



INTERNATIONAL CIVIL AVIATION ORGANIZATION

AFI PLANNING AND IMPLEMENTATION REGIONAL GROUP

SEVENTEENTH MEETING (APIRG/17)

(Burkina Faso, 2 to 6 August 2010)

Agenda 3.6: Aeronautical Information Management (AIM)

Adoption of Amendment 36 to ICAO Annex 15 and Amendment 56 to Annex 4 and its implications to the AFI Region as per the AIS-AIM Transition Roadmap

ADOPTION OF AMENDMENT 36 TO ANNEX 15

(Presented by the Secretariat)

SUMMARY

This paper presents the adoption of Amendment 36 to Annex 15 — Aeronautical Information Services. The adopted amendment introduces provisions relating to the use of the public Internet, the reporting of volcanic ash position, quality management systems (QMS), the use of automation enabling digital data exchange, electronic aeronautical information publications (e-AIP), the NOTAM Format and electronic terrain and obstacle data (e-TOD). Having examined the technical circumstances associated with the implementation of the amendment, the Air Navigation Commission considered that the proposed applicability date of 18 November 2010 would be suitable, except for proposed paragraphs 10.1.4 and 10.1.5 related to e-TOD for which applicability would be 12 November 2015. Action noted : The ICAO Council:

- a) adopted, as Amendment 36 to Annex 15, the amendment to definitions and to the Standards and Recommended Practices as contained in Appendix A to the State letter;
- approved, as part of the said amendment, the amendment to Notes as contained in Appendix A to the State letter;
- c) approved the Resolution of Adoption in Appendix B to State letter; and
- d) approved as part of the said amendment, the amendment to the Foreword of Annex 15 as contained in Appendix C to the State letter.

	This information paper relates to Strategic Objectives A and D as the various proposals will improve safety and efficiency of the air navigation system.
Financial implications:	States and industry: No substantial new cost except for the recommended implementation of automation enabling digital data exchange. The costs associated with the implementation of e-TOD are significant; however, the amendment substantially reduces costs in comparison with existing provisions. Other parts of the amendment could also lead to cost reductions.

## 1. INTRODUCTION

1.1 This paper deals with the adoption by the ICAO Council for the amendment of Annex 15 arising from the following sources:

a) The Secretariat, with the assistance of the Aviation Use of the Public Internet Study Group (AUPISG), to introduce new provisions relating to the operational use of the public Internet;

b) the Secretariat, with the assistance of the Aeronautical Information Services-Aeronautical Information Management Study Group (AIS-AIMSG) to update provisions related to quality management systems (QMS), the use of automation enabling digital data exchange, electronic aeronautical information publications (e-AIP), the NOTAM Format and electronic terrain and obstacle data (e-TOD); and

c) Editorial changes proposed by the Secretariat aimed at eliminating some inconsistencies.

## 2. BACKGROUND

2.1 The development and review of the proposed amendments have followed the established process, as shown in the table below:

Amendment concerning	Preliminary review by ANC and WP	State letter and date	Final review by the ANC and WP no.	Number of replies at final review <sup>1</sup>
Operational use of the public Internet <sup>2</sup>	30 November 2006 (ANC 173-12) AN-WP/8162	AN 7/11.15, AN 10/1-07/3 19 January 2007	30 October 2007 (ANC 176-5) AN-WP/8260	53 Contracting States (21) 3 int. orgs Total: 56 replies
Amendment concerning	Preliminary review by ANC and WP	State letter and date	Final review by the ANC and WP no.	Number of replies at final review <sup>1</sup>
Quality management systems (QMS), the use of automation enabling digital data exchange, electronic aeronautical information publications (e-AIP), the NOTAM Format and electronic terrain and obstacle data (e-TOD)	12 March 2009 (ANC 180-11) AN-WP/8375	AN 2/2.2-09/13 23 April 2009	28 January 2010 (ANC 183-5) AN-WP/8442 19 January 2010 (ANC 183-3) 12 January 2010 (ANC 183-1) 19 November 2009 (ANC 182-11) AN-WP/8416, Add. No. 1, DP Nos. 1, 2 and 3	57 Contracting States (19) 3 int. orgs Total: 60

2.2 The amendment listed in the table above was presented to the Council for inclusion in Amendment 36 to Annex 15 and thus the Council took action as stated in the executive summary.

### 3. RATIONAL, IMPLEMENTATION ISSUES AND COST IMPACT

#### 3.1 Rational

3.1.1 The purpose of the amendment related to the operational use of the public Internet for exchange of non-time critical messages is to enhance efficiency by permitting the use of the Internet where and when the provision or retention of aeronautical fixed service (AFS) facilities are not practical or cost effective. The proposals contain references to the Guidelines on the Use of the Public Internet for Aeronautical Applications (Doc 9855) which provide relevant guidance material.

3.1.2 The amendment will contribute to the safety and efficiency of international air navigation by supporting the progressive transition from a manual, paper-product environment to a digital environment that would contribute to the provision of timely, high-quality digital information and improve the efficiency and cost-effectiveness of aeronautical information services (AIS). The capability to provide digital information will provide the basis for the transition to aeronautical information management (AIM), and this allow for the establishment of new services that directly support current and future air traffic Management (ATM) service requirements.

3.1.3 With regard to the amendment related to e-TOD, it should be noted that Amendment 33 to Annex 15 (adopted in 2004) introduced requirements for States to provide e-TOD data over four areas. These requirements became applicable in 2008 as far as the “entire territory of a State” and “Category II and III operations area” are concerned (i.e. Area 1 and Area 4, respectively) and would become applicable in 2010 as far as the “terminal control area” and “aerodrome/heliport area” are concerned (i.e. Area 2 and Area 3, respectively). In reply to State letter AN 2/2.1-09/13 and the associated questionnaire States have indicated that the requirements related especially to Area 2 will be difficult and costly to implement and were not considered justified. This would have led to widespread non-compliance. This issue has been addressed by the proposal through a revision of associated provisions which are expected to substantially reduce implementation difficulties and costs.

#### 3.2 Implementation issues

3.2.1 No significant implementation issues are foreseen for the amendment, except for the amendments related to automation enabling digital data exchange and e-TOD which involve longer-term implementation planning and effort.

#### 3.3 Cost impact

3.3.1 The amendment on the operational use of the public Internet will not impose a financial burden to States and may result in savings for the airline industry through the use of more cost-effective means for the dissemination of aeronautical information.

3.1.2 The amendment related to the QMS refines existing provisions and could have moderate cost impact to States. Costs associated with the recommended use of automation enabling digital data exchange may be substantial, especially for States with little or no automation capabilities. Automation could be introduced in a progressive manner and in the long term should lead to efficiencies. The recommended implementation of the e-AIP is expected to reduce production and distribution costs compared to the paper product; however, the proposal would have cost implications for States that currently produce e-AIPs which are not harmonized with Annex 15, Appendix 1. The proposed changes to the NOTAM Format could imply moderate costs associated with software changes.

3.3.3 The amendment related to electronic terrain and obstacle data will substantially reduce implementation costs in comparison to existing Annex 15 provisions; nevertheless, implementation could have significant cost implications especially for States where existing obstacle data is not of the required quality. The extended applicability date supports a phased implementation which may reduce costs by taking into account normal aerodrome obstacle data re-surveys.

APPENDIX A

PROPOSED AMENDMENT TO INTERNATIONAL STANDARDS  
AND RECOMMENDED PRACTICES

AERONAUTICAL INFORMATION SERVICES

ANNEX 15

TO THE CONVENTION ON INTERNATIONAL CIVIL AVIATION

NOTES ON THE PRESENTATION OF THE PROPOSED AMENDMENT

1. The text of the amendment is arranged to show deleted text with a line through it and new text highlighted with grey shading, as shown below:

- |    |   |                                   |
|----|---|-----------------------------------|
| 1. | Text to be deleted is shown with a line through it.   | text to be deleted                |
| 2. | <b>New text to be inserted is highlighted with grey shading.</b>  | new text to be inserted           |
| 3. | Text to be deleted is shown with a line through it followed by the replacement text which is highlighted with grey shading. | new text to replace existing text |

2. The sources of the proposed amendments have been indicated as follows:

Source

Annotation

Secretariat, with the assistance of AIS-AIMSG/1

Source A

Consequential amendment concerning the operational use of the public Internet

Source B

IAVWOPSG/4

Source C

Editorial amendments arising from the Secretariat

Source D

Source A

## CHAPTER2. DEFINITIONS

When the following terms are used in the Standards and Recommended Practices for aeronautical information services, they have the following meanings:

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**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.

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**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.

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## CHAPTER 3.

## GENERAL

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Sources A & D

### 3.2

#### Quality management system

3.2.1 Each Contracting State shall take all necessary measures to introduce a properly organized quality system containing procedures, processes and resources necessary to implement quality Management at each function stage. Quality management systems shall be implemented and maintained encompassing all functions of an aeronautical information service, as outlined in 3.1.7 above. The execution of such quality management systems shall be made demonstrable for each function stage, when required.

3.2.2 Recommendation. — Quality management should be applicable to the whole aeronautical information data chain from data origination to distribution to the next intended user, taking into consideration the intended use of data.

Note1. — Quality management may be provided by a single quality management system or serial quality management systems.

Note2. — Letters of agreement concerning data quality between originator and distributor and between distributor and next intended user may be used to manage the aeronautical information data chain.

3.2.2 3.2.3 Recommendation.— The quality management system established in accordance with 3.2.1 should be in conformity with follow the International Organization for Standardization (ISO) 9000 series of quality assurance standards, and be certified by an approved organization.

Note1. — An ISO 9000 certificate issued by an accredited certification body would be considered an acceptable means of compliance.

Note2. — International Organization for Standardization (ISO) 9000 series of quality assurance standards provide a basic framework for the development of a quality assurance programme and define the term “accredited certification body”. The details of a successful programme are to be formulated by each State and in most cases are unique to the State organization.

Note 3.— Supporting material in respect of the processing of aeronautical data is contained in RTCA Document DO-200A and European Organization for Civil Aviation Equipment (EUROCAE) Document ED-76 — Standards for Processing Aeronautical Data. These standards support the development and application of aeronautical databases.

3.2.3 3.2.4 Within the context of a the established quality management system, the skills and knowledge required for each function shall be identified, and personnel assigned to perform those functions shall be appropriately trained. States shall ensure that personnel possess the skills and competencies required to perform specific assigned functions, and appropriate records shall be maintained so that the qualifications of personnel can be confirmed. Initial and periodic assessments shall be established that require personnel to demonstrate the required skills and competencies. Periodic assessments of personnel shall be used as a means to detect and correct shortfalls.

3.2.4 3.2.5 States shall ensure that established procedures exist in order that aeronautical data at any moment is traceable to its origin Each quality management system shall include the necessary policies, processes and procedures, including those for the use of metadata, to ensure and verify that aeronautical data is traceable throughout the aeronautical information data chain so as to allow any data anomalies or errors, -detected in use to be identified by root cause, corrected and communicated to affected users, during the production/maintenance phases or in operational use, to be corrected.

3.2.5 3.2.6 The established quality management system shall provide users with the necessary assurance and confidence that distributed aeronautical information/data satisfy stated requirements for data quality the aeronautical data quality requirements (for accuracy, resolution and integrity) and for data traceability by the use of appropriate procedures in every stage of data production or data modification process as specified in Appendix 7, and the data traceability requirements through the provision of appropriate metadata as specified in 3.8.1. The system shall also provide assurance of the applicability period of intended use of aeronautical data as well as that the agreed distribution dates will be met.

3.2.7 All necessary measures shall be taken to monitor compliance with the quality management system in place.

3.2.6 ~~3.2.8~~ The order of accuracy for aeronautical data, based upon a 95 per cent confidence level, shall be as specified in Annex 11, Chapter 2, and Annex 14, Volumes I and II, Chapter 2. In that respect, three types of positional data shall be identified: surveyed points (runway thresholds, navigation aid positions, etc.), calculated points (mathematical calculations from the known surveyed points of points in space/fixes) and declared points (e.g. flight information region boundary points).

3.2.7 ~~3.2.9~~ ~~States shall ensure that the~~The order of publication resolution of aeronautical data shall be that as specified in Appendices 1 and 7.

3.2.8 ~~3.2.10~~ ~~Contracting States shall ensure that the~~The integrity of aeronautical data is shall be maintained throughout the data process from survey/origin to distribution to the next intended user (the entity that receives the aeronautical information from the aeronautical information service provider). 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  $1 \times 10^{-8}$ : 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  $1 \times 10^{-5}$ : 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  $1 \times 10^{-3}$ : 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.

Note 1.— Distribution to the next intended user will differ in the delivery method applied which may either be:

Physical distribution. The means by which aeronautical information/data distribution is achieved through the delivery of a physical package, such as postal services.

or

Direct electronic distribution. The means by which aeronautical information/data distribution is achieved automatically through the use of a direct electronic connection between the AIS and the next intended user.

Note 2.— Different delivery methods and data media may require different procedures to ensure the required data quality.

3.2.9 ~~3.2.11~~ Aeronautical data quality requirements related to classification and data integrity shall be as provided in Tables A7-1 to A7-5 of Appendix 7.

3.2.10 ~~3.2.12~~ Protection of electronic Electronic aeronautical data sets while stored or in transit shall be totally monitored protected by the inclusion in the data sets of the a 32-bit cyclic redundancy check (CRC) implemented by the application dealing with the data sets. This shall apply to the protection

of all integrity levels of data sets as specified in 3.2.10. To achieve protection of the integrity level of critical and essential aeronautical data as classified in 3.2.8, a 32- or 24-bit CRC algorithm shall apply respectively.

Note 1.— This requirement does not apply to the communications systems used for the transfer of data sets.

Note 2.— Guidance material on the use of a 32-bit CRC algorithm to implement a protection of electronic aeronautical data sets is contained in the Aeronautical Information Services Manual (Doc 8126).

3.2.11 Recommendation.— To achieve protection of the integrity level of routine aeronautical data as classified in 3.2.8, a 16-bit CRC algorithm should apply.

3.2.12 3.2.13 Material to be issued as part of the Integrated Aeronautical Information Package shall be thoroughly checked and coordinated with the services responsible services before it is submitted to the aeronautical information service, in order to make certain that all necessary information has been included and that it is correct in detail prior to distribution. Validation and verification procedures shall be established which ensure that quality requirements (accuracy, resolution, integrity) and traceability of aeronautical data are met.

Note.— Guidance material on the liaison with other related services is contained in the Aeronautical Information Services Manual (Doc 8126).-

3.2.13 3.2.14 Demonstration of compliance of the quality management system applied shall be by audit. If nonconformity is identified, initiating action to correct its cause shall be determined and taken. All audit observations and remedial actions shall be evidenced and properly documented.

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## 3.6 General specifications

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### 3.6.5 Use of automation

Recommendation.— Automation in AIS enabling digital data exchange should be introduced with the objective of improving the speed, accuracy, quality, efficiency and cost-effectiveness of aeronautical information services.

Note.— Guidance material on an aeronautical conceptual and data exchange model for the development of databases and the establishment of data exchange services is contained in Doc 8126.

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### 3.6.7 Human Factors considerations

3.6.7.1 The organization of the aeronautical information services as well as the design, contents, processing and distribution of aeronautical information/data shall take into consideration Human Factors principles which facilitate their optimum utilization.

3.6.7.2 Due consideration shall be given to the integrity of information where human interaction is required and mitigating steps taken where risks are identified.

Note.— This may be accomplished through the design of systems, through operating procedures or through improvements in the operating environment.

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### 3.8 Metadata

3.8.1 Metadata shall be collected for aeronautical data processes and exchange points. This metadata collection shall be applied throughout the aeronautical information data chain, from survey / origin to distribution to the next intended user.

3.8.2 The metadata to be collected shall include, as a minimum:

- a) the name of the organization or entity performing the function;
- b) the function performed; and
- c) the date and time of operation.

Note.— The function performed indicates any action of originating, transmitting or manipulating the data.

## CHAPTER 4. AERONAUTICAL INFORMATION PUBLICATIONS (AIP)

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### 4.3 Specifications for AIP Amendments

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4.3.4 Each AIRAC AIP Amendment page, including the cover sheet, shall display an effective date. When an effective time other than 0000 UTC is used, the effective time shall also be displayed on the cover sheet.

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### 4.4 Specifications for AIP Supplements

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4.4.4 When an error occurs in an AIP Supplement or when the period of validity of an AIP Supplement is changed, a new AIP Supplement shall be published as a replacement.

Note.— The requirements for NOTAM apply when time constraints do not allow sufficient time for the distribution of an AIP Supplement.

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Editorial Note.— Renumber subsequent paragraphs accordingly.

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#### 4.6 Electronic AIP (eAIP)

4.6.1 Recommendation.— The AIP, AIP Amendment, AIP Supplement and AIC should also be published in a format that allows for displaying on a computer screen and printing on paper.

Note 1.— This composite electronic document is named “Electronic AIP” (e-AIP) and may be based on a format that allows for digital data exchange.

Note 2.— Guidance material for the production and provision of the e-AIP is contained in Doc 8126.

4.6.2 When provided, the information content of the e-AIP and the structure of chapters, sections and sub-sections shall follow the content and structure of the paper AIP. The e-AIP shall include files that allow for printing a paper AIP.

4.6.3 Recommendation.— When provided, the e-AIP should be available on a physical distribution medium (CD, DVD, etc.) and/or online on the Internet.

Note.— Guidance material on the use of the Internet is contained in Guidelines on the Use of the Public Internet for Aeronautical Applications (Doc 9855).

Sources C & D
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## CHAPTER 5: NOTAM

### 5.1 Origination

5.1.1 A NOTAM shall be originated and issued concerning the following information:

a) establishment, closure or significant changes in operation of aerodrome(s)/heliport(s) or runways;

b) establishment, withdrawal and significant changes in operation of aeronautical services (AGA, AIS, ATS, COMCNS, MET, SAR, etc.);

...  
 c) Significant changes in the level of protection normally available at an aerodrome/heliport for rescue and firefighting purposes. NOTAM shall be originated only when a change of

category is involved and such change of category shall be clearly stated (see Annex 14, Volume I, Chapter 9, and Attachment A, Section 17);

r) Presence or removal of, or significant changes in, hazardous conditions due to snow, slush, Ice, radioactive material, toxic chemicals, volcanic ash deposition or water on the movement area;

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Source A

5.1.1.6 When an AIP Amendment or an AIP Supplement is published in accordance with AIRAC procedures, a NOTAM shall be originated giving a brief description of the contents, the effective date and time, and the reference number to of the amendment or supplement. This NOTAM shall come into force on the same effective date and time as the amendment or supplement and shall remain valid in the pre-flight information bulletin for a period of fourteen days.

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## 5.2 General specifications

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5.2.2 Text of NOTAM shall be composed of the significations/uniform abbreviated phraseology assigned to the ICAO NOTAM Code complemented by ICAO abbreviations, indicators, identifiers, designators, call signs, frequencies, figures and plain language.

Note. — Detailed guidance material covering NOTAM, SNOWTAM, ASHTAM and PIB production is contained in Doc 8126.

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5.2.6 When errors occur in a NOTAM, a NOTAM with a new number to replace the erroneous NOTAM shall be issued or the erroneous NOTAM shall be cancelled and a new NOTAM issued.

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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.

Note. — Omitting a NOTAM from the checklist does not serve to cancel a NOTAM.

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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~~ 14 January 2010. 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.

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6.2 Provision of information in paper copy form

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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. This should be applied to the establishment of, and premeditated major changes in, the circumstances listed in Appendix 4, Part 3, and other major changes if deemed necessary.

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6.3 Provision of information in electronic form

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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. This should be applied to the establishment of, and premeditated major changes in, the circumstances listed in Appendix 4, Part 3, and other major changes if deemed necessary.

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CHAPTER 8. PRE-FLIGHT AND POST-FLIGHT INFORMATION/DATA

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8.2 Automated aeronautical information systems

8.2.1 Where the ~~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 ~~shall use~~ 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~~ The information/data made available shall comply with the provisions of 8.1.2 and 8.1.3.

8.2.4 8.2.2 Self-briefing facilities of an automated pre-flight information system shall provide for access by to operations personnel, including flight crew members and other aeronautical personnel — concerned, to for 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.

8.2.58.2.3 — Recommendation.— Automated pre-flight information systems for the supply of aeronautical information/data for self-briefing, flight planning and flight information service should shall:

a) provide for continuous and timely updating of the system database and monitoring of the validity and quality of the aeronautical information data stored;

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8.2.28.2.4 — 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.

8.2.38.2.5 — 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 a system in accordance with 9.5.1 of Annex 3.

## CHAPTER 9.

## TELECOMMUNICATION REQUIREMENTS

Source B
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9.3 Recommendation. — Subject to availability, satisfactory operation and bilateral/multilateral and/or regional air navigation agreements, the use of public Internet should be permitted for exchange of non-time critical types of aeronautical information.

Note.— Guidance material on non-time critical types of aeronautical information and relevant aspects of the public Internet is provided in the Guidelines on the Use of the Public Internet for Aeronautical Applications (Doc 9855).

Source A
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## CHAPTER 10. ELECTRONIC TERRAIN AND OBSTACLE DATA

### 10.1 Function

Sets of electronic terrain and obstacle data used in combination with aeronautical data, as appropriate, shall satisfy user requirements necessary to support the following air navigation applications:

Note.— Electronic terrain and obstacle data is intended to be used in the following air navigation applications:

- a) ground proximity warning system with forward looking terrain avoidance function and minimum safe altitude warning (MSAW) system;
- b) determination of contingency procedures for use in the event of an emergency during a missed approach or take-off;
- c) aircraft operating limitations analysis;
- d) instrument procedure design (including circling procedure);
- e) determination of en-route “drift-down” procedure and en-route emergency landing location;
- f) advanced surface movement guidance and control system (A-SMGCS); and
- g) aeronautical chart production and on-board databases;
- h) flight simulator;
- i) synthetic vision; and
- j) aerodrome/heliport obstacle restriction and removal.

The data may also be used in other applications such as flight simulator and synthetic vision systems, and may assist in determining the height restriction or removal of obstacles that pose a hazard to air navigation.

10.210.1 Coverage areas and requirements for data provision terrain and obstacle data numerical requirements

10.2.110.1.1 To satisfy requirements necessary to accommodate air navigation systems or functions specified in 10.1, sets of electronic terrain and obstacle data shall be specified as follows:—

- Area 1: the entire territory of a State;
- Area 2: terminal control area; within the vicinity of an aerodrome, sub-divided as follows;
- Area 2a: a rectangular area around a runway that comprises the runway strip plus any clearway that exists.

Note.— See Annex 14, Volume I, Chapter 3 for dimensions for runway strip.

- Area 2b: an area extending from the ends of Area 2a in the direction of departure, with a length of 10 km and a splay of 15% to each side;
- Area 2c: an area extending outside Area 2a and Area 2b at a distance of not more than 10 km from the boundary of Area 2a; and
- Area 2d: an area outside the Areas 2a, 2b and 2c up to a distance of 45 km from the aerodrome reference point, or to an existing TMA boundary, whichever is nearest;
- Area 3: aerodrome/heliport area; and the area bordering an aerodrome movement area that extends horizontally from the edge of a runway to 90 m from the runway centre line and 50 m from the edge of all other parts of the aerodrome movement area.
- Area 4: Category II or III operations approach areas. The area extending 900 m prior to the runway threshold and 60 m each side of the extended runway centre line in the direction of the approach on a precision approach runway, Category II or III.

Note.— See Appendix 8 for descriptions and graphical illustrations of the defined coverage areas.

10.1.2 Recommendation.— Where the terrain at a distance greater than 900 m (3 000 ft) from the runway threshold is mountainous or otherwise significant, the length of Area 4 should be extended to a distance not exceeding 2 000 m (6 500 ft) from the runway threshold.

10.2.2 Area 1 shall cover the entire territory of a State, including aerodromes/heliports. Area 2 shall be the terminal control area as published in a State's aeronautical information publication (AIP) or limited to a 45-km radius from the aerodrome/heliport reference point (whichever is smaller). At IFR aerodromes/heliports where a terminal control area has not been established, Area 2 shall be the area within a 45-km radius of the aerodrome/heliport reference point.

10.2.3 At IFR aerodromes/heliports, Area 3 shall cover the area that extends from the edge(s) of the runway(s) to 90 m from the runway centre line(s) and for all other parts of aerodrome/heliport movement area(s), 50 m from the edge(s) of the defined area(s).

10.2.4 Area 4 shall be restricted to those runways where precision approach Category II or III operations have been established and where detailed terrain information is required by operators to enable them to assess, by use of radio altimeters, the effect of terrain on decision height determination. The width of the area shall be 60 m on either side of the extended runway centre line while the length shall be 900 m from the runway threshold measured along the extended runway centre line.

10.2.5 According to the air navigation applications listed in 10.1 and areas of coverage, sets of electronic terrain data shall satisfy the numerical requirements specified in Appendix 8, Table A8-1 while obstacle data shall satisfy the numerical requirements specified in Appendix 8, Table A8-2.

Note 1. — Numerical terrain and obstacle data requirements for Area 2 provided in Appendix 8, Table A8-1 and Table A8-2, respectively, are defined on the basis of the most stringent application requirement (application listed under 10.1 b)).

Note 2.— It is recognized that some applications listed in 10.1 could be adequately accommodated with terrain and obstacle data sets that are of lower requirements than those specified in Appendix 8, Table A8-1 and Table A8-2, respectively. Consequently, careful evaluation of available data sets by data users is necessary in order to determine if the products are fit for their intended use.

10.1.3 Electronic terrain data shall be provided for Area 1. The obstacle data shall be provided for obstacles in Area 1 higher than 100 m above ground.

10.1.4 From 12 November 2015, at aerodromes regularly used by international civil aviation, electronic obstacle data shall be provided for all obstacles within Area 2 that are assessed as being a hazard to air navigation.

10.1.5 From 12 November 2015, at aerodromes regularly used by international civil aviation electronic terrain and obstacle data shall be provided for:

- a) Area 2a, for those obstacles that penetrate the relevant obstacle data collection surface specified in Appendix 8;
- b) penetrations of the take-off flight path area obstacle identification surfaces; and
- c) penetrations of the aerodrome obstacle limitation surfaces.

Note.— Take-off flight path area obstacle identification surfaces are specified in Annex 4, 3.8.2.1. Aerodrome obstacle limitation surfaces are specified in Annex 14, Volume 1, Chapter 4.

10.1.6 Recommendation.— At aerodromes regularly used by international civil aviation, electronic terrain and obstacle data should be provided for Areas 2b, 2c and 2d for obstacles and terrain that penetrate the relevant obstacle data collection surface specified in Appendix 8.

10.1.7 Recommendation.— At aerodromes regularly used by international civil aviation, electronic terrain and obstacle data should be provided for Area 3 for terrain and obstacles that penetrate the relevant obstacle data collection surface specified in Appendix 8.

10.1.8 At aerodromes regularly used by international civil aviation, electronic terrain and obstacle data shall be provided for Area 4 for terrain and obstacles that penetrate the relevant obstacle data collection surface specified in Appendix 8, for all runways where precision approach Category II or III operations have been established and where detailed terrain information is required by operators to enable them to assess, the effect of terrain on decision height determination by use of radio altimeters.

Note.— Area 4 terrain data and Area 2 obstacle data are normally sufficient to support the production of the Precision Approach Terrain Chart — ICAO. When more detailed obstacle data is required for Area 4, this may be provided in accordance with the Area 4 obstacle data requirements specified in Appendix 8, Table A8-2. Guidance on appropriate obstacles for this chart is given in the Aeronautical Chart Manual (Doc 8697).

10.1.9 Recommendation.— Where additional electronic obstacle or terrain data is collected to meet other aeronautical requirements, the obstacle and terrain data sets should be expanded to include these additional data.

10.1.10 Recommendation.— Arrangements should be made for the coordination of providing Area 2 electronic terrain and obstacle data for adjacent aerodromes where their respective coverage Areas overlap to assure that the data for the same obstacle or terrain is correct.

10.1.11 Recommendation.— At those aerodromes located near territorial boundaries, arrangements should be made among States concerned to share Area 2 electronic terrain and obstacle data.

10.3 10.2 Terrain database data set — content, numerical specification and structure

10.3.1 10.2.1 A terrain database data set shall contain digital sets of data representing terrain surface in the form of continuous elevation values at all intersections (points) of a defined grid, referenced to common datum. A terrain grid shall be angular or linear and shall be of regular or irregular shape.

Note.— In regions of higher latitudes, latitude grid spacing may be adjusted to maintain a constant linear density of measurement points.

10.3.2 10.2.2 Sets of electronic terrain data shall include spatial (position and elevation), thematic and temporal aspects for 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. In practical terms, depending on the acquisition method used, this shall represent the continuous surface that exists at the bare Earth, the top of the canopy or something in-between, also known as “first reflective surface”.

10.3.3 10.2.3 Terrain data shall be collected according to the areas specified in 10.2, terrain data collection surfaces and criteria specified in Appendix 8, Figure A8-1, and in accordance with the terrain data numerical requirements provided in Table A8-1 of Appendix 8. In terrain databases, only one feature type, i.e. terrain, shall be recorded. Feature attributes describing terrain shall be those listed in Appendix 8, Table A8-3. In terrain data sets, only one feature type, i.e. terrain, shall be provided. Feature attributes describing terrain shall be those listed in Table A8-3. The terrain feature attributes listed in Table A8-3 represent the minimum set of terrain attributes, and those annotated as mandatory shall be recorded in the terrain database data set.

10.3 Electronic terrain data for each area shall conform to the applicable numerical requirements in Appendix 8, Table 8A-1.

#### 10.4 Obstacle, database — content, numerical specification and structure

10.4.1 One obstacle database shall contain a digital set of obstacle data and shall include those features having vertical significance in relation to adjacent and surrounding features that are considered hazardous to air navigation. Obstacle data shall comprise the digital representation of the vertical and horizontal extent of man-made objects. Obstacles shall not be included in terrain databases. Obstacle data elements are features that shall be represented in the databases by points, lines or polygons.

10.4.2 Obstacles, which in accordance with the definition, can be fixed (permanent or temporary) or mobile shall be identified within the areas defined in 10.2, on the basis of the obstacle data collection surfaces and criteria specified in Appendix 8, Figure A8-2, and collected in accordance with obstacle data numerical requirements provided in Table A8-2 of Appendix 8. In an data, all defined obstacle feature types shall be recorded and each of them shall be described according to the list of mandatory attributes provided in Table A8-4 of Appendix 8, Table A8-4.

Note.— By definition, obstacles can be fixed (permanent or temporary) or mobile. Specific attributes associated with mobile (feature operations) and temporary types of obstacles are annotated in Appendix 8, Table A8-4, as optional attributes. If these types of obstacles are to be recorded provided in the database data set, appropriate attributes describing such obstacles are also required.

10.3 Electronic obstacle data for each area shall conform to the applicable numerical requirements in Appendix 8, Table 8A-2.

10.510.4 — Terrain and obstacle data product specifications

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Editorial Note — Renumber subsequent paragraphs accordingly.

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...

10.4.10 The obstacle data product specification, supported by geographical coordinates for each aerodrome included within the dataset, shall describe the following areas:

- Areas 2a, 2b, 2c, 2d;
- the take-off flight path area; and
- the obstacle limitation surfaces.

#### 10.6 Availability

10.6.1 States shall ensure that electronic terrain and obstacle data related to their entire territory are made available in the manner specified in 10.2, 10.3 and 10.4 for use by international civil aviation.

10.6.1.1 States shall ensure that as of 20 November 2008, electronic terrain and obstacle data are made available in accordance with Area 1 specifications and terrain data in accordance with Area 4 specifications.

10.6.1.2 States shall ensure that as of 18 November 2010, electronic terrain and obstacle data are made available in accordance with Area 2 and Area 3 specifications.

10.6.1.3 Recommendation.— States should ensure that electronic terrain and obstacle data are made available in accordance with Area 1, Area 2 and Area 3 specifications and terrain data in accordance with Area 4 specifications.

10.6.2 Recommendation. At those aerodromes located near territorial boundaries, arrangements should be made among States concerned to share terrain and obstacle data for the entire Area 2.

...

APPENDIX 1. CONTENTS OF AERONAUTICAL  
INFORMATION PUBLICATION (AIP)  
(see Chapter 4)

...

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:

...

- 6) ~~telex number; and~~ ~~mail address;~~
- 7) aeronautical fixed service (AFS) address: ~~and;~~
- 8) ~~website address, if available.~~

...

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:

...

- 5) ~~telex number~~ e-mail address;
- 6) AFS address;
- 7) website address, if available;

---

Editorial Note.— Renumber subsequent subparagraphs accordingly.

---

...

GEN 3.2 Aeronautical charts

GEN 3.2.1 Responsible service(s)

Description of service(s) responsible for the production of aeronautical charts, including:

- 5) ~~telex number~~ e-mail address;
- 6) AFS address;
- 7) website address, if available;

---

Editorial Note.— Renumber subsequent subparagraphs accordingly.

---

...

GEN 3.2.3 Purchase arrangements

Details of how charts may be obtained, containing:

- 5) ~~telex number~~ e-mail address;
- 6) AFS address;

7) website address, if available;

GEN 3.2.7 Topographical charts

Details of how topographical charts may be obtained, containing:

5) ~~telex number~~ e-mail address;

6) AFS address;

7) website address, if available;

GEN 3.3 Air traffic services

GEN 3.3.1 Responsible service

Description of the air traffic service and its major components, including:

...

5) ~~telex number~~ e-mail address;

6) AFS address;

7) website address, if available;

---

Editorial Note.— Renumber subsequent subparagraphs accordingly.

---

...

GEN 3.3.6 ATS units address list

A list of ATS units and their addresses arranged alphabetically, containing:

...

5) ~~telex number~~ e-mail address;

6) AFS address;

7) website address, if available;

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:

...

5) ~~telex number~~-mail address;

6) AFS address;

7) website address, if available;

---

Editorial Note.— Renumber subsequent subparagraphs accordingly.

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...

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:

...

5) ~~telex number~~-mail address;

6) AFS address;

7) website address, if available;

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Editorial Note.— Renumber subsequent subparagraphs accordingly.

---

...

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:

...

- 4) telephone, telex and telefax number(s), e-mail address, and, if available, website address.

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:

...

- 5) ~~telex number~~ e-mail address;

- 6) AFS address; and

- 7) website address, if available; and

- 8) 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.

...

PART 3 — AERODROMES (AD)

...

AD 2. AERODROMES

Note.— \*\*\*\* is to be replaced by the relevant ICAO location indicator.

...

\*\*\*\* AD 2.2 Aerodrome geographical and administrative data

The requirement is for aerodrome geographical and administrative data including:

...

- 6) name of aerodrome administration operator, address, telephone, telefax, e-mail address and telex numbers and AFS address and, if available, website address;

...

Source D

\*\*\*\* AD 2.3

Operational hours

Detailed description of the hours of operation of services at the aerodrome, including:

1) aerodrome ~~administration~~ operator;

...

Source A

\*\*\*\* AD 2.10

Aerodrome obstacles

Detailed description of obstacles, including:

1) obstacles in Area 2:

...

g) NIL indication, if appropriate.

Note 1.— Chapter 10, 10.2.2 **10.1.1**, 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.

...

2) the absence of an Area 2 data set for the aerodrome is to be clearly stated and obstacle data are to be provided for:

a) obstacles that penetrate the obstacle limitation surfaces;

b) obstacles that penetrate the take-off flight path area obstacle identification surface; and

c) other obstacles assessed as being hazardous to air navigation.

23) indication that information on obstacles in Area 3 is not provided, or if provided:

...

g) NIL indication, if appropriate.

Note 1.— Chapter 10, 10.2.3-10.4.1, 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 2.12

#### Runway physical characteristics

Detailed description of runway physical characteristics, for each runway, including:

...

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; of: —

— thresholds of a non-precision approach runway to the nearest metre or foot; and

— thresholds of a precision approach runway to the nearest tenth of a metre or tenth of a foot;

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 tenth of a metre or tenth of a foot;

...

\*\*\*\* 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); —

— for non-precision approaches, to the nearest metre or foot; and

— for precision approaches, to the nearest tenth of a metre or tenth of a foot;

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 tenth of a metre or tenth of a foot;

...

### AD 3. HELIPORTS

...

Note.— \*\*\*\* is to be replaced by the relevant ICAO location indicator.

...

#### \*\*\*\* AD 3.2 Heliport geographical and administrative data

The requirement is for heliport geographical and administrative data, including:

...

6) name of heliport administration operator, address, telephone, telefax, e-mail address, and telex numbers and AFS address and, if available, website address;

...

Source D

#### \*\*\*\* AD 3.3 Operational hours

Detailed description of the hours of operation of services at the aerodrome, including:

1) aerodrome administration operator;

...

Source A

#### \*\*\*\* 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 3.12

## Heliport data

Detailed description of heliport dimensions and related information, including:

...

- 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);

— for non-precision approaches, to the nearest metre or foot; and

— for precision approaches, to the nearest tenth of a metre or tenth of a foot;

- 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 tenth of a metre or tenth of a foot;

...

APPENDIX 4.  
(see Chapter 6, 6.1.1)

## INFORMATION TO BE NOTIFIED BY AIRAC

## PART 1

1. The establishment, and withdrawal of, and premeditated significant changes (including operational trials) to:

1.1 Limits (horizontal and vertical), regulations and procedures applicable to:

...

1.2 Positions, frequencies, call signs, identifiers, known irregularities and maintenance periods of radio navigation aids, and communication and surveillance facilities.

1.3 Holding and approach procedures, arrival and departure procedures, noise abatement procedures and any other pertinent ATS procedures.

1.4 Transition levels, transition altitudes and minimum sector altitudes.

1.4 1.5 Meteorological facilities (including broadcasts) and procedures.

1.5 1.6 Runways and stopways.

1.7 Taxiways and aprons.

1.8 Aerodrome ground operating procedures (including low visibility procedures).

1.9 Approach and runway lighting.

1.10 Aerodrome operating minima if published by a State.

## PART 2

2. The establishment and withdrawal of, and premeditated significant changes to:

2.1 Position, height and lighting of navigational obstacles.

2.2 Taxiways and aprons.

2.3 ~~2.2~~ Hours of service: ~~of~~ aerodromes, facilities and services.

2.4 ~~2.3~~ Customs, immigration and health services.

2.5 ~~2.4~~ Temporary danger, prohibited and restricted areas and navigational hazards, military exercises and mass movements of aircraft.

2.6 ~~2.5~~ Temporary areas or routes or portions thereof where the possibility of interception exists.

## PART 3

3. The establishment of, and premeditated major changes to:

3.1 New aerodromes for international IFR operations.

3.2 New runways for IFR operations at international aerodromes.

3.3 Design and structure of the air traffic services route network.

3.4 Design and structure of a set of terminal procedures (including change of procedure bearings due to magnetic variation change).

3.5 Circumstances listed in Part 1 if the entire State or any significant portion thereof is affected or if cross-border coordination is required.

...

APPENDIX 6.  
(see Chapter 5, 5.2.1)

## NOTAM FORMAT

...

### INSTRUCTIONS FOR THE COMPLETION OF THE NOTAM FORMAT

...

#### 2. NOTAM numbering

Each NOTAM shall be allocated a series identified by a letter and a four-digit number followed by a stroke and a two-digit number for the year (e.g. A0023/03). Each series shall start on 1 January with number 0001.

#### 3. Qualifiers (Item Q)

Item Q) is divided in eight fields, each separated by a stroke. An entry shall be made in each field. If no entry is to be made in a field, it is not necessary to transmit blanks between the strokes. Examples of how fields are to be filled are shown in the Aeronautical Information Services Manual (Doc 8126). The definition of the field is as follows:

##### 1) FIR

a) If the subject of the information is located geographically within one FIR, the ICAO location indicator shall be that of the affected FIR concerned. When an aerodrome is situated within the overlying FIR of another State, the first field of Item Q) shall contain the code for that overlying FIR (e.g. Q) LFRR/...A) EGJJ);

or,

if the subject of the information is located geographically within more than one FIR within a State, the FIR field shall be composed of first two letters of the ICAO location indicator nationality letters of a the State originating the NOTAM plus followed by "XX". (The location indicator of the overlying UIR shall not be used). The ICAO location indicators of the FIRs concerned shall then be listed in Item A) or indicator of State or non-governmental agency which is responsible for provision of a navigation service in more than one State.

...

##### 2) NOTAM CODE

All NOTAM Code groups contain a total of five letters and the first letter is always the letter Q. The second and third letters identify the subject, and the fourth and fifth letters denote the status or condition of the subject reported upon. The two-letter codes for subjects and conditions are those contained in the PANS-ABC (Doc 8400). For combinations of second and third, and fourth and fifth letters, insert the ICAO NOTAM codes listed in the PANS-ABC (Doc 8400) or in refer to the NOTAM Selection Criteria contained in the Aeronautical Information Services Manual (Doc- 8126) or insert one of the following combinations, as appropriate:

...

Source D

c) When a NOTAM containing operationally significant information is issued in accordance with Appendix 4 and Chapter 6 and when it is used to announce the existence of AIRAC AIP Amendments or Supplements, insert “TT” as the fourth and fifth letters of the NOTAM Code;

...

Source A

e) The following fourth and fifth letters of the NOTAM Code shall be used in NOTAM cancellations:

AL: AK: RESUMED NORMAL OPERATION  
OPERATIVE (OR RE-OPERATIVE) SUBJECT TO PREVIOUSLY PUBLISHED  
LIMITATIONS/CONDITIONS  
AO: OPERATIONAL CC: COMPLETED  
CN: CANCELLED  
HV: WORK COMPLETED XX: PLAIN LANGUAGE

3) TRAFFIC

I = IFR  
V = VFR  
K = NOTAM is a checklist

Note.— Depending on the NOTAM subject and content, the qualifier field TRAFFIC may contain combined qualifiers. For possible combinations refer to *Guidance concerning the combination of TRAFFIC qualifiers with subject and conditions in accordance with the NOTAM Selection Criteria* is in the Aeronautical Information Services Manual (Doc 8126).

4) PURPOSE

N = NOTAM selected for the immediate attention of aircraft operators  
B = NOTAM selected for PIB entry  
O = NOTAM concerning flight operations  
M = Miscellaneous NOTAM; not subject for a briefing, but it is available on request  
K = NOTAM is a checklist

Note.— Depending on the NOTAM subject and content, the qualifier field PURPOSE may contain the combined qualifiers BO or NBO. For possible combinations refer to Guidance concerning the combination of PURPOSE qualifiers with subject and conditions in accordance with the NOTAM Selection Criteria is contained in the Aeronautical Information Services Manual (Doc 8126).-

		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—*Guidance concerning the combination of SCOPE qualifiers with subject and conditions in accordance with the NOTAM Selection Criteria is contained 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) and shall express the actual vertical limits of the area of influence without the addition of buffers. In the case of navigation warnings and airspace restrictions, values entered shall be consistent with those provided under Items F) and G).

...

#### 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. In the cases of NOTAMR and NOTAMC, the date-time group is the actual date and time of the NOTAM origination. The start of a day shall be indicated by “0000”.

#### 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. The end of a day shall be indicated by “2359” (i.e. do not use “2400”). 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).

...

#### 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 only

one reference datum and units unit of measurement. The abbreviations GND or SFC shall be used in Item F) to designate ground and surface respectively. The abbreviation UNL shall be used in Item G) to designate unlimited.

Note.— For NOTAM examples see Doc 8126 and the PANS-ABC (Doc 8400).

ENDIX 7. AERONAUTICAL DATA QUALITY REQUIREMENTS Table A7-1. Latitude and longitude

Latitude and longitude	Publication resolution	Integrity Classification
Flight information region boundary points routine	1 min	1 × 10 <sup>-3</sup>
P, R, D area boundary points (outside CTA/CTZ boundaries)	1 min	1 × 10 <sup>-3</sup> routine
P, R, D area boundary points (inside CTA/CTZ boundaries)	1 sec	1 × 10 <sup>-5</sup> essential
CTA/CTZ boundary points essential	1 sec	1 × 10 <sup>-5</sup>
...		
Runway end (flight path alignment point) critical	1/100 sec	1 × 10 <sup>-8</sup>
...		

## APPENDIX 8. TERRAIN AND OBSTACLE DATA REQUIREMENTS

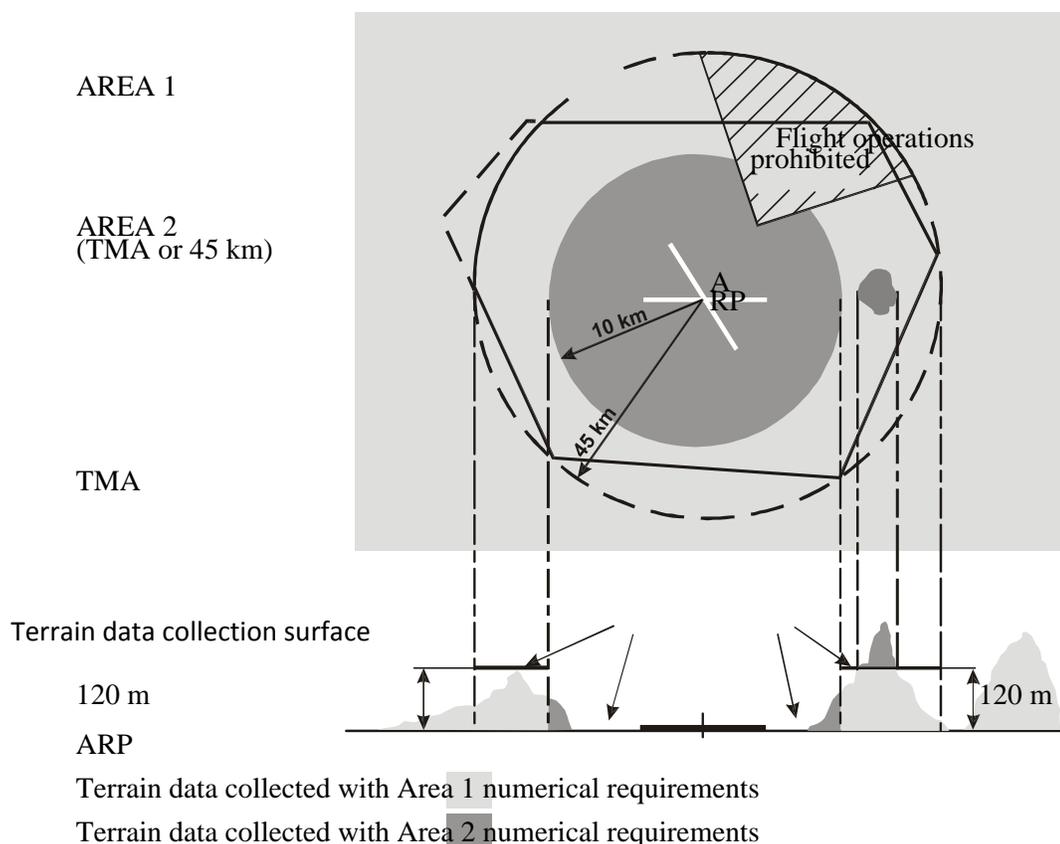


Figure A8-1. Terrain data collection surfaces — Area 1 and Area 2

1. Within the area covered by a 10-km radius from the ARP, terrain data shall be collected and recorded in accordance with the Area 2 numerical requirements.
2. In the area between 10 km and the TMA boundary or 45-km radius (whichever is smaller), data on terrain that penetrates the horizontal plane 120 m above the lowest runway elevation shall be collected and recorded in accordance with the Area 2 numerical requirements.
3. In the area between 10 km and the TMA boundary or 45-km radius (whichever is smaller), data on terrain that does not penetrate the horizontal plane 120 m above the lowest runway elevation shall be collected and recorded in accordance with the Area 1 numerical requirements.
4. In those portions of Area 2 where flight operations are prohibited due to very high terrain or other local restrictions and/or regulations, terrain data shall only be collected and recorded in accordance with the Area 1 numerical requirements.

Note.— Terrain data numerical requirements for Areas 1 and 2 are specified in Table A8-1.



1. Obstacle data shall be collected and recorded in accordance with the Area 2 numerical requirements specified in Table A8-2:

a) Area 2a: a rectangular area around a runway that comprises the runway strip plus any clearway that exists. The Area 2a obstacle collection surface shall have height of 3 m above any obstacle that penetrates the conical surface whose origin is at the edges of the 180-m wide rectangular area and at the nearest runway elevation measured along the runway centre line, extending at 1.2 per cent slope until it reaches 120 m above the lowest runway elevation of all operational runways at the aerodrome (1.2 per cent slope reaches 120 m at 10 km); in the remainder of Area 2 (between 10 km and the TMA boundary or 45-km radius, whichever is smaller), the horizontal surface 120 m above the lowest runway elevation; and and for those portions related to a clearway, if one exists, at the elevation of the nearest runway end;

b) Area 2b: an area extending from the ends of Area 2a in the direction of departure, with a length of 10 km and a splay of 15% to each side. The Area 2b collection surface has a 1.2% slope extending from the ends of Area 2a at the elevation of the runway end in the direction of departure, with a length of 10 km and a splay of 15% to each side;

c) Area 2c: an area extending outside Area 2a and Area 2b at a distance of not more than 10 km from the boundary of Area 2a. The Area 2c collection surface has a 1.2% slope extending outside Area 2a and Area 2b at a distance of not more than 10 km from the boundary of Area 2a. The initial elevation of Area 2c shall be the elevation of the point of Area 2a at which it commences; and

d) Area 2d: an area outside the Areas 2a, 2b and 2c up to a distance of 45 km from the aerodrome reference point, or to an existing TMA boundary, whichever is nearest. The Area 2d obstacle collection surface has a height of 100 m above ground.

b) 2) In these portions of Area 2 where flight operations are prohibited due to very high terrain or other local restrictions and/or regulations, obstacle data shall be collected and recorded in accordance with the Area 1 requirements.

23) Data on every obstacle within Area 1 whose height above the ground is 100 m or higher shall be collected and recorded in the database in accordance with the Area 1 numerical requirements specified in Table A8-2.

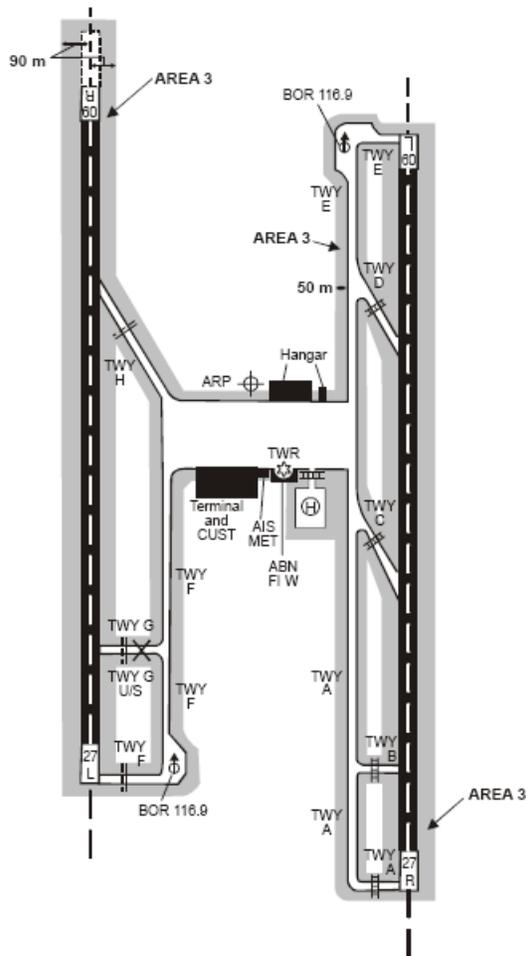
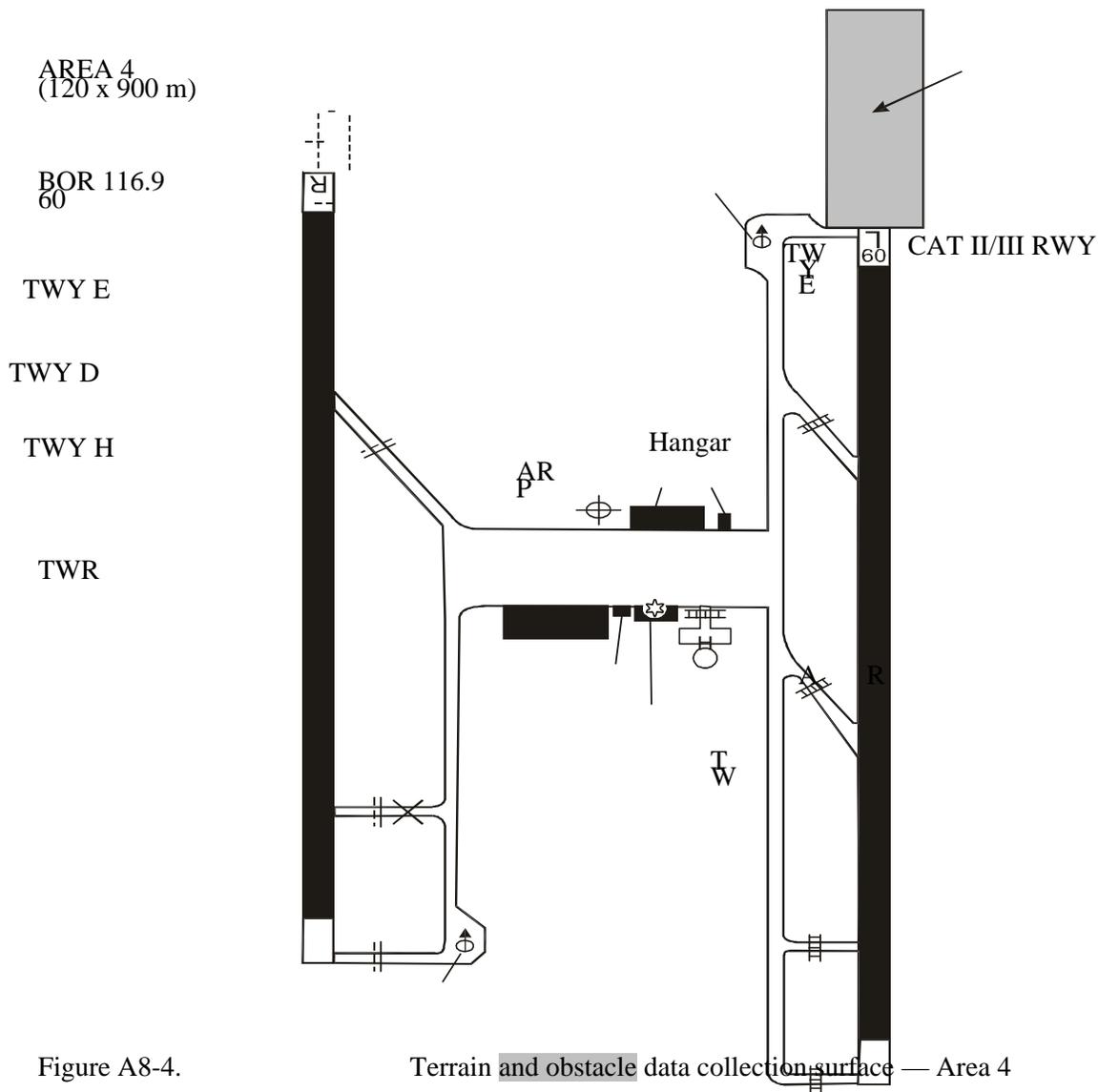


Figure A8-3. Terrain and obstacle data collection surface — Area 3

1. Data on The data collection surface for terrain and obstacles that extends more than a half-metre (0.5 m) above the horizontal plane passing through the nearest point on the aerodrome/heliport movement area shall be collected and recorded.
2. Terrain and obstacle data in Area 3 shall be collected and recorded in accordance comply with the numerical requirements specified in Table A8-1 and Table A8-2, respectively.



Only terrain data shall be collected and recorded in Area 4 shall comply in accordance with the numerical requirements specified in Table A8-1.

Note 1.— The horizontal extent of Area 2 covers Area 4. More detailed obstacle data may be collected in Area 4 in accordance with Area 4 numerical requirements for obstacle data specified in Table A8-2. (See 10.1.8.).

Note 2.— Area 4 may be extended in accordance with 10.1.2.

...

Table A8-1. Terrain data numerical requirements

	Area 1	Area 2	Area 3	Area 4
Post spacing	3 arc seconds (approx. 90 m)	1 arc second (approx. 30 m)	0.6 arc seconds (approx. 20 m)	0.3 arc seconds (approx. 9 m)
Vertical accuracy	30 m	3 m	0.5 m	1 m
Vertical resolution	1 m	0.1 m	0.01 m	0.1 m
Horizontal accuracy	50 m	5 m	0.5 m	2.5 m
Confidence level (1 )	90%	90%	90%	90%
Data classification	routine	essential	essential	essential
Integrity level	$1 \times 10^{-3}$	$1 \times 10^{-5}$	$1 \times 10^{-5}$	$1 \times 10^{-5}$
Maintenance period	as required	as required	as required	as required

Table A8-2. Obstacle data numerical requirements

Area 1	Area 2	Area 3	Area 4	
Vertical accuracy	30 m	3 m	0.5 m	<b>1 m</b>
Vertical resolution	1 m	0.1 m	0.01m	<b>0.1 m</b>
Horizontal accuracy	50 m	5 m	0.5 m	<b>2.5 m</b>
Confidence level (1 )	90%	90%	90%	<b>90%</b>
Data classification	routine	essentia	essentia	<b>Essential</b>
Integrity level	$1 \times 10^{-3}$	1 $1 \times 10^{-5}$	1 $1 \times 10^{-5}$	<b><math>1 \times 10^{-5}</math></b>
Maintenance period	as required	as required	as required	<b>as required</b>

Table A8-3. Terrain attributes

Terrain attribute	Mandatory/Optional
...	
Vertical confidence level	Mandatory
Surface type	Mandatory <b>Optional</b>
Recorded surface	Mandatory
...	

Table A8-4. Obstacle attributes

Obstacle attribute	Mandatory/Optional
...	
Elevation	Mandatory
<b>Height</b>	<b>Optional</b>
Vertical accuracy	Mandatory
...	

Add the following at the end of Table A:

Amendment	Source(s)	Subject	Adopted/Approved Effective Applicable
36	The Secretariat with the assistance of the Aviation Use of the Public Internet Study Group (AUPISG) and the Aeronautical Information Services- Aeronautical Information Management Study Group (AIS-AIMSG); recommendations of the fourth meeting of the International Airways Volcano Watch Operations Group (IAVWOPSG/4);	New provisions relating to the operational use of the public Internet; the reporting of volcanic ash deposition; quality management systems; the use of automation enabling digital data exchange; electronic aeronautical information publications; the NOTAM Format; and electronic terrain and obstacle data.	D * 18 November 2010 November 2015 (for paragraphs 10.1.4 and 10.1.5)

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The APIRG/17 Meeting is invited to note the following :

That the adopted amendment introduces new or revised provisions relating to the use of the public Internet, the reporting of volcanic ash deposition, quality management systems (QMS), the use of automation enabling digital data exchange, electronic aeronautical information publications (eAIP), the NOTAM Format and an extended applicability date and reduced requirements for electronic terrain and obstacle data (eTOD).

In conformity with the Resolution of Adoption, the meeting is invited to note the following:

- a) that before 12 July 2010 States should inform ICAO if there is any part of the adopted Standards and Recommended Practices (SARPs) amendments in Amendment 36 concerning which States wishes to register disapproval, using the form in Attachment B for this purpose. Please note that only statements of disapproval need be registered and if States do not reply it will be assumed that States do not disapprove of the amendment;
  
- b) that before 18 October 2010<sup>1</sup> States inform ICAO of the following, using the form in Attachment C:
  - 1) any differences that will exist on 18 November 2010<sup>2</sup> between the national regulations or practices of a State and the provisions of the whole of Annex 15, as amended by all amendments up to and including Amendment 36, and thereafter of any further differences that may arise;
  
  - 2) the date or dates by which a State will have complied with the provisions of the whole of Annex 15 as amended by all amendments up to and including Amendment 36.

The meeting is invited to:

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- a) note the information provided in this information paper;
- b) review and provide guidance on the status of outstanding work and provide updates;

## ADOPTION OF AMENDMENT 56 TO ANNEX 4

(Presented by the Secretariat)

### EXECUTIVE SUMMARY

This paper presents the Council adoption of Amendment 56 to Annex 4 — Aeronautical Charts. The amendment concerns consequential amendments related to the requirement for cyclic redundancy check (CRC) and the provision of the Aerodrome Terrain and Obstacle Chart — ICAO (Electronic) as a consequence of Amendment 36 to Annex 15 — Aeronautical Information Services. Having examined the technical circumstances associated with the implementation of the amendment, the Air Navigation Commission considers that the proposed applicability date of 18 November 2010 would be suitable, except for paragraph 5.2.1 related to the availability of the Aerodrome Terrain and Obstacle Chart — ICAO (Electronic) for which applicability should be 12 November 2015.

Action noted : The ICAO Council:

adopted, as Amendment 56 to Annex 4, the amendment to definitions and to the Standards and Recommended Practices as contained in Appendix A to this paper;  
approved, as part of the said amendment, the amendment to Notes as contained in Appendix A to this paper;  
approved the Resolution of Adoption in Appendix B to this paper; and  
approved, as part of the said amendment, the amendment to the Foreword of Annex 4 as contained in Appendix C to this paper.

Strategic Objectives:	This information paper relates to Strategic Objectives A and D as the various proposals will improve safety and efficiency of the air navigation system.
Financial implications:	States and industry: no substantial costs.

## 1. INTRODUCTION

1.1 This report deals with a ICAO Council adoption of the amendment of Annex 4 arising from the following sources:

- a) consequential amendments related to the requirement for cyclic redundancy check (CRC) and the provision of the Aerodrome Terrain and Obstacle Chart — ICAO (Electronic) as a consequence of Amendment 36 to Annex 15; and
- b) editorial changes proposed by the Secretariat to align definitions in Annex 4 with definitions in Annex 14 as amended by Amendment 10 to Volume I and Amendment 4 to Volume II, and the alignment of terminology with proposed Amendment 36 to Annex 15..

## 2. BACKGROUND

2.1 The development and review of the adopted amendments have followed the established process, as show in the table below:

Amendment concerning	Preliminary review by ANC and WP no.	State letter and date	Final review by the ANC and WP no.	No. of replies at final review <sup>1</sup>
Consequential amendments related to the requirement for cyclic redundancy check (CRC) and the provision of the Aerodrome Terrain and Obstacle Chart —ICAO (Electronic) as a consequence of Amendment 36 to Annex 152	12 March 2009 AN-WP/8375 (ANC 180-11)	AN 2/2.2-09/13 23 April 2009	28 January 2010 (ANC 183-5) AN-WP/8442 19 January 2010 (ANC 183-3) 12 January 2010 (ANC 183-1) 19 November 2009 (ANC 182-11) AN-WP/8416, Add. No. 1, DP Nos. 1, 2 and 3	57 Contracting States (19) 3 int. orgs Total: 60

1 Number in parentheses is the number of Council Member States who have replied.

Proposal also includes amendments to Annex 11 — Air Traffic Services, Annex 14 — Aerodromes, Volume I — Aerodrome Design and Operations and Volume II — Heliports, Annex 15 and the Procedures for Air Navigation Services — ICAO Abbreviations and Codes (PANS-ABC, Doc 8400).

The amendment listed in the table above were presented to the Council for inclusion in Amendment 56 to Annex 4 and thus the Council took action as stated in the official State letter.

### **3. RATIONALE, IMPLEMENTATION ISSUES AND COST IMPACT**

#### **3.1 Rationale**

3.1.1 The adopted amendment will contribute to the efficiency of international air navigation by introducing a requirement for only one cyclic redundancy check (CRC) algorithm (instead of three) for all integrity classifications in the interests of harmonization. The amendment will also increase the consistency of terminology in ICAO documentation. As the Aerodrome Terrain and Obstacle Chart — ICAO (Electronic) is based on the electronic terrain and obstacle data specified in Annex 15, Chapter 10, the applicability date for that chart has been extended as a consequence of Amendment 36 to Annex 15.

#### **3.2 Implementation issues**

3.2.1 No significant implementation issues are foreseen for the amendment proposals.

#### **3.3 Cost impact**

3.3.1 There is no significant cost impact associated with the amendment proposal.

## APPENDIX A

PROPOSED AMENDMENT TO INTERNATIONAL STANDARDS  
AND RECOMMENDED PRACTICES

## NAUTICAL INFORMATION SERVICES ANNEX 4

## TO THE CONVENTION ON INTERNATIONAL CIVIL AVIATION

## NOTES ON THE PRESENTATION OF THE PROPOSED AMENDMENT

1. The text of the amendment is arranged to show deleted text with a line through it and new text highlighted with grey shading, as shown below:

- |    |   |                                   |
|----|---|-----------------------------------|
| 1. | Text to be deleted is shown with a line through it.   | text to be deleted                |
| 2. | New text to be inserted is highlighted with grey shading.   | new text to be inserted           |
| 3. | Text to be deleted is shown with a line through it followed by the replacement text which is highlighted with grey shading. | new text to replace existing text |

2. The sources of the proposed amendments have been indicated as follows:

Source

Annotation

Secretariat, with the assistance of AIS-AIMSG/1

Source A



Editorial amendments arising from the Secretariat

Source B

...

CHAPTER 1. DEFINITIONS, APPLICABILITY AND AVAILABILITY

1.1 Definitions

...

Source B

Air taxiway. A defined path on the surface established for the air taxiing of helicopters.

...

Air transit route. A defined path on the surface established **route** for the air transiting **transiting** of helicopters.

...

Helicopter stand. An aircraft stand which provides for parking a helicopter and, where air taxiing **ground** taxi operations are contemplated, completed or where the helicopter touchdown **touches down** and lift-off lifts off for air taxi operations.

...

Taxi-route. A defined path established for the movement of helicopters from one part of a heliport to another. A taxi-route includes a helicopter air or ground taxiway which is centred on the taxi-route.

...

## CHAPTER 2. GENERAL SPECIFICATIONS

### 2.17 Aeronautical data

Source A

2.17.5 Protection of electronic Electronic aeronautical data sets, while stored or in transit shall be totally monitored protected by the inclusion in the data sets of a 32-bit Cyclic Redundancy Check cyclic redundancy check (CRC) implemented by the application dealing with the data sets. This shall apply to the protection of all integrity levels of data sets as specified in 2.17.3. To achieve protection of the integrity level of critical and essential aeronautical data as classified in 2.17.3, a 32- or 24-bit CRC algorithm shall apply, respectively.

2.17.6 Recommendation.—To achieve protection of the integrity level of routine aeronautical data as classified in 2.17.3, a 16-bit CRC algorithm should apply.

...

## CHAPTER 5.

## AERODROME TERRAIN

### AND OBSTACLE CHART — ICAO (ELECTRONIC)

...

#### 5.2

#### Availability

5.2.1 From 18 November 2010 **12 November 2015**, 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.

...

## APPENDIX 6.

## AERONAUTICAL DATA QUALITY REQUIREMENTS

...

Sources A & B
---------------

Table 1. Latitude and longitude

Latitude and longitude	Chart resolution	Integrity Classification
— [redacted]		
— [redacted]		

...

P, R, D area boundary points (outside CTA/CTZCTR boundaries).. —■	as plotted	1 × 10 <sup>-3</sup> / routine
P, R, D area boundary points (inside CTA/CTZCTR boundaries)....	as plotted	1 × 10 <sup>-5</sup> / essential
CTA/CTZCTR boundary points.....	as plotted	1 × 10 <sup>-5</sup> essential
Runway end (flight path alignment point).....	1 sec	1 × 10 <sup>-8</sup> / critical

Add the following at the end of Table A:

			Adopted/Approved Effective
56	The Secretariat, with assistance of the Aeronautical Information Services-Aeronautical Information Management Study Group (AIS-AIMSG)	Definitions and new provisions relating to cyclic redundancy check (CRC) and the provision of the Aerodrome Terrain and Obstacle Chart — ICAO (Electronic).	D * 18 November 2010 2 November 2015 (paragraph 5.2.1)

The APIRG/17 Meeting is invited to note the following :

That this amendment proposal introduces revised positions related to the requirement for cyclic redundancy check (CRC) and an extended applicability date for the provision of the Aerodrome Terrain and Obstacle Chart — ICAO (Electronic) as a consequence of Amendment 36 to Annex 15.

In conformity with the Resolution of Adoption, the meeting is invited to note the following:

- a) that before 12 July 2010 States should inform ICAO if there is any part of the adopted Standards and Recommended Practices (SARPs) amendments in Amendment 56 concerning which a State wishes to register disapproval, using the form in Attachment B to the State letter for this purpose. Please note that only statements of disapproval need be registered and if States do not reply it will be assumed that States do not disapprove of the amendment;
  
- b) that before 18 October 2010<sup>1</sup> States inform ICAO of the following, using the form in Attachment C of the State letter for this purpose:
  - 1) any differences that will exist on 18 November 2010<sup>2</sup> between the national regulations or practices of a State and the provisions of the whole of Annex 4, as amended by all amendments up to and including Amendment 56, and thereafter of any further differences that may arise;
  
  - 2) the date or dates by which a State has complied with the provisions of the whole of Annex 4 as amended by all amendments up to and including Amendment 56.

#### ACTION BY THE APIRG/17 MEETING

The meeting is invited to:

- a) Note the information provided in this information paper;
  
- b) review and provide guidance on the status of outstanding work and provide updates;

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