigációs Teljesítőképesség) típust nem tekintik az útvonal megnevezés szerves részének.

ENR 3.4. – Helikopter útvonalak

A helikopter útvonalak részletes leírása, beleértve a következőket:
1) az útvonal megjelölése, a meghatározott útvonalszakaszo/ko/n alkalmazható Megkövetelt Navigációs Teljesítőképesség (RNP – *Required Navigation Performance*) típus(ok), az útvonalat meghatározó

valamennyi fontos pont neve, kódolt megjelölése, vagy név-kódja és földrajzi koordinátái fokokban, percekben és másodpercekben megadva, beleértve a "kötelező" és "kérésre közlendő" jelentőpontokat is;
2) útirányszögek, vagy VOR radiálok, kerekítve a legközelebbi fokra, geodetikus távolságok (*geodesic distance*) a legközelebbi 1/10 kilométerre, vagy tengeri mérföldre kerekítve, minden egymást követő kijelölt fontos pont között, valamint a VOR radiálok esetén az átkapcsolási pontok között;
3) felső és alsó határok, valamint a légtér osztályba-sorolása;
4) a minimális tengerszint feletti repülési magasságok (*minimum flight altitudes*), kerekítve a legközelebbi magasabb 50[33]** méterre vagy 100 lábra; és
(**valószínűleg az 50 méter hibás adat, a 100 lábból csak 30 méter következne!! - Fordító)
5) megjegyzések, beleértve az irányító egység megjelölését, valamint üzemi frekvenciáját.
Megjegyzés.- az Annex 11, 1. Függelékével összefüggésben és repüléstervezési célokra, a meghatározott RNP (Megkövetelt Navigációs Teljesítőképesség) típust nem tekintik az útvonal megnevezés szerves részének.

ENR 3.5. – Egyéb útvonalak

Megkövetelik azoknak a pontosan kijelölt útvonalaknak a leírását, melyek használata kötelező a meghatározott légtér(ek)en belül.
Megjegyzés: - Az érkezési, átrepülő és indulási útvonalakat, melyeket a repülőterekről / helikopter repülőterekről induló, érkező forgalom eljárásaival kapcsolatosan határoztak meg, nem ebben a részben kell meghatározni, mivel ezek a 3. Rész - Repülőterek idevágó szakaszában lettek részletezve.

ENR 3.6. – Várakozás az útvonalon

Az útvonalon való várakozási eljárások részletes leírását követelik meg, mely az alábbiakat tartalmazza:
1) a várakozási eljárás azonosítása (ha van ilyen) és a várakozási pont (navigációs berendezés), vagy útvonalpont földrajzi koordinátákkal, fokban, percben és másodpercben megadva;
2) a rárepülés útiránya;
3) az eljárás fordulóinak iránya;
4) maximális műszer szerinti repülési sebesség (IAS);
5) a várakozásra használható minimális és maximális repülési szintek;
6) a kirepülés ideje/távolsága; és
7) az irányító egység megjelölését, valamint üzemi frekvenciáját.
Megjegyzés.- a várakozási eljárásokkal kapcsolatos akadálymentességi kritériumokat a "Léginavigációs Szolgálatok Eljárásai, a Légijárművek Üzemeltetése (PANS - OPS, Doc 8168), I. és II. Kötete tartalmazza.

ENR 4. - RÁDIÓNAVIGÁCIÓS SEGÉDESZKÖZÖK / RENDSZEREK

ENR 4.1. - Rádiónavigációs Segédeszközök - Útvonalrepülés

Az útvonalrepülés céljára létesített, rádiónavigációs szolgálatot biztosító állomások listája, az állomások neve szerint betűrendbe szedve, az alábbiakat beleértve:
1) az állomás neve és a mágneses elhajlás a legközelebbi fokra kerekítve, valamint a VOR-ok számára a VOR berendezés deklinációja (*Station declination)*[34]* a legközelebbi fokra kerekítve, melyet a berendezés műszaki beállításakor használnak;
2) azonosító;
3) az összes elem frekvenciája/csatornája;
4) üzemeltetési ideje;
5) a sugárzásra használt antenna telepítési helyének földrajzi koordinátái fokokban, percekben és másodpercekben megadva;
6) a DME adó antennájának tengerszint feletti magassága, kerekítve a legközelebbi 30 méterre (100 lábra); és

7) megjegyzések.
Ha a berendezést üzemeltető hatóság nem ugyanaz, mint a kijelölt állami képviselet, akkor az üzemeltetést végző hatóság nevét a megjegyzés rovatban kell feltüntetni. A berendezés hatótávolságát a megjegyzés rovatban kell jelezni.

ENR 4.2. – Különleges navigációs rendszerek.

A különleges navigációs rendszerekkel kapcsolatban lévő állomások leírása (DECCA, LORAN, stb.), az alábbiakat beleértve:
1) az állomás, vagy állomáslánc neve;
2) a rendelkezésre álló szolgálat típusa (vezérlő jel, segéd jel, szín);
3) frekvencia (csatornaszám, alap impulzus gyakoriság, ismétlődési sebesség, ahogy alkalmazható);
4) üzemidő;
5) az adóállomás telepítési helyének földrajzi koordinátái fokokban, percekben és másodpercekben megadva; és
6) megjegyzések.
Ha a berendezést üzemeltető hatóság nem ugyanaz, mint a kijelölt állami képviselet, akkor az üzemeltetést végző hatóság nevét a megjegyzés rovatban kell feltüntetni. A berendezés hatótávolságát a megjegyzés rovatban kell jelezni.

ENR 4.3 – GNSS – Globális navigációs műholdrendszer

A navigációs szolgáltatást biztosító, útvonalrepülés céljára létesített Globális Navigációs Műholdrendszer (GNSS) elemeinek listája és meghatározása, az elemek neve alapján betűrendbe szedve, az alábbiakat tartalmazza:
1) A GNSS elem (GPS, GLONASS, EGNOS, MSAS, WAAS, stb.) neve;
2) frekvencia (frekvenciák), értelemszerűen;
3) a névleges szolgálati terület és a lefedési terület földrajzi koordinátái fokokban, percekben és másodpercekben megadva; és
4) megjegyzések.
Ha a berendezést üzemeltető hatóság nem ugyanaz, mint a kijelölt állami képviselet, akkor az üzemeltetést végző hatóság nevét a megjegyzés rovatban kell feltüntetni.

ENR 4.4. – Fontos Pontok Név-kódjának kijelölése

A nem rádiónavigációs berendezések telepítési helyével kijelölt fontos pontok számára létrehozott név - kód elnevezések (5 betűs, kiejthető név-kódok) betűrendbe rendezett listája, beleértve:
1) név-kód elnevezés;
2) a pozíció földrajzi koordinátái fokokban, percekben és másodpercekben megadva; és
3) utalás azokra az ATS, vagy egyéb útvonalakra, amelyeken az adott pont elhelyezkedik.

ENR 4.5. – Légiforgalmi földi fények – útvonalon

Az Állam által fontosnak minősített földrajzi pontot jelölő léginavigációs földi fények, és más fényjeladók listája, az alábbiakat beleértve:
1) nagyobb, vagy kisebb város neve, vagy a fényjeladó egyéb azonosítója;
2) a fényjeladó típusa, és a fényintenzitás 1000 candelában ("cd" – gyertya) kifejezve;
3) a jelzés karakterisztikája;
4) üzemideje; és
5) megjegyzések.

ENR 5. – NAVIGÁCIÓS FIGYELMEZTETÉSEK

ENR 5.1. – Tiltott, korlátozott és veszélyes légterek

A tiltott, korlátozott és veszélyes légterek leírása, ahol lehetséges grafikus ábrázolással kiegészítve, olyan információkkal, melyek létesítésükkel és a működtetésükkel kapcsolatosak, az alábbiakat tartalmazza:
1) a légtér azonosítója, neve, valamint a légtér oldalhatárainak földrajzi koordinátái fokokban, percekben és másodpercekben, amennyiben az irányítói körzeteken / repülőtéri irányítói körzeteken belül található, valamint fokokban és percekben, amennyiben kívül helyezkedik el;
2) a felső és alsó határok; valamint
3) megjegyzések, beleértve az aktivitás idejét.
A megjegyzés rovatban jelezni kell a korlátozás típusát, vagy a veszély természetét és az elfogás kockázatát, amennyiben megsértenék ezt a légteret.

ENR 5.2. – Katonai gyakorló és kiképzési légterek, területek, valamint a Légvédelmi Azonosítási Körzet (*ADIZ – Air Defence Identification Zone*)

A létesített katonai kiképzési területek és a rendszeres időközönként végrehajtott katonai gyakorlatok, valamint a létesített Légvédelmi Azonosítási Körzet (ADIZ) részletes leírása, ahol alkalmazható grafikus ábrázolással kiegészítve, az alábbiakat beleértve:
1) oldalhatárainak földrajzi koordinátái fokokban, percekben és másodpercekben, amennyiben az irányítói körzeteken / repülőtéri irányítói körzeteken belül, fokokban és percekben amennyiben azokon kívül helyezkedik el;
2) a felső és alsó határai, valamint a működtetés bejelentésének rendszere és eszközei, azokkal az információkkal együtt, melyek a polgári repülésre vonatkoznak, valamint az alkalmazható ADIZ (*Légvédelmi Azonosítási Körzet – Air Defence Identification Zone*) eljárások;
3) megjegyzések, beleértve a működtetés idejét, valamint az elfogás kockázatát, amennyiben megsértenék a ADIZ légterét (*Légvédelmi Azonosítási Körzet – Air Defence Identification Zone*).

ENR 5.3. – Egyéb veszélyes jellegű tevékenységek és más potenciális veszélyek

ENR 5.3.1. – Egyéb veszélyes jellegű tevékenységek
A repülésekre esetleg hatással lévő tevékenységek leírása, ahol lehetséges térképvázlatokkal kiegészítve, az alábbiakat beleértve:
1) a terület középpontjának földrajzi koordinátái fokokban és percekben, valamint kiterjedése;
2) függőleges határok;
3) tanácsadói intézkedések;
4) az információk biztosításáért felelős hatóság; és
5) megjegyzések, beleértve az aktivitás idejét.
ENR 5.3.2. – Egyéb potenciális veszélyek
A repülésekre esetleg hatással lévő potenciális veszélyek (pl. működő vulkáni tevékenység, nukleáris erőművek, stb.) részletes leírása, ahol lehetséges navigációs térképpel kiegészítve, az alábbiakat beleértve:
1) a potenciális veszély helyének földrajzi koordinátái fokokban és percekben;
2) függőleges határok;
3) tanácsadói intézkedések;
4) az információk biztosításáért felelős hatóság; és
5) megjegyzések.

ENR 5.4. – Légiforgalmi akadályok

Az 1-es számú Területen (az Állam teljes területén) a légiközlekedést befolyásoló akadályok listája, a következőket beleértve:
1) az akadály azonosítóját, vagy megnevezését;
2) az akadály típusát;

3) az akadály helyzetét, fokokban, percekben és másodpercekben megadott földrajzi koordinátákkal;
4) az akadály tengerszint feletti magasságát, valamint függőleges kiterjedését a legközelebbi méterre, vagy lábra;
5) az akadály fényeinek (ha van ilyen) típusa és színe; és
6) ha alkalmazható, akkor annak jelzése, hogy az akadályok listája hozzáférhető elektronikus formában és egy hivatkozás a GEN 3.1.6 pontra;
Megjegyzés 1.- Egy akadály, aminek a magassága a föld felett 100 m, vagy több, akadálynak számít az 1-es számú Területen.
Megjegyzés 2.- Az 1-es számú Területen az akadályok helyzetének (földrajzi hosszúság és szélesség), valamint tengerszint feletti magasságának / függőleges kiterjedésének meghatározását és jelentését (a terepen végzett munka pontosságát és az adatok integritását) szabályzó részletes előírások, értelemszerűen, a 11. Annex, 5. Függelék, 1. és 2. Táblázatában találhatóak.

ENR 5.5 – Légi sport és szabadidős tevékenységek

Az intenzív légi sport és szabadidős tevékenységek rövid leírása, végrehajtásuk feltételeivel, körülményeivel, ahol alkalmazható, kiegészítve ezek grafikus ábrázolásával, beleértve az alábbiakat:
1) az azonosítója, neve és oldalhatárainak földrajzi koordinátái fokokban, percekben és másodpercekben, amennyiben az irányítói körzeteken / repülőtéri irányítói körzeteken belül található, fokokban és percekben, amennyiben azokon kívül helyezkedik el;
2) függőleges határai;
3) az üzemeltető/felhasználó telefonszáma; és
4) megjegyzések, beleértve aktivitás idejét.
Megjegyzés: - Ez a paragrafus további különböző fejezetekre bontható, minden egyes különböző tevékenységi osztály számára, minden esetben feltüntetve a részleteket.

ENR 5.6. – Madárvándorlás és az érzékeny faunával rendelkező területek

A madarak vándorlásával összefüggő mozgások leírása, beleértve ezek útvonalát is, a madarak állandó pihenőhelyeit, valamint a védelemre szoruló, érzékeny faunával rendelkező területeket is, ahol ez megvalósítható, navigációs térképekkel is kiegészítve.

ENR 6. – ÚTVONAL-TÉRKÉPEK
Ennek a szakasznak kell tartalmaznia az ICAO – Útvonal–térképeket, valamint az indextérképeket.

3. RÉSZ – AERODROMES (AD) – REPÜLŐTEREK
Abban az esetben, ha egy AIP egynél több kötetben készül el és kerül kibocsátásra, valamint mindegyik kötethez külön módosító és kiegészítő szolgáltatás tartozik, akkor minden egyes kötetnek tartalmaznia kell egy külön bevezető részt (előszót), az AIP Módosítások (*Amendments*) jegyzékét, az AIP Kiegészítések (*Supplements*) jegyzékét, az AIP lapok ellenőrző jegyzékét és a legutóbbi, kézzel bevezetett érvényes módosítások listáját. Abban az esetben, ha az AIP-t egyetlen kötetben adták ki, a "Nem alkalmazható" jelzéssel kell ellátni az előbb felsorolt összes alfejezetet.
AD 0.6. – A 3. Rész tartalomjegyzéke
A 3. Részben (Aerodromes /AD – Repülőterek/) található fejezetek és alfejezetek felsorolása.
Megjegyzés: - az alfejezeteket betűrendbe szedve is meg lehet adni.

AD 1. – REPÜLŐTEREK / HELIKOPTER REPÜLŐTEREK – BEVEZETÉS

AD 1.1. – Repülőterek / Helikopter Repülőterek hozzáférhetősége

A repülőterek és helikopter repülőterek vonatkozásában az Állam által kijelölt felelős hatóság rövid leírása, beleértve az alábbiakat:
1) azokat az általános feltételeket, melyek alapján a repülőtér / helikopter repülőtér rendelkezésre áll,

használható;
2) azoknak az ICAO dokumentumoknak a megnevezését, melyekre a szolgálatok munkáját alapozták, és utalást arra az AIP részre, ahol felsorolták az eltéréseket, ha vannak ilyenek;
3) azokat a szabályokat, ha vannak ilyenek, melyek alapján a katonai légitámaszpontokat polgári célra igénybe lehet venni;
4) azokat az általános feltételeket, ha vannak ilyenek, melyek alapján a repülőterek CAT II / III szerinti üzemelésére a "Rossz látási körülmények eljárásai" alkalmazhatóak;
5) a fékhatás mérésére használt eszközök és az a futópályán mérhető súrlódási együttható érték, amely alatt az Állam a futópályát csúszósnak fogja nyilvánítani, ha a felülete nedves; és
6) egyéb, hasonló természetű információk.

AD 1.2. – Műszaki mentő és tűzoltó szolgálatok, valamint a hóeltakarítási terv

AD 1.2.1. – Műszaki mentő és tűzoltó szolgálatok
A nyilvánosan rendelkezésre álló (közhasznú) repülőtereken / helikopter repülőtereken a mentő és tűzoltó szolgálatok létesítését meghatározó szabályok rövid leírása, valamint az Állam által megállapított mentő és tűzoltó kategóriák ismertetése.
AD 1.2.2. - Hóeltakarítási terv
Az általános hóeltakarítási terv szempontjainak rövid leírása azon közhasznú repülőterek / helikopter repülőterek számára, ahol rendszerint előfordulhat havazás, az alábbiakat beleértve:
1) a téli szolgáltatásokat végző szervezet;
2) a mozgási területek felügyelete;
3) mérési módszerek és az elvégzett mérések;
4) a mozgási területek használhatóságának megőrzése érdekében tett intézkedések;
5) a jelentések rendszere és eszközei;
6) a futópálya zárás esetei; és
7) a hóval kapcsolatos körülményekről szóló információk szétosztása.
Megjegyzés.- ahol a repülőtereken / helikopter repülőtereken eltérő hóeltakarítási-terv szempontokat alkalmaznak, ott ennek megfelelően lehet felosztani ezt az alfejezetet.

AD 1.3. – Repülőterek / helikopter repülőterek jegyzéke

Az Állam területén található repülőterek és helikopter repülőterek grafikus ábrázolással kiegészített listája, az alábbiakat beleértve:
1) a repülőtér / helikopter repülőtér neve és ICAO által kiosztott helységnév azonosítója;
2) milyen típusú forgalom számára engedik meg a repülőtér / helikopter repülőtér használatát (nemzetközi / belföldi, IFR / VFR, menetrend szerinti / menetrenden kívüli, magán); és
3) hivatkozás az AIP – 3. Részének azon alfejezetére, melyben a repülőterek / helikopter repülőterek részletes adatai megtalálhatóak.

AD 1.4. – A repülőterek / helikopter repülőterek csoportosítása

A repülőterek / helikopter repülőterek csoportosításában az Állam által használt követelmények rövid leírása tájékoztatások elkészítése/ szétosztása/biztosítása céljából (pl. nemzetközi/belföldi; elsődleges/ másodlagos; nagyobb/egyéb; polgári/katonai; stb.).

AD 2. – REPÜLŐTEREK

*Megjegyzés: - A leírásokban a **** behelyettesítendő a vonatkozó ICAO helységnév azonosító kóddal.*

**** AD 2.1. – A repülőtér helységnév azonosító kódja és neve

Megkövetelik a repülőtér számára kiosztott ICAO helységnév azonosító kódjának és nevének közzétételét.

Egy ICAO helységnév azonosító kód szerves részét kell képezze az AD 2. fejezet minden alfejezetében alkalmazandó hivatkozási rendszernek.

**** AD 2.2. – A repülőtér földrajzi és adminisztratív adatai

Itt követelik meg a repülőtér földrajzi és közigazgatási, adminisztratív adatainak közzétételét, az alábbiakat beleértve:
1) a repülőtér vonatkozási pontja (földrajzi koordinátái fokokban, percekben és másodpercekben) és elhelyezkedése;
2) a repülőtér vonatkozási pontjának iránya és távolsága a repülőtér által kiszolgált település (nagyváros, város) központjától;
3) a repülőtér tengerszint feletti magassága, kerekítve a legközelebbi méterre, vagy lábra, valamint a referencia hőmérséklet;
4) a Geoid (földalak) hullámossága, egyenetlensége (*Geoid undulation*) a repülőtér tengerszint feletti vonatkozási pontján, a legközelebbi méterre, vagy lábra kerekítve;
5) mágneses elhajlás a legközelebbi fokra kerekítve, az adat keletkezésének időpontja, az éves változása;
6) a repülőtéri igazgatóság, hatóság megnevezése, címe, telefax és telex számai és AFS címe;
7) milyen típusú forgalom számára engedik meg a repülőtér használatát (IFR / VFR); és
8) megjegyzések.

**** AD 2.3. – Üzemidő

A repülőtéren található szolgálatok üzemidejének részletes leírása, beleértve az alábbiakat:
1) repülőtéri igazgatóság;
2) vámhivatal és bevándorlási hivatal;
3) egészségügyi és közegészségügyi szolgálat;
4) AIS (*Aeronautical Information Services* - Légiforgalmi Tájékoztató Szolgálat) eligazító irodája;
5) ATS (*Air Traffic Services* – Légiforgalmi Szolgálatok) bejelentő irodája (*ARO – ATS reporting office*);
6) MET (repülés meteorológia) eligazító iroda;
7) légiforgalmi szolgálatok;
8) üzemanyag szolgáltatások;
9) földi kiszolgálás, utaskezelés;
10) biztonsági szolgálatok;
11) jégtelenítés; és
12) megjegyzések.

**** AD 2.4. – Földi kiszolgálás és eszközei

A repülőtéren a rendelkezésre álló földi kiszolgálás és a földi kiszolgálás eszközeinek részletes leírása, beleértve az alábbiakat:
1) a teherárú, rakomány kezelésére szolgáló létesítmények, eszközök, szolgáltatások;
2) a rendelkezésre álló üzemanyag és olajfajták;
3) az üzemanyag ellátás létesítményei, berendezései és kapacitásuk;
4) jégtelenítő létesítmények, berendezések, szolgáltatás;
5) hangár férőhelyek légijárművek átmeneti tárolására;
6) javítási szolgáltatások az átmenetileg itt tartózkodó légijárművek számára; és
7) megjegyzések.

**** AD 2.5. - Az utasok kiszolgálása és létesítményei

A repülőtéren az utasok rendelkezésére álló létesítmények, berendezések, utas-kiszolgálás rövid leírása, az alábbiakat beleértve:

1) *szálloda (szállodák) a repülőtéren, vagy annak közvetlen környezetében;*
2) *étterem (éttermek) a repülőtéren, vagy annak közvetlen környezetében;*
3) *közlekedési, szállítási lehetőségek;*
4) egészségügyi létesítmények;
5) *bankok, postahivatalok a repülőtéren, vagy annak közvetlen környezetében;*
6) *idegenforgalmi iroda;* és
7) megjegyzések.

****** AD 2.6. – Mentési és tűzoltó szolgálatok**

A repülőtéren rendelkezésre álló (műszaki) mentési és tűzoltó szolgálatok és berendezések, felszerelések részletes leírása, beleértve az alábbiakat:
1) a repülőtér tűzoltási kategóriája;
2) a műszaki mentés berendezései;
3) *a mozgásképtelenné vált légijárművek eltávolításának képessége, lehetősége;* és
4) megjegyzések.

****** AD 2.7. – Idényjellegű, időszakos használhatóság – hóeltakarítás**

A repülőtér mozgási területein a hóeltakarításra használt berendezéseknek, valamint a hóeltakarítás meghatározott elsőbbségi rendjének részletes leírása, az alábbiakat beleértve:
1) a hóeltakarításra használt eszköz(ök) típusa(i);
2) a hóeltakarítás sorrendje, elsőbbsége; és
3) megjegyzések.

****** AD 2.8. – Előterek, gurulóutak és az ellenőrző helyek / pontok adatai**

Az előterek, gurulóutak és a kijelölt ellenőrző pontok helyének/pozíciójának fizikai jellemzőivel kapcsolatos részletek, az alábbiakat beleértve:
1) a forgalmi előterek burkolata és teherbírása;
2) a gurulóutak szélessége, burkolata, és teherbírása;
3) a magasságmérő ellenőrzésére kijelölt pontok helyzetének meghatározása és a tengerszint feletti magassága, kerekítve a legközelebbi méterre, vagy lábra;
4) VOR ellenőrzésre kijelölt pontok helymeghatározása;
5) az INS (*Inertial Reference System* - Inerciális Referencia Rendszer) ellenőrzésére kijelölt pontok helyzetének meghatározása fokokban, percekben, másodpercekben és 1/100 másodpercekben; és
6) megjegyzések.
Ha az ellenőrző helyek / pontok szerepelnek egy repülőtér térképen, akkor erről információt kell biztosítani ebben az alfejezetben.

****** AD 2.9. – A földi mozgásokat irányító és ellenőrző rendszer, valamint a jelölések**

A gurulásokat irányító és ellenőrző rendszer, valamint a futópálya és gurulóút jelölések rövid leírása, az alábbiakat beleértve:
1) a légijármű állóhely azonosító jeleinek, a gurulóút nyomvonalaknak és a légijármű állóhelyeken található látás szerinti beállító / utas-beszállító hídhoz vezető rendszernek (*visual docking/parking guidance system*) a használata;
2) futópálya és gurulóút jelölések és fények;
3) megállító keresztfénysorok (ha vannak ilyenek); és
4) megjegyzések.

**** AD 2.10. – Repülőtéri akadályok

Az akadályok részletes ismertetése, az alábbiakat beleértve:
1) akadályok a 2-es számú Területen:
a) az akadály azonosítása, vagy neve;
b) az akadály típusa;
c) az akadály pozíciójának földrajzi koordinátái fokokban, percekben, másodpercekben és 1/10 másodpercekben;
d) az akadály tengerszint feletti magassága és függőleges kiterjedése a legközelebbi méterre, vagy lábra kerekítve;
e) az akadály jelölése, és az akadályfények típusa, színe (ha van);
f) ha alkalmazható, akkor annak jelzése, hogy az akadályok listája hozzáférhető elektronikus formában és egy hivatkozás a GEN 3.1.6 pontra; és
g) NIL jelölés, ha alkalmazható.
Megjegyzés 1.- A 10. Fejezet 10.2.2 pontja tartalmazza a 2-es számú Terület meghatározását, míg a 8. Függelék, A8-2 ábrája grafikus formában szemlélteti az akadály adatok gyűjtésére használandó felületeket, valamint a 2-es számú Területen az akadályok azonosításának kritériumait.
Megjegyzés 2.- Az 2-es számú Területen az akadályok helyzetének (földrajzi hosszúság és szélesség), valamint tengerszint feletti magasságának / függőleges kiterjedésének meghatározását és jelentését (a terepen végzett munka pontosságát és az adatok integritását) szabályzó részletes előírások, értelemszerűen, a 11. Annex, 5. Függelék, 1. és 2. Táblázatában találhatóak, valamint a 14. Annex, I. Kötet, 5. Függelék, A5-1 és A5-2 Táblázatában.
2) akadályok a 3-as számú Területen:
a) az akadály azonosítása, vagy neve;
b) az akadály típusa;
c) az akadály pozíciójának földrajzi koordinátái fokokban, percekben, másodpercekben és 1/10 másodpercekben;
d) az akadály tengerszint feletti magassága és függőleges kiterjedése a legközelebbi méterre, vagy lábra kerekítve;
e) az akadály jelölése és az akadályfények típusa, színe (ha van);
f) ha alkalmazható, akkor annak jelzése, hogy az akadályok listája hozzáférhető elektronikus formában és egy hivatkozás a GEN 3.1.6 pontra; és
g) NIL jelölés, ha helyénvaló.
Megjegyzés 1.- A 10. Fejezet 10.2.3 pontja tartalmazza a 3-as számú Terület meghatározását, míg a 8. Függelék, A8-3 ábrája grafikus formában szemlélteti az akadály adatok gyűjtésére használandó felületeket, valamint az akadályok azonosításának kritériumait a 3-es számú Területen.
Megjegyzés 2.- A 3-as számú Területen az akadályok helyzetének (földrajzi hosszúság és szélesség), valamint tengerszint feletti magasságának / függőleges kiterjedésének meghatározását és jelentését (a terepen végzett munka pontosságát és az adatok integritását) szabályzó részletes előírások a 14. Annex, I. Kötet, 5. Függelék, A5-1 és A5-2 Táblázatában találhatók, értelemszerűen.

**** AD 2.11. - A biztosított meteorológiai tájékoztatás

A repülőtéren biztosított meteorológiai tájékoztatások részletes leírása, valamint annak jelzése, hogy melyik meteorológiai iroda felelős a felsorolt szolgáltatások biztosításáért, beleértve a következőket:
1) a kapcsolódó meteorológiai iroda megnevezése;
2) üzemidő és ahol ez alkalmazható, az ezen az időszakon túl felelős meteorológiai irodának a megnevezése;
3) a TAF-ok összeállításáért felelős iroda megnevezése, érvényességi időszakai és az előrejelzések kiadásának idő-intervallumai;
4) a repülőtér számára rendelkezésre álló trend típusú előrejelzések és a kiadásának idő-intervallumai;

5) információk arról, hogy az eligazításokat és/vagy konzultációkat milyen módon biztosítják;
6) a biztosított repülési dokumentáció típusai és a repülési dokumentációban használt nyelv(ek);
7) az eligazítás, vagy konzultáció idején bemutatott, vagy rendelkezésre álló térképek és egyéb információ;
8) olyan kiegészítő berendezések, melyek segítségével a meteorológiai körülményekről információkat biztosíthatnak, ilyenek lehetnek a meteorológiai radar és vevő a meteorológiai műhold által biztosított képi ábrázolások számára;
9) a meteorológiai információval ellátott Légiforgalmi Szolgálati Egység(ek) (*Air Traffic Services Unit(s)*); és
10) további információk (pl. a szolgálat bármilyen fajta korlátozásáról, stb.).

**** AD 2.12. – A futópálya fizikai jellemzői

Minden egyes futópálya esetén a futópálya fizikai jellemzőinek részletes leírása, beleértve a következőket:
1) megnevezések;
2) földrajzi irányszögek 1/100 fokra kerekítve;
3) a futópálya méretei a legközelebbi méterre, vagy lábra kerekítve;
4) minden egyes futópálya és a hozzájuk tartozó végbiztonsági sávok burkolatának, valamint felületének teherbírása (PCN és a hozzákapcsolódó adatok);
5) minden egyes futópálya küszöbének és pályavégének földrajzi koordinátái fokokban, percekben, másodpercekben és 1/100 másodpercekben megadva, valamint a Földalak (*Geoid*) hullámossága, egyenetlensége (*Geoid undulation*), melyet a legközelebbi 1/2 méterre, vagy lábra kerekítenek, minden egyes küszöb esetén;
6) tengerszint feletti magassága:
· a nem precíziós futópályák küszöbének a legközelebbi méterre, vagy lábra kerekítve; és a precíziós futópályák küszöbének és a földetérési zóna legmagasabban fekvő pontjának, a legközelebbi 1/2 méterre, vagy lábra kerekítve;
7) minden egyes futópálya és hozzájuk tartozó végbiztonsági sávok lejtési viszonyai;
8) a végbiztonsági sáv (*stopway*) mérete a legközelebbi méterre, vagy lábra kerekítve (ha van ilyen);
9) az akadálymentes, felszállási biztonsági sáv (*clearway*) mérete (ha van ilyen) kerekítve a legközelebbi méterre, vagy lábra;
10) a leszállósávok (*strips*) méretei;
11) akadályoktól mentes zóna megléte; és
12) megjegyzések.

**** AD 2.13. – Közzétett távolságok

A közzétett, meghatározott távolságok kerekítve a legközelebbi méterre, vagy lábra minden egyes futópályának minden egyes felszálló irányára, beleértve az alábbiakat;
1) futópálya megnevezése;
2) TORA – az igénybe vehető nekifutási távolság;
3) TODA – az igénybe vehető felszállási távolság;
4) ASDA – az igénybe vehető gyorsítási-megállási távolság;
5) LDA – az igénybe vehető leszállási távolság; és
6) megjegyzések.
Ha egy futópálya valamelyik iránya nem használható felszállásra, leszállásra, vagy mindkettőre, mert azt üzemeltetési szempontból megtiltották, akkor ezt közzé kell tenni, és a "Nem Használható" (*Not Usable*) szavakat, vagy a "NU" rövidítést kell alkalmazni. (Annex 14, 1. Kötet, "A" Melléklet, 3. Szakasz).

**** AD 2.14. – Bevezető és futópálya fények

A bevezető és a futópálya fények részletes leírása, beleértve az alábbiakat:

1) a futópálya megnevezését;
2) a bevezető fényrendszer típusát, hosszúságát és intenzitását;
3) a futópálya küszöb fényeit, színüket és a szárny-fénysorokat (*VASIS*-ból);
4) a VASIS (*visual approach slope indicator system* - optikai siklópálya rendszer) típusát;
5) a futópálya földetérési zóna (*touchdown zone*) fényeinek a hosszúságát;
6) a futópálya középvonal fények (*centre line lights*) hosszúságát, a két lámpatest közötti távolságot, színüket és intenzitásukat;
7) a futópálya szegélyfények (*edge lights*) hosszúságát, a két lámpatest közötti távolságot, színüket és intenzitásukat;
8) a futópálya záró-fények és szárny-fénysorok (*wing bars)* színét;
9) a végbiztonsági sáv (*stopway*) fényeinek hosszát és színét; és
10) megjegyzéseket.

****** AD 2.15. – Egyéb fények, tartalék energia ellátás**

Az egyéb repülőtéri fények, tartalék energia ellátás részletes leírása, az alábbiakat beleértve:
1) a repülőtéri fényjeladó / azonosító fényjeladó (ha van ilyen) telepítési helye, karakterisztikája, és üzemeltetési ideje;
2) a szélsebesség mérő / leszállási irány kijelző telepítési helye és megvilágítása (ha van ilyen);
3) a gurulóutak szegély- és középvonal fényei;
4) tartalék, másodlagos áramellátás beleértve az átkapcsolási időt is; és
5) megjegyzések.

****** AD 2.16. – Helikopter leszálló terület**

A repülőtéren a helikopterek leszállására biztosított terület részletes leírása, az alábbiakat beleértve:
1) a földetérési és elemelkedési (*TLOF*) terület, vagy a végső megközelítési és felszállási (*FATO*) terület mindegyik küszöbe mértani középpontjának (ahol alkalmazható) földrajzi koordinátái fokokban, percekben, másodpercekben és 1/100 másodpercekben, valamint a (*Geoid*) Földalak hullámossága, egyenetlensége (*Geoid undulation*) a legközelebbi 1/2 méterre, vagy lábra kerekítve;
2) TLOF és/vagy FATO terület tengerszint feletti magassága;
· nem precíziós bevezetések esetén a legközelebbi méterre, vagy lábra kerekítve; és
· precíziós bevezetések esetén a legközelebbi 1/2 méterre, vagy lábra kerekítve;
3) a TLOF és FATO területek mérete a legközelebbi méterre, vagy lábra kerekítve, a burkolat típusa, teherbíró-képessége, felületi nyomószilárdsága és jelzései;
4) a FATO földrajzi irányszöge, 1/100 fokra kerekítve;
5) a rendelkezésre álló, közzétett, meghatározott távolságok a legközelebbi méterre, vagy lábra kerekítve;
6) bevezető és FATO fények; és
7) megjegyzések;

****** AD 2.17. – A Légiforgalmi Szolgálatok légtere**

A repülőtéren kialakított Légiforgalmi Szolgálatok (ATS) légterének részletes leírása, beleértve az alábbiakat:
1) a légtér megnevezését és oldalhatárainak földrajzi koordinátáit fokokban, percekben és másodpercekben megadva;
2) függőleges határait;
3) a légtér osztályba sorolását;
4) a szolgálatot biztosító ATS egység hívójelét és a használható nyelvet (nyelveket);
5) az átváltási magasságot; és
6) megjegyzéseket.

****** AD 2.18. – A Légiforgalmi Szolgálatok hírközlési berendezései**

A repülőtéren kialakított Légiforgalmi Szolgálatok hírközlési berendezéseinek részletes leírása, az alábbiakat beleértve:
1) a szolgálat megnevezése;
2) hívójele;
3) frekvenciája (frekvenciái);
4) bejelentkezési címe, értelemszerűen;
5) üzemidő; és
6) megjegyzések.

****** AD 2.l9. – Rádió-navigációs és leszállító berendezések**

A repülőtéren a műszeres megközelítéssel és a közelkörzeti eljárásokkal kapcsolatos rádiónavigációs és leszállító berendezések részletes bemutatása, az alábbiakat beleértve:
1) a berendezés típusa, és a mágneses elhajlás a legközelebbi fokra kerekítve, értelemszerűen, és a támogatott ILS/MLS, alap GNSS, SBAS, és GBAS üzemeltetés, valamint a VOR/ILS/MLS számára a telepítési hely mágneses deklinációja (*Station declination*) is, a legközelebbi fokra kerekítve, melyet a berendezés műszaki beállítására használnak fel;
2) azonosítója, ha szükséges;
3) frekvenciája (frekvenciái), értelemszerűen;
4) üzemideje, értelemszerűen;
5) az adásra használt antenna telepítési helyének földrajzi koordinátái fokokban, percekben, másodpercekben és 1/10 másodpercekben megadva, értelemszerűen;
6) a DME berendezés adó-antennájának tengerszint feletti magassága, kerekítve a legközelebbi 30 méterre (100 lábra), valamint a DME/P antenna esetén a legközelebbi 3 méterre (10 lábra); és
7) megjegyzések.
Abban az esetben, amikor ugyanazt a berendezést használják útvonalrepülési és repülőtéri célokra is, akkor a leírását meg kell adni az ENR 4. fejezetben is. Ha a Földi Bázisú (telepítésű) Kiterjesztő Rendszer (GBAS - *Ground Based Augmentation System*) több, mint egy repülőteret szolgál ki, akkor a berendezés leírását valamennyi repülőtérnél biztosítani kell. Amennyiben a berendezést üzemeltető hatóság nem ugyanaz, mint a kijelölt állami szervezet, akkor az üzemeltető hatóság nevét a megjegyzés rovatban fel kell tüntetni. A berendezés hatótávolságát jelezni kell a megjegyzés rovatban.

****** AD 2.20. - A forgalmat érintő helyi előírások, rendelkezések**

A repülőtér forgalmára vonatkozó előírások részletes leírása, beleértve a guruló légijárművek szabványos gurulási nyomvonalát, beállítási, parkolási előírásokat, oktató és kiképző repüléseket, valamint a hasonló, de kizárt, visszautasított repülési eljárásokat.

****** AD 2.21. - Zajcsökkentő eljárások**

A repülőtéren alkalmazott zajcsökkentő eljárások részletes leírása.

****** AD 2.22. - Repülési eljárások**

A repülőtéren, a légtérszervezés alapján kialakított feltételek és repülési eljárások részletes leírása, beleértve a radar és/vagy ADS-B eljárásokat is. Ha ki van alakítva, a repülőtéren a rossz látási körülmények eljárásainak részletes bemutatása, az alábbiakat beleértve:
1) a rossz látási körülmények között használatra engedélyezett futópálya, futópályák és a hozzá tartozó berendezés;
2) meghatározott meteorológiai viszonyok, amiknél a rossz látási körülmények eljárásait bevezetik,

használják és befejezik; és
3) a rossz látási körülményeknél használatos földi jelölések / fényrendszer ismertetése.

**** AD 2.23. - Kiegészítő információk

A repülőtérre vonatkozó kiegészítő információk, olyanok, mint például a repülőtéren található madárcsoportok, kiegészítve a pihenőhely és táplálkozási hely közötti jelentős napi mozgások feltüntetésével, amennyire csak lehetséges.

**** AD 2.24. - A repülőtérrel kapcsolatos navigációs térképek

Itt követelik meg a repülőtérre vonatkozó térképek közzétételét, az alábbi sorrendben:
1) Repülőtér / Helikopter repülőtér Térkép – ICAO;
2) Légijármű Parkolási / Beállítási Térkép – ICAO;
3) Repülőtéri Földi Mozgások Térképe – ICAO;
4) Repülőtéri Akadály térkép – ICAO A típusú (minden egyes futópályára);
5) Repülőtéri Domborzati és Akadály Térkép – ICAO (Elektronikus formában);
6) Precíziós Megközelítési Domborzati Térkép – ICAO - (Precíziós megközelítés Cat II. és Cat III. üzemre alkalmas futópályákra);
7) Körzeti Térkép – ICAO (indulási és tranzit útvonalakhoz);
8) Szabványos Indulási Útvonalak Térképe – Műszeres (*SID*) – ICAO;
9) Körzeti Térkép – ICAO (érkezési és tranzit útvonalakhoz);
10) Szabványos Érkezési Útvonalak Térképe – Műszeres (*STAR*) – ICAO;
11) A Radarvektorálásnál használható Minimális Tengerszint feletti Magasságok Térképe – ICAO;
12) Műszeres Megközelítési Térkép – ICAO (minden egyes futópályára és eljárás típusra);
13) Látvarepülési Megközelítési Térkép – ICAO; és
14) A repülőtér közvetlen környezetében található madárkolóniák, élőhelyek.
Ha a térképek közül valamelyiket nem adják ki, akkor erre a tényre utalni kell a GEN 3.2 (Léginavigációs térképek) szakaszban.
Megjegyzés. – Az AIP-ben egy oldalzseb használható a Repülőtéri Domborzati és Akadály Térkép – ICAO (Elektronikus formában) (Aerodrome Terrain and Obstacle Chart – ICAO [Electronic]) *egy megfelelő elektronikus adathordozón történő tárolására.*

AD 3. – HELIKOPTER REPÜLŐTEREK

Amikor egy repülőtéren helikopterek leszállására szolgáló területet biztosítanak, akkor az ezzel összefüggő adatokat a "**** AD 2.16." pont alatt kell felsorolni.
*Megjegyzés: - **** behelyettesítendő a vonatkozó ICAO helységnév azonosítóval.*

**** AD 3.1. – A helikopter repülőtér helységnév azonosítója és neve

Itt követelik meg a helikopter repülőtér helységnév azonosítójának és nevének közzétételét. Egy ICAO helységnév azonosító szerves részét kell képezze az AD 3. fejezet minden alfejezetében alkalmazandó hivatkozási rendszernek.

**** AD 3.2. – A helikopter repülőtér földrajzi és üzemeltetői adatai

Megkövetelik a helikopter repülőtér földrajzi és adminisztratív adatainak közzétételét, az alábbiakat beleértve:
1) a helikopter repülőtér vonatkozási pontja (a földrajzi koordináták fokokban, percekben és másodpercekben) és elhelyezkedése;
2) a helikopter repülőtér vonatkozási pontjának iránya és távolsága a helikopter repülőtér által kiszolgált település (nagyváros, város) központjától;
3) a repülőtér tengerszint feletti magassága kerekítve a legközelebbi méterre, vagy lábra, valamint a

referencia hőmérséklet;
4) a Földalak (*Geoid*) hullámossága, egyenetlensége (*Geoid undulation*) a helikopter repülőtér tengerszint feletti magasságának helyén a legközelebbi méterre, vagy lábra kerekítve;
5) mágneses elhajlás a legközelebbi fokra kerekítve, az adat keletkezésének időpontja, és az éves változás;
6) a helikopter repülőtéri igazgatóság megnevezése, címe, telefax és telex számai és AFS (Légiforgalmi Állandóhelyű Szolgálat) címe;
7) milyen típusú forgalom számára engedik meg a helikopter repülőtér használatát (IFR / VFR); és
8) megjegyzések.

****** AD 3.3. – Üzemidő**

A helikopter repülőtéren található alábbi szolgálatok üzemidejének részletes leírása:
1) helikopter repülőtér igazgatóság;
2) a vámhivatal és a bevándorlási hivatal;
3) az egészségügyi és a közegészségügyi szolgálat;
4) AIS (*Aeronautical Information Services* - Légiforgalmi Tájékoztató Szolgálat) eligazító irodája
5) ATS (*Air Traffic Services* - Légiforgalmi Szolgálatok) bejelentő irodája (*ARO – ATS reporting office*);
6) MET (repülés meteorológia) eligazító iroda;
7) légiforgalmi szolgálatok (*Air Traffic Services*);
8) üzemanyag szolgáltatás;
9) földi kiszolgálás;
10) biztonsági szolgálatok;
11) jégtelenítés; és
12) megjegyzések.

****** AD 3.4. – Földi kiszolgálás és eszközei**

A helikopter repülőtéren rendelkezésre álló földi kiszolgálás és a földi kiszolgálás eszközeinek részletes leírása, beleértve az alábbiakat:
1) a teherárú kezelésére szolgáló létesítmények, eszközök, szolgáltatások;
2) a rendelkezésre álló üzemanyag és olajfajták;
3) az üzemanyag ellátás létesítményei, berendezései és kapacitásuk;
4) jégtelenítő létesítmények, berendezések, szolgáltatás;
5) hangár férőhelyek helikopterek átmeneti tárolására;
6) javítási szolgáltatások az átmenetileg itt tartózkodó helikopterek számára; és
7) megjegyzések.

****** AD 3.5. – Az utasok kiszolgálása és létesítményei**

A helikopter repülőtéren az utasok rendelkezésre álló létesítmények, berendezések, utas-kiszolgálás rövid leírása, az alábbiakat beleértve:
1) *szálloda (szállodák) a helikopter repülőtéren, vagy közvetlen környezetében;*
2) *étterem (éttermek) a helikopter repülőtéren, vagy közvetlen környezetében;*
3) *közlekedési, szállítási lehetőségek;*
4) egészségügyi létesítmények;
5) *bankok, postahivatalok a helikopter repülőtéren, vagy annak közvetlen környezetében;*
6) *idegenforgalmi iroda;* és
7) megjegyzések.

****** AD 3.6 – Mentő és tűzoltó szolgálatok**

A helikopter repülőtéren rendelkezésre álló (műszaki) mentési és tűzoltó szolgálatok és berendezések,

felszerelések részletes leírása, beleértve az alábbiakat:
1) a helikopter repülőtér tűzoltási kategóriája;
2) a műszaki mentés berendezései;
3) *a mozgásképtelenné vált helikopterek eltávolításának képessége, lehetősége;* és
4) megjegyzések.

****** AD 3.7. – Idényjellegű, időszakos használhatóság - hóeltakarítás**

A helikopter repülőtér mozgási területein a hóeltakarításra használt berendezéseknek, valamint a hóeltakarítás meghatározott elsőbbségi rendjének részletes leírása, az alábbiakat beleértve:
1) a hóeltakarításra használt eszköz(ök) típusa(i);
2) a hóeltakarítás sorrendje, elsőbbsége; és
3) megjegyzések.

****** AD 3.8. – Előterek, gurulóutak és ellenőrző helyek / pontok adatai**

Az előterek, gurulóutak és kijelölt ellenőrző pontok helyének/pozíciójának fizikai jellemzőivel kapcsolatos részletek, az alábbiakat beleértve:
1) a forgalmi előterek és a helikopter állóhelyek burkolata és teherbírása;
2) a helikopterek földi gurulására használatos gurulóutak szélessége, burkolatának kivitele, teherbírása és megnevezése;
3) a helikopter légi gurulóutak, valamint a légi tranzit útvonalak szélessége és jelölése;
4) a magasságmérő ellenőrzésére kijelölt pontok helyzetének meghatározása és a tengerszint feletti magassága, kerekítve a legközelebbi méterre, vagy lábra;
5) VOR ellenőrzésre kijelölt pontok helymeghatározása;
6) az INS (*Inertial Reference System* - Inerciális Referencia Rendszer) ellenőrzésére kijelölt pontok helyzetének meghatározása fokokban, percekben, másodpercekben és 1/100 másodpercekben; és
7) megjegyzések.
Ha az ellenőrző helyek / pontok szerepelnek egy helikopter repülőtér navigációs térképén, akkor erről a tényről információt kell biztosítani ebben az alfejezetben.

****** AD 3.9. – Jelölések és jelzések**

A végső megközelítési – és felszállási terület, valamint a gurulóutak jelöléseinek és jelzéseinek rövid leírása, az alábbiakat beleértve:
1) A végső megközelítési - és felszállási terület jelölései;
2) gurulóutak jelölései, légi gurulóutak jelzései, valamint a légi tranzit útvonalak jelzései; és
3) megjegyzések.

****** AD 3.10. – A helikopter repülőtéren található akadályok**

Az akadályok részletes ismertetése, az alábbiakat beleértve:
1) akadályok a 2-es számú Területen:
a) az akadály azonosítása, vagy neve;
b) az akadály típusa;
c) az akadály pozíciójának földrajzi koordinátái fokokban, percekben, másodpercekben és 1/10 másodpercekben;
d) az akadály tengerszint feletti magassága, és függőleges kiterjedése a legközelebbi méterre, vagy lábra kerekítve;
e) az akadály jelölése, és az akadályfények típusa, színe (ha van);
f) ha alkalmazható, akkor annak jelzése, hogy az akadályok listája hozzáférhető elektronikus formában és egy hivatkozás a GEN 3.1.6 pontra; és

g) NIL jelölés, ha alkalmazható.
Megjegyzés 1.- A 10. Fejezet 10.2.2 pontja tartalmazza a 2-es számú Terület meghatározását, míg a 8. Függelék, A8-2 ábrája grafikus formában szemlélteti az akadály adatok gyűjtésére használandó felületeket, valamint a 2-es számú Területen az akadályok azonosításának kritériumait.
Megjegyzés 2.- Az 2-es számú Területen az akadályok helyzetének (földrajzi hosszúság és szélesség), valamint tengerszint feletti magasságának / függőleges kiterjedésének meghatározását és jelentését (a terepen végzett munka pontosságát és az adatok integritását) szabályzó részletes előírások, értelemszerűen, a 11. Annex, 5. Függelék, 1. és 2. Táblázatában találhatóak, valamint a 14. Annex, II. Kötet, 1. Függelék, 1. és 2. Táblázatában.
2) akadályok a 3-as számú Területen:
a) az akadály azonosítása, vagy neve;
b) az akadály típusa;
c) az akadály pozíciójának földrajzi koordinátái fokokban, percekben, másodpercekben és 1/10 másodpercekben;
d) az akadály tengerszint feletti magassága, és függőleges kiterjedése a legközelebbi méterre, vagy lábra kerekítve;
e) az akadály jelölése, és az akadályfények típusa, színe (ha van);
f) ha alkalmazható, akkor annak jelzése, hogy az akadályok listája hozzáférhető elektronikus formában és egy hivatkozás a GEN 3.1.6 pontra; és
g) NIL jelölés, ha helyénvaló.
Megjegyzés 1.- A 10. Fejezet 10.2.3 pontja tartalmazza a 3-as számú Terület meghatározását, míg a 8. Függelék, A8-3 ábrája grafikus formában szemlélteti az akadály adatok gyűjtésére használandó felületeket, valamint az akadályok azonosításának kritériumait a 3-es számú Területen.
Megjegyzés 2.- Az 3-as számú Területen az akadályok helyzetének (földrajzi hosszúság és szélesség), valamint tengerszint feletti magasságának / függőleges kiterjedésének meghatározását és jelentését (a terepen végzett munka pontosságát és az adatok integritását) szabályzó részletes előírások, értelemszerűen, a 14. Annex, II. Kötet, 1. Függelék, 1. és 2. Táblázatában találhatók.

****** AD 3.11 – A biztosított meteorológiai tájékoztatás**

A helikopter repülőtéren biztosított meteorológiai tájékoztatások részletes leírása, valamint annak jelzése, hogy melyik meteorológiai iroda felelős a felsorolt szolgáltatások biztosításáért, beleértve a következőket:
1) a kapcsolódó meteorológiai iroda megnevezése;
2) üzemidő, és ahol ez alkalmazható, az ezen az időszakon túl felelős meteorológiai irodának a megnevezése;
3) a TAF-ok összeállításáért felelős iroda megnevezése és az előrejelzések érvényességi időszakai;
4) a helikopter repülőtér számára rendelkezésre álló trend típusú előrejelzések és a kiadásának időintervallumai;
5) információk arról, hogy az eligazításokat és/vagy konzultációkat milyen módon biztosítják;
6) a biztosított repülési dokumentáció típusai és a repülési dokumentációban használt nyelv(ek);
7) az eligazítás, vagy konzultáció idején bemutatott, vagy rendelkezésre álló térképek és egyéb információ;
8) olyan kiegészítő berendezések, melyek segítségével a meteorológiai körülményekről információkat biztosíthatnak, ilyenek lehetnek a meteorológiai radar és vevő a meteorológiai műhold által biztosított képi ábrázolásokhoz;
9) a meteorológiai információval ellátott Légiforgalmi Szolgálati Egység(ek) (*Air Traffic Services Unit(s)*); és
10) további információk (pl. a szolgálat bármilyen fajta korlátozásáról, stb.).

****** AD 3.12. – A helikopter repülőtér adatai**

A helikopter repülőtér méreteinek és kapcsolódó adatainak részletes leírása, az alábbiakat beleértve:

1) a helikopter repülőtér típusa – talajszinten, kiemelkedésen, vagy külön az erre a célra készített emelvényen (*helideck*);
2) földetérési és elemelkedési (TLOF – *touchdown and lift-off*) terület méretei a legközelebbi méterre, vagy lábra kerekítve;
3) a végső megközelítési és felszállási terület (FATO – *final approach and take-off*) földrajzi irányszöge 1/100 fokra kerekítve;
4) a végső megközelítési és felszállási terület (FATO) terület mérete a legközelebbi méterre, vagy lábra kerekítve és a burkolat típusa;
5) a földetérési és elemelkedési (TLOF) terület burkolatának teherbíró képessége és felületi nyomószilárdsága tonnákban (1 000 kg)
6) a földetérési és elemelkedési (*TLOF*) terület, vagy a végső megközelítési és felszállási (*FATO*) terület mindegyik küszöbe mértani középpontjának (ahol alkalmazható) földrajzi koordinátái fokokban, percekben, másodpercekben és 1/100 másodpercekben, valamint a (*Geoid*) Földalak hullámossága, egyenetlensége (*Geoid undulation*) a legközelebbi 1/2 méterre, vagy lábra kerekítve;
7) a TLOF és/vagy FATO terület lejtése és tengerszint feletti magassága:
· a nem precíziós bevezetések esetén a legközelebbi méterre, vagy lábra kerekítve; és
· a precíziós bevezetések esetén a legközelebbi 1/2 méterre, vagy lábra kerekítve;
8) a biztonsági terület méretei;
9) a helikopter felszállási biztonsági, akadálymentességi sáv mérete a legközelebbi méterre, vagy lábra kerekítve;
10) az akadálymentességi szektor megléte, és
11) megjegyzések.

**** AD 3.13. – Közzétett távolságok

A közzétett, meghatározott távolságok kerekítve a legközelebbi méterre, vagy lábra, ahol ez a helikopter repülőtérre alkalmazható, beleértve az alábbiakat:
1) TODA – az igénybe vehető felszállási távolság;
2) a megszakított felszállásra igénybe vehető távolság;
3) LDA – az igénybe vehető leszállási távolság; és
4) megjegyzések;

**** AD 3.14. – Bevezető és FATO fények

A bevezető és a FATO fények részletes leírása, beleértve az alábbiakat:
1) a bevezető, megközelítési fényrendszer típusa, hosszúsága és intenzitása;
2) a VASIS (*Visual Approach Slope Indicator System* - Optikai Siklópálya Jelző Rendszer) típusa;
3) a végső megközelítési és felszállási (FATO) terület fényeinek elhelyezkedése és jellemzői;
4) a bevezetési pont fényeinek (a FATO-n található, háromszöggel jelölt felület) elhelyezkedése és jellemzői;
5) a földetérési és elemelkedési (TLOF) terület fényrendszerének elhelyezkedése és jellemzői; és
6) megjegyzések.

**** AD 3.15. – Egyéb fények, tartalék energia ellátás

Az egyéb fények, és a tartalék energia ellátás részletes leírása, az alábbiakat beleértve:
1) a helikopter repülőtéri fényjeladó / azonosító fényjeladó telepítési helye, jellemzői, és üzemideje;
2) a szélsebesség kijelző (WDI – *Wind Direction Indicator*) telepítési helye és megvilágítása;
3) a gurulóutak szegély - és középvonal fényei;
4) a tartalék áramellátás beleértve az átkapcsolási időt is; és
5) megjegyzések.

**** AD 3.16. – A Légiforgalmi Szolgálatok légtere

A helikopter repülőtéren kialakított Légiforgalmi Szolgálatok (ATS) légterének részletes leírása, beleértve az alábbiakat:
1) a légtér megnevezését és oldalhatárainak földrajzi koordinátáit fokokban, percekben és másodpercekben megadva;
2) függőleges határait;
3) a légtér osztályba sorolását;
4) a szolgálatot biztosító ATS egység hívójelét és a használható nyelvet (nyelveket);
5) az átváltási magasságot; és
6) megjegyzéseket.

**** AD 3.17. – A Légiforgalmi Szolgálatok hírközlési berendezései

A helikopter repülőtéren kialakított Légiforgalmi Szolgálatok hírközlési berendezéseinek részletes leírása, az alábbiakat beleértve:
1) a szolgálat megnevezése;
2) hívójele;
3) frekvenciája (frekvenciái);
4) üzemidő; és
5) megjegyzések.

**** AD 3.18. – Rádió-navigációs és leszállító berendezések

A helikopter repülőtéren a műszeres megközelítéssel és a közelkörzeti eljárásokkal összefüggő rádiónavigációs és leszállító berendezések részletes leírása, az alábbiakat beleértve:
1) a berendezés típusa és a mágneses elhajlás (*VOR* számára a telepítési hely mágneses deklinációja /*Station declination*/, melyet a berendezés műszaki beállítására használnak fel) a legközelebbi fokra kerekítve, valamint a ILS, MLS, alap GNSS, SBAS és GBAS üzemeltetés típusai;
2) azonosító, ha szükséges;
3) frekvencia (frekvenciák), értelemszerűen;
4) üzemideje, értelemszerűen;
5) az adásra használt antenna telepítési helyének földrajzi koordinátái fokokban, percekben, másodpercekben és 1/10 másodpercekben megadva, értelemszerűen;
6) a DME berendezés adó-antennájának tengerszint feletti magassága, kerekítve a legközelebbi 30 méterre (100 lábra), valamint a DME/P antennáé a legközelebbi 3 méterre (10 lábra); és
7) megjegyzések.
Abban az esetben, amikor ugyanazt a berendezést használják útvonalrepülési és helikopter repülőtéri célokra is, akkor ennek leírását meg kell adni az ENR 4. fejezetben is. Ha a Földi Bázisú (telepítésű) Kiterjesztő Rendszer (GBAS - *Ground Based Augmentation System*) több, mint egy helikopter repülőteret szolgál ki, akkor a berendezés leírását valamennyi repülőtérnél biztosítani kell. Amennyiben a berendezést üzemeltető hatóság nem ugyanaz, mint a kijelölt állami szervezet, akkor az üzemeltető hatóság nevét a megjegyzés rovatban fel kell tüntetni. A berendezés hatótávolságát jelezni kell a megjegyzés rovatban.

**** AD 3.19. – A forgalmat érintő helyi előírások, rendelkezések

A helikopter repülőtér forgalmára vonatkozó előírások részletes leírása, beleértve a guruló helikopterek szabvány gurulási nyomvonalát, beállítási, parkolási előírásokat, oktató és kiképző repüléseket, valamint a hasonló, de kizárt, visszautasított repülési eljárásokat.

**** AD 3.20. – Zajcsökkentő eljárások

A helikopter repülőtéren alkalmazott zajcsökkentő eljárások részletes leírása.

**** AD 3.21 – Repülési eljárások

A helikopter repülőtéren, a légtérszervezés alapján kialakított feltételek és a kijelölt repülési eljárások, beleértve a radar és / vagy ADS-B eljárásokat is. Ha ki van alakítva, a repülőtéren a rossz látási körülmények eljárásainak részletes bemutatása, az alábbiakat beleértve:
1) a rossz látási körülmények között használatra engedélyezett földetérési és elemelkedési terület(ek) (TLOF – touchdown and lift-off area(s)) és a hozzá tartozó berendezés;
2) meghatározott meteorológiai viszonyok, amiknél a rossz látási körülmények eljárásait bevezetik, használják és befejezik; és
3) a rossz látási körülményeknél használatos földi jelölések / fényrendszer ismertetése.

**** AD 3.22 – Kiegészítő információk

A helikopter repülőtérre vonatkozó kiegészítő információk, olyanok, mint például a repülőtéren található madárcsoportok, kiegészítve a pihenőhely és táplálkozási hely közötti jelentős napi mozgások feltüntetésével, amennyire csak lehetséges.

**** AD 3.23 – A helikopter repülőtérrel kapcsolatos térképek

Itt követelik meg a helikopter repülőtérre vonatkozó térképek közzétételét, az alábbi sorrendben:
1) Repülőtér / Helikopter repülőtér Térkép – ICAO;
2) Körzeti Térkép – ICAO (indulási és tranzit útvonalak);
3) Szabványos Indulási Útvonalak Térképe – Műszeres (*SID*) – ICAO;
4) Körzeti Térkép – ICAO (érkezési és tranzit útvonalak);
5) Szabványos Érkezési Útvonalak Térképe – Műszeres (*STAR*) – ICAO;
6) A Radarvektorálásnál használható Minimális Tengerszint feletti Magasságok Térképe – ICAO;
7) Műszeres Megközelítési Térkép – ICAO (minden egyes eljárás típusra);
8) Látvarepülési Megközelítési Térkép – ICAO; és
9) A helikopter repülőtér közvetlen környezetében található madárkolóniák.
Ha a térképek közül valamelyiket nem adják ki, akkor erre a tényre utalni kell a GEN 3.2 (Léginavigációs térképek) szakaszban.

A tűzhányó aktivitás riasztási szintjét jelző színkód	A tűzhányó aktivitásának állapota
ZÖLD RIASZTÁS	A tűzhányó nem működik, normális állapotban van, vagy *egy magasabb riasztási szintről történő változás után*: úgy vélik, hogy a tűzhányó aktivitása szünetel, és a tűzhányó visszatért normális állapotába.
SÁRGA RIASZTÁS	A vulkán az ismert háttér szintek fölé nyugtalan állapotának jeleit eregeti, vagy *egy magasabb riasztási szintről történő változás után*: a tűzhányó aktivitása jelentősen csökkent, de folyamatosan megfigyelés alatt kell tartani a lehetséges újra kezdődő erősödés miatt.
NARANCS RIASZTÁS	A vulkán megnövekedett valószínűségű kitörésének súlyosbodó jeleit mutatja, vagy a vulkán kitörése folyamatban van kicsi, vagy semmilyen hamu kibocsátással *[határozzák meg a hamu nyúlvány magasságát, ha lehetséges]*.
VÖRÖS RIASZTÁS	A vulkán kitörése minden percben bekövetkezhet jelentős hamu kibocsátással az atmoszférába, vagy a vulkán kitörése folyamatban van jelentős hamu kibocsátással az atmoszférába *[határozzák meg a hamu nyúlvány magasságát, ha lehetséges]*.

Megjegyzés. – Az érintett Állam területén a Körzeti Irányító Központ számára az illetékes vulkanológiai szervezetnek kell biztosítania a tűzhányó aktivitás riasztási szintjét jelző színkódot, és a korábbi szintben beálló bármilyen változást, pl. "RED ALERT FOLLOWING YELLOW" , vagy "GREEN ALERT FOLLOWING ORANGE", azaz "VÖRÖS RIASZTÁS A SÁRGA UTÁN", *vagy* "ZÖLD RIASZTÁS A NARANCS UTÁN".

3.6. F adatelem - Ha az üzemeltetésre jelentős hatású vulkáni hamufelhőt jelentettek, jelezni kell a vulkáni hamufelhő vízszintes kiterjedését a földrajzi szélesség / hosszúság felhasználásával (teljes fokokban kifejezve), a hamufelhő alsó/felső szintjét a tengerszinthez viszonyítva (*altitude*) 1000 méterben (lábban), és/vagy a kibocsátó vulkánhoz viszonyított radiállal és távolsággal. A tájékoztatást kezdetben csupán a különleges légi-jelentésekre is alapozhatják, de az illetékes meteorológiai figyelő állomásoktól és/vagy a Vulkáni Hamufelhők Tanácsadói Központjaitól (*Volcanic Ash Advisory Centre/s/*) származó értesítések jó alapot szolgáltathatnak a későbbi részletesebb tájékoztatások számára.
3.7. G adatelem – az illetékes meteorológiai megfigyelő állomásoktól és/vagy a Vulkáni Hamufelhők Tanácsadói Központjától származó értesítésekre alapozva jelezni kell a vulkáni hamufelhő mozgásának várható irányát a kiválasztott repülési szinteken.
3.8. H adatelem – jelezni kell azokat a repülési útvonalakat és repülési útvonal szakaszokat, valamint repülési szinteket, amelyeket a természeti jelenség érint, vagy várhatóan érinteni fog.
3.9. I adatelem – jelezni kell a légtér, a repülési útvonalak, vagy útvonalszakaszok zárását, valamint a rendelkezésre álló elkerülő útvonalak lehetőségét.
3.10. J adatelem – az információforrás jelzése, például "különleges légi-jelentés" ("*special air-report*"), vagy "vulkanológiai szervezet" ("*vulcanological agency*"), stb. Az információ forrását minden esetben fel kell tüntetni, akár éppen kitört egy vulkán, vagy egy vulkáni hamufelhőt jelentettek, akár nem.
3.11. K adatelem – az előző pontokhoz kiegészítésképpen, nyílt szöveggel leírva, bármely üzemeltetési szempontból fontos, lényeges információ.

5) HATÁSKÖR, TÁRGYKÖR (*SCOPE*)

A = Repülőtér *(Aerodrome)*
E = Útvonal *(En-route)*
W = Navigációs figyelmeztetés *(Nav Warning)*
K = Ez a NOTAM egy ellenőrző jegyzék.
Megjegyzés.– A NOTAM tárgyától és tartalmától függően a hatáskör, tárgykör (SCOPE) minősítő mezőben összetett minősítők is lehetnek. A lehetséges kombinációk a Légiforgalmi Tájékoztató Szolgálatok Kézikönyvében (Aeronautical Information Services Manual - Doc 8126), *a NOTAM Kiválasztás Követelményeiben találhatóak.*
Ha a hatáskört AE-nek minősítik, akkor a repülőtér helységnév azonosítóját az A) adattételben kell jelenteni.

6) és 7) ALSÓ/FELSŐ HATÁR (*LOWER/UPPER*)

Az ALSÓ és FELSŐ határokat mindig ki kell tölteni és mindig repülési szintben (FL) kell megadni. Navigációs figyelmeztetések és légtér korlátozások esetén, a közölt értékeknek meg kell egyezniük az F) és a G) adatelemekben megadottakkal.
Ha az adatelem nem tartalmaz pontosan meghatározott magassági információt, "000"-t kell az ALSÓ értéknek, és "999"-et a FELSŐ értéknek beállítani, mint alapértelmezés szerinti értéket.

8) KOORDINÁTÁK, SUGÁR (*COORDINATES, RADIUS*)

A földrajzi szélesség és hosszúság 1 perc pontossággal megadva, valamint egy három számjeggyel meghatározott távolsági érték, mely tengeri mérföldben adja meg a hatókör sugarát, (például: 4700N01140E043). A koordináták egy kör közepét adják meg, megközelítő pontossággal, melynek sugara körülzárja a hatókör teljes területét és ha a NOTAM a teljes FIR/UIR-re vonatkozik, vagy több, mint egy FIR/UIR-re, akkor a rádiusz helyére a "999" alapértelmezés szerinti értéket kell beírni.

4. A) adatelem
Ide annak a repülőtérnek, vagy FIR-nek az ICAO helységnév azonosítóját kell beírni – ahogy azt a Helységnév Azonosítók *(Locations Indicators – ICAO Doc 7910)* című kiadvány tartalmazza – ahol a jelentésbe foglalt berendezés, légtér, vagy körülmény megtalálható. Amennyiben szükséges, nemcsak egy, hanem több FIR/UIR is megnevezhető. Amennyiben nem áll rendelkezésre megfelelő ICAO helységnév azonosító, akkor használja az ICAO által biztosított, az államot azonosító betűket, ahogy azt a Helységnév Azonosítók *(Locations Indicators – ICAO Doc 7910)* című kiadvány 2. Része tartalmazza, valamint "XX" betűket, majd a későbbiek során az E) adatelemben nyílt szöveggel kell megadni a nevet.
Ha a tájékoztatás GNSS-re vonatkozik, az adott GNSS egységnek kiosztott megfelelő ICAO telepítés azonosítót, vagy a GNSS összes egységére vonatkozó közös telepítés azonosítót kell beírni (kivéve GBAS).
Megjegyzés. - GNSS esetén a telepítés azonosítót fel lehet használni egy GNSS egység üzemkiesésének azonosítására (például, a KNMH egy GPS műhold üzemszünetét jelenti).
5. B) adatelem
A dátum/idő csoport céljára egy tíz számból álló adatcsoportot kell használni, UTC-ben megadva az évet, hónapot, napot, órát és perceket. Ez a bejegyzés annak a dátum/időpont-nak a jelzése, amikor a NOTAMN, NOTAMR, vagy NOTAMC hatályba lép.
6. C) adatelem
A NOTAMC kivételével, itt egy dátum/idő adatcsoportot kell alkalmazni, (ez egy tíz számból álló adatcsoport, amely UTC-ben adja meg az évet, hónapot, napot, órát és perceket), mely feltünteti az információ érvényességének idejét, kivéve, ha az információ állandó természetű, mely esetben az adatcsoport helyére a "PERM" rövidítést kell illeszteni. Ha az időzítési információ még bizonytalan, akkor az érvényesség idejét egy dátum/idő adatcsoport alkalmazásával csak hozzávetőlegesen kell megadni, melyet az "EST" rövidítés kövessen. Minden olyan NOTAM-ot, mely tartalmazza az "EST" rövidítést, a későbbiek folyamán törölni kell, vagy le kell cserélni egy másik NOTAM-mal, még a C) adatelemben meghatározott dátum/idő adatcsoporttal megadott időpont előtt.
7. D) adatelem
Ha a jelentett veszély, üzemeltetési állapot, vagy berendezésekre vonatkozó kikötések, feltételek a megadott idő- és dátum ütemezés szerinti időszakokban lesznek érvényben, a B) és C) adatelemben közölt dátum/idő adatcsoport által meghatározott időpontok között, akkor az ilyen információkat a D) adatelemben kell jelezni. Ha a D) adatelem hossza meghaladná a 200 karaktert, akkor meg kell fontolni annak lehetőségét, hogy az ilyen információról szóló tájékoztatást önálló NOTAM-ban adják ki.
Megjegyzés.– A D) adatelem tartalmának egyeztetett, harmonizált meghatározásával kapcsolatos útmutató anyag a Légiforgalmi Tájékoztató Szolgálatok Kézikönyvében (Aeronautical Information Services Manual – Doc 8126) található.
8. E) adatelem
A kifejtett, dekódolt NOTAM kódot kell használni, ahol szükséges, kiegészítve azt az ICAO rövidítésekkel, jelzésekkel, azonosítókkal, elnevezésekkel, hívójelekkel, frekvenciákkal, számokkal és nyílt szöveges információval. Amennyiben a NOTAM-ot nemzetközi terjesztésre szánják, a nyílt szöveges részeknek a szöveget angolul kell tartalmazniuk. Ennek a bejegyzésnek érthetőnek és tömörnek kell lennie, hogy megfelelő, alkalmas PIB bejegyzést (Repülés Előtti Hivatalos Közlemény - *Pre-Flight Information Bulletins*) biztosítson.
NOTAMC (*cancellation* - törlés, érvénytelenítés) esetén a tárgyra vonatkozóan utalást, valamint állapotáról jelentést kell tartalmaznia, hogy ezzel lehetővé tegye a gondos valószínűség ellenőrzést.
9. F) és G) adatelemek
Ezek az elemek általában a navigációs figyelmeztetések, vagy a légtér korlátozások esetén használhatóak, és rendszerint részét képzik a PIB (Repülés Előtti Bulletinek - *Pre-Flight Information Bulletins*) bejegyzéseknek. Be kell jegyezni a tevékenység, vagy korlátozás alsó és felső magassági határát, egyértelműen feltüntetve a referencia alapadatot és a mérés mértékegységét.
Megjegyzés.- A NOTAM-okra példákat a Légiforgalmi Tájékoztató Szolgálatok Kézikönyvében *(Aeronautical Information Services Manual – Doc 8126) és a* Légiforgalmi Szolgálatok Eljárásai – ICAO

Rövidítések és Kódok *kiadványban (Procedures for Air Navigation Services – ICAO abbreviations and Codes - PANS-ABC, Doc 8400) található.*

A8-4. Táblázat – Akadály attribútumok

Akadály attribútumok		
Fedésterület	*Area of coverage*	Kötelező
Az adat létrehozójának azonosítója	*Data originator identifier*	Kötelező
Az akadály azonosítója	*Obstacle identifier*	Kötelező
Vízszintes pontosság	*Horizontal accuracy*	Kötelező
Vízszintes konfidenciaszint	*Horizontal confidence level*	Kötelező
Vízszintes helyzet	*Horizontal position*	Kötelező
Vízszintes felbontóképesség	*Horizontal resolution*	Kötelező
Vízszintes kiterjedés	*Horizontal extent*	Kötelező
Vízszintes referencia-rendszer	*Horizontal reference system*	Kötelező
Közepes tengerszint szerinti magasság	*Elevation*	Kötelező
Függőleges pontosság	*Vertical accuracy*	Kötelező
Függőleges konfidenciaszint	*Vertical confidence level*	Kötelező
Közepes tengerszint szerinti magasság vonatkoztatási alap	*Elevation reference*	Kötelező
Függőleges felbontóképesség	*Vertical resolution*	Kötelező
Függőleges referencia-rendszer	*Vertical reference system*	Kötelező
Az akadály típusa	*Obstacle type*	Kötelező
Geometriai típusa	*Geometry type*	Kötelező
Integritás	*Integrity*	Kötelező
Dátum és időbélyeg	*Date and time stamp*	Kötelező
A felhasznált mértékegység	*Unit of measurement used*	Kötelező
Műveletek	*Operations*	Opcionális
Effektivitás, hatékonyság	*Effectivity*	Opcionális
Fényrendszer	*Lighting*	Kötelező
Jelölések	*Marking*	Kötelező

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[1]ISO Szabványok :
ISO 19104 – Földrajzi információk – Fogalom meghatározások

[2]ISO Szabványok :
ISO 19108 – Földrajzi információk – Ideiglenes vázlat

[3]ISO Szabványok :
ISO 19131 – Földrajzi információk – Az adattermék (*Data product*) részletes leírása.

[4]ISO Szabványok :
ISO 19131 – Földrajzi információk – Az adattermék (*Data product*) részletes leírása.

[5]ISO Szabványok :
ISO 19101 – Földrajzi információk – Referencia modell

[6]ISO Szabványok :
ISO 19115 – Földrajzi információk – Meta-adatok

[7]ISO Szabványok :
ISO 19104 – Földrajzi információk – Fogalom meghatározások

[8]ISO Szabványok :
ISO 19101 – Földrajzi információk – Referencia modell

[9]ISO Szabványok :
ISO 19101 – Földrajzi információk – Referencia modell

[10]ISO Szabványok :
ISO 19110 – Földrajzi információk – Jellemző tulajdonságok nyilvántartásba vételének sémája

[11]ISO Szabványok :
ISO 19101 – Földrajzi információk – Referencia modell

[12]ISO Szabványok :
ISO 19110 – Földrajzi információk – Jellemző tulajdonságok nyilvántartásba vételének sémája

[13]ISO Szabványok :
ISO 19108 – Földrajzi információk – Ideiglenes vázlat

[14]ISO Szabványok :
ISO 19115 – Földrajzi információk – Meta-adatok

[15]ISO Szabványok :
ISO 19117 – Földrajzi információk – Leírás (*Portrayal*)

[16]ISO Szabványok :
ISO 8402 – Minőségirányítási és Minőségbiztosítási (Minőségügyi) Szakszótár

[17]ISO Szabványok :
ISO 8402 – Minőségirányítási és Minőségbiztosítási (Minőségügyi) Szakszótár

[18]ISO Szabványok :
ISO 8402 – Minőségirányítási és Minőségbiztosítási (Minőségügyi) Szakszótár

[19]ISO Szabványok :
ISO 8402 – Minőségirányítási és Minőségbiztosítási (Minőségügyi) Szakszótár

[20]ISO Szabványok :
ISO 8402 – Minőségirányítási és Minőségbiztosítási (Minőségügyi) Szakszótár

[21]ISO Szabványok :
ISO 8402 – Minőségirányítási és Minőségbiztosítási (Minőségügyi) Szakszótár

[22]ISO Szabványok :
ISO 8402 – Minőségirányítási és Minőségbiztosítási (Minőségügyi) Szakszótár

[23]ISO Szabványok :
ISO 8402 – Minőségirányítási és Minőségbiztosítási (Minőségügyi) Szakszótár

[24]*Ha szükségesnek látják, ezt az információt, vagy bármely részét az AIP is tartalmazhatja

[25]*Ha szükségesnek látják, ezt az információt, vagy bármely részét az AIP is tartalmazhatja

[26]*Ha szükségesnek látják, ezt az információt, vagy bármely részét az AIP is tartalmazhatja

[27]*Ha szükségesnek látják, ezt az információt, vagy bármely részét az AIP is tartalmazhatja

[28]*Ha szükségesnek látják, ezt az információt, vagy bármely részét az AIP is tartalmazhatja

[29]*Ha szükségesnek látják, ezt az információt, vagy bármely részét az AIP is tartalmazhatja

[30]*a matematikailag meghatározott ellipszoid felületén található két pont közötti legkisebb távolság

[31]*a matematikailag meghatározott ellipszoid felületén található két pont közötti legkisebb távolság

[32]*a matematikailag meghatározott ellipszoid felületén található két pont közötti legkisebb távolság

[33]**valószínűleg az 50 méter hibás adat, a 100 lábból csak 30 méter következne!! - Fordító

[34]ez megegyezik az adott VOR telepítési pontjának mágneses elhajlásával, mert a VOR berendezés nulla fokos radiálja a mágneses északi irányhoz van kalibrálva, kivéve Kanada északi területeit.

ANNEX 18.
Veszélyes áruk biztonságos légiszállítása

3. kiadás – 2001. július
9. módosítással

A Nemzetközi Polgári Repülésről szóló Egyezményhez
Ez a kiadás magában foglal a Tanács által 2001. március 8. előtt elfogadott minden módosítást és 2001. november 1-től a 18. Annex minden korábbi kiadásának helyébe lép.

A szabványok és az ajánlott gyakorlatok alkalmazási eljárásaira vonatkozó tájékoztatás az Előszóban és az egyes Fejezetek vonatkozó záradékaiban olvasható.

Nemzetközi Polgári Repülési Szervezet

ICAO

„A" Táblázat - a 18. Annex módosításai

Módosítás	*Forrása(i)*	*Tárgya(i)*	*Jóváhagyva* *Hatályba lép* *Alkalmazandó*
1. Kiadás	A Légi-navigációs Bizottság Tanulmánya		1981. jún. 26. 1983. jan. 1. 1984. jan. 1.
1.	A Veszélyes Anyagok Munkabizottság 6. ülése	Különféle módosítások az Egyesült Nemzetek szakértői bizottsága és az IAEA ajánlásai közötti egyezőség kialakítására	1982. nov.26. 1983. már.26. 1984. jan. 1.
2.	A Veszélyes Anyagok Munkabizottság 5., 6. és 7. ülése	A "Gyűjtő csomagolás" és az "egység rakodóeszköz" meghatározás pontosítása. A csomag és csomagolás meghatározások egységessé tétele az Egyesült Nemzetek Szakértői Bizottságának ajánlásaival. Újabb, a repülőtérre, vagy repülőtérről történő felszíni szállításra vonatkozó szakasz beiktatása. A „parancsnok pilóta tájékoztatása" követelmény módosítása, hogy jelezze, mikor kell e tájékoztatást biztosítani.	1983. jún. 1. 1983. okt. 1. 1984. jan. 1.
3.	A Veszélyes Anyagok Munkabizottság 8. ülése	A felmentés adhatóság körülményeinek tisztázása. A mérgező és fertőző anyagok állattól és élelmiszertől való elkülönítési követelményeinek tisztázása.	1985. márc. 25. 1985. júl. 29. 1986. jan. 1.
4. (2. Kiadás)	A Veszélyes Anyagok Munkabizottság 11. ülése	A 18. Annex rendelkezéseinek általános egyszerűsítése a technikai részletek eltávolítása révén. Különféle rendelkezések különféle módosítása.	1989. febr. 24. 1989. júl. 23. 1989. nov. 16.
5.	A Veszélyes Anyagok Munkabizottság 14. és 16. ülése	Az állami szere nyomatékosítása, miszerint felelős a Veszélyes Anyagok Biztonságos Légi-szállításának Technológiai Utasítása (Doc 9284) bármiféle	1999. márc. 10. 1999. júl. 19.

Módosítás	*Forrása(i)*	*Tárgya(i)*	*Jóváhagyva Hatályba lép Alkalmazandó*
		módosítása esetén az egyezés megvalósításáért. Az utas és a személyzet által vitt veszélyes anyagokra vonatkozó kivételek egyértelművé tétele.	1999. nov. 4.
6 (3. Kiadás)	A Veszélyes Anyagok Munkabizottság 17. ülése és a 6. Annex I. kötet 25. módosítása	a) a következő meghatározások módosítása: veszélyes anyag, személyzeti tag és parancsnok pilóta; b) Különleges körülmények között az átrepülendő államot felmentésadásra kötelező rendelkezések módosítása, elősegítendő a veszélyes anyag szállítást a területét átrepülő légi-járművön; c) a csomagolási rendelkezések összehangolása a Technológia Utasításban szereplőkkel; d) a veszélyes anyagok Technológiai Utasítás szerinti berakodásának és tárolásának követelményét lefedő rendelkezések beiktatása; e) rendelkezések módosítása az utas tájékoztatás teljes felelősségének az államra terhelése céljából; f) rendelkezések módosítása, biztosítandó, hogy a vészhelyzeti műveleti személyzet baleset, vagy esemény alkalmával késedelem nélkül kapjon tájékoztatást a légi-járművön rakományként szállított veszélyes anyagokról; g) rendelkezések módosítása a veszélyes anyagszállítás előírásait szándékosan megsértő szállítmányozókkal szemben teendő lépések tekintetében az államok közötti együttműködés fokozására; és h) vészhelyzetben a pilótát a fedélzeten lévő veszélyes anyagokról tájékoztatás adásra kötelező rendelkezések módosítása.	2001. márc. 7. 2001. júl. 16. 2001. nov. 1.
7	A Veszélyes Anyag Munkabizottság tizennyolcadik találkozója	a) az ICAO értesítése a veszélyes anyagért felelős nemzeti hatóságról b) veszélyes anyagra vonatkozó vészhelyzeti reagálási tájékoztatás biztosítása	2003. február 24. 2003. július 14. 2003. november 27.
8	A veszélyes Anyag Panel tizenkilencedik találkozója	a) a 9.6.1 pont finomítása világossá téve, hogy veszélyes anyag jelenlétéről csak akkor kell jelentést tenni, ha súlyos esemény történt, amelyben veszélyes anyag valószínűleg érintve volt; és b) Új, 13. Fejezet létrehozása előírva az államnak, hogy alakítson ki veszélyes anyagokkal kapcsolatos védelmi intézkedéseket.	2005. február 16. 2005. július 11. 2005. november 24.
9	A veszélyes Anyag Panel huszadik találkozója	A veszélyes anyaggal történt esemény és baleset kivizsgálással kapcsolatos (12. Fejezetben lévő) rendelkezések kiterjesztése a tévesen-, vagy be nem vallott veszélyes anyagok eseteire.	2007. február 19. 2007. július 16. 2008. november 20.

12. FEJEZET - VESZÉLYES ANYAGGAL TÖRTÉNT BALESET ÉS ESEMÉNY JELENTÉSE

12.1 Veszélyes anyagot érintő légi-jármű balesetek és repülőesemények ismételt előfordulásának megakadályozása érdekében a szerződő állam hozzon létre eljárásokat a felségterületén előfordult, más államból származó, vagy más államba tartó veszélyes anyag szállítását érintő légi-jármű balesetek, repülőesemények kivizsgálására és az ezzel kapcsolatos információk összeállítására. Az ilyen légi-jármű balesetről és repülőeseményről szóló jelentést a Technológiai Kézikönyv részletes előírásainak megfelelően kell elkészíteni.

12.2 **Ajánlás. –** Veszélyes anyagot érintő légi-jármű balesetek és repülőesemények ismételt előfordulásának megakadályozása érdekében a szerződő állam létesítsen eljárásokat a 12.1-ben nem szereplő egyéb ilyen, saját felségterületen előforduló baleset és repülőesemény kivizsgálására és az azzal kapcsolatos információk összeállítására. Az ilyen légi-jármű balesetekről és repülőeseményről szóló jelentést a Technológiai Kézikönyv részletes előírásainak megfelelően kell elkészíteni.

12.3 A légi rakományban lévő tévesen-, vagy be nem vallott veszélyes anyag estek ismételt előfordulásának megakadályozására a szerződő állam hozzon létre eljárásokat a felségterületén előfordult, más államból származó, vagy más államba tartó veszélyes anyag szállítását érintő esetek kivizsgálására és az ezzel kapcsolatos információk összeállítására. Az ilyen esetekről szóló jelentést a Technológiai Kézikönyv részletes előírásainak megfelelően kell elkészíteni.

12.4 **Ajánlás. –** A légi rakományban lévő tévesen-, vagy be nem vallott veszélyes anyag estek ismételt előfordulásának megakadályozására a szerződő állam létesítsen eljárásokat a 12.3-ban nem szereplő egyéb ilyen, saját felségterületen előforduló esetek kivizsgálására és az azzal kapcsolatos információk összeállítására. Az ilyen esetekről szóló jelentést a Technológiai Kézikönyv részletes előírásainak megfelelően kell elkészíteni.

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