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CHAPTER 1. GENERAL

Note 1.— The object of the aeronautical information service (AIS) is to ensure the flow of aeronautical data and aeronautical information necessary for global air traffic management (ATM) system safety, regularity, economy and efficiency in an environmentally sustainable manner. The role and importance of aeronautical data and aeronautical information changed significantly with the implementation of area navigation (RNAV), performance-based navigation (PBN), airborne computer-based navigation systems and data link systems. Corrupt, erroneous, late, or missing aeronautical data and aeronautical information can potentially affect the safety of air navigation.

Note 2.— 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).*

Note 3.— Guidance material on the organization and operation of aeronautical information services is contained in the Aeronautical Information Services Manual *(Doc 8126).*

1.1 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.

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 mapping data (AMD). Data collected for the purpose of compiling aerodrome mapping information.

Note.— Aerodrome mapping data are collected for purposes that include the improvement of the user's situational awareness, surface navigation operations, training, charting and planning.

Aerodrome mapping database (AMDB). A collection of aerodrome mapping data organized and arranged as a structured data set.

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 management (AIM). The dynamic, integrated management of aeronautical information through the provision and exchange of quality-assured digital aeronautical data in collaboration with all parties.

Aeronautical Information Product. Aeronautical data and aeronautical information provided either as digital data sets or as a standardized package of predefined presentation in paper or electronic media. Aeronautical

Information Products include:

— Aeronautical Information Publication (AIP), including Amendments and Supplements
— Aeronautical Information Circulars (AIC)
— Aeronautical charts
— NOTAM
— Digital data sets

Note.— Aeronautical Information Products are intended primarily to satisfy international requirements for the exchange of aeronautical information.

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 data and aeronautical information 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).

Air traffic management (ATM). The dynamic, integrated management of air traffic and airspace (including air traffic services, airspace management and air traffic flow management) — safely, economically and efficiently — through the provision of facilities and seamless services in collaboration with all parties and involving airborne and ground-based functions.

Application. Manipulation and processing of data in support of user requirements (ISO 19104*[1]).

Area navigation (RNAV). A method of navigation which permits aircraft operation on any desired flight path within the coverage of ground- or space-based navigation aids or within the limits of the capability of self-contained aids, or a combination of these.

Note.— Area navigation includes performance-based navigation as well as other operations that do not meet the definition of performance-based navigation.

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

[1] * All ISO Standards are listed at the end of this chapter.

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.

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.

Confidence level. The probability that the true value of a parameter is within a certain interval around the estimate of its value.

Note.— The interval is usually referred to as the accuracy of the estimate.

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.

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 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.

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.

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.

Integrity classification (aeronautical data). Classification based upon the potential risk resulting from the use of corrupted data. Aeronautical data are classified as:

a) *routine data:* 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;

b) *essential data:* 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) *critical data:* 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.

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.— A structured description of the content, quality, condition or other characteristics of 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

Navigation specification. A set of aircraft and flight crew requirements needed to support performance-based navigation operations within a defined airspace. There are two kinds of navigation specifications:

Required navigation performance (RNP) specification. A navigation specification based on area navigation that includes the requirement for performance monitoring and alerting, designated by the prefix RNP, e.g. RNP 4, RNP APCH.

Area navigation (RNAV) specification. A navigation specification based on area navigation that does not include the requirement for performance monitoring and alerting, designated by the prefix RNAV, e.g. RNAV 5, RNAV 1.

Note 1.— The Performance-based Navigation (PBN) Manual *(Doc 9613), Volume II, contains detailed guidance on navigation specifications.*

Note 2.— The term RNP, previously defined as "a statement of the navigation performance necessary for operation within a defined airspace", has been removed from this Annex as the concept of RNP has been overtaken by the concept of PBN. The term RNP in this Annex is now solely used in the context of navigation specifications that require performance monitoring and alerting, e.g. RNP 4 refers to the aircraft and operating requirements, including a 4 NM lateral performance with on-board performance monitoring and alerting that are detailed in Doc 9613.

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:

a) are located on an area intended for the surface movement of aircraft; or

b) extend above a defined surface intended to protect aircraft in flight; or

c) stand outside those defined surfaces and that have been assessed as being a hazard to air navigation.

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.

Performance-based navigation (PBN). Area navigation based on performance requirements for aircraft operating along an ATS route, on an instrument approach procedure or in a designated airspace.

Note.— Performance requirements are expressed in navigation specifications (RNAV specification, RNP specification) in terms of accuracy, integrity, continuity, availability and functionality needed for the proposed operation in the context of a particular airspace concept.

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*).

Radio navigation service. A service providing guidance information or position data for the efficient and safe operation of aircraft supported by one or more radio navigation aids.

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.

1.2 Common reference systems for air navigation

1.2.1 Horizontal reference system

1.2.1.1 World Geodetic System — 1984 (WGS-84) shall be used as the horizontal (geodetic) reference system for international air navigation. Consequently, published aeronautical geographical coordinates (indicating latitude and longitude) shall be expressed in terms of the WGS-84 geodetic reference datum.

Note 1.— Comprehensive guidance material concerning WGS-84 is contained in the World Geodetic System — 1984 (WGS-84) Manual *(Doc 9674)*.

Note 2.— Specifications governing the determination and reporting (accuracy of field work and data integrity) of WGS-
84-related aeronautical coordinates for geographical positions established by air traffic services are given in

Annex 11, Chapter 2, and Appendix 5, Table 1, and for aerodrome/heliport-related positions, in Annex 14, Volumes I and II, Chapter 2, and Table A5-1 and Table 1 of Appendices 5 and 1, respectively.

1.2.1.2 **Recommendation.—** *In precise geodetic applications and some air navigation applications, temporal changes in the tectonic plate motion and tidal effects on the Earth's crust should be modelled and estimated. To reflect the temporal effect, an epoch should be included with any set of absolute station coordinates.*

Note 1.— The epoch of the WGS-84 (G873) reference frame is 1997.0 while the epoch of the latest updated WGS-84 (G1150) reference frame, which includes plate motion model, is 2001.0. (G indicates that the coordinates were obtained through Global Positioning System (GPS) techniques, and the number following G indicates the GPS week when these coordinates were implemented in the United States of America's National Geospatial-Intelligence Agency's (NGA's) precise ephemeris estimation process.)

*Note 2.— The set of geodetic coordinates of globally distributed permanent GPS tracking stations for the most recent realization of the WGS-84 reference frame (WGS-84 (G1150)) is provided in Doc 9674. For each permanent GPS tracking station, the accuracy of an individually estimated position in WGS-84 (G1150) has been in the order of 1 cm (1*s*).*

Note 3.— Another precise worldwide terrestrial coordinate system is the International Earth Rotation Service (IERS) Terrestrial Reference System (ITRS), and the realization of ITRS is the IERS Terrestrial Reference Frame (ITRF). Guidance material regarding the ITRS is provided in Appendix C of Doc 9674. The most current realization of the WGS-84 (G1150) is referenced to the ITRF 2000 epoch. The WGS-84 (G1150) is consistent with the ITRF 2000 and in practical realization the difference between these two systems is in the one to two centimetre range worldwide, meaning WGS-84 (G1150) and ITRF 2000 are essentially identical.

1.2.1.3 Geographical coordinates which have been transformed into WGS-84 coordinates but whose accuracy of original field work does not meet the requirements in Annex 11, Chapter 2, and Annex 14, Volumes I and II, Chapter 2, shall be identified by an asterisk.

1.2.1.4 The order of publication resolution of geographical coordinates shall be that specified in Appendix 1 and Table A7-1 of Appendix 7 while the order of chart resolution of geographical coordinates shall be that specified in Annex 4, Appendix 6, Table 1.

1.2.2 Vertical reference system

1.2.2.1 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 international air navigation.

Note 1.— 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.

Note 2.— Gravity-related heights (elevations) are also referred to as orthometric heights while distances of points above the ellipsoid are referred to as ellipsoidal heights.

1.2.2.2 The Earth Gravitational Model — 1996 (EGM-96), containing long wavelength gravity field data to degree and order 360, shall be used by international air navigation as the global gravity model.

1.2.2.3 At those geographical positions where the accuracy of EGM-96 does not meet the accuracy requirements for elevation and geoid undulation specified in Annex 14, Volumes I and II, on the basis of EGM-96 data, regional, national or local geoid models containing high resolution (short wavelength) gravity field data shall be developed and used. When a geoid model other than the EGM-96 model is used, a description of the model used, including the parameters required for height transformation between the model and EGM-96, shall be provided in the Aeronautical Information Publication (AIP).

Note.— Specifications governing determination and reporting (accuracy of field work and data integrity) of elevation and geoid undulation at specific positions at aerodromes/heliports are given in Annex 14, Volumes I and II, Chapter 2, and Table A5-2 and Table 2 of Appendices 5 and 1, respectively.

1.2.2.4 In addition to elevation referenced to the MSL (geoid), for the specific surveyed ground positions, geoid undulation (referenced to the WGS-84 ellipsoid) for those positions specified in Appendix 1 shall also be published.

1.2.2.5 The order of publication resolution of elevation and geoid undulation shall be that specified in Appendix 1 and Table A7-2 of Appendix 7 while the order of chart resolution of elevation and geoid undulation shall be that specified in Annex 4, Appendix 6, Table 2.

1.2.3 Temporal reference system

1.2.3.1 For international civil aviation, the Gregorian calendar and Coordinated Universal Time (UTC) shall be used as the temporal reference system.

Note 1.— A value in the time domain is a temporal position measured relative to a temporal reference system.

Note 2.— Coordinated Universal Time (UTC) is a time scale maintained by the Bureau International de l'Heure (BIH)
and the IERS and forms the basis of a coordinated dissemination of standard frequencies and time signals.

Note 3.— See Attachment D of Annex 5 for guidance material relating to UTC.

Note 4.— ISO Standard 8601 specifies the use of the Gregorian calendar and 24-hour local or UTC for information interchange while ISO Standard 19108 prescribes the Gregorian calendar and UTC as the primary temporal reference system for use with geographic information.

1.2.3.2 When a different temporal reference system is used for some applications, the feature catalogue, or the metadata associated with an application schema or a data set, as appropriate, shall include either a description of that system or a citation for a document that describes that temporal reference system.

Note.— ISO Standard 19108, Annex D, describes some aspects of calendars that may have to be considered in such a description.

1.3 Miscellaneous specifications

1.3.1 Each element of the Aeronautical Information Products intended for international distribution shall include English text for those parts expressed in plain language.

1.3.2 Place names shall be spelt in conformity with local usage, transliterated, when necessary, into the Latin alphabet.

1.3.3 **Recommendation.—** *Units of measurement used in the origination, processing and distribution of aeronautical data and aeronautical information should be consistent with the decision taken by the State in respect of the use of the tables contained in Annex 5* — Units of Measurement to be Used in Air and Ground Operations.

1.3.4 ICAO abbreviations shall be used in the aeronautical information services whenever they are appropriate and their use will facilitate distribution of aeronautical data and aeronautical information.

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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 2. RESPONSIBILITIES AND FUNCTIONS

Comment [1]: This document contains the current Annex 15 AMDT 37 text, as a baseline for further editing. When editing this chapter, please track all changes (including the reason for the change) in https://docs.google.com/document/d/1v-J9BX8OooCwZZ6Hq-xyblCPHcRuGB9k01CgEz2UpvA/edit?usp=sharing

2.1 State responsibilities

2.1.1 Each Contracting State shall:

a) provide an aeronautical information service; or

b) agree with one or more other Contracting State(s) for the provision of a joint service; or

c) delegate the authority for the provision of the service to a non-governmental agency, provided the Standards and Recommended Practices of this Annex are adequately met.

2.1.2 Each Contracting State shall ensure that the provision of aeronautical data and aeronautical information covers its own territory and those areas over the high seas for which it is responsible for the provision of air traffic services.

2.1.3 The State concerned shall remain responsible for the aeronautical data and aeronautical information provided in accordance with 2.1.2. Aeronautical data and aeronautical information provided for and on behalf of a State shall clearly indicate that they are provided under the authority of that State.

2.1.4 Each Contracting State shall ensure that the aeronautical data and aeronautical information provided are complete, timely and of required quality in accordance with 3.3.

2.1.5 Each contracting State shall ensure that formal arrangements are established between originators of aeronautical data and aeronautical information and the aeronautical information service in relation to the timely and complete provision of aeronautical data and aeronautical information.

2.2 AIS responsibilities and functions

2.2.1 An aeronautical information service shall ensure that aeronautical data and aeronautical information necessary for the safety, regularity or efficiency of air navigation are made available in a form suitable for the operational requirements of the ATM community, including:

a) those involved in flight operations, including flight crews, flight planning and flight simulators; and

b) the air traffic services unit responsible for flight information service and the services responsible for pre-flight information.

Note.— A description of the ATM community is contained in the Global Air Traffic Management Operational Concept (Doc 9854).

2.2.2 An aeronautical information service shall receive, collate or assemble, edit, format, publish/store and distribute aeronautical data and aeronautical information concerning the entire territory of the State as well as those areas over the high seas in which the State is responsible for the provision of air traffic services. Aeronautical data and aeronautical information shall be provided as an Integrated Aeronautical Information Package.

Note.— An aeronautical information service may include origination functions.

2.2.3 Where 24-hour service is not provided, service shall be available during the whole period an aircraft is in flight in the area of responsibility of an aeronautical information service, plus a period of at least two hours before and after such a period. The service shall also be available at such other time as may be requested by an appropriate ground organization.

2.2.4 An aeronautical information service shall, in addition, obtain aeronautical data and aeronautical information to enable it to provide pre-flight information service and to meet the need for in-flight information:

a) from the aeronautical information services of other States;

b) from other sources that may be available.

Note.— One such source is the subject of a provision in 8.3.

2.2.5 Aeronautical data and aeronautical information obtained under 2.2.4 a) shall, when distributed, be clearly identified as having the authority of the State of Origin.

2.2.6 Aeronautical data and aeronautical information obtained under 2.2.4 b) shall, if possible, be verified before distribution and if not verified shall, when distributed, be clearly identified as such.

2.2.7 An aeronautical information service shall promptly make available to the aeronautical information services of other States any aeronautical data and aeronautical information necessary for the safety, regularity or efficiency of air navigation required by them, to enable them to comply with 2.2.1.

2.3 Exchange of aeronautical data and aeronautical information

2.3.1 Each State shall designate the office to which all elements of the Integrated Aeronautical Information Package originated by other States shall be addressed. Such an office shall be qualified to deal with requests for aeronautical data and aeronautical information originated by other States.

2.3.2 Formal arrangements should be established between those parties providing aeronautical information on behalf of the States and their users in relation to the provision of the service

Comment [2]: Text proposed to be included here after discussions in the SG. See AIS-AIMSG/8-SoD para 13.19

Note. — Guidance material on such formal arrangements may be found in ...

2.3.3 Where more than one international NOTAM office is designated within a State, the extent of responsibility and the territory covered by each office shall be defined.

2.3.4 An aeronautical information service shall arrange, as necessary, to satisfy operational requirements for the issuance and receipt of NOTAM distributed by telecommunication.

2.3.5 Wherever practicable, direct contact between aeronautical information services shall be established in order to facilitate the international exchange of aeronautical data and aeronautical information.

2.3.6 One copy of each of the elements of the Integrated Aeronautical Information Package that have been requested by the aeronautical information service of an ICAO Contracting State shall be made available by the originating State in the mutually-agreed form(s), without charge, even where authority for publication/storage and distribution has been delegated to a non-governmental agency.

2.3.7 **Recommendation**.— *The exchange of more than one copy of the elements of the Integrated Aeronautical Information Package and other air navigation documents, including those containing air navigation legislation and regulations, should be subject to bilateral agreement between ICAO Contracting States.*

2.3.8 **Recommendation.**— *The procurement of aeronautical data and aeronautical information, including the elements of the Integrated Aeronautical Information Package, and other air navigation documents, including those containing air navigation legislation and regulations, by States other than ICAO Contracting States and by other entities should be subject to separate agreement with the originating State.*

2.4 Copyright

Note.— In order to protect the investment in the products of a State's AIS as well as to ensure better control of their use, States may wish to apply copyright to those products in accordance with their national laws.

Any product of a State's AIS which has been granted copyright protection by that State and provided to another State in accordance with 2.3 shall only be made available to a third party on the condition that the third party is made aware that the product is copyright protected and provided that it is appropriately annotated that the product is subject to copyright by the originating State.

2.5 Cost recovery

Recommendation.— *The overhead cost of collecting and compiling aeronautical data and aeronautical information should be included in the cost basis for airport and air navigation services charges, as appropriate, in accordance with the principles contained in ICAO's Policies on Charges for Airports and Air Navigation Services (Doc 9082).*

Note.— When costs of collection and compilation of aeronautical data and aeronautical information are recovered through airports and air navigation services charges, the charge to an individual customer for the supply of a particular AIS product may be based on the costs of printing paper copies, production of electronic media, and costs of distribution.

CHAPTER 3. AERONAUTICAL INFORMATION MANAGEMENT

3.1 Information management requirements

The information management resources and processes established by an aeronautical information service shall be adequate to ensure the timely collection, processing, storing, integration, exchange and delivery of quality-assured aeronautical data and aeronautical information within the ATM system.

3.2 Aeronautical data and aeronautical information validation and verification

3.2.1 Material to be issued as part of the Integrated Aeronautical Information Package shall be thoroughly checked 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.

3.2.2 An aeronautical information service shall establish verification and validation procedures which ensure that upon receipt of aeronautical data and aeronautical information, quality requirements (accuracy, resolution, integrity and traceability) are met.

~~*Note 1.— Guidance material on the liaison with other related services is contained in Doc 8126.*~~

Note 2.— Guidance material on the aeronautical data quality requirements (accuracy, resolution, integrity, and traceability and protection requirements) may be found in the World Geodetic System — 1984 (WGS-84) Manual (Doc 9674). Supporting data quality material in respect of data accuracy, publication resolution, and integrity of aeronautical data, together with guidance material in respect to the rounding convention for aeronautical data, is contained in RTCA Document DO-201A and European Organization for Civil Aviation Equipment (EUROCAE) Document ED-77 — Standards for Aeronautical Information (or equivalent).

Note 3.— Guidance material on the management of aeronautical data quality is included in the Manual on the Quality Management System for Aeronautical Information Services (Doc 9839).

3.3 Data quality specifications

3.3.1 Accuracy

The order of accuracy for aeronautical data 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).

Note.— The accuracy requirements for electronic terrain and obstacle data are specified in Appendix 8.

3.3.2 Resolution

3.3.2.1 The order of publication resolution of aeronautical data shall be that as specified in Appendices 1 and 7.

3.3.2.2 **Recommendation.**— *The resolution of the data features contained in the database should be commensurate with the data accuracy requirements.*

Note.— The resolution of the data features contained in the database may be the same or finer than the publication resolution.

3.3.3 Integrity

3.3.3.1 The integrity classification related to aeronautical data shall be as provided in Tables A7-1 to A7-5 of Appendix 7.

Comment [3]: This note is not really related to the above paragraph. It is proposed to delete it.

Comment [4]: Proposed by the other group: Include in PANS-AIM Chapter 3 the following text, recuperated from DOC 8126: The resulting number in the extra decimal place will then be used to provide a publication resolution in accordance with the following rounding convention:
1) if the number in the extra decimal place is 5, 6, 7, 8 or 9, the last number of the final publication value will be rounded up by 1;
2) if the number in the extra decimal place is less than 5, it and any other numbers that have been extended in the calculation to additional decimal places shall be truncated.
Take care to prevent double rounding. Double rounding can occur when the same calculated value is used for more than one application, each having different publication resolution requirements.

Comment [5]: It is proposed to split this note into two parts. What should be the status of references to guidance material ? Should they stay in the Annex or go to the PANS ? ...

Comment [6]: We recommand to move this reference to the manual in the PANS

Comment [7]: Check for the right references once work on new chapter 4 is finished.

Comment [8]: This sentence should go as an introductory note. The three origination techniques mentioned here do not relate to "data accuracy". Besides, it is no ...

Comment [9]: Check for the right references once work on new chapter 4 is finished.

Comment [10]: check references

Comment [11]: Check if the use of "feature" is OK, depending on the vocabulary of the "data catalogue".

Comment [12]: It is proposed to replace "finer" by "higher".

Comment [13]: Check reference

3.3.3.2 The integrity of aeronautical data 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). Based on the applicable integrity classification, the validation and verification procedures shall:

a) for routine data: avoid corruption throughout the processing of the data;

b) for essential data: assure corruption does not occur at any stage of the entire process and may include additional processes as needed to address potential risks in the overall system architecture to further assure data integrity at this level; and

c) for critical data: assure corruption does not occur at any stage of the entire process and include additional integrity assurance processes to fully mitigate the effects of faults identified by thorough analysis of the overall system architecture as potential data integrity risks.

Note 1.— Guidance material in respect to the processing of aeronautical data and aeronautical information is contained in RTCA Document DO-200A and European Organization for Civil Aviation Equipment (EUROCAE) Document ED-76 — Standards for Processing Aeronautical Data.

Note 2.— Error-producing faults in the entire process may be mitigated by additional data quality assurance techniques as may be required. These could include application tests for critical data (for example, by flight check); the use of security, logic, semantic, comparison, and redundancy checks; digital error detection; and the qualification of human resources and process tools such as hardware and software.

Note 3.— Distribution to the next intended user will differ in the delivery method applied which may either be:

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

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

Note 4.— Different delivery methods and data media may require different procedures to ensure the required data quality.

3.4 Metadata

3.4.1 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.

Note.— ISO Standard 19115 specifies requirements for geographic information metadata.

a) the name of the organizations or entities performing any action of originating, transmitting or manipulating the data;

b) the action performed; and

c) the date and time the action was performed.

3.5 Data protection

3.5.1 Aeronautical data and data sets shall be protected in accordance with data error detection, security, and authentication techniques.

Note.— The PANS-AIM and the Aeronautical Information Services Manual (Doc 8126) contain suitable

Comment [14]: This looks to us like a definition. We propose to move it to the definition paragraph.

Comment [15]: Does this note need to appear earlier in the chapter (or in the Annex) ?

Comment [16]: This note 2 is an extract of DO-200A.

Comment [17]: It is proposed to move this note that is not about data integrity but about data distribution (chapter 5 - distribution service) if it has added value.

If the meaning is to indicate that integrity has to be maintained until delivery to the next intended user, then say it more clearly.

Comment [18]: Replace by "origination".

Comment [19]: Transfer chapter 3.4.2 of Annex 15 in PANS as a new chapter 3.4 "Metadata".

Comment [20]: It is proposed to delete this because §3.5.1 is about all data. It is not necessary to have a specific mention of data sets because they are included in "aeronautical data".

Comment [21]: Document hierarchy

Comment [22]: "Suitable" is not suitable in this sentence.

guidance on data error detection, security, and authentication techniques.

3.5.2 Aeronautical digital data sets shall be protected against loss or alteration of data by the application of a data integrity protection mechanism. This shall apply to the protection of the integrity classification of data set as specified in § 1.1 Definitions at "Integrity classification (aeronautical data)".

~~3.5.2 Electronic aeronautical data sets shall be protected by the inclusion in the data sets of a 32-bit cyclic redundancy check (CRC) implemented by the application dealing with the data sets. This shall apply to the protection of the integrity classification of data sets as specified in 3.3.3.~~

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

Note 2.— Guidance 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).

3.6 Use of automation

3.6.1 Automation shall be introduced with the objective of improving the timeliness, quality, efficiency and cost- effectiveness of aeronautical information services.

Note.— Guidance on the development of databases and the establishment of data exchange services may be found in the Aeronautical Information Services Manual (Doc 8126).

3.6.2 Where aeronautical data and aeronautical information are provided in multiple formats, processes shall be implemented to ensure data and information consistency between formats.

3.6.3 In order to meet the data quality requirements, automation shall:

a) enable digital aeronautical data exchange between the parties involved in the data processing chain; and

b) use aeronautical information exchange models and data exchange models designed to be globally interoperable.

Note.— Guidance on the aeronautical information and data exchange models may be found in the Aeronautical Information Services Manual (Doc 8126).

3.6.4 **Recommendation.**— *The aeronautical information model used should encompass the aeronautical data and aeronautical information to be exchanged.*

3.6.5 **Recommendation.**— *The aeronautical information model used should:*

a) use the Unified Modelling Language (UML) to describe the aeronautical information features and their properties, associations and data types;

b) include data value constraints and data verification rules;

c) include provisions for metadata as specified in 3.4.2; and

d) include a temporality model to enable capturing the evolution of the properties of an aeronautical information feature during its life cycle.

3.6.6 **Recommendation.**— The aeronautical data exchange model used should:

a) apply a commonly used data encoding format;

b) cover all the classes, attributes, data types and associations of the aeronautical information model detailed in 3.6.5;

and

Comment [23]: This is the new text for data protection specific to digital data sets. The intent is to avoid mandating CRC32 at the level of the Annex and to have a more "generic" requirement.

We have to add in the PANS the following requirement :

"The data protection mechanism for digital data sets shall offer, at the minimum, an equivalent level of protection as a 32-bit cyclic redundancy check (CRC)."

Comment [24]: To be replaced by "digital". Put the sentence this way : "Aeronautical digital data sets..."

Comment [25]: to be replaced by "in the definition of "data integrity classification".

Comment [26]: We do not understand the intent of this note. We propose to delete it if there is no good reason to keep it.

Comment [27]: To be moved to the PANS where CRC32 is mentioned as AMC.

Comment [28]: Why "introduce" ? Why not "applied or used" ? It would be more straight to the point, especially in a digital world.

Comment [29]: It does not seem to be true. Same comment as above on Doc 8126.

c) provide an extension mechanism by which groups of users can extend the properties of existing features and add new features which do not adversely affect global standardization.

Note 1.—The intent of using a commonly used data encoding format is to ensure interoperability of aeronautical data exchange between agencies and organizations involved in the data processing chain.

Note 2.—Examples of commonly used data encoding formats include Extensible Markup Language (XML), Geography Markup Language (GML), and JavaScript Object Notation (JSON).

Comment [30]: Is this format still used today ?

Comment [31]: These recommended practices are very detailed specifications for the "aeronautical information model" which is introduced at Annex level in 3.6.3. It should go to the PANS (with the notes)

3.7 Quality management system

3.7.1 Quality management systems shall be implemented and maintained encompassing all functions of an aeronautical information service, as outlined in 2.2. The execution of such quality management systems shall be made demonstrable for each function stage.

Note.— Guidance material is contained in the Manual on the Quality Management System for Aeronautical Information Services (Doc 9839).

3.7.2 **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.*

~~*Note 1.— Quality management may be provided by a single quality management system or serial quality management systems.*~~

~~*Note 2.— 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.*~~

Comment [32]: Modified to "formal arrangements" for coherence sake

Comment [33]: Moved to PANS because it constitutes "hows"

3.7.3 **Recommendation.**— *The quality management system established in accordance with 3.7.1 should follow the International Organization for Standardization (ISO) 9000 series of quality assurance standards, and be certified by an accredited certification body* ~~*approved organization*~~*.*

~~*Note 1.— An ISO 9000 certificate issued by an accredited certification body would be considered an acceptable means of compliance.*~~

Comment [34]: This note has been incorporated inside the 3.7.3 recommended practice.

~~Note 2.— 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.*~~

Comment [35]: This goes to the PANS

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.

Comment [36]: The RTCA document relates to QMS for the downstream aeronautical information chain. Do we want to keep it in Annex 15 or PANS ? Or just delete it ?

3.7.4 Within the context of the established quality management system, the competencies and the associated knowledge, skills and abilities required for each function shall be identified, and personnel assigned to perform those functions shall be appropriately trained. Processes shall be in place to ensure that personnel possess the competencies required to perform specific assigned functions. 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 competencies. Periodic assessments of personnel shall be used as a means to detect and correct shortfalls.

~~*Note.— Guidance material concerning training methodology to ensure the competency of personnel is contained in the Aeronautical Information Management Training Development Manual (Doc 9991).*~~

Comment [37]: Moved to PANS

3.7.5 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 are 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.

3.7.6 The established quality management system shall provide users with the necessary assurance and confidence that distributed aeronautical data and aeronautical information satisfy the aeronautical data quality requirements for accuracy, resolution and integrity as specified in 3.2 and 3.3 and that the data traceability requirements are met through the provision of appropriate metadata as specified in 3.4. 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.

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

3.7.8 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 without undue delay. All audit observations and remedial actions shall be evidenced and properly documented.

3.8 Safety management

3.8.1 A safety policy shall be established to demonstrate commitment to safety management in order to meet defined safety objectives.

3.8.2 Safety management activities shall, as a minimum:

a. ensure hazards and safety risks associated with changes to AIM processes, procedures, resources and systems shall be assessed and mitigated;
b. ensure that review and monitoring processes are in place to identify potential safety issues;
c. ensure that procedures are in place to assess and mitigate safety risks to aviation arising from data and information errors;
d. identify roles and responsibilities within the organisation for the performance of the safety management functions;
e. promote awareness of safety by involving all personnel to identify safety issues and propose solutions to identified safety issues;
f. ensure that documented procedures relating to safety management activities are defined; and
g. ensure that records pertaining to safety management performance are kept.

Comment [38]: The necessity to document the safety activities has been added because it is important to capture what has to be done in a systematic way.

Note 1 — The above activities may be included in the implementation of a Safety Management System as described in Annex 19 Safety Management and detailed in the Safety Management Manual (SMM) *(Doc 9859).*

Note 2 — Guidance pertaining to the relationship between SMS and QMS may be found in the QMS Manual (Doc 9839).

~~3.9 Human Factors considerations~~

~~3.9.1 The organization of the aeronautical information services as well as the design, contents, processing and distribution of aeronautical data and aeronautical information shall take into consideration Human Factors principles which facilitate their optimum utilization.~~

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

Comment [39]: It is proposed to delete this part because it is explained nowhere what "human Factors Principles" consist in which is the core of this paragraph.

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

Comment [40]: This should go to the safety management activities part because it is linked to "risk". We do not need to add human factor related text in the Annex so it will go to the PANS.

CHAPTER 4 – SCOPE OF AERONAUTICAL INFORMATION AND AERONAUTICAL DATA

Note 1 — Aeronautical data and aeronautical information required to be collected is described in this chapter and shall provide the minimum requirements for the collection of aeronautical data and aeronautical information.

Note 2 — Detailed specifications for the collection of aeronautical data and aeronautical information are contained in the Procedures for Air Navigation Services — Aeronautical Information Management Document (PANS-AIM, Doc XXXX).

Note 3 — The scope of the aeronautical data and aeronautical information as specified herein provides for the minimum requirement to support digital data exchange and data services as well as support for information products and services provided in other formats (i.e. paper or electronic documents).

4.1 General requirements

4.1.1 The scope of aeronautical data and aeronautical information to be collected shall satisfy the requirements of the Air Traffic Management (ATM) system. The aeronautical data and aeronautical information domains which together comprise and support an ATM system are.

a) Aerodromes:

b) Airspace;

c) ATS routes;

d) Instrument and visual flight procedures;

e) Radio navigation aids/systems;

f) Geographic information;

g) Obstacles.

4.1.2 Aeronautical information shall also be collected that detail a State's national regulations, rules and procedures applicable to air navigation, reference systems used in aviation, and the services responsible for the provision of air navigation services.

4.1.3 Metadata shall be collected for each aeronautical data process and exchange point.

4.1.4 The aeronautical data and aeronautical information that shall be collected is listed in paragraphs 4.2 to 4.11.

Note: Aeronautical data and aeronautical information is grouped according to the source from which the aeronautical data and aeronautical information will be collected.

4.2 National regulations, rules and procedures

a) The designated authorities responsible for facilitation of international air navigation along with entry, transit and departure regulations and requirements for aircraft, passengers and crew, and cargo;

b) The designated authority responsible for aerodromes and heliports, including regulations, rules, procedures and conditions applicable for use of aerodromes and heliports;

c) Air traffic service rules and procedures;

d) Charges applicable to air navigation services provided for international use;

e) Instruments, equipment (including aircraft communication, navigation and surveillance equipment) and flight documents to be carried on aircraft;

f) Emergency locator transmitter (ELT), signalling devices and life-saving equipment for flights over designated land areas;

g) Titles and references and, where applicable, summaries of national regulations affecting air navigation;

h) Differences, where lodged, from ICAO standards, recommended practices and procedures.

4.3 Aviation reference information

a) Units of measurement used by the State;

b) Temporal, horizontal and vertical reference systems used by the State;

c) Aircraft nationality and registration marks adopted by the State;

d) Public holidays adopted by the State and services affected;

e) Abbreviations used by the State;

f) Location indicators assigned to the locations of aeronautical fixed stations to be used for encoding and decoding purposes;

g) Conversion tables;

h) Criteria used for determination of the times given in the sunrise/sunset tables.

4.4 Air Navigation Services

4.4.1 The responsible service, area of responsibility and the types of services provided for the following:

i. Aeronautical information services;

ii. Aeronautical charts;

iii. Air traffic services;

iv. Communication services;

v. Meteorological services;

vi. Search and rescue;

vii. Electronic terrain and obstacle data.

4.5 Aerodromes/heliports

a) Administrative information;

b) Geographical data.

c) Services and facilities available;

d) Charges applicable at aerodromes/heliports available for international use;

e) Aerodrome, ATS and meteorological communication frequencies;

f) Runway, taxiway and apron physical characteristics;

g) Runway, taxiway and heliport final approach and take-off area markings.

h) Runway, taxiway and apron lighting;

i) Aerodrome surface movement guidance and control system;

j) Flight procedures established on the basis of airspace organization at aerodromes/heliports;

k) Regulations and procedures (noise abatement, low visibility);

l) Aerodrome obstacles;

m) Declared distances;

n) Landing aids associated with the instrument approach and the terminal area procedures;

o) Aerodrome mapping data not included above.

p) Average cold temperature (MET?)

4.6 Airspace

a) Flight information regions (FIR), upper flight information regions (UIR), terminal control areas (TMA), control areas (CTA) and control zones (CTR);

b) Geographical and administrative borders that are used in the definition of airspace structures;

c) Prohibited, restricted and danger areas;

d) Military training areas and established air defence identification zone (ADIZ);

e) Air traffic services (ATS) airspace organized at aerodromes/heliports;

f) ATS communication frequencies.

4.7 ATS Routes

a) Lower and upper ATS routes;

b) Area navigation (RNAV) routes;

c) Helicopter routes;

d) Enroute holding;

e) Specifically designated routes which are compulsory within specified area(s).

4.8 Instrument and visual flight procedures

a) Departure procedures;

b) Approach procedures;

c) Arrival procedures;

d) The minimum obstacle clearance altitude (MOCA) for each defined route segment;

Comment [41]: Move to ATS Routes

e) Helicopter procedures;

4.9 Radio navigation aids/systems

a) Stations providing radio navigation services;

b) Stations associated with special navigation systems (DECCA, LORAN, etc.);

Comment [42]: Remove DECCA

c) Global navigation satellite systems (GNSS);

d) Aeronautical ground lights and other light beacons.

4.10 Geographic information

a) Terrain data;

b) Topographical data;

c) Cultural data;

d) Earth gravitational model;

Comment [43]: Is this metadata. Also applies to horizontal and vertical reference systems

e) Magnetic variation.

4.11 Obstacle data

a) Other obstacles.

CHAPTER 5 - AERONAUTICAL INFORMATION PRODUCTS AND SERVICES

5.1 Aeronautical information shall be provided :

a) as Aeronautical Information Products in standardized presentation and/or as digital data sets

b) and associated services.

Note. — Cases where digital data sets may replace the corresponding elements of the standardized presentation are detailed in PANS-AIM

5.2 Aeronautical information in a standardized presentation

Comment [44]: re-number and update the traceability matrix where necessary

5.2.1 The AIP, AIP Amendment, AIP Supplement and AIC shall be published on paper and/or as an electronic document "Electronic AIP" (eAIP) that allows for both displaying on a computer screen and printing on paper.

5.2.2 Aeronautical Information Publication (AIP)

5.2.2.1 An Aeronautical Information Publication and its Amendments shall contain aeronautical information of lasting character (permanent information and long duration temporary changes) essential to air navigation.

5.2.2.2 AIP Supplement shall contain temporary changes to the information contained in the AIP which are published by means of special pages.

5.2.2.3 When aeronautical information is made available as digital data, a reference to the data set shall be provided in the AIP or the AIP Supplement.

5.2.3 Aeronautical Information Circulars (AIC)

5.2.3.1 An AIC shall be used ~~originated~~ when it is deemed necessary to publish~~ever 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.

5.2.3.2 An AIC shall not be used for information that qualifies for inclusion in AIP or NOTAM.

5.2.3.3 A checklist of AIC currently in force shall be issued at least once a year, with distribution as for the AIC.

5.2.4 Aeronautical Charts

Note 1. — Annex 4 provides standards and recommended practices including provision requirements for each chart type.

5.3.5.1 The aeronautical charts listed alphabetically below shall, when available for designated international aerodromes/heliports, form part of the AIP, or be ~~distributed~~provided 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.

5.3.5.2 The "Enroute Chart — ICAO" shall, when available, form part of the AIP, or be provided separately to recipients of the AIP.

5.3.5.3 The aeronautical charts listed alphabetically below shall, when available, be provided as part of the Aeronautical Information Products:

Comment [45]: reason for this para: complete coverage of the charts that are part of the AI Products

a) Aerodrome Obstacle Chart — ICAO Type B;

b) *The World Aeronautical Chart — ICAO 1:1 000 000;*

c) The Aeronautical Chart — ICAO 1:500 000

d) The Aeronautical Navigation Chart — ICAO Small Scale

e) The Plotting Chart — ICAO chart

f) Electronic Aeronautical Chart Display — ICAO

g) ATC Surveillance Minimum Altitude Chart — ICAO.

5.3.6 NOTAM

5.3.6.1 A NOTAM shall contain 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.

5.3.6.2 Information provided by NOTAM shall be limited to the circumstances specified in PANS-AIM as affecting the operations of aircraft.

Note.— Detailed specification covering NOTAM, including formats for SNOWTAM and ASHTAM, is contained in PANS-AIM.

5.3.6.3 International exchange of NOTAM shall take place only as mutually agreed between the international NOTAM offices concerned.

5.3.6.4 The originating State shall select the NOTAM that are to be given international distribution.

5.3.6.5 A checklist of valid NOTAM shall be issued as a NOTAM at intervals of not more than one month.

5.3.6.6 One checklist NOTAM shall be issued for each series.

~~5.3.6.8 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 6.2.13.3.~~

~~5.3.7 Monthly plain-language list~~

~~5.3.7.1 A summary (monthly plain language list) of valid NOTAM, including indications of the latest AIP Amendments, AIC issued and a checklist of AIP Supplements, shall be made available.~~

Comment [46]: Tokyo 2014, conclusion: monthly plain language to be removed. THe checklist covers the need for having the possibility to verify what are the latest valid NOTAM, AIC, SUP, etc.

5.4 Digital data

5.4.1 Digital data shall be provided in the form of the following data sets:

a) Aeronautical (AIP) data set

b) Terrain data sets

c) Obstacle data sets

d) Aerodrome mapping data sets

e) Instrument flight procedure data sets.

Comment [47]: Recommend adding a brief 'heads-up' that this is not the complete list of data sets for the end state system. This will allow States to plan and budget. Perhaps a note after 5.4.1 to the effect that

In developing AI systems, States are encouraged to consider end-state goals in the GANP /ASBU in order to transition to a fully digitized and integrated AI system which will expand to include other data sets including NOTAM.

5.4.2 Each data set shall include metadata.

5.4.3 Aeronautical (AIP) data set

5.4.3.1 The Aeronautical (AIP) data set shall contain the digital representation of aeronautical information of lasting character (permanent information and long duration temporary changes) essential to air navigation.

Note. — The exact content of the AIP data set is specified in PANS-AIM.

5.4.3.2 **Recommendation.** — *The Aeronautical (AIP) data set should be provided.*

5.4.3.3 **Recommendation.** — *When it is not possible to provide a complete Aeronautical (AIP) data set, the data subset(s) that are available should be provided.*

Comment [48]: Proposal: include a requirement that metadata which can have values specific for each individual value (UoM, reference system, accuracy, etc.) should be provided at the attribute level.

Comment [49]: Also specify which metadata, that already exists at attribute/feature level, should be provided at data set level, for discovery and quality assessment purpose.

Comment [50]: the objective is to indicate that even if a complete data set cannot be provided, the States are encouraged to provide what they have. This is to avoid the eTOD situation where States tend to not provide anything because they do not have the complete data set.

5.4.4 Terrain data sets

5.4.4.1 Terrain data sets shall contain the digital representation of the terrain surface in the form of continuous elevation values at all intersections (points) of a defined grid, referenced to common datum.

5.4.4.2 Electronic terrain data shall be provided for Area 1.

5.4.4.3 At aerodromes regularly used by international civil aviation, electronic terrain data shall be provided for:

a) Area 2a;

b) the take-off flight path area; and

c) an area bounded by the lateral extent of the aerodrome obstacle limitation surfaces.

5.4.4.4 **Recommendation.—** *At aerodromes regularly used by international civil aviation, electronic terrain should be provided for Areas 2b, 2c and 2d for terrain that penetrate the relevant terrain data collection surface specified in PANS-AIM.*

5.4.4.5 ***Recommendation.****— Arrangements should be made for the coordination of providing Area 2 electronic terrain data for adjacent aerodromes where their respective coverage areas overlap to assure that the data for the same terrain are correct.*

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

5.4.4.7 **Recommendation.**— *At aerodromes regularly used by international civil aviation, electronic terrain data should be provided for Area 3 for terrain, as specified in PANS-AIM.*

5.4.4.8 At aerodromes regularly used by international civil aviation, electronic terrain data shall be provided for Area 4 for terrain, 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.

5.4.4.9 **Recommendation.—** *Where additional electronic terrain data are collected to meet other aeronautical requirements, the terrain data sets should be expanded to include these additional data.*

5.4.5 Obstacle data sets

5.4.5.1 Obstacle data sets shall contain the digital representation of the vertical and horizontal extent of obstacles.

5.4.5.2 Obstacles shall not be included in terrain data sets.

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

5.4.5.4 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.

5.4.5.5 At aerodromes regularly used by international civil aviation, electronic 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) 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; and

c) penetrations of the aerodrome obstacle limitation surfaces.

Note.— Take-off flight path areas are specified in Annex 4, 3.8.2. Aerodrome obstacle limitation surfaces are specified in Annex 14, Volume 1, Chapter 4.

5.4.5.6 **Recommendation.**— *At aerodromes regularly used by international civil aviation, electronic obstacle data should be provided for Areas 2b, 2c and 2d for obstacles that penetrate the relevant obstacle data collection surface specified in PANS-AIM, except that data need not be collected for obstacles less than a height of 3 m above ground in Area 2b and less than a height of 15 m above ground in Area 2c.*

5.4.5.7 ***Recommendation.****— Arrangements should be made for the coordination of providing Area 2 electronic obstacle data for adjacent aerodromes where their respective coverage areas overlap to assure that the data for the same obstacle are correct.*

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

5.4.5.9 ***Recommendation.***— *At aerodromes regularly used by international civil aviation, electronic obstacle data should be provided for Area 3 for obstacles that penetrate the relevant obstacle data collection surface specified in PANS-AIM.*

5.4.5.10 At aerodromes regularly used by international civil aviation, electronic obstacle data shall be provided for Area 4 for obstacles that penetrate the relevant obstacle data collection surface specified in PANS-AIM, for all runways where precision approach Category II or III operations have been established.

5.4.5.11 **Recommendation.**— *Where additional electronic obstacle data are collected to meet other aeronautical requirements, the obstacle data sets should be expanded to include these additional data.*

5.4.6 Aerodrome mapping data sets

5.4.6.1 Aerodrome mapping data sets shall contain the digital representation of aerodrome features.

Note 1.— Aerodrome features consist of attributes and geometries, which are characterized as points, lines or polygons. Examples include runway thresholds, taxiway guidance lines and parking stand areas.

5.4.6.2 **Recommendation.**— *Aerodrome mapping data sets should be provided for aerodromes regularly used by international civil aviation, where the data is available.*

5.4.7 Instrument flight procedure data sets

5.4.7.1 Instrument flight procedure data sets shall contain the digital representation of instrument flight procedures.

Note. — The exact content of the instrument flight procedure data sets is specified in PANS-AIM.

5.4.7.2 **Recommendation.** — *Instrument flight procedures data sets should be made available for aerodromes regularly used by international civil aviation.*

5.5 Distribution services

5.5.1 Aeronautical Information Products shall be distributed on the basis of a request.

5.5.2 AIP, AIP Amendments, AIP Supplements and AIC ~~and the monthly plain language list~~ shall be made available by the most expeditious means.

5.5.2 NOTAM shall be prepared in conformity with the relevant provisions of the ICAO communication procedures.

5.5.2.1 The AFS shall, whenever practicable, be employed for NOTAM distribution.

5.5.2.2 When a NOTAM exchanged as specified in 5.5.2 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.

5.5.3 **Recommendation. -** *Data sets (including updates) should be made available through global communication networks and Web services.*

Comment [51]: PANS-AIM shall indicate which exactly are the networks (Internet, AMHS, physical media - CD, memo stick) and Web services (FTP, SOAP, WFS, etc.) that should be used.

5.6 Pre-Flight Information Service

Comment [52]: Action for Eva -> prepare text for PANS-AIM for pre-flight services

5.6.1 For any aerodrome/heliport used for international air operations, aeronautical information 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.

5.6.2 Aeronautical information provided for pre-flight planning purposes shall include information of operational significance from the elements of the Aeronautical Information Products.

Note 1.— The elements of the Aeronautical Information Products 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*~~ *with that library.*

Note 2.— A recapitulation of valid NOTAM of operational significance and other information of urgent character can be made available to flight crews in the form of plain-language pre-flight information bulletins (PIB). Guidance on the preparation of PIB is contained in the Aeronautical Information Services Manual *(Doc 8126).*

5.7 Post-flight information Service

5.7.1 Arrangements shall be made to receive at aerodromes/heliports information concerning the state and operation of air navigation facilities or services noted by aircrews and shall ensure that such information is made available to the aeronautical information service for such distribution as the circumstances necessitate.

5.7.2 Arrangements shall be 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.

CHAPTER 6 - AERONAUTICAL INFORMATION UPDATES

6.1 Aeronautical data and aeronautical information shall be amended or reissued ~~as necessary~~ to be kept up to date.

6.2 Aeronautical Information Regulation and Control (AIRAC)

6.2.1 Information concerning circumstances with operational significance 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 14 January 2010.

Comment [53]: This will be updated before publication

Note. — The circumstances considered as having operational significance are identified in the PANS-AIM.

6.2.2 The information notified under the AIRAC system 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.

6.2.3 When information has not been submitted by the AIRAC date, a NIL notification shall be originated and distributed not later than one cycle before the AIRAC effective date concerned.

6.2.4 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.

6.2.5 Information provided under the AIRAC system 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.

6.2.6 **Recommendation.**— *Whenever major changes are planned and where advance notice is desirable and possible ~~practicable~~, information should be distributed/made available by the AIS unit so as to reach recipients at least 56 days in advance of the AIRAC effective date.*

Note. — The circumstances considered as major changes are identified in the PANS-AIM.

6.3 Aeronautical Information Product updates

6.3.1 AIP and data sets shall be amended or reissued at regular intervals.

6.3.2 Updates to AIP, Aeronautical (AIP) data sets and Instrument Flight Procedures data sets shall be synchronised.

Comment [54]: to be amplified in PANS-AIM, explain that the cycle should be the same and the same item should be updated in the same time in all three.

6.3.3 Permanent changes to the AIP shall be published as AIP Amendments.

6.3.4 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.

6.3.5 A NOTAM shall be originated and issued promptly whenever the information to be distributed is of a temporary nature and of short duration or when operationally significant permanent changes, or temporary changes of long duration are made at short notice, except for extensive text and/or graphics.

6.3.6 Operationally significant permanent changes and changes of long duration made at short notice shall be published by NOTAM.

6.3.7 When an AIP Amendment, an AIP Supplement or digital data set is published in accordance with AIRAC procedures, a NOTAM shall be originated giving a brief description of the contents.

6.3.8 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.

6.3.9 Permanent changes and temporary changes of long duration (three months or longer) made available as digital data shall be issued in the form of a complete data set and/or a sub-set that includes only the differences from the previously issued complete data set.

6.3.10 **Recommendation. -** *When made available as a completely re-issued data set, the differences from the previously issued complete data set should be clearly indicated.*

6.3.11 **Recommendation.** - *When temporary changes of short duration are made available as digital data, they should use the same aeronautical information model as the complete data set.*