TECHNICAL STANDARDS – Issue version (2024)
NAMCATS: Part 175 – AERONAUTICAL INFORMATION SERVICES & AERONAUTICAL CHARTS (AIS)

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1. General

1.1 Section 227 of the Civil Aviation Act, 2016 (Act no. 6 of 2016 – hereinafter "the Act") empowers the Executive Director of Civil Aviation to issue technical standards for civil aviation "on such matters as may be prescribed". Section 227(3) of the Act further empowers the Executive Director of Civil Aviation to incorporate into a technical standard any international aviation standard or any amendment without publishing the text of such standard or any amendment "by mere reference" to the title, number and year of issue of such standard or amendment or to any other particulars by which such standard or amendment is sufficiently identified.

1.2 By way of Government Notice 89/2020 published in Government Gazette 7157 dated 27th March 2020, NAMCARS (amendment 2020) provides for Part 175 – "Aeronautical Information Services & Aeronautical Charts" (AIS). This Part 175 provides for the issue of technical standards as NAM-CATS-AIS. The Executive Director of Civil Aviation has, pursuant to the empowerment mentioned above, issued technical standards relating to NAMCAR Part 175 (Aeronautical Information Services & Aeronautical Charts) to be known as NAM-CATS-AIS as further set out in the SCHEDULE herein.

1.3 NAM-CATS-AIS comprises the standards, rules, requirements, methods, specifications, characteristics and procedures which are applicable in respect of the provision of Aeronautical Information Services to be used in all aspects of civil aviation air and ground operations.

1.4 To the extent possible, each reference to a technical standard in this document, is a reference to the corresponding regulation in the Namibian Civil Aviation Regulations.

Example: *(1) Technical standard 175.02.1 refers to regulation Part 175 of Subpart 02 of the Part 175*
(2) Technical standard 175.02.2 refers to either the whole, or more than one specific regulation, of Subpart 02 of Part 2.

1.5 Where there is any perceived disparity of meaning or inconsistency between these technical standards and the regulations, the provisions of the regulations will take precedence.

1.6 Where there is a difference between a standard and procedure prescribed in ICAO documents and the Civil Aviation Technical Standards (CATS), the CATS standard will prevail.

2. GUIDANCE MATERIAL

2.1 Guidelines and recommendations in support of any particular technical standard are contained in schedules or appendices to, and/or compliance notes inserted throughout, the technical standards. These guidelines, upon release, are intended to provide recommendations and guidance to illustrate a means, but not necessarily the only means of complying with the regulations and technical standards. They may explain certain regulatory requirements by providing interpretive and explanatory materials. It is expected that service providers will document internal actions in their own operational manuals, to put into effect those, or similarly adequate, practices.

3. AMENDMENTS TO THE TECHNICAL STANDARDS

3.1 The NCAA Safety (ANSO) Division has responsibility for the technical content of this technical standard.

3.2 This technical standard is issued, and may only be amended, under the authority of the Executive Director of Civil Aviation.

3.3 Requests for changes to the content of this technical standard must be forwarded to the Executive Director and may come from:

(a) technical areas within NCAA; or

(b) aviation industry service providers or operators; or

(c) pilots and ATC staff.

3.4 The need to change the content of this technical standard may arise for any of the following reasons:

(a) to ensure safety;

(b) to ensure standardisation;

(c) to respond to changed NCAA regulations or standards;

(d) to respond to changes initiated by ICAO;

(e) to accommodate proposed initiatives or new technologies.

3.5 NCAA may approve trials of new procedures or technologies to develop appropriate standards.

4. INTERNATIONAL STANDARDS

4.1 Section 227 of the Civil Aviation Act, 2016 empowers the Executive Director of Civil Aviation to issue technical standard for civil aviation. Section 227 of the Civil Aviation Act, 2016 further empowers the Executive Director of Civil Aviation to incorporate into a technical standard any international aviation standard or any amendment without stating the text of such standard or amendment, "by mere reference" to the title, number and year of issue of such standard or amendment, or to any other particulars by which such standard or amendment is sufficiently identified.

4.2 The following International standards, recommended practices and procedures, as amended from time to time, (art 37 of the Chicago Convention) will be incorporated into the technical standards and appendices contained in this document upon release:

(a) ICAO Annex 4 – Aeronautical Charts;

(b) ICAO Annex 5 – Units of Measurement;

(c) ICAO Annex 11 – Air Traffic Services;

(d) ICAO Annex 14 – Aerodromes (Volume I and II);

(e) ICAO Annex 15 – Aeronautical Information Services;

(f) ICAO Procedures for Aeronautical Information Services – Aeronautical Information Management (PANS-AIM) (Doc 10066)

(g) ICAO Procedures for Air Navigation Services – Air Traffic Management (PANS-ATM) (Doc 4444);

(h) ICAO Procedures for Air Navigation Services – Construction of Visual and Instrument Flight Procedures (PANS-OPS Volume II) (Doc 8168);

(i) ICAO Procedures for Air Navigation Services – Abbreviations and Codes (PANS-ABC)(Doc 8400);

(j) ICAO Aeronautical Information Services Manual (Doc 8126);

(k) ICAO Aeronautical Chart Manual (Doc 8697);

(l) Manual on the Quality Management System for Aeronautical Information Services (Doc 9839); and

(m) ICAO Regional Supplementary Procedures.

4.3 Differences from ICAO Standards, Recommended Practices and Procedures are published in the AIP.

Miscellaneous:

APPENDIX 1: Marginal Layout

APPENDIX 2: ICAO Chart Symbols

APPENDIX 3: Colour Guide

APPENDIX 4: Hypsometric Tint Guide

APPENDIX 5: Sheet Layout of the World Aeronautical Chart – ICAO 1:1 000 000

APPENDIX 6: Aeronautical Data Quality Requirements

APPENDIX 7: Specimen of ICAO Charts

4.4 In cases where the ICAO standards are incompatible with the standards prescribed in this Part or the associated CATS, the provisions of Part 175 (including this CATS) must prevail.

Compliance 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, performance-based communication (PBC), performance-based surveillance (PBS), data link systems and satellite voice communications (SATVOICE). Corrupt, erroneous, late, or missing aeronautical data and aeronautical information can potentially affect the safety of air navigation.

Compliance Note 2. These Standards are to be used in conjunction with the Procedures for Air Navigation Services — Aeronautical Information Management (PANS-AIM, Doc 10066).

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

Compliance Note 4. Guidance material on the production and publication of Aeronautical charts is contained in the Aeronautical Charts Manual (Doc 8697).

These Technical Standards apply with immediate effect.

Further access is available on NCAA website: www.ncaa.com.na

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EXECUTIVE DIRECTOR

SCHEDULE

Part 175 – AERONAUTICAL INFORMATION SERVICES & AERONAUTICAL CHARTS

(NAM-CATS AIS)

List of Technical Standards

175.01.01 Definitions

1.1 When the following terms are used, they have the following meanings

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

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

Aerodrome 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.

Aerodrome operating minima The limits of usability of an aerodrome for:

(a) take-off, expressed in terms of runway visual range and/or visibility and, if necessary, cloud conditions;

(b) landing in precision approach and landing operations, expressed in terms of visibility and/or runway visual range and decision altitude/height (DA/H) as appropriate to the category of the operation;

(c) landing in approach and landing operations with vertical guidance, expressed in terms of visibility and/or runway visual range and decision altitude/height (DA/H); and

(d) landing in non-precision approach and landing operations, expressed in terms of visibility and/or runway visual range, minimum descent altitude/height (MDA/H) and, if necessary, cloud conditions.

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

Aeronautical chart. A representation of a portion of the Earth, its culture and relief, specifically designated to meet the requirements of air navigation.

Aeronautical data. A representation of aeronautical facts, concepts or instructions in a formalized manner suitable for communication, interpretation or processing.

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

Aeronautical information. 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 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; and
- Digital data sets.

Compliance 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 provided 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.

Aircraft stand. A designated area on an apron intended to be used for parking an aircraft.

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.

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

Air transit route. A defined route for the air transiting of helicopters.

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

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

Application. Manipulation and processing of data in support of user requirements.

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

Area minimum altitude. (AMA) The minimum altitude to be used under instrument meteorological conditions (IMC) that provides a minimum obstacle clearance within a specified area, normally formed by parallels and meridians.

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.

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

Arrival routes. Routes identified in an instrument approach procedure by which aircraft may proceed from the en-route phase of flight to an initial approach fix.

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.

Compliance Note. The assemble phase includes checking the data and ensuring that detected errors and omissions are rectified.

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

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

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

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

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

Compliance 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.

Compliance 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.

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

Compliance Note. Change-over points are established to provide the optimum balance in respect of signal strength and quality between facilities at all levels to be used and to ensure a

common source of azimuth guidance for all aircraft operating along the same portion of a route segment.

Clearway. A defined rectangular area on the ground or water under the control of the appropriate authority, selected or prepared as a suitable area over which an aeroplane may make a portion of its initial climb to a specified height.

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

Compliance 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.

Contour line. A line on a map or chart connecting points of equal elevation.

Culture. All man-made features constructed on the surface of the Earth, such as cities, railways and canals.

Cyclic redundancy check (CRC). A mathematical algorithm applied to the digital expression of data that provides a level of assurance against loss or alteration of data.

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

Data accuracy. A degree of conformance between the estimated or measured value and the true value.

Data completeness. The degree of confidence that all of the data needed to support the intended use is provided.

Data format. A structure of data elements, records and files arranged to meet standards, specifications or data quality requirements.

Data integrity (assurance level). A degree of assurance that an aeronautical data and its value has not been lost or altered since the data origination or authorized amendment

Data product. A data set or data set series that conforms to a data product specification (ISO 19131).

Data product specification. A 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).

Compliance 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 (or equivalent assurance level), traceability, timeliness, completeness and format.

Data resolution. A number of units or digits to which a measured or calculated value is expressed and used.

Data set. Identifiable collection of data (ISO 19101).

Data set series. A collection of data sets sharing the same product specification (ISO 19115).

Data timeliness. The degree of confidence that the data is applicable to the period of its intended use.

Data traceability. The degree that a system or a data product can provide a record of the changes made to that product and thereby enable an audit trail to be followed from the end-user to the originator.

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.

Compliance 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.

Displaced threshold. A threshold not located at the extremity of a runway.

Electronic aeronautical chart display. An electronic device by which flight crews are enabled to execute, in a convenient and timely manner, route planning, route monitoring and navigation by displaying required information.

Elevation. The vertical distance of a point or a level, on or affixed to the surface of the earth, measured from mean sea level.

Ellipsoid height (Geodetic height). The height related to the reference ellipsoid, measured along the ellipsoidal outer normal through the point in question.

Executive Director. The Chief Executive Officer of the Namibia Civil Aviation Authority under the Act.

Feature. Abstraction of real world phenomena (ISO 19101).

Feature attribute. Acharacteristic of a feature (ISO 19101).

Compliance Note. A feature attribute has a name, a data type and a value domain associated with it.

Feature operation. An operation that every instance of a feature type may perform (ISO 19101).

Compliance 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. A class of real world phenomena with common properties (ISO 19110).

Compliance Note. In a feature catalogue, the basic level of classification is the feature type.

Final approach. That part of an instrument approach procedure which commences at the specified final approach fix or point, or where such a fix or point is not specified,

(a) at the end of the last procedure turn, base turn or inbound turn of a racetrack procedure, if specified; or

(b) at the point of interception of the last track specified in the approach procedure; and ends at a point in the vicinity of an aerodrome from which:

(i) a landing can be made; or

(ii) a missed approach procedure is initiated.

Final approach and take-off area (FATO). A defined area over which the final phase of the approach manoeuvre to hover or landing is completed and from which the take-off manoeuvre is commenced. Where the FATO is to be used by performance Class 1 helicopters, the defined area includes the rejected take-off area available.

Final approach fix or point. That fix or point of an instrument approach procedure where the final approach segment commences.

Final approach segment. That segment of an instrument approach procedure in which alignment and descent for landing are accomplished.

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

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

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

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

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

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

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

Geodesic distance. The shortest distance between any two points on a mathematically defined ellipsoidal surface.

Geodetic datum. A minimum set of parameters required to define location and orientation of the local reference system with respect to the global reference system/frame.

Geoid. The equipotential surface in the gravity field of the Earth which coincides with the undisturbed mean sea level (MSL) extended continuously through the continents.

Compliance 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.

Compliance Note. In respect to the World Geodetic System — 1984 (WGS-84) defined ellipsoid, the difference between the WGS-84 ellipsoidal height and orthometric height represents WGS-84 geoid undulation.

Glide path. A descent profile determined for vertical guidance during a final approach.

Gregorian calendar. A calendar in general use; introduced in 1582, to define a year that more closely approximates the tropical year than the Julian calendar.

Compliance 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.

Helicopter stand. An aircraft stand which provides for parking a helicopter and where ground taxi operations are completed or where the helicopter touches down and lifts off for air taxi operations.

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.

Heliport reference point (HRP). The designated location of a heliport or a landing location.

Human Factors principles. Principles which apply to aeronautical design, certification, training, operations and maintenance and which seek safe interface between the human and other system components by proper consideration to human performance.

Hypsometric tints. A succession of shades or colour gradations used to depict ranges of elevation.

Initial approach segment. That segment of an instrument approach procedure between the initial approach fix and the intermediate approach fix or, where applicable, the final approach fix or point.

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

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). A classification based upon the potential risk resulting from the use of corrupted data. Aeronautical data are classified as:

> ***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;
>
> ***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

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.

Intermediate approach segment. That segment of an instrument approach procedure between either the intermediate approach fix and the final approach fix or point, or between the end of a reversal, racetrack or dead reckoning track procedure and the final approach fix or point, as appropriate.

Intermediate holding position. A designated position intended for traffic control at which taxiing aircraft and vehicles must stop and hold until further cleared to proceed, when so instructed by the aerodrome control tower.

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.

Isogonal. A line on a map or chart on which all points have the same magnetic variation for a specified epoch.

Isogriv. A line on a map or chart which joins points of equal angular difference between the North of the navigation grid and Magnetic North.

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

Landing direction indicator. A device to indicate visually the direction currently designated for landing and for take-off.

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

Logon address. A specified code used for data link logon to an ATS unit.

Magnetic variation. The angular difference between True North and Magnetic North.

Compliance Note. The value given indicates whether the angular difference is East or West of True North.

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

Marking. A symbol or group of symbols displayed on the surface of the movement area in order to convey aeronautical information.

Metadata. Data about data (ISO 19115).

Compliance 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.

Minimum sector altitude (MSA). The lowest altitude which may be used which will provide a minimum clearance of 300 m (1 000 ft) above all objects located in an area contained within a sector of a circle of 46 km (25 NM) radius centred on a significant point, the aerodrome reference point (ARP) or the heliport reference point (HRP).

Missed approach point (MAPt). That point in an instrument approach procedure at or before which the prescribed missed approach procedure must be initiated in order to ensure that the minimum obstacle clearance is not infringed.

Missed approach procedure. The procedure to be followed if the approach cannot be continued.

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

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.

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

Compliance 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 CATS as the concept of RNP has been overtaken by the concept of PBN. The term RNP in this CATS 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 ICAO Doc 9613.

Next intended user. The entity that receives the aeronautical data or information from the
Aeronautical Information Service.

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.

Compliance Note. The term obstacle is used in this CATS solely for the purpose of specifying the charting of objects that are considered a potential hazard to the safe passage of aircraft in the type of operation for which the individual chart series is designed.

Obstacle clearance altitude (OCA) or obstacle clearance height (OCH). The lowest altitude or the lowest height above the elevation of the relevant runway threshold or the aerodrome elevation as applicable, used in establishing compliance with appropriate obstacle clearance criteria.

Compliance Note 1. Obstacle clearance altitude is referenced to mean sea level and obstacle clearance height is referenced to the threshold elevation or in the case of non-precision approaches to the aerodrome elevation or the threshold elevation if that is more than 2 m (7 ft) below the aerodrome elevation. An obstacle clearance height for a circling approach is referenced to the aerodrome elevation.

Compliance Note 2. For convenience when both expressions are used they may be written in the form "obstacle clearance altitude/height" and abbreviated "OCA/H".

Compliance Note 3. See Procedures for Air Navigation Services — Aircraft Operations(Doc 8168), Volume I, Part I, Section 4, Chapter 1, 1.5, and Volume II, Part I, Section 4, Chapter 5, 5.4, for specific applications of this definition.

Obstacle free zone (OFZ). The airspace above the inner approach surface, inner transitional surfaces, and balked landing surface and that portion of the strip bounded by these surfaces, which is not penetrated by any fixed obstacle other than a low-mass and frangibly mounted one required for air navigation purposes.

Obstacle/terrain data collection surface. A defined surface intended for the purpose collecting obstacle/terrain data.

Origination (aeronautical data or aeronautical information). The creation of the value associated with new data or information or the modification of the value of an existing data or information.

Originator (aeronautical data or aeronautical information). An entity that is accountable for data or information origination and/or from which the AIS organization receives aeronautical data and information.

Orthometric height. A height of a point related to the geoid, generally presented as an MSL elevation.

Performance-based communication (PBC). Communication based on performance specifications applied to the provision of air traffic services.

Compliance Note. An RCP specification includes communication performance requirements that are allocated to system components in terms of the communication to be provided and

associated transaction time, continuity, availability, integrity, safety and functionality needed for the proposed operation in the context of a particular airspace concept.

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.

Compliance 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.

Performance-based surveillance (PBS). Surveillance based on performance specifications applied to the provision of air traffic services.

Compliance Note. An RSP specification includes surveillance performance requirements that are allocated to system components in terms of the surveillance to be provided and associated data delivery time, continuity, availability, integrity, accuracy of the surveillance data, safety and functionality needed for the proposed operation in the context of a particular airspace concept.

Point light. A luminous signal appearing without perceptible length.

Portrayal. Presentation of information to humans (ISO 19117).

Position (geographical). A 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. An angular or linear distance between two adjacent elevation points.

Precision. The smallest difference that can be reliably distinguished by a measurement process.

Compliance 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.

Precision approach procedure. An instrument approach procedure utilizing azimuth and glide path information provided by ILS or PAR.

Pre-flight information bulletin (PIB). A presentation of current NOTAM information of operational significance, prepared prior to flight.

Procedure altitude/height. A published altitude/height used in defining the vertical profile of a flight procedure, at or above the minimum obstacle clearance altitude/height where established.

Procedure turn. A manoeuvre in which a turn is made away from a designated track followed by a turn in the opposite direction to permit the aircraft to intercept and proceed along the reciprocal of the designated track.

Compliance Note 1. Procedure turns are designated "left" or "right" according to the direction of the initial turn.

Compliance Note 2. Procedure turns may be designated as being made either in level flight or while descending, according to the circumstances of each individual procedure.

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

Quality. A degree to which a set of inherent characteristics fulfils requirements.

Compliance Note 1. The term "quality" can be used with adjectives such as poor, good or excellent.

Compliance 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. A 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.

Relief. The inequalities in elevation of the surface of the Earth represented on aeronautical charts by contours, hypsometric tints, shading or spot elevations.

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

Compliance Note. There are three categories of reporting points: ground-based navigation aid, intersection and waypoint. In the context of this definition, intersection is a significant point expressed as radials, bearings and/or distances from ground-based navigation aids. A reporting point can be indicated as "on request" or as "compulsory".

Required communication performance (RCP) specification. A set of requirements for air traffic service provision and associated ground equipment, aircraft capability, and operations needed to support performance-based communication.

Required surveillance performance (RSP) specification. A set of requirements for air traffic service provision and associated ground equipment, aircraft capability, and operations needed

to support performance-based surveillance.

Requirement. A need or expectation that is stated, generally implied or obligatory.

Compliance 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.

Compliance Note 2. A qualifier can be used to denote a specific type of requirement, e.g. product requirement, quality management requirement, customer requirement.

Compliance Note 3. A specified requirement is one which is stated, for example, in a document.

Compliance 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.

Resolution. A number of units or digits to which a measured or calculated value is expressed and used.

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

Reversal procedure. A procedure designed to enable aircraft to reverse direction during the initial approach segment of an instrument approach procedure. The sequence may include procedure turns or base turns.

Route stage. A route or portion of a route flown without an intermediate landing.

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

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

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

Runway strip. A defined area including the runway and stopway, if provided, intended:

(a) to reduce the risk of damage to aircraft running off a runway; and

(b) to protect aircraft flying over it during take-off or landing operations.

Runway visual range (RVR). The range over which the pilot of an aircraft on the centre line of a runway can see the runway surface markings or the lights delineating the runway or identifying its centre line.

Shoulder. An area adjacent to the edge of a pavement so prepared as to provide a transition between the pavement and the adjacent surface.

Significant point. A specified geographical location used in defining an ATS route or the flight path of an aircraft and for other navigation and ATS purposes.

Compliance Note. There are three categories of significant points: ground-based navigation aid, intersection and waypoint. In the context of this definition, intersection is a significant point expressed as radials, bearings and/or distances from ground-based navigation aids.

SNOWTAM. A special series NOTAM given in a standard format providing a surface condition report notifying the presence or cessation of hazardous conditions due to snow, ice, slush, frost, standing water or water associated with snow, slush, ice, or frost on the movement area.

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.

Stopway. A defined rectangular area on the ground at the end of take-off run available prepared as a suitable area in which an aircraft can be stopped in the case of an abandoned take-off.

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

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.

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

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

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

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

Terminal arrival altitude (TAA). The lowest altitude that will provide a minimum clearance of 300 m (1 000 ft) above all objects located in an arc of a circle defined by a 46 km (25 NM) radius centred on the initial approach fix (IAF), or where there is no IAF on the intermediate approach fix (IF), delimited by straight lines joining the extremity of the arc to the IF. The

combined TAAs associated with an approach procedure must account for an area of 360 degrees around the IF.

Terrain. The surface of the Earth containing naturally occurring features such as mountains, hills, ridges, valleys, bodies of water, permanent ice and snow, and excluding obstacles.

Compliance Note. In practical terms, depending on the method of data collection, terrain represents the continuous surface that exists at the bare Earth, the top of the canopy or something in-between, also known as "first reflective surface".

Threshold. The beginning of that portion of the runway usable for landing.

Touchdown and lift-off area (TLOF). A load bearing area on which a helicopter may touch down or lift off.

Touchdown zone. The portion of a runway, beyond the threshold, where it is intended landing aeroplanes first contact the runway.

Traceability. Ability to trace the history, application or location of that which is under consideration.

Compliance 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.*

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

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

Validation. Confirmation, through the provision of objective evidence, that the requirements for a specific intended use or application have been fulfilled.

Vectoring. Provision of navigational guidance to aircraft in the form of specific headings, based on the use of an ATS surveillance system.

Verification. Confirmation, through the provision of objective evidence, that specified requirements have been fulfilled.

Compliance Note 1. The term "verified" is used to designate the corresponding status.

Visual approach procedure. A series of predetermined manoeuvres by visual reference, from the initial approach fix, or where applicable, from the beginning of a defined arrival route to a point from which a landing can be completed and thereafter, if a landing is not completed, a go-around procedure can be carried out.

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.

Waypoint. A specified geographical location used to define an area navigation route or the flight path of an aircraft employing area navigation. Waypoints are identified as either:

Fly-by waypoint. A waypoint which requires turn anticipation to allow tangential interception of the next segment of a route or procedure; or

Flyover waypoint. A waypoint at which a turn is initiated in order to join the next segment of a route or procedure.

1.2 ISO Standards when referred to in these technical standards have the following meanings:

8601 — Data elements and interchange formats — Information interchange — Representation of dates and times

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

1.3 The "NCAA Procedures for Aeronautical Information Management" means the document developed by the NCAA deriving from and adopting the procedure contained in the ICAO Doc 10066, Procedures for Air Navigation Services – Aeronautical Information Management.

175.01.4 Common reference systems for air navigation

1. Horizontal reference system

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

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

1.2 In precise geodetic applications and some air navigation applications, temporal changes in the tectonic plate motion and tidal effects on the Earth's crust may be modelled and estimated. To

reflect the temporal effect, an epoch may be included with any set of absolute station coordinates.

Compliance 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' National Geospatial-Intelligence Agency's precise ephemeris estimation process.)

Compliance 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 (1σ).

Compliance 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. 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.

2. Vertical Reference System

2.1 Mean sea level (MSL) datum, must be used as the vertical reference system for air navigation.

Compliance 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.

Compliance 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.

2.2 The Earth Gravitational Model — 1996 (EGM-96), must be used by international air navigation as the global gravity model.

2.3 At those geographical positions where the accuracy of EGM-96 does not meet the accuracy requirements for elevation and geoid undulation on the basis of EGM-96 data, regional, national or local geoid models containing high resolution (short wavelength) gravity field data must 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, must be provided in the Aeronautical Information Publication (AIP).

Compliance 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 the NCAA Procedures for Aeronautical Information Management, Appendix 1.

3. Temporal reference System

3.1 The Gregorian calendar and Coordinated Universal Time (UTC) must be used as the temporal reference system for air navigation.

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

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

Compliance Note 3. See Part 2, NAMCATS- UOM, Attachment D for guidance material relating to UTC.

Compliance 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.

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, must include either a description of that system or a citation for a document that describes that temporal reference system.

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

175.01.5 Miscellaneous specification

1.1 Aeronautical information products intended for international distribution must include English text for those parts expressed in plain language.

1.2 Place names must be spelt in conformity with local usage, transliterated, when necessary, into the ISO-Basic Latin alphabet.

1.3 Units of measurement used in the origination, processing and distribution of aeronautical data and aeronautical information must be consistent with the tables contained in Part 2.

1.4 ICAO abbreviations must be used in the aeronautical information products whenever they are appropriate and their use will facilitate distribution of aeronautical data and aeronautical information.

175.02.2 Application for AIS provider certificate or amendment thereof

An application for an AIS provider certificate, or an amendment thereof, must be made to the Executive Director in the appropriate form published on the NCAA website.

175.02.3 Issue of AIS provider certificate

The Executive Director may issue an AIS provider certificate, if the Executive Director is satisfied that issued in the appropriate form published on the NCAA website.

175.02.4 Renewal of AIS provider certificate

An application for the renewal of an AIS provider certificate, must be made to the Executive Director on the appropriate form published on the NCAA website.

175.02.5 Duplicate certificate

An application for and a duplicate certificate must be made and issued in the appropriate form published on the NCAA website.

175.02.6 Privileges of AIS provider certificate holder

An AIS service provider certificate issued under this Part authorises the holder of the certificate to;

(a) Provide an aeronautical information service, including aeronautical charts covering the territory of Namibia and those areas over the high seas for which Namibia is responsible for the provision of air traffic services.
(b) Manage, distribute and publish aeronautical data and aeronautical information necessary for the safety, regularity and efficiency of air navigation.
(c) An AIS service Certificate is limited to the type of AIS services listed on the certificate.

175.04 RESPONSIBILITIES AND FUNCTIONS

175.04.1 Responsibilities of the Executive Director

1.1 The Executive Director must:

(a) provide an aeronautical information service; or

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

(c) delegate the authority for the provision of the aeronautical information service to a non-governmental agency provided the service is provided in accordance with this and the standards prescribed in this Document.

1.2 The Executive Director must ensure that the provision of aeronautical data and aeronautical information covers the territory of Namibia and those areas over the high seas for which Namibia is responsible for the provision of air traffic services.

1.3 The Executive Director remains responsible for the aeronautical data and aeronautical information provided in accordance with subregulation (2), and any aeronautical data and aeronautical information provided for and on behalf of Namibia must clearly indicate that the aeronautical data and aeronautical information are provided under the authority of the Executive Director irrespective of the format in which they are provided.

1.4 The Executive Director must ensure that the aeronautical data and aeronautical information provided are of required quality in accordance with 175.05.3.

1.5 The Executive Director must ensure that formal arrangements are established between originators of aeronautical data and aeronautical information and the AIS provider in relation to the timely and complete provision of aeronautical data and aeronautical information, to ensure timely and complete provision of the aeronautical data and aeronautical information.

Compliance Note. The scope of aeronautical data and aeronautical information that would be the subject of formal arrangements is specified in Subpart 175.06.

175.04.2 AIS provider responsibilities and functions

1.1 An AIS provider must ensure that aeronautical data and aeronautical information necessary for the safety, regularity and efficiency of air navigation is 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.

Compliance Note. The ATM community referred to in sub-regulation (1) includes, the regulatory authority, aerodrome operators, aircraft operators, air navigation service providers, the international civil aviation organisation and any other entity or organisation that is involved in the provision and operation of the aviation infrastructure or offers systems and services used in civil aviation operations.

1.2 An AIS provider must receive, collate or assemble, edit, format, publish/store and distribute aeronautical data and aeronautical information concerning the entire territory of Namibia as well as those areas over the high seas in which the Republic of Namibia is responsible for the provision of air traffic services. Aeronautical data and aeronautical information must be provided as an aeronautical information products.

Compliance Note. An AIS may include origination functions

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

1.4 An AIS provider must, 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.

Compliance Note. One such source is the subject of a provision in 175.07.6 (Post-flight information service).

1.5 Aeronautical data and aeronautical information obtained under paragraph 1.4 (a) above must, when distributed, be clearly identified as having the authority of the AIS provider.

1.6 Aeronautical data and aeronautical information obtained under paragraph 1.4 (b) must, if possible, be verified before distribution and if not verified must, when distributed, be clearly identified as such.

1.7 An AIS provider must 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 paragraph 1.1 above.

175.04.3 Exchange of aeronautical data and aeronautical information

1.1 The AIS provider must designate the office to which all elements of the aeronautical information products provided by other States' AIS providers must be addressed. Such an office must be qualified to deal with requests for aeronautical data and aeronautical information provided by other States.

1.2 Formal arrangements must be established between AIS or those parties providing aeronautical data and aeronautical information on behalf of Namibia and the users in relation to the provision of the service.

Compliance Note. Guidance material on such formal arrangements is contained in Doc 8126.

1.3 Where more than one international NOTAM office is designated, the AIS provider must define the extent of responsibility and the territory covered by each office.

1.4 An AIS provider must arrange, as necessary, to satisfy operational requirements for the issuance and receipt of NOTAM distributed by telecommunication.

1.5 Wherever practicable, direct contact between AIS must be established in order to facilitate the international exchange of aeronautical data and aeronautical information.

1.6 Except as provided in 1.8, one copy of the following aeronautical information products (where available) that have been requested by the AIS of a Contracting State must be made available by AIS and provided in the mutually-agreed form(s), without charge, even where authority for publication/storage and distribution has been delegated to another non-governmental agency:

a) Aeronautical Information Publication (AIP), including Amendments and Supplements;
b) Aeronautical Information Circulars (AIC);
c) NOTAM; and
d) Aeronautical Charts.

1.7 The exchange of more than one copy of the elements of aeronautical information products and other air navigation documents, including those containing air navigation legislation and regulations, must be subject to bilateral agreement between the AIS provider and entities.

1.8 When aeronautical data and aeronautical information are provided in the form of digital data sets to be used by the AIS, they must be provided on the basis of agreement between the AIS and other States concerned.

Compliance Note. The intention is to enable access to foreign data for the purposes specified in 175.04.2, paragraph 1.4.

1.9 The procurement of aeronautical data and aeronautical information, including the elements of aeronautical information products, and other air navigation documents, including those

containing air navigation legislation and regulations, by other non ICAO Contracting States and by other entities must be subject to separate agreement between the AIS and those States and entities.

1.10 Globally interoperable aeronautical data and aeronautical information exchange models must be used for the provision of data sets.

Compliance Note 1. Specifications concerning globally interoperable aeronautical data and aeronautical information exchange models are contained in the NCAA Procedures for Aeronautical Information Management.

Compliance Note 2. Guidance material on globally interoperable aeronautical data and aeronautical information exchange models is contained in Doc 8126.

175.04.4 Copyright

Note. In order to protect the investment in the products of AIS as well as to ensure better control of their use, the AIS provider may apply copyright in accordance with the national laws.

1.1 Any aeronautical information product, which has been granted copyright protection by the AIS provider and provided to another State in accordance with 175.04.03, may 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 AIS provider.

1.2 When aeronautical information and aeronautical data is provided to a State in accordance with 175.04.03, paragraph 1.8, the receiving State must not provide digital data sets provided by the AIS provider to any third party without the consent of the AIS provider.

175.04.5 Cost Recovery

1.1 The overhead cost of collecting and compiling aeronautical data and aeronautical information may be included in the cost basis for air navigation services charges, and such charges must be in accordance with the principles contained in ICAO's Policies on Charges for Airports and Air Navigation Services (Doc 9082).

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

175.05 AERONAUTICAL INFORMATION MANAGEMENT

175.05.1 Information management requirements

1.1 The information management resources and processes established by an AIS provider must be adequate to ensure the timely collection, processing, storing, integration, exchange and delivery of quality-assured aeronautical data and aeronautical information within the air traffic management (ATM) system.

175.05.2 Data quality specifications

1. Data Accuracy

The order of accuracy for aeronautical data must be in accordance with the use.

Compliance Note. Specifications concerning the order of accuracy (including confidence level) for aeronautical data are contained in the NCAA Procedures for Aeronautical Information Management, Appendix 1.

2. Data Resolution

The order of resolution of aeronautical data must be commensurate with the actual data accuracy.

Compliance Note 1. Specifications concerning the resolution of aeronautical data are contained in the NCAA Procedures for Aeronautical Information Management, Appendix 1.

Compliance Note 2. The resolution of the data contained in the database may be the same or finer than the publication resolution

3. Data Integrity

3.1 The integrity of aeronautical data must be maintained throughout the data process from origination to distribution to the next intended use.

Compliance Note. Specifications concerning the integrity classification related to aeronautical data are contained in the NCAA Procedures for Aeronautical Information Management, Appendix 1.

3.2 Based on the applicable integrity classification, procedures must be put in place in order to:

(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 must 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.

4. Data Traceability

4.1 Traceability of aeronautical data must be ensured and retained as long as the data is in use.

5. Data Timeliness

5.1 Timeliness must be ensured by including limits on the effective period of the data elements.

Compliance Note 1. These limits may be associated with individual data elements or data sets.

Compliance Note 2. If the effective period is defined for a data set, it will account for the effective dates of all of the individual data elements.

6. Data Completeness

6.1 Completeness of aeronautical data must be ensured in order to support the intended use.

7. Data Format

7.1 The format of delivered data must be adequate to ensure that the data is interpreted in a manner that is consistent with its intended use.

175.05.3 Aeronautical data and aeronautical information verification and validation

1.1 Material to be issued as part of an aeronautical information product must be thoroughly checked before it is submitted to the AIS, in order to ensure that all necessary information has been included and that it is correct in detail.

1.2 An AIS provider must establish verification and validation procedures which ensure that upon receipt of aeronautical data and information, quality requirements are met.

175.05.4 Data error detection

1.1 Digital data error detection techniques must be used during the transmission and/or storage of aeronautical data and digital data sets.

1.2 Digital data error detection techniques must be used in order to maintain the integrity levels as specified in 175.05.2, paragraph 3.

Compliance Note. Detailed specifications concerning digital data error detection techniques are contained in the NCAA Procedures for Aeronautical Information Management.

175.05.5 Use of automation

1.1 Automation must be applied in order to ensure the timeliness, quality, efficiency and cost-effectiveness of aeronautical information services.

Compliance Note. Guidance material on the development of databases and the establishment of data exchange services is contained in the Aeronautical Information Services Manual (Doc 8126).

1.2 Due consideration to the integrity of data and information must be given when automated processes are implemented and mitigating steps taken where risks are identified.

Compliance Note. Risks of altering the integrity of data and information may be introduced by automated processes in case of unexpected systems behaviours.

1.3 In order to meet the data quality requirements, automation must:

(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.

175.05.6 Quality management system

1.1 Quality management systems must be implemented and maintained encompassing all functions of an AIS, as outlined in 175.04.2. The execution of such quality management systems must be made demonstrable for each function stage.

Compliance Note. Guidance material is contained in the Manual on the Quality Management System for Aeronautical Information Services (Doc 9839)(planned for development by November 2019).

1.2 Quality management must 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.

1.3 The quality management system established in accordance with paragraph 1.1 must, as far as possible, follow the International Organization for Standardization (ISO) 9000 series of quality assurance standards and be certified by an accredited certification body.

1.4 Within the context of the established quality management system the competencies and the associated knowledge, skills and abilities required for each function must be identified, and personnel assigned to perform those functions must be appropriately trained. Processes must be in place to ensure that personnel possess the competencies required to perform specific assigned functions. Appropriate records must be maintained so that the qualifications of personnel can be confirmed. Initial and periodic assessments must be established that require personnel to demonstrate the required competencies. Periodic assessments of personnel must be used as a means to detect and correct shortfalls in knowledge, skills and abilities.

1.5 The quality management system must 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 to be identified by root cause, corrected and communicated to affected users.

1.6 The established quality management system must provide users with the necessary assurance and confidence that distributed aeronautical data and aeronautical information satisfy the aeronautical data quality requirements.

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

1.8 Demonstration of compliance of the quality management system applied must be by audit. If nonconformity is identified, initiating action to correct its cause must be determined and taken without undue delay. All audit observations and remedial actions must be evidenced and properly documented.

175.05.7 Human factors consideration

1.1 The organization of the AIS as well as the design, contents, processing and distribution of aeronautical data and aeronautical information must take into consideration human factors principles which facilitate their optimum utilization.

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

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

175.06 SCOPE OF AERONAUTICAL DATA AND AERONAUTICAL INFORMATION

Compliance Note. The scope of aeronautical data and aeronautical information provides the minimum requirement to support aeronautical information products and services, aeronautical navigation data bases, air navigation applications and air traffic management (ATM) systems.

175.06.1 Scope of aeronautical data and aeronautical information

1.1 The aeronautical data and aeronautical information to be received and managed by the AIS must include at least the following sub-domains:

a) national regulations, rules and procedures;
b) aerodromes and heliports;
c) airspace;
d) ATS routes;
e) instrument flight procedures;
f) radio navigation aids/systems;
g) obstacles;
h) terrain; and
i) geographic information.

Compliance Note 1. Detailed specifications concerning the content of each sub-domain are contained in the NCAA Procedures for Aeronautical Information Management, Appendix 1.

Compliance Note 2. Aeronautical data and aeronautical information in each sub-domain may be originated by more than one organization or authority

1.2 Determination and reporting of aeronautical data must be in accordance with the accuracy and integrity classification required to meet the needs of the end-user of aeronautical data.

Compliance Note. Specifications concerning the accuracy and integrity classification related to aeronautical data are contained in the NCAA Procedures for Aeronautical Information Management, Appendix 1.

175.06.2 Metadata

1.1 Metadata must be collected for aeronautical data processes and exchange points.

1.2 Metadata collection must be applied throughout the aeronautical information data chain, from origination to distribution to the next intended user.

Compliance Note. Detailed specifications concerning metadata are contained in the NCAA Procedures for Aeronautical Information Management.

175.07 AERONAUTICAL INFORMATION PRODUCTS AND SERVICES

175.07.1 General

1.1 Aeronautical information must be provided in the form of aeronautical information products and associated services.

Compliance Note. Specifications concerning the order of resolution of aeronautical data provided for each aeronautical information product are contained in the NCAA Procedures for Aeronautical Information Management, Appendix 1.

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

175.07.2 Aeronautical information in a standardised presentation

1.1 Aeronautical information provided in a standardized presentation must include the aeronautical information publication (AIP), AIP Amendments, AIP Supplements, AICs, NOTAMs and Aeronautical Charts.

Compliance Note 1. Detailed specifications about AIP, AIP Amendments, AIP Supplements, AICs and NOTAM are contained in the NCAA Procedures for Aeronautical Information Management.

Compliance Note 2. Cases where digital data sets may replace the corresponding elements of the standardized presentation are detailed in the NCAA Procedures for Aeronautical Information Management.

1.1.1 The AIP, AIP Amendment, AIP Supplement and AIC must be provided on paper and/or as an electronic document.

1.1.2 The AIP, AIP Amendment, AIP Supplement and AIC provided as an electronic document (eAIP) must allow for both displaying on electronic devices and printing on paper.

1.2 Aeronautical Information Publication (AIP)

Compliance Note 1. AIP is intended primarily to satisfy international requirements for the exchange of aeronautical information of a lasting character essential to air navigation.

Compliance Note 2. AIP constitute the basic information source for permanent information and long duration temporary changes.

1.2.1 AIP must include:

(a) a statement of air navigation services or procedures covered by the AIP;

(b) the general conditions under which the services or facilities are available for international use;

(c) a list of significant differences, as provided by the Executive Director to the AIS provider, between NAM-CARs/NAM-CATS and the related ICAO Standards, Recommended Practices and Procedures, given in a form that would enable a user to differentiate readily between the requirements of Namibia and the related ICAO provisions;

(d) the alternative course of actions where differences between the NAM-CARs/NAM-CATS and the related ICAO Standards, Recommended Practices and Procedures have been listed.

1.3 AIP Supplement

1.3.1 A checklist of valid AIP Supplements must be regularly provided.

Compliance Note. Detailed specifications concerning the frequency for providing checklists of valid AIP Supplements are contained in the NCAA Procedures for Aeronautical Information Management.

1.4 Aeronautical Information Circulars (AIC)

1.4.1 An AIC must be used to provide:

(a) a long-term forecast of any major change in legislation, regulations, procedures or facilities; or

(b) information of a purely explanatory or advisory nature liable to affect flight safety; or

(c) information or notification of an explanatory or advisory nature concerning technical, legislative or purely administrative matters.

1.4.2 An AIC must not be used for information that qualifies for inclusion in AIP or NOTAM.

1.4.3 The validity of AIC currently in force must be reviewed at least once a year.

1.4.4 A checklist of currently valid AIC must be regularly provided.

Compliance Note. Detailed specifications concerning the frequency for providing checklists of valid AIC are contained in the NCAA Procedures for Aeronautical Information Management.

1.5 Aeronautical Charts

Compliance Note. Subpart 175.09 provides standards and requirements for the provision of each chart type.

1.5.1 The aeronautical charts listed alphabetically below must, when available for designated international aerodromes/ heliports, form part of the AIP, or be 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 Obstacle Chart — ICAO Type B (when available);

(e) Aerodrome Terrain and Obstacle Chart — ICAO (Electronic);

(f) Aircraft Parking/Docking Chart — ICAO;

(g) Area Chart — ICAO;

(h) ATC Surveillance Minimum Altitude Chart — ICAO;

(i) Instrument Approach Chart — ICAO;

(j) Precision Approach Terrain Chart — ICAO;

(k) Standard Arrival Chart — Instrument (STAR) — ICAO;

(l) Standard Departure Chart — Instrument (SID) — ICAO; and

(m) Visual Approach Chart — ICAO.

Compliance Note: A page pocket may be used in the AIP to include the Aerodrome Terrain and Obstacle Chart — ICAO (Electronic) on appropriate electronic media.

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

1.5.3 The aeronautical charts listed alphabetically below must, when available, be provided as aeronautical information products:

(a) World Aeronautical Chart — ICAO 1:1 000 000;

(b) Aeronautical Chart — ICAO 1:500 000;

(c) Aeronautical Navigation Chart — ICAO Small Scale;

(d) Plotting Chart — ICAO chart; and

(e) ATC Surveillance Minimum Altitude Chart — ICAO.

1.5.4 Electronic aeronautical charts may be provided based on digital databases and the use of geographic information systems.

1.5.5 The chart resolution of aeronautical data must be that as specified for a particular chart.

Compliance Note. Specifications concerning the chart resolution for aeronautical data are contained in the NCAA Procedures for Aeronautical Information Management, Appendix 1.

1.6 NOTAM

Compliance Note. Detailed specifications for NOTAM, including formats for SNOWTAM and ASHTAM, are contained in the NCAA Procedures for Aeronautical Information Management.

1.6.1 A checklist of valid NOTAM must be regularly provided

Compliance Note. Detailed specifications concerning the frequency for providing checklists of valid NOTAM are contained in the NCAA Procedures for Aeronautical Information Management.

175.07.3 Digital Data sets

1. General

1.1 Digital data must be in the form of the following data sets:

(a) AIP data set;

(b) terrain data sets;

(c) obstacle data sets;

(d) aerodrome mapping data sets; and

(e) instrument flight procedure data sets.

Compliance Note. Detailed specifications concerning the content of the digital data sets are contained in the NCAA Procedures for Aeronautical Information Management.

1.2 Each data set must be provided to the next intended user together with at least the minimum set of metadata that ensures traceability.

Compliance Note. Detailed specifications concerning metadata are contained in the NCAA Procedures for Aeronautical Information Management.

1.3 A checklist of valid data sets must be regularly provided.

2. AIP data set

2.1 An AIP data set must be provided covering the extent of information as provided in the AIP.

2.2 When it is not possible to provide a complete AIP data set, the data subset(s) that are available must be provided.

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

3. Terrain and obstacle data sets

Compliance Note 1. Numerical requirements for terrain and obstacle data sets are contained in the NCAA Procedures for Aeronautical Information Management, Appendices 1 and 8.

Compliance Note 2. Requirements for terrain and obstacle data collection surfaces are contained in the NCAA Procedures for Aeronautical Information Management, Appendix 8.

3.1 The coverage areas for sets of terrain and obstacle data must be specified as:

- Area 1: the entire territory of Namibia;
- Area 2: within the vicinity of an aerodrome, subdivided as follows;
- Area 2a: a rectangular area around a runway that comprises the runway strip plus any clearway that exists.
  Note. See Part 139, 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 per cent 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;
- 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 terminal control area (TMA) boundary, whichever is nearest;
- Area 3: 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; and

— Area 4: 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, Cate gory II or III.

3.2 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 must be extended to a distance not exceeding 2 000 m (6 500 ft) from the runway threshold.

3.3 Terrain data sets

3.3.1 Terrain data sets must 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.

3.3.2 Terrain data must be provided for Area 1.

3.3.3 For aerodromes regularly used by international civil aviation, terrain data must 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.

3.3.4 For aerodromes regularly used by international civil aviation, additional terrain data must be provided within Area 2 as follows:

(a) extending to 10 km from the aerodrome reference point (ARP); and

(b) within the area between 10 km and the TMA boundary or 45-km radius (whichever is smaller) where terrain penetrates a horizontal terrain data collection surface specified as 120 m above the lowest runway elevation.

3.3.5 Arrangements must be made for coordinating the provision of terrain data for adjacent aerodromes where their respective coverage areas overlap to assure that the data for the same.

3.3.6 For those aerodromes located near territorial boundaries, arrangements must be made with the neighbouring States to share terrain data.

3.3.7 For aerodromes regularly used by international civil aviation, terrain data must be provided for Area 3.

3.3.8 For aerodromes regularly used by international civil aviation, terrain data must be provided for Area 4 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.

3.3.9 Where additional terrain data is collected to meet other aeronautical requirements, the terrain data sets must be expanded to include this additional data.

3.4 Obstacle data sets

3.4.1 Obstacle data sets must contain comprise the digital representation of the vertical and horizontal extent of obstacles.

3.4.2 Obstacle data must not be included in terrain data sets.

3.4.3 The obstacle data must be provided for obstacles in Area 1 whose height is 100 m or higher above ground.

3.4.4 For aerodromes regularly used by international civil aviation, obstacle data must be provided for all obstacles within Area 2 that are assessed as being a hazard to air navigation.

3.4.5 For aerodromes regularly used by international civil aviation, obstacle data must be provided for:

(a) Area 2a for those obstacles that penetrate an obstacle data collection surface outlined by a rectangular area around a runway that comprises the runway strip plus any clearway that exists. The Area 2a obstacle collection surface must have height of 3 m above the nearest runway elevation measured along the runway centre line, and for those portions related to a clearway, if one exists, at the elevation of the nearest runway end;

(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.

Compliance Note. Take-off flight path areas are specified in Sub-Part 175.09 of this CATS. Aerodrome obstacle limitation surfaces are specified in Part 139.

3.4.6 For aerodromes regularly used by international civil aviation, obstacle data must be provided for Areas 2b, 2c and 2d for obstacles that penetrate the relevant obstacle data collection surface specified as follows:

(a) 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 obstacle 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;

(b) 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 obstacle 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 must be the elevation of the point of Area 2a at which it commences; and

(c) 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;

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.

3.4.7 Arrangements must be made for coordinating the provision of obstacle data for adjacent aerodromes where their respective coverage areas overlap to assure that the data for the same obstacle

3.4.8 For those aerodromes located near territorial boundaries, arrangements must be made with those neighbouring States to share obstacle data.

3.4.9 For aerodromes regularly used by international civil aviation, obstacle data must be provided for Area 3 for obstacles that penetrate the relevant obstacle data collection surface extending a half-metre (0.5 m) above the horizontal plane passing through the nearest point on the aerodrome movement area.

3.4.10 For aerodromes regularly used by international civil aviation, obstacle data must be provided for Area 4 for all runways where precision approach Category II or III operations have been established.

3.4.11 Where additional obstacle data are collected to meet other aeronautical requirements, the obstacle data sets must be expanded to include these additional data.

4. Aerodrome mapping data sets

4.1 Aerodrome mapping data sets must contain the digital representation of aerodrome features.

Compliance Note. 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.

4.2 Aerodrome mapping data sets must be made available for aerodromes regularly used by international civil aviation.

5. Instrument flight procedure data sets

5.1 Instrument flight procedure data sets must contain the digital representation of instrument flight procedures.

5.2 Instrument flight procedures data sets must be made available for aerodromes regularly used by international civil aviation.

175.07.4 Distribution services

1. General

1.1 Aeronautical information products must be distributed to authorized users.

1.2 AIP, AIP Amendments, AIP Supplements and AIC must be made available by the most expeditious means.

1.3 Global communication networks such as the Internet must, whenever practicable, be employed for the provision of aeronautical information products.

2. NOTAM distribution

2.1 NOTAM must be distributed on the basis of a request.

2.2 NOTAM must be prepared in conformity with the relevant provisions of the ICAO communication procedures.

2.3 The Aeronautical Fixed Service (AFS) must, whenever practicable, be employed for NOTAM distribution.

2.4 When a NOTAM 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 must be used, preceding the text. The AIS provider must select the NOTAM that are to be given international distribution.

2.5 International exchange of NOTAM must take place only as mutually agreed between the international NOTAM offices concerned and between the NOTAM offices and multinational NOTAM Processing Units.

2.6 The AIS provider must upon request grant distribution of NOTAM series other than those distributed internationally.

2.7 Selective distribution lists must be used when practicable.

Compliance Note. Guidance material relating to selective distribution lists is contained in the Aeronautical Information Services Manual (ICAO Doc 8126).

175.07.5 Pre-flight information service

1.1 For any aerodrome/heliport used for international air operations, aeronautical information relative to the route stages originating at the aerodrome/heliport must be made available to flight operations personnel, including flight crews and services responsible for pre-flight information.

1.2 Aeronautical information provided for pre-flight planning purposes must include information of operational significance from the elements of the aeronautical information products.

Compliance 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 with that library.

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

175.07.6 Post-flight information service

1.1 For any aerodrome/heliport used for international air operations, arrangements must be made to receive information concerning the state and operation of air navigation facilities or services noted by aircrews.

1.2 The arrangements specified in 1.1 must ensure that such information is made available to the aeronautical information service for distribution as the circumstances necessitate.

1.3 For any aerodrome/heliport used for international air operations, arrangements must be made to receive information concerning the presence of wildlife hazard observed by aircrews.

1.4 The information about presence of wildlife hazard must be made available to the aeronautical information service for such distribution as the circumstances necessitate.

Compliance Note. See Part 139 for requirements on wildlife hazard management.

175.08 AERONAUTICAL INFORMATION UPDATES

175.08.1 General Specifications

1.1 Aeronautical data and aeronautical information must be kept up to date.

175.08.2 Aeronautical Information Regulation and Control (AIRAC)

1.1 Information concerning the following circumstances must 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 November 2018:

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

(i) flight information regions;

(ii) control areas;

(iii) control zones;

(iv) advisory areas;

(v) ATS routes;

(vi) permanent danger, prohibited and restricted areas (including type and periods of activity when known) and ADIZ;

(vii) permanent areas or routes or portions thereof where the possibility of interception exists.

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

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

d) Transition levels, transition altitudes and minimum sector altitudes.

e) Meteorological facilities (including broadcasts) and procedures.

f) Runways and stopways.

g) Taxiways and aprons.

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

i) Approach and runway lighting.

j) Aerodrome operating minima if published.

1.2 The information notified under the AIRAC system must 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.

1.3 Information provided under the AIRAC system must be made available by the AIS so as to reach recipients at least 28 days in advance of the effective date.

Compliance Note. AIRAC information is distributed by the AIS unit at least 42 days in advance of the AIRAC effective dates with the objective of reaching recipients at least 28 days in advance of the effective date.

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

1.5 Implementation dates other than AIRAC effective dates must not be used for pre-planned operationally significant changes requiring cartographic work and/or for updating of navigation databases.

1.6 The regulated system (AIRAC) must also be used for the provision of information relating to the establishment and withdrawal of, and premeditated significant changes in, the circumstances listed below:

(a) Position, height and lighting of navigational obstacles.
(b) Hours of service of aerodromes, facilities and services.
(c) Customs, immigration and health services.
(d) Temporary danger, prohibited and restricted areas and navigational hazards, military exercises and mass movements of aircraft.
(e) Temporary areas or routes or portions thereof where the possibility of interception exists.

1.7 Whenever major changes are planned and where advance notice is desirable and practicable, information must be made available by the AIS so as to reach recipients at least 56 days in advance of the effective date. This must be applied to the establishment of, and premeditated major changes in, the circumstances listed below, and other major changes if deemed necessary:

(a) New aerodromes for international IFR operations
(b) New runways for IFR operations at international aerodromes
(c) Design and structure of the air traffic services route network
(d) Design and structure of a set of terminal procedures (including change of procedure bearings due to magnetic variation change)
(e) Circumstances listed in 1.1 above, if the entire State or any significant portion thereof is affected or if cross-border coordination is required.

175.08.3 Aeronautical Information Product Updates

1. AIP updates

1.1 AIP must be amended or reissued at such regular intervals as may be necessary to keep them up to date.

1.2 Permanent changes to the AIP must be published as AIP Amendments.

1.3 Temporary changes of long duration (three months or longer) and information of short duration which contains extensive text and/or graphics must be published as AIP Supplements.

2. NOTAM

2.1 When an AIP Amendment or an AIP Supplement is published in accordance with AIRAC procedures, a "Trigger" NOTAM must be originated.

Compliance Note. Detailed specifications concerning the Trigger NOTAM are contained in the NCAA Procedures for Aeronautical Information Management.

2.2 A NOTAM must 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.

2.3 A NOTAM must 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, COM, MET, SAR, etc.);

(c) establishment, withdrawal and significant changes in operational capability of radio navigation and air- ground communication services. This includes: interruption or return to operation, change of frequencies, change in notified hours of service, change of identification, change of orientation (directional aids), change of location, power increase or decrease amounting to 50 percent or more, change in broadcast schedules or contents, or irregularity or unreliability of operation of any radio navigation, and air-

ground communication services or limitations of relay stations including operational impact, affected service, frequency and area;

(d) unavailability of back-up and secondary systems, having a direct operational impact;

(e) establishment, withdrawal or significant changes made to visual aids;

(f) interruption of or return to operation of major components of aerodrome lighting systems;

(g) establishment, withdrawal or significant changes made to procedures for air navigation services;

(h) occurrence or correction of major defects or impediments in the maneuvering area;

(i) changes to and limitations on availability of fuel, oil and oxygen;

(j) major changes to search and rescue facilities and services available;

(k) establishment, withdrawal or return to operation of hazard beacons marking obstacles to air navigation;

(l) changes in regulation requiring immediate action, e.g. prohibited areas for SAR action;

(m) presence of hazards not otherwise promulgated, which affect air navigation (including obstacles, military exercises and operations, intentional and unintentional radio frequency interferences, rocket launches, displays, fireworks, sky lanterns, rocket debris, races and major parachuting events;

(n) conflict zones which affect air navigation (to include information that is as specific as possible regarding the nature and extent of threats of that conflict and its consequences for civil aviation);

(o) *Compliance Note.— Guidance related to conflict zones is contained in the Risk Assessment Manual for Civil Aircraft Operations Over or Near Conflict Zones (Doc 10084).* planned laser emissions, laser displays and search lights if pilots' night vision is likely to be impaired;

(p) erecting or removal of, or changes to, obstacles to air navigation in the take-off/climb, missed approach, approach areas and runway strip;

(q) establishment or discontinuance (including activation or deactivation) as applicable, or changes in the status of prohibited, restricted or danger areas;

(r) establishment or discontinuance of areas or routes or portions thereof where the possibility of interception exists and where the maintenance of guard on the VHF emergency frequency 121.5 MHz is required;

(s) allocation, cancellation or change of location indicators;

(t) changes in aerodrome/heliport rescue and fire fighting category provided (see Part 139, Subpart 16, and NAMCATS-AH, Volume I, Attachment A, Section 17)

(u) presence or removal of, or significant changes in, hazardous conditions due to water on the movement area;

(v) outbreaks of epidemics necessitating changes in notified requirements for inoculations and quarantine measures;

(w) observations or forecasts of space weather phenomena, the date and time of their occurrence, the flight levels where provided, and portions of the airspace which may be affected by the phenomena;

(x) an operationally significant change in volcanic activity, the location, date and time of volcanic eruptions and/or horizontal and vertical extent of volcanic ash cloud, including direction of movement, flight levels and routes or portions of routes which could be affected;

(y) release into the atmosphere of radioactive materials or toxic chemicals following a nuclear or chemical incident, the location, date and time of the incident, the flight levels and routes or portions thereof which could be affected and the direction of movement;

(z) establishment of operations of humanitarian relief missions, such as those undertaken under the auspices of United Nations, together with procedures and/or limitations which affect air navigation; and

(aa) implementation of short-term contingency measures in cases of disruption, or partial disruption, of air traffic services and related supporting services as described in Part 172.

Compliance Note. See Part 172 and Attachment C to NAMCATS-ATS.

Compliance Note – Specifications concerning the timely promulgation of information by NOTAM are contained in Chapter 6 of the *NCAA Procedures for Aeronautical Information Management*

2.4 The following information must not be notified by NOTAM:

(a) routine maintenance work on aprons and taxiways which does not affect the safe movement of aircraft;

(b) runway marking work, when aircraft operations can safely be conducted on other available runways, or the equipment used can be removed when necessary;

(c) temporary obstructions in the vicinity of aerodromes/heliports that do not affect the safe operation of aircraft;

(d) partial failure of aerodrome/heliport lighting facilities where such failure does not directly affect aircraft operations;

(e) partial temporary failure of air-ground communications when suitable alternative frequencies are known to be available and are operative;

(f) the lack of apron marshaling services and road traffic control;

(g) the unserviceability of location, destination or other instruction signs on the aerodrome movement area;

(h) parachuting when in uncontrolled airspace under VFR when controlled, at promulgated sites or within danger or prohibited areas;

(i) training activities by ground units;

(j) unavailability of back-up and secondary systems if these do not have an operational impact;

(k) limitations to airport facilities or general services with no operational impact;

(l) national regulations not affecting general aviation;

(m) announcement or warnings about possible/potential limitations, without any operational impact;

(n) general reminders on already published information;

(o) availability of equipment for ground units without containing information on the operational impact for airspace and facility users;

(p) information about laser emissions without any operational impact and fireworks below minimum flying heights;

(q) closure of movement area parts in connection with planned work locally coordinated of duration of less than one hour;

(r) closure, changes, unavailability in operation of aerodrome(s)/heliport(s) outside the aerodrome(s)/heliport(s) operational hours;

(s) other non-operational information of a similar temporary nature.

Compliance Note: Information which relates to an aerodrome and its vicinity and does not affect its operational status may be distributed locally during pre-flight or in-flight briefing or other local contact with flight crew members.

3. Data set updates

3.1 Data sets must be amended or reissued at such regular intervals as may be necessary to keep them up to date.

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

3.3 When made available as a completely re-issued data set, the differences from the previously issued complete data set must be indicated.

3.4 When temporary changes of short duration are made available as digital data (Digital NOTAM), they must use the same aeronautical information model as the complete data set.

3.5 Updates to AIP and the digital data sets must be synchronized.

175.09 AERONAUTICAL CHARTS

Compliance Note. Definitions applicable to aeronautical Charts are contained in 175.01.3.

175.09.1 Applicability

1. The specifications in this Subpart 175.09 apply to all charts.

Compliance Note. 175.09.3, (2,3), (2,3,4) and 175.09.4 (5) apply to all charts.

2. All charts coming within the scope of this Subpart and bearing the aeronautical information date of 19 November 2009 or later must conform to the standards relevant to the particular chart.

175.09.2 Availability

1. *Information*. An AIS provider must on request by another Contracting State provide all information relating to the territory of Namibia that is necessary to enable the requirements of this Subpart to be met.

2. *Charts*. The AIS provider must ensure the availability of charts in whichever of the following ways is appropriate for a particular chart or single sheet of a chart series.

Note. The availability of charts includes specified electronic chart.

2.1 For any chart or single sheet of a chart series entirely contained within the territory of Namibia, the AIS provider may either:

(a) produce the chart or sheet itself; or

(b) in coordination with the Executive Director, arrange for its production by another Contracting State or by an agency; or

(c) in coordination with the Executive Director, provide another Contracting State prepared to accept an obligation to produce the chart or sheet with the data necessary for its production.

3. For any chart or single sheet of a chart series which includes the territory of Namibia and other States, and where Namibia has jurisdiction over the territory so included, the AIS provider must determine the manner in which the chart or sheet will be made available. This determination must be made with due regard being given to regional air navigation agreements and to any programme of allocation established by the Council of ICAO.

Compliance Note. The phrase "regional air navigation agreements" refers to the agreements approved by the Council of ICAO normally on the advice of regional air navigation meetings.

4. The AIS provider must take all reasonable measures to ensure that the information it provides and the aeronautical charts made available are adequate and accurate and that they are maintained up to date by an adequate revision service.

5. To improve worldwide dissemination of information on new charting techniques and production methods, appropriate charts produced by Namibia may be made available without charge to other Contracting States on request on a reciprocal basis.

Compliance Note. Guidance material on the preparation of aeronautical charts, including sample formats, is contained in the Aeronautical Chart Manual (Doc 8697).

175.09.3 General Specifications for Aeronautical Charts

Compliance Note. The Standards contained in this chapter are applicable to all ICAO aeronautical charts unless otherwise stated in the specifications of the chart concerned.

1. Operational requirements for charts

For the purposes of this Subpart, the total flight is divided into the following phases:-

Phase 1 - Taxi from aircraft stand to take off

Phase 2 - Take off and climb to en-route ATS route structure

Phase 3 - Enroute ATS route structure

Phase 4 - Descent to approach

Phase 5 - Approach to land and missed approach

Phase 6 - Landing and taxi to aircraft stand.

1.1 Each type of chart must provide information relevant to the function of the chart and its design must observe Human Factors principles which facilitate its optimum use.

Note:-Guidance material on the application of Human Factors principles can be found in the Human Factors Training Manual (Doc 9683).

1.2 Each type of chart must provide information appropriate to the phase of flight to ensure the safe and expeditious operation of the aircraft.

1.3 The presentation of information must be accurate, free from distortion and clutter, unambiguous, and be readable under all normal operating conditions.

1.4 Colours or tints and type size used must be such that the chart can be easily read and interpreted by the pilot in varying conditions of natural and artificial light.

1.5 The information must be in a form which enables the pilot to acquire it in a reasonable time consistent with workload and operating conditions.

1.6 The presentation of information provided on each type of chart must permit smooth transition from chart to chart as appropriate to the phase of flight.

1.7 The charts must as much as possible, be True North orientated.

1.8 The basic sheet size of the charts must as much as possible, be 210 × 148 mm (8.27 □ 5.82 in). (A5).

2.1 Titles

The title of a chart or chart series prepared in accordance with the specifications contained in this Technical Standards and intended to satisfy the function of the chart must be that as specified in the relevant heading as modified by application of any Standard contained therein, except that such title may not include "ICAO" unless the chart conforms with all Standards specified in this section and any specified for the particular chart.

2.2 Miscellaneous information

2.2.1 The marginal note layout must be as given in Appendix 1 to this Sub-Part, except as otherwise specified for a particular chart.

2.2.2 The following information must be shown on the face of each chart unless otherwise stated in the specification of the chart concerned:

a) designation or title of the chart series;

Compliance Note. The title may be abbreviated.

b) name and reference of the sheet;

c) on each margin an indication of the adjoining sheet (when applicable)

2.2.3 A legend to the symbols and abbreviations used must be provided. The legend must be on the face or reverse of each chart except that, where it is impracticable for reasons of space, a legend may be published separately.

2.2.4 The name and adequate address of the producing agency must be shown in the margin of the chart except that, where the chart is published as part of an aeronautical document, this information may be placed in the front of that document.

2.3 Symbols

2.3.1 Symbols used must conform to those shown in Appendix 2 - ICAO Chart Symbols, except that where it is desired to show on an aeronautical chart special features or items of importance to civil aviation for which no ICAO symbol is at present provided, any appropriate symbol may be chosen for this purpose, provided that it does not cause confusion with any existing ICAO chart symbol or impair the legibility of the chart.

Compliance Note. The size and prominence of symbols and the thickness and spacing of lines may be varied according to the scale and functions of the chart, with due regard to the importance of the information they convey.

2.3.2 To represent ground-based navigation aids, intersections and waypoints, the same basic symbol must be used on all charts on which they appear, regardless of chart purpose.

2.3.3 The symbol used for significant points must be based on a hierarchy of symbols and selected in the following order: ground-based navigation aid, intersection, waypoint symbol. A waypoint symbol may be used only when a particular significant point does not already exist as either a ground-based navigation aid or intersection.

2.3.4 The AIS provider must ensure that symbols are shown in the manner specified in 2.3.2, 2.3.3 and Appendix 2 — ICAO Chart Symbols, symbol number 121.

2.4 Units of measurement

2.4.1 Distances must be derived as geodesic distances.

2.4.2 Distances must be expressed in either kilometres or nautical miles or both, provided the units are clearly differentiated.

2.4.3 Altitudes, elevations and heights must be expressed in either metres or feet or both, provided the units are clearly differentiated.

2.4.4 Linear dimensions on aerodromes and short distances must be expressed in metres.

2.4.5 The order of resolution of distances, dimensions, elevations and heights must be that as specified for a particular chart.

2.4.6 The units of measurement used to express distances, altitudes, elevations and heights must be conspicuously stated on the face of each chart.

2.4.7 Conversion Scales (kilometers/nautical miles, metres/feet) must be provided on each chart on which distances, elevations or altitudes are shown. The conversion scales must be placed on the face of each chart.

2.5 Scale and projection

2.5.1 For charts of large areas, the name and basic parameters and scale of the projection must be indicated.

2.5.2 For charts of small areas, a linear scale only may be indicated

2.6 Date of validity of aeronautical information

2.6.1 The date of validity of aeronautical information must be clearly indicated on the face of each chart.

2.7 Spelling of geographical names

2.7.1 The symbols of the Roman alphabet must be used for all writing.

2.7.2 The names of places and of geographical features in countries which officially use varieties of the Roman alphabet must be accepted in their official spelling, including the accents and diacritical marks used in the respective alphabets.

2.7.3 Where a geographical term such as “cape”, “point”, “gulf”, “river”, is abbreviated on any

particular chart, that word must be spelt out in full in the language used by the publishing agency, in respect of the most important example of each type Punctuation marks may not be used in abbreviations within the body of a chart.

2.7.4 In areas where romanized names have not been officially produced or adopted, and outside the territory of Namibia, names may be transliterated from the non-Roman alphabet form by the system generally used by the producing agency.

2.8 Abbreviations

2.8.1 Abbreviations must be used on aeronautical charts whenever they are appropriate.

2.8.2 Where applicable, abbreviations must be selected from the Procedures for Air Navigation Services - ICAO Abbreviations and Codes (Doc 8400).

2.9 Political boundaries

2.9.1 International boundaries must be shown, but may be interrupted if data more important to the use of the chart would be obscured.

2.9.2 Where the territory of other States, other than Namibia appears on a chart, the names identifying the countries must be indicated.

Compliance Note. In the case of a dependent territory, the name of the sovereign State may be added in brackets.

2.10 Colours

Colours used on charts must conform to - Colour Guide in Appendix 3 of this Sub-Part.

2.11 Relief

2.11.1 Relief, where shown, must be portrayed in a manner that will satisfy the chart users' need for:

(a) Orientation and identification;

(b) Safe terrain clearance;

(c) Clarity of aeronautical information when shown;

(d) Planning.

Compliance Note. Relief is usually portrayed by combinations of contours, hypsometric tints, spot elevations and hill shading, the choice of method being affected by the nature and scale of the chart and its intended use.

2.11.2 Where relief is shown by hypsometric tints, the tints used must be based on those shown in the Hypsometric Tint Guide in Appendix 4 of this Sub-Part.

2.11.3 Where spot elevations are used they must be shown for selected critical points.

2.11.3.1 The value of spot elevations of doubtful accuracy must be followed by the sign ±.

2.12 Prohibited, restricted and danger areas

When prohibited, restricted or danger areas are shown, the reference or other identification must be included, except that the nationality letters may be omitted.

Compliance Note. Nationality letters are those contained in ICAO Doc 7910 — Location Indicators.

2.13 Air traffic service airspaces

2.13.1 When ATS airspace is shown on a chart, the class of airspace, the type, name or call sign, the vertical limits and the radio frequency(ies) to be used must be indicated and the horizontal limits depicted in accordance Appendix 2 of this CATS - ICAO Chart Symbols.

2.13.2 On charts used for visual flight, those parts of the ATS Airspace Classes table shown in Part 172 (NAMCATS-ATS, Appendix 4), applicable to the airspace depicted on the chart, may be on the face or reverse of each chart.

2.14 Magnetic variation

2.14.1 True North and magnetic variation must be indicated. The order of resolution of magnetic variation must be as specified for a particular chart.

2.14.2 When magnetic variation is shown on a chart, the values shown must be those for the year nearest to the date of publication that is divisible by 5, i.e. 1980, 1985, etc In exceptional cases where the current value would be more than one degree different, after applying the calculation for annual change, an interim date and value must be quoted.

Compliance Note. The date and the annual change may be shown.

2.14.3 For instrument procedure charts, the publication of a magnetic variation change must be completed within a maximum of six AIRAC cycles.

2.14.4 In large terminal areas with multiple aerodromes, a single rounded value of magnetic variation may be applied so that the procedures that service multiple aerodromes use a single, common variation value.

2.15 Typography

Compliance Note. Samples of type suitable for use on aeronautical charts are included in the Aeronautical Chart Manual (Doc 8697).

2.16 Aeronautical data

2.16.1 All necessary measures must be taken to introduce a properly organized quality system containing procedures, processes and resources necessary to implement quality management at each function stage outlined in 175.05.6. The execution of such quality management must be made demonstrable for each function stage, when required. In addition, States must ensure that established procedures exist in order that aeronautical data at any moment is traceable to its origin so to allow any data anomalies or errors, detected during the production/maintenance phases or in the operational use, to be corrected.

Note: - Specifications governing the quality system must be as specified in 175.05.

2.16.2 The chart resolution of aeronautical data must be as specified for a particular chart.

Compliance Note. Specifications concerning the chart resolution for aeronautical data are contained in the NCAA Procedures for Aeronautical Information Management, Appendix 1.

2.16.3 The integrity of aeronautical data must be maintained throughout the data process from origination to distribution to the next intended user.

Compliance Note. Specifications concerning the integrity classification related to aeronautical data are provided in the NCAA Procedures for Aeronautical Information Management, Appendix 1.

2.16.4 Digital data error detection techniques must be used during the transmission and/or storage of aeronautical data and digital data sets.

Compliance Note. Detailed specifications concerning digital data error detection techniques are contained in the NCAA Procedures for Aeronautical Information Management.

2.17 Common reference systems

2.17.1 Horizontal reference system

2.17.1.1 World Geodetic System — 1984 (WGS-84) must be used as the horizontal (geodetic) reference system. Published aeronautical geographical coordinates (indicating latitude and longitude) must be expressed in terms of the WGS-84 geodetic reference datum.

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

2.17.1.2 Geographical coordinates which have been transformed into WGS-84 coordinates but whose accuracy of original field work does not meet the requirements of Part 139 must be identified by an asterisk.

2.17.1.3 The chart resolution of geographical coordinates must be that specified for a particular chart series.

Compliance Note 1. Specifications concerning 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 Part 172; and for aerodrome/heliport-related positions, in Part 139.

Compliance Note 2. Specifications concerning the accuracy and integrity classification of WGS-84-related aeronautical data are contained in the NCAA Procedures for Aeronautical Information Management, Appendix 1.

2.17.2 Vertical reference system

2.17.2.1 Mean sea level (MSL) datum, which gives the relationship of gravity-related height (elevation) to a surface known as the geoid, must be used as the vertical reference system.

Compliance Note1: The geoid globally most closely approximates MSL. It is defined as the equipotential surface in the gravity field of the Earth that coincides with the undisturbed MSL extended continuously through the continents.

Compliance 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.

2.17.2.2 In addition to the elevations referenced to MSL, for the specific surveyed ground positions, geoid undulation (referenced to the WGS-84 ellipsoid) for those positions must also be published as specified for a particular chart.

Compliance Note 1. Specifications concerning the determination and reporting (accuracy of field work and data integrity) of elevation and geoid undulation at specific positions at aerodromes/heliports are given in Part 139.

Compliance Note 2. Specifications concerning the accuracy and integrity classification of elevation and geoid undulation at specific positions at aerodromes/heliports are contained in the NCAA Procedures for Aeronautical Information Management, Appendix 1.

2.17.2.3 The chart resolution of elevation and geoid undulation must be that specified for a particular chart series.

Compliance Note. Specifications concerning the chart resolution of elevation and geoid undulation are contained in the NCAA Procedures for Aeronautical Information Management, Appendix 1.

2.17.3 Temporal reference system

2.17.3.1 The Gregorian calendar and Coordinated Universal Time (UTC) must be used as the temporal reference system.

2.17.3.2 When a different temporal reference system is used for charting, this must be indicated in GEN 2.1.2 of the Aeronautical Information Publication (AIP).

2.18 Requirements for aeronautical charts

2.18.1 **Mandatory Charts**

The six mandatory charts are the Aerodrome Obstacle Chart — ICAO Type A; Precision Approach Terrain Chart — ICAO; Enroute Chart — ICAO; Instrument Approach Chart — ICAO; Aerodrome/Heliport Chart — ICAO; and the World Aeronautical Chart — ICAO, 1:1 000 000

2.18.2 **Non-Mandatory Charts**

2.18.3.1 Six other charts, which are touched upon below, are considered “non-mandatory” charts, which means that these should be produced only if, in the opinion of the State

authority, the availability of these charts would contribute to the safety, regularity and efficiency of aircraft operations.

2.18.3.2 The Aerodrome Obstacle Chart — ICAO Type B should be produced only where a need exists for a chart to assist in the determination of critical heights, e.g., for circling procedures, or of procedures for use in the event of an emergency during take-off or landing, and of obstacle clearing and marking criteria. Where the Aerodrome Terrain and Obstacle Chart — ICAO (Electronic) is made available, Aerodrome Obstacle Chart — ICAO Type B is not required.

2.18.3.3 The Aerodrome Ground Movement Chart — ICAO is a supplementary chart which should be produced only where the detailed information needed for the ground movement of aircraft along taxiways to and from the aircraft stands and the parking and docking of aircraft, cannot be shown with sufficient clarity on the Aerodrome/Heliport Chart— ICAO.

2.18.3.4 The Aircraft Parking/Docking Chart — ICAO is also a supplementary chart which should be made available only where, due to the complexity of terminal facilities, the information on the ground movement of aircraft between the taxiways and the aircraft stands and the parking/docking of aircraft cannot be shown with sufficient clarity on the Aerodrome/Heliport Chart — ICAO or on the Aerodrome Ground Movement Chart — ICAO.

2.18.3.5 The Aeronautical Chart — ICAO 1:500 000 and the Aeronautical Navigation Chart — Small Scale should be provided only when operational requirements for visual navigation or chart production considerations indicate a need for these charts either as a substitute for or to supplement the World Aeronautical Chart — ICAO 1:1 000 000.

2.18.3.6 Plotting Chart — ICAO. These charts are a useful adjunct where a need exists for a chart which will provide a means of maintaining a continuous flight record of the aircraft position by various fixing methods and dead-reckoning, and maintain an intended flight path. These charts would be appropriate to major air routes over oceanic areas and sparsely settled areas flown by international commercial air transport.

2.18.4 **Conditionally required charts**.

The requirement for production of the four charts listed below is “conditional”, which means that the availability of these charts is required only if certain conditions/circumstances prevail.

2.18.4.1 The Area Chart — ICAO is to be made available only where the air traffic services routes or position reporting requirements are complex and cannot be adequately shown on the Enroute Chart — ICAO.

2.18.4.2 The Standard Departure Chart — Instrument (SID) — ICAO must be produced wherever a standard departure route — instrument has been established and cannot be shown with sufficient clarity on the Area Chart —ICAO.

2.18.4.3 The Standard Arrival Chart — Instrument (STAR) — ICAO is to be made available wherever a standard arrival route — instrument has been established and cannot be shown with sufficient clarity on the Area Chart — ICAO.

2.18.4.4 The Visual Approach Chart — ICAO has to be made available for all aerodromes used by international civil aviation where only limited navigation facilities are available or radio communication facilities are not available or not

175.09.4 Charts

1. Aerodrome Obstacle Chart – ICAO Type A (Operating limitations)

1.1 Function

This chart, in combination with the relevant information published in the AIP, must provide the data necessary to enable an operator to comply with the applicable operating limitations specified in the Operation of aircraft regulations.

1.2 Availability

1.2.1 Aerodrome Obstacle Charts — ICAO Type A (Operating Limitations) must be made available, in the manner prescribed in 175.09.2 (2) for all aerodromes regularly used by international civil aviation, except for those aerodromes where there are no obstacles in the take-off flight path areas or where the Aerodrome Terrain and Obstacle Chart — ICAO (Electronic) is provided in accordance with 175.09.2 (3)

1.2.2 Where a chart is not required because no obstacles exist in the take-off flight path area, a notification to this effect must be published in the AIP.

1.3 Units of measurement

1.3.1 Elevations must be shown to the nearest half-metre or to the nearest foot.

1.3.2 Linear dimensions must be shown to the nearest half-metre.

1.4 Coverage and scale

1.4.1 The extent of each plan must be sufficient to cover all obstacles.

Compliance Note. Isolated distant obstacles that would unnecessarily increase the sheet size may be indicated by the appropriate symbol and an arrow, provided that the distance and bearing from the end of the runway farthest removed and the elevation are given.

1.4.2 The horizontal scale must be within the range of 1:10 000 to 1:15 000.

Compliance Note. When the production of the charts would be expedited thereby, a scale of 1:20 000 may be used.

1.4.3 The vertical scale must be ten times the horizontal scale.

1.4.4 *Linear scales*. Horizontal and vertical linear scales showing both metres and feet must be included in the charts.

1.5 Format

1.5.1 The charts must depict a plan and profile of each runway, any associated stopway or clearway, the take-off flight path area and obstacles.

1.5.2 The profile for each runway, stopway, clearway and the obstacles in the take-off flight path area must be shown above its corresponding plan. The profile of an alternative take-off flight path area must comprise a linear projection of the full take-off flight path and must be disposed above its corresponding plan in the manner most suited to the ready interpretation of the information.

1.5.3 A profile grid must be ruled over the entire profile area exclusive of the runway. The zero for vertical coordinates must be mean sea level. The zero for horizontal coordinates must be the end of the runway furthest from the take-off flight path area concerned. Graduation marks indicating the sub-divisions of intervals must be shown along the base of the grid and along the vertical margins.

1.5.4 The vertical grid may have intervals of 30 m (100 ft) and the horizontal grid may have intervals of 300 m (1 000 ft).

1.5.5 The chart must include:

a) a box for recording the operational data specified in 3.8.3;

b) a box for recording amendments and dates thereof.

1.6 Identification

The chart must be identified by the name of the country in which the aerodrome is located, the name of the city or town or area which the aerodrome serves, the name of the aerodrome and the designator(s) of the runway(s).

1.7 Magnetic variation

The magnetic variation to the nearest degree and date of information must be indicated.

1.8 Aeronautical data

1.8.1 Obstacles

1.8.1.1 Objects in the take-off flight path area which project above a plane surface having a 1.2 per cent slope and having a common origin with the take-off flight path area must be regarded as obstacles, except that obstacles lying wholly below the shadow of other obstacles as defined in 175.09.4 (1.8.1.2) need not be shown. Mobile objects such as boats, trains and trucks, which may project above the 1.2 per cent plane, must be considered obstacles but may not be considered as being capable of creating a shadow.

1.8.1.2 The shadow of an obstacle is considered to be a plane surface originating at a horizontal line passing through the top of the obstacle at right angles to the centre line of the take-off flight path area. The plane covers the complete width of the take-off flight path area and extends to the plane defined in 175.09.4 (1.8.1.1) or to the next higher obstacle if it occurs first. For the first 300 m (1 000 ft) of the take-off flight path area, the shadow planes are horizontal and beyond this point such planes have an upward slope of 1.2 per cent.

1.8.1.3 If the obstacle creating a shadow is likely to be removed, objects that would become obstacles by its removal must be shown.

1.8.2 Take-off flight path area

1.8.2.1 The take-off flight path area consists of a quadrilateral area on the surface of the earth lying directly below, and symmetrically disposed about, the take-off flight path. This area has the following characteristics:

a) it commences at the end of the area declared suitable for take-off (i.e. at the end of the runway or clearway as appropriate);

b) its width at the point of origin is 180 m (600 ft) and this width increases at the rate of 0.25D to a maximum of 1 800 m (6 000 ft), where D is the distance from the point of origin;

c) it extends to the point beyond which no obstacles exist or to a distance of 10.0 km (5.4 NM), whichever is the lesser.

1.8.2.2 For runways serving aircraft having operating limitations which do not preclude the use of a take-off flight path gradient of less than 1.2 per cent, the extent of the take-off flight path area specified in 3.8.2.1 c) must be increased to not less than 12.0 km (6.5 NM) and the slope of the plane surface specified in 3.8.1.1 and 3.8.1.2 must be reduced to 1.0 per cent or less.

Compliance Note. When a 1.0 per cent survey plane touches no obstacles, this plane may be lowered until it touches the first obstacle.

1.8.3 Declared distances

1.8.3.1 The following information for each direction of each runway must be entered in the space provided:

a) take-off run available;

b) accelerate-stop distance available;

c) take-off distance available;

d) landing distance available.

Compliance Note. Guidance on declared distances is given in Part 139, NAMCATS-AH, Attachment A, Section 3.

1.8.3.2 Where a declared distance is not provided because a runway is usable in one direction only, that runway must be identified as “not usable for take-off, landing or both”.

1.8.4 Plan and profile views

1.8.4.1 The plan view must show:

a) the outline of the runways by a solid line, including the length and width, the magnetic bearing to the nearest degree, and the runway number;
b) the outline of the clearways by a broken line, including the length and identification as such;
c) take-off flight path areas by a dashed line and the centre line by a fine line consisting of short and long dashes;
d) alternative take-off flight path areas. When alternative take-off flight path areas not centred on the extension of the runway centre line are shown, notes must be provided explaining the significance of such areas;
e) obstacles, including:
    (i) the exact location of each obstacle together with a symbol indicative of its type;
    (ii) the elevation and identification of each obstacle;
    (iii) the limits of penetration of obstacles of large extent in a distinctive manner identified in the legend.

Compliance Note: This does not exclude the necessity for indicating critical spot elevations within the take-off flight path area.

1.8.4.1.1 The nature of the runway and stop way surfaces must be indicated.

1.8.4.1.2 Stopways must be identified as such and must be shown by a broken line.

1.8.4.1.3 When stopways are shown, the length of each stopway must be indicated.

1.8.4.2 The profile view must show:

a) the profile of the centre line of the runway by a solid line and the profile of the centre line of any associated stopways and clearways by a broken line;
b) the elevation of the runway centre line at each end of the runway, at the stop way and at the origin of each take- off
c) Obstacles, including:

(i) each obstacle by a solid vertical line extending from a convenient grid line over at least one other grid line to the elevation of the top of the obstacle;

(ii) identification of each obstacle;

(iii) the limits of penetration of obstacles of large extent in a distinctive manner identified in the legend.

Compliance Note: An obstacle profile consisting of a line joining the tops of each obstacle and representing the shadow created by successive obstacles may be shown.

1.9 Accuracy

1.9.1 The order of accuracy attained must be shown on the chart.

1.9.2 The horizontal dimensions and the elevations of the runway, stopway and clearway to be printed on the chart must be determined to the nearest 0.5 m (1 ft).

1.9.3 The order of accuracy of the field work and the precision of chart production must be such that measurements in the take-off flight path areas can be taken from the chart within the following maximum deviations:

a) horizontal distances: 5 m (15 ft) at a point of origin increasing at a rate of 1 per 500;

b) vertical distances: 0.5 m (1.5 ft) in the first 300 m (1 000ft) and increasing at a rate of 1 per 1 000.

1.9.4 *Datum*. Where no accurate datum for vertical reference is available, the elevation of the datum used must be stated and must be identified as assumed.

2. Aerodrome Obstacle Chart – ICAO Type B

1.7 Function

This chart, must provide information to satisfy the following functions:

a) the determination of minimum safe altitudes/heights including those for circling procedures;
b) the determination of procedures for use in the event of an emergency during take-off or landing;
c) the application of obstacle clearing and marking criteria; and
d) the provision of source material for aeronautical charts.

1.8 Availability

1.8.1 Aerodrome Obstacle Charts — ICAO Type B must be made available, in the manner prescribed in 1.3.2 for all aerodromes regularly used by international civil aviation, except for those aerodromes where the Aerodrome Terrain and Obstacle Chart — ICAO (Electronic) is provided.

1.8.2 When a chart combining the specifications in Section 2 and 3 of this Sub-part is made available, it must be called the Aerodrome Obstacle Chart – ICAO (Comprehensive).

1.9 Units of measurement

1.9.1 Elevations must be shown to the nearest half-metre or to the nearest foot.

1.9.2 Linear dimensions must be shown to the nearest half-metre.

1.10 Coverage and scale

1.10.1 The extent of each plan must be sufficient to cover all obstacles.

Compliance Note. Isolated distant obstacles that would unnecessarily increase the sheet size may be indicated by the appropriate symbol and an arrow, provided that the distance and bearing from the end of the runway farthest removed and the elevation are given.

1.10.2 The horizontal scale must be within the range of 1:10 000 to 1:20 000.

1.10.3 A horizontal linear scale showing both metres and feet must be included in the chart. When necessary, a linear scale for kilometres and a linear scale for nautical miles must also be shown.

1.11 Format

1.11.1 The charts must include:

a) any necessary explanation of the project used;
b) any necessary identification of the grid used;
c) a notation indicating that obstacles are those which penetrate the obstacle limitation surfaces specified in Part 139.
d) a box for recording amendments and dates thereof; and
e) outside the neat line, every minute of latitude and longitude marked in degrees and minutes

1.12 Identification

The chart must be identified by the name of the country in which the aerodrome is located, the name of the city or town or area which the aerodrome serves, and the name of the aerodrome.

1.13 Culture and topography

1.13.1 Drainage and hydrographic details must be kept to a minimum.

1.13.2 Buildings and other salient features associated with the aerodrome must be shown. Wherever possible, they must be shown to scale.

1.13.3 All objects, either cultural or natural, that project above the take-off and approach surfaces specified in 4.9 or the clearing and marking surfaces specified in Annex 14, Chapter 4, must be shown.

1.13.4 Roads and railroads within the take-off and approach area, and less than 600 m (2 000 ft) from the end of the runway or runway extensions, must be shown.

Compliance Note. Geographical names of features may be shown if of significance.

1.14 Magnetic variation

The chart must show a compass rose orientated to the True North, or a North point, showing the magnetic variation to the nearest degree with the date of magnetic information and annual change.

1.15 Aeronautical data

1.15.1 The charts must show:

a) the aerodrome reference point and its geographical coordinates in degrees, minutes and seconds;
b) the outline of the runways by a solid line;
c) the length and width of the runway;
d) the magnetic bearing to the nearest degree of the runway and the runway number;
e) the elevation of the runway centre line at each end of the runway, at the stopway, at the origin of each take-off and approach area, and at each significant change of slope of runway and stopway;
f) taxiways, aprons and parking areas identified as such, and the outlines by a solid line;
g) stopways identified as such and depicted by a broken line;
h) the length of each stopway;
i) clearways identified as such and depicted by a broken line;
j) the length of each clearway;
k) take-off and approach surfaces identified as such and depicted by a broken line;
l) take-off and approach areas;
Compliance Note. The take-off area is described in 3.8.2.1. The approach area consists of an area on the surface of the earth lying directly below the approach surface as specified in Part 139.
m) obstacles at their exact location, including:
    i) a symbol indicative of their type;
    ii) elevation;

iii) identification;

iv) limits of penetration of large extent in a distinctive manner identified in the legend;

Note: - This does not exclude the necessity for indicating critical spot elevations within the take-off and approach areas.

n) any additional obstacles, as determined by 3.8.1.1 including the obstacles in the shadow of an obstacle, which would otherwise be exempted.

Compliance Note: Part 139 provides the minimum specifications requirements. Where lower surfaces have been established, they may be used in the determination of obstacles.

1.15.1.3 The nature of the runway and stopway surfaces may be given.

1.15.1.4 Wherever practicable, the highest object or obstacle between adjacent approach areas within a radius of 5 000 m (15 000 ft) from the aerodrome reference point may be indicated in a prominent manner.

1.15.1.5 The extent of tree areas and relief features, part of which constitute obstacles, may be shown.

1.16 Accuracy

1.16.1 The order of accuracy attained must be shown on the chart.

1.16.2 The horizontal dimensions and the elevations of the movement area, stopways and clearways to be printed on the chart must be determined to the nearest 0.5 m (1 ft).

1.16.3 The order of accuracy of the field work and the precision of chart production may be such that the resulting data will be within the maximum deviations indicated herein:

a) Take-off and approach areas:

i) horizontal distances: 5 m (15 ft) at point of origin increasing at a rate of 1 per 500;

ii) vertical distances: 0.5 m (1.5 ft) in the first 300 m (1 000 ft) and increasing at a rate of 1 per 1 000.

b) Other areas:

i) horizontal distances: 5 m (15 ft) within 5 000 m (15 000 ft) of the aerodrome reference point and 12 m (40 ft) beyond that area;

ii) vertical distances: 1 m (3 ft) within 1 500 m (5 000 ft) of the aerodrome reference point increasing at a rate of 1 per 1 000.

1.16.4 *Datum*. Where no accurate datum for vertical reference is available, the elevation of the datum used must be stated and must be identified as assumed.

3. Aerodrome terrain and Obstacle Chart – ICAO (Electronic)

3.1 Function

This electronic chart must portray the terrain and obstacle data in combination with aeronautical data, as appropriate, necessary to:

a) enable an operator to comply with the operating limitations of Annex 6, Part I, Chapter 5, and Part III, Section II, Chapter 3, by developing contingency procedures for use in the event of an emergency during a missed approach or take-off, and by performing aircraft operating limitations analysis; and

b) support the following air navigation applications:

(i) instrument procedure design (including circling procedure);

(ii) aerodrome obstacle restriction and removal; and

(iii) provision of source data for the production of other aeronautical charts.

3.2 Availability

3.2.1 From 12 November 2015, Aerodrome Terrain and Obstacle Charts — ICAO (Electronic) must be made available, in the manner prescribed in 1.3.2 for aerodromes regularly used by international civil aviation.

Compliance Note 1. Where the Aerodrome Terrain and Obstacle Chart — ICAO (Electronic) is made available, the Aerodrome Obstacle Chart — ICAO Type A (Operating Limitations) and the Aerodrome Obstacle Chart — ICAO Type B are not required.

Compliance Note 2.The information required by the Precision Approach Terrain Chart — ICAO may be provided in the Aerodrome Terrain and Obstacle Chart — ICAO (Electronic). Where this occurs, the Precision Approach Terrain Chart — ICAO is not required.

3.2.2 Aerodrome Terrain and Obstacle Charts — ICAO (Electronic) may be made available, in the manner prescribed in 175.09.2 (2) for all aerodromes regularly used by international civil aviation.

3.2.3 The Aerodrome Terrain and Obstacle Chart — ICAO (Electronic) must also be made available in hard copy format upon request.

Compliance Note. For specifications regarding hard copy printed output, see 3.7.7.

3.2.4 The ISO 19100 series of standards for geographic information must be used as a general data modelling framework.

Compliance Note. The use of the ISO 19100 series of standards for geographic information supports the interchange and use of the Aerodrome Terrain and Obstacle Chart — ICAO (Electronic) among different users.

3.3 Identification

Electronic charts must be identified by the name of the country in which the aerodrome is located, the name of the city or town which the aerodrome serves, and the name of the aerodrome.

3.4 Chart coverage

The extent of each chart must be sufficient to cover Area 2 as specified in 175.07.

3.5 Chart content

3.5.1 General

3.5.1.1 When developing computer graphic applications that are used to portray features on the chart, the relationships between features, feature attributes, and the underlying spatial geometry and associated topological relationships must be specified by an application schema. Portrayed information must be provided on the basis of portrayal specifications applied according to defined portrayal rules. Portrayal specifications and portrayal rules may not be part of the data set. Portrayal rules must be stored in a portrayal catalogue which make reference to separately stored portrayal specifications.

Compliance Note. ISO Standard 19117 contains a definition of the schema describing the portrayal mechanism of feature-based geographic information, while ISO Standard 19109 contains rules for application schema. Spatial geometry and associated topological relationships are defined in ISO Standard 19107.

3.5.1.2 Symbols used to portray features must be in accordance with 1.4 and Appendix 2 — ICAO Chart Symbols.

3.5.2 Terrain Feature

3.5.2.1 The terrain feature, and associated attributes, to be portrayed and database-linked to the chart must be based on the electronic terrain data sets which satisfy the requirements in 175.07

Compliance Note. Specifications concerning terrain data sets are contained in the NCAA Procedures for Aeronautical Information Management, Chapter 5 and Appendices 1, 6 and 8.

3.5.2.2 The terrain feature must be portrayed in a manner that provides an effective general impression of a terrain. This must be a representation of terrain surface by continuous elevation values at all intersections of the defined grid, also known as the Digital Elevation Model (DEM).

Compliance Note. In accordance with Part 175, Subpart 175.07 and the NCAA Procedures for Aeronautical Information Management, Chapter 5 and Appendices 1 and 8, the DEM for Area 2 post spacing (grid) is specified at 1 arc second (approximately 30 m).

3.5.2.3 Representation of terrain surface may be provided as a selectable layer of contour lines in addition to the DEM.

3.5.2.4 An ortho-rectified image which matches the features on the DEM with features on the overlying image may be used to enhance the DEM. The image must be provided as a separate selectable layer.

3.5.2.5 The portrayed terrain feature must be linked to the following associated attributes in the database(s):

a) horizontal positions of grid points in geographic coordinates and elevations of the points;
b) surface type;
c) contour line values, if provided; and
d) names of cities, towns and other prominent topographic features.

3.5.2.6 Additional terrain attributes provided in the database(s) must be linked to the portrayed terrain feature.

Compliance Note. Specifications concerning terrain attributes are contained in the NCAA Procedures for Aeronautical Information Management, Appendix 6, Table A6-1.

3.5.3 Obstacle features

3.5.3.1 Obstacle features, and associated attributes, portrayed or database -linked to the chart must be based on obstacle data sets which satisfy the requirements of 175.07.

Note. Specifications concerning obstacle data sets are contained in the NCAA Procedures for Aeronautical Information Management, Chapter 5 and Appendices 1, 6 and 8.

3.5.3.2 Each obstacle must be portrayed by an appropriate symbol and obstacle identifier.

3.5.3.3 The portrayed obstacle feature must be linked to the following associated attributes in the database(s):

a) horizontal position in geographic coordinates and associated elevation;
b) obstacle type; and
c) obstacle extent, if appropriate.

3.5.3.4 Additional obstacle attributes provided in the database(s) must be linked to the portrayed obstacle feature.

3.5.4 Aerodrome features

3.5.4.1 Aerodrome features, and associated attributes, portrayed and database -linked to the chart must be based on aerodrome data which satisfy the requirements of 175.07.

Compliance Note. Specifications concerning aerodrome features and associated attributes are contained in the NCAA Procedures for Aeronautical Information Management, Chapter 5 and Appendix 1.

3.5.4.2 The following aerodrome features must be portrayed by an appropriate symbol:

a) aerodrome reference point;
b) runway(s), with designation numbers, and if available, stopway(s) and clearway(s); and
c) taxiways, aprons, large buildings and other prominent aerodrome features.

3.5.4.3 The portrayed aerodrome feature must be linked to the following associated attributes in the database(s):

a) geographical coordinates of the aerodrome reference point;
b) aerodrome magnetic variation, year of information and annual change;
Note:-Magnetic variation may be database-linked to the aerodrome reference point.
c) length and width of runway(s), stopway(s) and clearway(s);
d) type of surface of runway(s) and stopway(s);

e) magnetic bearings of the runway(s) to the nearest degree;

f) elevations at each end of runway(s), stopway(s) and clearway(s), and at each significant change in slope of runway(s) and stopway(s);

g) declared distances for each runway direction, or the abbreviation "NU" where a runway direction cannot be used for take-off or landing or both.

Compliance Note: Part 139, NAMCATS-AH, Attachment A provides guidance on declared distances.

3.5.5 Radio navigation aid features

Each radio navigation aid feature located within the chart coverage must be portrayed by an appropriate symbol.

Compliance Note: Navigation aid feature attributes may be linked to the portrayed navigation aid features in the database(s).

3.6 Accuracy and resolution

3.6.1 The order of accuracy of aeronautical, terrain and obstacle data must be in accordance with its intended use.

Compliance Note. Specifications concerning the accuracy of aeronautical, terrain and obstacle data are contained in the NCAA Procedures for Aeronautical Information Management, Appendix 1.

3.6.2 The aeronautical, terrain and obstacle data resolution must be commensurate with the actual data accuracy.

Note. Specifications concerning the order of resolution for aeronautical, terrain and obstacle data are provided in the NCAA Procedures for Aeronautical Information Management, Appendix 1.

3.7 Electronic functionality

3.7.1 It must be possible to vary the scale at which the chart is viewed. Symbols and text size must vary with chart scale to enhance readability.

3.7.2 Information on the chart must be geo-referenced, and it must be possible to determine cursor position to at least the nearest second.

3.7.3 The chart must be compatible with widely available desktop computer hardware, software and media.

3.7.4 The chart must include its own "reader" software.

3.7.5 It must not be possible to remove information from the chart without an authorized update.

3.7.6 When, due to congestion of information, the details necessary to support the function of the chart cannot be shown with sufficient clarity on a single comprehensive chart view, selectable information layers must be provided to allow for the customized combination of information.

Compliance Note. An electronic chart format with user-selectable information layers is the preferred method of presentation for most aerodrome features.

3.7.7 It must be possible to print the chart in hard copy format according to the content specifications and scale determined by the user.

Compliance Note 1. Printed output may consist of "tiled" sheets or specific selected areas according to user requirements.

Compliance Note 2. Feature attribute information available through database link may be supplied separately on appropriately referenced sheets.

3.8 Chart data product specifications

3.8.1 A comprehensive statement of the data sets comprising the chart must be provided in the form of data product specifications on which basis air navigation users will be able to evaluate the chart data product and determine whether it fulfils the requirements for its intended use (application).

3.8.2 The chart data product specifications must include an overview, a specification scope, a data product identification, data content information, the reference systems used, the data quality requirements, and information on data capture, data maintenance, data portrayal, data product delivery, as well as any additional information available, and metadata.

Compliance Note: ISO Standard 19131 specifies the requirements and outline of data product specifications for geographic information.

3.8.3 The overview of the chart data product specifications must provide an informal description of the product and must contain general information about the data product. The specification scope of the chart data product specifications must contain the spatial (horizontal) extent of the chart coverage. The chart data product identification must include the title of the product, a brief narrative summary of the content and purpose, and a description of the geographic area covered by the chart.

3.8.4 The data content of the chart data product specifications must clearly identify the type of coverage and/or imagery and must provide a narrative description of each.

Compliance Note. ISO Standard 19123 contains schema for coverage geometry and functions.

3.8.5 The chart data product specifications must include information that defines the reference systems used. This must include the spatial reference system (horizontal and vertical) and, if appropriate, temporal reference system. The chart data product specifications must identify the data quality requirements. This must include a statement on acceptable conformance quality levels and corresponding data quality measures. This statement must cover all the data quality

elements and data quality sub-elements, even if only to state that a specific data quality element or sub-element is not applicable.

Note:-ISO Standard 19113 contains quality principles for geographic information while ISO Standard 19114 covers quality evaluation procedures.

3.8.6 The chart data product specifications must include a data capture statement which must be a general description of the sources and of processes applied for the capture of chart data. The principles and criteria applied in the maintenance of the chart must also be provided in the chart data product specifications, including the frequency with which the chart product is updated. Of particular importance is the maintenance information of obstacle data sets included on the chart and an indication of the principles, methods and criteria applied for obstacle data maintenance.

3.8.7 The chart data product specifications must contain information on how data are portrayed on the chart, as detailed in 5.5.1.1. The chart data product specifications must also contain data product delivery information which must include delivery formats and delivery medium information.

3.8.8 The core chart metadata elements must be included in the chart data product specifications. Any additional metadata items required to be supplied must be stated in the product specifications together with the format and encoding of the metadata.

Compliance Note1: ISO Standard 19115 specifies requirements for geographic information metadata.

Compliance Note2: The chart data product specifications document the chart data product which is implemented as data set. Those data sets are described by metadata.

4. Precision Approach Terrain Chart – ICAO

4.1 Function

The chart must provide detailed terrain profile information within a defined portion of the final approach so as to enable aircraft operating agencies to assess the effect of the terrain on decision height determination by the use of radio altimeters.

4.2 Availability

4.2.1 The Precision Approach Terrain Chart — ICAO must be made available for all precision approach runways Categories II and III at aerodromes used by international civil aviation, except where the requisite information is provided in the Aerodrome Terrain and Obstacle Chart — ICAO (Electronic) in accordance with 175.09.4 (3).

4.2.2 The Precision Approach Terrain Chart — ICAO must be revised whenever any significant change occurs.

4.3 Scale

4.3.1 The horizontal scale must be 1:2 500, and the vertical scale 1:500.

4.3.2 When the chart includes a profile of the terrain to a distance greater than 900 m (3 000 ft) from the runway threshold, the horizontal scale must be 1:5 000.

4.4 Identification

The chart must be identified by the name of the country in which the aerodrome is located, the name of the city or town or area which the aerodrome serves, the name of the aerodrome and the designator of the runway.

4.5 Plan and profile information

4.5.1 The chart must include:

a) a plan showing contours at 1 m (3 ft) intervals in the area 60 m (200 ft) on either side of the extended centre line of the runway, to the same distance as the profile, the contours to be related to the runway threshold;

b) an indication where the terrain or any object thereon, within the plan defined in a), differs by ±3 m (10 ft) in height from the centre line profile and is likely to affect a radio altimeter;

c) a profile of the terrain to a distance of 900 m (3 000 ft) from the threshold along the extended centre line of the runway.

4.5.2 Where the terrain at a distance greater than 900 m (3 000 ft) from the runway threshold is mountainous or otherwise significant to users of the chart, the profile of the terrain must be shown to a distance not exceeding 2 000 m (6 500 ft) from the runway threshold.

4.5.3 The ILS reference datum height must be shown to the nearest half metre or foot.

5. En-route Chart – ICAO

5.1 Function

This chart must provide flight crews with information to facilitate navigation along ATS routes in compliance with air traffic services procedures.

Compliance Note: Simplified versions of these charts are appropriate for inclusion in Aeronautical Information Publications to complement the tabulation of communication and navigation facilities.

5.2 Availability

5.2.1 The En-route Chart — ICAO must be made available, in the manner prescribed in 175.9.2 (2) for the flight information region.

Note: Under certain conditions, an Area Chart — ICAO may have to be provided (175.09.4 (6)).

5.2.2 Where different air traffic services routes, position reporting requirements or lateral limits of the flight information region or control areas exist in different layers of airspace and cannot be shown with sufficient clarity on one chart, separate charts must be provided.

5.3 Coverage and scale

Compliance Note 1: A uniform scale for charts of this type cannot be specified due to the varying degree of congestion of information in certain areas.

Compliance Note 2. A linear scale based on the mean scale of the chart may be shown.

5.3.1 Layout of sheet lines must be determined by the density and pattern of the ATS route structure.

5.3.2 Large variations of scale between adjacent charts showing a continuous route structure must be avoided.

5.3.3 An adequate overlap of charts must be provided to ensure continuity of navigation.

5.4 Projection

5.4.1 A conformal projection on which a straight line approximates a great circle must be used.

5.4.2 Parallels and meridians must be shown at suitable intervals.

5.4.3 Graduation marks must be placed at consistent intervals along selected parallels and meridians.

5.5 Identification

Each sheet must be identified by chart series and number.

5.6 Culture and topography

5.6.1 Generalized shore lines of all open water areas, large lakes and rivers must be shown except where they conflict with data more applicable to the function of the chart.

5.6.2 Within each quadrilateral formed by the parallels and meridians, the area minimum altitude must be shown, except as provided for in 6.6.3.

Compliance Note 1. Quadrilaterals formed by the parallels and meridians normally correspond to the whole degree of latitude and longitude. Regardless of the chart scale being used, the area minimum altitude relates to the consequent quadrilateral.

Compliance Note 2. Refer to the Procedures for Air Navigation – Aircraft Operations (PANS-OPS, Doc 8168), Volume II, Section 2, Chapter 1, paragraph 1.8 for the method for determination of area minimum altitude.

5.6.3 In areas of high latitude where it is determined that True North orientation of the chart is impractical, the area minimum altitude must be shown within each quadrilateral formed by reference lines of the graticule (grid) used.

5.6.4 Where charts are not True North orientated, this fact and the selected orientation used must be clearly indicated.

5.7 Magnetic variation

Isogonals must be indicated and the date of the isogonic information given.

5.8 Bearings, tracks and radials

5.8.1 Bearings, tracks and radials must be magnetic, except as provided for in 4.8.2. Where bearings and tracks are additionally provided as true values for RNAV segments, they must be shown in parentheses to the nearest tenth of a degree, e. g. 290° (294.9°T).

5.8.2 In areas of high latitude where it is determined by the appropriate authority that reference to Magnetic North is impractical, another suitable reference, i.e. True North or Grid North, must be used.

5.8.3 Where bearings, tracks or radials are given with reference to True North or Grid North, this must be clearly indicated. When Grid North is used, its reference grid meridian must be identified.

5.9 Aeronautical data

5.9.1 Aerodromes

All aerodromes used by international civil aviation to which an instrument approach can be made must be shown.

Compliance Note: Other aerodromes may be shown.

5.9.2 Prohibited, restricted and danger areas

Prohibited, restricted and danger areas relevant to the layer of airspace must be depicted with their identification and vertical limits.

5.9.3 Air traffic services system

5.9.3.1 Where appropriate, the components of the established air traffic services system must be shown.

5.9.3.1.1 The components must include the following:

a) the radio navigation aids associated with the air traffic services system together with their names, identifications, frequencies and geographical coordinates in degrees, minutes and seconds;

b) in respect of DME, additionally the elevation of the transmitting antenna of the DME to the nearest 30 m (100 ft);

c) an indication of all designated airspace, including lateral and vertical limits and the appropriate class of airspace;

d) All ATS routes for en-route flight including route designators, the track to the nearest degree in both directions along each segment of the routes and, where established, the designation of the navigation specification(s) including any limitations and the direction of traffic flow;

Compliance Note. Guidance material on the organisation of ATS routes for en-route flight publication which may be used to facilitate charting is contained in the Aeronautical information Services Manual (ICAO Doc 8126).

e) all significant points which define the ATS routes and are not marked by the position of a radio navigation aid, together with their name-codes and geographical coordinates in degrees, minutes and seconds;

f) in respect of waypoints defining VOR/DME area navigation routes, additionally,

(i) the station identification and radio frequency of the reference VOR/DME;

(ii) the bearing to the nearest tenth of a degree and the distance to the nearest two-tenths of a kilometre (tenth of a nautical mile) from the reference VOR/ DME, if the waypoint is not collocated with it;

g) an indication of all compulsory and “on-request” reporting points and ATS/MET reporting points;

h) the distances to the nearest kilometre or nautical mi le between significant points constituting turning points or reporting points;

Note:-Overall distances between radio navigation aids may also be shown.

i) change-over points on route segments defined by reference to very high frequency omnidirectional radio ranges, indicating the distances to the nearest kilometre or nautical mile to the navigation aids;

Compliance Note. Change-over points established at the mid-point between two aids, or at the intersection of two radials in the case of a route which changes direction

between the aids, need not be shown for each route segment if a general statement regarding their existence is made.

j) minimum en-route altitudes and minimum obstacle clearance altitudes, on ATS routes to the nearest higher 50 metres or 100 feet;

k) communication facilities listed with their channels and, if applicable, logon address and satellite voice communications (SATVOICE) number;

l) Air Defence identification zone (ADIZ) properly identified.

Compliance Note. ADIZ procedures may be described in the chart legend.

5.9.4 Supplementary information

5.9.4.1 Details of departure and arrival routes and associated holding patterns in terminal areas must be shown unless they are shown on an Area Chart, a Standard Departure Char t — Instrument (SID) — ICAO or a Standard Arrival Chart — Instrument (STAR) — ICAO.

Compliance Note 1: The specifications of these charts, must be in accordance with this CATS.

Compliance Note 2: Departure routes normally originate at the end of a runway; arrival routes normally terminate at the point where an instrument approach is initiated.

5.9.4.2 Where established, altimeter setting regions must be shown and identified.

6. Area Chart – ICAO

6.1 Function

This chart must provide the flight crew with information to facilitate the following phases of instrument flight:

a) the transition between the en-route phase and approach to an aerodrome;

b) the transition between take-off/missed approach and en-route phase of flight; and

c) flights through areas of complex ATS routes or airspace structure.

Compliance Note: The function described in 7.1 c) may be satisfied by a separate chart or an inset on an En-route Chart — ICAO.

6.2 Availability

6.2.1 The Area Chart — ICAO must be made available, in the manner prescribed in 175.09.2 (2) where the air traffic services routes or position reporting requirements are complex and cannot be adequately shown on an En-route Chart — ICAO.

6.2.2 Where air traffic services routes or position reporting requirements are different for arrivals and for departures, and these cannot be shown with sufficient clarity on one chart, separate charts must be provided.

Compliance Note. Under certain conditions, a Standard Departure Chart — Instrument (SID) — ICAO and a Standard Arrival Chart — Instrument (STAR) — ICAO may have to be provided.

6.3 Coverage and scale

6.3.1 The coverage of each chart must extend to points that effectively show departure and arrival routes.

6.3.2 The chart must be drawn to scale and a scale-bar shown.

6.4 Projection

6.4.1 Parallels and meridians must be shown at suitable intervals.

6.4.2 Graduation marks must be placed at consistent intervals along the neat lines, as appropriate.

6.5 Identification

The chart must be identified by a name associated with the airspace portrayed.

Compliance Note. The name may be that of the air traffic services centre, the name of the largest city or town situated in the area covered by the chart or the name of the city that the aerodrome serves. Where more than one aerodrome serves the city or town, the name of the aerodrome on which the procedures are based must be added.

6.6 Culture and topography

6.6.1 Generalized shorelines of all open water areas, large lakes and rivers must be shown except where they conflict with data more applicable to the function of the charts.

6.6.2 To improve situational awareness in areas where significant relief exists, all relief exceeding 300 m (1 000 ft) above the elevation of the primary aerodrome must be shown by smoothed contour lines, contour values and layer tints printed in brown. Appropriate spot elevations, including the highest elevation within each top contour line, must be shown printed in black. Obstacles must also be shown.

Compliance Note 1: The next higher suitable contour line appearing on base topographic maps exceeding 300 m (1 000 ft) above the elevation of the primary aerodrome may be selected to start layer tinting.

Compliance Note 2: An appropriate brown colour, on which half-tone layer tinting is to be based, is specified in Appendix 3 to this Sub-Part — Colour Guide for contours and topographic features.

Compliance Note 3: Appropriate spot elevations and obstacles are those provided by the procedures specialist.

6.7 Magnetic variation

The average magnetic variation of the area covered by the chart must be shown to the nearest degree.

6.8 Bearings, tracks and radials

6.8.1 Bearings, tracks and radials must be magnetic, except as provided for in 5.2. Where bearings and tracks are additionally provided as true values for RNAV segments, they must be shown in parentheses to the nearest tenth of a degree, e.g. 290° (294.9°T).

6.8.2 Where bearings, tracks or radials are given with reference to True North or Grid North, this must be clearly indicated. When Grid North is used, its reference grid meridian must be identified.

6.9 Aeronautical data

6.9.1 Aerodromes

All aerodromes which affect the terminal routings must be shown. Where appropriate, a runway pattern symbol must be used.

6.9.2 Prohibited, restricted and danger areas

Prohibited, restricted and danger areas must be depicted with their identification and vertical limits.

6.9.3 Area minimum altitudes

Area minimum altitudes must be shown within quadrilaterals formed by the parallels and meridians.

Compliance Note 1. Quadrilaterals formed by the parallels and meridians normally correspond to the whole degree of latitude and longitude. Regardless of the chart scale being used, the area minimum altitude relates to the consequent quadrilateral.

Compliance Note 2. Refer to the Procedures for Air Navigation – Aircraft Operations (PANS-OPS, Doc 8168), Volume II, Section 2, Chapter 1, paragraph 1.8 for the method for determination of area minimum altitude.

6.9.4 Air traffic services system

6.9.4.1 The components of the established relevant air traffic services system must be shown.

6.9.4.1.1 The components must include the following:

a) the radio navigation aids associated with the air traffic services system, together with their names, identifications, frequencies and geographical coordinates in degrees, minutes and seconds;

b) in respect of DME, additionally the elevation of the transmitting antenna of the DME to the nearest 30 m (100 ft);

c) terminal radio aids which are required for outbound and inbound traffic and for holding patterns;

d) the lateral and vertical limits of all designated airspace and the appropriate class of airspace;

e) the designation of the navigation specification(s) including any limitations, where established;

f) holding patterns and terminal routings, together with the route designators, and the track to the nearest degree along each segment of the prescribed airways and terminal routings;

g) all significant points which define the terminal routings and are not marked by the position of a radio navigation aid, together with their name-codes and geographical coordinates in degrees, minutes and seconds;

h) in respect of waypoints defining VOR/DME area navigation routes, additionally,

   i. the station identification and radio frequency of the reference VOR/DME;

   ii. the bearing to the nearest tenth of a degree and the distance to the nearest two-tenths of a kilometre (tenth of a nautical mile) from the reference VOR/DME, if the waypoint is not collocated with it;

i) an indication of all compulsory and “on-request” reporting points;

j) the distances to the nearest kilometre or nautical mile between significant points constituting turning points or reporting points;

Compliance Note. Overall distances between radio navigation aids may also be shown.

k) change-over points on route segments defined by reference to very high frequency omnidirectional radio ranges, indicating the distances to the nearest kilometre or nautical mile to the radio navigation aids;

Compliance Note. Change-over points established at midpoint between two aids, or at the intersection of two radials in the case of a route which changes direction between the aids, need not be shown for each route segment if a general statement regarding their existence is made.

l) minimum en-route altitudes and minimum obstacle clearance altitudes, on ATS routes to the nearest higher 50 metres or 100 feet;

m) established minimum vectoring altitudes to the nearest higher 50 m or 100 ft, clearly identified;

Compliance Note 1. Where ATS surveillance systems are used to vector aircraft to or from significant points on a published standard departure or arrival route or to issue clearance for descent below the minimum sector altitude during arrival, the relevant procedures may be shown on the Area Chart — ICAO unless excessive chart clutter will result.

Compliance Note 2. Where excessive chart clutter will result, an ATC Surveillance Minimum Altitude Chart — ICAO may be provided in which case the elements indicated by 7.9.4.1.1, l), need not be duplicated on the Area Chart — ICAO.

n) area speed and level/altitude restrictions where established;

o) communication facilities listed with their channels and, if applicable, logon address and SATVOICE number; and

p) an indication of "flyover" significant points.

7. Standard Departure Chart – Instrument (SID) – ICAO

7.1 Function

This chart must provide the flight crew with information to enable it to comply with the designated standard departure route instrument from take-off phase to the en-route phase.

Note 1:- Provisions governing the identification of standard departure routes are in Part 139; guidance material relating to the establishment of such routes is contained in the Air Traffic Services Planning Manual (Doc 9426).

Note 2:-Provisions governing obstacle clearance criteria and details of the minimum information to be published are contained in the Procedures for Air Navigation Services — Aircraft Operations *(PANS-OPS, Doc 8168).*

7.2 Availability

The Standard Departure Chart — Instrument (SID) — ICAO must be made available wherever a standard departure route — instrument has been established and cannot be shown with sufficient clarity on the Area Chart — ICAO.

7.3 Coverage and scale

7.3.1 The coverage of the chart must be sufficient to indicate the point where the departure route begins and the specified significant point at which the en-route phase of flight along a designated air traffic services route can be commenced.

Note: - The departure route normally originates at the end of a runway.

7.3.2 The chart must be drawn to scale.

7.3.3 A scale scale-bar must be shown.

7.3.4 When the chart is not drawn to scale, the annotation "NOT TO SCALE" must be shown and the symbol for scale break must be used on tracks and other aspects of the chart which are too large to be drawn to scale.

7.4 Projection

7.4.1 A conformal projection on which a straight line approximates a great circle must be used.

7.4.2 When the chart is drawn to scale, parallels and meridians must be shown at suitable intervals.

7.4.3 Graduation marks must be placed at consistent intervals along the neat lines.

7.5 Identification

The chart must be identified by the name of the city or town or area which the aerodrome serves, the name of the aerodrome and the identification of the established standard departure route(s) — instrument.

Note:-The identification of the standard departure route(s) — instrument is provided by the procedures specialist.

7.6 Culture and topography

7.6.1 Where the chart is drawn to scale, generalized shore lines of all open water areas, large lakes and rivers must be shown except where they conflict with data more applicable to the function of the chart.

7.6.2 To improve situational awareness in areas where significant relief exists, the chart must be drawn to scale and all relief exceeding 300 m (1 000 ft) above the aerodrome elevation must be shown by smoothed contour lines, contour values and layer tints printed in brown. Appropriate spot elevations, including the highest elevation within each top contour line, must be shown printed in black. Obstacles must also be shown.

Compliance Note 1. The next higher suitable contour line appearing on base topographic maps exceeding 300 m (1 000 ft) above the aerodrome elevation may be selected to start layer tinting.

Compliance Note 2. An appropriate brown colour, on which half-tone layer tinting is to be based, is specified in Appendix 3 — Colour Guide for contours and topographic features.

Compliance Note 3. Appropriate spot elevations and obstacles are those provided by the procedures specialist.

7.7 Magnetic variation

Magnetic variation used in determining the magnetic bearings, tracks and radials must be shown to the nearest degree.

7.8 Bearings, tracks and radials

7.8.1 Bearings, tracks and radials must be magnetic, except as provided for in 6.8.2. Where bearings and tracks are additionally provided as true values for RNAV segments, they must be shown in parentheses to the nearest tenth of a degree, e.g. 290° (294.9°T).

Compliance Note. A note to this effect may be included on the chart.

7.8.2 In areas of high latitude, where it is determined by the appropriate authority that reference to Magnetic North is impractical, another suitable reference, i.e. True North or Grid North, must be used.

7.8.3 Where bearings, tracks or radials are given with reference to True North or Grid North, this must be clearly indicated. When Grid North is used, its reference grid meridian must be

7.8.4 identified.

7.9 Aeronautical data

7.9.1 Aerodromes

7.9.1.1 The aerodrome of departure must be shown by the runway pattern.

7.9.1.2 All aerodromes which affect the designated standard departure route — instrument must be shown and identified. Where appropriate, the aerodrome runway patterns must be shown.

7.9.2 Prohibited, restricted and danger areas

Prohibited, restricted and danger areas which may affect the execution of the procedures must be shown with their identification and vertical limits.

7.9.3 Minimum sector altitude

7.9.3.1 The established minimum sector altitude, must be shown with a clear indication of the sector to which it applies.

7.9.3.2 Where the minimum sector altitude has not been established, the chart must be drawn to scale and area minimum altitudes must be shown within quadrilaterals formed by the parallels and meridians. Area minimum altitudes must also be shown in those parts of the chart not covered by the minimum sector altitude.

Compliance Note 1. Quadrilaterals formed by the parallels and meridians normally correspond to the whole degree of latitude and longitude. Regardless of the chart scale being used, the area minimum altitude relates to the consequent quadrilateral.

Compliance Note 2. Refer to the Procedures for Air Navigation – Aircraft Operations (PANS-OPS, Doc 8168), Volume II, Part I, Section 2, Chapter 1, paragraph 1.8 for the method for determination of area minimum altitude.

7.9.4 Air traffic services system

7.9.4.1 The components of the established relevant air traffic services system must be shown.

9.9.4.1.1 The components must comprise the following:

a) a graphic portrayal of each standard departure route — instrument, including:
   (i) for departure procedures designed specifically for helicopters the term "CAT H" must be depicted in the departure chart plan view.
   (ii) route designator;
   (iii) significant points defining the route;
   (iv) track or radial to the nearest degree along each segment of the route;
   (v) distances to the nearest kilometre or nautical mile between significant points;
   (vi) minimum obstacle clearance altitudes, along the route or route segments and altitudes required by the procedure to the nearest higher 50 m or 100 ft and flight level restrictions where established;
   (vii) where the chart is drawn to scale and vectoring on departure is provided, established minimum vectoring altitudes to the nearest higher 50 m or 100 ft, clearly identified;

Compliance *Note 1. Where ATS surveillance systems are used to vector aircraft to or from significant points on a published standard departure route, the relevant procedures may be shown on the Standard Departure Chart — Instrument (SID) — ICAO unless excessive chart clutter will result.*

Compliance Note 2. Where excessive chart clutter will result, an ATC Surveillance Minimum Altitude Chart — ICAO may be provided (see Section 20), in which case the elements indicated by 8.9.4.1.1, a) vi), need not be duplicated on the Standard Departure Chart — Instrument (SID) — ICAO.

b) the radio navigation aid(s) associated with the route(s) including:

1) when the radio navigation aid is used for conventional navigation:
   (i) plain language name;
   (ii) identification;
   (iii) Morse code;
   (iv) frequency;
   (v) geographical coordinates in degrees, minutes and seconds; and
   (vi) for DME, the channel and the elevation of the transmitting antenna of the DME to the nearest 30 m (100 ft);
2) when the radio navigation aid is used as a significant point for area navigation:
   (i) plain language name; and
   (ii) identification;

c) significant points not marked by the position of a radio navigation aid including:

1) when the significant point is used for conventional navigation:
   (i) name-code;
   (ii) geographical coordinates in degrees, minutes and seconds;
   (iii) bearing to the nearest tenth of a degree from the reference radio navigation aid;
   (iv) distance to the nearest two-tenths of a kilometre (tenth of a nautical mile) from the reference radio navigation aid; and
   (v) identification of the reference radio navigation aid;
2) when the significant point is used for area navigation:
   (i) name-code;

d) applicable holding patterns;

e) transition altitude/height to the nearest higher 300 m or 1 000 ft;

f) the position and height of close-in obstacles which penetrate the obstacle identification surface (OIS). A note must be included whenever close-in obstacles penetrating the OIS exist but which were not considered for the published procedure design gradient;

Compliance Note. In accordance with PANS-OPS, Volume II, information on close-in obstacles is provided by the procedures specialist.

g) area speed restrictions, where established;

h) the designation of the navigation specification(s) including any limitations, where established;

i) all compulsory and "on-request" reporting points;

j) radio communication procedures, including:

   i. call sign(s) of ATS unit(s);

   ii. frequency, and if applicable, SATVOICE number;

   iii. transponder setting, where appropriate;

k) an indication of "flyover" significant points.

7.9.4.2 A textual description of standard departure route(s) — instrument (SID) and relevant communication failure procedures must be provided and must, whenever feasible, be shown on the chart or on the same page which contains the chart.

7.9.4.3 Aeronautical database requirements

Appropriate data to support navigation database coding must be published on the verso of the chart or as a separate, properly referenced sheet.

Note:-Appropriate data are those provided by the procedures specialist.

8. Standard Arrival Chart – Instrument (STAR) – ICAO

8.1 Function

This chart must provide the flight crew with information to enable it to comply with the designated standard arrival route instrument from the en-route phase to the approach phase.

Compliance Note 1. Standard arrival routes — instrument are to be interpreted as including "standard descent profiles", "continuous descent approach", and other non-standard descriptions. In the case of a standard descent profile, the depiction of a cross-section is not required.

Compliance Note 2:- Provisions governing the identification of standard arrival routes are in Part 172, NAMCATS-ATS, Appendix 3; guidance material relating to the establishment of such routes is contained in the Air Traffic Services Planning Manual (Doc 9426).

Availability

The Standard Arrival Chart — Instrument (STAR) — ICAO must be made available wherever a standard arrival route — instrument has been established and cannot be shown with sufficient clarity on the Area Chart.

8.2 Coverage and scale

8.3.1 The coverage of the chart must be sufficient to indicate the points where the en-route phase ends and the approach phase begins.

8.3.2 The chart may be drawn to scale.

8.3.3 If the chart is drawn to scale, a scale-bar must be shown.

8.3.3 When the chart is not drawn to scale, the annotation “NOT TO SCALE” must be shown and the symbol for scale break must be used on tracks and other aspects of the chart which are too large to be drawn to scale.

8.3 Projection

8.4.1 A conformal projection on which a straight line approximates a great circle may be used.

8.4.2 When the chart is drawn to scale, parallels and meridians must be shown at suitable intervals.

8.4.3 Graduation marks must be placed at consistent intervals along the neat lines.

8.4 Identification

The chart must be identified by the name of the city or town or area which the aerodrome serves, the name of the aerodrome, and the identification of the standard arrival route(s) — instrument as established in accordance with the Procedures for Air Navigation Services — Aircraft Operations (PANS-OPS, Doc 8168), Volume II, Part I, Section 4, Chapter 2.

Compliance Note. The identification of the standard arrival route(s) — instrument is provided by the procedures specialist.

8.5 Culture and topography

8.5.1 Where the chart is drawn to scale, generalized shore lines of all open water areas, large lakes and rivers must be shown except where they conflict with data more applicable to the function of the chart.

8.5.2 To improve situational awareness in areas where significant relief exists, the chart may be drawn to scale and all relief exceeding 300 m (1 000 ft) above the aerodrome elevation must be shown by smoothed contour lines, contour values and layer tints printed in brown. Appropriate spot elevations, including the highest elevation within each top contour line, must be shown printed in black. Obstacles must also be shown.

Compliance Note 1. The next higher suitable contour line appearing on base topographic maps exceeding 300 m (1 000 ft) above the aerodrome elevation may be selected to start layer tinting.

Compliance Note 2. An appropriate brown colour, on which half-tone layer tinting is to be based, is specified in the Appendices to this CATS — Colour Guide for contours and topographic features.

Compliance Note 3. Appropriate spot elevations and obstacles are those provided by the procedures specialist.

8.6 Magnetic variation

Magnetic variation used in determining the magnetic bearings, tracks and radials must be shown to the nearest degree.

8.7 Bearings, tracks and radials

8.8.1 Bearings, tracks and radials must be magnetic, except as provided for in 10.8.2. Where bearings and tracks are additionally provided as true values for RNAV segments, they must be shown in parentheses to the nearest tenth of a degree, e.g. 290° (294.9°T).

Note: A note to this effect may be included on the chart.

8.8.2 In areas of high latitude, where it is determined that reference to Magnetic North is impractical, another suitable reference, i.e. True North or Grid North, may be used.

8.8.3 Where bearings, tracks or radials are given with reference to True North or Grid North, this must be clearly indicated. When Grid North is used, its reference grid meridian must be identified.

8.8 Aeronautical data

8.8.1 Aerodromes

8.8.1.1 The aerodrome of landing must be shown by the runway pattern.

8.8.1.2 All aerodromes which affect the designated standard arrival route — instrument must be shown and identified. Where appropriate, the aerodrome runway patterns must be shown.

8.8.2 Prohibited, restricted and danger areas

Prohibited, restricted and danger areas which may affect the execution of the procedures must be shown with their identification and vertical limits.

8.8.3 Minimum sector altitude

8.9.3.1 The established minimum sector altitude must be shown with a clear indication of the sector to which it applies.

8.9.3.2 Where the minimum sector altitude has not been established, the chart must be drawn to scale and area minimum altitudes must be shown within quadrilaterals formed by the parallels and meridians. Area minimum altitudes must also be shown in those parts of the chart not covered by the minimum sector altitude.

Compliance Note 1. Quadrilaterals formed by the parallels and meridians normally correspond to the whole degree of latitude and longitude. Regardless of the chart scale being used, the area minimum altitude relates to the consequent quadrilateral.

Compliance Note 2. Refer to the Procedures for Air Navigation – Aircraft Operations (PANS-OPS, Doc 8168), Volume II, Section 2, Chapter 1, paragraph 1.8 for the method for determination of area minimum altitude.

8.8.4 Air traffic services system

8.9.4.1 The components of the established relevant air traffic services system must be shown.

8.9.4.1.1 The components must comprise the following:

a) a graphic portrayal of each standard arrival route — instrument, including:
   (i) route designator;
   (ii) significant points defining the route;
   (iii) track or radial to the nearest degree along each segment of the route;
   (iv) distances to the nearest kilometre or nautical mile between significant points;

(v) minimum obstacle clearance altitudes, along the route or route segments and altitudes required by the procedure to the nearest higher 50 m or 100 ft and flight level restrictions where established;

(vi) where the chart is drawn to scale and vectoring on arrival is provided, established minimum vectoring altitudes to the nearest higher 50 m or 100 ft, clearly identified;

Compliance Note 1. Where ATS surveillance systems are used to vector aircraft to or from significant points on a published standard arrival route or to issue clearance for descent below the minimum sector altitude during arrival, the relevant procedures may be shown on the Standard Arrival Chart — Instrument (STAR) — ICAO unless excessive chart clutter will result.

Compliance Note 2. Where excessive chart clutter will result, an ATC Surveillance Minimum Altitude Chart — ICAO may be provided, in which case the elements indicated by 10.9.4.1.1, a) vi), need not be duplicated on the Standard Arrival Chart — Instrument (STAR) — ICAO.

b) the radio navigation aid(s) associated with the route(s) including:

1) when the radio navigation aid is used for conventional navigation:

(i) plain language name;

(ii) identification;

(iii) Morse code

(iv) frequency;

(v) geographical coordinates in degrees, minutes and seconds; and

(vi) for DME, the channel and the elevation of the transmitting antenna of the DME to the nearest 30 m (100 ft);

2) when the radio navigation aid is used as a significant point for area navigation:

(i) plain language name; and

(ii) identification;

c) significant points not marked by the position of a radio navigation aid including:

1) when the significant point is used for conventional navigation:

(i) name-code;

(ii) geographical coordinates in degrees, minutes and seconds;

(iii) bearing to the nearest tenth of a degree from the reference radio navigation aid;

(iv) distance to the nearest two-tenths of a kilometre (tenth of a nautical mile) from the reference radio navigation aid;

(v) identification of the reference radio navigation aid;

2) when the significant point is used for area navigation:

(i) name-code;

d) applicable holding patterns;

e) transition altitude/height to the nearest higher 300 m or 1 000 ft;

f) area speed restrictions, where established;

g) the designation of the navigation specification(s) including any limitations, where established;

h) all compulsory and "on-request" reporting points;

i) radio communication procedures, including:

i. call sign(s) of ATS unit(s);

ii. frequency and, if applicable, SATVOICE number;

iii. transponder setting, where appropriate;

j) an indication of "flyover" significant waypoints; and

k) for arrival procedures to an instrument approach designed specifically for helicopters the term "CAT H" must be depicted in the arrival chart plan view.

8.9.4.2 A textual description of standard arrival route(s) — instrument (STAR) and relevant communication failure procedures must be provided and must, whenever feasible, be shown on the chart or on the same page which contains the chart.

8.9.4.3 Aeronautical database requirements

Appropriate data to support navigation database coding must be published on the verso of the chart or as a separate, properly referenced sheet.

Compliance Note. Appropriate data are those provided by the procedures specialist.

9. Instrument Approach Chart – ICAO

9.1 Function

This chart must provide flight crews with information which will enable them to perform an approved instrument approach procedure to the runway of intended landing including the missed approach procedure and, where applicable, associated holding patterns.

Compliance Note. Detailed criteria for the establishment of instrument approach procedures and the resolutions of associated altitudes/heights are contained in the Procedures for Air Navigation Services — Aircraft Operations (PANS-OPS, Doc 8168).

9.2 Availability

9.2.1 Instrument Approach Charts — ICAO must be made available for all aerodromes used by international civil aviation where instrument approach procedures have been established by the State concerned.

9.2.2 A separate Instrument Approach Chart — ICAO must normally be provided for each precision approach procedure.

9.2.3 A separate Instrument Approach Chart — ICAO must normally be provided for each non-precision approach procedure.

Compliance Note. A single precision or non-precision approach procedure chart may be provided to portray more than one approach procedure when the procedures for the intermediate approach, final approach and missed approach segments are identical.

9.2.4 When the values for track, time or altitude differ between categories of aircraft on other than the final approach segment of the instrument approach procedures and the listing of these

differences on a single chart could cause clutter or confusion, more than one chart must be provided.

Compliance Note. For categories of aircraft, see Procedures for Air Navigation Services — Aircraft Operations (PANS-OPS, Doc 8168), Volume II, Part I, Section 4, Chapter 9.

9.2.5 Instrument Approach Charts — ICAO must be revised whenever information essential to safe operation becomes out of date.

9.3 Coverage and scale

9.3.1 The coverage of the chart must be sufficient to include all segments of the instrument approach procedure and such additional areas as may be necessary for the type of approach intended.

9.3.2 The scale selected must ensure optimum legibility consistent with:

a) the procedure shown on the chart;

b) sheet size.

9.3.3 A scale indication must be given.

9.3.3.1 Except where this is not practicable, a distance circle with a radius of 20 km (10 NM) centred on a DME located on or close to the aerodrome, or on the aerodrome reference point where no suitable DME is available, must be shown; its radius must be indicated on the circumference.

9.3.3.2 A distance scale must be shown directly below the profile.

9.4 Format

The sheet size must be 210 × 148 mm (8.27 x 5.82 in)..

9.5 Projection

9.5.1 A conformal projection on which a straight line approximates a great circle must be used.

9.5.2 Graduation marks must be placed at consistent intervals along the neat lines.

9.6 Identification

The chart must be identified by the name of the city or town or area which the aerodrome serves, the name of the aerodrome and the identification of the instrument approach procedure as established in accordance with the Procedures for Air Navigation Services — Aircraft Operations (PANS-OPS, Doc 8168), Volume II, Part I, Section 4, Chapter 9.

Compliance Note. The identification of the instrument approach procedure is provided by the procedures specialist.

9.7 Culture and topography

9.7.1 Culture and topographic information pertinent to the safe execution of the instrument approach procedure, including the missed approach procedure, associated holding procedures and visual manoeuvring (circling) procedure when established, must be shown. Topographic information must be named, only when necessary, to facilitate the understanding of such information, and the minimum must be a delineation of land masses and significant lakes and rivers.

9.7.2 Relief must be shown in a manner best suited to the particular elevation characteristics of the area. In areas where relief exceeds 1 200 m (4 000 ft) above the aerodrome elevation within the coverage of the chart or 600 m (2 000 ft) within 11 km (6 NM) of the aerodrome reference point or when final approach or missed approach procedure gradient is steeper than optimal due to terrain, all relief exceeding 150 m (500 ft) above the aerodrome elevation must be shown by smoothed contour lines, contour values and layer tints printed in brown. Appropriate

spot elevations, including the highest elevation within each top contour line, must also be shown printed in black.

Note. The next higher suitable contour line appearing on base topographic maps exceeding 150 m (500 ft) above the aerodrome elevation may be selected to start layer tinting.

Note 2. An appropriate brown colour, on which half-tone layer tinting is to be based, is specified in the Appendix 3 to this CATS - Colour Guide for contours and topographic features.

Note 3. Appropriate spot elevations are those provided by the procedures specialist.

9.7.3 In areas where relief is lower than specified in 11.7.2, all relief exceeding 150 m (500 ft) above the aerodrome elevation must be shown by smoothed contour lines, contour values and layer tints printed in brown. Appropriate spot elevations, including the highest elevation within each top contour line, must also be shown printed in black.

Compliance Note 1. The next higher suitable contour line appearing on base topographic maps exceeding 150 m (500 ft) above the aerodrome elevation may be selected to start layer tinting.

Compliance Note 1. An appropriate brown colour, on which half-tone layer tinting is to be based, is specified in the Appendix 3 — Colour Guide for contours and topographic features.

Compliance Note 1. Appropriate spot elevations are those provided by the procedures specialist.

9.8 Magnetic variation

9.8.1 The magnetic variation must be shown.

9.8.2 When shown, the value of the variation, indicated to the nearest degree, must agree with that used in determining magnetic bearings, tracks and radials.

9.9 Bearings, tracks and radials

9.9.1 Bearings, tracks and radials must be magnetic, except as provided for in 11.9.2. Where bearings and tracks are additionally provided as true values for RNAV segments, they must be shown in parentheses to the nearest tenth of a degree, e.g. 290° (294.9°T).

Compliance Note. A note to this effect may be included on the chart.

9.9.2 In areas of high latitude, where it is determined by the appropriate authority that reference to Magnetic North is impractical, another suitable reference, i.e. True North or Grid North, must be used.

9.9.3 Where bearings, tracks or radials are given with reference to True North or Grid North, this must be clearly indicated. When Grid North is used, its reference grid meridian must be identified.

9.10 Aeronautical data

9.10.1 Aerodromes

9.10.1.1 All aerodromes which show a distinctive pattern from the air must be shown by the appropriate symbol. Abandoned aerodromes must be identified as abandoned.

9.10.1.2 The runway pattern, at a scale sufficiently large to show it clearly, must be shown for:

a) the aerodrome on which the procedure is based;
b) aerodromes affecting the traffic pattern or so situated as to be likely, under adverse weather conditions, to be mistaken for the aerodrome of intended landing.

9.10.1.3 The aerodrome elevation must be shown to the nearest metre or foot in a prominent position on the chart.

9.10.1.4 The threshold elevation or, where applicable, the highest elevation of the touchdown zone must be shown to the nearest metre or foot.

9.10.2 Obstacles

9.10.2.1 Obstacles must be shown on the plan view of the chart.

Compliance Note. Appropriate obstacles are those provided by the procedures specialist.

9.10.2.2 If one or more obstacles are the determining factor of an obstacle clearance altitude/height, those obstacles must be identified.

9.10.2.3 The elevation of the top of obstacles must be shown to the nearest (next higher) metre or foot.

9.10.2.4 The heights of obstacles above a datum other than mean sea level must be shown. When shown, they must be given in parentheses on the chart.

9.10.2.5 When the heights of obstacles above a datum other than mean sea level are shown, the datum is the aerodrome elevation except that, at aerodromes having an instrument runway (or runways) with a threshold elevation more than 2 m (7 ft) below the aerodrome elevation, the chart datum is the threshold elevation of the runway to which the instrument approach is related.

9.10.2.6 Where a datum other than mean sea level is used, it must be stated in a prominent position on the chart.

9.10.2.7 Where an obstacle free zone has not been established for a precision approach runway Category I, this must be indicated.

9.10.3 Prohibited, restricted and danger areas

Prohibited areas, restricted areas, and danger areas which may affect the execution of the procedures must be shown with their identification and vertical limits.

9.10.4 Radio communication facilities and navigation aids

9.10.4.1 Radio navigation aids required for the procedures together with their frequencies, identifications and track-defining characteristics, if any, must be shown. In the case of a procedure in which more than one station is located on the final approach track, the facility to be used for track guidance for final approach must be clearly identified. In addition, consideration must be given to the elimination from the approach chart of those facilities that are not used by the procedure.

9.10.4.1.1 When a radio navigation aid is used as a significant point for area navigation, only its plain language name and identification must be shown.

9.10.4.2 The initial approach fix (IAF), the intermediate approach fix (IF), the final approach fix (FAF) (or final approach point (FAP) for an ILS approach procedure), the missed approach point (MAPt), where established, and other essential fixes or points comprising the procedure must be shown and identified.

9.10.4.3 When the final approach fix is used for conventional navigation (or final approach point for an ILS approach procedure) may be identified with its geographical coordinates in degrees, minutes and seconds.

9.10.4.4 Radio navigation aids that might be used in diversionary procedures together with their track-defining characteristics, if any, must be shown or indicated on the chart.

9.10.4.5 Radio communication frequencies, including call signs that are required for the execution of the procedures must be shown.

9.10.4.6 When required by the procedures, the distance to the aerodrome from each radio navigation aid concerned with the final approach must be shown to the nearest kilometre or nautical mile. When no track-defining aid indicates the bearing of the aerodrome, the bearing must also be shown to the nearest degree.

9.10.5 Minimum sector altitude or terminal arrival altitude

The minimum sector altitude or terminal arrival altitude established by the competent authority must be shown, with a clear indication of the sector to which it applies.

9.10.6 Portrayal of procedure tracks

9.10.6.1 The plan view must show the following information in the manner indicated:

a) the approach procedure track by an arrowed continuous line indicating the direction of flight;
b) the missed approach procedure track by an arrowed broken line;
c) any additional procedure track, other than those specified in a) and b), by an arrowed dotted line;
d) bearings, tracks, radials to the nearest degree and distances to the nearest two-tenths of a kilometre or tenth of a nautical mile or times required for the procedure;
e) where no track-defining aid is available, the magnetic bearing to the nearest degree to the aerodrome from the radio navigation aids concerned with the final approach;
f) the boundaries of any sector in which visual manoeuvring (circling) is prohibited;
g) where specified, the holding pattern and minimum holding altitude/height associated with the approach and missed approach;
h) caution notes where required, prominently displayed on the face of the chart;
i) an indication of "flyover" significant points.

9.10.6.2 The plan view may show the distance to the aerodrome from each radio navigation aid concerned with the final approach.

9.10.6.3 A profile must be provided normally below the plan view showing the following data:

a) the aerodrome by a solid block at aerodrome elevation;
b) the profile of the approach procedure segments by an arrowed continuous line indicating the direction of flight;
c) the profile of the missed approach procedure segment by an arrowed broken line and a description of the procedure;

d) the profile of any additional procedure segment, other than those specified in b) and c), by an arrowed dotted line;

e) bearings, tracks, radials to the nearest degree and distances to the nearest two-tenths of a kilometre or tenth of a nautical mile or times required for the procedure;

f) altitudes/heights required by the procedures, including transition altitude and procedure altitudes/heights, where established;

g) Altitudes/heights required by the procedures, including transition altitude, procedure altitudes/heights and heliport crossing height (HCH), where established;

a) limiting distance to the nearest kilometre or nautical mile on procedure turn, when specified;

b) the intermediate approach fix or point, on procedures where no course reversal is authorized;

c) a line representing the aerodrome elevation or threshold elevation, as appropriate, extended across the width of the chart including a distance scale with its origin at the runway threshold.

9.10.6.4 Heights required by procedures must be shown in parentheses, using the height datum selected in accordance with 11.10.2.5.

9.10.6.5 The profile view may include a ground profile or a minimum altitude/height portrayal as follows:

a) a ground profile shown by a solid line depicting the highest elevations of the relief occurring within the primary area of the final approach segment. The highest elevations of the relief occurring in the secondary areas of the final approach segment shown by a dashed line; or

b) minimum altitudes/heights in the intermediate and final approach segments indicated within bounded shaded blocks.

Compliance Note 1. For the ground profile portrayal, actual templates of the primary and secondary areas of the final approach segment are provided to the cartographer by the procedures specialist.

Compliance Note 2. The minimum altitude/height portrayal is intended for use on charts depicting non-precision approaches with a final approach fix.

9.10.7 Aerodrome operating minima

9.10.7.1 Aerodrome operating minima, when established for the aerodrome, must be shown.

9.10.7.2 The obstacle clearance altitudes/heights for the aircraft categories for which the procedure is designed must be shown; for precision approach procedures, additional OCA/H for Cat DL aircraft (wing span between 65 m and 80 m and/or vertical distance between the flight path of the wheels and the glide path antenna between 7 m and 8 m) must be published, when necessary.

9.10.8 Supplementary information

9.10.8.1 When the missed approach point is defined by:

— a distance from the final approach fix, or

— a facility or a fix and the corresponding distance from the final approach fix,

the distance to the nearest two-tenths of a kilometre or tenth of a nautical mile and a table showing ground speeds and times from the final approach fix to the missed approach point must be shown.

9.10.8.2 When DME is required for use in the final approach segment, a table showing altitudes/heights for each 2 km or 1 NM, as appropriate, must be shown. The table may not include distances which would correspond to altitudes/heights below the OCA/H.

9.10.8.3 For procedures in which DME is not required for use in the final approach segment but where a suitably located DME is available to provide advisory descent profile information, a table showing the altitudes/heights may be included.

9.10.8.4 A rate of descent table must be shown.

9.10.8.5 For non-precision approach procedures with a final approach fix, the final approach descent gradient to the nearest one-tenth of a per cent and, in parentheses, descent angle to the nearest one-tenth of a degree must be shown.

9.10.8.6 For precision approach procedures and approach procedures with vertical guidance, the reference datum height to the nearest half metre or foot and the glide path/elevation/vertical path angle to the nearest one-tenth of a degree must be shown.

9.10.8.7 When a final approach fix is specified at the final approach point for ILS, a clear indication must be given whether it applies to the ILS, the associated ILS localizer only procedure, or both. In the case of MLS, a clear indication must be given when an FAF has been specified at the final approach point.

9.10.8.8 If the final approach descent gradient/angle for any type of instrument approach procedure exceeds the maximum value specified in the *Procedures for Air Navigation Services – Aircraft Operations (PANS-OPS, ICAO Doc 8168), Volume II*, a cautionary note must be included.

9.10.8.9 A note must be included on the chart indicating the approach procedures that are authorized for simultaneous independent or dependent operations. The note must include the runway(s) involved and if they are closely spaced.

9.10.9 Aeronautical database requirements

Appropriate data to support navigation database coding must be published in accordance with the provisions of *Procedures for Air Navigation Services – Aircraft Operations (PANS-OPS, ICAO Doc 8168)*, Volume II, Part III, Section 5, Chapter 2, 2.3, for RNAV procedures and Volume II, Part I, Section 4, Chapter 9, 9.4.1.3, for non-RNAV procedures, on the verso of the chart or as a separate, properly referenced sheet.

Compliance Note. Appropriate data are those provided by the procedures specialist.

10. Visual Approach Chart – ICAO

10.1 Function

This chart must provide flight crews with information which will enable them to transit from the en-route/descent to approach phases of flight to the runway of intended landing by means of visual reference.

10.2 Availability

The Visual Approach Chart — ICAO must be made available, in the manner prescribed in 1.3.2 for all aerodromes used by international civil aviation where:

a) only limited navigation facilities are available; or

b) radio communication facilities are not available; or

c) no adequate aeronautical charts of the aerodrome and its surroundings at 1:500 000 or greater scale are available; or

d) visual approach procedures have been established.

10.3 Scale

10.3.1 The scale must be sufficiently large to permit depiction of significant features and indication of the aerodrome layout.

10.3.2 The scale must not be smaller than 1:500 000.

Compliance Note. A scale of 1:250 000 or 1:200 000 is preferred.

10.3.3 When an Instrument Approach Chart is available for a given aerodrome, the Visual Approach Chart must be drawn to the same scale.

10.4 Format

The sheet size must be 210 × 148 mm (8.27 □5.82 in).

Compliance Note. It would be advantageous to print the charts in several colours, selected to provide maximum legibility in varying degrees and kinds of light.

10.5 Projection

10.5.1 A conformal projection on which a straight line approximates a great circle must be used.

10.5.2 Graduation marks must be placed at consistent intervals along the neat lines.

10.6 Identification

The chart must be identified by the name of the city or town which the aerodrome serves and the name of the aerodrome.

10.7 Culture and topography

10.7.1 Natural and cultural landmarks must be shown (e.g. bluffs, cliffs, sand dunes, cities, towns, roads, railroads, isolated lighthouses).

10.7.1.1 Geographical place names may be included only when they are required to avoid confusion or ambiguity.

10.7.2 Shore lines, lakes, rivers and streams must be shown.

10.7.3 Relief must be shown in a manner best suited to the particular elevation and obstacle characteristics of the area covered by the chart.

10.7.4 When shown, spot elevations must be carefully selected.

Compliance Note. The value of certain spot elevations/heights in relation to both mean sea level and aerodrome elevation may be given.

10.7.5 The figures relating to different reference levels must be clearly differentiated in their presentation.

10.8 Magnetic variation

The magnetic variation must be shown.

10.9 Bearings, tracks and radials

10.9.1 Bearings, tracks and radials must be magnetic except as provided for in 11.9.2.

10.9.2 In areas of high latitude, where it is determined by that reference to Magnetic North is impractical, another suitable reference, i.e. True North or Grid North, must be used.

10.9.3 Where bearings, tracks or radials are given with reference to True North or Grid North, this must be clearly indicated. When Grid North is used, its reference grid meridian must be identified.

10.10 Aeronautical data

10.10.1 Aerodromes

10.10.1.1 All aerodromes must be shown by the runway pattern. Restrictions on the use of any landing direction must be indicated. Where there is any risk of confusion between two neighbouring aerodromes, this must be indicated. Abandoned aerodromes must be identified as abandoned.

10.10.1.2 The aerodrome elevation must be shown in a prominent position on the chart.

10.10.2 Obstacles

10.10.2.1 Obstacles must be shown and identified.

10.10.2.2 The elevation of the top of obstacles must be shown to the nearest (next higher) metre or foot.

10.10.2.3 The heights of obstacles above the aerodrome elevation must be shown.

10.10.2.3.1 When the heights of obstacles are shown, the height datum must be stated in a prominent position on the chart and the heights must be given in parentheses on the chart.

10.10.3 Prohibited, restricted and danger areas

Prohibited areas, restricted areas, and danger areas must be depicted with their identification and vertical limits.

10.10.4 Designated airspace

Where applicable, control zones and aerodrome traffic zones must be depicted with their vertical limits and the appropriate class of airspace.

10.10.5 Visual approach information

10.10.5.1 Visual approach procedures must be shown where applicable.

10.10.5.2 Visual aids for navigation must be shown as appropriate.

10.10.5.3 Location and type of the visual approach slope indicator systems with their nominal approach slope angle(s), minimum eye height(s) over the threshold of the on-slope signal(s), and where the axis of the system is not parallel to the runway centre line, the angle and direction of displacement, i.e. left or right, must be shown.

10.10.6 Supplementary information

10.10.6.1 Radio navigation aids together with their frequencies and identifications must be shown as appropriate.

10.10.6.2 Radio communication facilities with their frequencies must be shown as appropriate.

11. Aerodrome/Heliport Chart – ICAO

11.1 Function

This chart must provide flight crews with information which will facilitate the ground movement of aircraft:

a) from the aircraft stand to the runway; and
b) from the runway to the aircraft stand;

and helicopter movement:

a) from the helicopter stand to the touchdown and lift-off area and to the final approach and take-off area;
b) from the final approach and take-off area to the touchdown and lift-off area and to the helicopter stand;
c) along helicopter ground and air taxiways; and
d) along air transit routes;

it must also provide essential operational information at the aerodrome/heliport.

11.2 Availability

11.2.1 The Aerodrome/Heliport Chart — ICAO must be made available, in the manner prescribed in 1.3.2 for all aerodromes/heliports regularly used by international civil aviation.

11.2.2 The Aerodrome/Heliport Chart — ICAO must be made available also for all other aerodromes/heliports available, in the manner prescribed in 1.3.2 for use by international civil aviation.

Compliance Note. Under certain conditions, an Aerodrome Ground Movement Chart — ICAO and an Aircraft Parking/Docking Chart (see Chapters 14 and 15) — ICAO may have to be provided; in which case, the elements portrayed on these supplementary charts need not be duplicated on the Aerodrome/Heliport Chart — ICAO.

11.2 Coverage and scale

11.3.1 The coverage and scale must be sufficiently large to show clearly all the elements listed in 13.6.1.

11.3.2 A linear scale must be shown.

11.3 Identification

The chart must be identified by the name of the city or town or area which the aerodrome/heliport serves and the name of the aerodrome/heliport.

11.4 Magnetic variation

True and Magnetic North arrows and magnetic variation to the nearest degree and annual change of the magnetic variation must be shown.

11.5 Aerodrome/heliport data

11.5.1 This chart must show:

a) geographical coordinates in degrees, minutes and seconds for the aerodrome/heliport reference point;

b) elevations, to the nearest metre or foot, of the aerodrome/heliport and apron (altimeter checkpoint locations) where applicable; and for non-precision approaches, elevations and geoid undulations of runway thresholds and the geometric centre of the touchdown and lift-off area;

c) elevations and geoid undulations, to the nearest half-metre or foot, of the precision approach runway threshold, the geometric centre of the touchdown and lift-off area, and at the highest elevation of the touchdown zone of a precision approach runway;

d) all runways including those under construction with designation number, length and width to the nearest metre, bearing strength, displaced thresholds, stopways, clearways, runway directions to the nearest degree magnetic, type of surface and runway markings;
Compliance Note. Bearing strengths may be shown in tabular form on the face or verso of the chart.

e) all aprons, with aircraft/helicopter stands, lighting, markings and other visual guidance and control aids, where applicable, including location and type of visual docking guidance systems, type of surface for heliports, and bearing strengths or aircraft type restrictions where the bearing strength is less than that of the associated runways;

Compliance Note. Bearing strengths or aircraft type restrictions may be shown in tabular form on the face or verso of the chart.

f) geographical coordinates in degrees, minutes and seconds for thresholds, geometric centre of touchdown and lift-off area and/or thresholds of the final approach and take-off area (where appropriate);

g) all taxiways, helicopter air and ground taxiways with type of surface, helicopter air transit routes, with designations, width, lighting, markings (including runway-holding positions and, where established, intermediate holding positions), stop bars, other

visual guidance and control aids, and bearing strength or aircraft type restrictions where the bearing strength is less than that of the associated runways;
Compliance Note. Bearing strengths or aircraft type restrictions may be shown in tabular form on the face or verso of the chart.

h) where established, hot spot locations with additional information properly annotated;
Compliance Note. Additional information regarding hot spots may be shown in tabular form on the face or verso of the chart.

i) geographical coordinates in degrees, minutes, seconds and hundredths of seconds for appropriate taxiway centre line points and aircraft stands;
j) where established, standard routes for taxiing aircraft with their designators;
k) the boundaries of the air traffic control service;
l) position of runway visual range (RVR) observation sites;
m) approach and runway lighting;
n) location and type of the visual approach slope indicator systems with their nominal approach slope angle(s), minimum eye height(s) over the threshold of the on-slope signal(s), and where the axis of the system is not parallel to the runway centre line, the angle and direction of the displacement, i.e. left or right;
o) relevant communication facilities listed with their channels and, if applicable, logon address and SATVOICE number;
p) obstacles to taxiing;
q) aircraft servicing areas and buildings of operational significance;
r) VOR checkpoint and radio frequency of the aid concerned;
s) any part of the depicted movement area permanently unsuitable for aircraft, clearly identified as such.

11.5.1 For aerodromes accommodating aeroplanes with folding wing tips, the location where the wing tips may be safely extended may be shown on the chart.

11.5.3 In addition to the items in 13.6.1 relating to heliports, the chart must show:
a) heliport type;

Compliance Note. Heliport types are identified in Aerodrome Technical Standards Part II as surface-level, elevated or helideck.

b) touchdown and lift-off area including dimensions to the nearest metre, slope, type of surface and bearing strength in tonnes;

c) final approach and take-off area including type, true bearing to the nearest degree, designation number (where appropriate), length and width to the nearest metre, slope and type of surface;

d) safety area including length, width and type of surface;

e) helicopter clearway including length and ground profile;

f) obstacles including type and elevation of the top of the obstacles to the nearest (next higher) metre or foot;

g) visual aids for approach procedures, marking and lighting of final approach and take-off area, and of touchdown and lift-off area;

h) declared distances to the nearest metre for heliports, where relevant, including:

(i) take-off distance available;

(ii) rejected take-off distance available

(iii) landing distance available

12. Aerodrome Ground Movement Chart – ICAO

12.1 Function

This supplementary chart must provide flight crews with detailed information to facilitate the ground movement of aircraft to and from the aircraft stands and the parking/docking of aircraft.

12.2 Availability

The Aerodrome Ground Movement Chart — ICAO must be made available, in the manner prescribed in 1.3.2 where, due to congestion of information, details necessary for the ground movement of aircraft along the taxiways to and from the aircraft stands cannot be shown with sufficient clarity on the Aerodrome/Heliport Chart — ICAO.

12.3 Coverage and scale

12.3.1 The coverage and scale must be sufficiently large to show clearly all the elements listed in 14.6.

12.4 Identification

The chart must be identified by the name of the city or town or area which the aerodrome serves and the name of the aerodrome.

12.5 Magnetic variation

12.5.1 A True North arrow must be shown.

12.5.2 Magnetic variation to the nearest degree and its annual change must be shown.

Compliance Note. This chart need not be True North orientated.

12.6 Aerodrome data

12.6.1 This chart must show in a similar manner all the information on the Aerodrome/Heliport Chart — ICAO relevant to the area depicted, including:

a) apron elevation to the nearest metre or foot;

b) aprons with aircraft stands, bearing strengths or aircraft type restrictions, lighting, marking and other visual guidance and control aids, where applicable, including location and type of visual docking guidance systems;

c) geographical coordinates in degrees, minutes, seconds and hundredths of seconds for aircraft stands;

d) taxiways with designations, width to the nearest metre, bearing strength or aircraft type restrictions where applicable, lighting, markings (including runway-holding positions and, where established, intermediate holding positions), stop bars, and other visual guidance and control aids;

e) where established, hot spot locations with additional information properly annotated;
Compliance Note. Additional information regarding hot spots may be shown in tabular form on the face or verso of the chart.
f) where established, standard routes for taxiing aircraft, with their designators;
g) geographical coordinates in degrees, minutes, seconds and hundredths of seconds for appropriate taxiway centre line points;
h) the boundaries of the ai r traffic control service;
i) relevant communication facilities listed with their channels and, if applicable, logon address;
j) obstacles to taxiing;
k) aircraft servicing areas and buildings of operational significance;
l) VOR checkpoint and radio frequency of the aid concerned;
m) any part of the depicted movement area permanently unsuitable for aircraft, clearly identified as such.

12.6.2 For aerodromes accommodating aeroplanes with folding wing tips, the location where the wing tips may be safely extended may be shown on the chart.

13. Aircraft Parking/Docking Chart – ICAO

13.1 Function

This supplementary chart must provide flight crews with detailed information to facilitate the ground movement of aircraft between the taxiways and the aircraft stands and the parking/docking of aircraft.

13.2 Availability

The Aircraft Parking/Docking Chart — ICAO must be made available, in the manner prescribed in 1.3.2 in the manner prescribed in 1.3.2 where, due to the complexity of the terminal facilities, the information cannot be shown with sufficient clarity on the Aerodrome/Heliport Chart — ICAO or on the Aerodrome Ground Movement Chart — ICAO.

13.3 Coverage and scale

13.3.1 The coverage and scale must be sufficiently large to show clearly all the elements listed in 15.6.

13.4 Identification

The chart must be identified by the name of the city or town or area which the aerodrome serves and the name of the aerodrome.

13.5 Magnetic variation

13.5.1 A True North arrow must be shown.

13.5.2 Magnetic variation to the nearest degree and its annual change must be shown.

Compliance Note. This chart need not be True North orientated.

13.6 Aerodrome data

This chart must show in a similar manner all the information on the Aerodrome/Heliport Chart — ICAO and the Aerodrome Ground Movement Chart — ICAO relevant to the area depicted, including:

a) apron elevation to the nearest metre or foot;

b) aprons with aircraft stands, bearing strengths or aircraft type restrictions, lighting, marking and other visual guidance and control aids, where applicable, including location and type of visual docking guidance systems;

c) geographical coordinates in degrees, minutes, seconds and hundredths of seconds for aircraft stands;

d) taxiway entries with designations, including runway-holding positions and, where established, intermediate holding positions, and stop bars;

e) where established, hot spot locations with additional information properly annotated;
Compliance Note. Additional information regarding hot spots may be shown in tabular form on the face or verso of the chart.

f) geographical coordinates in degrees, minutes, seconds and hundredths of seconds for appropriate taxiway centre line points;

g) the boundaries of the air traffic control service;

h) relevant communication facilities listed with their channels and, if applicable, logon address;

i) obstacles to taxiing;

j) aircraft servicing areas and buildings of operational significance;

k) VOR checkpoint and radio frequency of the aid concerned;

l) any part of the depicted movement area permanently unsuitable for aircraft, clearly identified as such.

14. World Aeronautical Chart – ICAO 1:1 000 000

14.1 Function

This chart must provide information to satisfy the requirements of visual air navigation.

Compliance Note. This chart may also serve:

a) as a basic aeronautical chart:

(i) when highly specialized charts lacking visual information do not provide essential data;

(ii) to provide complete world coverage at a constant scale with a uniform presentation of planimetric data;

(iii) in the production of other charts required by international civil aviation;

b) as a pre-flight planning chart.

14.2 Availability

14.2.1 The World Aeronautical Chart — ICAO 1:1 000 000 must be made available, in the manner prescribed in 1.3.2 in the manner prescribed in 1.3.2 for all areas delineated in Appendix 5.

Compliance Note. When operational or chart production considerations indicate that operational requirements can be effectively satisfied by Aeronautical Charts — ICAO 1:500 000 or Aeronautical Navigation Charts — ICAO Small Scale, either of these charts may be made available instead of the basic 1:1 000 000 chart.

14.2.2 To ensure complete coverage of all land areas and adequate continuity in any one coordinated series, the selection of a scale of other than 1:1 000 000 must be determined by regional agreement.

14.3 Scales

14.3.1 Linear scales for kilometres and nautical miles arranged in the following order:

a. kilometres,

b. nautical miles,

with their zero points in the same vertical line must be shown in the margin.

14.3.1.1 The length of the linear scales must represent at least 200 km (110 NM).

14.3.2 A conversion scale (metre s/feet) must be shown in the margin.

14.4 Format

14.4.1 The title and marginal notes must be in one of the working languages of ICAO.

Compliance Note. The language of the publishing country may be used in addition to the ICAO working language.

14.4.2 The information regarding the number of the adjoining sheets and the unit of measurement to express elevations must be so located as to be clearly visible when the sheet is folded.

14.4.3 The method of folding may be as follows:

Fold the chart on the long axis near the mid-parallel of latitude, face out, with the bottom part of the chart face upward. Fold inward near the meridian, and fold both halves backward in accordion folds.

14.4.4 Whenever practicable, the sheet lines must conform with those shown in the index in Appendix 5 to this Sub-Part.

Compliance Note 1. The area covered by a sheet may vary from the lines shown to satisfy particular requirements.

Compliance Note 2. The value of adopting identical sheet lines for ICAO 1:1 000 000 Charts and the corresponding sheet of the International Map of the World (IMW), provided aeronautical requirements are not compromised, is recognized.

14.4.5 Overlaps must be provided by extending the chart area on the top and right side beyond the area given on the index. This overlap area must contain all aeronautical, topographical, hydrographical and cultural information. The overlap must extend up to 28 km (15 NM), if possible, but in any case from the limiting parallels and meridians of each chart to the neat line.

14.5 Projection

14.5.1 The projections must be as follows:

a) between the Equator and 80° latitude: the Lambert conformal conic projection, in separate bands for each tier of charts. The standard parallels for each 4° band must be 40 ′ south of the northern parallel and 40 ′ north of the southern parallel;

b) between 80° and 90° latitude: the Polar stereographic projection with scale matching that of the Lambert conformal conic projection at latitude 80°, except that in the northern hemisphere the Lambert conformal conic projection may be used between 80° and 84° latitude and the Polar stereographic projection between 84° and 90° with the scales matching at 84° North.

14.5.2 Graticules and graduations must be shown as follows:

a) Parallels:

Latitude	*Distance between parallels*	*Graduations on parallels*
0° to 72°	30′	1′
72° to 84°	30′	5′
84° to 89°	30′	1°
89° to 90°	30′	5° (Only on degree parallels from 72° to 89°)

b) Meridians:

Latitude	*Interval between meridians*	*Graduations on meridians*
0° to 52°	30′	1′
52° to 72°	30′	1′ (Only on even numbered meridians)
72° to 84°	1°	1′
84° to 89°	5°	1′
89° to 90°	15°	1′ (Only on every fourth meridian)

14.5.3 The graduation marks at 1 ′ and 5′ intervals must extend away from the Greenwich Meridian and from the Equator. Each 10′ interval must be shown by a mark on both sides of the graticule line.

14.5.3.1 The length of the graduation marks must be approximately 1.3 mm (0.05 in) for the 1′ intervals, and 2 mm (0.08 in) for the 5′ intervals and 2 mm (0.08 in) extending on both sides of the graticule line for the 10′ intervals.

14.5.4 All meridians and parallels shown must be numbered in the borders of the chart. In addition, each parallel must be numbered within the body of the chart in such a manner that the parallel can be readily identified when the chart is folded.

Compliance Note. Meridians may be numbered within the body of the chart.

14.5.5 The name and basic parameters of the projection must be indicated in the margin.

14.6 Identification

Sheet numbering must be in conformity with the index in the appendices to this CATS.
Compliance Note. The corresponding International Map of the World (IMW) sheet number may also be shown.

14.7 Culture and topography

14.7.1 Built-up areas

14.7.1.1 Cities, towns and villages must be selected and shown according to their relative importance to visual air navigation.

14.7.1.2 Cities and towns of sufficient size may be indicated by the outline of their built-up areas and not of their established city limits.

14.7.2 Railroads

14.7.2.1 All railroads having landmark value must be shown.

Compliance Note 1. In congested areas, some railroads may be omitted in the interest of legibility.

Compliance Note 2. Railroads may be named where space permits.

14.7.2.2 *Important tunnels must be shown.*

Compliance Note. A descriptive note may be added.

14.7.3 Highways and roads

14.7.3.1 Road systems must be shown in sufficient detail to indicate significant patterns from the air.

14.7.3.2 Roads may not be shown in built-up areas unless they can be distinguished from the air as definite landmarks.

Compliance Note. The numbers or names of important highways may be shown.

14.7.4 Landmarks

Natural and cultural landmarks, such as bridges, prominent transmission lines, permanent cable car installations, wind turbines, mine structures, forts, ruins, levees, pipelines, rocks, bluffs, cliffs, sand dunes, isolated lighthouses and lightships, when considered to be of importance for visual air navigation, must be shown.

Compliance Note. Descriptive notes may be added.

14.7.5 Political boundaries

International boundaries must be shown. Undemarcated and undefined boundaries must be distinguished by descriptive notes.

14.7.6 Hydrography

14.7.6.1 All water features compatible with the scale of the chart comprising shore lines, lakes, rivers and streams (including those non-perennial in nature), salt lakes, glaciers and ice caps must be shown.

14.7.6.2 The tint covering large open water areas must be kept very light.

Compliance Note. A narrow band of darker tone may be used along the shore line to emphasize this feature.

14.7.6.3 Reefs and shoals, including rocky ledges, tidal flats, isolated rocks, sand, gravel, stone and all similar areas, must be shown by symbols when of significant landmark value.

Compliance Note. Groups of rocks may be shown by a few representative rock symbols within the area.

14.7.7 Contours

14.7.7.1 Contours must be shown. The selection of intervals must be governed by the requirement to depict clearly the relief features required in air navigation.

14.7.7.2 The values of the contours used must be shown.

14.7.8 Hypsometric tints

14.7.8.1 When hypsometric tints are used, the range of elevations for the tints must be shown.

14.7.8.2 The scale of the hypsometric tints used on the chart must be shown in the margin.

14.7.9 Spot elevations

14.7.9.1 Spot elevations must be shown at selected critical points. The elevations selected must always be the highest in the immediate vicinity and must generally indicate the top of a peak, ridge, etc. Elevations in valleys and at lake surface levels which are of special value to the aviator must be shown. The position of each selected elevation must be indicated by a dot.

14.7.9.2 The elevation (in metres or feet) of the highest point on the chart and its geographical position to the nearest five minutes must be indicated in the margin.

14.7.9.3 The spot elevation of the highest point in any sheet must be cleared of hypsometric tinting.

14.7.10 Incomplete or unreliable relief

14.7.10.1 Areas that have not been surveyed for contour information must be labelled “Relief data incomplete”.

14.7.10.2 Charts on which spot elevations are generally unreliable must bear a warning note prominently displayed on the face of the chart in the colour used for aeronautical information, as follows: “Warning — The reliability of relief information on this char t is doubtful and elevations must be used with caution.”

14.7.11 Escarpments

Escarpments must be shown when they are prominent landmarks or when cultural detail is very sparse.

14.7.12 Wooded areas

14.7.12.1 Wooded areas must be shown.

Compliance Note. On high latitude charts, the approximate extreme northern or southern limits of tree growth may be shown.

14.7.12.2 Where shown, the approximate extreme northern or southern limits of tree growth must be indicated by a dashed black line and must be appropriately labelled.

14.13 Date of topographic information

The date of latest information shown on the topographic base must be indicated in the margin.

14.8 Magnetic variation

14.8.1 Isogonic lines must be shown.

14.8.2 The date of the isogonic information must be indicated in the margin.

14.9 Aeronautical data

14.9.1 General

Aeronautical data shown must be kept to a minimum consistent with the use of the chart for visual navigation and the revision cycle (see 16.9.6).

14.9.2 Aerodromes

14.9.2.1 Land and water aerodromes and heliports must be shown with their names, to the extent that they do not produce undesirable congestion on the chart, priority being given to those of greatest aeronautical significance.

14.9.2.2 The aerodrome elevation, the lighting available, the type of runway surface and the length of the longest runway or channel, shown in abbreviated form for each aerodrome in conformity with the example given in Appendix 2 to this Sub-Part, provided they do not cause undesirable clutter on the chart, must be indicated.

14.9.2.3 Abandoned aerodromes which are still recognizable as aerodromes from the air must be shown and identified as abandoned.

14.9.3 Obstacles

14.9.3.1 Obstacles must be shown.
Compliance Note. Objects of a height of 100 m (300 ft) or more above ground are normally regarded as obstacles.

14.9.3.2 When considered of importance to visual flight, prominent transmission lines, permanent cable car installations and wind turbines, which are obstacles, must be shown.

14.9.4 Prohibited, restricted and danger areas

Prohibited, restricted and danger areas must be shown.

14.9.5 Air traffic services system

14.9.5.1 Significant elements of the air traffic services system including, where practicable, control zones, aerodrome traffic zones, control areas, flight information regions and other airspaces in which VFR flights operate must be shown together with the appropriate class of airspace.

14.9.5.2 Where appropriate, the Air Defence identification zone (ADIZ) must be shown and properly identified.
Compliance Note. ADIZ procedures may be described in the chart legend.

14.9.6 Radio navigation aids

Radio navigation aids must be shown by the appropriate symbol and named, but excluding their frequencies, coded designators, times of operation and other characteristics unless any or all of this information which is shown is kept up to date by means of new editions of the chart.

14.9.7 Supplementary information

14.9.7.1 Aeronautical ground lights together with their characteristics or their identifications or both must be shown.

14.9.7.2 Marine lights on outer prominent coastal or isolated features of not less than 28 km (15 NM) visibility range must be shown:

a) where they are not less distinguishable than more powerful marine lights in the vicinity;
b) where they are readily distinguishable from other marine or other types of lights in the vicinity of built-up coastal areas;
c) where they are the only lights of significance available.

15. Aeronautical Chart – ICAO 1:500 000

15.1 Function

This chart must provide information to satisfy the requirements of visual air navigation for low speed, short- or medium-range operations at low and intermediate altitudes.

Compliance Note 1. This chart may be used:

a) to serve as a basic aeronautical chart;

b) to provide a suitable medium for basic pilot and navigation training;

c) to supplement highly specialized charts which do not provide essential visual information;

d) in pre-flight planning.

Compliance Note2. It is intended that these charts be provided for land areas where charts of this scale are required for civil air operations employing visual air navigation independently or in support of other forms of air navigation.

Compliance Note 3. Where States produce charts of this series covering their national territories, the entire area being portrayed is usually treated on a regional basis.

15.2 Availability

The Aeronautical Chart — ICAO 1:500 000 must be made available, in the manner prescribed in 1.3.2 for all areas delineated in Appendix 5 to this Sub-Part.

Compliance Note. The selection of this scale as an alternative to the World Aeronautical Chart — ICAO 1:1 000 000 is covered by 15.2.1 and 15.2.2.

15.3 Scales

15.3.1 Linear scales for kilometres and nautical miles arranged in the following order:

- kilometres,
- nautical miles,

with their zero points in the same vertical line must be shown in the margin.

15.3.1.1 The length of the linear scale must be not less than 200 mm (8 in).

15.3.2 A conversion scale (metre s/feet) must be shown in the margin.

15.4 Format

15.4.1 The title and marginal notes must be in the English language.
Compliance Note. The language of the publishing country or any other language may be used in addition to the ICAO working language.

15.4.2 The information regarding the number of the adjoining sheets and the unit of measurement used to express elevation must be so located as to be clearly visible when the sheet is folded.

15.4.3 The method of folding is as follows:
Fold the chart on the long axis near the mid-parallel of latitude, face out, with the bottom part of the chart face upward. Fold inward near the meridian, and fold both halves backward in accordion folds.

15.4.4 Whenever practicable, sheets must be quarter sheets of the World Aeronautical Chart - ICAO 1:1 000 000. An appropriate index to adjacent sheets, showing the relationship between the two chart series, must be included on the face of the chart or on the reverse side.

Compliance Note. Sheet lines may be varied to satisfy particular requirements.

15.4.5 Overlaps must be provided by extending the chart area on the top and right side beyond the area given on the index. This overlap area must contain all aeronautical, topographical, hydrographical and cultural information. The overlap must extend up to 15 km (8 NM), if

possible, but in any case from the limiting parallels and meridians of each chart to the neat line.

15.5 Projection

15.5.1 A conformal (orthomorphic) projection must be used.

15.5.2 The projection of the World Aeronautical Chart — ICAO 1:1 000 000 must be used.

15.5.3 Parallels must be shown at intervals of 30 ′.

15.5.3.1 Meridians must normally be shown at intervals of 30 ′.

Note:-At high latitudes, this interval may be increased.

15.5.4 Graduation marks must be shown at 1′ intervals along each whole degree meridian and parallel, extending away from the Greenwich Meridian and from the Equator. Each 10′ interval must be shown by a mark on both sides of the graticule line.

15.5.4.1 The length of the graduation marks must be approximately 1.3 mm (0.05 in) for the 1′ intervals, and 2 mm (0.08 in) for the 5′ intervals and 2 mm (0.08 in) extending on both sides of the graticule line for the 10′ intervals.

15.5.5 All meridians and parallels shown must be numbered in the borders of the chart.

15.5.5.1 Each meridian and parallel must be numbered within the body of the chart whenever this data is required operationally.

15.5.6 The name and basic parameters of the projection must be indicated in the margin.

15.6 Identification

15.6.1 Each sheet must be identified by a name which must be that of the principal town or of a main geographical feature appearing on the sheet.

15.6.1.1 Where applicable, sheets must also be identified by the reference number of the corresponding World Aeronautical Chart — ICAO 1:1 000 000, with the addition of one or more of the following letter suffixes indicating the quadrant or quadrants:

Letter Chart quadrant

A North-West

B North-East

C South-East

D South-West

15.7 Culture and topography

15.7.1 Built-up areas

15.7.1.1 Cities, towns and villages must be selected and shown according to their relative importance to visual air navigation.

15.1.2 Cities and towns of sufficient size must be indicated by the outline of their built-up areas and not of their established city limits.

15.7.2 Railroads

15.7.2.1 All railroads having landmark value must be shown.

Compliance Note 1. In congested areas, some railroads may be omitted in the interest of legibility.

Compliance Note 2. Railroads may be named.

Compliance Note3. Rail stations may be shown.

15.7.2.2 Tunnels must be shown when they serve as prominent landmarks.

Compliance Note. A descriptive note may be added, if necessary, to accentuate this feature.

15.7.3 Highways and roads

15.7.3.1 Road systems must be shown in sufficient detail to indicate significant patterns from the air.

Compliance Note. Roads under construction may be shown.

15.7.3.2 Roads may not be shown in built-up areas unless they can be distinguished from the air as definite landmarks.

Compliance Note. The numbers or names of important highways may be shown.

15.7.4 Landmarks

Natural and cultural landmarks, such as bridges, prominent transmission lines, permanent cable car installations, wind turbines, mine structures, lookout towers, forts, ruins, levees, pipelines, rocks, bluffs, cliffs, sand dunes, isolated lighthouses and lightships, when considered to be of importance for visual air navigation, must be shown.

Compliance Note. Descriptive notes may be added.

15.7.5 Political boundaries

International boundaries must be shown. Undemarcated and undefined boundaries must be distinguished by descriptive notes.

Compliance Note. Other boundaries may be shown.

15.7.6 Hydrography

15.7.6.1 All water features compatible with the scale of the chart comprising shore lines, lakes, rivers and streams (including those non-perennial in nature), salt lakes, glaciers and ice caps must be shown.

15.7.6.2 The tint covering large open water areas must be kept very light.
Compliance Note. A narrow band of darker tone may be used along the shore line to emphasize this feature.

15.7.6.3 Reefs and shoals, including rocky ledges, tidal flats, isolated rocks, sand, gravel, stone and all similar areas, must be shown by symbols when of significant landmark value.

Compliance Note. Groups of rocks may be shown by a few representative rock symbols within the area.

15.7.7 Contours

15.7.7.1 Contours must be shown. The selection of intervals must be governed by the requirement to depict clearly the relief features required in air navigation.

15.7.7.2 The values of the contours used must be shown.

15.7.8 Hypsometric tints

15.7.8.1 When hypsometric tints are used, the range of elevations for the tints must be shown.

15.7.8.2 The scale of the hypsometric tints used on the chart must be shown in the margin.

15.7.9 Spot elevations

15.7.9.1 Spot elevations must be shown at selected critical points. The elevations selected must always be the highest in the immediate vicinity and must generally indicate the top of a peak, ridge, etc. Elevations in valleys and at lake surface levels which are of navigational value must be shown. The position of each selected elevation must be indicated by a dot.

15.7.9.2 The elevation (in metres or feet) of the highest point on the chart and its geographical position to the nearest five minutes must be indicated in the margin.

15.7.9.3 The spot elevation of the highest point on any sheet must be cleared of hypsometric tinting.

15.7.10 Incomplete or unreliable relief

15.7.10.1 Areas that have not been surveyed for contour information must be labelled "Relief data incomplete".

15.7.10.2 Charts on which spot elevations are generally unreliable must bear a warning note prominently displayed on the face of the chart in the colour used for aeronautical information, as follows:

"Warning — The reliability of relief information on this chart is doubtful and elevations must be used with caution."

15.7.11 Escarpments

Escarpments must be shown when they are prominent landmarks or when cultural detail is very sparse.

15.7.12 Wooded areas

15.7.12.1 Wooded areas must be shown.

Compliance Note. On high latitude charts, the approximate extreme northern or southern limits of tree growth may be shown.

15.7.12.2 Where shown, the approximate northern or southern limits of tree growth must be indicated by a dashed black line and must be appropriately labelled.

15.7.13 Date of topographic information

The date of latest information shown on the topographic base must be indicated in the margin.

15.8 Magnetic variation

15.8.1 Isogonic lines must be shown.

15.8.2 The date of the isogonic information must be indicated in the margin.

15.9 Aeronautical data

15.9.1 General

Aeronautical information must be shown consistent with the use of the chart and the revision cycle.

15.9.2 Aerodromes

15.9.2.1 Land and water aerodromes and heliports must be shown with their names, to the extent that they do not produce undesirable congestion on the chart, priority being given to those of greatest aeronautical significance.

15.9.2.2 The aerodrome elevation, the lighting available, the type of runway surface and the length of the longest runway or channel, shown in abbreviated form for each aerodrome in

conformity with the example given in Appendix 2 to this Subpart, provided they do not cause undesirable clutter on the chart, must be indicated.

15.9.2.3 Abandoned aerodromes which are still recognizable as aerodromes from the air must be shown and identified as abandoned.

15.9.3 Obstacles

15.9.3.1 Obstacles must be shown.

Compliance Note. Objects of a height of 100 m (300 ft) or more above ground are normally regarded as obstacles.

15.9.3.2 When considered of importance to visual flight, prominent transmission lines, permanent cable car installations and wind turbines, which are obstacles, must be shown.

15.9.4 Prohibited, restricted and danger areas

Prohibited, restricted and danger areas must be shown.

15.9.5 Air traffic services system

15.9.5.1 Significant elements of the air traffic services system including, where practicable, control zones, aerodrome traffic zones, control areas, flight information regions and other airspaces in which VFR flights operate must be shown together with the appropriate class of airspace.

15.9.5.2 Where appropriate, the Air Defence identification zone (ADIZ) must be shown and properly identified.

Compliance Note. ADIZ procedures may be described in the chart legend.

15.9.6 Radio navigation aids

Radio navigation aids must be shown by the appropriate symbol and named, but excluding their frequencies, coded designators, times of operation and other characteristics unless any or all of this information which is shown is kept up to date by means of new editions of the chart.

15.9.7 Supplementary information

15.9.7.1 Aeronautical ground lights together with their characteristics or their identifications or both must be shown.

15.9.7.2 Marine lights on outer prominent coastal or isolated features of not less than 28 km (15 NM) visibility range must be shown:

a) where they are not less distinguishable than more powerful marine lights in the vicinity;

b) where they are readily distinguishable from other marine or other types of lights in the vicinity of built-up coastal areas;

c) where they are the only lights of significance available.

16. Aeronautical Navigation Chart – ICAO Small Scale

16.1 Function

This chart:

a) serves as an air navigation aid for flight crews of long-range aircraft at high altitudes;

b) provides selective checkpoints over extensive ranges for identification at high altitudes and speeds, which are required for visual confirmation of position;

c) provides for continuous visual reference to the ground during long-range flights over areas lacking radio or other electronic navigation aids, or over areas where visual navigation is preferred or becomes necessary;

d) provides a general purpose chart series for long-range flight planning and plotting.

16.2 Availability

The Aeronautical Navigation Chart — ICAO Small Scale must be made available, in the manner prescribed in 1.3.2 for all areas delineated in the appendices to this CATS.

Compliance Note. The selection of this scale as an alternative to the World Aeronautical Chart — ICAO 1:1 000 000 is covered by 15.2.1 and 15.2.2.

16.3 Coverage and scale

16.3.1 The Aeronautical Navigation Chart — ICAO Small Scale must provide, as a minimum, complete coverage of the major land masses of the world.

Compliance Note 1. A sheet layout for this series is contained in the Aeronautical Chart Manual *(Doc 8697).*

Compliance Note 2. The sheet size may represent the maximum press size available to the producing agency.

16.3.2 The scale must be in the range of 1:2 000 000 to 1:5 000 000.

16.3.2 The scale of the chart must be substituted in the title for the words “Small Scale”.

16.3.4 Linear scales for kilometres and nautical miles arranged in the following order:

- kilometers,
- nautical miles,

with their zero points in the same vertical line must be shown in the margin.

16.3.5 The length of the linear scale must be not less than 200 mm (8 in).

16.3.6 A conversion scale (metre s/feet) must be shown in the margin.

16.4 Format

16.4.1 The title and marginal notes must be in one of the working languages of ICAO.

Compliance Note. The language of the publishing country or any other language may be used in addition to the ICAO working language.

16.4.2 The information regarding the number of the adjoining sheets and the unit of measurement to express elevations must be so located as to be clearly visible when the sheet is folded.

Compliance Note. There is no internationally agreed sheet numbering.

16.5 Projection

16.5.1 A conformal (orthomorphic) projection must be used.

16.5.1.1 The name and basic parameters of the projection must be shown in the margin.

16.5.2 Parallels must be shown at intervals of 1°.

16.5.2.1 Graduations on the parallels must be shown at sufficiently close intervals compatible with the latitude and the scale of the chart.

16.5.3 Meridians must be shown at intervals compatible with the latitude and the scale of the chart.

16.5.3.1 Graduations on the meridians must be shown at intervals not exceeding 5 ′.

16.5.4 The graduation marks must extend away from the Greenwich Meridian and from the Equator.

16.5.5 All meridians and parallels shown must be numbered in the borders of the chart. In addition, when required, meridians and parallels must be numbered within the body of the chart in such a manner that they can be readily identified when the chart is folded.

16.6 Culture and topography

16.6.1 Built-up areas

16.6.1.1 Cities, towns and villages must be selected and shown according to their relative importance to visual air navigation.

16.6.1.2 Cities and towns of sufficient size must be indicated by the outline of their built-up areas and not of their established city limits.

16.6.2 Railroads

16.6.2.1 All railroads having landmark value must be shown.
Compliance Note. In congested areas, some railroads may be omitted in the interest of legibility.

16.6.2.2 Important tunnels must be shown.

Compliance Note. A descriptive note may be added.

16.6.3 Highways and roads

16.6.3.1 Road systems must be shown in sufficient detail to indicate significant patterns from the air.

16.6.3.2 Roads may not be shown in built-up areas unless they can be distinguished from the air as definite landmarks.

16.6.4 Landmarks

Natural and cultural landmarks, such as bridges, prominent transmission lines, permanent cable car installations, mine structures, forts, ruins, levees, pipelines, rocks, bluffs, cliffs, sand dunes, isolated lighthouses and lightships, when considered to be of importance for visual air navigation, must be shown.

Compliance Note. Descriptive notes may be added.

16.6.5 Political boundaries

International boundaries must be shown. Undemarcated and undefined boundaries must be distinguished by descriptive notes.

16.6.6 Hydrography

16.6.6.1 All water features compatible with the scale of the chart comprising shore lines, lakes, rivers and streams (including those non-perennial in nature), salt lakes, glaciers and ice caps must be shown.

16.6.6.2 The tint covering large open water areas must be kept very light.

Compliance Note. A narrow band of darker tone may be used along the shore line to emphasize this feature.

16.6.6.3 Reefs and shoals, including rocky ledges, tidal flats, isolated rocks, sand, gravel, stone and all similar areas, must be shown by symbols when of significant landmark value.

16.6.7 Contours

16.6.7.1 Contours must be shown. The selection of intervals is to be governed by the requirement to depict clearly the relief features required in air navigation.

16.6.7.2 The values of the contours used must be shown.

16.6.8 Hypsometric tints

16.6.8.1 When hypsometric tints are used, the range of elevations for the tints must be shown.

16.6.8.2 The scale of the hypsometric tints used on the chart must be shown in the margin.

16.6.9 Spot elevations

16.6.9.1 Spot elevations must be shown at selected critical points. The elevations selected must always be the highest in the immediate vicinity and must generally indicate the top of a peak, ridge, etc. Elevations in valleys and at lake surface levels which are of value to visual air navigation must be shown. The position of each selected elevation must be indicated by a dot.

16.6.9.2 The elevation (in metres or feet) of the highest point on the chart and its geographical position to the nearest five minutes must be indicated in the margin.

18.6.9.3 The spot elevation of the highest point in any sheet must be cleared of hypsometric tinting.

16.6.10 Incomplete or unreliable relief

16.6.10.1 Areas that have not been surveyed for contour information must be labelled “Relief data incomplete”.

16.6.10.2 Charts on which spot elevations are generally unreliable must bear a warning note prominently displayed on the face of the chart in the colour used for aeronautical information, as follows:

“Warning — the reliability of relief information on this chart is doubtful and elevations must be used with caution.”

16.6.11 Escarpments

Escarpments must be shown when they are prominent landmarks or when cultural detail is very sparse.

16.6.12 Wooded areas

Wooded areas of large extent must be shown.

16.6.13 Date of topographic information

The date of latest information shown on the topographic base must be indicated in the margin.

16.6.14 Colours

16.6.14.1 Subdued colours must be used for the chart background to facilitate plotting.

16.6.14.2 Good colour contrast must be ensured to emphasize features important to visual air navigation.

16.7 Magnetic variation

16.7.1 Isogonic lines must be shown.

16.7.2 The date of isogonic information must be indicated in the margin.

18.8 Aeronautical data

16.8.1 Aerodromes

Land and water aerodromes and heliports must be shown with their names, to the extent that they do not produce undesirable congestion on the chart, priority being given to those of greatest aeronautical significance.

16.8.2 Obstacles

Obstacles must be shown.

16.8.3 Prohibited, restricted and danger areas

Prohibited, restricted and danger areas must be shown when considered to be of importance to air navigation.

16.8.4 Air traffic services system

16.8.4.1 Significant elements of the air traffic services system must be shown when considered to be of importance to air navigation.

16.8.4.2 Where appropriate, the Air Defence identification zone (ADIZ) must be shown and properly identified.

Compliance Note: ADIZ procedures may be described in the chart legend.

16.8.5 Radio navigation aids

Compliance Note: Radio aids to navigation may be shown by the appropriate symbol and named.

17. Plotting Chart – ICAO

17.1 Function

This chart must provide a means of maintaining a continuous flight record of the aircraft position by various fixing methods and dead reckoning in order to maintain an intended flight path.

17.2 Availability

This chart must be made available, in the manner prescribed in 1.3.2, to cover major air routes over oceanic areas and sparsely settled areas used by international civil aviation.

Compliance Note. In areas where the Enroute Chart — ICAO is provided, there may be no requirement for a plotting chart.

17.3 Coverage and scale

17.3.1 Where practicable, the chart for a particular region must cover major air routes and their terminals on a single sheet.

17.3.2 The scale must be governed by the area to be covered.
Compliance Note. Normally the scale will range from 1:3 000 000 to 1:7 500 000.

17.4 Format

The sheet must be of a size that can be adapted for use on a navigator's plotting table.

17.5 Projection

17.5.1 A conformal projection on which a straight line approximates a great circle must be used.

17.5.2 Parallels and meridians must be shown.

17.5.2.1 The intervals must be arranged to permit accurate plotting to be carried out with a minimum of time and effort.

17.5.2.2 Graduation marks must be shown at consistent intervals along an appropriate number of parallels and meridians. The interval selected must, regardless of scale, minimize the amount of interpolation required for accurate plotting.

17.5.2.3 Parallels and meridians must be numbered so that a number appears at least once every 15 cm (6 in) on the face of the chart.

17.5.2.4 If a navigational grid is shown on charts covering the higher latitudes, it must comprise lines parallel to the Meridian or anti-Meridian of Greenwich.

17.6 Identification

Each sheet must be identified by chart series and number.

17.7 Culture and topography

17.7.1 Generalized shore lines of all open water areas, large lakes and rivers must be shown.

17.7.2 Spot elevations for selected features constituting a hazard to air navigation must be shown.

17.7.3 Particularly hazardous or prominent relief features must be emphasized.
Compliance Note. Large cities and towns may be shown.

17.8 Magnetic variation

17.8.1 Isogonals or, in higher latitudes, isogrivs, or both, must be shown at consistent intervals throughout the chart. The interval selected must, regardless of scale, minimize the amount of interpolation required.

17.8.2 The date of the isogonic information must be shown.

17.9 Aeronautical data

17.9.1 The following aeronautical data must be shown:

a) aerodromes regularly used by international commercial air transport together with their names;

b) selected radio aids to navigation that will contribute to position-finding together with their names and identifications;
c) lattices of long-range electronic aids to navigation, as required;
d) boundaries of flight information regions, control areas and control zones necessary to the function of the chart;
e) designated reporting points necessary to the function of the chart;
f) ocean station vessels.

Compliance Note. Other aeronautical data may be shown provided that they do not detract from the legibility of essential information.

17.9.2 Aeronautical ground lights and marine lights useful for air navigation must be shown where other means of navigation are non-existent.

18. Electronic Aeronautical Chart Display – ICAO

18.1 Function

The Electronic Aeronautical Chart Display — ICAO, with adequate back-up arrangements and in compliance with the requirements of Annex 6 for charts, must enable flight crews to execute, in a convenient and timely manner, route planning, route monitoring and navigation by displaying required information.

18.2 Information available for display

18.2.1 The Electronic Aeronautical Chart Display — ICAO must be capable of displaying all aeronautical, cultural and topographic information required by Section 5 and Sections 6 through 19 of this Sub-Part.

18.2.2 The Electronic Aeronautical Chart Display — ICAO must be capable of displaying all aeronautical, cultural and topographic information recommended by Section 5 and Sections 7 through 19 of this Sub-Part.

Compliance Note. The Electronic Aeronautical Chart Display — ICAO may display supplementary information, in addition to that required for the equivalent paper chart, which may be considered useful for safe navigation.

18.3 Display requirements

18.3.1 Display categories

18.3.1.1 Information available for display must be subdivided into the following categories:

a). basic display information, permanently retained on the display and consisting of the minimum information essential for the safe conduct of flight; and

b). other display information, which may be removed from the display or displayed individually on demand, and consisting of information not considered essential for the safe conduct of flight.

18.3.1.2 It must be a simple function to add or remove other display information but it must not be possible to remove information contained in the basic display.

18.3.2 Display mode and generation of neighbouring area

18.3.2.1 The Electronic Aeronautical Chart Display — ICAO must be capable of continuously plotting the aircraft's position in a true motion mode where reset and generation of the surrounding area must take place automatically.

Compliance Note. Other modes, such as static chart displays, may be available.

18.3.2.2 It must be possible manually to change the chart area and the position of the aircraft relative to the edge of the display.

18.3.3 Scale

It must be possible to vary the scale at which a chart is displayed.

18.3.4 Symbols

Symbols used must conform to those specified for electronic charts in Appendix 2 — ICAO Chart Symbols except where it is desired to show items for which no ICAO chart symbol is provided. In these cases, electronic chart symbols must be chosen which:

a) employ a minimum use of lines, arcs and area fills;
b) do not cause confusion with any existing aeronautical chart symbol;
c) do not impair the legibility of the display.

Compliance Note. Additional details for each symbol may be added according to the resolution of the output media, but any enhancements may not change the basic recognizability of the symbol.

18.3.5 Display hardware

18.3.5.1 The effective size of the chart presentation must be sufficient to display the information required by 20.2 without excessive scrolling.

18.3.5.2 The display must have the capabilities required to accurately portray required elements of Appendix 2 — ICAO Chart Symbols.

18.3.5.3 The method of presentation must ensure that the displayed information is clearly visible to the observer in the conditions of natural and artificial light experienced in the cockpit.

18.3.5.4 The display luminance must be adjustable by the flight crew.

18.4 Provision and updating of data

18.4.1 The provision and updating of data for use by the display must be in conformance with the aeronautical data quality system requirements.

18.4.2 The display must be capable of automatically accepting authorized updates to existing data. A means of ensuring that authorized data and all relevant updates to that data have been correctly loaded into the display must be provided.

18.4.3 The display must be capable of accepting updates to authorized data entered manually with simple means for verification prior to final acceptance of the data. Updates entered manually must be distinguishable on the display from authorized data and its authorized updates and may not affect display legibility.

18.4.4 A record must be kept of all updates, including date and time of application.

18.4.5 The display must allow the flight crew to display updates so that the flight crew may review the contents of the updates and determine that they have been included in the system.

18.5 Performance tests, malfunction alarms and indications

18.5.1 A means must be provided for carrying out on-board tests of major functions. In case of a failure, the test must display information to indicate which part of the system is at fault.

18.5.2 A suitable alarm or indication of system malfunction must be provided.

18.6 Back-up arrangements

To ensure safe navigation in case of a failure of the Electronic Aeronautical Chart Display — ICAO, the provision of adequate back-up arrangements must include:

a) facilities enabling a safe takeover of display functions in order to ensure that a failure does not result in a critical situation; and

b) a back-up arrangement facilitating the means for safe navigation of the remaining part of the flight.

Compliance Note. A suitable back-up system may include the carriage of paper charts.

19. ATC Surveillance Minimum Altitude Chart – ICAO

19.1 Function

19.1.1 This supplementary chart must provide information that will enable flight crews to monitor and cross-check altitudes assigned by a controller using an ATS surveillance system.

Compliance Note. The objectives of the air traffic control service as prescribed in Part 172 do not include prevention of collision with terrain. The procedures prescribed in the Procedures for Air Navigation Services — Air Traffic Management (PANS-ATM, Doc 4444) do not relieve pilots of their responsibility to ensure that any clearances issued by air traffic control units are safe in this respect. When an IFR flight is vectored or is given a direct routing which takes the aircraft off an ATS route, the PANS-ATM, Chapter 8, 8.6.5.2, applies.

19.1.2 A note indicating that the chart may only be used for cross-checking of altitudes assigned while the aircraft is identified must be prominently displayed on the face of the chart.

19.2 Availability

The ATC Surveillance Minimum Altitude Chart — ICAO must be made available, in the manner prescribed in 175.09.2 (2), where vectoring procedures are established and minimum vectoring altitudes cannot be shown adequately on the Area Chart — ICAO, Standard Departure Chart — Instrument (SID) — ICAO or Standard Arrival Chart — Instrument (STAR) — ICAO.

19.3 Coverage and scale

19.3.1 The coverage of the chart must be sufficient to effectively show the information associated with vectoring procedures.

19.3.2 The chart must be drawn to scale.

19.3.3 The chart must be drawn to the same scale as the associated Area Chart — ICAO.

19.**4** **Projection**

19.4.1 A conformal projection on which a straight line approximates a geodesic line must be used.

19.4.2 Graduation marks must be placed at consistent intervals along the neat lines, as appropriate.

19.**5** **Identification**

The chart must be identified by the name of the aerodrome for which the vectoring procedures are established or, when procedures apply to more than one aerodrome, the name associated with the airspace portrayed.

Compliance Note. The name may be that of the city which the aerodrome serves or, when the procedures apply to more than one aerodrome, that of the air traffic services centre or the largest city or town situated in the area covered by the chart.

19.**6** **Culture and topography**

19.6.1 Generalized shorelines of all open water areas, large lakes and rivers must be shown except where they conflict with data more applicable to the function of the chart.

19.6.2 Appropriate spot elevations and obstacles must be shown.

Compliance Note. Appropriate spot elevations and obstacles are those provided by the procedures specialist.

19.**7** **Magnetic variation**

The average magnetic variation of the area covered by the chart must be shown to the nearest degree.

19.8 Bearings, tracks and radials

19.8.1 Bearings, tracks and radials must be magnetic, except as provided for in 19.8.2.

19.8.2 In areas of high latitude, where it is determined by the appropriate authority that reference to Magnetic North is impractical, another suitable reference, i.e. True North or Grid North, must be used.

19.8.3 Where bearings, tracks or radials are given with reference to True North or Grid North, this must be clearly indicated. When Grid North is used, its reference grid meridian must be identified.

19.9 Aeronautical data

19.9.1 Aerodromes

19.9.1.1 All aerodromes that affect the terminal routings must be shown. Where appropriate, a runway pattern symbol must be used.

19.9.1.2 The elevation of the primary aerodrome to the nearest metre or foot must be shown.

19.9.2 Prohibited, restricted and danger areas

Prohibited, restricted and danger areas must be depicted with their identification.

19.9.3 Air traffic services system

19.9.3.1 The chart must show components of the established air traffic services system including:

a) relevant radio navigation aids together with their identifications;
b) lateral limits of relevant designated airspace;
c) relevant significant points associated with standard instrument departure and arrival procedures;

Compliance Note. Routes used in the vectoring of aircraft to and from the significant points may be shown.

d) transition altitude, where established;

e) information associated with vectoring including:

(i) minimum vectoring altitudes to the nearest higher 50 m or 100 ft, clearly identified;

(ii) lateral limits of minimum vectoring altitude sector s normally defined by bearings and radials to/from radio navigation aids to the nearest degree or, if not practicable, geographical coordinates in degrees, minutes and seconds and shown by heavy lines so as to clearly differentiate between established sectors;

Compliance Note. In congested areas, geographical coordinates may be omitted in the interest of legibility.

(iii) distance circles at 20-km or 10-NM intervals or, when practicable, 10-km or 5-NM intervals shown as fine dashed lines with the radius indicated on the circumference and centred on the identified aerodrome main VOR radio navigation aid or, if not available, on the aerodrome/heliport reference point;

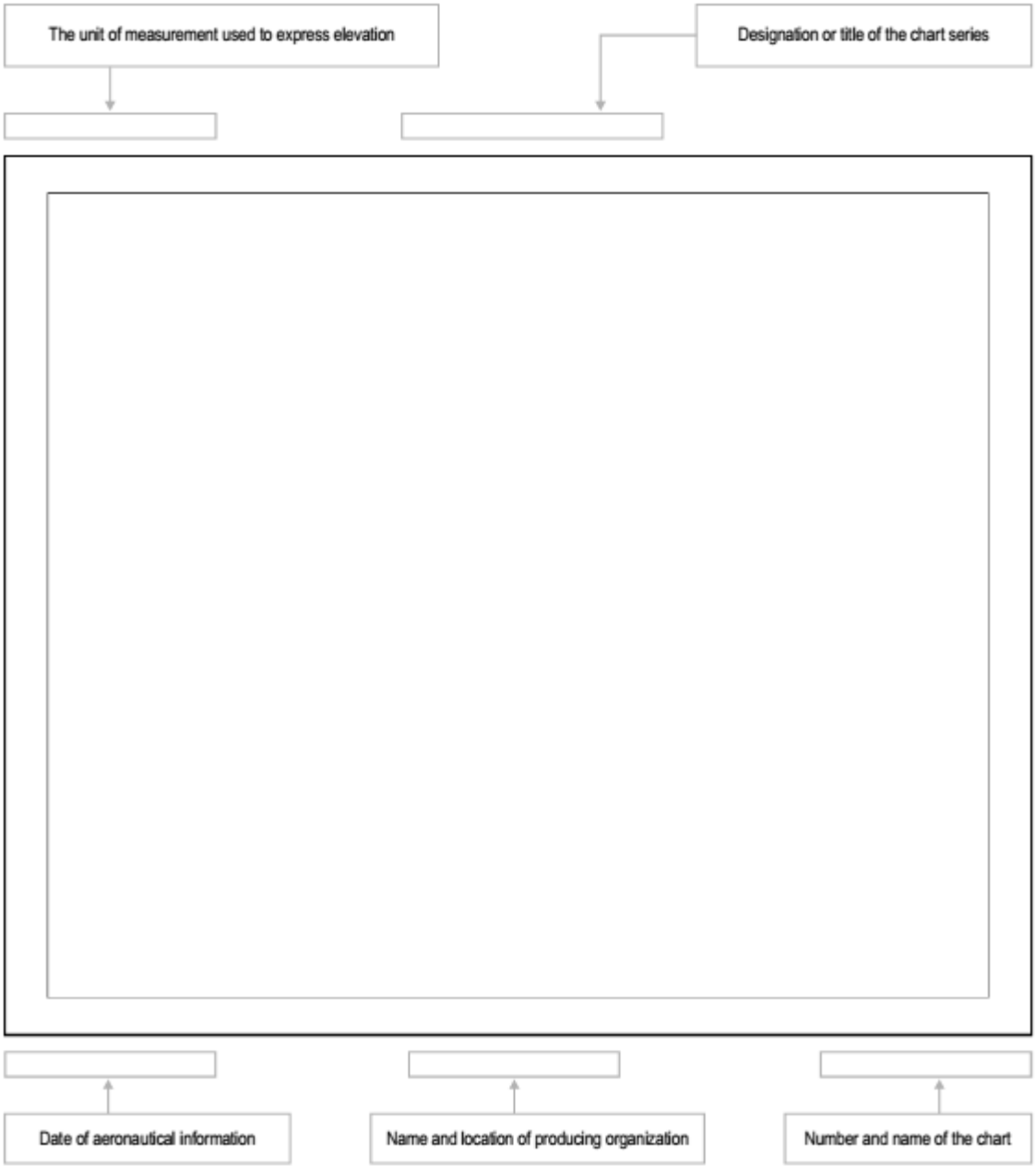
(iv) notes concerning correction for low temperature effect, as applicable;

f) communications procedures including call sign(s) and channel(s) of the ATC unit(s) concerned.

19.9.3.2 A textual description of relevant communication failure procedures may be provided and whenever feasible, be shown on the chart or on the same page that contains the chart.

APPENDICES TO SUBPART 175.09 AERONAUTICAL CHARTS

Appendix 1: Marginal Layout



Appendix 2: ICAO Chart Symbols

1. CATEGORY INDEX

	Symbol No.
Shoals	41
Shore line (reliable)	19
Shore line (unreliable)	20
Small river (perennial)	24
Spring, well or water hole	37
Swamp	35
Tidal flats	21
Unusual water features appropriately labelled	46
Wash	40

CULTURE (47–83)

Built-up Areas (47–50)

Buildings	50
City or large town	47
Town	48
Village	49

Railroads (51–56)

Railroad (single track)	51
Railroad (two or more tracks)	52
Railroad (under construction)	53
Railroad bridge	54
Railroad station	56
Railroad tunnel	55

Highways and Roads (57–62)

Dual highway	57
Primary road	58
Road bridge	61
Road tunnel	62
Secondary road	59
Trail	60

Miscellaneous (63–83)

Boundaries (international)	63
Church	80
Coast guard station	73
Dam	67
Fence	65
Ferry	68
Forest ranger station	76
Fort	79
Lookout tower	74
Mine	75
Mosque	81
Nuclear power station	72
Oil or gas field	70
Outer boundaries	64
Pagoda	82

2. ALPHABETICAL INDEX

TOPOGRAPHY

1	Contours	
2	Approximate contours	
3	Relief shown by hachures	
4	Bluff, cliff or escarpment	
5	Lava flow	
6	Sand dunes	
7	Sand area	
8	Gravel	
9	Levee or esker (Alternative)	
10	Unusual land features appropriately labelled	Many Small Volcanoes; Rock Outcrop
	Active volcano	
11	Mountain pass	5395
12	Highest elevation on chart (Alternative)	17456; .17456
13	Spot elevation	.6397 .8975
14	Spot elevation (of doubtful accuracy)	.6370±
15	Coniferous trees	
16	Other trees	
17	Palms	
18	Areas not surveyed for contour information or relief data incomplete	Caution

HYDROGRAPHY

19	Shore line (reliable)	
20	Shore line (unreliable)	
21	Tidal flats	
22	Coral reefs and ledges	
23	Large river (perennial)	
24	Small river (perennial)	
25	Rivers and streams (non-perennial) (Alternative)	
26	Rivers and streams (unsurveyed)	
27	Rapids	
28	Falls	
29	Canal	
30	Abandoned canal *Note.— Dry canal having landmark value.*	
31	Lakes (perennial)	
32	Lakes (non-perennial) (Alternative)	
33	Salt lake	
34	Salt pans (evaporator)	
35	Swamp	
36	Rice field (Alternative)	
37	Spring, well or water hole	perennial; intermittent
38	Reservoir	Reservoir
39	Dry lake bed (Alternative)	
40	Wash (Alternative)	
41	Shoals	
42	Glaciers and ice caps	
43	Danger line (2 m or one fathom line)	
44	Charted isolated rock	+
45	Rock awash	
46	Unusual water features appropriately labelled	Covered Reef

CULTURE

BUILT-UP AREAS

47	City or large town	
48	Town	
49	Village	
50	Buildings	

RAILROADS

51	Railroad (single track)	
52	Railroad (two or more tracks)	
53	Railroad (under construction)	
54	Railroad bridge	
55	Railroad tunnel	
56	Railroad station	

HIGHWAYS AND ROADS

57	Dual highway	
58	Primary road	
59	Secondary road	
60	Trail	
61	Road bridge	
62	Road tunnel	

MISCELLANEOUS

63	Boundaries (international)	
64	Outer boundaries	
65	Fence	X—X—X
66	Telegraph or telephone line (when a landmark)	—T—T—
67	Dam	
68	Ferry	

MISCELLANEOUS (Cont.)

69	Pipeline	Pipeline
70	Oil or gas field	
71	Tank farms	
72	Nuclear power station	
73	Coast guard station	
74	Lookout tower	
75	Mine	
76	Forest ranger station	
77	Race track or stadium	
78	Ruins	
79	Fort	
80	Church	
81	Mosque	
82	Pagoda	
83	Temple	

AERODROMES

84	Civil	Land	
85	Civil	Water	
86	Military	Land	
87	Military	Water	

88	Joint civil and military	Land	
89	Joint civil and military	Water	
90	Emergency aerodrome or aerodrome with no facilities		
91	Abandoned or closed aerodrome		

92	Sheltered anchorage	
93	Aerodrome for use on charts on which aerodrome classification is not required e.g. Enroute Charts	
94	Heliport *Note.— Aerodrome for the exclusive use of helicopters*	H

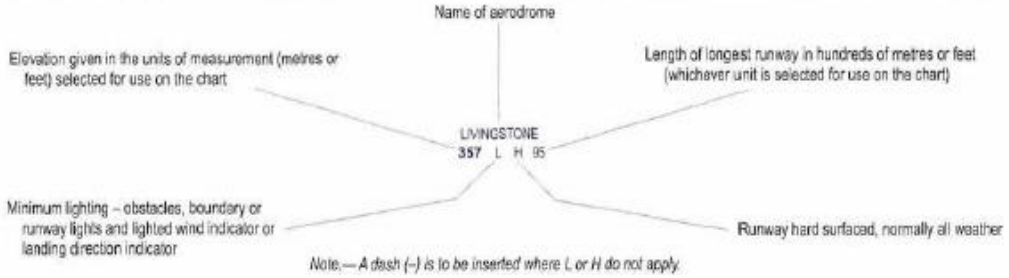
95	*Note.— Where required by the function of the chart, the runway pattern of the aerodrome may be shown in lieu of the aerodrome symbol, for example:*	

AERODROMES *(Cont.)*

AERODROME DATA IN ABBREVIATED FORM WHICH MAY BE IN ASSOCIATION WITH AERODROME SYMBOLS

(Reference: 16.9.2.2 and 17.9.2.2)

96



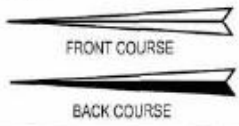
Note.— A dash (–) is to be inserted where L or H do not apply.

AERODROME SYMBOLS FOR APPROACH CHARTS

97	Aerodromes affecting the traffic pattern on the aerodrome on which the procedure is based	
98	The aerodrome on which the procedure is based	

RADIO NAVIGATION AIDS*

99	Basic radio navigation aid symbol *Note.— This symbol may be used with or without a box to enclose the data.*		
100	Non-directional radio beacon	NDB	
101	VHF omnidirectional radio range	VOR	
102	Distance measuring equipment	DME	
103	Collocated VOR and DME radio navigation aids	VOR/DME	
104	DME distance	Distance in kilometres (nautical miles) to DME → 15 km Identification of radio navigation aid → KAV	
105	VOR radial	Radial bearing from, and identification of, VOR	R 090 KAV
106	UHF tactical air navigation aid	TACAN	

107	Collocated VOR and TACAN radio navigation aids	VORTAC	
108	Instrument landing system	ILS	PLAN VIEW  Electronic  PROFILE  Electronic 
109	Radio marker beacon	Elliptical Bone Shape	 

Note.— Marker beacon may be shown by outline, or stipple, or both.

110 Compass rose
To be orientated on the chart in accordance with the alignment of the station (normally Magnetic North)

Compass rose to be used as appropriate in combination with the following symbols:

VOR	
VOR/DME	
TACAN	
VORTAC	

Note.— Additional points of compass may be added as required.

**Note.— Guidance material on the presentation of radio navigation aid data is given in the Aeronautical Chart Manual (Doc 8697).*

AIR TRAFFIC SERVICES

111	Flight information region	FIR	
112	Aerodrome traffic zone	ATZ	
113	Control area Airway Controlled route	CTA AWY	Alternative
114	Uncontrolled route		
115	Advisory airspace	ADA	
116	Control zone	CTR	

117	Air defence identification zone	ADIZ	ADIZ
118	Advisory route	ADR	Alternative
119	Visual flight path	compulsory with radio communication requirement	
		compulsory, without radio communication requirement	
		recommended	
120	Scale-break (on ATS route)		Alternative

Significant Point Functionality

			Significant point depiction for conventional navigation		Significant point depiction for area navigation			
		REPORTING FLY-BY/FLY-OVER	On request (NA)	Compulsory (NA)	On request fly-by	Compulsory fly-by	On request flyover	Compulsory flyover
121	Basic Symbols with functionality	VFR reporting point	△	▲	△	▲	△	▲
		Intersection INT	△	▲	△	▲	△	▲
		VORTAC						
		TACAN						
		VOR						
		VOR/DME						
		NDB						
		Waypoint WPT	Not used	Not used				

For details on use and meaning of these symbols, refer to paragraph 2.4

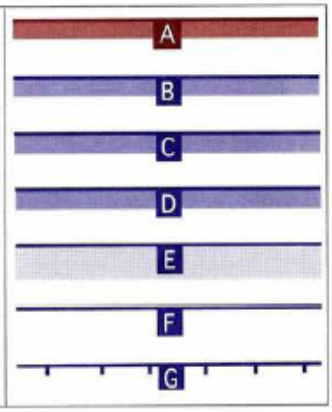
122	Change-over point To be superimposed on the appropriate route symbol at right angles to the route	COP	26 / 36	123	ATS/MET reporting point	MRP	Compulsory On request	124	Final approach fix FAF

AIR TRAFFIC SERVICES *(cont.)*

125	Altitudes/flight levels	Altitude/flight level "window"	17 000 10 000	FL 220 10 000
		"At or above" altitude/flight level	7 000	FL 70
		"At or below" altitude/flight level	5 000	FL 50
		"Mandatory" altitude/flight level	3 000	FL 30
		"Recommended" procedure altitude/flight level	5 000	FL 50
		"Expected" altitude	Expect 5 000	Expect FL 50
	Note.— For use only on SID and STAR charts. Not intended for depiction of minimum obstacle clearance altitude.			

AIRSPACE CLASSIFICATIONS

126 Airspace classifications



Aeronautical data in abbreviated form to be used in association with airspace classification symbols:

127 Alternative

TMA DONLON 119.1 C 200m AGL - FL 245

Type — Name or call sign — Radio frequency(ies) — Airspace classification — Vertical limits

AIRSPACE RESTRICTIONS

128	Restricted airspace (prohibited, restricted or danger area)		Common boundary of two areas	
	Note.—The angle and density of rulings may be varied according to scale and the size, shape and orientation of the area.			
129	International boundary closed to passage of aircraft except through air corridor			

OBSTACLES

130	Obstacle		134	Exceptionally high obstacle (optional symbol)
131	Lighted obstacle		135	Exceptionally high obstacle—lighted (optional symbol) *Note.— For obstacles having a height of the order of 300 m (1 000 ft) above terrain.*
132	Group obstacles		136	Elevation of top (italics) — 52 / (15) — Height above specified datum (upright type in parentheses)
133	Lighted group obstacles			

MISCELLANEOUS

137	Prominent transmission line	
138	Isogonic line or isogonal	3° E
139	Ocean station vessel (normal position)	

140	Wind turbine — unlighted and lighted	
141	Wind turbines — minor group and group in major area, lighted	

VISUAL AIDS

142	Marine light *Note 2.– Characteristics are to be indicated as follows:*		Alt Alternating B Blue F Fixed	F	*Note 1.– Marine alternating lights are red and white unless otherwise indicated. Marine lights are white unless colours are stated.*	Fl Flashing G Green Gp Group	Occ Occulting R Red SEC Sector	sec Second (U) Unwatched W White	
143	Aeronautical ground light	☆	Electronic ★		144	Lightship			

SYMBOLS FOR AERODROME/HELIPORT CHARTS

145	Hard surface runway	
146	Pierced steel plank or steel mesh runway	
147	Unpaved runway	
148	Stopway SWY	
149	Taxiways and parking areas	
150	Helicopter alighting area on an aerodrome	Ⓗ
151	Aerodrome reference point ARP	
152	VOR check-point	
153	Runway visual range (RVR) observation site	

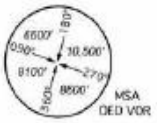
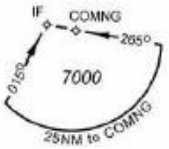
154	Point light	● ○
155	Obstacle light	
156	Landing direction indicator (lighted)	T
157	Landing direction indicator (unlighted)	T
158	Stop bar	▪▪▪
159	Runway-holding position Pattern A / Pattern B *Note.– For application, see Annex 14, Volume I, 5.2.10.*	
160	Intermediate holding position *Note.– For application, see Annex 14, Volume I, 5.2.11.*	
161	Hot spot *Note.– Hot spot location to be circled.*	

SYMBOLS FOR AERODROME OBSTACLE CHARTS - TYPE A, B AND C

		Plan	Profile
162	Tree or shrub		Identification number ①
163	Pole, tower, spire, antenna, etc.		
164	Building or large structure		
165	Railroad		
166	Transmission line or overhead cable		

		Plan	Profile
167	Terrain penetrating obstacle plane		
168	Escarpment		
169	Stopway SWY		
170	Clearway CWY		

ADDITIONAL SYMBOLS FOR USE ON PAPER AND ELECTRONIC CHARTS

	PLAN VIEW		Electronic
171	Minimum sector altitude *Note.— This symbol may be modified to reflect particular sector shapes.*	MSA	
172	Terminal arrival altitude *Note.— This symbol may be modified to reflect particular TAA shapes.*	TAA	
173	Holding pattern		
174	Missed approach track		

PROFILE

175	Runway	
176	Radio navigation aid (type of aid and its use in the procedure to be annotated on top of the symbol)	
177	Radio marker beacon (type of beacon to be annotated on top of the symbol)	
178	Collocated radio navigation aid and marker beacon (type of aid to be annotated on top of the symbol)	
179	DME fix (distance from DME and the fix use in the procedure to be annotated on top of the symbol)	
180	Collocated DME fix and marker beacon (distance from DME and the type of beacon to be annotated on top of the symbol)	

Appendix 3: Colour Guide

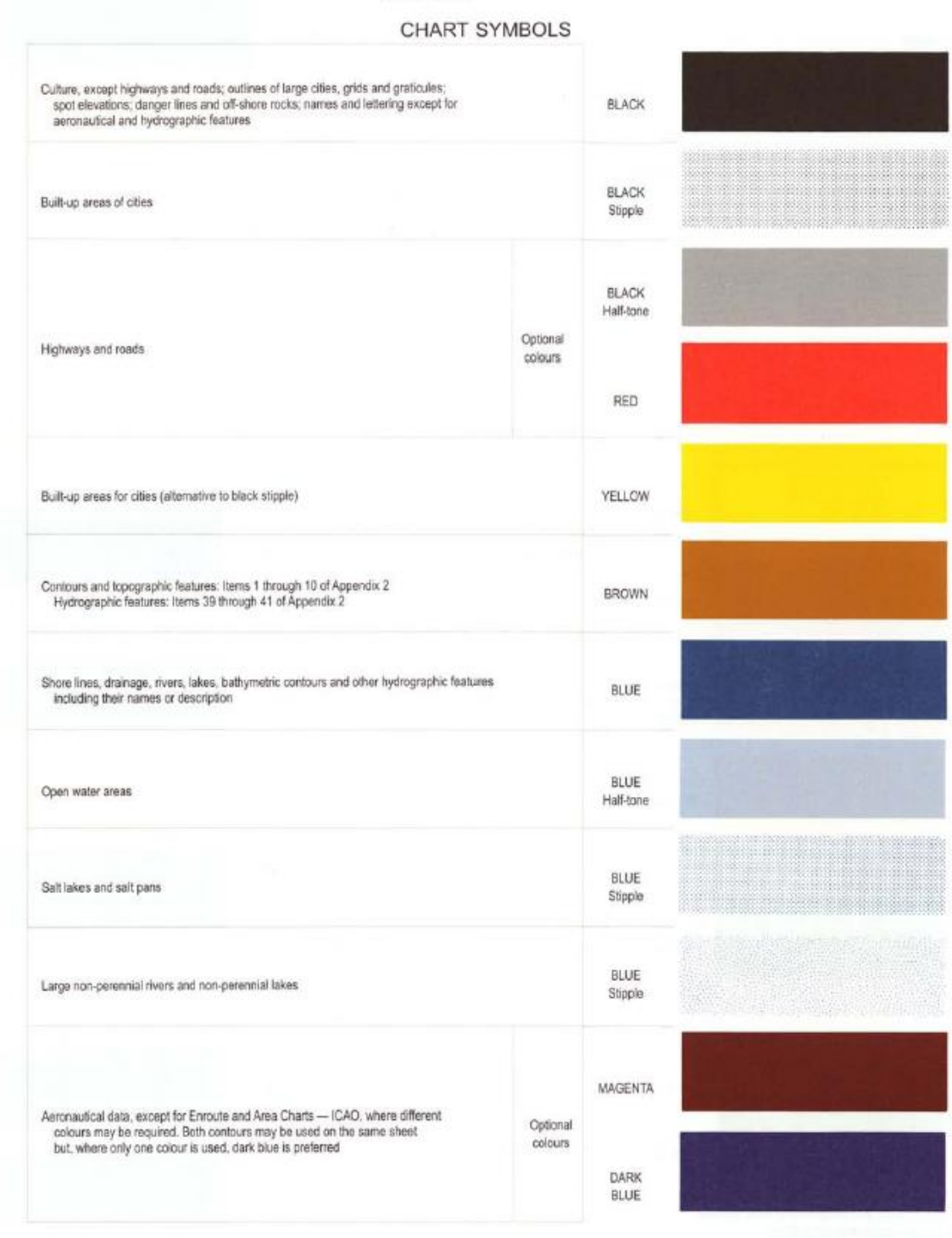


CHART SYMBOLS *(Cont.)*

Woods		GREEN	
Areas which have not been surveyed for contour information or relief data are incomplete	Optional colours	GOLDEN BUFF	
		WHITE	

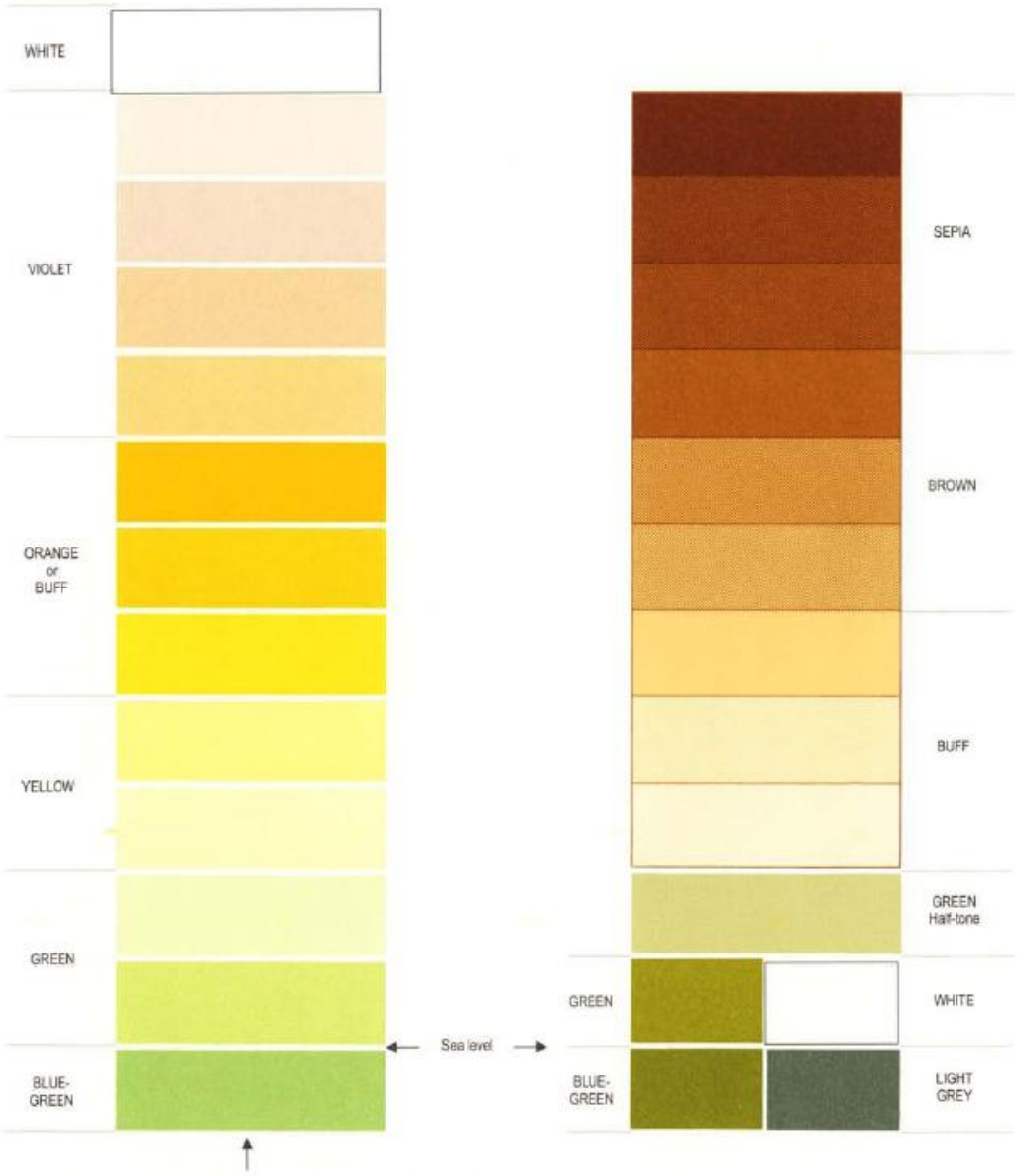
HYPSOMETRIC TINTS

	WHITE	Tint for extreme elevations		SEPIA	
	VIOLET				
	ORANGE or BUFF	Tint for higher range elevations		BROWN	
	YELLOW	Tint for middle range elevations		BUFF	
	GREEN	Tint for lower range elevations	Optional colours	GREEN	
				WHITE	
	BLUE-GREEN	Tint for areas below sea level	Optional colours	BLUE-GREEN	
				LIGHT GREY	

Note.— Basic tints are identical to those specified for the International Map of the World.

Appendix 4: Hypsometric Tint Guide

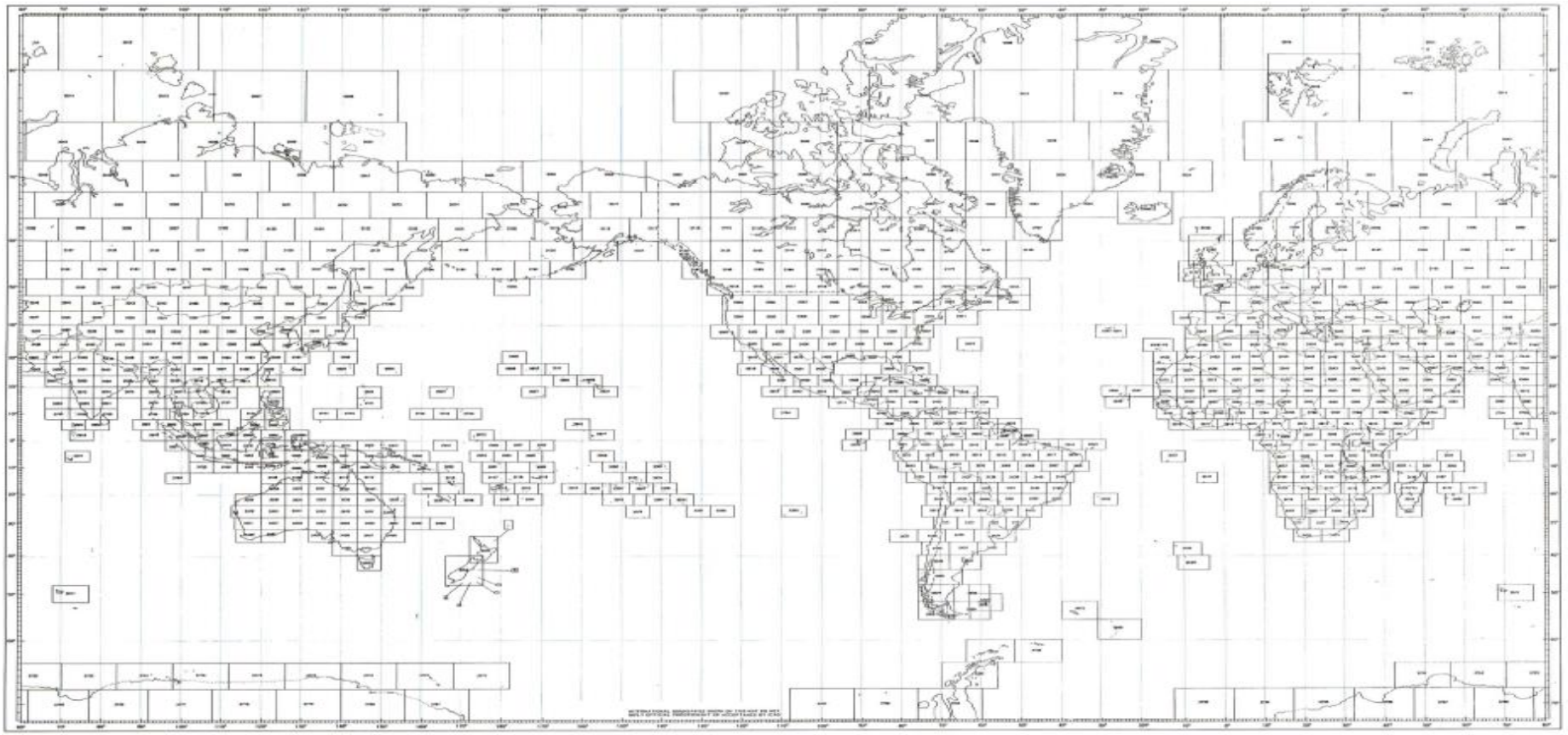
(Alternative systems, reference 2.12.2)



Note 1.— These tints are identical to those specified for the International Map of the World.

Note 2.— Elevations have not been associated with tints of either system in order to allow for flexibility in their selection.

Appendix 5: Sheet Layout of the World Aeronautical Chart – ICAO 1:1 000 000



Appendix 6: Aeronautical Data Quality Requirements

Table 1 Latitude and Longitude

LATTUDE AND LONGITUDE	CHART RESOLUTION	INTEGRITY CLASSIFICATION
Flight information region boundary points.	as plotted	**routine**
P, R, D area boundary points (outside CTA/CTZ boundaries).	as plotted	**routine**
P, R, D area boundary points (inside CTA/CTZ boundaries).	as plotted	**essential**
CTA/CTZ boundary points.	as plotted	**essential**
En-route NAV/AIDS and fixes, holding STAR/SID points.	1**sec**	**essential**
Obstacles in Area 1 (the entire State territory).	as plotted	**routine**
Aerodrome/ heliport reference point.	1 **sec**	**routine**
NAVAIDS located at the aerodrome/heliport.	as plotted	**essential**
Obstacles in Area 3.	1/10**sec**	**essential**
Obstacles in Area 2.	1/10**sec**	**essential**
Final approach fixes/points and other essential fixes/points comprising the instrument procedure.	1 sec	**essential**
Runway thresholds	1 sec	**critical**
Taxiway centre line/parking guidance line points	1/100 sec	**essential**
Runway end (flight path alignment point)	1 sec	**critical**
Runway holding position.	1 sec	**critical**
Taxiway intersection marking line.	1 sec	**essential**
Exit guidance line.	1 sec	**essential**
Apron boundaries (polygon)	1 sec	**routine**
Aircraft stand points/INS checkpoints.	1/100 sec	**routine**
Geometric centre of TLOF or FATO thresholds, heliports.	1 sec	**critical**

Table 2 Elevation/ Altitude/ Height

Elevation/altitude/height	**CHART RESOLUTION**	**INTEGRITY CLASSIFICATION**
Aerodrome/heliport elevation	1m or1ft	**essential**
WGS84 geoid undulation at aerodrome/heliport elevation position.	1m or 1ft	**essential**
Runway or FATO threshold, non-precision approaches.	1m or 1ft	**essential**
WGS-84 geoid undulation at runway or FATO threshold, TLOF geometric centre, non-precision approaches	1m or 1ft	**essential**
Runway or FATO threshold, precision approaches.	0.5m or 1ft	**critical**

WGS-84 geoid undulation at runway or FATO threshold, TLOF geometric centre, precision approaches	0.5m or 1ft	**critical**
Threshold crossing height (Reference datum height) precision approaches	0.5m or 1ft	**critical**
Obstacle clearance altitude/height (OCA/H)	As specified in PANS-OPS (Doc 8168)	**essential**
Obstacles in Area 1 (the entire state territory).	3m (10 ft)	**routine**
Obstacles in Area 2.	1m or 1ft	**essential**
Obstacles in Area 3.	1m or 1ft	**essential**
Distance measuring Equipment (DME)	30m (100ft)	**essential**
Instrument approach procedures altitude	As specified in PANS-OPS (Doc 8168)	**essential**
Minimum altitudes	50m or 100ft	**Routine**
Heliport crossing height, PinS approaches	1m or 1ft	**essential**

Table 3 Gradients and Angles

Type of gradient/angle	**Chart resolution**	**Integrity Classification**
Non-precision final approach descent gradient	0.1 per cent	critical
Final approach descent angle (Non-precision approach or approach with vertical guidance).	0.1 degree	critical
Precision approach glide path/elevation angle	0.1 degree	critical

Table 4 Magnetic Variation

Magnetic variation Chart	**Chart resolution**	**Integrity Classification**
Aerodrome/heliport magnetic variation	1 Degree	essential

Table 5 Bearing

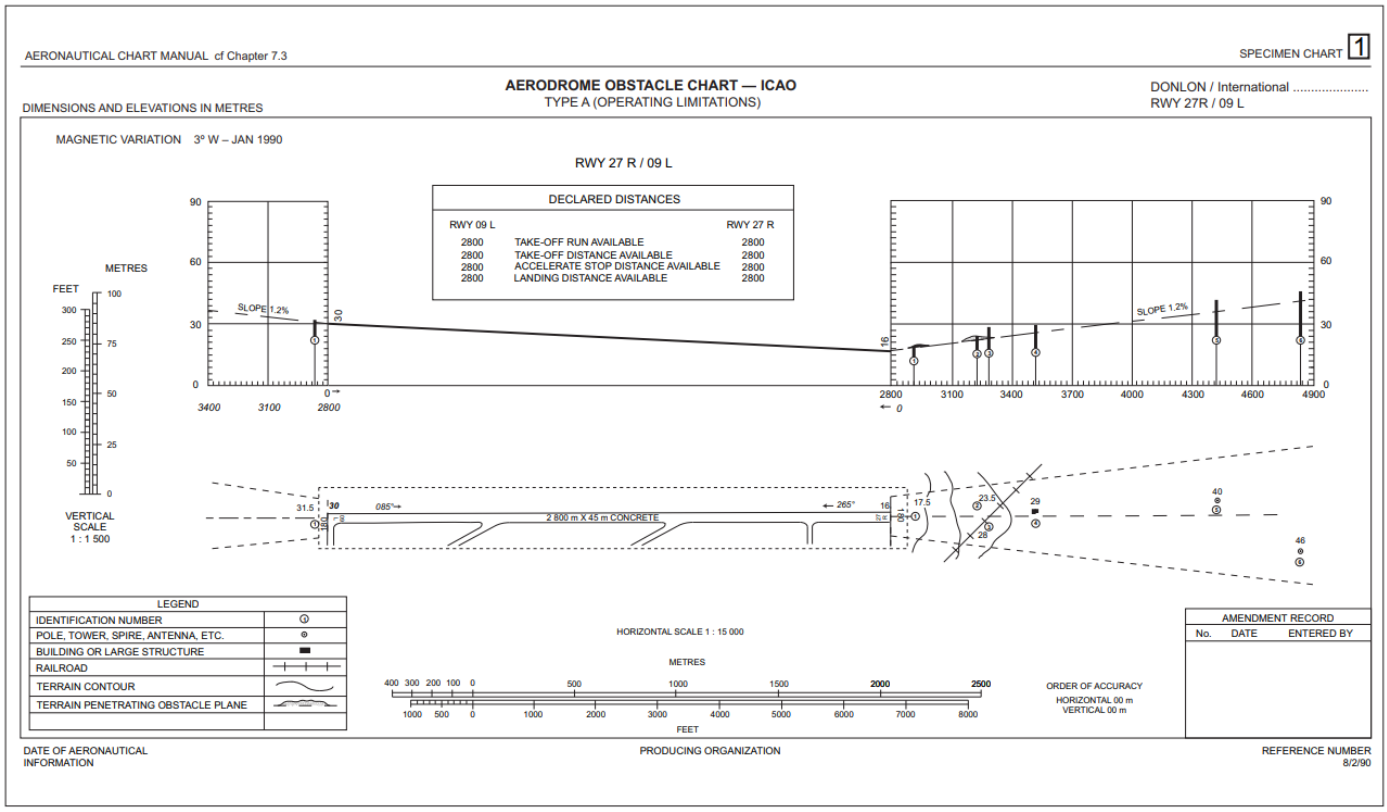
BEARING	**PUBLICATION RESOLUTION**	**INTEGRITY CLASSIFICATION**
Airway segments.	1 degree	**routine**
Bearings used for the formation of an en route and of a terminal fix	1/10 degree	**routine**
Terminal arrival/departure route segment	1 degree	**routine**
Bearings used for the formation of an instrument approach procedure fix	1/10 degree	**essential**
ILS localizer alignment	1 degree	**essential**
MLS zero azimuth alignment	1 degree	**essential**
Runway and FATO bearing	1 degree	**routine**

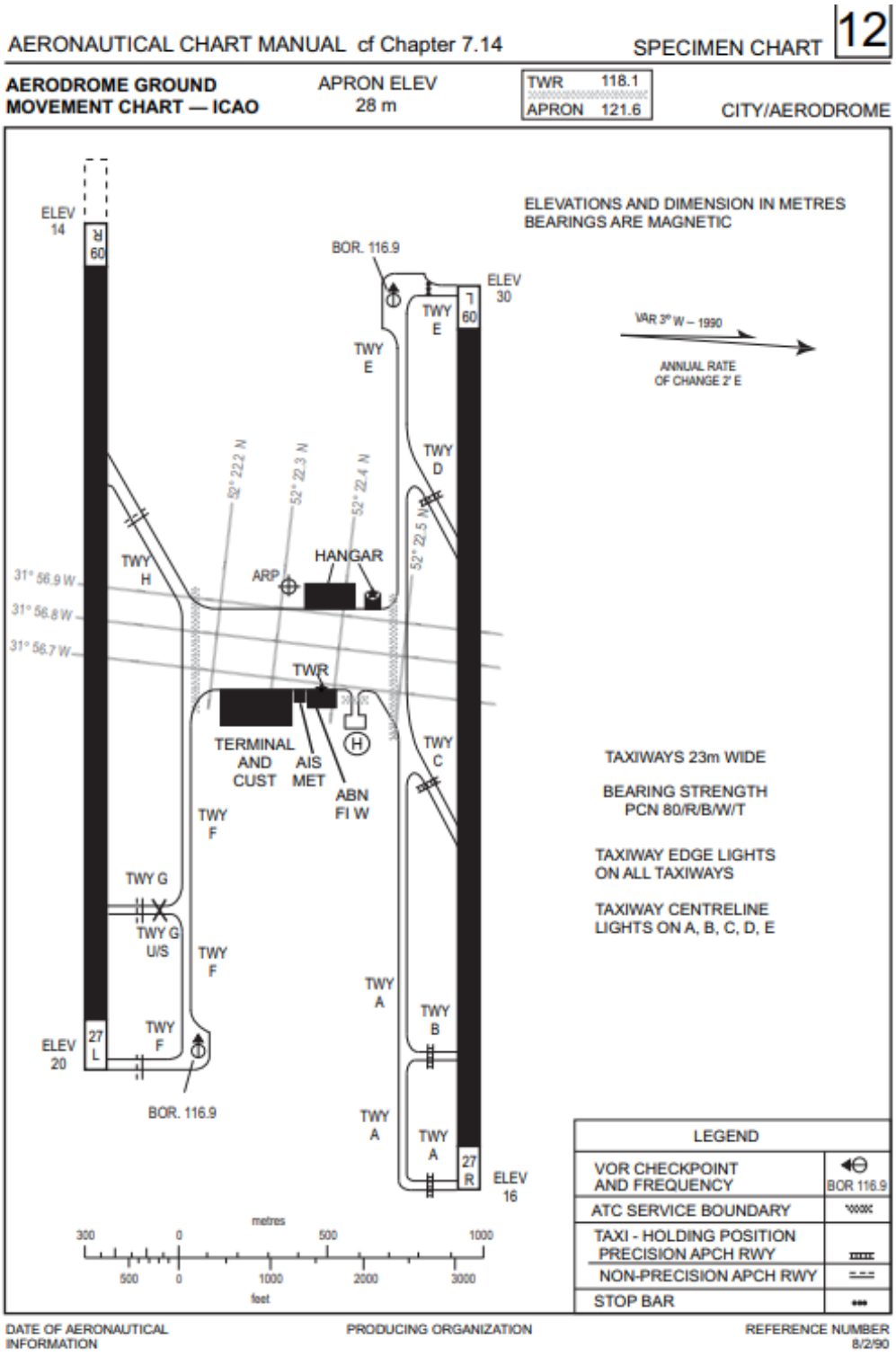
Table 6 Length / Distance / Dimension

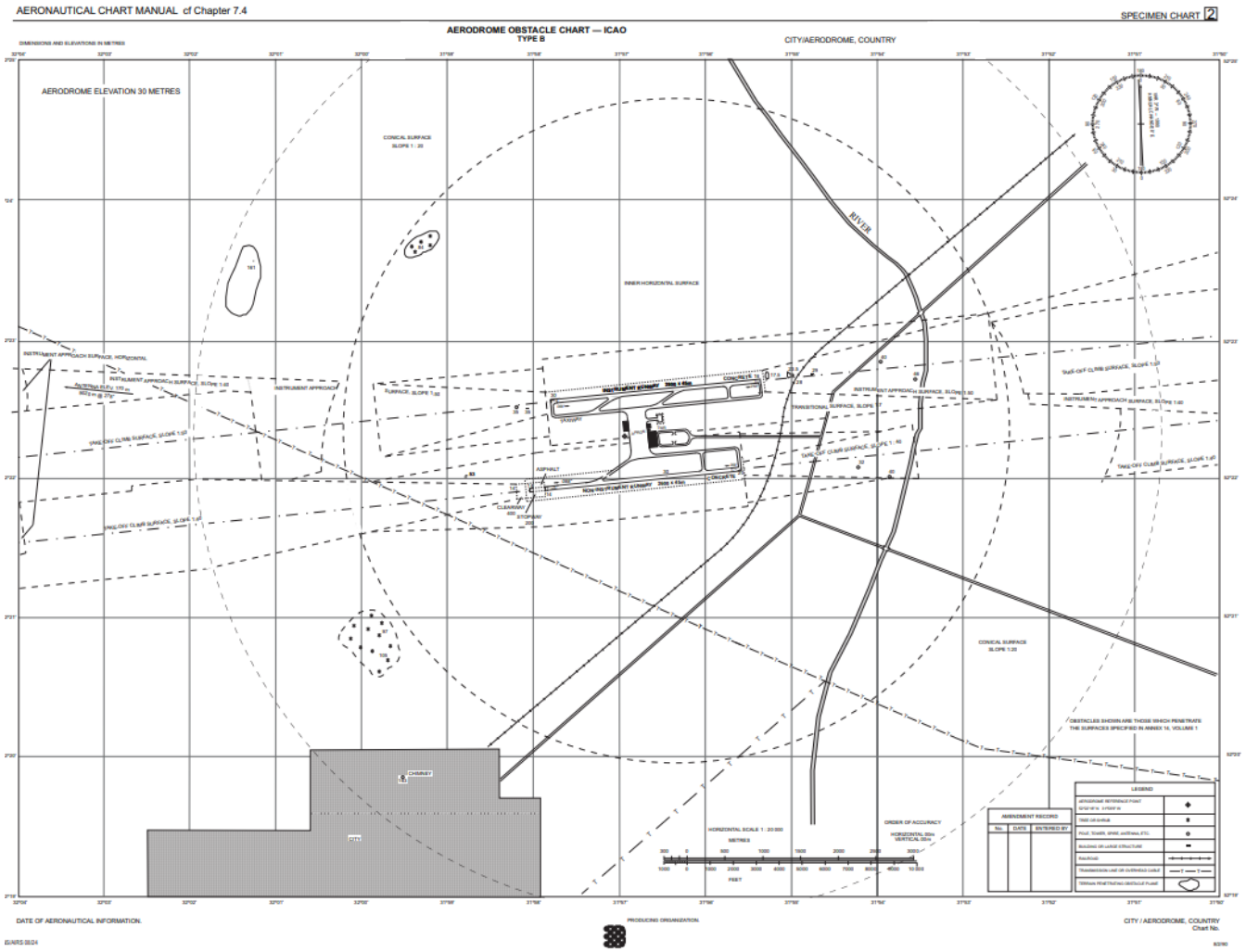
Length/distance/dimension	**Chart resolution**	**Integrity Classification**

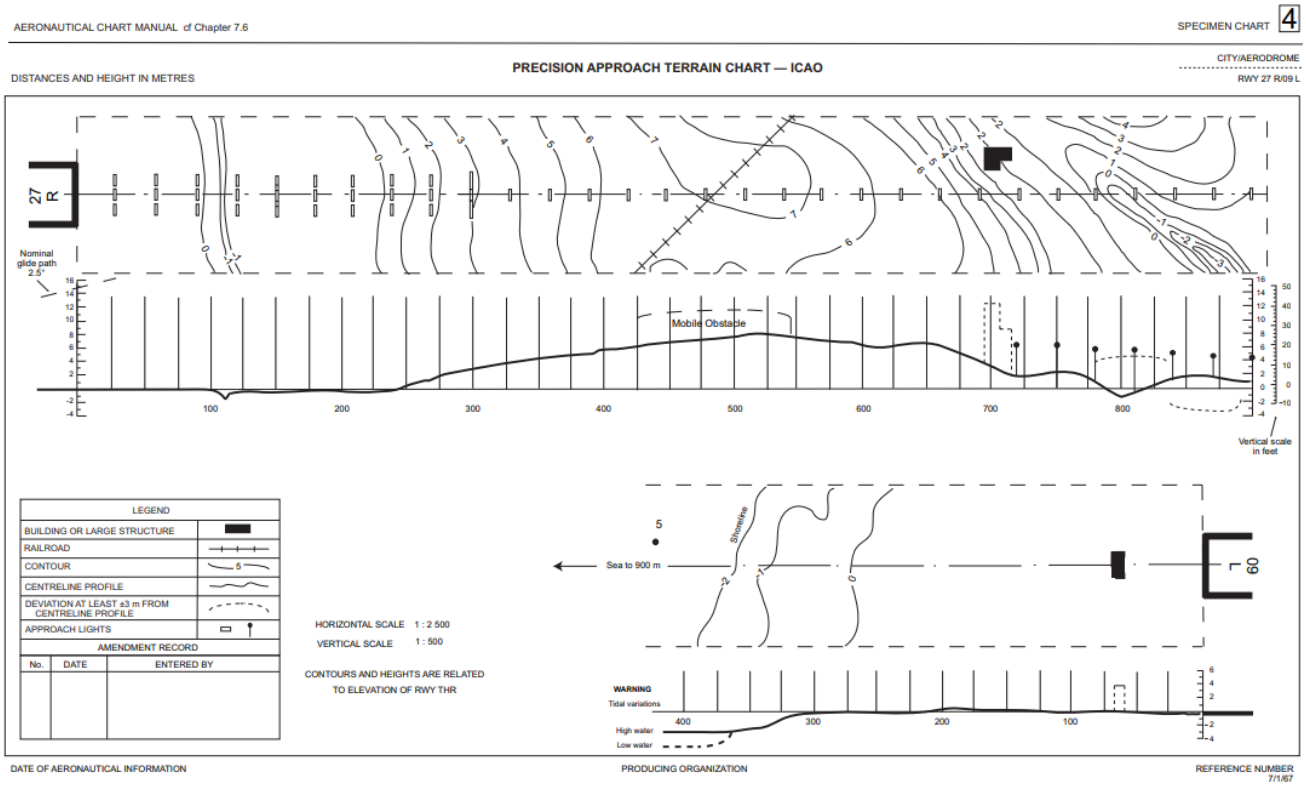
Airway segment length	1 km or 1 NM	routine
Distance used for the formation of an en route fix	2/10 km (1/10 NM)	routine
Terminal arrival/departure route segment length	1 km or 1 NM	essential
Distance used for the formation of a terminal and instrument approach procedure fix	2/10 km (1/10 NM)	essential
Runway and FATO length, TLOF dimensions	1m	critical
Runway width	1m	essential
Stop way length and width	1m	critical
Landing distance available	1m	critical
Take-off run available	1m	critical
Take-off distance available	1m	critical
Accelerate-stop distance available	1m	critical
ILS localizer antenna-runway end, distance	As plotted	routine
ILS glide slope antenna-threshold, distance along centre line	As plotted	routine
ILS marker-threshold distance	2/10 km (1/10 NM)	essential
ILS DME antenna-threshold, distance along centre line 1v□10-5 / essential	as plotted	essential
MLS azimuth antenna-runway end, distance 1 × 10-3 / routine	as plotted	routine
MLS elevation antenna-threshold, distance along centre line	as plotted	routine
MLS DME/P antenna-threshold, distance along centre line	as plotted	essential

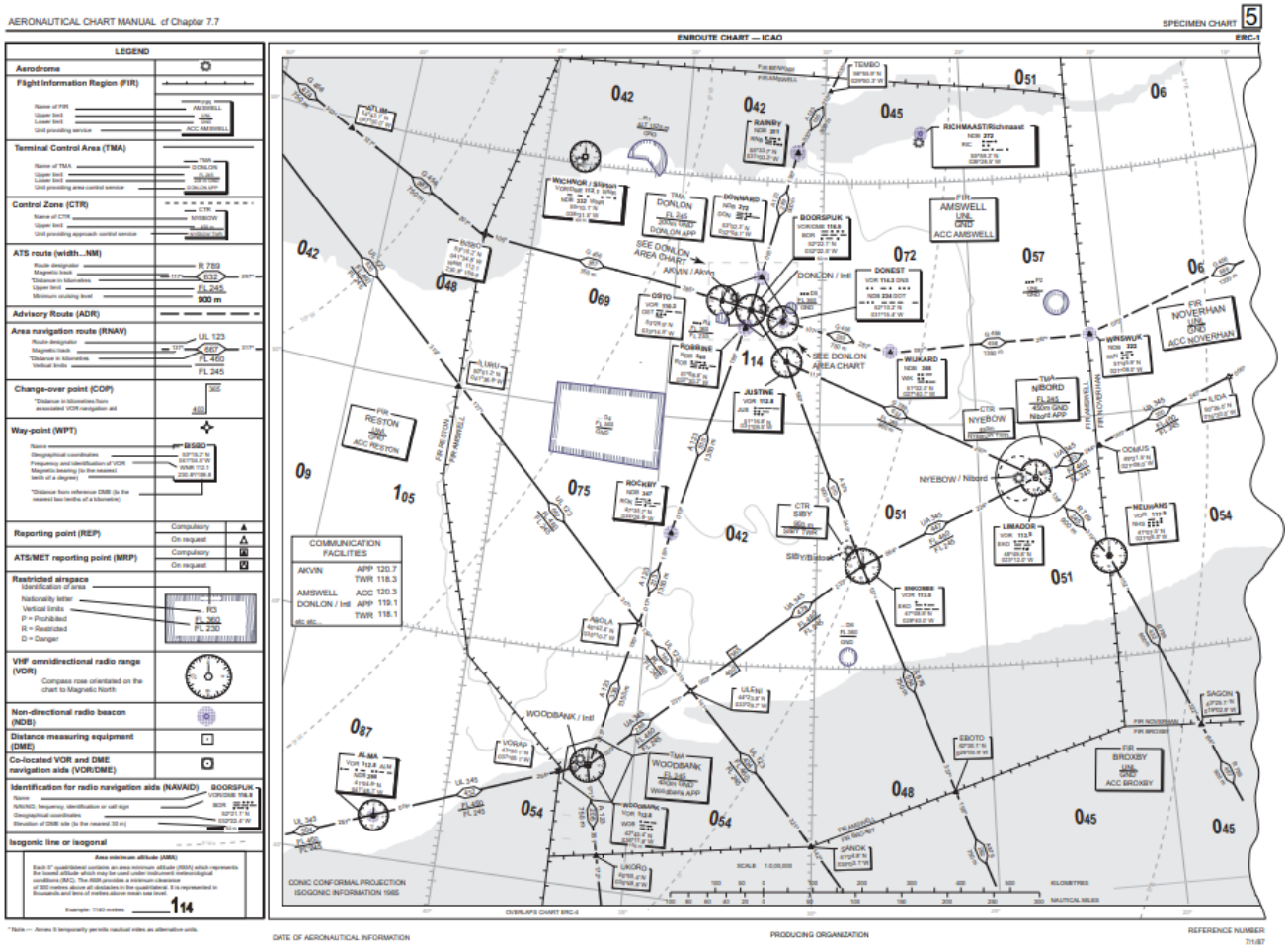
Appendix 7: Specimen of ICAO Charts

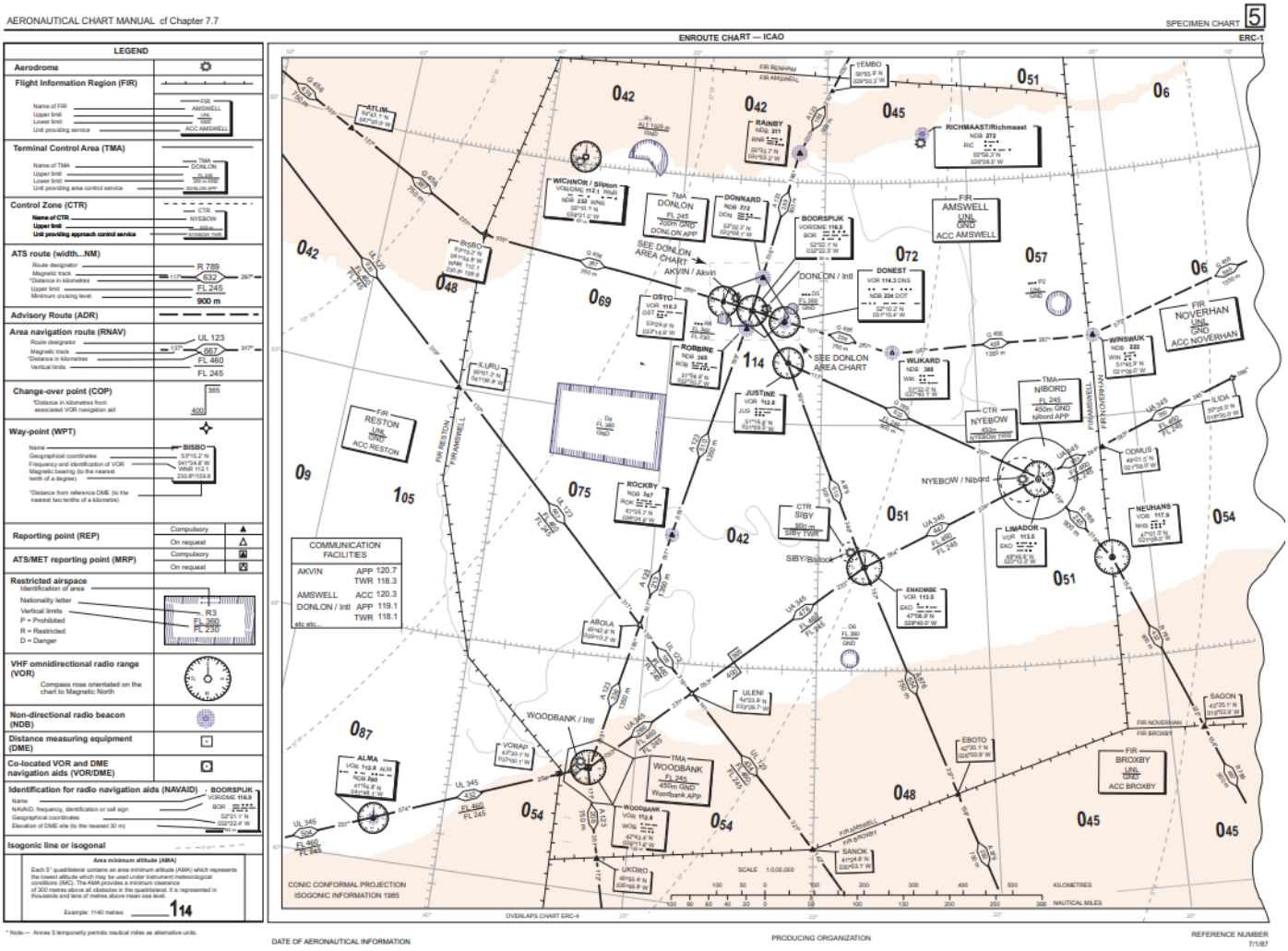



AERONAUTICAL CHART MANUAL cf Chapter 7.14
SPECIMEN CHART 12
AERODROME GROUND MOVEMENT CHART — ICAO
APRON ELEV 28 m
TWR 118.1
APRON 121.6
CITY/AERODROME
ELEVATIONS AND DIMENSION IN METRES
BEARINGS ARE MAGNETIC
VAR 3° W – 1990
ANNUAL RATE OF CHANGE 2' E
ELEV 14
ELEV 30
BOR. 116.9
TWY E
TWY D
TWY H
ARP
HANGAR
TWR
TERMINAL AND CUST
AIS MET
ABN FI W
TWY C
TWY F
TWY G
TWY G U/S
TWY A
TWY B
ELEV 20
ELEV 16
52° 22.2 N
52° 22.3 N
52° 22.4 N
52° 22.5 N
31° 56.9 W
31° 56.8 W
31° 56.7 W
TAXIWAYS 23m WIDE
BEARING STRENGTH PCN 80/R/B/W/T
TAXIWAY EDGE LIGHTS ON ALL TAXIWAYS
TAXIWAY CENTRELINE LIGHTS ON A, B, C, D, E
LEGEND
VOR CHECKPOINT AND FREQUENCY
ATC SERVICE BOUNDARY
TAXI - HOLDING POSITION PRECISION APCH RWY
NON-PRECISION APCH RWY
STOP BAR
metres
feet
DATE OF AERONAUTICAL INFORMATION
PRODUCING ORGANIZATION
REFERENCE NUMBER 8/2/90


AERONAUTICAL CHART MANUAL cf Chapter 7.4
SPECIMEN CHART 2
AERODROME OBSTACLE CHART — ICAO
TYPE B
CITY/AERODROME, COUNTRY
AERODROME ELEVATION 30 METRES
RIVER
CONICAL SURFACE
SLOPE 1 : 20
INNER HORIZONTAL SURFACE
TRANSITIONAL SURFACE, SLOPE 1:7
CONICAL SURFACE
SLOPE 1:20
OBSTACLES SHOWN ARE THOSE WHICH PENETRATE THE SURFACES SPECIFIED IN ANNEX 14, VOLUME I
LEGEND
AMENDMENT RECORD
No.
DATE
ENTERED BY
HORIZONTAL SCALE 1 : 20 000
METRES
FEET
ORDER OF ACCURACY
DATE OF AERONAUTICAL INFORMATION.
PRODUCING ORGANIZATION
CITY / AERODROME, COUNTRY
Chart No.


AERONAUTICAL CHART MANUAL cf Chapter 7.6
SPECIMEN CHART 4
DISTANCES AND HEIGHT IN METRES
PRECISION APPROACH TERRAIN CHART — ICAO
CITY/AERODROME
RWY 27 R/09 L
27 R
Nominal glide path 2.5°
Mobile Obstacle
Vertical scale in feet
LEGEND
BUILDING OR LARGE STRUCTURE
RAILROAD
CONTOUR
CENTRELINE PROFILE
DEVIATION AT LEAST ±3 m FROM CENTRELINE PROFILE
APPROACH LIGHTS
AMENDMENT RECORD
No.
DATE
ENTERED BY
HORIZONTAL SCALE 1 : 2 500
VERTICAL SCALE 1 : 500
CONTOURS AND HEIGHTS ARE RELATED TO ELEVATION OF RWY THR
Sea to 900 m
Shoreline
09 L
WARNING
Tidal variations
High water
Low water
DATE OF AERONAUTICAL INFORMATION
PRODUCING ORGANIZATION
REFERENCE NUMBER
7/1/67


AERONAUTICAL CHART MANUAL cf Chapter 7.7
ENROUTE CHART — ICAO
SPECIMEN CHART 5
ERC-1
LEGEND
Aerodrome
Flight Information Region (FIR)
Terminal Control Area (TMA)
Control Zone (CTR)
ATS route (width...NM)
Advisory Route (ADR)
Area navigation route (RNAV)
Change-over point (COP)
Way-point (WPT)
Reporting point (REP)
ATS/MET reporting point (MRP)
Restricted airspace
VHF omnidirectional radio range (VOR)
Non-directional radio beacon (NDB)
Distance measuring equipment (DME)
Co-located VOR and DME navigation aids (VOR/DME)
Identification for radio navigation aids (NAVAID)
Isogonic line or isogonal
COMMUNICATION FACILITIES
AKVIN APP 120.7
TWR 118.3
AMSWELL ACC 120.3
DONLON / Intl APP 119.1
TWR 118.1
DONLON
AMSWELL
ACC AMSWELL
RESTON
ACC RESTON
NOVERHAN
ACC NOVERHAN
NYEBOW
NYEBOW / Nibord
WOODBANK / Intl
BROXBY
ACC BROXBY
CONIC CONFORMAL PROJECTION
ISOGONIC INFORMATION 1985
DATE OF AERONAUTICAL INFORMATION
PRODUCING ORGANIZATION
REFERENCE NUMBER


AERONAUTICAL CHART MANUAL cf Chapter 7.7
ENROUTE CHART — ICAO
SPECIMEN CHART 5
ERC-1
LEGEND
Aerodrome
Flight Information Region (FIR)
Terminal Control Area (TMA)
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ATS route (width...NM)
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Change-over point (COP)
Way-point (WPT)
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Restricted airspace
VHF omnidirectional radio range (VOR)
Non-directional radio beacon (NDB)
Distance measuring equipment (DME)
Co-located VOR and DME navigation aids (VOR/DME)
Identification for radio navigation aids (NAVAID)
Isogonic line or isogonal
Area minimum altitude (AMA)
COMMUNICATION FACILITIES
AKVIN APP 120.7 TWR 118.3
AMSWELL ACC 120.3
DONLON / Intl APP 119.1 TWR 118.1
SEE DONLON AREA CHART
NYEBOW / Nbord
SIBY/Bisbok
WOODBANK / Ind
CONIC CONFORMAL PROJECTION
ISOGONIC INFORMATION 1985
SCALE 1:10,000,000
KILOMETRES
NAUTICAL MILES
OVERLAPS CHART ERC-4
DATE OF AERONAUTICAL INFORMATION
PRODUCING ORGANIZATION
REFERENCE NUMBER

AERONAUTICAL CHART MANUAL of Chapter 7.8

SPECIMEN CHART 6

AREA CHART — ICAO

TMA DONLON

LEGEND		
CONTROL AREA	(TMA) (AWY)	
ADVISORY ROUTE	(ADR)	
CONTROL ZONE	(CTR)	
REPORTING POINT	(Compulsory)	▲
DEPARTURE/ARRIVAL ROUTING		DON 2A
DISTANCE IN KILOMETRES		57
MINIMUM FLIGHT ALTITUDE		1 500 m
MAGNETIC BEARING		340°
RADIO NAVIGATION AID — NAME		BOORSPIJK
NAVAID TYPE AND FREQUENCY		VOR/DME 116.9
IDENTIFICATION		BOR
COORDINATES		52°22'06" N 032°22'30" W
ELEVATION OF DME ANTENNA		60 m

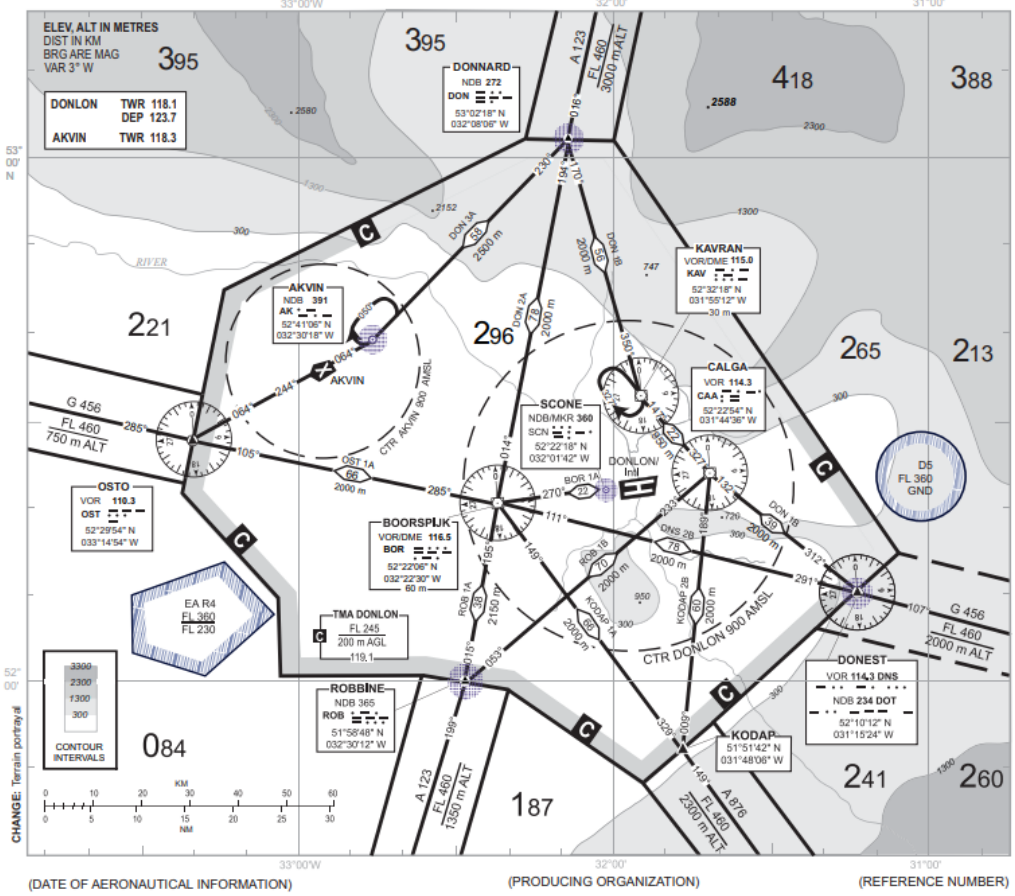
Area minimum altitude (AMA)

Each 1° quadrilateral contains an area minimum altitude (AMA) which represents the lowest altitude which may be used under instrument meteorological conditions (IMC). The AMA provides a minimum clearance of 300 metres (600 m in mountainous areas) above all obstacles in the quadrilateral. It is represented in thousands and tens of metres above mean sea level.

Example: 1140 metres 114

COM FAILURE

Set transponder code 7600
Maintain last assigned speed and LVL, or MNM FLT ALT, if higher for 7 MIN following time of:
a) reaching last assigned LVL or MNM FLT ALT; or
b) setting transponder code 7600; or
c) failure to REP over compulsory REP; whichever is later.
Thereafter adjust LVL and speed according to FPL.



(DATE OF AERONAUTICAL INFORMATION) (PRODUCING ORGANIZATION) (REFERENCE NUMBER)

AERONAUTICAL CHART MANUAL cf Chapter 7.8 SPECIMEN CHART

LEGEND	
CONTROL AREA (TMA) (AWY)	
ADVISORY ROUTE (ADR)	
CONTROL ZONE (CTR)	
REPORTING POINT (Compulsory)	▲
DEPARTURE/ARRIVAL ROUTING	DON 2A
DISTANCE IN KILOMETRES	57
MINIMUM FLIGHT ALTITUDE	1 500 m
MAGNETIC BEARING	340°
RADIO NAVIGATION AID — NAME	BOORSPIJK
NAVAID TYPE AND FREQUENCY	VOR/DME 116.9
IDENTIFICATION	BOR
COORDINATES	52°22'06" N 032°22'30" W
ELEVATION OF DME ANTENNA	60 m

Area minimum altitude (AMA)

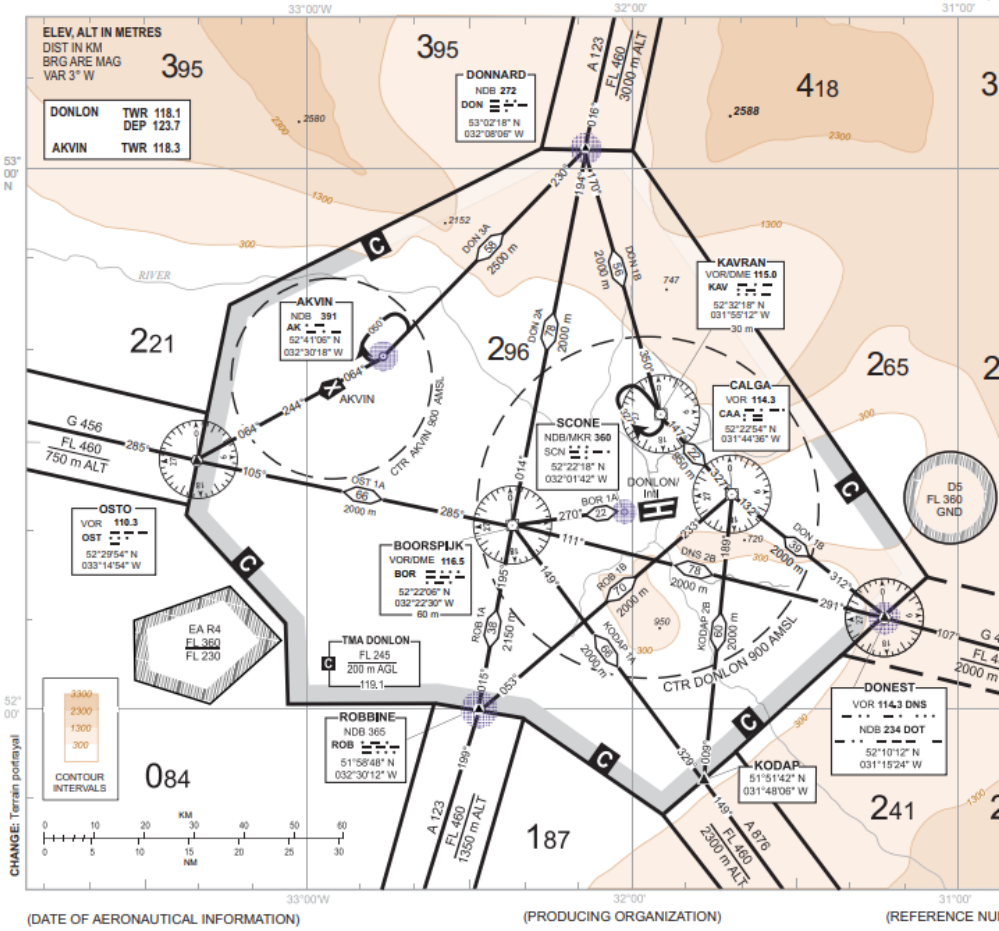
Each 1° quadrilateral contains an area minimum altitude (AMA) which represents the lowest altitude which may be used under instrument meteorological conditions (IMC). The AMA provides a minimum clearance of 300 metres (600 m in mountainous areas) above all obstacles in the quadrilateral. It is represented in thousands and tens of metres above mean sea level.

Example: 1140 metres 114

COM FAILURE

Set transponder code 7600
Maintain last assigned speed and LVL, or MNM FLT ALT, if higher for 7 MIN following time of:
a) reaching last assigned LVL or MNM FLT ALT; or
b) setting transponder code 7600; or
c) failure to REP over compulsory REP; whichever is later.
Thereafter adjust LVL and speed according to FPL.

AREA CHART — ICAO



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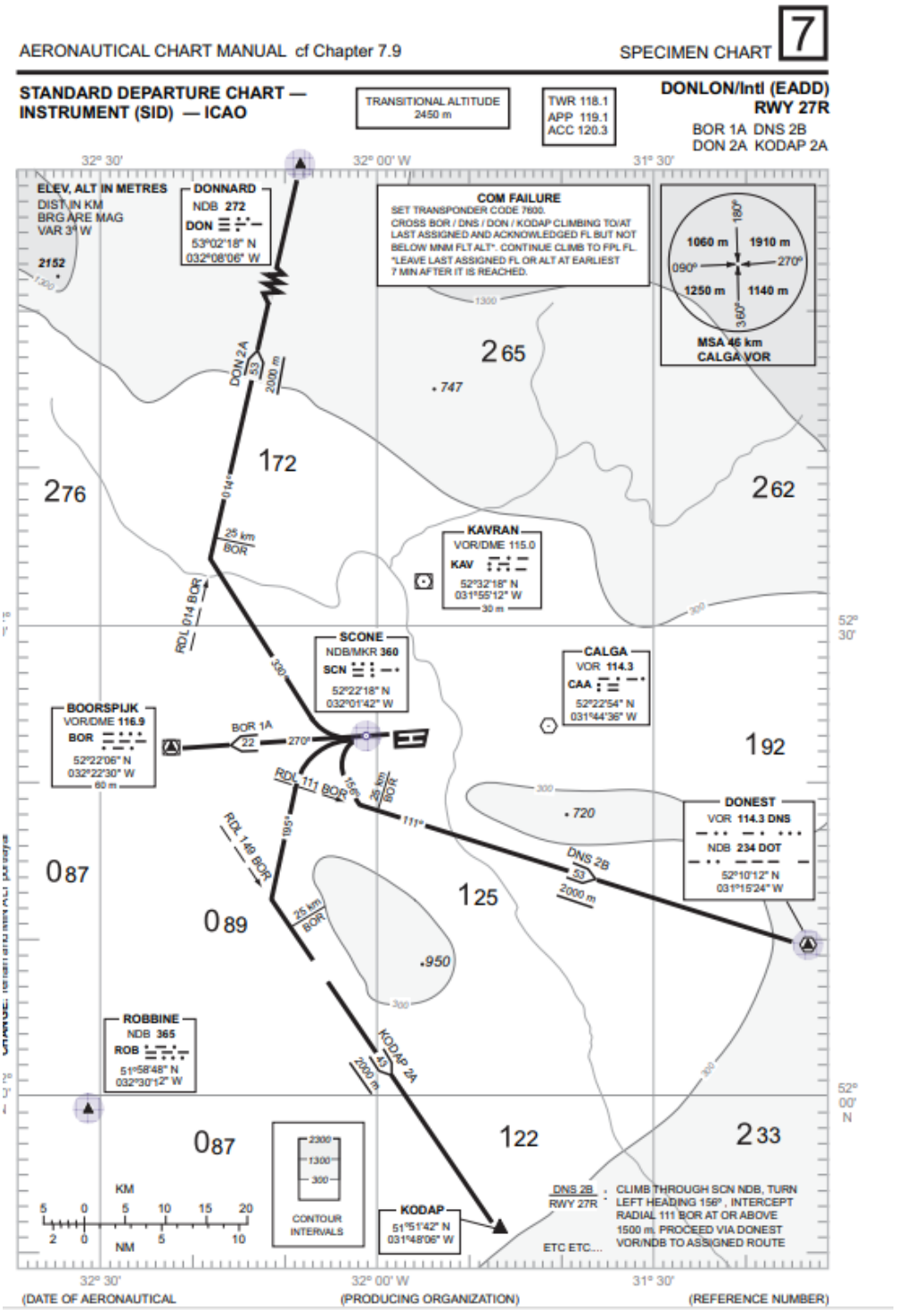
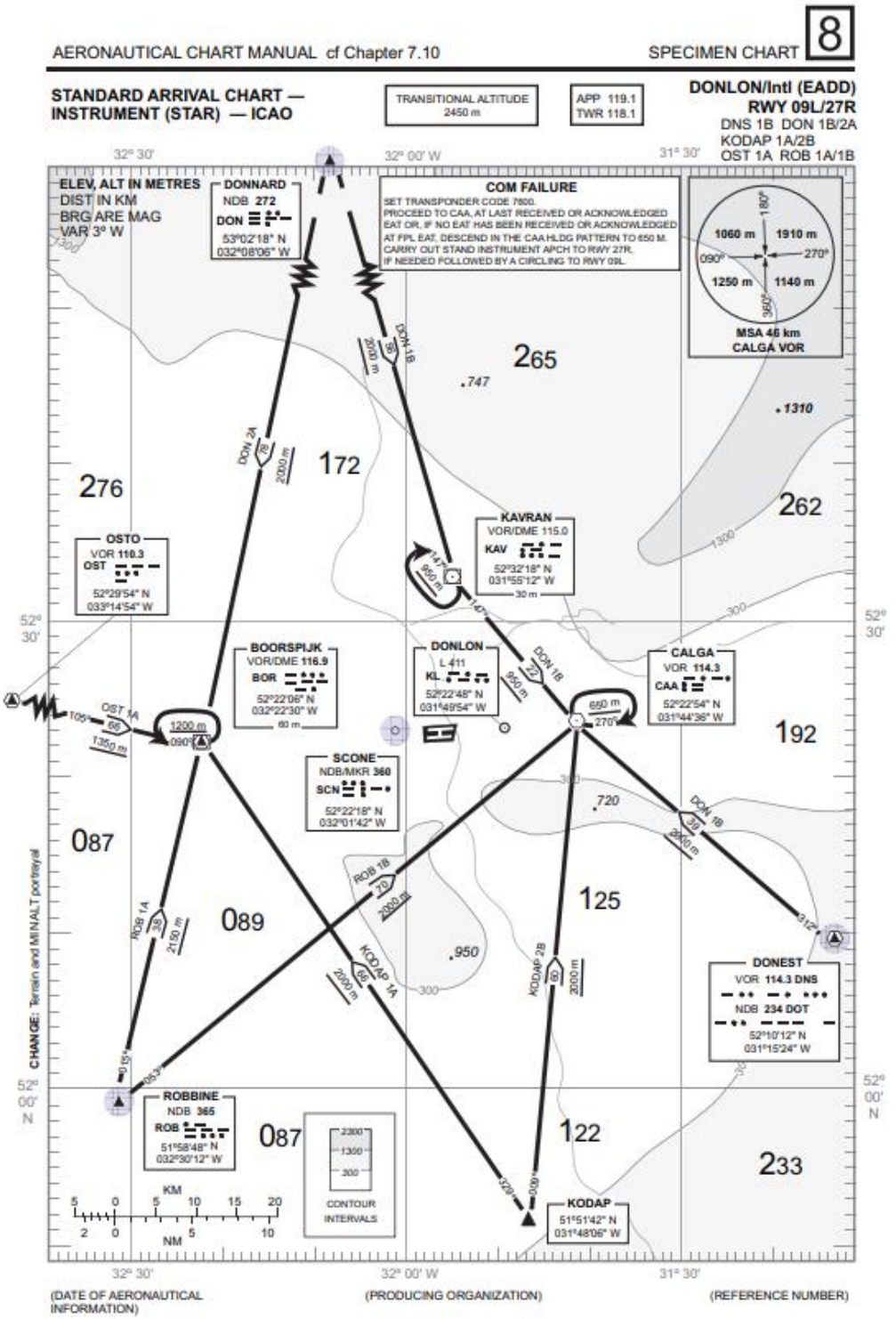
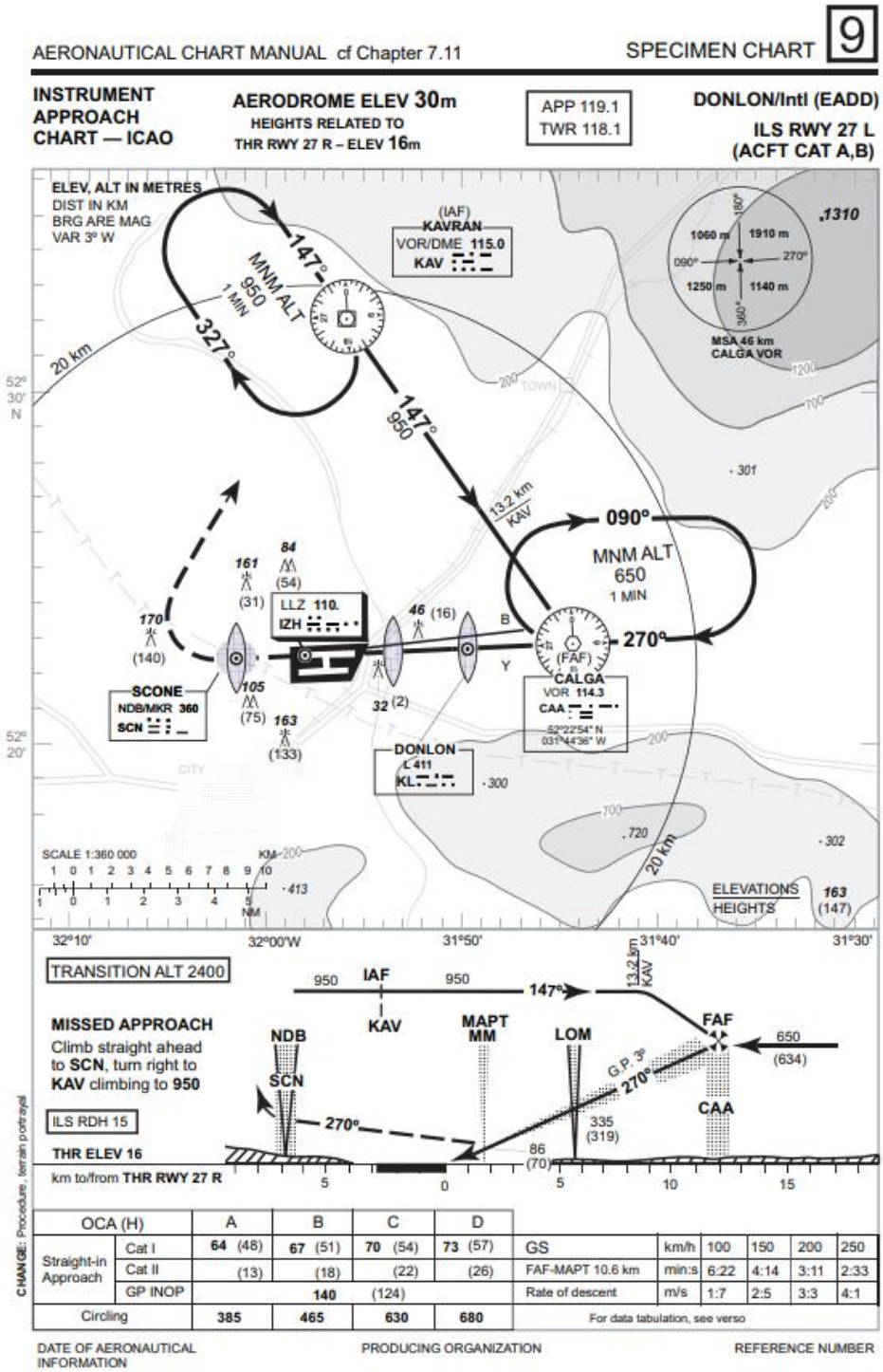
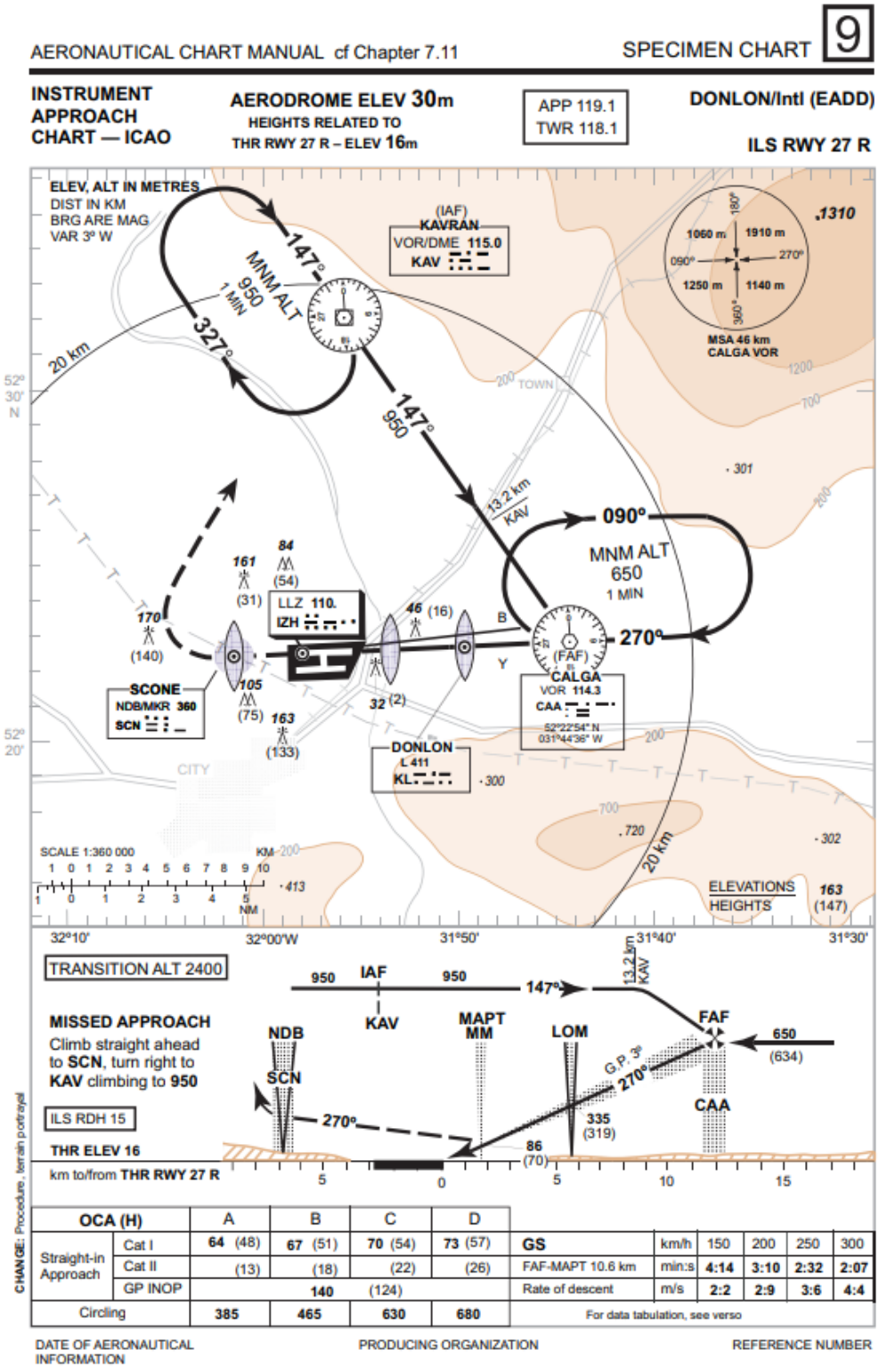

AERONAUTICAL CHART MANUAL cf Chapter 7.9
SPECIMEN CHART 7
STANDARD DEPARTURE CHART — INSTRUMENT (SID) — ICAO
TRANSITIONAL ALTITUDE 2450 m
TWR 118.1
APP 119.1
ACC 120.3
DONLON/Intl (EADD)
RWY 27R
BOR 1A DNS 2B
DON 2A KODAP 2A
ELEV, ALT IN METRES
DIST IN KM
BRG ARE MAG
VAR 3° W
DONNARD
NDB 272
DON
53°02'18" N
032°08'06" W
COM FAILURE
SET TRANSPONDER CODE 7600.
CROSS BOR / DNS / DON / KODAP CLIMBING TO/AT LAST ASSIGNED AND ACKNOWLEDGED FL BUT NOT BELOW MNM FLT ALT*. CONTINUE CLIMB TO FPL FL.
*LEAVE LAST ASSIGNED FL OR ALT AT EARLIEST 7 MIN AFTER IT IS REACHED.
1060 m
1910 m
1250 m
1140 m
MSA 46 km
CALGA VOR
DON 2A
KAVRAN
VOR/DME 115.0
KAV
52°32'18" N
031°55'12" W
SCONE
NDB/MKR 360
SCN
52°22'18" N
032°01'42" W
CALGA
VOR 114.3
CAA
52°22'54" N
031°44'36" W
BOORSPIJK
VOR/DME 116.9
BOR
52°22'06" N
032°22'30" W
BOR 1A
RDL 014 BOR
RDL 111 BOR
RDL 149 BOR
DONEST
VOR 114.3 DNS
NDB 234 DOT
52°10'12" N
031°15'24" W
DNS 2B
KODAP 2A
ROBBINE
NDB 365
ROB
51°58'48" N
032°30'12" W
KODAP
51°51'42" N
031°48'06" W
CONTOUR INTERVALS
DNS 2B RWY 27R
CLIMB THROUGH SCN NDB, TURN LEFT HEADING 156°, INTERCEPT RADIAL 111 BOR AT OR ABOVE 1500 m, PROCEED VIA DONEST VOR/NDB TO ASSIGNED ROUTE
ETC ETC...
(DATE OF AERONAUTICAL
(PRODUCING ORGANIZATION)
(REFERENCE NUMBER)


AERONAUTICAL CHART MANUAL cf Chapter 7.10
SPECIMEN CHART 8
STANDARD ARRIVAL CHART — INSTRUMENT (STAR) — ICAO
TRANSITIONAL ALTITUDE 2450 m
APP 119.1
TWR 118.1
DONLON/Intl (EADD)
RWY 09L/27R
DNS 1B DON 1B/2A
KODAP 1A/2B
OST 1A ROB 1A/1B
ELEV, ALT IN METRES
DIST IN KM
BRG ARE MAG
VAR 3° W
DONNARD
NDB 272
DON
53°02'18" N
032°08'06" W
COM FAILURE
SET TRANSPONDER CODE 7600.
PROCEED TO CAA, AT LAST RECEIVED OR ACKNOWLEDGED EAT OR, IF NO EAT HAS BEEN RECEIVED OR ACKNOWLEDGED AT FPL EAT, DESCEND IN THE CAA HLDG PATTERN TO 650 M.
CARRY OUT STAND INSTRUMENT APCH TO RWY 27R.
IF NEEDED FOLLOWED BY A CIRCLING TO RWY 09L.
1060 m
1910 m
1250 m
1140 m
MSA 46 km
CALGA VOR
OSTO
VOR 110.3
OST
52°29'54" N
033°14'54" W
KAVRAN
VOR/DME 115.0
KAV
52°32'18" N
031°55'12" W
BOORSPIJK
VOR/DME 116.9
BOR
52°22'06" N
032°22'30" W
DONLON
L 411
KL
52°22'48" N
031°49'54" W
CALGA
VOR 114.3
CAA
52°22'54" N
031°44'36" W
SCONE
NDB/MKR 360
SCN
52°22'18" N
032°01'42" W
DONEST
VOR 114.3 DNS
NDB 234 DOT
52°10'12" N
031°15'24" W
ROBBINE
NDB 365
ROB
51°58'48" N
032°30'12" W
KODAP
51°51'42" N
031°48'06" W
CONTOUR INTERVALS
CHANGE: Terrain and MINALT portrayal
265
276
172
262
192
087
089
125
122
233
.747
.1310
.720
.950
32° 30'
32° 00' W
31° 30'
52° 30'
52° 00' N
(DATE OF AERONAUTICAL INFORMATION)
(PRODUCING ORGANIZATION)
(REFERENCE NUMBER)


AERONAUTICAL CHART MANUAL cf Chapter 7.11
SPECIMEN CHART 9
INSTRUMENT APPROACH CHART — ICAO
AERODROME ELEV 30m
HEIGHTS RELATED TO THR RWY 27 R – ELEV 16m
APP 119.1
TWR 118.1
DONLON/Intl (EADD)
ILS RWY 27 L
(ACFT CAT A,B)
ELEV, ALT IN METRES
DIST IN KM
BRG ARE MAG
VAR 3° W
(IAF)
KAVRAN
VOR/DME 115.0
KAV
MNM ALT 950
1 MIN
147°
327°
20 km
147°
950
13.2 km
KAV
090°
MNM ALT
650
1 MIN
270°
(FAF)
CALGA
VOR 114.3
CAA
SCONE
NDB/MKR 360
SCN
LLZ 110.
IZH
DONLON
411
KL
1060 m
1910 m
1250 m
1140 m
MSA 46 km
CALGA VOR
ELEVATIONS
HEIGHTS
163
(147)
SCALE 1:360 000
32°10'
32°00'W
31°50'
31°40'
31°30'
TRANSITION ALT 2400
MISSED APPROACH
Climb straight ahead to SCN, turn right to KAV climbing to 950
ILS RDH 15
THR ELEV 16
km to/from THR RWY 27 R
950
IAF
KAV
MAPT
MM
NDB
SCN
LOM
FAF
650
(634)
G.P. 3°
270°
CAA
335
(319)
86
(70)
CHANGE: Procedure, terrain portrayal
OCA (H)
A
B
C
D
Straight-in Approach
Cat I
64 (48)
67 (51)
70 (54)
73 (57)
Cat II
(13)
(18)
(22)
(26)
GP INOP
140
(124)
Circling
385
465
630
680
GS
km/h
100
150
200
250
FAF-MAPT 10.6 km
min:s
6:22
4:14
3:11
2:33
Rate of descent
m/s
1:7
2:5
3:3
4:1
For data tabulation, see verso
DATE OF AERONAUTICAL INFORMATION
PRODUCING ORGANIZATION
REFERENCE NUMBER


AERONAUTICAL CHART MANUAL cf Chapter 7.11
SPECIMEN CHART 9
INSTRUMENT APPROACH CHART — ICAO
AERODROME ELEV 30m
HEIGHTS RELATED TO THR RWY 27 R – ELEV 16m
APP 119.1
TWR 118.1
DONLON/Intl (EADD)
ILS RWY 27 R
ELEV, ALT IN METRES
DIST IN KM
BRG ARE MAG
VAR 3° W
(IAF)
KAVRAN
VOR/DME 115.0
KAV
MNM ALT 950 1 MIN
147°
327°
20 km
147°
950
13.2 km KAV
090°
MNM ALT 650 1 MIN
270°
MSA 46 km
CALGA VOR
1060 m
1910 m
1250 m
1140 m
LLZ 110.
IZH
SCONE
NDB/MKR 360
SCN
(FAF)
CALGA
VOR 114.3
CAA
52°22'54" N
031°44'36" W
DONLON
L 411
KL
CITY
TOWN
SCALE 1:360 000
ELEVATIONS
HEIGHTS
32°10'
32°00'W
31°50'
31°40'
31°30'
52° 30' N
52° 20'
TRANSITION ALT 2400
MISSED APPROACH
Climb straight ahead to SCN, turn right to KAV climbing to 950
ILS RDH 15
THR ELEV 16
km to/from THR RWY 27 R
950
IAF
KAV
MAPT
MM
NDB
SCN
LOM
FAF
650
(634)
G.P. 3°
270°
CAA
335
(319)
86
(70)
OCA (H)
A
B
C
D
Straight-in Approach
Cat I
64 (48)
67 (51)
70 (54)
73 (57)
Cat II
(13)
(18)
(22)
(26)
GP INOP
140
(124)
Circling
385
465
630
680
GS
km/h
150
200
250
300
FAF-MAPT 10.6 km
min:s
4:14
3:10
2:32
2:07
Rate of descent
m/s
2:2
2:9
3:6
4:4
For data tabulation, see verso
CHANGE: Procedure, terrain portrayal
DATE OF AERONAUTICAL INFORMATION
PRODUCING ORGANIZATION
REFERENCE NUMBER

9 SPECIMEN CHART AERONAUTICAL CHART MANUAL cf Chapter 7.11

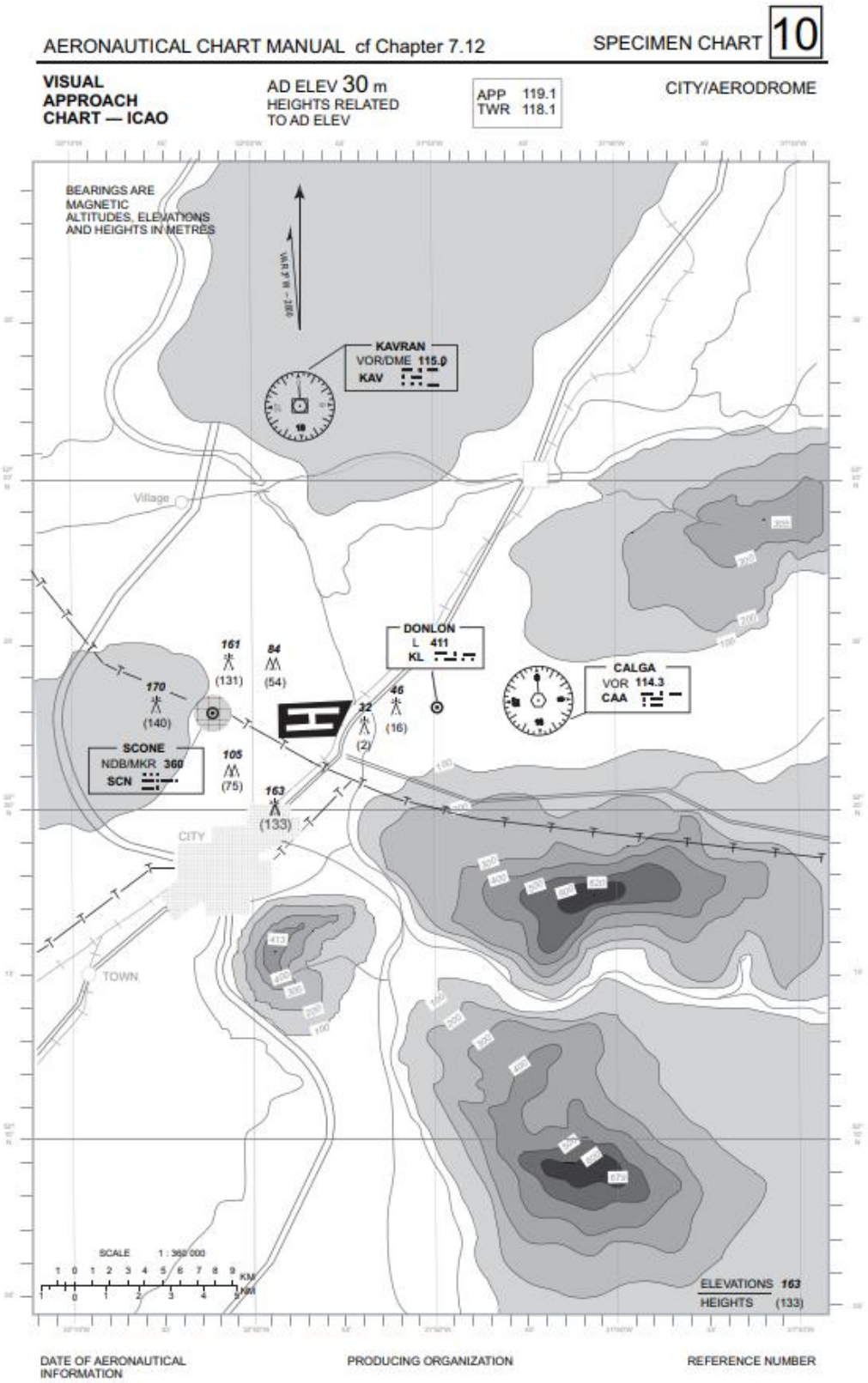
DONLON/Intl (EADD)

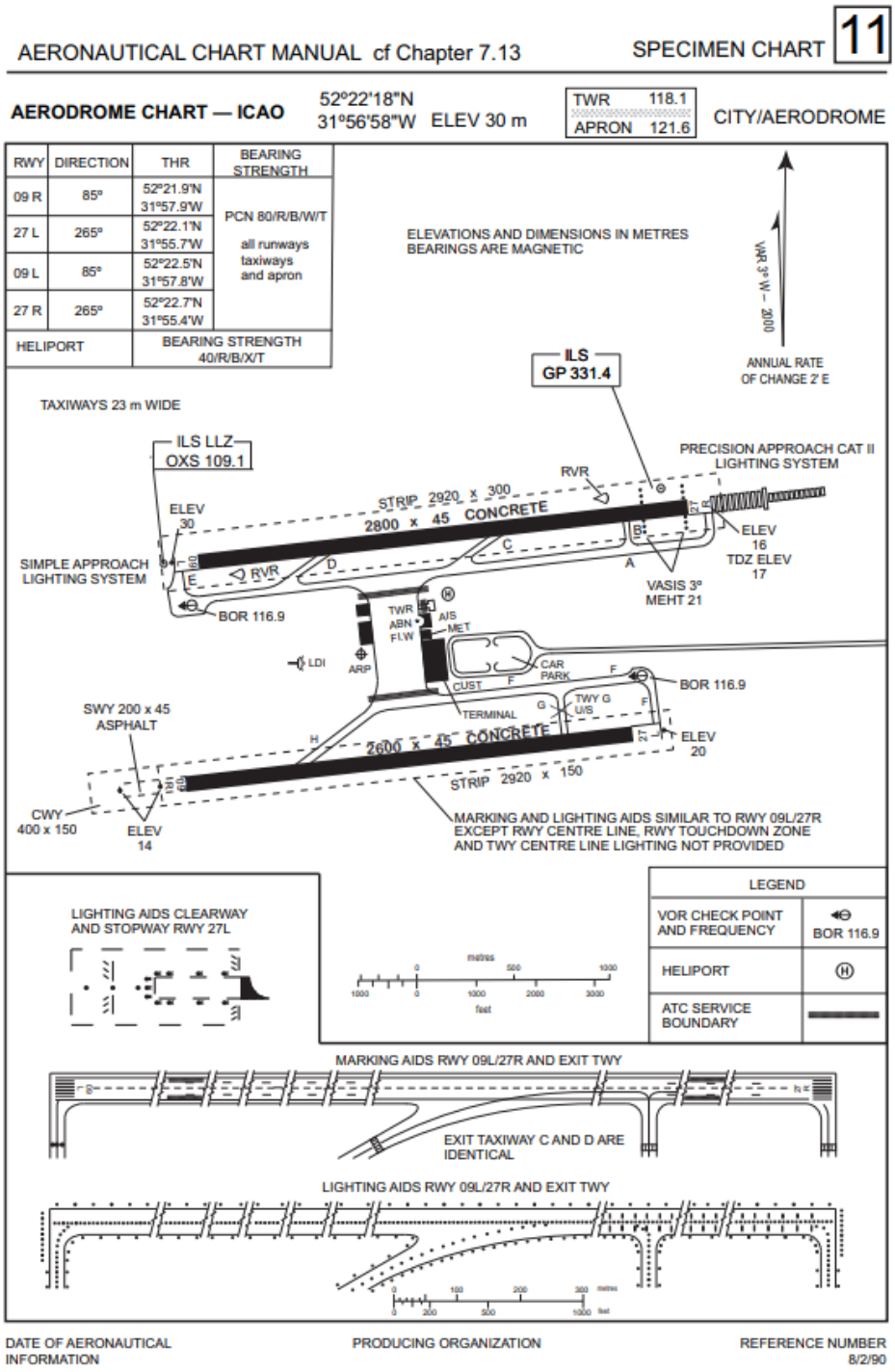
ILS RWY 27 R

AERONAUTICAL DATA TABULATION

ILS approach to RWY 27R from KAV VOR/DME	
Fix/point	**Coordinates**
KAV VOR/DME (IAF)	52° 32'18.1"N 031°55'12.3"W
13.2 D KAV – BRG 147.05°/13.20 km KAV	52° 26'12.3"N 031°48'55.1"W
CAA VOR (FAF)	52° 22'54.2"N 031°44'36.1"W
KL L	52° 22'49.4"N 031°44'36.8"W
MM (MAPT) – BRG 270.03°/10.61 km CAA	52° 22'41.7"N 031°53'36.4"W
THR RWY 27R	52° 22'38.91"N 031°55'27.29"W
IZH LLZ	52° 22'38.0"N 031°58'00.9"W
SCN NDB/MKR	52° 22'22.4"N 031°01'40.2"W

DATE OF AERONAUTICAL INFORMATION | PRODUCING ORGANIZATION | REFERENCE NUMBER


AERONAUTICAL CHART MANUAL cf Chapter 7.12
SPECIMEN CHART 10
VISUAL APPROACH CHART — ICAO
AD ELEV 30 m
HEIGHTS RELATED TO AD ELEV
APP 119.1
TWR 118.1
CITY/AERODROME
BEARINGS ARE MAGNETIC
ALTITUDES, ELEVATIONS AND HEIGHTS IN METRES
KAVRAN
VOR/DME 115.0
KAV
DONLON
L 411
KL
CALGA
VOR 114.3
CAA
SCONE
NDB/MKR 360
SCN
Village
CITY
TOWN
SCALE 1 : 362 000
ELEVATIONS 163
HEIGHTS (133)
DATE OF AERONAUTICAL INFORMATION
PRODUCING ORGANIZATION
REFERENCE NUMBER


AERONAUTICAL CHART MANUAL cf Chapter 7.13
SPECIMEN CHART 11
AERODROME CHART — ICAO
52°22'18"N
31°56'58"W ELEV 30 m
TWR 118.1
APRON 121.6
CITY/AERODROME
RWY | DIRECTION | THR | BEARING STRENGTH
09 R | 85° | 52°21.9'N 31°57.9'W | PCN 80/R/B/W/T all runways taxiways and apron
27 L | 265° | 52°22.1'N 31°55.7'W
09 L | 85° | 52°22.5'N 31°57.8'W
27 R | 265° | 52°22.7'N 31°55.4'W
HELIPORT | BEARING STRENGTH 40/R/B/X/T
ELEVATIONS AND DIMENSIONS IN METRES
BEARINGS ARE MAGNETIC
VAR 3° W – 2000
ANNUAL RATE OF CHANGE 2' E
ILS GP 331.4
TAXIWAYS 23 m WIDE
ILS LLZ OXS 109.1
PRECISION APPROACH CAT II LIGHTING SYSTEM
RVR
ELEV 30
STRIP 2920 x 300
2800 x 45 CONCRETE
ELEV 16
TDZ ELEV 17
SIMPLE APPROACH LIGHTING SYSTEM
VASIS 3° MEHT 21
BOR 116.9
TWR
ABN
FLW
AIS
MET
LDI
ARP
CAR PARK
CUST
TERMINAL
TWY G U/S
SWY 200 x 45 ASPHALT
2600 x 45 CONCRETE
ELEV 20
STRIP 2920 x 150
CWY 400 x 150
ELEV 14
MARKING AND LIGHTING AIDS SIMILAR TO RWY 09L/27R EXCEPT RWY CENTRE LINE, RWY TOUCHDOWN ZONE AND TWY CENTRE LINE LIGHTING NOT PROVIDED
LEGEND
VOR CHECK POINT AND FREQUENCY
HELIPORT
ATC SERVICE BOUNDARY
LIGHTING AIDS CLEARWAY AND STOPWAY RWY 27L
MARKING AIDS RWY 09L/27R AND EXIT TWY
EXIT TAXIWAY C AND D ARE IDENTICAL
LIGHTING AIDS RWY 09L/27R AND EXIT TWY
DATE OF AERONAUTICAL INFORMATION
PRODUCING ORGANIZATION
REFERENCE NUMBER
8/2/90

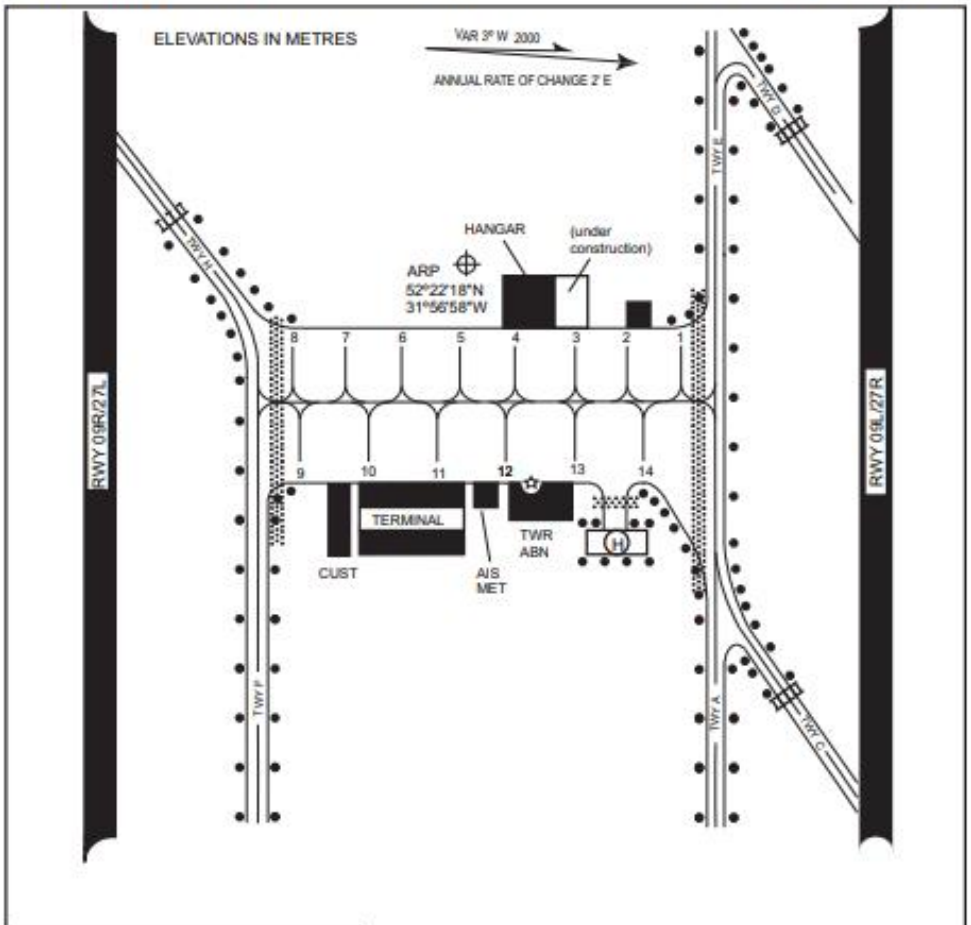
AERONAUTICAL CHART MANUAL cf Chapter 7.15 SPECIMEN CHART 13

AIRCRAFT PARKING/ DOCKING CHART — ICAO

APRON ELEV 28 m

TWR	118.1
APRON	121.6

CITY/AERODROME



LEGEND	
AIRCRAFT STAND	5
TAXIWAY LIGHT	•
ATC SERVICE BOUNDARY	
TAXI - HOLDING POSITION PRECISION APCH RWY	
NON - PRECISION APCH RWY	

metres
100 0 100 200 300 400 500
200 0 400 800 1200 1600
feet

TAXIWAYS 23 m WIDE

TAXIWAYS AND APPROACH BEARING STRENGTH PCN 80/R/B/W/T

AIRCRAFT STANDS 1 AND 8 NOT FOR B747

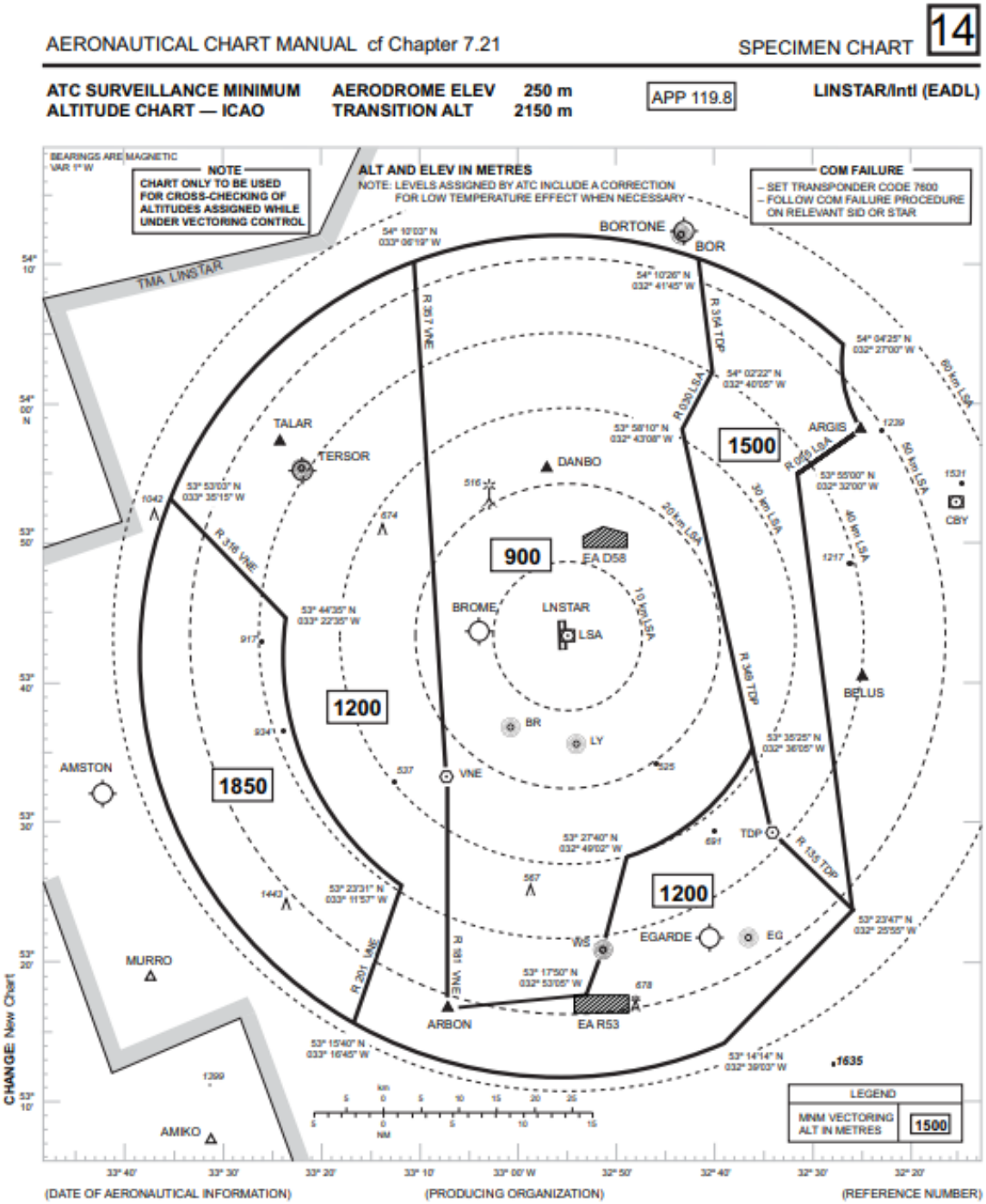
AIRCRAFT STANDS 10 TO 13 AGNIS EQUIPPED

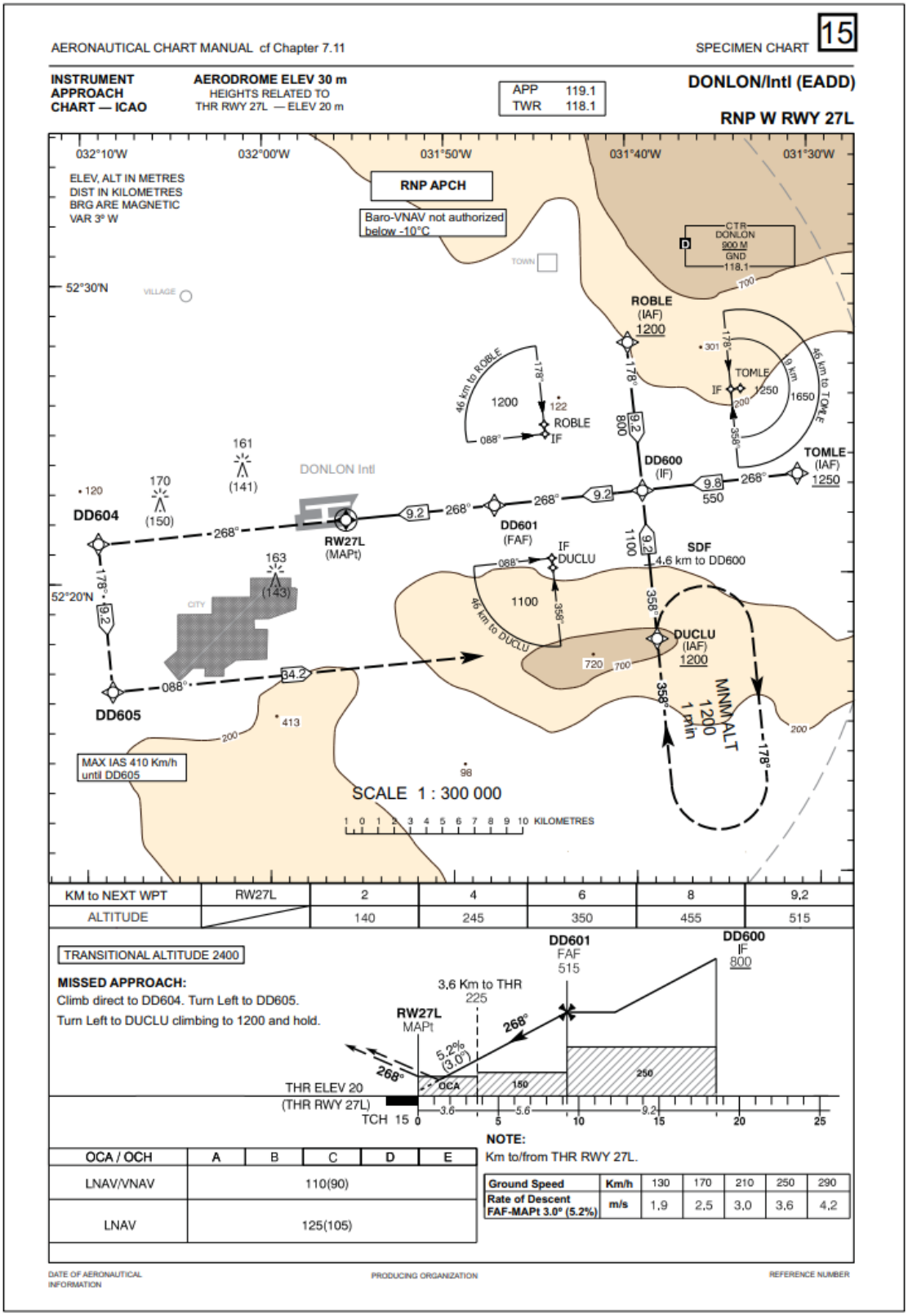
INS COORDINATES FOR AIRCRAFT STANDS					
1	52°22.5'N	031°56.9'W	8	52°22.2'N	031°56.9'W
2,3	52°22.4'N	031°56.9'W	9,10	52°22.2'N	031°56.7'W
4,5	52°22.3'N	031°56.9'W	11,12	52°22.3'N	031°56.7'W
6,7	52°22.2'N	031°56.9'W	13,14	52°22.4'N	031°56.7'W

DATE OF AERONAUTICAL INFORMATION

PRODUCING ORGANIZATION

REFERENCE NUMBER 8/2/90


AERONAUTICAL CHART MANUAL cf Chapter 7.21
SPECIMEN CHART 14
ATC SURVEILLANCE MINIMUM ALTITUDE CHART — ICAO
AERODROME ELEV 250 m
TRANSITION ALT 2150 m
APP 119.8
LINSTAR/Intl (EADL)
BEARINGS ARE MAGNETIC VAR 1° W
NOTE
CHART ONLY TO BE USED FOR CROSS-CHECKING OF ALTITUDES ASSIGNED WHILE UNDER VECTORING CONTROL
ALT AND ELEV IN METRES
NOTE: LEVELS ASSIGNED BY ATC INCLUDE A CORRECTION FOR LOW TEMPERATURE EFFECT WHEN NECESSARY
COM FAILURE
– SET TRANSPONDER CODE 7600
– FOLLOW COM FAILURE PROCEDURE ON RELEVANT SID OR STAR
TMA LINSTAR
BORTONE
BOR
TALAR
TERSOR
DANBO
ARGIS
CBY
BELUS
BROME
LNSTAR
LSA
EA D58
EA R53
VNE
BR
LY
TDP
EGARDE
EG
WS
ARBON
AMSTON
MURRO
AMKO
1500
1200
900
1850
1200
R 351 VNE
R 364 TDP
R 330 LSA
R 058 LSA
R 316 VNE
R 348 TDP
R 138 TDP
R 201 LSE
R 191 VNE
10 km LSA
20 km LSA
30 km LSA
40 km LSA
50 km LSA
60 km LSA
CHANGE: New Chart
LEGEND
MNM VECTORING ALT IN METRES 1500
(DATE OF AERONAUTICAL INFORMATION)
(PRODUCING ORGANIZATION)
(REFERENCE NUMBER)


AERONAUTICAL CHART MANUAL cf Chapter 7.11
SPECIMEN CHART 15
INSTRUMENT APPROACH CHART — ICAO
AERODROME ELEV 30 m
HEIGHTS RELATED TO THR RWY 27L — ELEV 20 m
APP 119.1
TWR 118.1
DONLON/Intl (EADD)
RNP W RWY 27L
032°10'W
032°00'W
031°50'W
031°40'W
031°30'W
ELEV, ALT IN METRES
DIST IN KILOMETRES
BRG ARE MAGNETIC
VAR 3° W
RNP APCH
Baro-VNAV not authorized below -10°C
CTR DONLON 900 M GND 118.1
52°30'N
52°20'N
ROBLE (IAF) 1200
TOMLE (IAF) 1250
DD600 (IF)
DD601 (FAF)
DD604
DD605
RW27L (MAPt)
DONLON Intl
IF DUCLU
DUCLU (IAF) 1200
SDF 4.6 km to DD600
MNM ALT 1200 1 min
MAX IAS 410 Km/h until DD605
SCALE 1 : 300 000
1 0 1 2 3 4 5 6 7 8 9 10 KILOMETRES
KM to NEXT WPT | RW27L | 2 | 4 | 6 | 8 | 9,2
ALTITUDE | | 140 | 245 | 350 | 455 | 515
TRANSITIONAL ALTITUDE 2400
MISSED APPROACH:
Climb direct to DD604. Turn Left to DD605.
Turn Left to DUCLU climbing to 1200 and hold.
3,6 Km to THR
225
5,2% (3,0°)
THR ELEV 20
(THR RWY 27L)
TCH 15
NOTE:
Km to/from THR RWY 27L.
OCA / OCH | A | B | C | D | E
LNAV/VNAV | 110(90)
LNAV | 125(105)
Ground Speed | Km/h | 130 | 170 | 210 | 250 | 290
Rate of Descent FAF-MAPt 3.0° (5.2%) | m/s | 1,9 | 2,5 | 3,0 | 3,6 | 4,2
DATE OF AERONAUTICAL INFORMATION
PRODUCING ORGANIZATION
REFERENCE NUMBER

AERONAUTICAL CHART MANUAL cf Chapter 7.11 — SPECIMEN CHART 15

INSTRUMENT APPROACH CHART — ICAO

AERODROME ELEV 30 m
HEIGHTS RELATED TO
THR RWY 27L — ELEV 20 m

DONLON/Intl (EADD)

RNP W RWY 27L

TABULAR DESCRIPTION

RNP W RWY 27L

Serial Number	Path Descriptor	Waypoint Identifier	Fly-Over	Course °M(°T)	Magnetic Variation	Distance (km)	Turn Direction	Altitude(m)	Speed limit (km/h)	VPA/ TCH	Navigation Specification
010	IF	TOMLE	-	-	-	-	-	+1250	-	-	RNP APCH
020	TF	DD600	-	268(264.7)	-	9.8	-	+800	-	-	RNP APCH
010	IF	DUCLU	-	-	-	-	-	+1200	-	-	RNP APCH
020	TF	DD600	-	358(355.3)	-	9.2	-	+800	-	-	RNP APCH
010	IF	ROBLE	-	-	-	-	-	+1200	-	-	RNP APCH
020	TF	DD600	-	178(175.3)	-	9.2	-	+800	-	-	RNP APCH
010	IF	DD600	-	-	-	-	-	+800	-	-	RNP APCH
020	TF	DD601	-	268(265.3)	-	9.2	-	@515	-	-	RNP APCH
030	TF	RW27L	Y	268(265.3)	-	9.2	-	@35	-	-3.0/15	RNP APCH
040	FA	RW27L	-	268(265.3)	+3.0	-	-	-[1]	-	-	RNP APCH
050	DF	DD604	-	-	-	-	-	-	-	-	RNP APCH
060	TF	DD605	-	178(175.0)	-	9.2	L	-	-410	-	RNP APCH
070	TF	DUCLU	-	088(085.0)	-	34.2	L	+1200	-	-	RNP APCH
080	HM	DUCLU	-	358(355.0)	-	-	R	+1200	-	-	RNP APCH

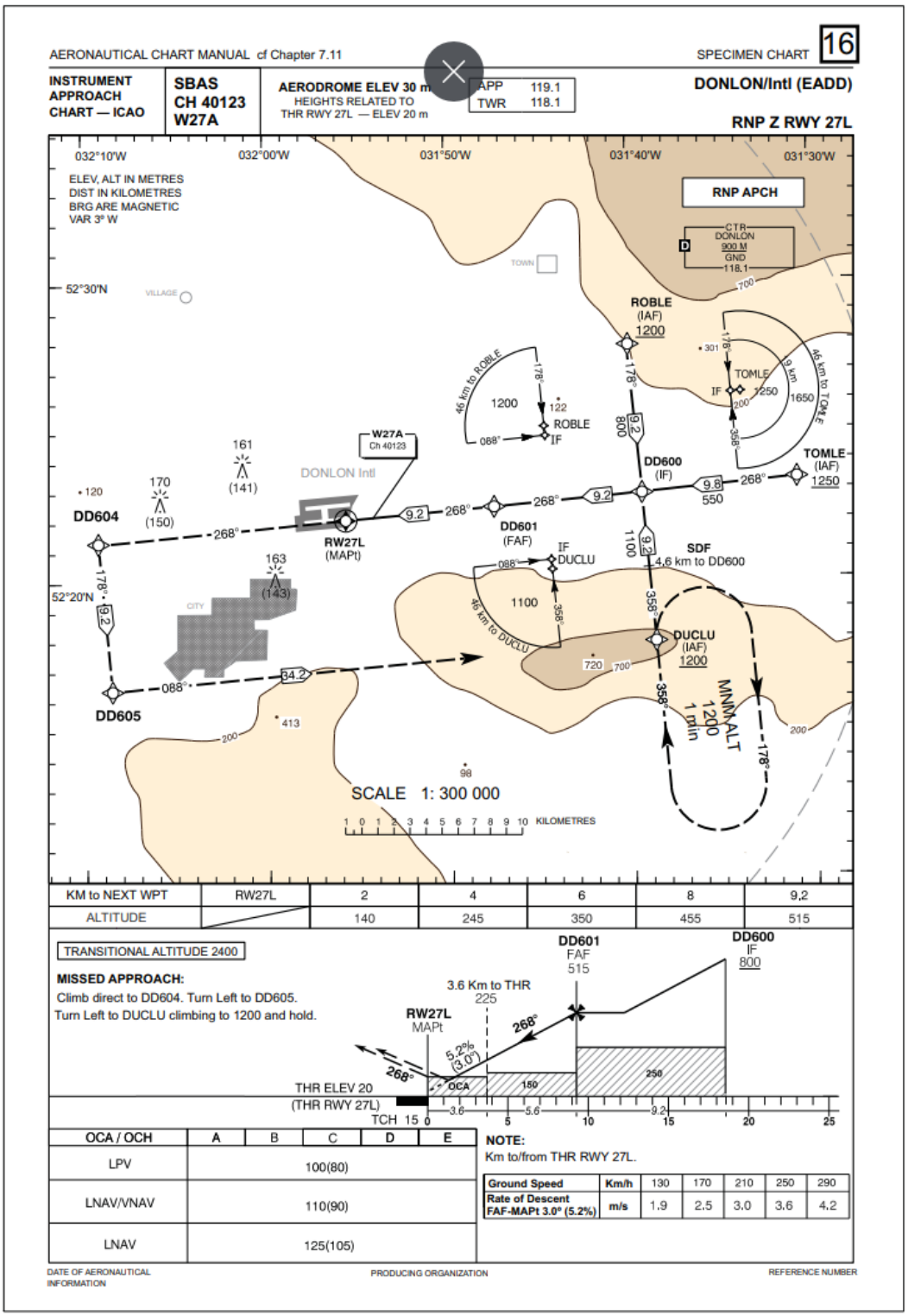
1) This value is provided by industry.

WAYPOINT LIST

RNP W RWY 27L

Waypoint Identifier	Coordinates	
TOMLE	52°23'20.8"N	031°30'50.5"W
ROBLE	52°27'50.7"N	031°40'01.5"W
DUCLU	52°17'53.6"N	031°38'41.6"W
DD600	52°22'52.2"N	031°39'21.4"W
DD601	52°22'27.4"N	031°47'29.3"W
RW27L	52°22'02.71"N	031°55'37.08"W
DD604	52°21'20.1"N	032°09'13.7"W
DD605	52°16'22.2"N	032°08'31.5"W

DATE OF AERONAUTICAL INFORMATION — PRODUCING ORGANIZATION — REFERENCE NUMBER


AERONAUTICAL CHART MANUAL cf Chapter 7.11
SPECIMEN CHART 16
INSTRUMENT APPROACH CHART — ICAO
SBAS CH 40123 W27A
AERODROME ELEV 30 m
HEIGHTS RELATED TO THR RWY 27L — ELEV 20 m
APP 119.1
TWR 118.1
DONLON/Intl (EADD)
RNP Z RWY 27L
RNP APCH
ELEV, ALT IN METRES
DIST IN KILOMETRES
BRG ARE MAGNETIC
VAR 3° W
ROBLE (IAF) 1200
TOMLE (IAF) 1250
DD600 (IF)
DD601 (FAF)
DD604
DD605
RW27L (MAPt)
DONLON Intl
IF DUCLU
DUCLU (IAF) 1200
SDF 4,6 km to DD600
MNMALT 1200 1 min
SCALE 1: 300 000
KILOMETRES
KM to NEXT WPT
ALTITUDE
TRANSITIONAL ALTITUDE 2400
MISSED APPROACH:
Climb direct to DD604. Turn Left to DD605.
Turn Left to DUCLU climbing to 1200 and hold.
3.6 Km to THR
THR ELEV 20
(THR RWY 27L)
TCH 15
OCA / OCH
LPV
LNAV/VNAV
LNAV
NOTE:
Km to/from THR RWY 27L.
Ground Speed
Rate of Descent FAF-MAPt 3.0° (5.2%)
DATE OF AERONAUTICAL INFORMATION
PRODUCING ORGANIZATION
REFERENCE NUMBER

AERONAUTICAL CHART MANUAL cf Chapter 7.11 — SPECIMEN CHART 16

INSTRUMENT APPROACH CHART — ICAO	SBAS CH 40123 W27A	AERODROME ELEV 30 m HEIGHTS RELATED TO THR RWY 27L — ELEV 20 m	DONLON/Intl (EADD) RNP Z RWY 27L

TABULAR DESCRIPTION

RNP Z RWY 27L

Serial Number	Path Descriptor	Waypoint Identifier	Fly-Over	Course °M(°T)	Magnetic Variation	Distance (km)	Turn Direction	Altitude(m)	Speed limit (km/h)	VPA/ TCH	Navigation Specification
010	IF	TOMLE	-	-	-	-	-	+1250	-	-	RNP APCH
020	TF	DD600	-	268(264.7)	-	9.8	-	+800	-	-	RNP APCH
010	IF	DUCLU	-	-	-	-	-	+1200	-	-	RNP APCH
020	TF	DD600	-	358(355.3)	-	9.2	-	+800	-	-	RNP APCH
010	IF	ROBLE	-	-	-	-	-	+1200	-	-	RNP APCH
020	TF	DD600	-	178(175.3)	-	9.2	-	+800	-	-	RNP APCH
010	IF	DD600	-	-	-	-	-	+800	-	-	RNP APCH
020	TF	DD601	-	268(265.3)	-	9.2	-	@515	-	-	RNP APCH
030	TF	RW27L	Y	268(265.3)	-	9.2	-	@35	-	-3.0/15	RNP APCH
040	FA	RW27L	-	268(265.3)	+3.0	-	-	-[1]	-	-	RNP APCH
050	DF	DD604	-	-	-	-	-	-	-	-	RNP APCH
060	TF	DD605	-	178(175.0)	-	9.2	L	-	-410	-	RNP APCH
070	TF	DUCLU	-	088(085.0)	-	34.2	L	+1200	-	-	RNP APCH
080	HM	DUCLU	-	358(355.0)	-	-	R	+1200	-	-	RNP APCH

1) This value is provided by industry.

WAYPOINT LIST

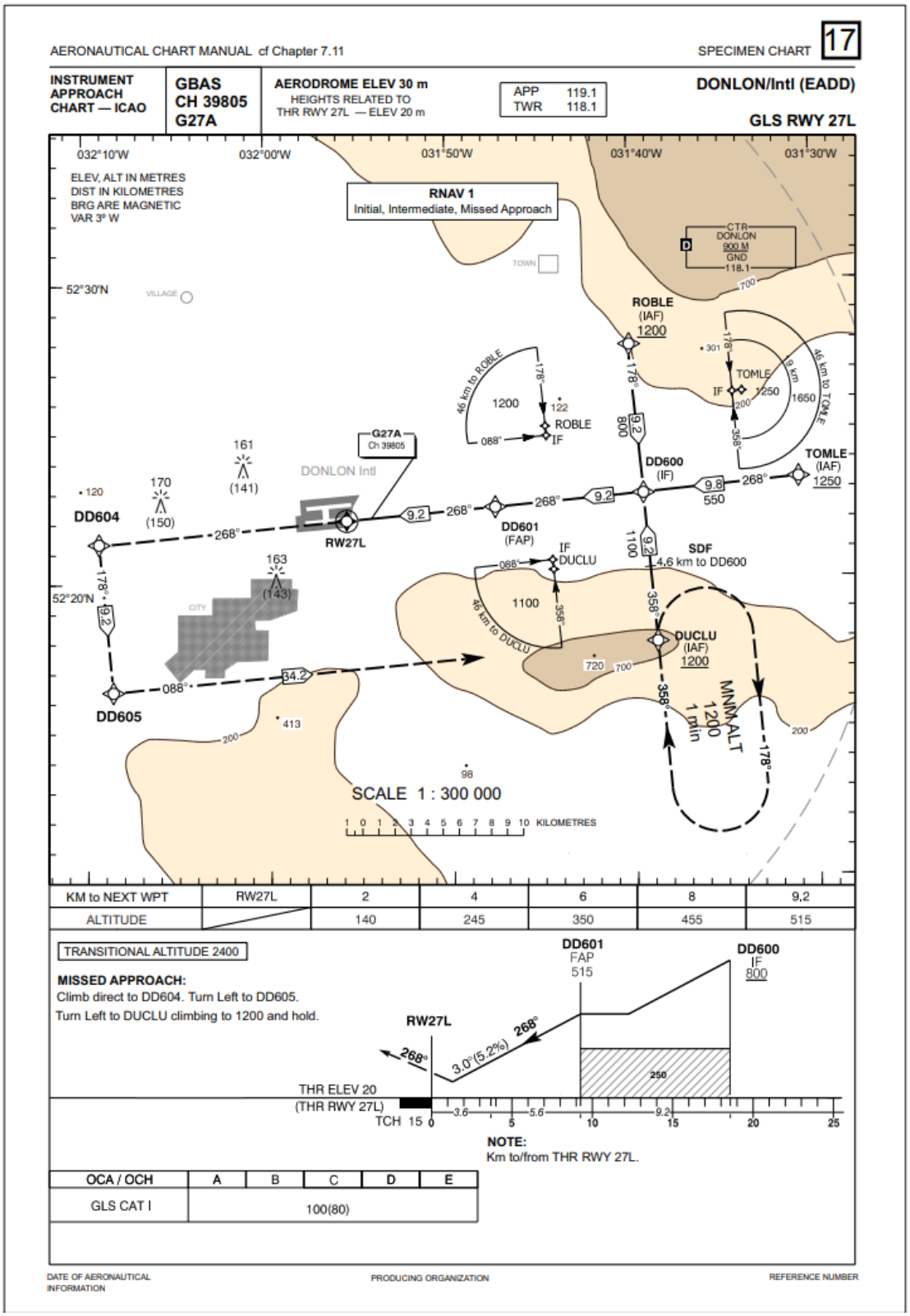
RNP Z RWY 27L

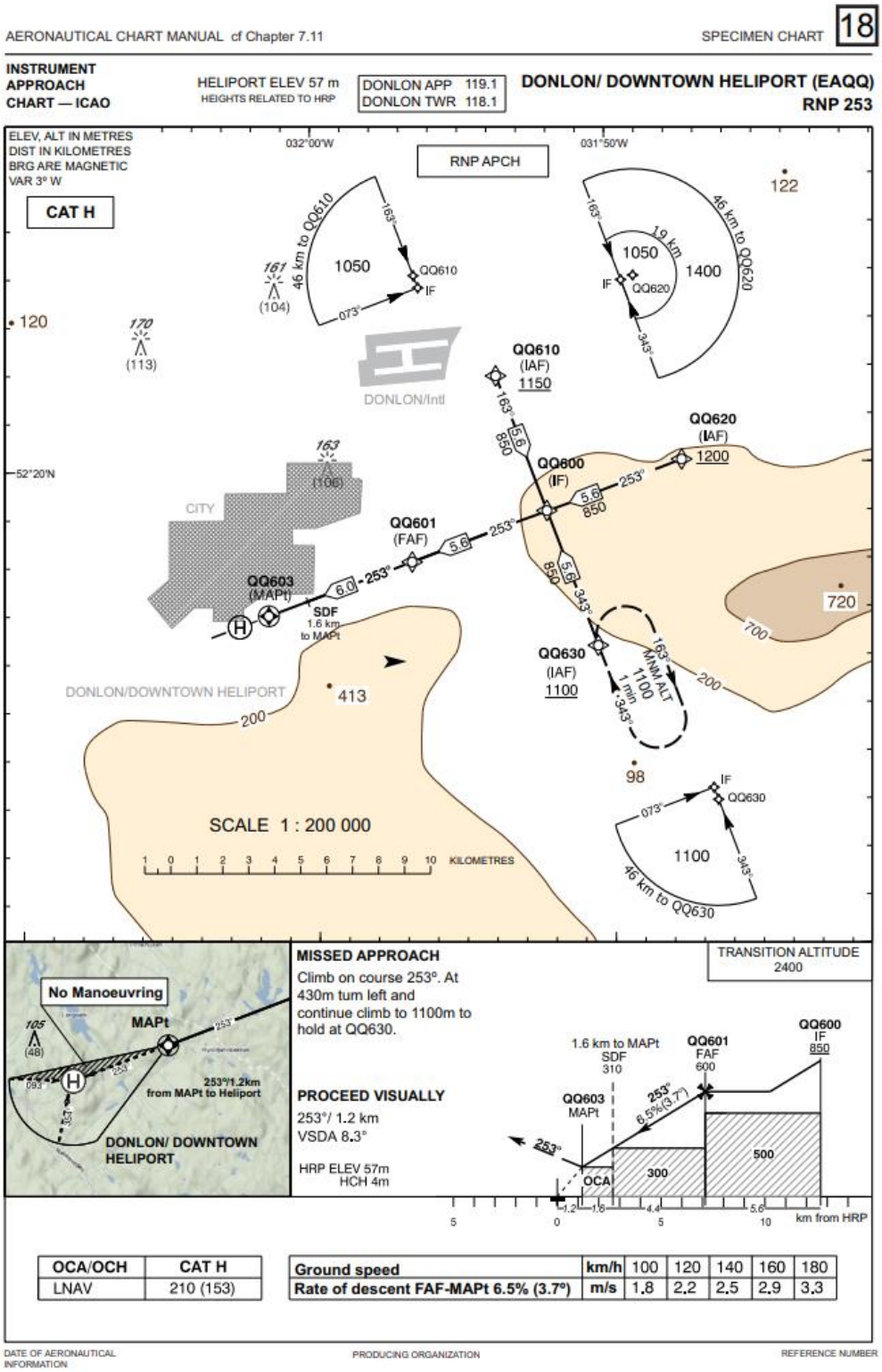
Waypoint Identifier	Coordinates
TOMLE	52°23'20.8"N 031°30'50.5"W
ROBLE	52°27'50.7"N 031°40'01.5"W
DUCLU	52°17'53.6"N 031°38'41.6"W
DD600	52°22'52.2"N 031°39'21.4"W
DD601	52°22'27.4"N 031°47'29.3"W
RW27L	52°22'02.71"N 031°55'37.08"W
DD604	52°21'20.1"N 032°09'13.7"W
DD605	52°16'22.2"N 032°08'31.5"W

FAS DATA BLOCK

Operation Type	0	**LTP/FTP ellipsoidal height**	31.7
SBAS Provider	0	**FPAP latitude**	522155.5020N
Airport Identifier	EADD	**FPAP longitude**	0315805.4200W
Runway	RW27L	**Threshold crossing height**	15
Approach performance designator	0	**TCH units**	1
Route indicator	Z	**Glide path angle**	3
Reference path data selector	0	**Course width at threshold**	100
Reference path ID	W27A	**Length offset**	48
LTP/FTP latitude	522202.7050N	**Horizontal alert limit (HAL)**	40
LTP/FTP longitude	0315537.0790W	**Vertical alert limit (VAL)**	50
Precision approach path point data CRC remainder	F1A36CCC		
LTP Orthometric Height	*20.1*		
FPAP Orthometric Height	*20.3*		

DATE OF AERONAUTICAL INFORMATION — PRODUCING ORGANIZATION — REFERENCE NUMBER


AERONAUTICAL CHART MANUAL cf Chapter 7.11
SPECIMEN CHART 17
INSTRUMENT APPROACH CHART — ICAO
GBAS CH 39805 G27A
AERODROME ELEV 30 m
HEIGHTS RELATED TO THR RWY 27L — ELEV 20 m
APP 119.1
TWR 118.1
DONLON/Intl (EADD)
GLS RWY 27L
032°10'W
032°00'W
031°50'W
031°40'W
031°30'W
ELEV, ALT IN METRES
DIST IN KILOMETRES
BRG ARE MAGNETIC
VAR 3° W
RNAV 1
Initial, Intermediate, Missed Approach
CTR DONLON 900 M GND 118.1
52°30'N
ROBLE (IAF) 1200
TOMLE (IAF) 1250
DD600 (IF)
DD601 (FAP)
DD604
DD605
RW27L
G27A Ch 39805
DONLON Intl
IF DUCLU
DUCLU (IAF) 1200
SDF 4,6 km to DD600
MNMALT 1200 1 min
52°20'N
SCALE 1 : 300 000
1 0 1 2 3 4 5 6 7 8 9 10 KILOMETRES
KM to NEXT WPT | RW27L | 2 | 4 | 6 | 8 | 9,2
ALTITUDE | | 140 | 245 | 350 | 455 | 515
TRANSITIONAL ALTITUDE 2400
MISSED APPROACH:
Climb direct to DD604. Turn Left to DD605.
Turn Left to DUCLU climbing to 1200 and hold.
DD601 FAP 515
DD600 IF 800
RW27L
3.0°(5.2%)
THR ELEV 20
(THR RWY 27L)
TCH 15
NOTE:
Km to/from THR RWY 27L.
OCA / OCH | A | B | C | D | E
GLS CAT I | 100(80)
DATE OF AERONAUTICAL INFORMATION
PRODUCING ORGANIZATION
REFERENCE NUMBER


AERONAUTICAL CHART MANUAL cf Chapter 7.11
SPECIMEN CHART 18
INSTRUMENT APPROACH CHART — ICAO
HELIPORT ELEV 57 m
HEIGHTS RELATED TO HRP
DONLON APP 119.1
DONLON TWR 118.1
DONLON/ DOWNTOWN HELIPORT (EAQQ)
RNP 253
ELEV, ALT IN METRES
DIST IN KILOMETRES
BRG ARE MAGNETIC
VAR 3° W
CAT H
RNP APCH
032°00'W
031°50'W
52°20'N
QQ610 (IAF) 1150
QQ620 (IAF) 1200
QQ600 (IF)
QQ601 (FAF)
QQ603 (MAPt)
SDF 1.6 km to MAPt
QQ630 (IAF) 1100
DONLON/Intl
CITY
DONLON/DOWNTOWN HELIPORT
SCALE 1 : 200 000
KILOMETRES
No Manoeuvring
MAPt
253°/1.2km from MAPt to Heliport
DONLON/ DOWNTOWN HELIPORT
MISSED APPROACH
Climb on course 253°. At 430m turn left and continue climb to 1100m to hold at QQ630.
PROCEED VISUALLY
253°/ 1.2 km
VSDA 8.3°
HRP ELEV 57m
HCH 4m
TRANSITION ALTITUDE 2400
1.6 km to MAPt
SDF 310
QQ601 FAF 600
QQ600 IF 850
QQ603 MAPt
6.5%(3.7°)
OCA
300
500
km from HRP
OCA/OCH
CAT H
LNAV
210 (153)
Ground speed km/h 100 120 140 160 180
Rate of descent FAF-MAPt 6.5% (3.7°) m/s 1.8 2.2 2.5 2.9 3.3
DATE OF AERONAUTICAL INFORMATION
PRODUCING ORGANIZATION
REFERENCE NUMBER

AERONAUTICAL CHART MANUAL cf Chapter 7.11 SPECIMEN CHART 18

INSTRUMENT APPROACH CHART — ICAO

HELIPORT ELEV 57 m
HEIGHTS RELATED TO HRP

DONLON/ DOWNTOWN HELIPORT (EAQQ)
RNP 253

TABULAR DESCRIPTION

RNP 253

Serial Number	Path Descriptor	Waypoint Identifier	Fly-over	Course °M(°T)	Magnetic Variation	Distance (km)	Turn Direction	Altitude (m)	Speed (km/hr)	VPA/ TCH	Navigation Specification
010	IF	QQ610	-	-	-	-	-	+1150	-	-	RNP APCH
020	TF	QQ600	-	163(159,6)	-	5,6	-	+850	-	-	RNP APCH
010	IF	QQ620	-	-	-	-	-	+1200	-	-	RNP APCH
020	TF	QQ600	-	253(250,4)	-	5,6	-	+850	-	-	RNP APCH
010	IF	QQ630	-	-	-	-	-	+1100	-	-	RNP APCH
020	TF	QQ600	-	343(340.2)	-	5.6	-	+850	-	-	RNP APCH
010	IF	QQ600	-	-	-	-	-	+850	-	-	RNP APCH
020	TF	QQ601	-	253(250.4)	-	5.6	-	600	-	-	RNP APCH
030	TF	QQ603	Y	253(250.4)	-	6.0	-	210	-	-3.7/-	RNP APCH
040	CA	-	-	253(250.4)	-	-	-	-1)	-	-	RNP APCH
050	DF	QQ630	-	-	-	-	L	+1100	-	-	RNP APCH
060	HM	QQ630	-	343(340.2)	-	1 minute	R	+1100	-	-	RNP APCH

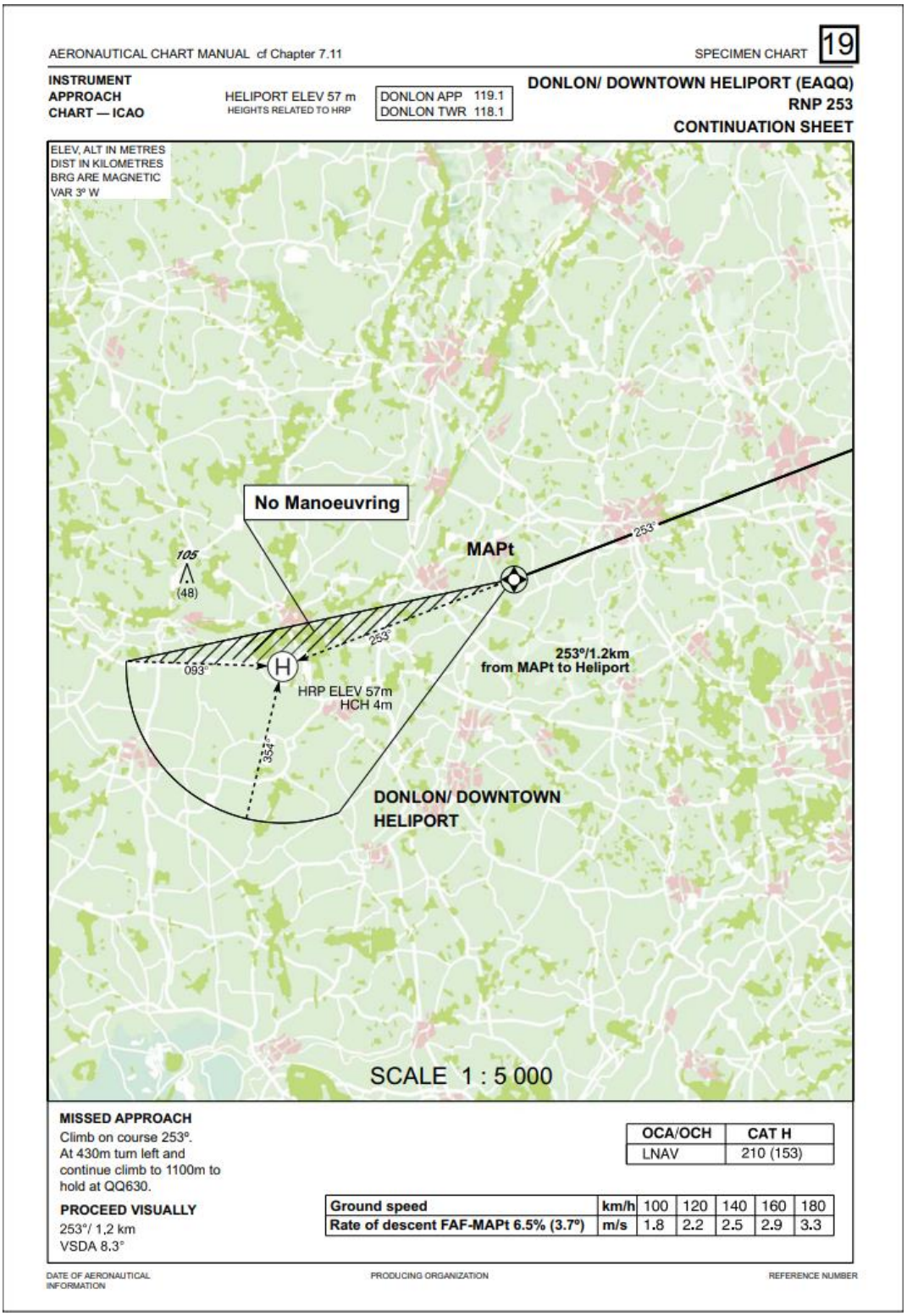
1) This value is provided by industry.

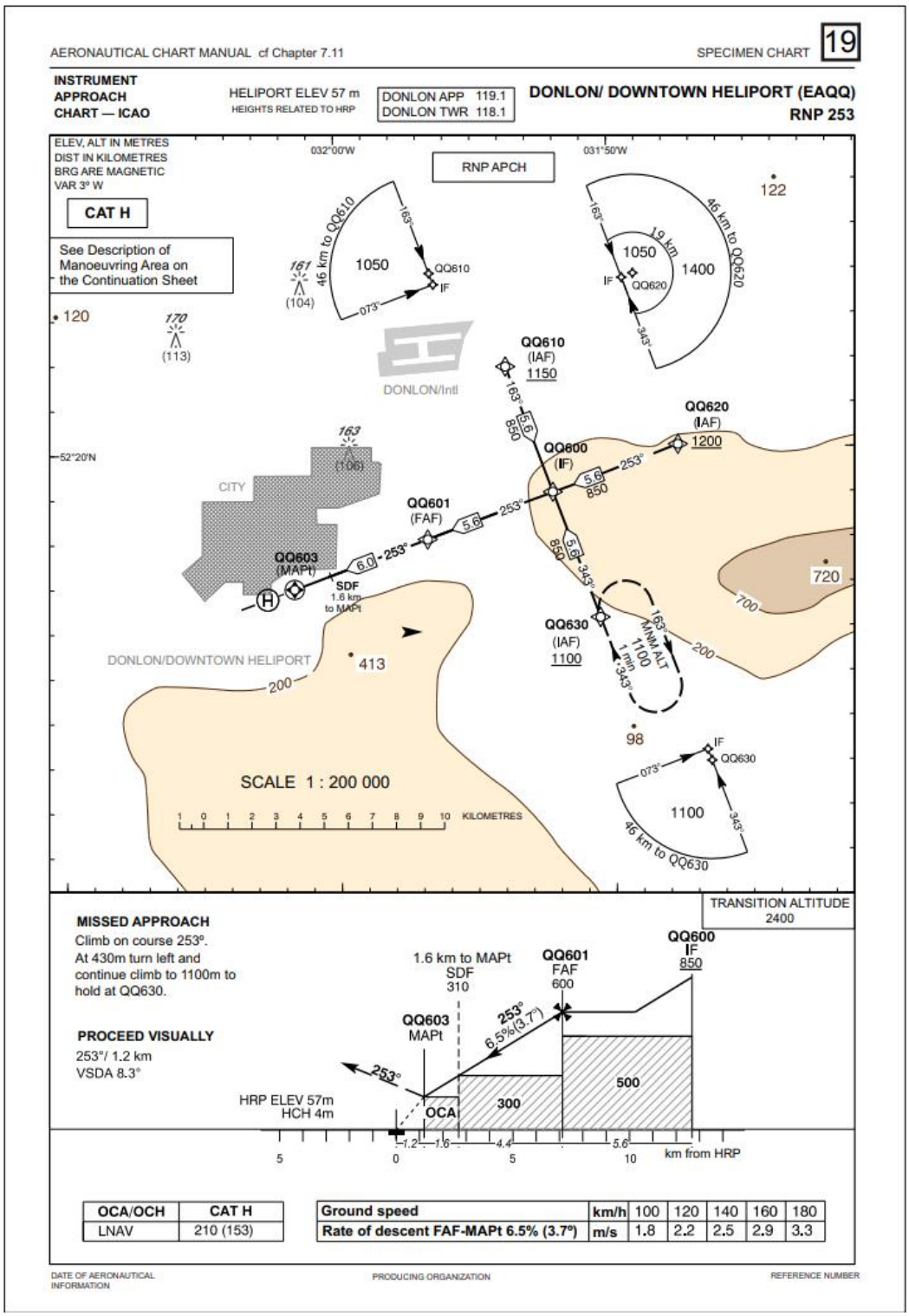
WAYPOINT LIST

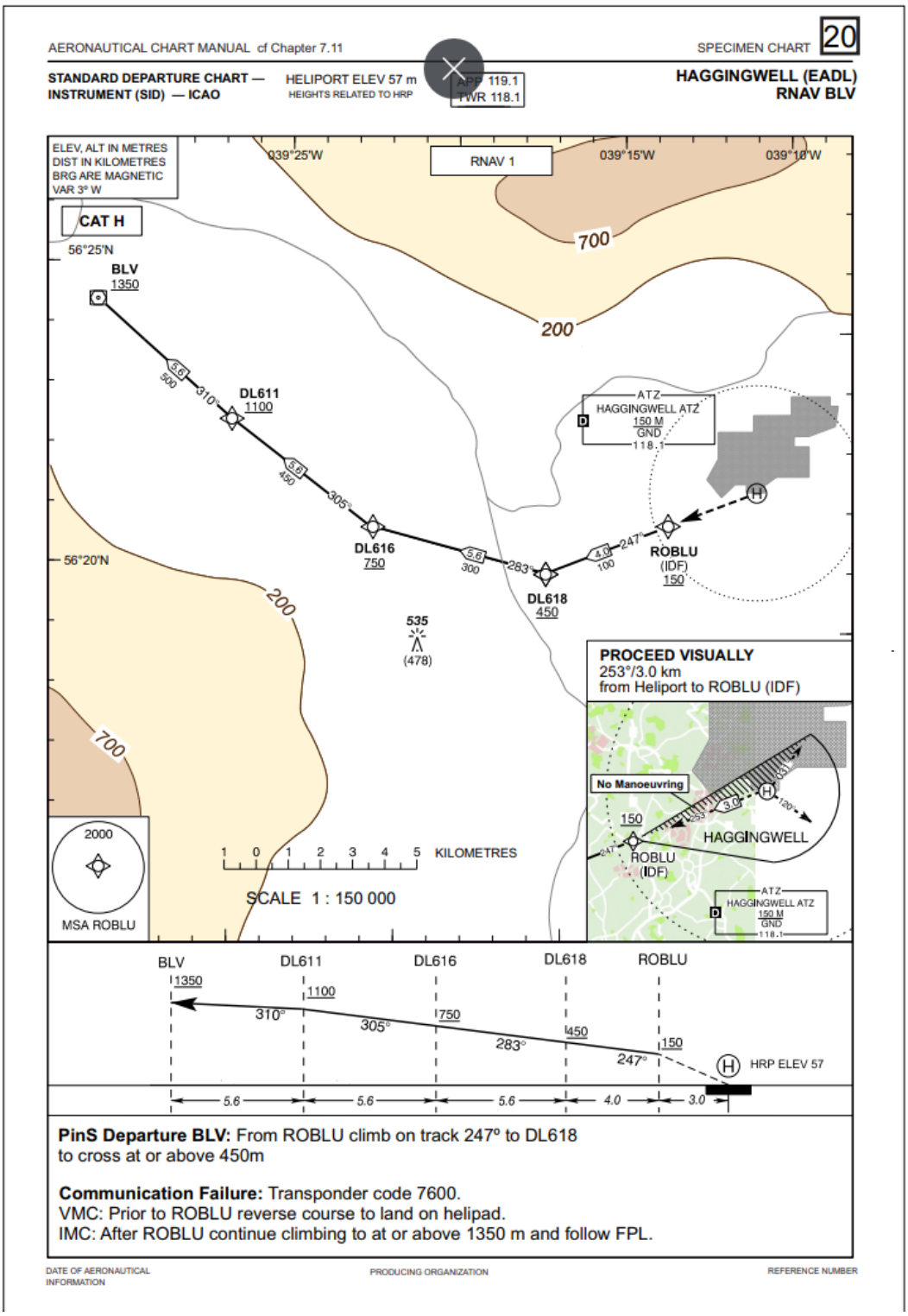
RNP 253

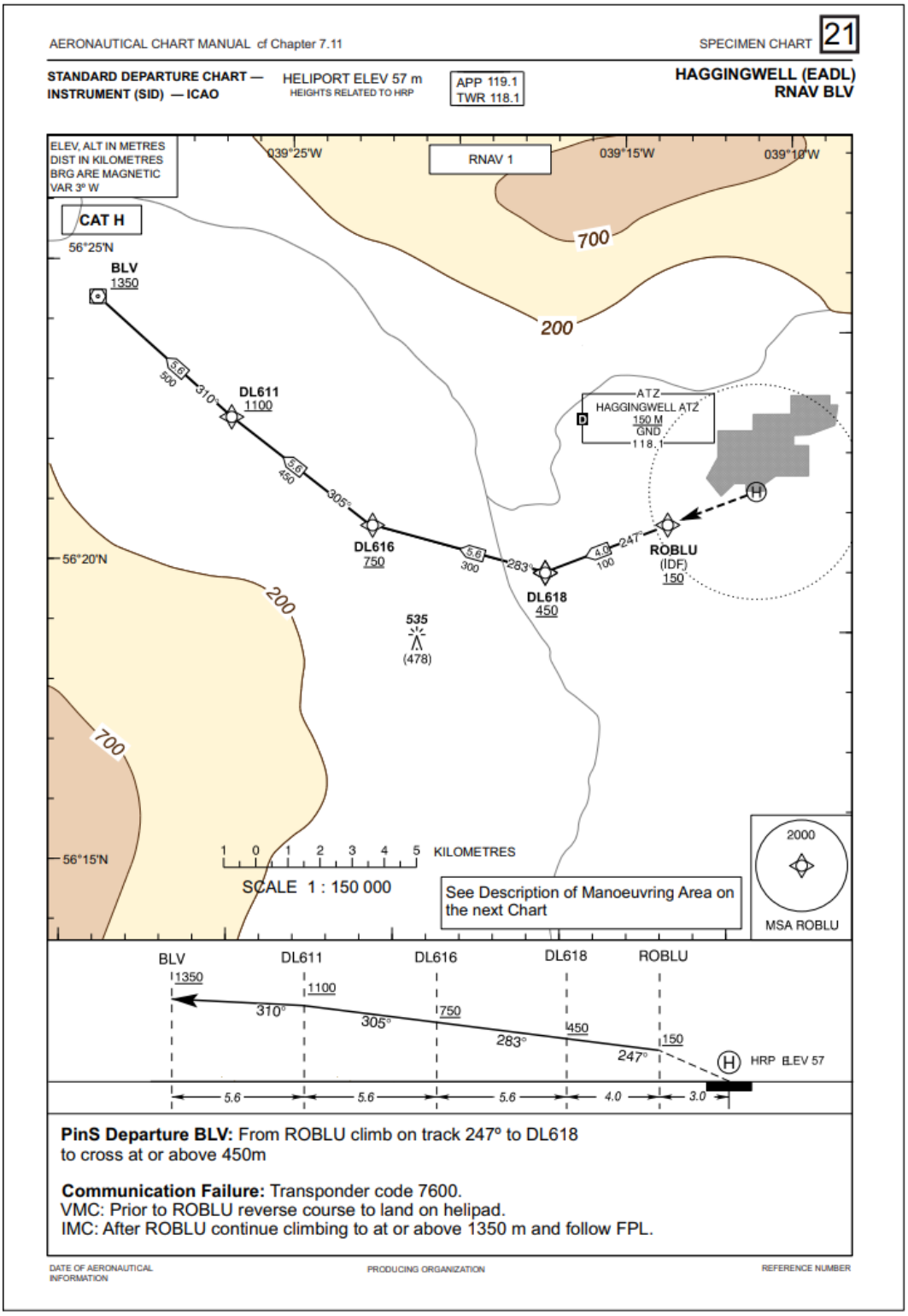
Waypoint Identifier	Coordinates	
QQ630	52°16'15.4N	031°50'26.9W
QQ620	52°20'05.9N	031°47'31.6W
QQ610	52°21'53.3N	031°53'47.5W
QQ600	52°19'04.3N	031°52'07.2W
QQ601	52°18'02.8N	031°56'42.7W
QQ603	52°16'57.0N	032°01'36.6W

DATE OF AERONAUTICAL INFORMATION | PRODUCING ORGANIZATION | REFERENCE NUMBER


AERONAUTICAL CHART MANUAL cf Chapter 7.11
SPECIMEN CHART 19
INSTRUMENT APPROACH CHART — ICAO
HELIPORT ELEV 57 m
HEIGHTS RELATED TO HRP
DONLON APP 119.1
DONLON TWR 118.1
DONLON/ DOWNTOWN HELIPORT (EAQQ)
RNP 253
CONTINUATION SHEET
ELEV, ALT IN METRES
DIST IN KILOMETRES
BRG ARE MAGNETIC
VAR 3° W
No Manoeuvring
MAPt
253°
105
(48)
253°
093°
H
253°/1.2km
from MAPt to Heliport
HRP ELEV 57m
HCH 4m
354°
DONLON/ DOWNTOWN
HELIPORT
SCALE 1 : 5 000
MISSED APPROACH
Climb on course 253°.
At 430m turn left and
continue climb to 1100m to
hold at QQ630.
PROCEED VISUALLY
253°/ 1,2 km
VSDA 8.3°
OCA/OCH
CAT H
LNAV
210 (153)
Ground speed km/h 100 120 140 160 180
Rate of descent FAF-MAPt 6.5% (3.7°) m/s 1.8 2.2 2.5 2.9 3.3
DATE OF AERONAUTICAL INFORMATION
PRODUCING ORGANIZATION
REFERENCE NUMBER


AERONAUTICAL CHART MANUAL cf Chapter 7.11
SPECIMEN CHART 19
INSTRUMENT APPROACH CHART — ICAO
HELIPORT ELEV 57 m
HEIGHTS RELATED TO HRP
DONLON APP 119.1
DONLON TWR 118.1
DONLON/ DOWNTOWN HELIPORT (EAQQ)
RNP 253
ELEV, ALT IN METRES
DIST IN KILOMETRES
BRG ARE MAGNETIC
VAR 3° W
CAT H
See Description of Manoeuvring Area on the Continuation Sheet
RNP APCH
032°00'W
031°50'W
52°20'N
46 km to QQ610
46 km to QQ620
19 km
1050
1400
QQ610
IF
QQ620
(IAF)
1150
1200
QQ600
(IF)
QQ601
(FAF)
QQ603
(MAPt)
SDF
1.6 km to MAPt
QQ630
(IAF)
1100
MNM ALT 1100
1 nm
DONLON/Intl
CITY
DONLON/DOWNTOWN HELIPORT
SCALE 1 : 200 000
KILOMETRES
MISSED APPROACH
Climb on course 253°.
At 430m turn left and continue climb to 1100m to hold at QQ630.
PROCEED VISUALLY
253°/ 1.2 km
VSDA 8.3°
TRANSITION ALTITUDE
2400
1.6 km to MAPt
SDF
310
QQ601
FAF
600
QQ600
IF
850
QQ603
MAPt
6.5%(3.7°)
HRP ELEV 57m
HCH 4m
OCA
300
500
km from HRP
OCA/OCH
CAT H
LNAV
210 (153)
Ground speed
km/h
100
120
140
160
180
Rate of descent FAF-MAPt 6.5% (3.7°)
m/s
1.8
2.2
2.5
2.9
3.3
DATE OF AERONAUTICAL INFORMATION
PRODUCING ORGANIZATION
REFERENCE NUMBER


AERONAUTICAL CHART MANUAL cf Chapter 7.11
SPECIMEN CHART 20
STANDARD DEPARTURE CHART — INSTRUMENT (SID) — ICAO
HELIPORT ELEV 57 m
HEIGHTS RELATED TO HRP
APP 119.1
TWR 118.1
HAGGINGWELL (EADL)
RNAV BLV
ELEV, ALT IN METRES
DIST IN KILOMETRES
BRG ARE MAGNETIC
VAR 3° W
CAT H
RNAV 1
039°25'W
039°15'W
039°10'W
56°25'N
56°20'N
BLV
1350
DL611
1100
DL616
750
DL618
450
ROBLU
(IDF)
150
700
200
ATZ
HAGGINGWELL ATZ
150 M
GND
118.1
535
(478)
PROCEED VISUALLY
253°/3.0 km
from Heliport to ROBLU (IDF)
No Manoeuvring
HAGGINGWELL
2000
MSA ROBLU
1 0 1 2 3 4 5 KILOMETRES
SCALE 1 : 150 000
BLV DL611 DL616 DL618 ROBLU
1350 1100 750 450 150
310° 305° 283° 247°
HRP ELEV 57
5.6 5.6 5.6 4.0 3.0
PinS Departure BLV: From ROBLU climb on track 247° to DL618 to cross at or above 450m
Communication Failure: Transponder code 7600.
VMC: Prior to ROBLU reverse course to land on helipad.
IMC: After ROBLU continue climbing to at or above 1350 m and follow FPL.
DATE OF AERONAUTICAL INFORMATION
PRODUCING ORGANIZATION
REFERENCE NUMBER


AERONAUTICAL CHART MANUAL cf Chapter 7.11
SPECIMEN CHART 21
STANDARD DEPARTURE CHART — INSTRUMENT (SID) — ICAO
HELIPORT ELEV 57 m
HEIGHTS RELATED TO HRP
APP 119.1
TWR 118.1
HAGGINGWELL (EADL)
RNAV BLV
ELEV, ALT IN METRES
DIST IN KILOMETRES
BRG ARE MAGNETIC
VAR 3° W
CAT H
RNAV 1
039°25'W
039°15'W
039°10'W
56°25'N
56°20'N
56°15'N
700
200
BLV
1350
DL611
1100
DL616
750
DL618
450
ROBLU
(IDF)
150
ATZ
HAGGINGWELL ATZ
150 M
GND
118.1
535
(478)
5.6
4.0
310°
305°
283°
247°
1 0 1 2 3 4 5 KILOMETRES
SCALE 1 : 150 000
See Description of Manoeuvring Area on the next Chart
2000
MSA ROBLU
BLV
DL611
DL616
DL618
ROBLU
HRP ELEV 57
3.0
PinS Departure BLV: From ROBLU climb on track 247° to DL618 to cross at or above 450m
Communication Failure: Transponder code 7600.
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