Bhutan Civil Aviation Requirement

BCAR – 4

Aeronautical Charts

Fifth Edition, Mar 2026

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(i) RECORD OF AMENDMENTS

AMENDMENTS				
No.	*Date applicable*	*Date entered*	*Entered by*	*Subject(s)*
1	31 Dec 2017	30 Nov 2017	ANS Section	
2	28 May 2021	27 Apr 2021	ANS Section	
3	05 Jan 2023	05 Dec 2022	ANS Section	Para 1.3.2.2
4	31 Oct 2024	5 Sept 2024	ANS Section	Incorporating ICAO amendment 62. Para 9.9.4.1.1(h), 10.9.4.1.1(g), 11.10.8.10, 13.6.2, 14.6.2.
5	19 Mar 2026	17 Mar 2026	ANS Section	Incorporated requirements for additional charts. Revised provisions for clarity. Removed appendixes to establish direct cross-references to ICAO Annexes.
1-5	*Incorporated in this edition*			

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(ii) TABLE OF CONTENTS

(iii) FOREWORD

Section 59 of the Civil Aviation Act of Bhutan 2016 empowers the Head of Authority of Bhutan Civil Aviation Authority (BCAA) to make Rules and Regulations concerning the use of the airspace, air navigation facilities and services. Accordingly, the fifth edition of BCAR–4 (Aeronautical Charts) incorporating all the amendments issued till amendment number 5 has been developed.

The fifth edition of BCAR–4 or BCAR–Aeronautical Charts, which are to be used interchangeably and construed to refer to this document, is hereby published in accordance with Section 56 of the Act.

During the transposing of the amended standard and recommended practices of ICAO Annex 4 to this BCAR, some provisions that are not applicable or currently irrelevant have been left out and marked as "Reserved". These provisions will be incorporated as and when required.

Any difference existing in this BCAR and the related ICAO Standards and Recommended Practices and any amendments thereto will be notified to the ICAO and the same shall be published in the Aeronautical Information Publication (AIP).

This edition hereby supersedes the fourth edition of BCAR–4 that was published on October 31, 2024.

This is a controlled document and the provisions contained herein are subject to change through amendments.

Director General
Bhutan Civil Aviation Authority

Date: 19/03/2026

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CHAPTER 1. DEFINITIONS, APPLICABILITY & AVAILABILITY

1.1 Definitions

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

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

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

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

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

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

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

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

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

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

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

Air defence identification zone. Special designated airspace of defined dimensions within which aircraft are required to comply with special identification and/or reporting procedures additional to those related to the provision of air traffic services (ATS).

Air 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 (ISO 19104*).

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

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

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

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

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

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

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

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

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

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

Bare Earth. Surface of the Earth including bodies of water and permanent ice and snow, and excluding vegetation and man-made objects.

Calendar. Discrete temporal reference system that provides the basis for defining temporal position to a resolution of one day (ISO 19108*).

Canopy. Bare Earth supplemented by vegetation height.

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

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

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

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

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

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

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

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

Data product specification. Detailed description of a data set or data set series together with additional information that will enable it to be created, supplied to and used by another party (ISO 19131*).

Note.— A data product specification provides a description of the universe of discourse and a specification for mapping the universe of discourse to a data set. It may be used for production, sales, end-use or other purpose.

Data quality. A degree or level of confidence that the data provided meet the requirements of the data user in terms of accuracy, resolution and integrity 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. Collection of data sets sharing the same product specification (ISO 19115*).

Datum. Any quantity or set of quantities that may serve as a reference or basis for the calculation of other quantities (ISO 19104*).

Digital Elevation Model (DEM). The representation of terrain surface by continuous elevation values at all intersections of a defined grid, referenced to common datum.

Note.— Digital Terrain Model (DTM) is sometimes referred to as DEM.

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

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

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

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

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

Feature attribute. Characteristic of a feature (ISO 19101*).

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

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

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

b) at the point of interception of the last track specified in the approach procedure; and

ends at a point in the vicinity of an aerodrome from which:

1) a landing can be made; or

2) a missed approach procedure is initiated.

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

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

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

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

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

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

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

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

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

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

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

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

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

Note.— The geoid is irregular in shape because of local gravitational disturbances (wind tides, salinity, current, etc.) and the direction of gravity is perpendicular to the geoid at every point.

Geoid undulation. The distance of the geoid above (positive) or below (negative) the mathematical reference ellipsoid.

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

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

Gregorian calendar. Calendar in general use; first introduced in 1582 to define a year that more closely approximates the tropical year than the Julian calendar (ISO 19108*).

Note.— In the Gregorian calendar, common years have 365 days and leap years 366 days divided into twelve sequential months.

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

Helicopter stand. An aircraft stand which provides for parking a helicopter and where 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.

Holding procedure. A predetermined manoeuvre which keeps an aircraft within a specified airspace while awaiting further clearance.

Hot spot. A location on an aerodrome movement area with a history or potential risk of collision or runway incursion, and where heightened attention by pilots/drivers is necessary.

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

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

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

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

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

a) routine data: there is a very low probability when using corrupted routine data that the continued safe flight and landing of an aircraft would be severely at risk with the potential for catastrophe;

b) essential data: there is a low probability when using corrupted essential data that the continued safe flight and landing of an aircraft would be severely at risk with the potential for catastrophe; and

c) critical data: there is a high probability when using corrupted critical data that the continued safe flight and landing of an aircraft would be severely at risk with the potential for catastrophe.

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

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

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

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

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

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

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

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

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

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

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

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

Metadata. Data about data (ISO 19115[*]).

Note.— Data that describes and documents data.

Minimum en-route altitude (MEA). The altitude for an en-route segment that provides adequate reception of relevant navigation facilities and ATS communications, complies with the airspace structure and provides the required obstacle clearance.

Minimum obstacle clearance altitude (MOCA). The minimum altitude for a defined segment of flight that provides the required obstacle clearance.

Minimum sector altitude (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(s).

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

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

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

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

Note 2.— The term RNP, previously defined as "a statement of the navigation performance necessary for operation within a defined airspace", has been removed from BCAR-4 as the concept of RNP has been overtaken by the concept of PBN. The term RNP in BCAR-4 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.

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.

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

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

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

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

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

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

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

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

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

Point light. A luminous signal appearing without perceptible length.

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

Position (geographical). Set of coordinates (latitude and longitude) referenced to the mathematical reference ellipsoid which define the position of a point on the surface of the Earth.

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

Procedure altitude/height. A 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.

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

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

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

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

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

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".

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.

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

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

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

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

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

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

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

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

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

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.

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 shall account for an area of 360 degrees around the IF.

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

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

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

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

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

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

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

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

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

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

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

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

1.2 Applicability

1.2.1 All charts coming within the scope of this BCAR shall conform to the specifications and requirements relevant to the particular chart.

1.3 Availability

1.3.1 *Information.* The aeronautical charts service provider shall on request by another ICAO Contracting State provide all information relating to its own territory that is necessary to enable the provisions of this BCAR to be met.

1.3.2 *Charts.* The aeronautical charts service provider shall, when so specified, ensure the availability of charts in whichever of the following ways is appropriate for a particular chart or single sheet of a chart series.

1.3.2.1 For any chart or single sheet of a chart series entirely contained within the territory of Bhutan, the aeronautical charts service provider shall either produce the chart or sheet itself, or arrange for its production by a contracted organization.

1.3.2.2 For any chart or single sheet of a chart series which includes the territory of two or more Contracting States, the States having jurisdiction over the territory so included shall determine the manner in which the chart or sheet will be made available. This determination shall be made with due regard being given to regional air navigation agreements and to any programme of allocation established by the Council of ICAO.

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

1.3.3 The Service Provider shall ensure that the information it provides and the aeronautical charts made available are adequate and accurate and that they are maintained up to date by an adequate revision service.

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

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

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* ISO Standard
19101, *Geographic information — Reference model*
19104, *Geographic information — Terminology*
19108, *Geographic information — Temporal schema*
19115, *Geographic information — Metadata*
19117, *Geographic information — Portrayal*
19131, *Geographic information — Data product specifications*

CHAPTER 2. GENERAL SPECIFICATIONS

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

2.1 Operational requirements for charts

2.1.1 The aeronautical charts service provider shall ensure that each type of chart provides information relevant to the function of the chart and its design observes 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 (ICAO Doc 9683).

2.1.2 The aeronautical charts service provider shall ensure that for the safe and expeditious operation of the aircraft, each type of chart provides information appropriate to the phase of flight as listed below:

a) Phase 1 — Taxi from aircraft stand to take-off point;

b) Phase 2 — Take-off and climb to en-route ATS route structure;

c) Phase 3 — En-route ATS route structure;

d) Phase 4 — Descent to approach;

e) Phase 5 — Approach to land and missed approach; and

f) Phase 6 — Landing and taxi to aircraft stand.

2.1.3 The aeronautical charts service provider shall ensure that presentation of information is accurate, free from distortion and clutter, unambiguous, and be readable under all normal operating conditions.

2.1.4 The aeronautical charts service provider shall ensure that colours or tints and type size used are such that the chart can be easily read and interpreted by the pilot in varying conditions of natural and artificial light.

2.1.5 The aeronautical charts service provider shall ensure that information is in a form which enables the pilot to acquire it in a reasonable time consistent with workload and operating conditions.

2.1.6 The aeronautical charts service provider shall ensure that presentation of information provided on each type of chart permits smooth transition from chart to chart as appropriate to the phase of flight.

2.1.7 The aeronautical charts service provider shall ensure that charts are True North orientated.

2.1.8 The aeronautical charts service provider shall ensure that basic sheet size of the charts is 210 x 148 mm (8.27 x 5.82 in) (A5).

2.2 Titles

The aeronautical charts service provider shall ensure that the title of a chart or chart series prepared in accordance with the specifications contained in this BCAR and intended to satisfy the function of the chart are that of the relevant chapter heading as modified by application of any provision contained therein, except that such title shall not include "ICAO" unless the chart conforms with all provisions specified in this Chapter 2 and any specified for the particular chart.

2.3 Miscellaneous information

2.3.1 The aeronautical charts service provider shall ensure that the marginal note layout is as given in Appendix 1 of Annex 4 to the Convention on International Civil Aviation (referred in this BCAR as Chicago Convention), except as otherwise specified for a particular chart.

2.3.2 The aeronautical charts service provider shall ensure that the following information is 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;

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).

2.3.3 The aeronautical charts service provider shall ensure that a legend to the symbols and abbreviations used is provided. The legend shall 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.

2.3.4 The aeronautical charts service provider shall ensure that the name and adequate address of the producing agency are 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.

2.4 Symbols

2.4.1 The aeronautical charts service provider shall ensure that the symbols used conform to those shown in Appendix 2 of Annex 4 to the Chicago Convention, 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.

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.

2.4.2 The aeronautical charts service provider shall ensure that the same basic symbol is used on all charts on which they appear, regardless of chart purpose, to represent ground-based navigation aids, intersections and waypoints.

2.4.3 The aeronautical charts service provider shall ensure that symbol used for significant points is based on a hierarchy of symbols and selected in the following order: ground-based navigation aid, intersection, waypoint symbol. A waypoint symbol shall be used only when a particular significant point does not already exist as either a ground-based navigation aid or intersection.

2.4.4 The aeronautical charts service provider shall ensure that symbols are shown in the manner specified in 2.4.2, 2.4.3 and Appendix 2, symbol number 121 of Annex 4 to the Chicago Convention.

2.5 Units of measurement

2.5.1 The aeronautical charts service provider shall ensure that the distances are derived as geodesic distances.

2.5.2 The aeronautical charts service provider shall ensure that the distances are expressed in either kilometres or nautical miles or both, provided the units are clearly differentiated.

2.5.3 The aeronautical charts service provider shall ensure that the altitudes, elevations and heights are expressed in either metres or feet or both, provided the units are clearly differentiated.

2.5.4 The aeronautical charts service provider shall ensure that the linear dimensions on aerodromes and short distances are expressed in metres.

2.5.5 The aeronautical charts service provider shall ensure that the order of resolution of distances, dimensions, elevations and heights arethat as specified for a particular chart.

2.5.6 The aeronautical charts service provider shall ensure that the units of measurement used to express distances, altitudes, elevations and heights are conspicuously stated on the face of each chart.

2.5.7 The aeronautical charts service provider shall ensure that the conversion scales (kilometres/nautical miles, metres/feet) are provided on each chart on which distances, elevations or altitudes are shown. The conversion scales shall be placed on the face of each chart.

2.6 Scale and projection

2.6.1 The aeronautical charts service provider shall ensure that, for charts of large areas, the name and basic parameters and scale of the projection are indicated.

2.6.2 The aeronautical charts service provider shall ensure that, for charts of small areas, a linear scale only is indicated.

2.7 Date of validity of aeronautical information

The aeronautical charts service provider shall ensure that date of validity of aeronautical information is clearly indicated on the face of each chart.

2.8 Spelling of geographical names

2.8.1 The aeronautical charts service provider shall ensure that the symbols of the Roman alphabet are used for all writing.

2.8.2 The aeronautical charts service provider shall ensure that the names of places and of geographical features in countries which officially use varieties of the Roman alphabet are accepted in their official spelling, including the accents and diacritical marks used in the respective alphabets.

2.8.3 The aeronautical charts service provider shall ensure that, where a geographical term such as "cape", "point", "gulf", or "river" is abbreviated on any particular chart, that word is spelt out in full in the language used by the chart service provider, in respect of the most important example of each type. Punctuation marks shall not be used in abbreviations within the body of a chart.

2.9 Abbreviations

2.9.1 The aeronautical charts service provider shall ensure that abbreviations are used on aeronautical charts whenever they are appropriate.

2.9.2 The aeronautical charts service provider shall ensure that abbreviations are selected from the *Procedures for Air Navigation Services — ICAO Abbreviations and Codes* (ICAO Doc 8400), where applicable.

2.10 Political boundaries

2.10.1 The aeronautical charts service provider shall ensure that international boundaries are shown, but may be interrupted if data more important to the use of the chart would be obscured.

2.10.2 The aeronautical charts service provider shall ensure that, where the territory of more than one State appears on a chart, the names identifying the States are indicated.

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

2.11 Colours

The aeronautical charts service provider shall ensure that the colours used on charts conform to Appendix 3 of Annex 4 to the Chicago Convention.

2.12 Relief

2.12.1 The aeronautical charts service provider shall ensure that relief, where shown, is 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.

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.

2.12.2 The aeronautical charts service provider shall ensure that, where relief is shown by hypsometric tints, the tints used are based on those shown in the Hypsometric Tint Guide in Appendix 4 of Annex 4 to the Chicago Convention.

2.12.3 The aeronautical charts service provider shall ensure that, where spot elevations are used, they are shown for selected critical points.

2.12.3.1 The value of spot elevations of doubtful accuracy shall be followed by the sign ±.

2.13 Prohibited, restricted and danger areas

The aeronautical charts service provider shall ensure that, when prohibited, restricted or danger areas are shown, the reference or other identification is included, except that the nationality letters may be omitted.

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

2.14 Air traffic services airspaces

2.14.1 The aeronautical charts service provider shall ensure that, 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 are indicated, and that the horizontal limits depicted in accordance with Appendix 2 of Annex 4 to the Chicago Convention.

2.14.2 The aeronautical charts service provider shall ensure that, on charts used for visual flight, those parts of the ATS Airspace Classes table in Appendix 4 of Annex 11 to the Chicago Convention, that are applicable to the airspace depicted on the chart are shown on the face or reverse of each chart.

2.15 Magnetic variation

2.15.1 The aeronautical charts service provider shall ensure that True North and magnetic variation are indicated. The order of resolution of magnetic variation shall be as specified for the particular chart.

2.15.2 The aeronautical charts service provider shall ensure that, when magnetic variation is shown on a chart, the values shown are those for the year nearest to the date of publication that is divisible by 5 (e.g. 1980, 1985, etc.). In exceptional cases where the current value would differ by more than one degree after applying the calculation for annual change, an interim date and value shall be quoted.

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

2.15.3 The aeronautical charts service provider shall ensure that, for instrument procedure charts, the publication of any magnetic variation change is completed within a maximum of six AIRAC cycles.

2.15.4 The aeronautical charts service provider shall ensure that, in large terminal areas with multiple aerodromes, a single rounded value of magnetic variation is applied so that the procedures that service multiple aerodromes use a single, common variation value.

2.16 Typography

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

2.17 Aeronautical data

2.17.1 The aeronautical charts service provider shall take all necessary measures to introduce a properly organized quality system containing procedures, processes and resources necessary to implement quality management at each function stage as outlined in BCAR-15, 3.6. The execution of such quality management shall be made demonstrable for each function stage, when required. In addition, it shall be ensured 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 are given in BCAR-15, Chapter 3.

2.17.2 The aeronautical charts service provider shall ensure that the chart resolution of aeronautical data is as specified for the particular chart in PANS-AIM (ICAO Doc 10066), Appendix 1.

2.17.3 The aeronautical charts service provider shall ensure that the integrity of aeronautical data is maintained throughout the data process, from origination to distribution to the next intended user, as specified in PANS-AIM (ICAO Doc 10066), Appendix 1.

2.17.4 The aeronautical charts service provider shall ensure that the digital data error detection techniques are used during the transmission and/or storage of aeronautical data and digital data sets as specified in PANS-AIM (ICAO Doc 10066).

2.18 Common reference systems

2.18.1 Horizontal reference system

2.18.1.1 The aeronautical charts service provider shall ensure that the World Geodetic System — 1984 (WGS-84) is used as the horizontal (geodetic) reference system. Published aeronautical geographical coordinates (indicating latitude and longitude) shall be expressed in terms of the WGS-84 geodetic reference datum.

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

2.18.1.2 The aeronautical charts service provider shall ensure that geographical coordinates which have been transformed into WGS-84 coordinates, but whose accuracy of original field work does not meet the requirements of BCAR-11, Chapter 2, and ICAO Annex 14, Volumes I and II, Chapter 2, are identified by an asterisk.

2.18.1.3 The aeronautical charts service provider shall ensure that the order of chart resolution for geographical coordinates is as specified for the particular chart series in PANS-AIM (ICAO Doc 10066), Appendix 1.

Note.— 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 BCAR-11, Chapter 2; and for aerodrome/heliport-related positions, in ICAO Annex 14, Volumes I and II, Chapter 2.

Note 2.— Specifications concerning the accuracy and integrity classification of WGS-84-related aeronautical data are contained in PANS-AIM (ICAO Doc 10066), Appendix 1.

2.18.2 Vertical reference system

2.18.2.1 The aeronautical charts service provider shall ensure that the mean sea level (MSL) datum, which gives the relationship of gravity-related height (elevation) to a surface known as the geoid, is used as the vertical reference system.

Note 1.— 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.

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.

2.18.2.2 The aeronautical charts service provider shall ensure that, 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 is also published as specified for the particular chart.

Note.— 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 ICAO Annex 14, Volumes I and II, Chapter 2.

Note 2.— Specifications concerning the accuracy and integrity classification of elevation and geoid undulation at specific positions at aerodromes/heliports are contained in PANS-AIM (ICAO Doc 10066), Appendix 1.

2.18.2.3 The aeronautical charts service provider shall ensure that the chart resolution of elevation and geoid undulation is as specified for the particular chart series in PANS-AIM (ICAO Doc 10066), Appendix 1.

2.18.3 Temporal reference system

2.18.3.1 The aeronautical charts service provider shall ensure that the Gregorian calendar and Coordinated Universal Time (UTC) are used as the temporal reference system.

2.18.3.2 The aeronautical charts service provider shall ensure that, when a different temporal reference system is used for charting, this is indicated in GEN 2.1.2 of the Aeronautical Information Publication (AIP).

CHAPTER 3. AERODROME OBSTACLE CHART — ICAO TYPE A (OPERATING LIMITATIONS)

3.1 Function

The aeronautical charts service provider shall ensure that the Aerodrome Obstacle chart – ICAO Type A, in combination with the relevant information published in the AIP, provides the data necessary to enable an operator to comply with the operating limitations of ICAO Annex 6, Part I, Chapter 5, and Part III, Section II, Chapter 3.

3.2 Availability

3.2.1 The aeronautical charts service provider shall ensure that Aerodrome Obstacle Charts — ICAO Type A are made available in the manner prescribed in 1.3.2 for all aerodromes regularly used by international and domestic civil aviation, except for those aerodromes where there are no obstacles in the take-off flight path areas, or where the Aerodrome Terrain and Obstacle Chart — ICAO (Electronic) is provided in accordance with Chapter 5.

3.2.2 The aeronautical charts service provider shall ensure that, where a chart is not required because no obstacles exist in the take-off flight path area, a notification to this effect is published in the AIP.

3.3 Units of measurement

3.3.1 The aeronautical charts service provider shall ensure that elevations are shown to the nearest half-metre or to the nearest foot.

3.3.2 The aeronautical charts service provider shall ensure that linear dimensions are shown to the nearest half-metre.

3.4 Coverage and scale

3.4.1 The aeronautical charts service provider shall ensure that the extent of each plan is sufficient to cover all obstacles.

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

3.4.2 The aeronautical charts service provider shall ensure that the horizontal scale is within the range of 1:10 000 to 1:15 000.

3.4.3 [Reserved]

3.4.4 The aeronautical charts service provider shall ensure that the vertical scale is ten times the horizontal scale.

3.4.5 The aeronautical charts service provider shall ensure that the horizontal and vertical linear scales showing both metres and feet are included in the charts.

3.5 Format

3.5.1 The aeronautical charts service provider shall ensure that the charts depict a plan and profile of each runway; any associated stopway or clearway; the take-off flight path area; and obstacles.

3.5.2 The aeronautical charts service provider shall ensure that the profile for each runway, stopway, clearway and the obstacles in the take-off flight path area are shown above their corresponding plan. The profile of an alternative take-off flight path area shall comprise a linear projection of the full take-off flight path and shall be disposed above its corresponding plan in the manner most suited to the ready interpretation of the information.

3.5.3 The aeronautical charts service provider shall ensure that a profile grid is ruled over the entire profile area exclusive of the runway. The zero for vertical coordinates shall be mean sea level. The zero for horizontal coordinates shall be the end of the runway furthest from the take-off flight path area concerned. Graduation marks indicating the sub-divisions of intervals shall be shown along the base of the grid and along the vertical margins.

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

3.5.4 The aeronautical charts service provider shall ensure that the chart includes:

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

b) a box for recording amendments and dates thereof.

3.6 Identification

The aeronautical charts service provider shall ensure that the chart is identified by the name of the country in which the aerodrome is located; the name of the city, town, or area served by the aerodrome; the name of the aerodrome; and the designator(s) of the runway(s).

3.7 Magnetic variation

The aeronautical charts service provider shall ensure that the magnetic variation to the nearest degree and the date of the information are indicated.

3.8 Aeronautical data

3.8.1 Obstacles

3.8.1.1 The aeronautical charts service provider shall ensure that 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 are regarded as obstacles, except those obstacles lying wholly

below the shadow of other obstacles as defined in 3.8.1.2 need not be shown. Mobile objects such as boats, trains and trucks, which may project above the 1.2 per cent plane, shall be considered obstacles but shall not be considered as being capable of creating a shadow.

3.8.1.2 The aeronautical charts service provider shall ensure that the shadow of an obstacle is considered to be a plane surface originating at a horizontal line passing through the top of the obstacle at right angles to the centre line of the take-off flight path area. The plane covers the complete width of the take-off flight path area and extends to the plane defined in 3.8.1.1 or to the next higher obstacle if it occurs first. For the first 300 m (1 000 ft) of the take-off flight path area, the shadow planes are horizontal and beyond this point such planes have an upward slope of 1.2 per cent.

3.8.1.3 The aeronautical charts service provider shall ensure that, if the obstacle creating a shadow is likely to be removed, objects that would become obstacles by its removal are shown.

3.8.2 Take-off flight path area

3.8.2.1 The aeronautical charts service provider shall ensure that the take-off flight path area consists of a quadrilateral area on the surface of the earth lying directly below, and symmetrically disposed about, the take-off flight path. This area has the following characteristics:

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

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

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

3.8.2.2 The aeronautical charts service provider shall ensure that, 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) is 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 is reduced to 1.0 per cent or less.

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

3.8.3 Declared distances

3.8.3.1 The aeronautical charts service provider shall ensure that the following information for each direction of each runway is entered in the space provided:

a) take-off run available;

b) accelerate-stop distance available;

c) take-off distance available;

d) landing distance available.

3.8.3.2 The aeronautical charts service provider shall ensure that, where a declared distance is not provided because a runway is usable in one direction only, that runway is identified as "not usable for take-off, landing or both".

3.8.4 Plan and profile views

3.8.4.1 The aeronautical charts service provider shall ensure that the plan view shows:

a) the outline of the runways by a solid line, including the length and width, the magnetic bearing to the nearest degree, and the runway number;

b) the outline of the clearways by a broken line, including the length and identification as such;

c) take-off flight path areas by a dashed line and the centre line by a fine line consisting of short and long dashes;

d) alternative take-off flight path areas. When alternative take-off flight path areas not centred on the extension of the runway centre line are shown, notes shall be provided explaining the significance of such areas;

e) obstacles, including:

1) the exact location of each obstacle together with a symbol indicative of its type;

2) the elevation and identification of each obstacle;

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

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

3.8.4.1.1 The nature of the runway and stopway surfaces shall be indicated.

3.8.4.1.2 Stopways shall be identified as such and shall be shown by a broken line.

3.8.4.1.3 When stopways are shown, the length of each stopway shall be indicated.

3.8.4.2 The aeronautical charts service provider shall ensure that the profile view shows:

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 stopway and at the origin of each take-off flight path area, and at each significant change in slope of runway and stopway;

c) obstacles, including:

1) 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;

2) identification of each obstacle;

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

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.

3.9 Accuracy

3.9.1 The aeronautical charts service provider shall ensure that the order of accuracy attained is shown on the chart.

3.9.2 The aeronautical charts service provider shall ensure that the horizontal dimensions and the elevations of the runway, stopway, and clearway to be printed on the chart are determined to the nearest 0.5 m (1 ft).

3.9.3 The aeronautical charts service provider shall ensure that the order of accuracy of the field work and the precision of chart production are 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.

3.9.4 The aeronautical charts service provider shall ensure that, where no accurate datum for vertical reference is available, the elevation of the datum used is stated and identified as assumed.

CHAPTER 4. AERODROME OBSTACLE CHART – ICAO TYPE B

4.1 Function

The aeronautical charts service provider shall ensure that the Aerodrome Obstacle Chart – ICAO Type B provides information to satisfy the following functions:

a) the determination of minimum safe altitudes/heights including those for circling procedures;

b) the determination of procedures for use in the event of an emergency during take-off or landing;

c) the application of obstacle clearing and marking criteria; and

d) the provision of source material for aeronautical charts.

4.2 Availability

4.2.1 The aeronautical charts service provider shall ensure that the Aerodrome Obstacle Charts — ICAO Type B is made available, in the manner prescribed in 1.3.2, for all aerodromes regularly used by international and domestic civil aviation except for those aerodromes where the Aerodrome Terrain and Obstacle Chart — ICAO (Electronic) is provided in accordance with Chapter 5.

4.2.2 The aeronautical charts service provider shall ensure that, when a chart combining the specifications of Chapters 3 and 4 is made available, it is called the Aerodrome Obstacle Chart — ICAO (Comprehensive).

4.3 Units of measurement

4.3.1 The aeronautical charts service provider shall ensure that elevations are shown to the nearest half-metre or to the nearest foot.

4.3.2 The aeronautical charts service provider shall ensure that the linear dimensions are shown to the nearest half-metre.

4.4 Coverage and scale

4.4.1 The aeronautical charts service provider shall ensure that the extent of each plan is sufficient to cover all obstacles.

Note.— Isolated distant obstacles that would unnecessarily increase the sheet size may be indicated by the appropriate symbol and an arrow, provided that the distance and bearing from the aerodrome reference point and elevation are given.

4.4.2 The aeronautical charts service provider shall ensure that the horizontal scale is within the range of 1:10 000 to 1:20 000.

4.4.3 The aeronautical charts service provider shall ensure that a horizontal linear scale showing both metres and feet is included in the chart. When necessary, a linear scale for kilometres and a linear scale for nautical miles shall also be shown.

4.5 Format

The aeronautical charts service provider shall ensure that the charts include:

a) any necessary explanation of the projection used;

b) any necessary identification of the grid used;

c) a notation indicating that obstacles are those which penetrate the surfaces specified in Bhutan Aerodrome Standards, Volume I, Chapter 4;

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.

Note.— Lines of latitude and longitude may be shown across the face of the chart.

4.6 Identification

The aeronautical charts service provider shall ensure that the chart is identified by the name of the country in which the aerodrome is located, the name of the city, town or area served by the aerodrome, and the name of the aerodrome.

4.7 Culture and topography

4.7.1 The aeronautical charts service provider shall ensure that the drainage and hydrographic details are kept to a minimum.

4.7.2 The aeronautical charts service provider shall ensure that the buildings and other salient features associated with the aerodrome are shown, and wherever possible, shown to scale.

4.7.3 The aeronautical charts service provider shall ensure that 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 Bhutan Aerodrome Standards, Volume I, Chapter 4, are shown.

4.7.4 The aeronautical charts service provider shall ensure that the 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, are shown.

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

4.8 Magnetic variation

The aeronautical charts service provider shall ensure that the chart shows a compass rose orientated to the True North, or a North point, showing the magnetic variation to the nearest degree with the date of magnetic information and annual change.

4.9 Aeronautical data

4.9.1 The aeronautical charts service provider shall ensure that the charts show:

a) the aerodrome reference point and its geographical coordinates in degrees, minutes and seconds;

b) the outline of the runways by a solid line;

c) the length and width of the runway;

d) the magnetic bearing to the nearest degree of the runway and the runway number;

e) the elevation of the runway centre line at each end of the runway, at the stopway, at the origin of each take-off and approach area, and at each significant change of slope of runway and stopway;

f) taxiways, aprons and parking areas identified as such, and the outlines by a solid line;

g) stopways identified as such and depicted by a broken line;

h) the length of each stopway;

i) clearways identified as such and depicted by a broken line;

j) the length of each clearway;

k) take-off and approach surfaces identified as such and depicted by a broken line;

l) take-off and approach areas;

Note.— The take-off area is described in 3.8.2.1. The approach area consists of an area on the surface of the earth lying directly below the approach surface as specified in Bhutan Aerodrome Standards, Volume I, Chapter 4.

m) obstacles at their exact location, including:

1) a symbol indicative of their type;

2) elevation;

3) identification;

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

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

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

Note.— The specifications in Bhutan Aerodrome Standards, Volume I, Chapter 4, are minimum requirements. Where the competent authority has established lower surfaces, they may be used in the determination of obstacles.

4.9.1.1 The aeronautical charts service provider shall ensure that the nature of the runway and stopway surfaces is given.

4.9.1.2 The aeronautical charts service provider shall ensure that, 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 is indicated in a prominent manner.

4.9.1.3 The aeronautical charts service provider shall ensure that the extent of tree areas and relief features, parts of which constitute obstacles, is shown.

4.10 Accuracy

4.10.1 The aeronautical charts service provider shall ensure that the order of accuracy attained is shown on the chart.

4.10.2 The aeronautical charts service provider shall ensure that the horizontal dimensions and the elevations of the movement area, stopways and clearways to be printed on the chart are determined to the nearest 0.5 m (1 ft).

4.10.3 The aeronautical charts service provider shall ensure that the order of accuracy of the field work and the precision of chart production are such that the resulting data will be within the maximum deviations indicated herein:

a) Take-off and approach areas:

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

2) 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:

1) 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;

2) 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.

4.10.4 The aeronautical charts service provider shall ensure that, where no accurate datum for vertical reference is available, the elevation of the datum used is stated and identified as assumed.

CHAPTER 5. AERODROME TERRAIN AND OBSTACLE CHART – ICAO (ELECTRONIC)

5.1 Function

The aeronautical charts service provider shall ensure that the Aerodrome Terrain and Obstacle Chart – ICAO (Electronic)portrays 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 ICAO Annex 6, Part I, Chapter 5, and Part III, Section II, Chapter 3, by developing contingency procedures for use in the event of an emergency during a missed approach or take-off, and by performing aircraft operating limitations analysis; and

b) support the following air navigation applications:

1) instrument procedure design (including circling procedure);

2) aerodrome obstacle restriction and removal; and

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

5.2 Availability

5.2.1 The aeronautical charts service provider shall ensure that the aerodrome Terrain and Obstacle Charts - ICAO (Electronic) is made available in the manner specified in 1.3.2 for aerodromes regularly used by international and domestic civil aviation.

Note 1.— Where the Aerodrome Terrain and Obstacle Chart — ICAO (Electronic) is made available, the Aerodrome Obstacle Chart — ICAO Type A (Operating Limitations) and the Aerodrome Obstacle Chart — ICAO Type B are not required (see 3.2.1 and 4.2.1).

Note 2.— The information required by the Precision Approach Terrain Chart — ICAO may be provided in the Aerodrome Terrain and Obstacle Chart — ICAO (Electronic). Where this occurs, the Precision Approach Terrain Chart — ICAO is not required (see 6.2.1).

5.2.2 The aeronautical charts service provider should ensure that Aerodrome Terrain and Obstacle Charts — ICAO (Electronic) are made available in the manner prescribed in 1.3.2 for all aerodrome regularly used by international and domestic civil aviation.

5.2.3 The aeronautical chart service provider shall also make Aerodrome Terrain and Obstacle Chart – ICAO (Electronic) available in hard copy format upon request.

Note.— For specifications regarding hard copy printed output, see 5.7.7.

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

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

5.3 Identification

The aeronautical charts service provider shall ensure that electronic charts are identified by the name of the country in which the aerodrome is located, the name of the city or town which the aerodrome serves, and the name of the aerodrome.

5.4 Chart coverage

The aeronautical charts service provider shall ensure that the extent of each chart is sufficient to cover Area 2 as specified in BCAR-15, Chapter 5.

5.5 Chart content

5.5.1 General

5.5.1.1 The aeronautical charts service provider shall ensure that, 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 are specified by an application schema. Portrayed information shall be provided on the basis of portrayal specifications applied according to defined portrayal rules. Portrayal specifications and portrayal rules shall not be part of the data set. Portrayal rules shall be stored in a portrayal catalogue which shall make reference to separately stored portrayal specifications.

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

5.5.1.2 The aeronautical charts service provider shall ensure that the symbols used to portray features are in accordance with 2.4 and Appendix 2 of Annex 4 to the Chicago Convention.

5.5.2 Terrain feature

5.5.2.1 The aeronautical charts service provider shall ensure that the terrain feature, and associated attributes, to be portrayed and database-linked to the chart are based on the terrain data sets which satisfy the requirements of BCAR-15, Chapter 5.

Note.— Specifications concerning terrain data sets are contained in PANS-AIM (ICAO Doc 10066), Chapter 5 and Appendices 1, 6 and 8.

5.5.2.2 The aeronautical charts service provider shall ensure that the terrain feature is portrayed in a manner that provides an effective general impression of a terrain. This shall be a representation of terrain surface by continuous elevation values at all intersections of the defined grid, also known as the Digital Elevation Model (DEM).

Note.— In accordance with BCAR-15, Chapter 5 and PANS-AIM (ICAO Doc 10066), Chapter 5 and Appendices 1 and 8, the DEM for Area 2 post spacing (grid) is specified at 1 arc second (approximately 30 m).

5.5.2.3 The aeronautical charts service provider shall ensure that, the Representation of terrain surface is provided as a selectable layer of contour lines in addition to the DEM.

5.5.2.4 The aeronautical charts service provider shall ensure that an ortho-rectified image which matches the features on the DEM with features on the overlying image is used to enhance the DEM. The image shall be provided as a separate selectable layer.

5.5.2.5 The aeronautical charts service provider shall ensure that the portrayed terrain feature is linked to the following associated attributes in the database(s):

a) horizontal positions of grid points in geographic coordinates and elevations of the points;

b) surface type;

c) contour line values, if provided; and

d) names of cities, towns and other prominent topographic features.

5.5.2.6 The aeronautical charts service provider shall ensure that the additional terrain attributes provided in the database(s) are linked to the portrayed terrain feature.

Note.— Specifications concerning terrain attributes are contained in PANS-AIM (ICAO Doc 10066), Appendix 6, Table A6-1.

5.5.3 Obstacle features

5.5.3.1 The aeronautical charts service provider shall ensure that obstacle features, and associated attributes, portrayed or database-linked to the chart are based on electronic obstacle data sets which satisfy the requirements of BCAR-15, Chapter 5.

Note.— Specifications concerning obstacle data sets are contained in PANS-AIM (ICAO Doc 10066), Chapter 5 and Appendices 1, 6 and 8.

5.5.3.2 The aeronautical charts service provider shall ensure that each obstacle is portrayed by an appropriate symbol and obstacle identifier.

5.5.3.3 The aeronautical charts service provider shall ensure that the portrayed obstacle feature is linked to the following associated attributes in the database(s):

a) horizontal position in geographic coordinates and associated elevation

b) obstacle type; and

c) obstacle extent, if appropriate.

5.5.3.4 The aeronautical charts service provider shall ensure that additional obstacle attributes provided in the database(s) are linked to the portrayed obstacle feature.

Note.— Specifications concerning obstacle attributes are contained in PANS-AIM (ICAO Doc 10066), Appendix 6, Table A6-2.

5.5.4 Aerodrome features

5.5.4.1 The aeronautical charts service provider shall ensure that aerodrome features, and associated attributes, portrayed and database-linked to the chart are based on aerodrome data which satisfy the requirements of BCAR-15, Chapter 5.

Note.— Specifications concerning aerodrome features and associated attributes are contained in PANS-AIM (ICAO Doc 10066), Chapter 5 and Appendix 1.

5.5.4.2 The aeronautical charts service provider shall ensure that the following aerodrome features are portrayed by an appropriate symbol:

a) aerodrome reference point;

b) runway(s), with designation numbers, and if available, stopway(s) and clearway(s); and

c) taxiways, aprons, large buildings and other prominent aerodrome features.

5.5.4.3 The aeronautical charts service provider shall ensure that the portrayed aerodrome feature is linked to the following associated attributes in the database(s):

a) geographical coordinates of the aerodrome reference point;

b) aerodrome magnetic variation, year of information and annual change;

Note.— Magnetic variation may be database-linked to the aerodrome reference point.

c) length and width of runway(s), stopway(s) and clearway(s);

d) type of surface of runway(s) and stopway(s);

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

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

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

Note.— ICAO Annex 14, Volume I, Attachment A, provides guidance on declared distances.

5.5.5 Radio navigation aid features

The aeronautical charts service provider shall ensure that each radio navigation aid feature located within the chart coverage is portrayed by an appropriate symbol.

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

5.6 Accuracy and resolution

5.6.1 The aeronautical charts service provider shall ensure that the order of accuracy of aeronautical, terrain and obstacle data is in accordance with its intended use.

Note.— Specifications concerning the accuracy of aeronautical, terrain and obstacle data are contained in the PANS-AIM (ICAO Doc 10066), Appendix 1.

5.6.2 The aeronautical charts service provider shall ensure that the aeronautical, terrain and obstacle data resolution commensurate with the actual data accuracy.

Note.— Specifications concerning the order of resolution for aeronautical, terrain and obstacle data are provided in the PANS-AIM (ICAO Doc 10066), Appendix 1.

5.7 Electronic functionality

5.7.1 The aeronautical charts service provider shall ensure that the symbols and text size vary with chart scale to enhance readability.

5.7.2 The aeronautical charts service provider shall ensure that the information on the chart is geo-referenced, and it is possible to determine cursor position to at least the nearest second.

5.7.3 The aeronautical charts service provider shall ensure that the chart is compatible with widely available desktop computer hardware, software and media.

5.7.4 The aeronautical charts service provider shall ensure that the chart includes its own “reader” software.

5.7.5 The aeronautical charts service provider shall ensure that it is not possible to remove information from the chart without an authorized update.

5.7.6 The aeronautical charts service provider shall ensure that, when congestion of information prevents the necessary details from being shown with sufficient clarity on a single comprehensive chart view, selectable information layers are provided to allow for the customized combinations of information.

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

5.7.7 The aeronautical charts service provider shall ensure that, it is possible to print the chart in hard copy format according to the content specifications and scale determined by the user.

Note 1.— Printed output may consist of “tiled” sheets or specific selected areas according to user requirements.

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

5.8 Chart data product specifications

5.8.1 The aeronautical charts service provider shall ensure that a comprehensive statement of the data sets comprising the chart is provided in the form of data product specifications on which basis air navigation users will be able to evaluate the chart data product and determine whether it fulfils the requirements for its intended use (application).

5.8.2 The aeronautical charts service provider shall ensure that the chart data product specifications include an overview, a specification scope, a data product identification, data content information, the reference systems used, the data quality requirements, and information on data capture, data maintenance, data portrayal, data product delivery, as well as any additional information available, and metadata.

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

5.8.3 The aeronautical charts service provider shall ensure that the overview of the chart data product specifications provides an informal description of the product and contains general information about the data product. The specification scope of the chart data product specifications shall contain the spatial (horizontal) extent of the chart coverage. The chart data product identification shall include the title of the product, a brief narrative summary of the content and purpose, and a description of the geographic area covered by the chart.

5.8.4 The aeronautical charts service provider shall ensure that the data content of the chart data product specifications clearly identifies the type of coverage and/or imagery and provides a narrative description of each.

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

5.8.5 The aeronautical charts service provider shall ensure that the chart data product specifications include information that defines the reference systems used. This shall include the spatial reference system (horizontal and vertical) and, if appropriate, temporal reference system. The chart data product specifications shall identify the data quality requirements. This shall include a statement on acceptable conformance quality levels and corresponding data quality measures. This statement shall cover all the data quality elements and data quality sub-elements, even if only to state that a specific data quality element or sub-element is not applicable.

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

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

5.8.7 The aeronautical charts service provider shall ensure that the chart data product specifications contain information on how data are portrayed on the chart, as detailed in 5.5.1.1. The chart data

product specifications shall also contain data product delivery information which shall include delivery formats and delivery medium information.

5.8.8 The aeronautical charts service provider shall ensure that the core chart metadata elements are included in the chart data product specifications. Any additional metadata items required to be supplied shall be stated in the product specifications together with the format and encoding of the metadata.

Note 1.— ISO Standard 19115 specifies requirements for geographic information metadata.

Note 2.— The chart data product specifications document the chart data product which is implemented as data set. Those data sets are described by metadata.

CHAPTER 6. PRECISION APPROACH TERRAIN CHART – ICAO

6.1 Function

The aeronautical charts service provider shall ensure that the Precision Approach Terrain Chart – ICAO provides detailed terrain profile information within a defined portion of the final approach so as to enable aircraft operating agencies to assess the effect of the terrain on decision height determination by the use of radio altimeters.

6.2 Availability

6.2.1 The aeronautical charts service provider shall ensure that the Precision Approach Terrain Chart — ICAO is made available for all precision approach runways Categories II and III at aerodromes used by international civil aviation, except where the requisite information is provided in the Aerodrome Terrain and Obstacle Chart — ICAO (Electronic) in accordance with Chapter 5.

6.2.2 The aeronautical charts service provider shall ensure that the Precision Approach Terrain Chart — ICAO is revised whenever any significant change occurs.

6.3 Scale

6.3.1 The aeronautical charts service provider shall ensure that the horizontal scale is 1:2 500, and the vertical scale 1:500.

6.3.2 The aeronautical charts service provider shall ensure that, 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 is 1:5 000.

6.4 Identification

The aeronautical charts service provider shall ensure that the chart is identified by the name of the country in which the aerodrome is located, the name of the city or town or area which the aerodrome serves, the name of the aerodrome and the designator of the runway.

6.5 Plan and profile information

6.5.1 The aeronautical charts service provider shall ensure that the chart includes:

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.

6.5.2 The aeronautical charts service provider shall ensure that, 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 is shown to a distance not exceeding 2 000 m (6 500 ft) from the runway threshold.

6.5.3 The aeronautical charts service provider shall ensure that the ILS reference datum height is shown to the nearest half metre or foot.

CHAPTER 7. ENROUTE CHART – ICAO

7.1 Function

The aeronautical charts service provider shall ensure that the Enroute Chart – ICAO chart provides flight crews with information to facilitate navigation along ATS routes in compliance with air traffic services procedures.

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

7.2 Availability

7.2.1 The aeronautical charts service provider shall ensure that the Enroute Chart — ICAO is made available in the manner prescribed in 1.3.2 for all areas where flight information regions have been established.

Note.— Under certain conditions, an Area Chart — ICAO may have to be provided. (See Chapter 8.)

7.2.2 The aeronautical charts service provider shall ensure that, where different air traffic services routes, position reporting requirements or lateral limits of flight information regions or control areas exist in different layers of airspace and cannot be shown with sufficient clarity on one chart, separate charts are provided.

7.3 Coverage and scale

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

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

7.3.1 The aeronautical charts service provider shall ensure that the layout of sheet lines is determined by the density and pattern of the ATS route structure.

7.3.2 The aeronautical charts service provider shall ensure that the large variations of scale between adjacent charts showing a continuous route structure are avoided.

7.3.3 The aeronautical charts service provider shall ensure that an adequate overlap of charts is provided to ensure continuity of navigation.

7.4 Projection

7.4.1 The aeronautical charts service provider shall ensure that a conformal projection on which a straight line approximates a great circle are used.

7.4.2 The aeronautical charts service provider shall ensure that the parallels and meridians are shown at suitable intervals.

7.4.3 The aeronautical charts service provider shall ensure that the graduation marks are placed at consistent intervals along selected parallels and meridians.

7.5 Identification

The aeronautical charts service provider shall ensure that each sheet is identified by chart series and number.

7.6 Culture and topography

7.6.1 The aeronautical charts service provider shall ensure that the generalized shore lines of all open water areas, large lakes and rivers are shown except where they conflict with data more applicable to the function of the chart.

7.6.2 The aeronautical charts service provider shall ensure that, within each quadrilateral formed by the parallels and meridians, the area minimum altitude is shown, except as provided for in 7.6.3.

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.

Note 2. — Refer to the Procedures for Air Navigation — Aircraft Operations (PANS OPS, ICAO Doc 8168), Volume II, Part I, Section 2, Chapter 1, 1.8, for method for determination of area minimum altitude.

7.6.3 [Reserved]

7.6.4 The aeronautical charts service provider shall ensure that, where charts are not True North orientated, this fact and the selected orientation used are clearly indicated.

7.7 Magnetic variation

The aeronautical charts service provider shall ensure that the isogonals are indicated and the date of the isogonic information given.

7.8 Bearings, tracks and radials

7.8.1 The aeronautical charts service provider shall ensure that the bearings, tracks and radials are magnetic, except as provided for in 7.8.2. Where bearings and tracks are additionally provided as true values for RNAV segments, they shall be shown in parentheses to the nearest tenth of a degree, e.g. 290° (294.9°T).

7.8.2 [Reserved]

7.8.3 The aeronautical charts service provider shall ensure that where bearings, tracks or radials are given with reference to True North or Grid North, this is clearly indicated. When Grid North is used, its reference grid meridian shall be identified.

7.9 Aeronautical data

7.9.1 Aerodromes

The aeronautical charts service provider shall ensure that all aerodromes used by international civil aviation to which an instrument approach can be made are shown.

Note.— Other aerodromes may be shown.

7.9.2 Prohibited, restricted and danger areas

The aeronautical charts service provider shall ensure that the prohibited, restricted and danger areas relevant to the layer of airspace are depicted with their identification and vertical limits.

7.9.3 Air traffic services system

7.9.3.1 The aeronautical charts service provider shall ensure that, where appropriate, the components of the established air traffic services system are shown.

7.9.3.1.1 The components shall 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;

Note.— Guidance material on the organization 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,

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

2) 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 mile 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;

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 (see BCAR-11, 2.23);

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.

Note.— ADIZ procedures may be described in the chart legend.

7.9.4 Supplementary information

7.9.4.1 The aeronautical charts service provider shall ensure that the details of departure and arrival routes and associated holding patterns in terminal areas are shown unless they are shown on an Area Chart, a Standard Departure Chart — Instrument (SID) — ICAO or a Standard Arrival Chart — Instrument (STAR) — ICAO.

Note 1.— For specifications of these charts, see Chapters 8, 9 and 10.

Note 2.— Departure routes normally originate at the end of a runway; arrival routes normally terminate at the point where an instrument approach is initiated.

7.9.4.2 The aeronautical charts service provider shall ensure that where established, altimeter setting regions are shown and identified.

CHAPTER 8. AREA CHART – ICAO

8.1 Function

The aeronautical charts service provider shall ensure that the Area Chart - ICAO provides the flight crew with information to facilitate the following phases of instrument flight:

a) the transition between the en-route phase and approach to an aerodrome;

b) the transition between take-off/missed approach and en-route phase of flight; and

c) flights through areas of complex ATS routes or airspace structure.

Note.— The function described in 8.1 c) may be satisfied by a separate chart or an inset on an Enroute Chart — ICAO.

8.2 Availability

8.2.1 The aeronautical charts service provider shall ensure that the Area Chart — ICAO is made available in the manner prescribed in 1.3.2 where the air traffic services routes or position reporting requirements are complex and cannot be adequately shown on an Enroute Chart — ICAO.

8.2.2 The aeronautical charts service provider shall ensure that, 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 are provided.

Note.— Under certain conditions, a Standard Departure Chart — Instrument (SID) — ICAO and a Standard Arrival Chart — Instrument (STAR) — ICAO may have to be provided (see Chapters 9 and 10).

8.3 Coverage and scale

8.3.1 The aeronautical charts service provider shall ensure that the coverage of each chart extends to points that effectively show departure and arrival routes.

8.3.2 The aeronautical charts service provider shall ensure that the chart is drawn to scale and a scale-bar is shown.

8.4 Projection

8.4.1 The aeronautical charts service provider shall ensure that a conformal projection on which a straight line approximates a great circle is used.

8.4.2 The aeronautical charts service provider shall ensure that the parallels and meridians are shown at suitable intervals.

8.4.3 The aeronautical charts service provider shall ensure that the graduation marks are placed at consistent intervals along the neat lines, as appropriate.

8.5 Identification

The aeronautical charts service provider shall ensure that the chart is identified by a name associated with the airspace portrayed.

Note.— The name may be that of the air traffic services centre, the name of the largest city or town situated in the area covered by the chart or the name of the city that the aerodrome serves. Where more than one aerodrome serves the city or town, the name of the aerodrome on which the procedures are based should be added.

8.6 Culture and topography

8.6.1 The aeronautical charts service provider shall ensure that the generalized shorelines of all open water areas, large lakes and rivers are shown except where they conflict with data more applicable to the function of the chart.

8.6.2 The aeronautical charts service provider shall ensure that, 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 is shown by smoothed contour lines, contour values and layer tints printed in brown. Appropriate spot elevations, including the highest elevation within each top contour line, shall be shown printed in black. Obstacles shall also be shown.

Note 1.— The next higher suitable contour line appearing on base topographic maps exceeding 300 m (1 000 ft) above the elevation of the primary aerodrome may be selected to start layer tinting.

Note 2.— An appropriate brown colour, on which half-tone layer tinting is to be based, is specified in ICAO Annex 4, Appendix 3 — Colour Guide for contours and topographic features.

Note 3.— Appropriate spot elevations and obstacles are those provided by the procedures specialist.

8.7 Magnetic variation

The aeronautical charts service provider shall ensure that the average magnetic variation of the area covered by the chart is shown to the nearest degree.

8.8 Bearings, tracks and radials

8.8.1 The aeronautical charts service provider shall ensure that the bearings, tracks and radials are magnetic, except as provided for in 8.8.2. Where bearings and tracks are additionally provided as true values for RNAV segments, they shall be shown in parentheses to the nearest tenth of a degree, e.g. 290° (294.9°T).

8.8.2 [Reserved]

8.8.3 The aeronautical charts service provider shall ensure that, where bearings, tracks or radials are given with reference to True North or Grid North, this is clearly indicated. When Grid North is used, its reference grid meridian shall be identified.

8.9 Aeronautical data

8.9.1 Aerodromes

The aeronautical charts service provider shall ensure that all aerodromes which affect the terminal routings are shown. Where appropriate, a runway pattern symbol shall be used.

8.9.2 Prohibited, restricted and danger areas

The aeronautical charts service provider shall ensure that the prohibited, restricted and danger areas are depicted with their identification and vertical limits.

8.9.3 Area minimum altitudes

The aeronautical charts service provider shall ensure that the area minimum altitudes are shown within quadrilaterals formed by the parallels and meridians.

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.

Note 2.— Refer to the Procedures for Air Navigation — Aircraft Operations (PANS OPS, ICAO Doc 8168), Volume II, Part I, Section 2, Chapter 1, 1.8, for method for determination of area minimum altitude.

8.9.4 Air traffic services system

8.9.4.1 The aeronautical charts service provider shall ensure that the components of the established relevant air traffic services system are shown.

8.9.4.1.1 The components shall 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,

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

2) 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;

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;

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 (see BCAR-11, 2.23);

m) established minimum vectoring altitudes to the nearest higher 50 m or 100 ft, clearly identified;

Note 1.— Where ATS surveillance systems are used to vector aircraft to or from significant points on a published standard departure or arrival route or to issue clearance for descent below the minimum sector altitude during arrival, the relevant procedures may be shown on the Area Chart — ICAO unless excessive chart clutter will result.

Note 2.— Where excessive chart clutter will result, an ATC Surveillance Minimum Altitude Chart — ICAO may be provided (see Chapter 21), in which case the elements indicated by 8.9.4.1.1, 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.

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CHAPTER 9. STANDARD DEPARTURE CHART — INSTRUMENT (SID) — ICAO

9.1 Function

The aeronautical charts service provider shall ensure that the Standard Departure Chart – Instrument (SID) – ICAO provides 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 ICAO Annex 11, Appendix 3; guidance material relating to the establishment of such routes is contained in the Air Traffic Services Planning Manual (ICAO 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, ICAO Doc 8168), Volume II, Part II.

9.2 Availability

The aeronautical charts service provider shall ensure that the Standard Departure Chart — Instrument (SID) — ICAO are made available wherever a standard departure route — instrument has been established and cannot be shown with sufficient clarity on the Area Chart — ICAO.

9.3 Coverage and scale

9.3.1 The aeronautical charts service provider shall ensure that the coverage of the chart issufficient to indicate the point where the departure route begins and the specified significant point at which the en-route phase of flight along a designated air traffic services route can be commenced.

Note.— The departure route normally originates at the end of a runway.

9.3.2 The aeronautical charts service provider shall ensure that the chart is drawn to scale.

9.3.3 The aeronautical charts service provider shall ensure that, if the chart is drawn to scale, a scale-bar is shown.

9.3.4 The aeronautical charts service provider shall ensure that, when the chart is not drawn to scale, the annotation “NOT TO SCALE” is shown and the symbol for scale-break is used on tracks and other aspects of the chart which are too large to be drawn to scale.

9.4 Projection

9.4.1 The aeronautical charts service provider shall ensure that a conformal projection on which a straight line approximates a great circle is used.

9.4.2 The aeronautical charts service provider shall ensure that, when the chart is drawn to scale, parallels and meridians are shown at suitable intervals.

9.4.3 The aeronautical charts service provider shall ensure that the graduation marks are placed at consistent intervals along the neat lines.

9.5 Identification

The aeronautical charts service provider shall ensure that the chart is identified by the name of the city or town or area which the aerodrome serves, the name of the aerodrome and the identification of the standard departure route(s) — instrument as established in accordance with the Procedures for Air Navigation Services — Aircraft Operations (PANS-OPS, ICAO Doc 8168), Volume II, Part I, Section 3, Chapter 5.

Note.— The identification of the standard departure route(s) — instrument is provided by the procedures specialist.

9.6 Culture and topography

9.6.1 The aeronautical charts service provider shall ensure that, where the chart is drawn to scale, generalized shore lines of all open water areas, large lakes and rivers are shown except where they conflict with data more applicable to the function of the chart.

9.6.2 The aeronautical charts service provider shall ensure that, to improve situational awareness in areas where significant relief exists, the chart is drawn to scale and all relief exceeding 300 m (1 000 ft) above the aerodrome elevation are shown by smoothed contour lines, contour values and layer tints printed in brown. Appropriate spot elevations, including the highest elevation within each top contour line, shall be shown printed in black. Obstacles shall also be shown.

Note 1.— The next higher suitable contour line appearing on base topographic maps exceeding 300 m (1 000 ft) above the aerodrome elevation may be selected to start layer tinting.

Note 2.— An appropriate brown colour, on which half-tone layer tinting is to be based, is specified in Appendix 3 — Colour Guide for contours and topographic features.

Note 3.— Appropriate spot elevations and obstacles are those provided by the procedures specialist.

9.7 Magnetic variation

The aeronautical charts service provider shall ensure that the magnetic variation used in determining the magnetic bearings, tracks and radials is shown to the nearest degree.

9.8 Bearings, tracks and radials

9.8.1 The aeronautical charts service provider shall ensure that the bearings, tracks and radials are magnetic, except as provided for in 9.8.2. Where bearings and tracks are additionally provided as

true values for RNAV segments, they shall 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.

9.8.2 The aeronautical charts service provider shall ensure that, 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, is used.

9.8.3 The aeronautical charts service provider shall ensure that, where bearings, tracks or radials are given with reference to True North or Grid North, this is clearly indicated. When Grid North is used, its reference grid meridian shall be identified.

9.9 Aeronautical data

9.9.1 Aerodromes

9.9.1.1 The aeronautical charts service provider shall ensure that aerodrome of departure are shown by the runway pattern.

9.9.1.2 The aeronautical charts service provider shall ensure that all aerodromes which affect the designated standard departure route — instrument are shown and identified. Where appropriate, the aerodrome runway patterns shall be shown.

9.9.2 Prohibited, restricted and danger areas

The aeronautical charts service provider shall ensure that the prohibited, restricted and danger areas which may affect the execution of the procedures are shown with their identification and vertical limits.

9.9.3 Minimum sector altitude

9.9.3.1 The aeronautical charts service provider shall ensure that the established minimum sector altitude is shown with a clear indication of the sector to which it applies.

9.9.3.2 The aeronautical charts service provider shall ensure that, where the minimum sector altitude has not been established, the chart is drawn to scale and area minimum altitudes are shown within quadrilaterals formed by the parallels and meridians. Area minimum altitudes shall also be shown in those parts of the chart not covered by the minimum sector altitude.

Note 1.— Depending on the selected chart scale, quadrilaterals formed by the parallels and meridians normally correspond to the half-degree of latitude and longitude.

Note 2.— Refer to the Procedures for Air Navigation — Aircraft Operations (PANS OPS, ICAO Doc 8168), Volume II, Part I, Section 2, Chapter 1, 1.8, for method for determination of area minimum altitude.

9.9.4 Air traffic services system

9.9.4.1 The aeronautical charts service provider shall ensure that the components of the established relevant air traffic services system are shown.

9.9.4.1.1 The components shall comprise the following:

a) a graphic portrayal of each standard departure route — instrument, including:

1) for departure procedures designed specifically for helicopters, the term “CAT H” shall be depicted in the departure chart plan view;

2) route designator;

3) significant points defining the route;

4) track or radial to the nearest degree along each segment of the route;

5) distances to the nearest kilometre or nautical mile between significant points;

6) 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;

7) where the chart is drawn to scale and vectoring on departure is provided, established minimum vectoring altitudes to the nearest higher 50 m or 100 ft, clearly identified;

Note 1.— Where ATS surveillance systems are used to vector aircraft to or from significant points on a published standard departure route, the relevant procedures may be shown on the Standard Departure Chart — Instrument (SID) — ICAO unless excessive chart clutter will result.

Note 2.— Where excessive chart clutter will result, an ATC Surveillance Minimum Altitude Chart — ICAO may be provided (see Chapter 21), in which case the elements indicated by 9.9.4.1.1, a) 6), 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 shall be included whenever close-in obstacles penetrating the OIS exist but which were not considered for the published procedure design gradient;

Note.— In accordance with PANS-OPS, Volume II, information on close-in obstacles is provided by the procedures specialist.

g) area speed restrictions, where established;

h) for PBN procedures, a PBN requirements box;

Note.— Refer to the Procedures for Air Navigation Services — Aircraft Operations (PANS-OPS, ICAO Doc 8168), Volume II, Part III, Section 5 for information on a PBN requirements box.

i) all compulsory and “on-request” reporting points;

j) radio communication procedures, including:

1) call sign(s) of ATS unit(s);

2) frequency and, if applicable, SATVOICE number;

3) transponder setting, where appropriate;

k) an indication of "flyover" significant points.

9.9.4.2 The aeronautical charts service provider shall ensure that a textual description of standard departure route(s) - instrument (SID) and relevant communication failure procedures is provided and, whenever feasible, is shown on the chart or on the same page which contains the chart.

9.9.4.3 Aeronautical database requirements

The aeronautical charts service provider shall ensure that an appropriate data to support navigation database coding is published in accordance with the Procedures for Air Navigation Services — Aircraft Operations (PANS-OPS, ICAO Doc 8168), Volume II, Part III, Section 5, Chapter 2, 2.1, on the verso of the chart or as a separate, properly referenced sheet.

Note.— Appropriate data are those provided by the procedures specialist.

CHAPTER 10. STANDARD ARRIVAL CHART - INSTRUMENT (STAR) – ICAO

10.1 Function

The aeronautical charts service provider shall ensure that the the Standard Arrival Chart – Instrument (STAR) – ICAO provides the flight crew with information to enable it to comply with the designated standard arrival route— instrument from the en-route phase to the approach phase.

Note 1.— Standard arrival routes — instrument are to be interpreted as including "standard descent profiles", "continuous descent approach", and other non-standard descriptions. In the case of a standard descent profile, the depiction of a cross-section is not required.

Note 2.— Provisions governing the identification of standard arrival routes are in ICAO Annex 11, Appendix 3; guidance material relating to the establishment of such routes is contained in the Air Traffic Services Planning Manual (ICAO Doc 9426).

10.2 Availability

The aeronautical charts service provider shall ensure that the Standard Arrival Chart — Instrument (STAR) — ICAO is made available wherever a standard arrival route — instrument has been established and cannot be shown with sufficient clarity on the Area Chart.

10.3 Coverage and scale

10.3.1 The aeronautical charts service provider shall ensure that the coverage of the chart is sufficient to indicate the points where the en-route phase ends and the approach phase begins.

10.3.2 The aeronautical charts service provider shall ensure that the chart is drawn to scale.

10.3.3 The aeronautical charts service provider shall ensure that, if the chart is drawn to scale, a scale-bar is shown.

10.3.4 The aeronautical charts service provider shall ensure that, when the chart is not drawn to scale, the annotation "NOT TO SCALE" is shown and the symbol for scale break is used on tracks and other aspects of the chart which are too large to be drawn to scale.

10.4 Projection

10.4.1 The aeronautical charts service provider shall ensure that a conformal projection on which a straight line approximates a great circle is used.

10.4.2 The aeronautical charts service provider shall ensure that, when the chart is drawn to scale, parallels and meridians are shown at suitable intervals.

10.4.3 The aeronautical charts service provider shall ensure that the graduation marks are placed at consistent intervals along the neat lines.

10.5 Identification

The aeronautical charts service provider shall ensure that the chart is identified by the name of the city, town or area served by the aerodrome, the name of the aerodrome, and the identification of the standard arrival route(s) — instrument, as established in accordance with the Procedures for Air Navigation Services — Aircraft Operations (PANS-OPS, Doc 8168), Volume II, Part I, Section 4, Chapter 2.

Note.— The identification of the standard arrival route(s) — instrument is provided by the procedures specialist.

10.6 Culture and topography

10.6.1 The aeronautical charts service provider shall ensure that the, where the chart is drawn to scale, generalized shore lines of all open water areas, large lakes and rivers are shown except where they conflict with data more applicable to the function of the chart.

10.6.2 The aeronautical charts service provider shall ensure that, to improve situational awareness in areas where significant relief exists, the chart is drawn to scale and all relief exceeding 300 m (1 000 ft) above the aerodrome elevation are shown by smoothed contour lines, contour values and layer tints printed in brown. Appropriate spot elevations, including the highest elevation within each top contour line, shall be shown printed in black. Obstacles shall also be shown.

Note 1.— The next higher suitable contour line appearing on base topographic maps exceeding 300 m (1 000 ft) above the aerodrome elevation may be selected to start layer tinting.

Note 2.— An appropriate brown colour, on which half-tone layer tinting is to be based, is specified in Appendix 3 — Colour Guide for contours and topographic features.

Note 3.— Appropriate spot elevations and obstacles are those provided by the procedures specialist.

10.7 Magnetic variation

The aeronautical charts service provider shall ensure that the magnetic variation used in determining the magnetic bearings, tracks and radials are shown to the nearest degree.

10.8 Bearings, tracks and radials

10.8.1 The aeronautical charts service provider shall ensure that the Bearings, tracks and radials shall be magnetic, except as provided for in 10.8.2. Where bearings and tracks are additionally provided as true values for RNAV segments, they shall 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.

10.8.2 [Reserved]

10.8.3 The aeronautical charts service provider shall ensure that, where bearings, tracks or radials are given with reference to True North or Grid North, this is clearly indicated. When Grid North is used, its reference grid meridian shall be identified.

10.9 Aeronautical data

10.9.1 Aerodromes

10.9.1.1 The aeronautical charts service provider shall ensure that the aerodrome of landing is shown by the runway pattern.

10.9.1.2 The aeronautical charts service provider shall ensure that all aerodromes which affect the designated standard arrival route — instrument are shown and identified. Where appropriate, the aerodrome runway patterns shall be shown.

10.9.2 Prohibited, restricted and danger areas

The aeronautical charts service provider shall ensure that the prohibited, restricted and danger areas which may affect the execution of the procedures are shown with their identification and vertical limits.

10.9.3 Minimum sector altitude

10.9.3.1 The aeronautical charts service provider shall ensure that the established minimum sector altitude is shown with a clear indication of the sector to which it applies.

10.9.3.2 The aeronautical charts service provider shall ensure that, where the minimum sector altitude has not been established, the chart is drawn to scale and area minimum altitudes is shown within quadrilaterals formed by the parallels and meridians. Area minimum altitudes shall also be shown in those parts of the chart not covered by the minimum sector altitude.

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

Note 2.— Refer to the Procedures for Air Navigation — Aircraft Operations (PANS OPS, ICAO Doc 8168), Volume II, Part I, Section 2, Chapter 1, 1.8, for method for determination of area minimum altitude.

10.9.4 Air traffic services system

10.9.4.1 The aeronautical charts service provider shall ensure that the components of the established relevant air traffic services system are shown.

10.9.4.1.1 The components shall comprise the following:

a) a graphic portrayal of each standard arrival route — instrument, including:

1) route designator;

2) significant points defining the route;

3) track or radial to the nearest degree along each segment of the route;

4) distances to the nearest kilometre or nautical mile between significant points;

5) 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;

6) where the chart is drawn to scale and vectoring on arrival is provided, established minimum vectoring altitudes to the nearest higher 50 m or 100 ft, clearly identified;

Note 1.— Where ATS surveillance systems are used to vector aircraft to or from significant points on a published standard arrival route or to issue clearance for descent below the minimum sector altitude during arrival, the relevant procedures may be shown on the Standard Arrival Chart — Instrument (STAR) — ICAO unless excessive chart clutter will result.

Note 2.— Where excessive chart clutter will result, an ATC Surveillance Minimum Altitude Chart — ICAO may be provided (see Chapter 21), in which case the elements indicated by 10.9.4.1.1, a) 6), 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;

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) for PBN procedures, a PBN requirements box;

Note.— Refer to the Procedures for Air Navigation Services — Aircraft Operations (PANS-OPS, ICAO Doc 8168), Volume II, Part III, Section 5 for information on a PBN requirements box.

h) all compulsory and "on-request" reporting points;

i) radio communication procedures, including:

1) call sign(s) of ATS unit(s);

2) frequency and if applicable, SATVOICE number;

3) 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" shall be depicted in the arrival chart plan view.

10.9.4.2 The aeronautical charts service provider shall ensure that a textual description of standard arrival route(s) — instrument (STAR) and relevant communication failure procedures is provided and, whenever feasible, is shown on the chart or on the same page which contains the chart.

10.9.4.3 Aeronautical database requirements

The aeronautical charts service provider shall ensure that an appropriate data to support navigation database coding is published in accordance with the Procedures for Air Navigation Services — Aircraft Operations (PANS-OPS, ICAO Doc 8168), Volume II, Part III, Section 5, Chapter 2, 2.2, on the verso of the chart or as a separate, properly referenced sheet.

Note.— Appropriate data are those provided by the procedures specialist.

CHAPTER 11. INSTRUMENT APPROACH CHART – ICAO

11.1 Function

The aeronautical charts service provider shall ensure that the Instrument Approach Chart – ICAO provides flight crews with information which will enable them to perform an approved instrument approach procedure to the runway of intended landing including the missed approach procedure and, where applicable, associated holding patterns.

Note.— Detailed criteria for the establishment of instrument approach procedures and the resolutions of associated altitudes/heights are contained in the Procedures for Air Navigation Services — Aircraft Operations (PANS-OPS, ICAO Doc 8168).

11.2 Availability

11.2.1 The aeronautical charts service provider shall ensure that the Instrument Approach Charts — ICAO are made available for all aerodromes used by international and domestic civil aviation where instrument approach procedures have been established by the State concerned.

11.2.2 The aeronautical charts service provider shall ensure that a separate Instrument Approach Chart — ICAO is normally be provided for each precision approach procedure established by the State.

11.2.3 The aeronautical charts service provider shall ensure that a separate Instrument Approach Chart — ICAO is normally provided for each non-precision approach procedure established.

Note.— A single precision or non-precision approach procedure chart may be provided to portray more than one approach procedure when the procedures for the intermediate approach, final approach and missed approach segments are identical.

11.2.4 The aeronautical charts service provider shall ensure that, 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 is provided.

Note.— For categories of aircraft, see Procedures for Air Navigation Services — Aircraft Operations (PANS-OPS, ICAO Doc 8168), Volume II, Part I, Section 4, Chapter 9.

11.2.5 The aeronautical charts service provider shall ensure that the Instrument Approach Charts — ICAO are revised whenever information essential to safe operation becomes out of date.

11.3 Coverage and scale

11.3.1 The aeronautical charts service provider shall ensure that the coverage of the chart is sufficient to include all segments of the instrument approach procedure and such additional areas as may be necessary for the type of approach intended.

11.3.2 The aeronautical charts service provider shall ensure that the scale selected ensures optimum legibility consistent with:

a) the procedure shown on the chart;

b) sheet size.

11.3.3 The aeronautical charts service provider shall ensure that a scale indication is given.

11.3.3.1 Except where this is not practicable, a distance circle with a radius of 20 km (10 NM) centred on a DME located on or close to the aerodrome, or on the aerodrome reference point where no suitable DME is available, shall be shown; its radius shall be indicated on the circumference.

11.3.3.2 A distance scale should be shown directly below the profile.

11.4 Format

11.4.1 The aeronautical charts service provider shall ensure that the sheet size is 210 x 148 mm (8.27 x 5.82 in).

11.5 Projection

11.5.1 The aeronautical charts service provider shall ensure that a conformal projection on which a straight line approximates a great circle is used.

11.5.2 The aeronautical charts service provider shall ensure that the graduation marks are placed at consistent intervals along the neat lines.

11.6 Identification

The aeronautical charts service provider shall ensure that the chart is identified by the name of the city, town or area served by the aerodrome, 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, ICAO Doc 8168), Volume II, Part I, Section 4, Chapter 9.

Note.— The identification of the instrument approach procedure is provided by the procedures specialist.

11.7 Culture and topography

11.7.1 The aeronautical charts service provider shall ensure that the 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, are shown. Topographic information shall be named, only when necessary, to facilitate the understanding of such information, and the minimum shall be a delineation of land masses and significant lakes and rivers.

11.7.2 The aeronautical charts service provider shall ensure that the relief is shown in a manner best suited to the particular elevation characteristics of the area. In areas where relief exceeds 1 200 m (4 000

ft) above the aerodrome elevation within the coverage of the chart or 600 m (2 000 ft) within 11 km (6 NM) of the aerodrome reference point or when final approach or missed approach procedure gradient is steeper than optimal due to terrain, all relief exceeding 150 m (500 ft) above the aerodrome elevation shall be shown by smoothed contour lines, contour values and layer tints printed in brown. Appropriate spot elevations, including the highest elevation within each top contour line, shall also be shown printed in black.

Note 1.— The next higher suitable contour line appearing on base topographic maps exceeding 150 m (500 ft) above the aerodrome elevation may be selected to start layer tinting.

Note 2.— An appropriate brown colour, on which half-tone layer tinting is to be based, is specified in Appendix 3 — Colour Guide for contours and topographic features.

Note 3.— Appropriate spot elevations are those provided by the procedures specialist.

11.7.3 The aeronautical charts service provider shall ensure that, in areas where relief is lower than specified in 11.7.2, all relief exceeding 150 m (500 ft) above the aerodrome elevation are shown by smoothed contour lines, contour values and layer tints printed in brown. Appropriate spot elevations, including the highest elevation within each top contour line, should also be shown printed in black.

Note 1.— The next higher suitable contour line appearing on base topographic maps exceeding 150 m (500 ft) above the aerodrome elevation may be selected to start layer tinting.

Note 2.— An appropriate brown colour, on which half-tone layer tinting is to be based, is specified in Appendix 3 — Colour Guide for contours and topographic features.

Note 3.— Appropriate spot elevations are those provided by the procedures specialist.

11.8 Magnetic variation

11.8.1 The aeronautical charts service provider shall ensure that the magnetic variation is shown.

11.8.2 The aeronautical charts service provider shall ensure that, when shown, the value of the variation, indicated to the nearest degree, agrees with that used in determining magnetic bearings, tracks and radials.

11.9 Bearings, tracks and radials

11.9.1 The aeronautical charts service provider shall ensure that the bearings, tracks and radials are magnetic, except as provided for in 11.9.2. Where bearings and tracks are additionally provided as true values for RNAV segments, they shall 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.

11.9.2 [Reserved]

11.9.3 The aeronautical charts service provider shall ensure that, where bearings, tracks or radials are given with reference to True North or Grid North, this is clearly indicated. When Grid North is used, its reference grid meridian shall be identified.

11.10 Aeronautical data

11.10.1 Aerodromes

11.10.1.1 The aeronautical charts service provider shall ensure that all aerodromes which show a distinctive pattern from the air are shown by the appropriate symbol. Abandoned aerodromes shall be identified as abandoned.

11.10.1.2 The aeronautical charts service provider shall ensure that runway pattern, at a scale sufficiently large to show it clearly, is 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.

11.10.1.3 The aeronautical charts service provider shall ensure that the aerodrome elevation is shown to the nearest metre or foot in a prominent position on the chart.

11.10.1.4 The aeronautical charts service provider shall ensure that the threshold elevation or, where applicable, the highest elevation of the touchdown zone is shown to the nearest metre or foot.

11.10.2 Obstacles

11.10.2.1 The aeronautical charts service provider shall ensure that the obstacles are shown on the plan view of the chart.

Note.— Appropriate obstacles are those provided by the procedures specialist.

11.10.2.2 The aeronautical charts service provider shall ensure that, if one or more obstacles are the determining factor of an obstacle clearance altitude/height, those obstacles are identified.

11.10.2.3 The aeronautical charts service provider shall ensure that the elevation of the top of obstacles are shown to the nearest (next higher) metre or foot.

11.10.2.4 The aeronautical charts service provider shall ensure that the heights of obstacles above a datum other than mean sea level (see 11.10.2.3) are shown. When shown, they shall be given in parentheses on the chart.

11.10.2.5 The aeronautical charts service provider shall ensure that, 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 shall be the threshold elevation of the runway to which the instrument approach is related.

11.10.2.6 The aeronautical charts service provider shall ensure that, where a datum other than mean sea level is used, it is stated in a prominent position on the chart.

11.10.2.7 The aeronautical charts service provider shall ensure that, where an obstacle free zone has not been established for a precision approach runway Category I, this is indicated.

11.10.3 Prohibited, restricted and danger areas

The aeronautical charts service provider shall ensure that the prohibited areas, restricted areas, and danger areas which may affect the execution of the procedures are shown with their identification and vertical limits.

11.10.4 Radio communication facilities and navigation aids

11.10.4.1 The aeronautical charts service provider shall ensure that the radio navigation aids required for the procedures together with their frequencies, identifications and track-defining characteristics, if any, are shown. In the case of a procedure in which more than one station is located on the final approach track, the facility to be used for track guidance for final approach shall be clearly identified. In addition, consideration shall be given to the elimination from the approach chart of those facilities that are not used by the procedure.

11.10.4.1.1 The aeronautical charts service provider shall ensure that, when a radio navigation aid is used as a significant point for area navigation, only its plain language name and identification are shown.

11.10.4.2 The aeronautical charts service provider shall ensure that 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 are shown and identified.

11.10.4.3 The aeronautical charts service provider shall ensure that, when the final approach fix is used for conventional navigation (or final approach point for an ILS approach procedure), it is identified with its geographical coordinates in degrees, minutes and seconds.

11.10.4.4 The aeronautical charts service provider shall ensure that the radio navigation aids that might be used in diversionary procedures together with their track-defining characteristics, if any, are shown or indicated on the chart.

11.10.4.5 The aeronautical charts service provider shall ensure that the radio communication frequencies, including call signs that are required for the execution of the procedures are shown.

11.10.4.6 The aeronautical charts service provider shall ensure that, when required by the procedures, the distance to the aerodrome from each radio navigation aid concerned with the final approach is shown to the nearest kilometre or nautical mile. When no track-defining aid indicates the bearing of the aerodrome, the bearing shall also be shown to the nearest degree.

11.10.5 Minimum sector altitude or terminal arrival altitude

The aeronautical charts service provider shall ensure that the minimum sector altitude or terminal arrival altitude are shown, with a clear indication of the sector to which it applies.

11.10.6 Portrayal of procedure tracks

11.10.6.1 The aeronautical charts service provider shall ensure that the plan view shows 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.

11.10.6.2 The aeronautical charts service provider shall ensure that the plan view shows the distance to the aerodrome from each radio navigation aid concerned with the final approach.

11.10.6.3 The aeronautical charts service provider shall ensure that a profile is 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, procedure altitudes/heights and heliport crossing height (HCH), where established;

g) limiting distance to the nearest kilometre or nautical mile on procedure turn, when specified;

h) the intermediate approach fix or point, on procedures where no course reversal is authorized;

i) a line representing the aerodrome elevation or threshold elevation, as appropriate, extended across the width of the chart including a distance scale with its origin at the runway threshold.

11.10.6.4 The aeronautical charts service provider shall ensure that the heights required by procedures are shown in parentheses, using the height datum selected in accordance with 11.10.2.5.

11.10.6.5 The aeronautical charts service provider shall ensure that the profile view includes a ground profile or a minimum altitude/height portrayal as follows:

a) a ground profile shown by a solid line depicting the highest elevations of the relief occurring within the primary area of the final approach segment. The highest elevations of the relief occurring in the secondary areas of the final approach segment shown by a dashed line; or

b) minimum altitudes/heights in the intermediate and final approach segments indicated within bounded shaded blocks.

Note 1.— For the ground profile portrayal, actual templates of the primary and secondary areas of the final approach segment are provided to the cartographer by the procedures specialist.

Note 2.— The minimum altitude/height portrayal is intended for use on charts depicting non-precision approaches with a final approach fix.

11.10.7 Aerodrome operating minima

11.10.7.1 The aeronautical charts service provider shall ensure that the aerodrome operating minima when established by the State is shown.

11.10.7.2 The aeronautical charts service provider shall ensure that the obstacle clearance altitudes/heights for the aircraft categories for which the procedure is designed are shown; for precision approach procedures, additional OCA/H for Cat D_L aircraft (wing span between 65 m and 80 m and/or vertical distance between the flight path of the wheels and the glide path antenna between 7 m and 8 m) shall be published, when necessary.

11.10.8 Supplementary information

11.10.8.1 The aeronautical charts service provider shall ensure that, 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 are shown.

11.10.8.2 The aeronautical charts service provider shall ensure that, 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, is shown. The table shall not include distances which would correspond to altitudes/heights below the OCA/H.

11.10.8.3 The aeronautical charts service provider shall ensure that, or 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 is included.

11.10.8.4 The aeronautical charts service provider shall ensure that a rate of descent table is shown.

11.10.8.5 The aeronautical charts service provider shall ensure that, 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, the descent angle to the nearest one-tenth of a degree is shown.

11.10.8.6 The aeronautical charts service provider shall ensure that, 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 are shown.

11.10.8.7 The aeronautical charts service provider shall ensure that, when a final approach fix is specified at the final approach point for ILS, a clear indication is given whether it applies to the ILS, the associated ILS localizer only procedure, or both. In the case of MLS, a clear indication shall be given when an FAF has been specified at the final approach point.

11.10.8.8 The aeronautical charts service provider shall ensure that, 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 is included.

11.10.8.9 The aeronautical charts service provider shall ensure that a note is included on the chart indicating the approach procedures that are authorized for simultaneous independent or dependent operations. The note shall include the runway(s) involved and if they are closely spaced.

11.10.8.10 The aeronautical charts service provider shall ensure that, for approach procedures having PBN segments, a PBN requirements box is included.

Note.— Refer to the Procedures for Air Navigation Services — Aircraft Operations (PANS-OPS, Doc 8168), Volume II, Part III, Section 5 for information on a PBN requirements box.

11.10.9 Aeronautical database requirements

The aeronautical charts service provider shall ensure that an appropriate data to support navigation database coding is published in accordance with the 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.

Note.— Appropriate data are those provided by the procedures specialist.

CHAPTER 12. VISUAL APPROACH CHART — ICAO

12.1 Function

The aeronautical charts service provider shall ensure that the Visual Approach Chart – ICAO provides 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.

12.2 Availability

The aeronautical charts service provider shall ensure that the Visual Approach Chart — ICAO is made available in the manner prescribed in 1.3.2 for all aerodromes used by both domestic and 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.

12.3 Scale

12.3.1 The aeronautical charts service provider shall ensure that the scale is sufficiently large to permit depiction of significant features and indication of the aerodrome layout.

12.3.2 The aeronautical charts service provider shall ensure that the scale is not smaller than 1:500 000.

Note.— A scale of 1:250 000 or 1:200 000 is preferred.

12.3.3 The aeronautical charts service provider shall ensure that, when an Instrument Approach Chart is available for a given aerodrome, the Visual Approach Chart is drawn to the same scale.

12.4 Format

The aeronautical charts service provider shall ensure that sheet size is 210 x 148 mm (8.27 x 5.82 in) (A4).

Note.— It would be advantageous to print the charts in several colours, selected to provide maximum legibility in varying degrees and kinds of light.

12.5 Projection

12.5.1 The aeronautical charts service provider shall ensure that a conformal projection on which a straight line approximates a great circle is used.

12.5.2 The aeronautical charts service provider shall ensure that the graduation marks is placed at consistent intervals along the neat lines.

12.6 Identification

The aeronautical charts service provider shall ensure that the chart is identified by the name of the city or town which the aerodrome serves and the name of the aerodrome.

12.7 Culture and topography

12.7.1 The aeronautical charts service provider shall ensure that the natural and cultural landmarks are shown (e.g. bluffs, cliffs, sand dunes, cities, towns, roads, railroads, isolated lighthouses).

12.7.1.1 Geographical place names shall be included only when they are required to avoid confusion or ambiguity.

12.7.2 The aeronautical charts service provider shall ensure that the shore lines, lakes, rivers and streams are shown.

12.7.3 The aeronautical charts service provider shall ensure that the relief is shown in a manner best suited to the particular elevation and obstacle characteristics of the area covered by the chart.

12.7.4 The aeronautical charts service provider shall ensure that, when shown, spot elevations are carefully selected.

Note.— The value of certain spot elevations/heights in relation to both mean sea level and aerodrome elevation may be given.

12.7.5 The aeronautical charts service provider shall ensure that the figures relating to different reference levels are clearly differentiated in their presentation.

12.8 Magnetic variation

The aeronautical charts service provider shall ensure that the magnetic variation is shown.

12.9 Bearings, tracks and radials

12.9.1 The aeronautical charts service provider shall ensure that the bearings, tracks and radials are magnetic except as provided for in 12.9.2.

12.9.2 [Reserved]

12.9.3 The aeronautical charts service provider shall ensure that, where bearings, tracks or radials are given with reference to True North or Grid North, this is clearly indicated. When Grid North is used, its reference grid meridian shall be identified.

12.10 Aeronautical data

12.10.1 Aerodromes

12.10.1.1 The aeronautical charts service provider shall ensure that, all aerodromes are shown by the runway pattern. Restrictions on the use of any landing direction shall be indicated. Where there is any risk of confusion between two neighbouring aerodromes, this shall be indicated. Abandoned aerodromes shall be identified as abandoned.

12.10.1.2 The aeronautical charts service provider shall ensure that the aerodrome elevation is shown in a prominent position on the chart.

12.10.2 Obstacles

12.10.2.1 The aeronautical charts service provider shall ensure that the obstacles are shown and identified.

12.10.2.2 The aeronautical charts service provider shall ensure that the elevation of the top of obstacles is shown to the nearest (next higher) metre or foot.

12.10.2.3 The aeronautical charts service provider shall ensure that the heights of obstacles above the aerodrome elevation are shown.

12.10.2.3.1 When the heights of obstacles are shown, the height datum shall be stated in a prominent position on the chart and the heights shall be given in parentheses on the chart.

12.10.3 Prohibited, restricted and danger areas

The aeronautical charts service provider shall ensure that the prohibited areas, restricted areas, and danger areas are depicted with their identification and vertical limits.

12.10.4 Designated airspace

The aeronautical charts service provider shall ensure that, where applicable, control zones and aerodrome traffic zones are depicted with their vertical limits and the appropriate class of airspace.

12.10.5 Visual approach information

12.10.5.1 The aeronautical charts service provider shall ensure that the visual approach procedures are shown where applicable.

12.10.5.2 The aeronautical charts service provider shall ensure that the visual aids for navigation are shown as appropriate.

12.10.5.3 The aeronautical charts service provider shall ensure that the 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, are shown.

12.10.6 Supplementary information

12.10.6.1 The aeronautical charts service provider shall ensure that the radio navigation aids together with their frequencies and identifications are shown as appropriate.

12.10.6.2 The aeronautical charts service provider shall ensure that the radio communication facilities with their frequencies are shown as appropriate.

CHAPTER 13. AERODROME/HELIPORT CHART – ICAO

13.1 Function

The aeronautical charts service provider shall ensure that the Aerodrome/Heliport Chart – ICAO provides flight crews with information which will facilitate the ground movement of aircraft:

a) from the aircraft stand to the runway; and

b) from the runway to the aircraft stand;

and helicopter movement:

a) from the helicopter stand to the touchdown and lift-off area and to the final approach and take-off area;

b) from the final approach and take-off area to the touchdown and lift-off area and to the helicopter stand;

c) along helicopter ground and air taxiways; and

d) along air transit routes.

It shall also provide essential operational information at the aerodrome/heliport.

13.2 Availability

13.2.1 The aeronautical charts service provider shall ensure that the Aerodrome/Heliport Chart — ICAO is made available in the manner prescribed in 1.3.2 for all aerodromes/heliports regularly used by domestic and international civil aviation.

13.2.2 The aeronautical charts service provider shall ensure that the Aerodrome/Heliport Chart — ICAO is made available also, in the manner prescribed in 1.3.2, for all other aerodromes/heliports available for use by both domestic and international civil aviation.

Note.— Under certain conditions, an Aerodrome Ground Movement Chart — ICAO and an Aircraft Parking/Docking Chart — ICAO may have to be provided (see Chapters 14 and 15); in which case, the elements portrayed on these supplementary charts need not be duplicated on the Aerodrome/Heliport Chart — ICAO.

13.3 Coverage and scale

13.3.1 The aeronautical charts service provider shall ensure that the coverage and scale are sufficiently large to show clearly all the elements listed in 13.6.1.

13.3.2 The aeronautical charts service provider shall ensure that a linear scale is shown.

13.4 Identification

The aeronautical charts service provider shall ensure that chart is identified by the name of the city or town or area which the aerodrome/heliport serves and the name of the aerodrome/heliport.

13.5 Magnetic variation

The aeronautical charts service provider shall ensure that the True and Magnetic North arrows and magnetic variation to the nearest degree and annual change of the magnetic variation are shown.

13.6 Aerodrome/heliport data

13.6.1 The aeronautical charts service provider shall ensure that this chart shows:

a) geographical coordinates in degrees, minutes and seconds for the aerodrome/heliport reference point;

b) elevations, to the nearest metre or foot, of the aerodrome/heliport and apron (altimeter checkpoint locations) where applicable; and for non-precision approaches, elevations and geoid undulations of runway thresholds and the geometric centre of the touchdown and lift-off area;

c) elevations and geoid undulations, to the nearest half-metre or foot, of the precision approach runway threshold, the geometric centre of the touchdown and lift-off area, and at the highest elevation of the touchdown zone of a precision approach runway;

d) all runways including those under construction with designation number, length and width to the nearest metre, bearing strength, displaced thresholds, stopways, clearways, runway directions to the nearest degree magnetic, type of surface and runway markings;

Note.— Bearing strengths may be shown in tabular form on the face or verso of the chart.

e) all aprons, with aircraft/helicopter stands, lighting, markings and other visual guidance and control aids, where applicable, including location and type of visual docking guidance systems, type of surface for heliports, and bearing strengths or aircraft type restrictions where the bearing strength is less than that of the associated runways;

Note.— Bearing strengths or aircraft type restrictions may be shown in tabular form on the face or verso of the chart.

f) geographical coordinates in degrees, minutes and seconds for thresholds, geometric centre of touchdown and lift-off area and/or thresholds of the final approach and take-off area (where appropriate);

g) all taxiways, helicopter air and ground taxiways with type of surface, helicopter air transit routes, with designations, width, lighting, markings (including runway-holding positions and, where established, intermediate holding positions), stop bars, other visual guidance and control aids, and bearing strength or aircraft type restrictions where the bearing strength is less than that of the associated runways;

Note.— Bearing strengths or aircraft type restrictions may be shown in tabular form on the face or verso of the chart.

h) where established, hot spot locations with additional information properly annotated;

Note.— Additional information regarding hot spots may be shown in tabular form on the face or verso of the chart.

i) geographical coordinates in degrees, minutes, seconds and hundredths of seconds for appropriate taxiway centre line points and aircraft stands;

j) where established, standard routes for taxiing aircraft with their designators;

k) the boundaries of the air traffic control service;

l) position of runway visual range (RVR) observation sites;

m) approach and runway lighting;

n) location and type of the visual approach slope indicator systems with their nominal approach slope angle(s), minimum eye height(s) over the threshold of the on-slope signal(s), and where the axis of the system is not parallel to the runway centre line, the angle and direction of the displacement, i.e. left or right;

o) relevant communication facilities listed with their channels and, if applicable, logon address 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.

13.6.2 The aeronautical charts service provider shall ensure that, for aerodromes accommodating aeroplanes with folding wing tips, the areas where it is safe for aeroplanes with folding wing tips to operate with wing tips extended, are shown on the chart.

13.6.3 The aeronautical charts service provider shall ensure that, in addition to the items in 13.6.1 relating to heliports, the chart shows:

a) heliport type;

Note.— Heliport types are identified in ICAO Annex 14, Volume II, as surface-level, elevated or helideck.

b) touchdown and lift-off area including dimensions to the nearest metre, slope, type of surface and bearing strength in tonnes;

c) final approach and take-off area including type, true bearing to the nearest degree, designation number (where appropriate), length and width to the nearest metre, slope and type of surface;

d) safety area including length, width and type of surface;

e) helicopter clearway including length and ground profile;

f) obstacles including type and elevation of the top of the obstacles to the nearest (next higher) metre or foot;

g) visual aids for approach procedures, marking and lighting of final approach and take-off area, and of touchdown and lift-off area;

h) declared distances to the nearest metre for heliports, where relevant, including:

1) take-off distance available;

2) rejected take-off distance available;

3) landing distance available.

CHAPTER 14. AERODROME GROUND MOVEMENT CHART – ICAO

14.1 Function

The aeronautical charts service provider shall ensure that the Aerodrome Ground Movement Chart – ICAO provides flight crews with detailed information to facilitate the ground movement of aircraft to and from the aircraft stands and the parking/docking of aircraft.

14.2 Availability

The aeronautical charts service provider shall ensure that the Aerodrome Ground Movement Chart — ICAO is made available in the manner prescribed in 1.3.2 where, due to congestion of information, details necessary for the ground movement of aircraft along the taxiways to and from the aircraft stands cannot be shown with sufficient clarity on the Aerodrome/Heliport Chart — ICAO.

14.3 Coverage and scale

14.3.1 The aeronautical charts service provider shall ensure that the coverage and scale are sufficiently large to show clearly all the elements listed in 14.6.

14.3.2 The aeronautical charts service provider shall ensure that a linear scale is shown.

14.4 Identification

The aeronautical charts service provider shall ensure that the chart is identified by the name of the city or town or area which the aerodrome serves and the name of the aerodrome.

14.5 Magnetic variation

14.5.1 The aeronautical charts service provider shall ensure that a True North arrow is shown.

14.5.2 The aeronautical charts service provider shall ensure that the magnetic variation to the nearest degree and its annual change is shown.

Note.— This chart need not be True North orientated.

14.6 Aerodrome data

14.6.1 The aeronautical charts service provider shall ensure that this chart shows 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 meter or foot;

b) aprons with aircraft stands, bearing strengths or aircraft type restrictions, lighting, marking and other visual guidance and control aids, where applicable, including location and type of visual docking guidance systems;

c) geographical coordinates in degrees, minutes, seconds and hundredths of seconds for aircraft stands;

d) taxiways with designations, width to the nearest metre, bearing strength or aircraft type restrictions where applicable, lighting, markings (including runway-holding positions and, where established, intermediate holding positions), stop bars, and other visual guidance and control aids;

e) where established, hot spot locations with additional information properly annotated;

Note.— Additional information regarding hot spots may be shown in tabular form on the face or verso of the chart.

f) where established, standard routes for taxiing aircraft, with their designators;

g) geographical coordinates in degrees, minutes, seconds and hundredths of seconds for appropriate taxiway centre line points;

h) the boundaries of the air traffic control service;

i) relevant communication facilities listed with their channels and, if applicable, logon address;

j) obstacles to taxiing;

k) aircraft servicing areas and buildings of operational significance;

l) VOR checkpoint and radio frequency of the aid concerned;

m) any part of the depicted movement area permanently unsuitable for aircraft, clearly identified as such.

14.6.2 The aeronautical charts service provider shall ensure that, for aerodromes accommodating aeroplanes with folding wing tips, the areas where it is safe for aeroplanes with folding wing tips to operate with wing tips extended, are shown on the chart.

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CHAPTER 15. AIRCRAFT PARKING/DOCKING CHART — ICAO

15.1 Function

The aeronautical charts service provider shall ensure that the Aircraft Parking/Docking Chart – ICAO provides flight crews with detailed information to facilitate the ground movement of aircraft between the taxiways and the aircraft stands and the parking/docking of aircraft.

15.2 Availability

The aeronautical charts service provider shall ensure that the Aircraft Parking/Docking Chart — ICAO is made available in the manner prescribed in 1.3.2 where, due to the complexity of the terminal facilities, the information cannot be shown with sufficient clarity on the Aerodrome/Heliport Chart — ICAO or on the Aerodrome Ground Movement Chart — ICAO.

15.3 Coverage and scale

15.3.1 The aeronautical charts service provider shall ensure that the coverage and scale are sufficiently large to show clearly all the elements listed in 15.6.

15.3.2 The aeronautical charts service provider shall ensure that a linear scale is shown.

15.4 Identification

The aeronautical charts service provider shall ensure that the chart is identified by the name of the city or town or area which the aerodrome serves and the name of the aerodrome.

15.5 Magnetic variation

15.5.1 The aeronautical charts service provider shall ensure that a True North arrow is shown.

15.5.2 The aeronautical charts service provider shall ensure that the magnetic variation to the nearest degree and its annual change is shown.

Note.— This chart need not be True North orientated.

15.6 Aerodrome data

The aeronautical charts service provider shall ensure that this chart shows in a similar manner all the information on the Aerodrome/Heliport Chart — ICAO and the Aerodrome Ground Movement Chart — ICAO relevant to the area depicted, including:

a) apron elevation to the nearest metre or foot;

b) aprons with aircraft stands, bearing strengths or aircraft type restrictions, lighting, marking and other visual guidance and control aids, where applicable, including location and type of visual docking guidance systems;

c) geographical coordinates in degrees, minutes, seconds and hundredths of seconds for aircraft stands;

d) taxiway entries with designations, including runway-holding positions and, where established, intermediate holding positions, and stop bars;

e) where established, hot spot locations with additional information properly annotated;

Note.— Additional information regarding hot spots may be shown in tabular form on the face or verso of the chart.

f) geographical coordinates in degrees, minutes, seconds and hundredths of seconds for appropriate taxiway centre line points;

g) the boundaries of the air traffic control service;

h) relevant communication facilities listed with their channels and, if applicable, logon address;

i) obstacles to taxiing;

j) aircraft servicing areas and buildings of operational significance;

k) VOR checkpoint and radio frequency of the aid concerned;

l) any part of the depicted movement area permanently unsuitable for aircraft, clearly identified as such.

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CHAPTER 16. WORLD AERONAUTICAL CHART – ICAO 1:1000 000

16.1 Function

The aeronautical charts service provider shall ensure that the World Aeronautical Chart – ICAO 1:1 000 000 provides information to satisfy the requirements of visual air navigation.

Note.— This chart may also serve:

a) as a basic aeronautical chart:

1) when highly specialized charts lacking visual information do not provide essential data;

2) to provide complete world coverage at a constant scale with a uniform presentation of planimetric data;

3) in the production of other charts required by international civil aviation;

b) as a pre-flight planning chart.

16.2 Availability

16.2.1 The aeronautical charts service provider shall ensure that the World Aeronautical Chart — ICAO 1:1 000 000 is made available in the manner prescribed in 1.3.2 for all areas delineated in Appendix 5 of Annex 4 to the Chicago Convention.

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.

16.2.2 The aeronautical charts service provider shall ensure that, 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 is determined by regional agreement.

16.3 Scales

16.3.1 The aeronautical charts service provider shall ensure that the linear scales for kilometres and nautical miles arranged in the following order:

— kilometres,

— nautical miles,

with their zero points in the same vertical line is shown in the margin.

16.3.1.1 The length of the linear scales shall represent at least 200 km (110 NM).

16.3.2 The aeronautical charts service provider shall ensure that a conversion scale (metres/feet) is shown in the margin.

16.4 Format

16.4.1 The aeronautical charts service provider shall ensure that the title and marginal notes are in one of the working languages of ICAO.

Note.— The language of the publishing country may be used in addition to the ICAO working language.

16.4.2 The aeronautical charts service provider shall ensure that the information regarding the number of the adjoining sheets and the unit of measurement to express elevations is located so as to be clearly visible when the sheet is folded.

16.4.3 The aeronautical charts service provider shall ensure that 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.

16.4.4 The aeronautical charts service provider shall ensure that, whenever practicable, the sheet lines conform with those shown in the index in Appendix 5 of Annex 4 to the Chicago Convention.

Note 1.— The area covered by a sheet may vary from the lines shown to satisfy particular requirements.

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.

16.4.5 The aeronautical charts service provider shall ensure that the overlaps are provided by extending the chart area on the top and right side beyond the area given on the index. This overlap area shall contain all aeronautical, topographical, hydrographical and cultural information. The overlap shall 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.

16.5 Projection

16.5.1 The aeronautical charts service provider shall ensure that the projections are 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 shall 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.

16.5.2 The aeronautical charts service provider shall ensure that the graticules and graduations are 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°

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)

16.5.3 The aeronautical charts service provider shall ensure that the graduation marks at 1 and 5 intervals shall extend away from the Greenwich Meridian and from the Equator. Each 10 interval shall be shown by a mark on both sides of the graticule line.

16.5.3.1 The length of the graduation marks shall be approximately 1.3 mm (0.05 in) for the 1 interval, 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.

16.5.4 The aeronautical charts service provider shall ensure that all meridians and parallels shown are numbered in the borders of the chart. In addition, each parallel shall be numbered within the body of the chart in such a manner that the parallel can be readily identified when the chart is folded.

Note.— Meridians may be numbered within the body of the chart.

16.5.5 The aeronautical charts service provider shall ensure that the name and basic parameters of the projection are indicated in the margin.

16.6 Identification

Sheet numbering shall be in conformity with the index in Appendix 5 of Annex 4 to the Chicago Convention.

Note.— The corresponding International Map of the World (IMW) sheet number may also be shown.

16.7 Culture and topography

16.7.1 Built-up areas

16.7.1.1 The aeronautical charts service provider shall ensure that the cities, towns and villages are selected and shown according to their relative importance to visual air navigation.

16.7.1.2 The aeronautical charts service provider shall ensure that the cities and towns of sufficient size are indicated by the outline of their built-up areas and not of their established city limits.

16.7.2 Railroads

16.7.2.1 The aeronautical charts service provider shall ensure that all railroads having landmark value are shown.

Note 1.— In congested areas, some railroads may be omitted in the interest of legibility.

Note 2.— Railroads may be named where space permits.

16.7.2.2 The aeronautical charts service provider shall ensure that the important tunnels are shown.

Note.— A descriptive note may be added.

16.7.3 Highways and roads

16.7.3.1 The aeronautical charts service provider shall ensure that the road systems are shown in sufficient detail to indicate significant patterns from the air.

16.7.3.2 The aeronautical charts service provider shall ensure that the roads are not be shown in built-up areas unless they can be distinguished from the air as definite landmarks.

Note.— The numbers or names of important highways may be shown.

16.7.4 Landmarks

The aeronautical charts service provider shall ensure that 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, are shown.

Note.— Descriptive notes may be added.

16.7.5 Political boundaries

The aeronautical charts service provider shall ensure that international boundaries are shown. Undemarcated and undefined boundaries shall be distinguished by descriptive notes.

16.7.6 Hydrography

16.7.6.1 The aeronautical charts service provider shall ensure that all water features compatible with the scale of the chart comprising shore lines, lakes, rivers and streams (including those non-perennials in nature), salt lakes, glaciers and ice caps are shown.

16.7.6.2 The aeronautical charts service provider shall ensure that the tint covering large open water areas is kept very light.

Note.— A narrow band of darker tone may be used along the shore line to emphasize this feature.

16.7.6.3 The aeronautical charts service provider shall ensure that reefs and shoals, including rocky ledges, tidal flats, isolated rocks, sand, gravel, stone and all similar areas, are shown by symbols when of significant landmark value.

Note.— Groups of rocks may be shown by a few representative rock symbols within the area.

16.7.7 Contours

16.7.7.1 The aeronautical charts service provider shall ensure that contours are shown. The selection of intervals shall be governed by the requirement to depict clearly the relief features required in air navigation.

16.7.7.2 The aeronautical charts service provider shall ensure that the values of the contours used are shown.

16.7.8 Hypsometric tints

16.7.8.1 The aeronautical charts service provider shall ensure that, when hypsometric tints are used, the range of elevations for the tints are shown.

16.7.8.2 The aeronautical charts service provider shall ensure that the scale of the hypsometric tints used on the chart are shown in the margin.

16.7.9 Spot elevations

16.7.9.1 The aeronautical charts service provider shall ensure that spot elevations are shown at selected critical points. The elevations selected shall always be the highest in the immediate vicinity and shall 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 shall be shown. The position of each selected elevation shall be indicated by a dot.

16.7.9.2 The aeronautical charts service provider shall ensure that the elevation (in metres or feet) of the highest point on the chart and its geographical position to the nearest five minutes is indicated in the margin.

16.7.9.3 The aeronautical charts service provider shall ensure that the spot elevation of the highest point in any sheet are cleared of hypsometric tinting.

16.7.10 Incomplete or unreliable relief

16.7.10.1 The aeronautical charts service provider shall ensure that areas that have not been surveyed for contour information are labelled “Relief data incomplete”.

16.7.10.2 The aeronautical charts service provider shall ensure that charts on which spot elevations are generally unreliable bears 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 should be used with caution.”

16.7.11 Escarpments

The aeronautical charts service provider shall ensure that escarpments are shown when they are prominent landmarks or when cultural detail is very sparse.

16.7.12 Wooded areas

16.7.12.1 The aeronautical charts service provider shall ensure that wooded areas are shown.

Note.— On high latitude charts, the approximate extreme northern or southern limits of tree growth may be shown.

16.7.12.2 The aeronautical charts service provider shall ensure that, where shown, the approximate extreme northern or southern limits of tree growth are indicated by a dashed black line and are appropriately labelled.

16.7.13 Date of topographic information

The aeronautical charts service provider shall ensure that the date of latest information shown on the topographic base is indicated in the margin.

16.8 Magnetic variation

16.8.1 The aeronautical charts service provider shall ensure that isogonic lines are shown.

16.8.2 The aeronautical charts service provider shall ensure that the date of the isogonic information is indicated in the margin.

16.9 Aeronautical data

16.9.1 General

The aeronautical charts service provider shall ensure that aeronautical data shown are kept to a minimum consistent with the use of the chart for visual navigation and the revision cycle (see 16.9.6).

16.9.2 Aerodromes

16.9.2.1 The aeronautical charts service provider shall ensure that land and water aerodromes and heliports are 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.

16.9.2.2 The aeronautical charts service provider shall ensure that 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, provided they do not cause undesirable clutter on the chart, are indicated.

16.9.2.3 The aeronautical charts service provider shall ensure that abandoned aerodromes which are still recognizable as aerodromes from the air are shown and identified as abandoned.

16.9.3 Obstacles

16.9.3.1 The aeronautical charts service provider shall ensure that obstacles are shown.

Note.— Objects of a height of 100 m (300 ft) or more above ground are normally regarded as obstacles.

16.9.3.2 The aeronautical charts service provider shall ensure that, when considered of importance to visual flight, prominent transmission lines, permanent cable car installations and wind turbines, which are obstacles, are shown.

16.9.4 Prohibited, restricted and danger areas

The aeronautical charts service provider shall ensure that prohibited, restricted and danger areas are shown.

16.9.5 Air traffic services system

16.9.5.1 The aeronautical charts service provider shall ensure that 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 are shown together with the appropriate class of airspace.

16.9.5.2 The aeronautical charts service provider shall ensure that, where appropriate, the air defence identification zone (ADIZ) is shown and properly identified.

Note.— ADIZ procedures may be described in the chart legend.

16.9.6 Radio navigation aids

The aeronautical charts service provider shall ensure that radio navigation aids are 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.

16.9.7 Supplementary information

16.9.7.1 The aeronautical charts service provider shall ensure that aeronautical ground lights together with their characteristics or their identifications or both are shown.

16.9.7.2 The aeronautical charts service provider shall ensure that marine lights on outer prominent coastal or isolated features of not less than 28 km (15 NM) visibility range are 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.

CHAPTER 17. AERONAUTICAL CHART – ICAO 1:500 000

17.1 Function

The aeronautical charts service provider shall ensure that the Aeronautical Chart – ICAO 1:500 000 chart shall provide information to satisfy the requirements of visual air navigation for low speed, short- or medium-range operations at low and intermediate altitudes.

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.

Note 2.— 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.

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.

17.2 Availability

The aeronautical charts service provider shall ensure that the Aeronautical Chart — ICAO 1:500 000 is made available in the manner prescribed in 1.3.2 for all areas delineated in Appendix 5 of Annex 4 to the Chicago Convention.

Note.— The selection of this scale as an alternative to the World Aeronautical Chart — ICAO 1:1 000 000 is covered by 16.2.1 and 16.2.2.

17.3 Scales

17.3.1 The aeronautical charts service provider shall ensure that the linear scales for kilometres and nautical miles are arranged in the following order:

— kilometres,

— nautical miles,

with their zero points in the same vertical line shall be shown in the margin.

17.3.2 The aeronautical charts service provider shall ensure that the length of the linear scale is not less than 200 mm (8 in).

17.3.3 The aeronautical charts service provider shall ensure that a conversion scale (metres/feet) is shown in the margin.

17.4 Format

17.4.1 The aeronautical charts service provider shall ensure that the title and marginal notes are in one of the working languages of ICAO.

Note.— The language of the publishing country or any other language may be used in addition to the ICAO working language.

17.4.2 The aeronautical charts service provider shall ensure that information regarding the number of the adjoining sheets and the unit of measurement used to express elevation are located so as to be clearly visible when the sheet is folded.

17.4.3 The aeronautical charts service provider shall ensure that 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.

17.4.4 The aeronautical charts service provider shall ensure that, whenever practicable, sheets are 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, shall be included on the face of the chart or on the reverse side.

Note.— Sheet lines may be varied to satisfy particular requirements.

17.4.5 The aeronautical charts service provider shall ensure that the overlaps are provided by extending the chart area on the top and right side beyond the area given on the index. This overlap area shall contain all aeronautical, topographical, hydrographical and cultural information. The overlap shall 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.

17.5 Projection

17.5.1 The aeronautical charts service provider shall ensure that a conformal (orthomorphic) projection is used.

17.5.2 The aeronautical charts service provider shall ensure that the projection of the World Aeronautical Chart — ICAO 1:1 000 000 is used.

17.5.3 The aeronautical charts service provider shall ensure that parallels are shown at intervals of 30′.

17.5.3.1 Meridians shall normally be shown at intervals of 30′.

Note.— At high latitudes, this interval may be increased.

17.5.4 The aeronautical charts service provider shall ensure that the graduation marks are shown at 1′ intervals along each whole degree meridian and parallel, extending away from the Greenwich Meridian and from the Equator. Each 10′ interval shall be shown by a mark on both sides of the graticule line.

17.5.4.1 The length of the graduation marks should 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.

17.5.5 The aeronautical charts service provider shall ensure that all meridians and parallels shown are numbered in the borders of the chart.

17.5.5.1 Each meridian and parallel shall be numbered within the body of the chart whenever this data is required operationally.

17.5.6 The aeronautical charts service provider shall ensure that the name and basic parameters of the projection are indicated in the margin.

17.6 Identification

17.6.1 Each sheet shall be identified by a name which should be that of the principal town or of a main geographical feature appearing on the sheet.

17.6.1.1 Where applicable, sheets shall 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*

17.7 Culture and topography

17.7.1 Built-up areas

17.7.1.1 The aeronautical charts service provider shall ensure that cities, towns and villages are selected and shown according to their relative importance to visual air navigation.

17.7.1.2 The aeronautical charts service provider shall ensure that cities and towns of sufficient size are indicated by the outline of their built-up areas and not of their established city limits.

17.7.2 Railroads

17.7.2.1 The aeronautical charts service provider shall ensure that all railroads having landmark value are shown.

Note 1.— In congested areas, some railroads may be omitted in the interest of legibility.

Note 2.— Railroads may be named.

Note 3.— Rail stations may be shown.

17.7.2.2 The aeronautical charts service provider shall ensure that tunnels are shown when they serve as prominent landmarks.

Note.— A descriptive note may be added, if necessary, to accentuate this feature.

17.7.3 Highways and roads

17.7.3.1 The aeronautical charts service provider shall ensure that road systems are shown in sufficient detail to indicate significant patterns from the air.

Note.— Roads under construction may be shown.

17.7.3.2 The aeronautical charts service provider shall ensure that roads are not be shown in built-up areas unless they can be distinguished from the air as definite landmarks.

Note.— The numbers or names of important highways may be shown.

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CHAPTER 18. AERONAUTICAL NAVIGATION CHART – ICAO SMALL SCALE

[Reserved]

CHAPTER 19. PLOTTING CHART – ICAO

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CHAPTER 20. ELECTRONIC AERONAUTICAL CHART DISPLAY – ICAO

20.1 Function

The aeronautical charts service provider shall ensure that the Electronic Aeronautical Chart Display — ICAO, with adequate back-up arrangements and in compliance with the requirements of ICAO Annex 6 for charts, enables flight crews to execute, in a convenient and timely manner, route planning, route monitoring and navigation by displaying required information.

20.2 Information available for display

20.2.1 The aeronautical charts service provider shall ensure that the Electronic Aeronautical Chart Display — ICAO is capable of displaying all aeronautical, cultural and topographic information required by Chapter 5 and Chapters 7 through 19.

20.2.2 [Reserved]

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.

20.3 Display requirements

20.3.1 Display categories

20.3.1.1 The aeronautical charts service provider shall ensure that information available for display are 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.

20.3.1.2 The aeronautical charts service provider shall ensure that it is a simple function to add or remove other display information but is not possible to remove information contained in the basic display.

20.3.2 Display mode and generation of neighbouring area

20.3.2.1 The aeronautical charts service provider shall ensure that the Electronic Aeronautical Chart Display — ICAO is capable of continuously plotting the aircraft's position in a true motion mode where reset and generation of the surrounding area takes place automatically.

Note.— Other modes, such as static chart displays, may be available.

20.3.2.2 The aeronautical charts service provider shall ensure that it is possible manually to change the chart area and the position of the aircraft relative to the edge of the display.

20.3.3 Scale

The aeronautical charts service provider shall ensure that it is possible to vary the scale at which a chart is displayed.

20.3.4 Symbols

The aeronautical charts service provider shall ensure that symbols used conform to those specified for electronic charts in Appendix 2 of Annex 4 to the Chicago Convention except where it is desired to show items for which no ICAO chart symbol is provided. In these cases, electronic chart symbols shall 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.

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.

20.3.5 Display hardware

20.3.5.1 The aeronautical charts service provider shall ensure that the effective size of the chart presentation is sufficient to display the information required by 20.2 without excessive scrolling.

20.3.5.2 The aeronautical charts service provider shall ensure that the display have the capabilities required to accurately portray required elements of Appendix 2 of Annex 4 to the Chicago Convention.

20.3.5.3 The aeronautical charts service provider shall ensure that the method of presentation ensures that the displayed information is clearly visible to the observer in the conditions of natural and artificial light experienced in the cockpit.

20.3.5.4 The aeronautical charts service provider shall ensure that the display luminance is adjustable by the flight crew.

20.4 Provision and updating of data

20.4.1 The aeronautical charts service provider shall ensure that the provision and updating of data for use by the display are in conformance with the aeronautical data quality system requirements.

Note.— For aeronautical data quality system requirements, see Chapter 2, 2.17, and BCAR-15, Chapter 3, 3.2.

20.4.2 The aeronautical charts service provider shall ensure that the display is 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 shall be provided.

20.4.3 The aeronautical charts service provider shall ensure that the display is capable of accepting updates to authorized data entered manually with simple means for verification prior to final acceptance of the data. Updates entered manually shall be distinguishable on the display from authorized data and its authorized updates and shall not affect display legibility.

20.4.4 The aeronautical charts service provider shall ensure that a record is kept of all updates, including date and time of application.

20.4.5 The aeronautical charts service provider shall ensure that the display allows 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.

20.5 Performance tests, malfunction alarms and indications

20.5.1 The aeronautical charts service provider shall ensure that a means is provided for carrying out on-board tests of major functions. In case of a failure, the test shall display information to indicate which part of the system is at fault.

20.5.2 The aeronautical charts service provider shall ensure that a suitable alarm or indication of system malfunction is provided.

20.6 Back-up arrangements

The aeronautical charts service provider shall ensure that, to ensure safe navigation in case of a failure of the Electronic Aeronautical Chart Display — ICAO, the provision of adequate back-up arrangements 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.

Note.— A suitable back-up system may include the carriage of paper charts.

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CHAPTER 21. ATC SURVEILLANCE MINIMUM ALTITUDE CHART – ICAO

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