

THE SIERRA LEONE CIVIL AVIATION REGULATIONS



PART 4 – AERONAUTICAL CHARTS

MAY 2025

PREAMBLE

WHEREAS, the Director-General shall have the power to perform such acts,- including the conduct of investigations, to issue and amend orders, rules, regulations and procedures pursuant to and in accordance with the Civil Aviation Act, 2023.

WHEREAS, the Director-General shall have the power to publish all reports, orders, decisions, rules, and regulations issued under the Civil Aviation Act, 2023 in such form and manner as may be best adapted for public information and use;

NOW THEREBY, The Director General, under its powers given by Article 17(1) and 17(2) (a) of the Civil Aviation Act, 2023, issues the following regulations which supersede previous regulations on Aeronautical Charts.

1.SHORT TITLE

This regulation may be cited as Sierra Leone Civil Aviation Regulation “SLCAR Part 4- Aeronautical Charts”

2. EFFECTIVE DATE

This Regulation shall come into force as of the 20th day of May 2025.


Musayeroh Barrie
Director General



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1 GENERAL PROVISIONS

In transposing ICAO Annex 4 to develop these regulations all amendments 1-62 have been considered.

1.1 Definitions

When the following words and phrases as used in these regulations they shall have the following meanings:

- (a) **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.
- (b) **Aerodrome elevation.** The elevation of the highest point of the landing area
- (c) **Aerodrome operating minima.** The limits of usability of an aerodrome for:
 - (i) take-off, expressed in terms of runway visual range and/or visibility and, if necessary, cloud conditions;
 - (ii) 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;
 - (iii) 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
 - (iv) 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.
- (d) **Aerodrome reference point.** The designated geographical location of an aerodrome
- (e) **Aeronautical chart.** A representation of a portion of the Earth, its culture and relief, specifically designated to meet the requirements of air navigation.
- (f) **Aircraft stand.** A designated area on an apron intended to be used for parking an aircraft.
- (g) **Air defense 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).
- (h) **Air taxiway.** A defined path on the surface established for the air taxiing of helicopters.
- (i) **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)
- (j) **Air transit route.** A defined path on the surface established for the air transiting of helicopters.
- (k) **Airway.** A control area or portion thereof established in the form of a corridor.
- (l) **Altitude.** The vertical distance of a level, a point or an object considered as a point, measured from mean sea level (MSL).

- (m) **Application.** Manipulation and processing of data in support of user requirements (ISO 19104*)
- (n) **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.
- (o) **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.
- (p) **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.
- (q) **ATS route.** A specified route designed for channeling the flow of traffic as necessary for the provision of air traffic services.
- (r) **ATS surveillance system.** A generic term meaning variously, ADS-B, PSR, SSR or any comparable ground-based system that enables the identification of aircraft.
- (s) **Authority.** Means the Sierra Leone Civil Aviation Authority
- (t) **Bare Earth.** Surface of the Earth including bodies of water and permanent ice and snow, and excluding vegetation and man-made objects
- (u) **Calendar.** Discrete temporal reference system that provides the basis for defining temporal position to a resolution of one day (ISO 19108*)
- (v) **Canopy.** Bare Earth supplemented by vegetation height.
- (w) **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.
- (x) **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.
- (y) **Contour line.** A line on a map or chart connecting points of equal elevation.
- (z) **Culture.** All man-made features constructed on the surface of the Earth, such as cities, railways and canals.
- (aa) **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.
- (bb) **Danger area.** An airspace of defined dimensions within which activities dangerous to the flight of aircraft may exist at specified times.
- (cc) **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*).
- (dd) **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.
- (ee) **Data resolution.** A number of units or digits to which a measured or calculated value is expressed and use
- (ff) **Data set.** Identifiable collection of data (ISO 19101*)

- (gg) **Data Set Series.** Collection of data sets sharing the same product specification (ISO 19115*).
- (hh) **Datum.** Any quantity or set of quantities that may serve as a reference or basis for the calculation of other quantities (ISO 19104*)
- (ii) **Digital Elevation Model (DEM).** The representation of terrain surface by continuous elevation values at all intersections of a defined grid, referenced to common datum.
- (jj) **Displaced threshold.** A threshold not located at the extremity of a runway.
- (kk) **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.
- (ll) **Elevation.** The vertical distance of a point or a level, on or affixed to the surface of the earth, measured from mean sea level.
- (mm) **Ellipsoid height (Geodetic height).** The height related to the reference ellipsoid, measured along the ellipsoidal outer normal through the point in question.
- (nn) **Feature.** Abstraction of real world phenomena (ISO 19101*)
- (oo) **Feature attribute.** Characteristic of a feature (ISO 19101*)
- (pp) **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,
 - (i) at the end of the last procedure turn, base turn or inbound turn of a racetrack procedure, if specified; or
 - (ii) 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.
- (qq) **Final approach and take-off area (FATO).** A defined area over which the final phase of the approach maneuver to hover or landing is completed and from which the take-off maneuver is commenced. Where the FATO is to be used by performance Class 1 helicopters, the defined area includes the rejected take-off area available.
- (rr) **Final approach fix or point.** That fix or point of an instrument approach procedure where the final approach segment commences.
- (ss) **Final approach segment.** That segment of an instrument approach procedure in which alignment and descent for landing are accomplished.
- (tt) **Flight information region.** An airspace of defined dimensions within which flight information service and alerting service are provided.
- (uu) **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.
- (vv) **Geodesic distance.** The shortest distance between any two points on a mathematically defined ellipsoidal surface

- (ww) **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.
- (xx) **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.
- (yy) **Geoid undulation.** The distance of the geoid above (positive) or below (negative) the mathematical reference ellipsoid.
- (zz) **Glide path.** A descent profile determined for vertical guidance during a final approach.
- (aaa) **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*).
- (bbb) **Height.** The vertical distance of a level, a point or an object considered as a point, measured from a specified datum.
- (ccc) **Helicopter stand.** An aircraft stand which provides for parking a helicopter and, where air taxiing operations are contemplated, the helicopter touchdown and liftoff.
- (ddd) **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.
- (eee) **Heliport reference point (HRP).** The designated location of a heliport or a landing location
- (fff) **Holding procedure.** A predetermined maneuver which keeps an aircraft within a specified airspace while awaiting further clearance.
- (ggg) **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
- (hhh) **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.
- (iii) **Hypsometric tints.** A succession of shades or color gradations used to depict ranges of elevation.
- (jjj) **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 fixes or point.
- (kkk) **Instrument approach procedure.** A series of predetermined maneuvers 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.

- (lll) **Integrity classification (aeronautical data).** Classification based upon the potential risk resulting from the use of corrupted data. Aeronautical data is classified as:
- (i) 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;
 - (ii) 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
 - (iii) 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.
- (mmm) **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.
- (nnn) **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.
- (ooo) **Isogonal.** A line on a map or chart on which all points have the same magnetic variation for a specified epoch
- (ppp) **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
- (qqq) **Landing area.** That part of a movement area intended for the landing or take-off of aircraft.
- (rrr) **Landing direction indicator.** A device to indicate visually the direction currently designated for landing and for take-off.
- (sss) **Level.** A generic term relating to the vertical position of an aircraft in flight and meaning variously, height, altitude or flight level
- (ttt) **Magnetic variation.** The angular difference between True North and Magnetic North
- (uuu) **Maneuvering area.** That part of an aerodrome to be used for the take-off, landing and taxiing of aircraft, excluding aprons.
- (vvv) **Marking.** A symbol or group of symbols displayed on the surface of the movement area in order to convey aeronautical information.
- (www) **Metadata.** Data about data (ISO 19115*)
- (xxx) **Minimum en-route altitude (MEA).** The altitude for an enroute segment that provides adequate reception of relevant navigation facilities and ATS communications complies with the airspace structure and provides the required obstacle clearance.
- (yyy) **Minimum obstacle clearance altitude (MOCA).** The minimum altitude for a defined segment of flight that provides the required obstacle clearance

- (zzz) **Minimum sector altitude (MSA).** The lowest altitude which may be used which will provide a minimum clearance of 300m (1000 ft) above all objects located in an area contained within a sector of a circle of 46km (25NM) radius centered on significant point, the aerodrome reference point(ARP) or the helicopter reference point(HRP).
- (aaaa) **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.
- (bbbb) **Missed approach procedure.** The procedure to be followed if the approach cannot be continued.
- (cccc) **Movement area.** That part of an aerodrome to be used for the take-off, landing and taxiing of aircraft, consisting of the maneuvering area and the apron(s).
- (dddd) **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.
- (eeee) **Obstacle.** All fixed (whether temporary or permanent) and mobile objects, or parts thereof, that:
- (i) are located on an area intended for the surface movement of aircraft; or
 - (ii) extend above a defined surface intended to protect aircraft in flight; or
 - (iii) stand outside those defined surfaces and that have been assessed as being a hazard to air navigation.
- (ffff) **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.
- (gggg) **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.
- (hhhh) **Orthometric height.** Height of a point related to the geoid, generally presented as an MSL elevation.
- (iiii) **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.

- (jjjj) **Point light.** A luminous signal appearing without perceptible length **Portrayal.** Presentation of information to humans (ISO 19117*)
- (kkkk) **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.
- (llll) **Precision approach procedure.** An instrument approach procedure utilizing azimuth and glide path information provided by ILS or PAR.
- (mmmm) **Procedure altitude/height.** A specified altitude/height flown operationally at or above the minimum altitude/height and established to accommodate a stabilized descent at a prescribed descent gradient/angle in the intermediate/final approach segment
- (nnnn) **Procedure turn.** A maneuver 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.
- (oooo) **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.
- (pppp) **Relief.** The inequalities in elevation of the surface of the Earth represented on aeronautical charts by contours, hypsometric tints, shading or spot elevations.
- (qqqq) **Reporting point.** A specified geographical location in relation to which the position of an aircraft can be reported
- (rrrr) **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.
- (ssss) **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.
- (tttt) **Runway.** A defined rectangular area on a land aerodrome prepared for the landing and take-off of aircraft.
- (uuuu) **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.
- (vvvv) **Runway strip.** A defined area including the runway and stopway, if provided, intended:
- (i) to reduce the risk of damage to aircraft running off a runway; and
 - (ii) to protect aircraft flying over it during take-off or landing operations.
- (wwww) **Runway visual range (RVR).** The range over which the pilot of an aircraft on the center line of a runway can see the runway surface markings or the lights delineating the runway or identifying its center line.
- (xxxx) **Shoulder.** An area adjacent to the edge of a pavement so prepared as to provide a transition between the pavement and the adjacent surface.

- (yyyy) **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.
- (zzzz) **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.
- (aaaaa) **Taxiing.** Movement of an aircraft on the surface of an aerodrome under its own power, excluding take-off and landing
- (bbbbb) **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 centered around on the taxi-route
- (ccccc) **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:
- (i) Aircraft stand taxilane. A portion of an apron designated as a taxiway and intended to provide access to aircraft stands only.
 - (ii) Apron taxiway. A portion of a taxiway system located on an apron and intended to provide a through taxi route across the apron.
 - (iii) 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 their exit taxiways thereby minimizing runway occupancy times.
- (ddddd) **Terminal arrival altitude (TAA).** The lowest altitude that will provide a minimum clearance of 300m (1000ft) above all objects located in an arc of a circle defined by a 46-km (25 NM) radius centered 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.
- (eeee) **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.
- (ffff) **Threshold.** The beginning of that portion of the runway usable for landing
- (ggggg) **Touchdown and lift-off area (TLOF).** A load bearing area on which a helicopter may touchdown or lift off.
- (hhhhh) **Touchdown zone.** The portion of a runway, beyond the threshold, on which landing aeroplanes first touch the runway
- (iiii) **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).
- (jjjjj) **Transition altitude.** The altitude at or below which the vertical position of an aircraft is controlled by reference to altitudes.
- (kkkkk) **Vectoring.** Provision of navigational guidance to aircraft in the form of specific headings, based on the use of an ATS surveillance system

(lllll) **Visual approach procedure.** A series of predetermined maneuvers 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.

(mmmmm) **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:

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

(ii) **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

(a) The approval of an Organisation and/or person who are, or wants to provide aeronautical chart service within designated airspaces and at aerodromes for civil aviation purposes in Sierra Leone.

(b) Aeronautical chart approval

(a) All charts coming within the scope of this regulation shall conform to the regulations relevant to the particular chart.

1.3 Requirements for Approval

1.3.1 No person shall provide aeronautical chart service for Sierra Leone without the approval of the Authority.

1.4 Application for Approval

1.4.1 Each applicant for the grant of Approval for the design of aeronautical charts for aerodromes, heliports, and airspace shall apply for Approval to the Authority

1.4.4 The application shall be submitted along with payment of the appropriate fee prescribed by the Authority.

1.5 Aeronautical Chart Service Provider Approval

1.5.1 Quality Management System

1.5.1.1 Applicants for Approval as an aeronautical chart service provider shall demonstrate they have established and continuously maintained a suitable Quality Management System (QMS).

1.5.1.2 The Quality Management System shall include the following as a minimum:

(a) A detailed process for the management and the processing of the required aeronautical data set to facilitate aeronautical charts design activities, such as:

(i) A process for both internal and external transfer of aeronautical data in accordance with SLCAR Part 15

(ii) A record control and storage system of input data including items e.g.:

(1) Aerodrome Survey

- (2) AD 2.10 Data (when applicable).
 - (3) Other obstacles (e.g. DVOF/spot heights/etc.)
 - (4) Terrain data.
 - (5) Airspace Data.
 - (6) Charts/Maps.
- (iii) A process for management/processing/transfer/import of required data into the design environment.
- (iv) The data handling process used by the aeronautical cartographer including all chart processes and procedures to provide demonstrable proof of data quality, integrity, and accuracy. A full reference to any maps or charts is required. Copies of paper maps used will be required unless electronic versions are available and provided.
- (v) A process for the verification of data sets used within the chart design activities, for example:
 - (1) Completeness of data sets.
 - (2) Validity of data.
 - (3) The latest available data sets are used.
- (b) A set of processes, procedures, and work instructions covering steps from the collection of sponsor requirements to the publication of the chart in the AIP.
- (c) A training programme and associated training plans to ensure that all aeronautical cartographers are suitably trained and competent and current to exercise the privileges as granted by their approval:
 - (i) Clearly defined and documented requirements for aeronautical chart design competencies within the organisation.
 - (ii) A structured training programme for the development of aeronautical chart that should be competency-based
 - (iii) A process in identifying training requirements for individuals within the organisation.
 - (iv) The training programme shall demonstrate how individuals are assessed to be competent for the development of aeronautical chart within the organisation and documented as such.
 - (v) The training programme must ensure that aeronautical cartographers within their respective company have acquired and maintained their competencies through OJT, recurrent training (at an interval of not more than three (3) years) and refresher training.
 - (vi) A record of all training-related activities, and individuals' training and competencies records.
 - (vii) Evidence of completed training
 - (viii) Where automation is employed as part of the design process, clear documentation relating to the design tools is required. This will need to include the following:
 - (1) The user requirements for the design tools.
 - (2) Selection and procurement criteria of the design tools.
 - (3) Evidence of installation and validation of the design tool

- (4) Control procedures for validation of design software for both the current (active) version and any versions that may be undergoing validation activities
- (d) Document control ensuring all documents are suitably managed; the following factors shall be addressed:
 - (i) Document control, management and storage of all relevant reference material
 - (ii) Document control, management and storage of all chart-related documents.

1.5.2 Facility Requirements

- 1.5.2.1 Each applicant for the grant of Approval for the design of aeronautical charts for aerodromes, heliports, and airspace shall establish offices and facilities.

1.6 Approval of Aeronautical Cartographer

- 1.6.1 Applicant for approval as an aeronautical cartographer for aerodromes, heliports, and airspace shall provide evidence of the following qualifications and experience:
 - (a) Proof of successful completion of an advanced aeronautical cartography course from an organisation acceptable to the Authority
 - (b) a comprehensive record of all training activities
 - (c) a record of the cartographers' competency and currency for each chart type
 - (d) A resume detailing the aviation experience of the individual.
 - (e) a documented list of completed chart designs
 - (f) If the Authority believes additional evidence is necessary to inform our regulatory decision, the applicant will be contacted.

2. GENERAL SPECIFICATIONS

2.1 Operational Requirements for Charts

- 2.1.1 Each type of chart provides information relevant to the function of the chart and its design shall observe Human Factors principles which facilitate its optimum use.
- 2.1.2 Each type of chart shall provide information appropriate to the phase of flight to ensure the safe and expeditious operation of the aircraft.
- 2.1.3 The presentation of information shall be accurate, free from distortion and clutter, unambiguous, and be readable under all normal operating conditions.
- 2.1.4 Colours or tints and type size used shall be 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 information on the charts shall be in a form which enables the pilot to acquire it in a reasonable time consistent with workload and operating conditions.
- 2.1.6 The presentation of information provided on each type of chart shall permit smooth transition from chart to chart as appropriate to the phase of flight.
- 2.1.7 The Charts shall be True North oriented
- 2.1.8 Reserved

2.2 Titles

The title of a chart or chart series prepared in accordance with these regulations and intended to satisfy the function of the chart shall be that of the relevant chapter

heading therein, except that such title shall not include “ICAO” unless the chart conforms with all requirement specified in chapter 2 and any other specified for the specified chart.

2.3 Miscellaneous Information

- 2.3.1 The marginal note layout shall be as given in IS: 2.3.1, except as otherwise specified for a particular chart.
- 2.3.2 The following information shall be shown on the face of each chart unless otherwise stated in the specification of the chart concerned:
 - a) designation or title of the chart series;
 - b) name and reference of the sheet;
 - c) on each margin an indication of the adjoining sheet (when applicable).
- 2.3.3 A legend to the symbols and abbreviations used shall be 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 name and adequate address of the producing agency shall be shown in the margin of the chart except that, where the chart is published as part of an aeronautical document, this information may be placed in the front of that document.

2.4 Symbols

- 2.4.1 Symbols used shall conform to those specified in IS: 2.4.1 of these regulations, 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.
- 2.4.2 To represent ground-based navigation aids, intersections and waypoints, the same basic symbol shall be used on all charts on which they appear, regardless of chart purpose.
- 2.4.3 The symbol used for significant points shall be based on a hierarchy of symbols and selected in the following order: ground-based navigation aid, intersection, waypoint symbol. A waypoint symbol is used only when a particular significant point does not already exist as either a ground-based navigation aid or intersection.
- 2.4.4 The symbols shown in the manner specified in 2.4.2, 2.4.3 and IS: 2.4.1, symbol number 121 shall be used.

2.5 Units of measurement

- 2.5.1 Distances are derived as geodesic distances.
- 2.5.2 Distances shall be expressed in either kilometres or nautical miles or both, provided the units are clearly differentiated.
- 2.5.3 Altitudes, elevations and heights shall be expressed in either metres or feet or both, provided the units are clearly differentiated.
- 2.5.4 Linear dimensions on aerodromes and short distances shall be expressed in metres.
- 2.5.5 The order of resolution of distances, dimensions, elevations and heights shall be that as specified for a particular chart.

- 2.5.6 The units of measurement used to express distances, altitudes, elevations and heights shall be conspicuously stated on the face of each chart.
- 2.5.7 Conversion scales (kilometres/nautical miles, metres/feet) shall be 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 name and basic parameters and scale of the projection shall be indicated for charts of large areas.
- 2.6.2 for charts of small areas, a linear scale only is indicated.

2.7 Date of validity of aeronautical information

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

2.8 Spelling of geographical names

- 2.8.1 The symbols of the Roman alphabet shall be used for all writing.
- 2.8.2 The names of places and of geographical features in countries which officially use varieties of the Roman alphabet shall be accepted in their official spelling, including the accents and diacritical marks used in the respective alphabets.
- 2.8.3 Where a geographical term such as “cape”, “point”, “gulf”, “river” is abbreviated on any particular chart that word shall be spelt out in full. Punctuation marks shall not be used in abbreviations within the body of a chart.

2.9 Abbreviations

- 2.9.1 Abbreviations shall be used on aeronautical charts whenever they are appropriate.
- 2.9.2 Abbreviations shall be selected from the Procedures for Air Navigation Services — ICAO Abbreviations and Codes Doc 8400, where applicable.

2.10 Political Boundaries

- 2.10.1 International boundaries shall be shown, but may be interrupted if data more important to the use of the chart would be obscured.
- 2.10.2 Where the territory of more than one State appears on a chart, the names identifying the countries shall be indicated.

2.11 Colours

Colours used on charts shall conform to the Colour Guide in IS: 2.11 of these Regulations.

2.12 Relief

- 2.12.1 Relief, where shown, shall be portrayed in a manner that will satisfy the chart users' need for:
- (a) orientation and identification;
 - (b) safe terrain clearance;
 - (c) clarity of aeronautical information when shown;
 - (d) planning.

2.12.2 Where relief is shown by hypsometric tints, the tints used shall be based on those shown in the Hypsometric Tint Guide in IS: 2.12.2.

2.12.3 Where spot elevations are used, they shall be shown for selected critical points.

2.12.3.1 The value of spot elevations of doubtful accuracy shall be followed by the sign $\pm$.

2.13 Prohibited, Restricted and Danger Areas

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

2.14 Air Traffic Services Airspaces

2.14.1 When ATS airspace is shown on a chart, the class of airspace, the type, name or call sign, the vertical limits and the radio frequency(ies) to be used shall be indicated and the horizontal limits depicted in accordance with IS: 2.4.1 — ICAO Chart Symbols.

2.14.2 On charts used for visual flight, those parts of the ATS Airspace Classes table (IS: 2.6.3) in SLCAR Part 11 applicable to the airspace depicted on the chart shall be the face or reverse of each chart.

2.15 Magnetic Variation

2.15.1 True North and magnetic variation shall be indicated. The order of resolution of magnetic variation shall be that as specified for a particular chart.

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

2.16 Topography

Reserved

2.17 Aeronautical Data

2.17.1 An aeronautical cartographic service provider shall ensure that-

(a) all necessary measures are taken to introduce a properly organized quality system containing procedures, processes and resources necessary to implement quality management at each function stage as specified in the Civil Aviation (Aeronautical Information Services) Regulations, 3.6.

(b) the execution of such quality management is made demonstrable for each function stage, when required.

(c) 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.

2.17.2 An aeronautical cartographic service provider shall ensure that the chart resolution of aeronautical data is that as specified for a particular chart.

2.17.3 An aeronautical cartographic service provider shall ensure that integrity of aeronautical data is maintained throughout the data process from origination to distribution to the next intended user and is given as IS: 2.17.3.

- 2.17.4 An aeronautical cartographic service provider shall ensure that digital data error detection techniques are used during the transmission and/or storage of aeronautical data and digital data sets.

2.18 Common Reference Systems

2.18.1 Horizontal reference system

- 2.18.1.1 World Geodetic System — 1984 (WGS-84) shall be 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.
- 2.18.1.2 Geographical coordinates which have been transformed into WGS-84 coordinates but whose accuracy of original field work does not meet the requirements in the Civil Aviation (Air Traffic Services) Regulations Part 11 and the Civil Aviation (Aerodrome) Part 14 shall be identified by an asterisk.
- 2.18.1.3 The chart resolution of geographical coordinates shall be that specified for a particular chart series.

2.18.2 Vertical reference system

- 2.18.2.1 Mean sea level (MSL) datum, which gives the relationship of gravity-related height (elevation) to a surface known as the geoid, shall be used as the vertical reference system.
- 2.18.2.2 In addition to the elevation referenced to MSL, for the specific surveyed ground positions, geoid undulation (referenced to the WGS-84 ellipsoid) for those positions shall be published as specified for a particular chart.
- 2.18.2.3 An aeronautical cartographic service provider shall ensure that the chart resolution of elevation and geoid undulation is that specified for a particular chart series.

2.18.3 Temporal reference system

- 2.18.3.1 The Gregorian calendar and Coordinated Universal Time (UTC) shall be used as the temporal reference system.
- 2.18.3.2 When a different temporal reference system is used for charting, this shall be indicated in GEN 2.1.2 of the Aeronautical Information Publication (AIP).

3.0 AERODROME OBSTACLE CHART — ICAO TYPE A (OPERATING LIMITATIONS)

3.1 Function

This chart, in combination with the relevant information published in the AIP, shall provide the data necessary to enable an operator to comply with the operating limitations of Civil Aviation (Operations of Aircraft) Regulations.

3.2 Availability

- 3.2.1 Aerodrome Obstacle Charts — ICAO Type A (Operating Limitations) shall be made available in the manner specified in 1.3.2 for all aerodromes regularly used by international civil aviation, except for those aerodromes where there are no obstacles

in the take-off flight path areas or where the Aerodrome Terrain and Obstacle Chart — ICAO (Electronic) is provided in accordance with 5.0 of these regulations.

3.2.2 Where a chart is not required because no obstacles exist in the take-off flight path area, a notification to this effect shall be published in the AIP.3.3 Units of Measurement

3.3.1 Elevations shall be shown to the nearest half-metre or to the nearest foot.

3.3.2 Linear dimensions shall be shown to the nearest half-metre.

3.4 Coverage and Scale

3.4.1 The extent of each plan shall be sufficient to cover all obstacles.

3.4.2 The horizontal scale shall be within the range of 1:10 000 to 1:15 000.

3.4.3 Reserved

3.4.4 The vertical scale shall be ten times the horizontal scale.

3.4.5 Horizontal and vertical linear scales showing both metres and feet shall be included in the charts.

3.5 Format

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

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

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

3.5.4 The chart shall include:

- (a) a box for recording the operational data specified in 3.8.3;
- (b) a box for recording amendments and dates thereof.

3.6 Identification

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

3.7 Magnetic Variation

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

3.8 Aeronautical Data

3.8.1 Obstacles

- 3.8.1.1 Objects in the take-off flight path area which project above a plane surface having a 1.2 per cent slope and having a common origin with the take-off flight path area shall be regarded as obstacles, except that obstacles lying wholly below the shadow of other obstacles as defined in 3.8.1.2 need not be shown. Mobile objects such as boats, trains and trucks, which may project above the 1.2 per cent plane, shall be considered obstacles but shall not be considered as being capable of creating a shadow.
- 3.8.1.2 The shadow of an obstacle is considered to be a plane surface originating at a horizontal line passing through the top of the obstacle at right angles to the centre line of the take-off flight path area. The plane covers the complete width of the take-off flight path area and extends to the plane defined in 3.8.1.1 or to the next higher obstacle if it occurs first. For the first 300 m (1 000 ft) of the take-off flight path area, the shadow planes are horizontal and beyond this point such planes have an upward slope of 1.2 per cent.
- 3.8.1.3 If the obstacle creating a shadow is likely to be removed, objects that would become obstacles by its removal shall be shown.

3.8.2 Take-off flight path area

- 3.8.2.1 The take-off flight path area consists of a quadrilateral area on the surface of the earth lying directly below, and symmetrically disposed about, the take-off flight path. This area has the following characteristics:
- (a) it commences at the end of the area declared suitable for take-off (i.e. at the end of the runway or clearway as appropriate);
 - (b) its width at the point of origin is 180 m (600 ft.) and this width increases at the rate of 0.25D to a maximum of 1 800 m (6 000 ft.), where D is the distance from the point of origin;
 - (c) it extends to the point beyond which no obstacles exist or to a distance of 10.0 km (5.4 NM), whichever is the lesser.
- 3.8.2.2 For runways serving aircraft having operating limitations which do not preclude the use of a take-off flight path gradient of less than 1.2 per cent, the extent of the take-off flight path area specified in 3.8.2.1 c) shall be increased to not less than 12.0 km (6.5 NM) and the slope of the plane surface specified in 3.8.1.1 and 3.8.1.2 shall be reduced to 1.0 per cent or less.

3.8.3 Declared distances

- 3.8.3.1 The following information for each direction of each runway shall be entered in the space provided:
- (a) take-off run available;
 - (b) accelerate-stop distance available;
 - (c) take-off distance available;
 - (d) landing distance available.
- 3.8.3.2 Where a declared distance is not provided because a runway is usable in one direction only, that runway shall be identified as “not usable for take-off, landing or both”.

3.8.4 Plan and profile views

- 3.8.4.1 The plan view shall show:

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

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 profile view shall show:

- (a) the profile of the centre line of the runway by a solid line and the profile of the centre line of any associated stopways and clearways by a broken line;
- (b) the elevation of the runway centre line at each end of the runway, at the 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:
 - (i) each obstacle by a solid vertical line extending from a convenient grid line over at least one other grid line to the elevation of the top of the obstacle;
 - (ii) identification of each obstacle;
 - (iii) the limits of penetration of obstacles of large extent in distinctive manner identified in the legend.

3.9 Accuracy

3.9.1 The order of accuracy attained shall be shown on the chart.

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

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

- (a) horizontal distances: 5 m (15 ft) at a point of origin increasing at a rate of 1 per 500;
- (b) vertical distances: 0.5 m (1.5 ft) in the first 300 m (1 000 ft) and increasing at a rate of 1 per 1 000.

3.9.4 Where no accurate datum for vertical reference is available, the elevation of the datum used shall be stated and shall be identified as assumed.

4. AERODROME OBSTACLE CHART —ICAO TYPE B

4.1 Function

This chart shall provide information to satisfy the following functions:

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

4.2 Availability

- 4.2.1 Aerodrome Obstacle Charts — ICAO Type B shall be made available, in the manner prescribed in 1.3.2, for all aerodromes regularly used by international civil aviation except for those aerodromes where the Aerodrome Terrain and Obstacle Chart — ICAO (Electronic) is provided in accordance with regulations 5.0.
- 4.2.2 When a chart combining the specifications of 3.0 and 4.0 is made available, it shall be called the Aerodrome Obstacle Chart — ICAO (Comprehensive).

4.3 Units of Measurement

- 4.3.1 Elevations shall be shown to the nearest half-metre or to the nearest foot.
- 4.3.2 Linear dimensions shall be shown to the nearest half-metre.

4.4 Coverage and Scale

- 4.4.1 The extent of each plan shall be sufficient to cover all obstacles.
- 4.4.2 The horizontal scale shall be within the range of 1:10 000 to 1:20 000.
- 4.4.3 A horizontal linear scale showing both metres and feet shall be included in the chart. When necessary, a linear scale for kilometres and a linear scale for nautical miles shall also be shown.

4.5 Format

The charts shall include:

- (a) any necessary explanation of the projection used;
- (b) any necessary identification of the grid used;
- (c) a notation indicating that obstacles are those which penetrate the surfaces specified in Sierra Leone Civil Aviation(Aerodromes) Regulations Part 14;
- (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.

4.6 Identification

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

4.7 Culture and Topography

4.7.1 Drainage and hydrographic details shall be kept to a minimum.

4.7.2 Buildings and other salient features associated with the aerodrome shall be shown.

Wherever possible, they shall be shown to scale.

4.7.3 All objects, either cultural or natural, that project above the take-off and approach surfaces specified in 4.9 or the clearing and marking surfaces specified in Sierra Leone Civil Aviation (Aerodromes) Regulations Part 14

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

4.8 Magnetic Variation

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

4.9 Aeronautical Data

4.9.1 The charts shall show:

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

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

(c) the length and width of the runway;

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

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

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

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

(h) the length of each stopway;

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

(j) the length of each clearway;

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

(l) take-off and approach areas;

(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;

(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.

4.9.1.1 The nature of the runway and stopway surfaces shall be given.

4.9.1.2 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 shall be indicated in a prominent manner.

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

4.10 Accuracy

4.10.1 The order of accuracy attained shall be shown on the chart.

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

4.10.3 The order of accuracy of the field work and the precision of chart production shall be 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 Where no accurate datum for vertical reference is available, the elevation of the datum used shall be stated and identified as assumed.

5. AERODROME TERRAIN AND OBSTACLE CHART — ICAO (ELECTRONIC)

5.1 Function

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

(a) enable an operator to comply with the operating limitations of the Sierra Leone Civil Aviation (Operations of Aircraft) Regulations Part 6, by developing contingency procedures for use in the event of an emergency during a missed approach or take-off, and by performing aircraft operating limitations analysis; and

(b) support the following air navigation applications:

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

(ii) aerodrome obstacle restriction and removal; and

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

5.2 Availability

5.2.1 Aerodrome Terrain and Obstacle Charts — ICAO (Electronic) shall be made available in the manner specified in 1.3.2 for aerodromes regularly used by international civil aviation.

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

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

5.3 Identification

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

5.4 Chart coverage

The extent of each chart shall be sufficient to cover Area 2 as specified in the Sierra Leone Civil Aviation (Aeronautical Information Services) Regulations Part 15.

5.5 Chart Content

5.5.1 General

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

5.5.1.2 Symbols used to portray features shall be in accordance with 2.4 and ICAO Chart Symbols in IS: 2.4.1.

5.5.2 Terrain feature

5.5.2.1 The terrain feature, and associated attributes, to be portrayed and database-linked to the chart shall be based on the terrain data sets which satisfy the requirements of the Sierra Leone Civil Aviation (Aeronautical Information Services) Regulations Part 15.

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

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

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

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

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

- (b) surface type;
- (c) contour line values, if provided; and
- (d) names of cities, towns and other prominent topographic features.

5.5.3 Obstacle features

5.5.3.1 Obstacle features, and associated attributes, portrayed or database-linked to the chart shall be based on obstacle data sets which satisfy the requirements of the Sierra Leone Civil Aviation (Aeronautical Information Services) Regulations Part 15.

5.5.3.2 Each obstacle shall be portrayed by an appropriate symbol and obstacle identifier.

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

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

5.5.4 Aerodrome features

5.5.4.1 Aerodrome features, and associated attributes, portrayed and database-linked to the chart shall be based on aerodrome data which satisfy the requirements of Civil Aviation (Aeronautical Information Services) Regulations.

5.5.4.2 The following aerodrome features shall be portrayed by an appropriate symbol:

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

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

- (a) geographical coordinates of the aerodrome reference point;
- (b) aerodrome magnetic variation, year of information and annual change;
- (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.

5.5.5 Radio navigation aid features

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

5.6 Accuracy and Resolution

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

5.6.2 The aeronautical, terrain and obstacle data resolution shall be commensurate with the actual data accuracy.

5.7 Electronic Functionality

- 5.7.1 It shall be possible to vary the scale at which the chart is viewed. Symbols and text size shall vary with chart scale to enhance readability.
- 5.7.2 Information on the chart shall be geo-referenced, and it shall be possible to determine cursor position to at least the nearest second.
- 5.7.3 The chart shall be compatible with widely available desktop computer hardware, software and media.
- 5.7.4 The chart shall include its own “reader” software.
- 5.7.5 It shall not be possible to remove information from the chart without an authorized update.
- 5.7.6 When, due to congestion of information, the details necessary to support the function of the chart cannot be shown with sufficient clarity on a single comprehensive chart view, selectable information layers shall be provided to allow for the customized combination of information.
- 5.7.7 It shall be possible to print the chart in hard copy format according to the content specifications and scale determined by the user.

5.8 Chart Data Product Specifications

- 5.8.1 A comprehensive statement of the data sets comprising the chart shall be provided in the form of data product specifications on which basis air navigation users will be able to evaluate the chart data product and determine whether it fulfills the requirements for its intended use (application).
- 5.8.2 The chart data product specifications shall include an overview, a specification scope, a data product identification, data content information, the reference systems used, the data quality requirements, and information on data capture, data maintenance, data portrayal, data product delivery, as well as any additional information available, and metadata.
- 5.8.3 The overview of the chart data product specifications shall provide an informal description of the product and shall contain general information about the data product. The specification scope of the chart data product specifications shall contain the spatial (horizontal) extent of the chart coverage. The chart data product identification shall include the title of the product, a brief narrative summary of the content and purpose, and a description of the geographic area covered by the chart.
- 5.8.4 The data content of the chart data product specifications shall clearly identify the type of coverage and/or imagery and shall provide a narrative description of each.
- 5.8.5 The chart data product specifications shall include information that defines the reference systems used. This shall include the spatial reference system (horizontal and vertical) and, if appropriate, temporal reference system. The chart data product specifications shall identify the data quality requirements. This shall include a statement on acceptable conformance quality levels and corresponding data quality measures. This statement shall cover all the data quality elements and data quality sub-elements; even if only to state that a specific data quality element or sub-element is not applicable.

- 5.8.6 The chart data product specifications shall include a data capture statement which shall be a general description of the sources and of processes applied for the capture of chart data. The principles and criteria applied in the maintenance of the chart shall also be provided in the chart data product specifications, including the frequency with which the chart product is updated. Of particular importance shall be the maintenance information of obstacle data sets included on the chart and an indication of the principles, methods and criteria applied for obstacle data maintenance.
- 5.8.7 The chart data product specifications shall contain information on how data are portrayed on the chart, as detailed in 5.5.1.1. The chart data product specifications shall also contain data product delivery information which shall include delivery formats and delivery medium information.
- 5.8.8 The core chart metadata elements shall be included in the chart data product specifications. Any additional metadata items required to be supplied shall be stated in the product specifications together with the format and encoding of the metadata.

6. PRECISION APPROACH TERRAIN CHART — ICAO

6.1 Function

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

6.2 Availability

- 6.2.1 The Precision Approach Terrain Chart — ICAO shall be made available for all precision approach runways Categories II and III at aerodromes used by international civil aviation, except where the requisite information is provided in the Aerodrome Terrain and Obstacle Chart — ICAO (Electronic) as prescribed by the Authority in accordance with 5.0 of these regulations.
- 6.2.2 The Precision Approach Terrain Chart — ICAO shall be revised whenever any significant change occurs.

6.3 Scale

- 6.3.1 The horizontal scale shall be 1:2 500, and the vertical scale 1:500.
- 6.3.2 When the chart includes a profile of the terrain to a distance greater than 900 m (3 000 ft) from the runway threshold, the horizontal scale shall be 1:5 000.

6.4 Identification

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

6.5 Plan and Profile Information

- 6.5.1 The chart shall include:
- (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 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 shall be shown to a distance not exceeding 2 000 m (6 500 ft) from the runway threshold.
- 6.5.3 The ILS reference datum height shall be shown to the nearest half metre or foot.

7. ENROUTE CHART — ICAO

7.1 Function

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

7.2 Availability

- 7.2.1 The Enroute Chart — ICAO shall be made available in the manner prescribed in 1.3.2 for all areas where flight information regions have been established.
- 7.2.2 Where different air traffic services routes, position reporting requirements or lateral limits of flight information regions or control areas exist in different layers of airspace and cannot be shown with sufficient clarity on one chart, separate charts shall be provided.

7.3 Coverage and Scale

- 7.3.1 Layout of sheet lines shall be determined by the density and pattern of the ATS route structure.
- 7.3.2 Large variations of scale between adjacent charts showing a continuous route structure shall be avoided.
- 7.3.3 An adequate overlap of charts shall be provided to ensure continuity of navigation.

7.4 Projection

- 7.4.1 A conformal projection on which a straight line approximates a great circle shall be used.
- 7.4.2 Parallels and meridians shall be shown at suitable intervals.
- 7.4.3 Graduation marks shall be placed at consistent intervals along selected parallels and meridians.

7.5 Identification

Each sheet shall be identified by chart series and number.

7.6 Culture and Topography

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

- 7.6.2 Within each quadrilateral formed by the parallels and meridians, the area minimum altitude shall be shown, except as provided for in 7.6.3.
- 7.6.3 In areas of high latitude where it is determined that True North orientation of the chart is impractical, the area minimum altitude shall be shown within each quadrilateral formed by reference lines of the graticule (grid) used.
- 7.6.4 Where charts are not True North orientated, this fact and the selected orientation used shall be clearly indicated.

7.7 Magnetic Variation

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

7.8 Bearings, Tracks and Radials

- 7.8.1 Bearings, tracks and radials shall be magnetic, except as provided for in 7.8.2. 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,
- 7.8.2 In areas of high latitude where it has been determined that reference to Magnetic North is impractical, another suitable reference, i.e. True North or Grid North, shall be used.
- 7.8.3 Where bearings, tracks or radials are given with reference to True North or Grid North, this shall be clearly indicated. When Grid North is used, its reference grid meridian shall be identified.

7.9 Aeronautical Data

7.9.1 Aerodromes

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

7.9.2 Prohibited, restricted and danger areas

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

7.9.3 Air traffic services system

- 7.9.3.1 Where appropriate, the components of the established air traffic services system shall be shown.

7.9.3.1.1 The components shall include the following:

- (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 Distance Measuring Equipment (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;

- (e) all significant points which define the ATS routes and are not marked by the position of a radio navigation aid, together with their name-codes and geographical coordinates in degrees, minutes and seconds;
- (f) in respect of waypoints defining VOR/DME area navigation routes, additionally,
 - (i) the station identification and radio frequency of the reference VOR/DME;
 - (ii) the bearing to the nearest tenth of a degree and the distance to the nearest two-tenths of a kilometre (tenth of a nautical mile) from the reference VOR/ DME, if the waypoint is not collocated with it;
- (g) an indication of all compulsory and “on-request” reporting points and ATS/MET reporting points;
- (h) the distances to the nearest kilometre or nautical mile between significant points constituting turning points or reporting points;
- (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;
- (j) j) minimum en-route altitudes and minimum obstacle clearance altitudes, on ATS routes to the nearest higher 50 metres or 100 feet (the Civil Aviation (Air Traffic Service Regulations);
- (k) communication facilities listed with their channels and, if applicable, logon address and satellite voice communications (SATVOICE) number; and
- (l) air defence identification zone (ADIZ) properly identified.

7.9.4 Supplementary information

7.9.4.1 Details of departure and arrival routes and associated holding patterns in terminal areas shall be shown unless they are shown on an Area Chart, a Standard Departure Chart — Instrument (SID) — ICAO or a Standard Arrival Chart — Instrument (STAR) — ICAO.

7.9.4.2 Altimeter setting regions shall be shown and identified where established

8. AREA CHART — ICAO

8.1 Function

This chart shall provide the flight crew with information to facilitate the following phases of instrument flight:

- (a) the transition between the en-route phase and approach to an aerodrome;
- (b) the transition between take-off/missed approach and en-route phase of flight; and
- (c) flights through areas of complex ATS routes or airspace structure.

8.2 Availability

8.2.1 The Area Chart — ICAO shall be made available in the manner specified in 1.3.2 where the air traffic services routes or position reporting requirements are complex and cannot be adequately shown on an En-route Chart — ICAO.

- 8.2.2 Where air traffic services routes or position reporting requirements are different for arrivals and for departures, and these cannot be shown with sufficient clarity on one chart, separate charts shall be provided.

8.3 Coverage and Scale

- 8.3.1 The coverage of each chart shall extend to points that effectively show departure and arrival routes.
- 8.3.2 The chart shall be drawn to scale and a scale-bar shown.

8.4 Projection

- 8.4.1 A conformal projection on which a straight line approximates a great circle shall be used.
- 8.4.2 Parallels and meridians shall be shown at suitable intervals.
- 8.4.3 Graduation marks shall be placed at consistent intervals along the neat lines, as appropriate.

8.5 Identification

The chart shall be identified by a name associated with the airspace portrayed.

8.6 Culture and Topography

- 8.6.1 Generalized shorelines of all open water areas, large lakes and rivers shall be shown except where they conflict with data more applicable to the function of the chart.
- 8.6.2 To improve situational awareness in areas where significant relief exist, all relief exceeding 300 m (1 000 ft) above the elevation of the primary aerodrome 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 be shown printed in black. Obstacles shall also be shown.

8.7 Magnetic Variation

The average magnetic variation of the area covered by the chart shall be shown to the nearest degree.

8.8 Bearings, Tracks and Radials

- 8.8.1 Bearings, tracks and radials shall be magnetic, except as provided for in 8.8.2. 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.
- 8.8.2 In areas of high latitude, where it has been determined that reference to Magnetic North is impractical, another suitable reference, i.e. True North or Grid North, shall be used.
- 8.8.3 Where bearings, tracks or radials are given with reference to True North or Grid North, this shall be clearly indicated. When Grid North is used, its reference grid meridian shall be identified.

8.9 Aeronautical Data

8.9.1 Aerodromes

All aerodromes which affect the terminal routings shall be shown. Where appropriate, a runway pattern symbol shall be used.

8.9.2 Prohibited, restricted and danger areas

Prohibited, restricted and danger areas shall be depicted with their identification and vertical limits.

8.9.3 Area minimum altitudes

Area minimum altitudes shall be shown within quadrilaterals formed by the parallels and meridians.

8.9.4 Air traffic services system

8.9.4.1 The components of the established relevant air traffic services system shall be shown.

8.9.4.1.1 The components shall include the following:

- (a) the radio navigation aids associated with the air traffic services system, together with their names, identifications, frequencies and geographical coordinates in degrees, minutes and seconds;
- (b) in respect of DME, additionally the elevation of the transmitting antenna of the DME to the nearest 30 m (100 ft);
- (c) terminal radio aids which are required for outbound and inbound traffic and for holding patterns;
- (d) the lateral and vertical limits of all designated airspace and the appropriate class of airspace;
- (e) the designation of the navigation specification(s) including any limitations, where established;
- (f) holding patterns and terminal routings, together with the route designators, and the track to the nearest degree along each segment of the prescribed airways and terminal routings;
- (g) all significant points which define the terminal routings and are not marked by the position of a radio navigation aid, together with their name-codes and geographical coordinates in degrees, minutes and seconds;
- (h) in respect of waypoints defining VOR/DME area navigation routes, additionally,
 - (i) the station identification and radio frequency of the reference VOR/DME;
 - (ii) the bearing to the nearest tenth of a degree and the distance to the nearest two-tenths of a kilometre (tenth of a nautical mile) from the reference VOR/DME, if the waypoint is not collocated with it;
- (i) an indication of all compulsory and “on-request” reporting points;
- (j) the distances to the nearest kilometre or nautical mile between significant points constituting turning points or reporting points;
- (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;
- (l) minimum en-route altitudes and minimum obstacle clearance altitudes, on ATS routes to the nearest higher 50 metres or 100 feet;
- (m) established minimum vectoring altitudes to the nearest higher 50 m or 100 ft, clearly identified;

- (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 an indication of “flyover” significant points.

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

9.1 Function

This chart shall provide the flight crew with information to enable it to comply with the designated standard departure route —instrument from take-off phase to the en-route phase.

9.2 Availability

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

9.3 Coverage and Scale

- 9.3.1 The coverage of the chart shall be sufficient to indicate the point where the departure route begins and the specified significant point at which the en-route phase of flight along a designated air traffic services route can be commenced.
- 9.3.2 The chart shall be drawn to scale.
- 9.3.2 A scale-bar shall be shown.

9.4 Projection

- 9.4.1 A conformal projection on which a straight line approximates a great circle shall be used.
- 9.4.2 When the chart is drawn to scale, parallels and meridians shall be shown at suitable intervals.
- 9.4.3 Graduation marks shall be placed at consistent intervals along the neat lines.

9.5 Identification

The chart shall be identified by the name of the city or town or area which the aerodrome serves, the name of the aerodrome and the identification of the standard departure route(s)
— instrument as established in accordance with the Procedures for Air Navigation Services — Aircraft Operations Volume II, Part I, Section 3, Chapter 5.

9.6 Culture and Topography

- 9.6.1 Where the chart is drawn to scale, generalized shore lines of all open water areas, large lakes and rivers shall be shown except where they conflict with data more applicable to the function of the chart.
- 9.6.2 All relief exceeding 300 m (1 000 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 be shown printed in black. Obstacles shall also be shown.

9.7 Magnetic Variation

Magnetic variation used in determining the magnetic bearings, tracks and radials shall be shown to the nearest degree.

9.8 Bearings, Tracks and Radials

9.8.1 Bearings, tracks and radials shall be magnetic, except as provided for in 9.8.2. 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.

9.8.2 In areas of high latitude, where it has been determined that reference to Magnetic North is impractical, another suitable reference, i.e. True North or Grid North, shall be used.

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

9.9 Aeronautical Data

9.9.1 Aerodromes

9.9.1.1 The aerodrome of departure shall be shown by the runway pattern.

9.9.1.2 All aerodromes which affect the designated standard departure route — instrument shall be shown and identified. Where appropriate, the aerodrome runway patterns shall be shown.

9.9.2 Prohibited, restricted and danger areas

Prohibited, restricted and danger areas which may affect the execution of the procedures shall be shown with their identification and vertical limits.

9.9.3 Minimum sector altitude

9.9.3.1 The established minimum sector altitude shall be shown with a clear indication of the sector to which it applies.

9.9.3.2 Where the minimum sector altitude has not been established, the chart shall be drawn to scale and area minimum altitudes shall be shown within quadrilaterals formed by the parallels and meridians. Area minimum altitudes shall also be shown in those parts of the chart not covered by the minimum sector altitude.

9.9.4 Air traffic services system

9.9.4.1 The components of the established relevant air traffic services system shall be shown.

9.9.4.1.1 The components shall comprise the following:

(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;
- (b) the radio navigation aid(s) associated with the route(s) including:
 - (1) plain language name;
 - (2) identification;
 - (3) frequency;
 - (4) geographical coordinates in degrees, minutes and seconds;
 - (5) for DME, the channel and the elevation of the transmitting antenna of the DME to the nearest 30 m (100 ft);
- (c) the name-codes of the significant points not marked by the position of a radio navigation aid, their geographical coordinates in degrees, minutes and seconds and the bearing to the nearest tenth of a degree and distance to the nearest two-tenths of a kilometre (tenth of a nautical mile) from the reference radio navigation aid;
- (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;
- (g) area speed restrictions, where established;
- (h) the designation of the navigation specification(s) including any limitations, where established;
- (i) all compulsory and “on-request” reporting points;
- (j) radio communication procedures, including:
 - (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 A textual description of standard departure route (s) — instrument (SID) and relevant communication failure procedures shall be provided and shall, whenever feasible be shown on the chart or on the same page which contains the chart.

9.9.4.3 Aeronautical database requirements

Appropriate data to support navigation database coding shall be published in accordance with the Procedures for Air Navigation Services — Aircraft Operations (PANS-OPS, Doc 8168), Volume II, Part III, Section 5, Chapter 2, 2.1, on the verso of the chart or as a separate, properly referenced sheet.

10. STANDARD ARRIVAL CHART —INSTRUMENT (SID) — ICAO

10.1 Function

This chart shall provide the flight crew with information to enable it to comply with the designated standard arrival route—instrument from the en-route phase to the approach phase.

10.2 Availability

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

10.3 Coverage and Scale

10.3.1 The coverage of the chart shall be sufficient to indicate the points where the en-route phase ends and the approach phase begins.

10.3.2 The chart shall be drawn to scale,

10.3.3 A scale-bar shall be shown.

10.4 Projection

10.4.1 A conformal projection on which a straight line approximates a great circle shall be used.

10.4.2 Parallels and meridians shall be shown at suitable intervals.

10.4.3 Graduation marks shall be placed at consistent intervals along the neat lines.

10.5 Identification

The chart shall be identified by the name of the city or town or area which the aerodrome serves, the name of the aerodrome, and the identification of the standard arrival route(s) — instrument as established in accordance with the Procedures for Air Navigation Services

— Aircraft Operations (PANS-OPS, Doc 8168), Volume II, Part I, Section 4, Chapter 2.

10.6 Culture and Topography

10.6.1 Where the chart is drawn to scale, generalized shore lines of all open water areas, large lakes and rivers shall be shown except where they conflict with data more applicable to the function of the chart.

10.6.2 All relief exceeding 300 m (1 000 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 be shown printed in black. Obstacles shall also be shown.

10.7 Magnetic Variation

Magnetic variation used in determining the magnetic bearings, tracks and radials shall be shown to the nearest degree.

10.8 Bearings, Tracks and Radials

- 10.8.1 Bearings, tracks and radials shall be magnetic, except as provided for in 10.8.2. 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.
- 10.8.2 In areas of high latitude, where it has been determined that reference to Magnetic North is impractical, another suitable reference, i.e. True North or Grid North, shall be used.
- 10.8.3 Where bearings, tracks or radials are given with reference to True North or Grid North, this shall be clearly indicated. When Grid North is used, its reference grid meridian shall be identified.

10.9 Aeronautical Data

10.9.1 Aerodromes

- 10.9.1.1 The aerodrome of landing shall be shown by the runway pattern.
- 10.9.1.2 All aerodromes which affect the designated standard arrival route — instrument shall be shown and identified. Where appropriate, the aerodrome runway patterns shall be shown.

10.9.2 Prohibited, restricted and danger areas

Prohibited, restricted and danger areas which may affect the execution of the procedures shall be shown with their identification and vertical limits.

10.9.3 Minimum sector altitude

- 10.9.3.1 The established minimum sector altitude shall be shown with a clear indication of the sector to which it applies.
- 10.9.3.2 Where the minimum sector altitude has not been established, the chart shall be drawn to scale and area minimum altitudes shall be shown within quadrilaterals formed by the parallels and meridians. Area minimum altitudes shall also be shown in those parts of the chart not covered by the minimum sector altitude.

10.9.4 Air traffic services system

- 10.9.4.1 The components of the established relevant air traffic services system shall be shown.
- 10.9.4.1.1 The components shall comprise the following:
- (a) a graphic portrayal of each standard arrival route — instrument, including:
 - (i) route designator;
 - (ii) significant points defining the route;
 - (iii) track or radial to the nearest degree along each segment of the route;
 - (iv) distances to the nearest kilometre or nautical mile between significant points;
 - (v) minimum obstacle clearance altitudes, along the route or route segments and altitudes required by the procedure to the nearest higher 50 m or 100 ft and flight level restrictions where established;
 - (vi) where the chart is drawn to scale and vectoring on arrival is provided, established minimum vectoring altitudes to the nearest higher 50 m or 100 ft, clearly identified;

- (b) the radio navigation aid(s) associated with the route(s) including:
 - (i) plain language name;
 - (ii) identification;
 - (iii) frequency;
 - (iv) geographical coordinates in degrees, minutes and seconds;
 - (v) for DME, the channel and the elevation of the transmitting antenna of the DME to the nearest 30 m (100 ft);
- (c) the name-codes of the significant points not marked by the position of a radio navigation aid, their geographical coordinates in degrees, minutes and seconds and the bearing to the nearest tenth of a degree and distance to the nearest two-tenths of a kilometre (tenth of a nautical mile) from the reference radio navigation aid;
- (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;
- (h) all compulsory and “on-request” reporting points;
- (i) radio communication procedures, including:
 - (i) call sign(s) of ATS unit(s);
 - (ii) frequency and, if applicable, SATVOICE number;
 - (iii) transponder setting, where appropriate;
- (j) an indication of “flyover” significant waypoints; and
- (k) for arrival procedures to an instrument approach designed specifically for helicopters, the term “CAT H” shall be depicted in the arrival chart plan view.

10.9.4.2 A textual description of standard arrival route(s) — instrument (STAR) and relevant communication failure procedures shall be provided and whenever feasible, be shown on the chart or on the same page which contains the chart.

10.9.4.3 Aeronautical database requirements

Appropriate data to support navigation database coding shall be published in accordance with the Procedures for Air Navigation Services — Aircraft Operations (PANS-OPS, Doc 8168), Volume II, Part III, Section 5, Chapter 2, 2.2, on the verso of the chart or as a separate, properly referenced sheet.

11. INSTRUMENT APPROACH CHART — ICAO

11.1 Function

This chart shall provide flight crews with information which will enable them to perform an approved instrument approach procedure to the runway of intended landing including the missed approach procedure and, where applicable, associated holding patterns.

11.2 Availability

- 11.2.1 Instrument Approach Charts — ICAO shall be made available for all aerodromes used by international civil aviation where instrument approach procedures have been established by the State concerned.
- 11.2.2 A separate Instrument Approach Chart — ICAO shall normally be provided for each precision approach procedure established by the State.
- 11.2.3 A separate Instrument Approach Chart — ICAO shall normally be provided for each non-precision approach procedure established by the State.
- 11.2.4 When the values for track, time or altitude differ between categories of aircraft on other than the final approach segment of the instrument approach procedures and the listing of these differences on a single chart could cause clutter or confusion, more than one chart shall be provided.
- 11.2.5 Instrument Approach Charts — ICAO shall be revised whenever information essential to safe operation becomes out of date.

11.3 Coverage and Scale

- 11.3.1 The coverage of the chart shall be sufficient to include all segments of the instrument approach procedure and such additional areas as may be necessary for the type of approach intended.
- 11.3.2 The scale selected shall ensure optimum legibility consistent with:
 - (a) the procedure shown on the chart;
 - (b) sheet size.
- 11.3.3 A scale indication shall be given.
 - 11.3.3.1 Except where this is not practicable, a distance circle with a radius of 20 km (10 NM) centred on a DME located on or close to the aerodrome, or on the aerodrome reference point where no suitable DME is available, shall be shown; its radius shall be indicated on the circumference.
 - 11.3.3.2 A distance scale shall be shown directly below the profile.

11.4 Format

The sheet size shall be 210 × 297 mm (8.27 x 11.69 inches) (A4).

11.5 Projection

- 11.5.1 A conformal projection on which a straight line approximates a great circle shall be used.
- 11.5.2 Graduation marks shall be placed at consistent intervals along the neat lines.

11.6 Identification

The chart shall be identified by the name of the city or town or area which the aerodrome serves, the name of the aerodrome and the identification of the instrument approach procedure as established in accordance with the Procedures for Air Navigation Services — Aircraft Operations (PANS-OPS, Doc 8168), Volume II, Part I, Section 4, Chapter 9.

11.7 Culture and topography

- 11.7.1 Culture and topographic information pertinent to the safe execution of the instrument approach procedure, including the missed approach procedure, associated holding procedures and visual manoeuvring (circling) procedure when established, shall be shown. Topographic information shall be named, only when necessary, to facilitate the understanding of such information, and the minimum shall be a delineation of land masses and significant lakes and rivers.
- 11.7.2 Relief shall be shown in a manner best suited to the particular elevation characteristics of the area. In areas where relief exceeds 1 200 m (4 000 ft) above the aerodrome elevation within the coverage of the chart or 600 m (2 000 ft) within 11 km (6 NM) of the aerodrome reference point or when final approach or missed approach procedure gradient is steeper than optimal due to terrain, all relief exceeding 150 m (500 ft) above the aerodrome elevation shall be shown by smoothed contour lines, contour values and layer tints printed in brown. Appropriate spot elevations, including the highest elevation within each top contour line, shall also be shown printed in black.
- 11.7.3 In areas where relief is lower than specified in 11.7.2, all relief exceeding 150 m (500 ft) above the aerodrome elevation 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.

11.8 Magnetic Variation

- 11.8.1 The magnetic variation shall be shown.
- 11.8.2 The value of the variation, indicated to the nearest degree, shall agree with that used in determining magnetic bearings, tracks and radials.

11.9 Bearings, tracks and radials

- 11.9.1 Bearings, tracks and radials shall be magnetic, except as provided for in 11.9.2. Where bearings and tracks are additionally provided as true values for Area Navigation (RNAV) segments, they shall be shown in parentheses to the nearest tenth of a degree.
- 11.9.2 In areas of high latitude, where it is determined by the appropriate authority that reference to Magnetic North is impractical, another suitable reference, i.e. True North or Grid North, shall be used.
- 11.9.3 Where bearings, tracks or radials are given with reference to True North or Grid North, this shall be clearly indicated. When Grid North is used, its reference grid meridian shall be identified.

11.10 Aeronautical Data

11.10.1 Aerodromes

- 11.10.1.1 All aerodromes which show a distinctive pattern from the air shall be shown by the appropriate symbol. Abandoned aerodromes shall be identified as abandoned.
- 11.10.1.2 The runway pattern, at a scale sufficiently large to show it clearly, shall be shown for:

- (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 aerodrome elevation shall be shown to the nearest metre or foot in a prominent position on the chart.

11.10.1.4 The threshold elevation or, where applicable, the highest elevation of the touchdown zone shall be shown to the nearest metre or foot.

11.10.2 Obstacles

11.10.2.1 Obstacles shall be shown on the plan view of the chart.

11.10.2.2 Obstacles shall be identified, if one or more obstacles are the determining factor of an obstacle clearance altitude/height.

11.10.2.3 The elevation of the top of obstacles shall be shown to the nearest (next higher) metre or foot.

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

11.10.2.5 When the heights of obstacles above a datum other than mean sea level are shown, the datum shall be the aerodrome elevation except that, at aerodromes having an instrument runway (or runways) with a threshold elevation more than 2 m (7 ft) below the aerodrome elevation, the chart datum shall be the threshold elevation of the runway to which the instrument approach is related.

11.10.2.6 Where a datum other than mean sea level is used, it shall be stated in a prominent position on the chart.

11.10.2.7 Where an obstacle free zone has not been established for a precision approach runway Category I, this shall be indicated.

11.10.2.8 Obstacles that penetrate the visual segment surface (VSS) shall be identified on the chart.

11.10.3 Prohibited, restricted and danger areas

Prohibited areas, restricted areas, and danger areas which may affect the execution of the procedures shall be shown with their identification and vertical limits.

11.10.4 Radio communication facilities and navigation aids

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

11.10.4.1.1 When radio navigation aid is used as a significant point for each area navigation, only its plain language name and identification shall be shown.

11.10.4.2 The initial approach fix (IAF), the intermediate approach fix (IF), the final approach fix (FAF) (or final approach point (FAP) for an ILS approach procedure), the missed approach point (MAPt), where established, and other essential fixes or points comprising the procedure shall be shown and identified.

- 11.10.4.3 When the final approach fix is used for conventional navigation (or final approach point for an ILS approach procedure), it shall be identified with its geographical coordinates in degrees, minutes and seconds.
- 11.10.4.4 Radio navigation aids that might be used in diversionary procedures together with their track-defining characteristics, if any, shall be shown or indicated on the chart.
- 11.10.4.5 Radio communication frequencies, including call signs that are required for the execution of the procedures shall be shown.
- 11.10.4.6 When required by the procedures, the distance to the aerodrome from each radio navigation aid concerned with the final approach shall be shown to the nearest kilometre or nautical mile. When no track-defining aid indicates the bearing of the aerodrome, the bearing shall also be shown to the nearest degree.

11.10.5 Minimum sector altitude or terminal arrival altitude

The minimum sector altitude or terminal arrival altitude established by the competent authority shall be shown, with a clear indication of the sector to which it applies.

11.10.6 Portrayal of procedure tracks

- 11.10.6.1 The plan view shall show the following information in the manner indicated:
- (a) the approach procedure track by an arrowed continuous line indicating the direction of flight;
 - (b) the missed approach procedure track by an arrowed broken line;
 - (c) any additional procedure track, other than those specified in a) and b), by an arrowed dotted line;
 - (d) bearings, tracks, radials to the nearest degree and distances to the nearest two-tenths of a kilometre or tenth of a nautical mile or times required for the procedure;
 - (e) where no track-defining aid is available, the magnetic bearing to the nearest degree to the aerodrome from the radio navigation aids concerned with the final approach;
 - (f) the boundaries of any sector in which visual manoeuvring (circling) is prohibited;
 - (g) where specified, the holding pattern and minimum holding altitude/height associated with the approach and missed approach;
 - (h) caution notes where required, prominently displayed on the face of the chart;
 - (i) an indication of “flyover” significant points.
- 11.10.6.2 The plan view shall show the distance to the aerodrome from each radio navigation aid concerned with the final approach.
- 11.10.6.3 A profile shall be provided normally below the plan view showing the following data:
- (a) the aerodrome by a solid block at aerodrome elevation;
 - (b) the profile of the approach procedure segments by an arrowed continuous line indicating the direction of flight;
 - (c) the profile of the missed approach procedure segment by an arrowed broken line and a description of the procedure;

- (d) the profile of any additional procedure segment, other than those specified in b) and c), by an arrowed dotted line;
- (e) bearings, tracks, radials to the nearest degree and distances to the nearest two-tenths of a kilometre or tenth of a nautical mile or times required for the procedure;
- (f) altitudes/heights required by the procedures, including transition altitude, 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 Heights required by procedures shall be shown in parentheses, using the height datum selected in accordance with 11.10.2.5.

11.10.6.5 The profile view shall include a ground profile or a minimum altitude/height portrayal as follows:

- (a) a ground profile shown by a solid line depicting the highest elevations of the relief occurring within the primary area of the final approach segment. The highest elevations of the relief occurring in the secondary areas of the final approach segment shown by a dashed line; or
- (b) minimum altitudes/heights in the intermediate and final approach segments indicated within bounded shaded blocks.

11.10.7 Aerodrome operating minima

11.10.7.1 Aerodrome operating minima when established by the State shall be shown.

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

11.10.8 Supplementary information

11.10.8.1 When the missed approach point is defined by:

- (i) a distance from the final approach fix, or
- (ii) a facility or a fix and the corresponding distance from the final approach fix, the distance to the nearest two-tenths of a kilometre or tenth of a nautical mile and a table showing ground speeds and times from the final approach fix to the missed approach point shall be shown.

11.10.8.2 When DME is required for use in the final approach segment, a table showing altitudes/heights for each 2 km or 1 NM, as appropriate, shall be shown. The table shall not include distances which would correspond to altitudes/heights

11.10.8.3 For procedures in which DME is not required for use in the final approach segment but where a suitably located DME is available to provide advisory

descent profile information, a table showing the altitudes/heights shall be included.

11.10.8.4 A rate of descent table shall be shown.

11.10.8.5 For non-precision approach procedures with a final approach fix, the final approach descent gradient to the nearest one-tenth of a per cent and, in parentheses, descent angle to the nearest one-tenth of a degree shall be shown.

11.10.8.6 For precision approach procedures and approach procedures with vertical guidance, the reference datum height to the nearest half metre or foot and the glide path/elevation/vertical path angle to the nearest one-tenth of a degree shall be shown.

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

11.10.8.8 If the final approach descent gradient/angle for any type of instrument approach procedure exceeds the maximum value specified in the Procedures for Air Navigation Services — Aircraft Operations (PANS-OPS, Doc 8168), Volume II, a cautionary note shall be included.

11.10.8.9 For approach procedures having PBN segments, a PBN requirements box shall be included.

11.10.9 Aeronautical database requirements

Appropriate data to support navigation database coding shall be published in accordance with the Procedures for Air Navigation Services — Aircraft Operations (PANS-OPS, Doc 8168), Volume II, Part III, Section 5, Chapter 2, 2.3, for RNAV procedures and Volume II, Part I, Section 4, Chapter 9, 9.4.1.3, for non-RNAV procedures, on the verso of the chart or as a separate, properly referenced sheet.

12. VISUAL APPROACH CHART — ICAO

12.1 Function

This chart shall provide flight crews with information which will enable them to transit from the en-route/descent to approach phases of flight to the runway of intended landing by means of visual reference.

12.2 Availability

The Visual Approach Chart — ICAO shall be made available in the manner prescribed in

1.3.2 for all aerodromes used by international civil aviation where:

- (a) only limited navigation facilities are available; or
- (b) radio communication facilities are not available; or
- (c) no adequate aeronautical charts of the aerodrome and its surroundings at 1:500 000 or greater scale are available; or
- (d) visual approach procedures have been established.

12.3 Scale

- 12.3.1 The scale shall be sufficiently large to permit depiction of significant features and indication of the aerodrome layout.
- 12.3.2 The scale shall not be smaller than 1:500 000.
- 12.3.3 When an Instrument Approach Chart is available for a given aerodrome, the Visual Approach Chart shall be drawn to the same scale.

12.4 Format

The sheet size shall be 210 × 297 mm (8.27 x 11.69 inches) (A4).

12.5 Projection

- 12.5.1 A conformal projection on which a straight line approximates a great circle shall be used.
- 12.5.2 Graduation marks shall be placed at consistent intervals along the neat lines.

12.6 Identification

The chart shall be 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 Natural and cultural landmarks shall be 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 Shore lines, lakes, rivers and streams shall be shown.
- 12.7.3 Relief shall be shown in a manner best suited to the particular elevation and obstacle characteristics of the area covered by the chart.
- 12.7.4 Spot elevations shall be carefully selected when shown.
- 12.7.5 The figures relating to different reference levels shall be clearly differentiated in their presentation.

12.8 Magnetic Variation

The magnetic variation shall be shown.

12.9 Bearings, Tracks and Radials

- 12.9.1 Bearings, tracks and radials shall be magnetic except as provided for in 12.9.2.
- 12.9.2 In areas of high latitude, where it has been determined that reference to Magnetic North is impractical, another suitable reference, i.e. True North or Grid North, shall be used.
- 12.9.3 Where bearings, tracks or radials are given with reference to True North or Grid North, this shall be clearly indicated. When Grid North is used, its reference grid meridian shall be identified.

12.10 Aeronautical Data

12.10.1 Aerodromes

12.10.1.1 All aerodromes shall be 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 aerodrome elevation shall be shown in a prominent position on the chart.

12.10.2 Obstacles

12.10.2.1 Obstacles shall be shown and identified.

12.10.2.2 The elevation of the top of obstacles shall be shown to the nearest (next higher) metre or foot.

12.10.2.3 The heights of obstacles above the aerodrome elevation shall be shown.

12.10.2.3.1 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

Prohibited areas, restricted areas, and danger areas shall be depicted with their identification and vertical limits.

12.10.4 Designated airspace

Control zones and aerodrome traffic zones shall be depicted with their vertical limits and the appropriate class of airspace where applicable.

12.10.5 Visual approach information

12.10.5.1 Visual approach procedures shall be shown where applicable.

12.10.5.2 Visual aids for navigation shall be shown as appropriate.

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

12.10.6 Supplementary information

12.10.6.1 Radio navigation aids together with their frequencies and identifications shall be shown as appropriate.

12.10.6.2 Radio communication facilities with their frequencies shall be shown as appropriate.

13. AERODROME/HELIPORT CHART — ICAO

13.1 Function

This chart shall provide flight crews with information which will facilitate the ground movement of aircraft:

- a) from the aircraft stand to the runway; and
- b) from the runway to the aircraft stand;

and helicopter movement:

- (a) from the helicopter stand to the touchdown and lift-off area and to the final approach and take-off area;
- (b) from the final approach and take-off area to the touchdown and lift-off area and to the helicopter stand;
- (c) along helicopter ground and air taxiways; and
- (d) along air transit routes;

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

13.2 Availability

- 13.2.1 The Aerodrome/Heliport Chart — ICAO shall be made available in the manner prescribed in 1.3.2 for all aerodromes/heliports regularly used by international civil aviation.
- 13.2.2 The Aerodrome/Heliport Chart — ICAO shall be made available in the manner prescribed in 1.3.2 for all other aerodromes/heliports available for used by international civil aviation.

13.3 Coverage and Scale

- 13.3.1 The coverage and scale shall be sufficiently large to show clearly all the elements listed in 13.6.1.
- 13.3.2 A linear scale shall be shown.

13.4 Identification

The chart shall be identified by the name of the city or town or area which the aerodrome/heliport serves and the name of the aerodrome/heliport.

13.5 Magnetic Variation

True and Magnetic North arrows and magnetic variation to the nearest degree and annual change of the magnetic variation shall be shown.

13.6 Aerodrome/Heliport Data

- 13.6.1 This chart shall show:
 - (a) geographical coordinates in degrees, minutes and seconds for the aerodrome/heliport reference point;
 - (b) elevations, to the nearest metre or foot, of the aerodrome/heliport and apron (altimeter checkpoint locations) where applicable; and for non-precision approaches, elevations and geoid undulations of runway thresholds and the geometric centre of the touchdown and lift-off area;
 - (c) elevations and geoid undulations, to the nearest half-metre or foot, of the precision approach runway threshold, the geometric centre of the touchdown and lift-off area, and at the highest elevation of the touchdown zone of a precision approach runway;
 - (d) all runways including those under construction with designation number, length and width to the nearest metre, bearing strength, displaced thresholds, stopways, clearways, runway directions to the nearest degree magnetic, type of surface and runway markings;
 - (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;

- (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;
- (h) where established, hot spot locations with additional information properly annotated;
- (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 For aerodromes accommodating aeroplanes with folding wingtips, areas where it is safe for aeroplanes with folding wing tips to operate with wing tips extended, shall be shown on the chart

13.6.3 In addition to the items in 13.6.1 relating to heliports, the chart shall show:

- (a) heliport type;
- (b) touchdown and lift-off area including dimensions to the nearest metre, slope, type of surface and bearing strength in tonnes;
- (c) final approach and take-off area including type, true bearing to the nearest degree, designation number (where appropriate), length and width to the nearest metre, slope and type of surface;
- (d) safety area including length, width and type of surface;
- (e) helicopter clearway including length and ground profile;
- (f) obstacles including type and elevation of the top of the obstacles to the nearest (next higher) metre or foot;
- (g) visual aids for approach procedures, marking and lighting of final approach and take-off area, and of touchdown and lift-off area;
- (h) declared distances to the nearest metre for heliports, where relevant, including:

- (i) take-off distance available;
- (ii) rejected take-off distance available;
- (iii) landing distance available.

14. AERODROME GROUND MOVEMENT CHART — ICAO

14.1 Function

This supplementary chart shall provide flight crews with detailed information to facilitate the ground movement of aircraft to and from the aircraft stands and the parking/docking of aircraft.

14.2 Availability

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

14.3 Coverage and Scale

14.3. The coverage and scale shall be sufficiently large to show clearly all the elements listed in 14.6.

14.3.2 A linear scale shall be shown.

14.4 Identification

The chart shall be identified by the name of the city or town or area which the aerodrome serves and the name of the aerodrome.

14.5 Magnetic variation

14.5.1 A True North arrow shall be shown.

14.5.2 Magnetic variation to the nearest degree and its annual change shall be shown.

14.6 Aerodrome Data

14.6.1 This chart shall show in a similar manner all the information on the Aerodrome/Heliport Chart — ICAO relevant to the area depicted, including:

- (a) apron elevation to the nearest metre or foot;
- (b) aprons with aircraft stands, bearing strengths or aircraft type restrictions, lighting, marking and other visual guidance and control aids, where applicable, including location and type of visual docking guidance systems;
- (c) geographical coordinates in degrees, minutes, seconds and hundredths of seconds for aircraft stands;
- (d) taxiways with designations, width to the nearest metre, bearing strength or aircraft type restrictions where applicable, lighting, markings (including runway-holding positions and, where established, intermediate holding positions), stop bars, and other visual guidance and control aids;
- (e) where established, hot spot locations with additional information properly annotated;
- (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 For aerodromes accommodating aeroplanes with folding wingtips, areas where it is safe for aeroplanes with folding wing tips to operate with wing tips extended, shall be shown on the chart

15. AIRCRAFT PARKING/DOCKING CHART — ICAO

15.1 Function

This supplementary chart shall provide flight crews with detailed information to facilitate the ground movement of aircraft between the taxiways and the aircraft stands and the parking/docking of aircraft.

15.2 Availability

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

15.3 Coverage and Scale

15.3.1 The coverage and scale shall be sufficiently large to show clearly all the elements listed in

15.6.

15.3.2 A linear scale shall be shown.

15.4 Identification

The chart shall be identified by the name of the city or town or area which the aerodrome serves and the name of the aerodrome.

15.5 Magnetic Variation

15.5.1 A True North arrow shall be shown.

15.5.2 Magnetic variation to the nearest degree and its annual change shall be shown.

15.6 Aerodrome Data

This chart shall show in a similar manner all the information on the Aerodrome/Heliport Chart — ICAO and the Aerodrome Ground Movement Chart — ICAO relevant to the area depicted, including:

- (a) apron elevation to the nearest metre or foot;

- (b) aprons with aircraft stands, bearing strengths or aircraft type restrictions, lighting, marking and other visual guidance and control aids, where applicable, including location and type of visual docking guidance systems;
- (c) geographical coordinates in degrees, minutes, seconds and hundredths of seconds for aircraft stands;
- (d) taxiway entries with designations, including runway-holding positions and, where established, intermediate holding positions, and stop bars;
- (e) where established, hot spot locations with additional information properly annotated;
- (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.

16. WORLD AERONAUTICAL CHART — ICAO 1:1 000 000

16.1 Function

This chart shall provide information to satisfy the requirements of visual air navigation.

(a) as a basic aeronautical chart:

- (i) when highly specialized charts lacking visual information do not provide essential data;
- (ii) to provide complete world coverage at a constant scale with a uniform presentation of planimetric data;
- (iii) in the production of other charts required by international civil aviation;

(b) as a pre-flight planning chart.

16.2 Availability

16.2.1 The World Aeronautical Chart — ICAO 1:1 000 000 shall be made available in the manner prescribed in 1.3.2 for all areas delineated in IS: 16.2.1.

16.3 Scales

16.3.1 Linear scales for kilometres and nautical miles arranged with their zero points in the same vertical line shall be shown in the margin in the following order:

- (i) kilometres,
- (ii) nautical miles,

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

16.3.2 A conversion scale (metres/feet) shall be shown in the margin.

16.4 Format

16.4.1 The title and marginal notes shall be in English.

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

16.5 Projection

16.5.1 The projections shall be as follows:

- a) between the Equator and 80° latitude: the Lambert conformal conic projection, in separate bands for each tier of charts. The standard parallels for each 4° band 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 Graticules and graduations shall be shown as follows:

a) Parallels:

Latitude	Distance between parallels	Graduations on parallels
0° to 72°	30'	1'
72° to 84°	30'	5'
84° to 89°	30'	1°
89° to 90°	30'	5° (Only on degree parallels from 72° to 89°)

b) Meridians:

Latitude	Interval between meridians	Graduations on meridians
0° to 52°	30'	1'

52° to 72°	30'	1' (Only on even numbered meridians)
72° to 84°	1°	1'
84° to 89°	5°	1'
89° to 90°	15°	1' (Only on every fourth meridian from 72° to 89°)

16.5.3 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' 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.

16.5.4 All meridians and parallels shown shall be 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.

16.5.5 The name and basic parameters of the projection shall be indicated in the margin.

16.6 Identification

Sheet numbering shall be in conformity with the index in IS: 16.2.1.

16.7 Culture and topography

16.7.1 Built-up areas

Cities, towns and villages shall be selected and shown according to their relative importance to visual air navigation

16.7.2 Railroads

16.7.2.1 All railroads having landmark value shall be shown.

16.7.3 Highways and roads

16.7.3.1 Road systems shall be shown in sufficient detail to indicate significant patterns from the air.

16.7.3.2 Roads shall not be shown in built-up areas unless they can be distinguished from the air as definite landmarks.

16.7.4 Landmarks

Natural and cultural landmarks, such as bridges, prominent transmission lines, permanent cable car installations, wind turbines, mine structures, forts, ruins, levees, pipelines, rocks, bluffs, cliffs, sand dunes, isolated lighthouses and lightships, when considered to be of importance for visual air navigation, shall be shown.

16.7.5 Political boundaries

International boundaries shall be shown. Undemarcated and undefined boundaries shall be distinguished by descriptive notes.

16.7.6 Hydrography

16.7.6.1 All water features compatible with the scale of the chart comprising shore lines, lakes, rivers and streams (including those non-perennial in nature), salt lakes, glaciers and ice caps shall be shown.

16.7.6.2 The tint covering large open water areas shall be kept very light.

16.7.6.3 Reefs and shoals, including rocky ledges, tidal flats, isolated rocks, sand, gravel, stone and all similar areas, shall be shown by symbols when of significant landmark value.

16.7.7 Contours

16.7.7.1 Contours shall be 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 values of the contours used shall be shown.

16.7.8 Hypsometric tints

16.7.8.1 When hypsometric tints are used, the range of elevations for the tints shall be shown.

16.7.8.2 The scale of the hypsometric tints used on the chart shall be shown in the margin.

16.7.9 Spot elevations

16.7.9.1 Spot elevations shall be 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 elevation (in metres or feet) of the highest point on the chart and its geographical position to the nearest five minutes shall be indicated in the margin.

16.7.9.3 The spot elevation of the highest point in any sheet shall be cleared of hypsometric tinting.

16.7.10 Incomplete or unreliable relief

16.7.10.1 Areas that have not been surveyed for contour information shall be labelled "Relief data incomplete".

16.7.10.2 Charts on which spot elevations are generally unreliable shall bear a warning note prominently displayed on the face of the chart in the colour used for aeronautical information, as follows: "Warning — The reliability of relief information on this chart is doubtful and elevations shall be used with caution."

16.7.11 Escarpments

Escarpments shall be shown when they are prominent landmarks or when cultural detail is very sparse.

16.7.12 Wooded areas

16.7.12.1 Reserved

16.7.12.2 The approximate extreme northern or southern limits of tree growth shall be indicated by a dashed black line and shall be appropriately labelled where shown.

16.7.13 Date of topographic information

The date of latest information shown on the topographic base shall be indicated in the margin.

16.8 Magnetic Variation

16.8.1 Isogonic lines shall be shown.

16.8.2 The date of the isogonic information shall be indicated in the margin.

16.9 Aeronautical data

16.9.1 General

Aeronautical data shown shall be kept to a minimum consistent with the use of the chart for visual navigation and the revision cycle.

16.9.2 Aerodromes

16.9.2.1 Land and water aerodromes and heliports shall be shown with their names, to the extent that they do not produce undesirable congestion on the chart, priority being given to those of greatest aeronautical significance.

16.9.2.2 The aerodrome elevation, the lighting available, the type of runway surface and the length of the longest runway or channel, shown in abbreviated form for each aerodrome in conformity with the example given in IS: 2.4.1, provided they do not cause undesirable clutter on the chart, shall be indicated.

16.9.2.3 Abandoned aerodromes which are still recognizable as aerodromes from the air shall be shown and identified as abandoned.

16.9.3 Obstacles

16.9.3.1 Obstacles shall be shown.

16.9.3.2 When considered of importance to visual flight, prominent transmission lines, permanent cable car installations and wind turbines, which are obstacles, shall be shown.

16.9.4 Prohibited, restricted and danger areas

Prohibited, restricted and danger areas shall be shown.

16.9.5 Air traffic services system

16.9.5.1 Significant elements of the air traffic services system including, where practicable, control zones, aerodrome traffic zones, control areas, flight information regions and other airspaces in which VFR flights operate shall be shown together with the appropriate class of airspace.

16.9.5.2 Where appropriate, the air defence identification zone (ADIZ) shall be shown and properly identified.

16.9.6 Radio navigation aids

Radio navigation aids shall be shown by the appropriate symbol and named, but excluding their frequencies, coded designators, times of operation and other characteristics unless any or all of this information which is shown is kept up to date by means of new editions of the chart

16.9.7 Supplementary information

16.9.7.1 Aeronautical ground lights together with their characteristics or their identifications or both shall be shown.

16.9.7.2 Marine lights on outer prominent coastal or isolated features of not less than 28 km (15 NM) visibility range shall be shown:

- (a) where they are not less distinguishable than more powerful marine lights in the vicinity;
- (b) where they are readily distinguishable from other marine or other types of lights in the vicinity of built-up coastal areas;
- (c) where they are the only lights of significance available.

17. AERONAUTICAL CHART — ICAO 1:500 000

17.1 Function

This 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.

17.2 Availability

The Aeronautical Chart — ICAO 1:500 000 shall be made available in the manner prescribed in 1.3.2 for all areas delineated in IS: 16.2.1.

17.3 Scales

17.3.1 Linear scales for kilometres and nautical miles arranged with their zero points in the same vertical line shall be shown in the margin in the following order:

- (i) kilometres,
- (ii) nautical miles,

17.3.1.1 The length of the linear scale shall be not less than 200 mm (8 in).

17.3.2 A conversion scale (metres/feet) shall be shown in the margin.

17.4 Format

17.4.1 The title and marginal notes shall be in one of the working languages of ICAO.

17.4.2 The information regarding the number of the adjoining sheets and the unit of measurement used to express elevation shall be so located as to be clearly visible when the sheet is folded.

17.5 Projection

17.5.1 A conformal (orthomorphic) projection shall be used.

17.5.2 Reserved

17.5.3 Parallels shall be shown at intervals of 30'.

17.5.3.1 Meridians shall be shown at interval of 30'

17.5.4 Graduation marks shall be shown at 1' intervals along each whole degree meridian and parallel, extending away from the Greenwich Meridian and from the Equator. Each 10' interval shall be shown by a mark on both sides of the graticule line.

17.5.4.1 The length of the graduation marks shall 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 All meridians and parallels shown shall be 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 name and basic parameters of the projection shall be indicated in the margin.

17.6 Identification

17.6.1 Each sheet shall be identified by a name which shall 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 Cities, towns and villages shall be selected and shown according to their relative importance to visual air navigation.

17.7.2 Railroads

17.7.2.1 All railroads having landmark value shall be shown.

17.7.2.2 Tunnels shall be shown when they serve as prominent landmarks.

17.7.3 Highways and roads

17.7.3.1 Road systems shall be shown in sufficient detail to indicate significant patterns from the air.

17.7.4 Landmarks

Natural and cultural landmarks, such as bridges, prominent transmission lines, permanent cable car installations, wind turbines, mine structures, lookout towers, forts, ruins, levees, pipelines, rocks, bluffs, cliffs, sand dunes, isolated lighthouses and lightships, when considered to be of importance for visual air navigation, shall be shown.

17.7.5 Political boundaries

International boundaries shall be shown. Undemarcated and undefined boundaries shall be distinguished by descriptive notes.

17.7.6 Hydrography

17.7.6.1 All water features compatible with the scale of the chart comprising shore lines, lakes, rivers and streams (including those non-perennial in nature), salt lakes, glaciers and ice caps shall be shown.

17.7.7 Contours

17.7.7.1 Contours shall be shown. The selection of intervals shall be governed by the requirement to depict clearly the relief features required in air navigation.

17.7.7.2 The values of the contours used shall be shown.

17.7.8 Hypsometric tints

17.7.8.1 When hypsometric tints are used, the range of elevations for the tints shall be shown.

17.7.8.2 The scale of the hypsometric tints used on the chart shall be shown in the margin.

17.7.9 Spot elevations

17.7.9.1 Spot elevations shall be 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 navigational value shall be shown. The position of each selected elevation shall be indicated by a dot.

17.7.9.2 The elevation (in metres or feet) of the highest point on the chart and its geographical position to the nearest five minutes shall be indicated in the margin.

17.7.9.3 The spot elevation of the highest point on any sheet shall be cleared of hypsometric tinting.

17.7.10 Incomplete or unreliable relief

17.7.10.1 Areas that have not been surveyed for contour information shall be labelled “Relief data incomplete”.

17.7.10.2 Charts on which spot elevations are generally unreliable shall bear a warning note prominently displayed on the face of the chart in the colour used for aeronautical information, as follows: “Warning — The reliability of relief information on this chart is doubtful and elevations shall be used with caution.”

17.7.11 Escarpments

Escarpments shall be shown when they are prominent landmarks or when cultural detail is very sparse.

17.7.12 Wooded areas

17.7.12.1 Reserved.

17.7.12.2 Where shown, the approximate northern or southern limits of tree growth shall be indicated by a dashed black line and shall be appropriately labelled.

17.7.13 Date of topographic information

The date of latest information shown on the topographic base shall be indicated in the margin.

17.8 Magnetic Variation

17.8.1 Isogonic lines shall be shown.

17.8.2 The date of the isogonic information shall be indicated in the margin.

17.9 Aeronautical Data

17.9.1 General

Aeronautical information shall be shown consistent with the use of the chart and the revision cycle.

17.9.2 Aerodromes

17.9.2.1 Land and water aerodromes and heliports shall be shown with their names, to the extent that they do not produce undesirable congestion on the chart, priority being given to those of greatest aeronautical significance.

17.9.2.2 The aerodrome elevation, the lighting available, the type of runway surface and the length of the longest runway or channel, shown in abbreviated form for each aerodrome in conformity with the example given in IS: 2.4.1, provided they do not cause undesirable clutter on the chart, shall be indicated.

17.9.2.3 Abandoned aerodromes which are still recognizable as aerodromes from the air shall be shown and identified as abandoned.

17.9.3 Obstacles

17.9.3.1 Obstacles shall be shown.

17.9.3.2 When considered of importance to visual flight, prominent transmission lines, permanent cable car installations and wind turbines, which are obstacles, shall be shown.

17.9.4 Prohibited, restricted and danger areas

Prohibited, restricted and danger areas shall be shown.

17.9.5 Air traffic services system

17.9.5.1 Significant elements of the air traffic services system including, where practicable, control zones, aerodrome traffic zones, control areas, flight information regions and other airspaces in which VFR flights operate shall be shown together with the appropriate class of airspace.

17.9.5.2 Where appropriate, the air defence identification zone (ADIZ) shall be shown and properly identified.

17.9.6 Radio navigation aids

Radio navigation aids shall be shown by the appropriate symbol and named, but excluding their frequencies, coded designators, times of operation and other characteristics unless any or all of this information which is shown is kept up to date by means of new editions of the chart.

17.9.7 Supplementary information

17.9.7.1 Aeronautical ground lights together with their characteristics or their identifications or both shall be shown.

17.9.7.2 Marine lights on outer prominent coastal or isolated features of not less than 28 km (15 NM) visibility range shall be shown:

- (a) where they are not less distinguishable than more powerful marine lights in the vicinity;
- (b) where they are readily distinguishable from other marine or other types of lights in the vicinity of built-up coastal areas;
- (c) where they are the only lights of significance available.

18. AERONAUTICAL NAVIGATION CHART —ICAO SMALL SCALE

18.1 Function

This chart shall:

- a) serve as an air navigation aid for flight crews of long-range aircraft at high altitudes;
- b) provide selective checkpoints over extensive ranges for identification at high altitudes and speeds, which are required for visual confirmation of position;

- c) provide for continuous visual reference to the ground during long-range flights over areas lacking radio or other electronic navigation aids, or over areas where visual navigation is preferred or becomes necessary;
- d) provide a general purpose chart series for long-range flight planning and plotting.

18.2 Availability

The Aeronautical Navigation Chart — ICAO Small Scale shall be made available in the manner prescribed in 1.3.2 for all areas delineated in IS: 16.2.1 .

18.3 Coverage and Scale

18.3.1 The Aeronautical Navigation Chart — ICAO Small Scale shall provide, as a minimum, complete coverage of the major land masses of the world.

18.3.2 The scale shall be in the range of 1:2 000 000 to 1:5 000 000.

18.3.3 The scale of the chart shall be substituted in the title for the words “Small Scale”.

18.3.4 Linear scales for kilometres and nautical miles arranged with their zero points in the same vertical line shall be shown in the margin in the following order:

- (i) kilometres,
- (ii) nautical miles,

18.3.5 The length of the linear scale shall be not less than 200 mm (8 in).

18.3.6 A conversion scale (metres/feet) shall be shown in the margin.

18.4 Format

18.4.1 The title and marginal notes shall be in one of the working languages of ICAO.

18.4.2 The information regarding the number of the adjoining sheets and the unit of measurement to express elevations shall be so located as to be clearly visible when the sheet is folded.

18.5 Projection

18.5.1 A conformal (orthomorphic) projection shall be used.

18.5.1.1 The name and basic parameters of the projection shall be shown in the margin.

18.5.2 Parallels shall be shown at intervals of 1°.

18.5.2.1 Graduations on the parallels shall be shown at sufficiently close intervals compatible with the latitude and the scale of the chart.

18.5.3 Meridians shall be shown at intervals compatible with the latitude and the scale of the chart.

18.5.3.1 Graduations on the meridians shall be shown at intervals not exceeding 5’.

18.5.4 The graduation marks shall extend away from the Greenwich Meridian and from the Equator.

18.5.5 All meridians and parallels shown shall be numbered in the borders of the chart. In addition, when required, meridians and parallels shall be numbered within the body of the chart in such a manner that they can be readily identified when the chart is folded.

18.6 Culture and Topography

18.6.1 Built-up areas

18.6.1.1 Cities, towns and villages shall be selected and shown according to their relative importance to visual air navigation.

18.6.1.2 Reserved.

18.6.2 Railroads

18.6.2.1 All railroads having landmark value shall be shown.

18.6.3 Highways and roads

18.6.3.1 Road systems shall be shown in sufficient detail to indicate significant patterns from the air.

18.6.4 Landmarks

Natural and cultural landmarks, such as bridges, prominent transmission lines, permanent cable car installations, mine structures, forts, ruins, levees, pipelines, rocks, bluffs, cliffs, sand dunes, isolated lighthouses and lightships, when considered to be of importance for visual air navigation, shall be shown.

18.6.5 Political boundaries

International boundaries shall be shown. Undemarcated and undefined boundaries shall be distinguished by descriptive notes.

18.6.6 Hydrography

18.6.6.1 All water features compatible with the scale of the chart comprising shore lines, lakes, rivers and streams (including those non-perennial in nature), salt lakes, glaciers and ice caps shall be shown.

18.6.7 Contours

18.6.7.1 Contours shall be shown. The selection of intervals shall be governed by the requirement to depict clearly the relief features required in air navigation.

18.6.7.2 The values of the contours used shall be shown.

18.6.8 Hypsometric tints

18.6.8.1 When hypsometric tints are used, the range of elevations for the tints shall be shown.

18.6.8.2 The scale of the hypsometric tints used on the chart shall be shown in the margin.

18.6.9 Spot elevations

18.6.9.1 Spot elevations shall be 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 value to visual air navigation shall be shown. The position of each selected elevation shall be indicated by a dot.

18.6.9.2 The elevation (in metres or feet) of the highest point on the chart and its geographical position to the nearest five minutes shall be indicated in the margin.

18.6.9.3 The spot elevation of the highest point in any sheet shall be cleared of hypsometric tinting.

18.6.10 Incomplete or unreliable relief

18.6.10.1 Areas that have not been surveyed for contour information shall be labelled "Relief data incomplete".

18.6.10.2 Charts on which spot elevations are generally unreliable shall bear a warning note prominently displayed on the face of the chart in the colour used for aeronautical information, as follows: “Warning — The reliability of relief information on this chart is doubtful and elevations shall be used with caution.”

18.6.11 Escarpments

Escarpments shall be shown when they are prominent landmarks or when cultural detail is very sparse.

18.6.12 Wooded areas

Wooded areas of large extent shall be shown.

18.6.13 Date of topographic information

The date of latest information shown on the topographic base shall be indicated in the margin.

18.6.14 Colours

18.6.14.1 Subdued colours shall be used for the chart background to facilitate plotting.

18.6.14.2 Good colour contrast shall be ensured to emphasize features important to visual air navigation.

18.7 Magnetic Variation

18.7.1 Isogonic lines shall be shown.

18.7.2 The date of isogonic information shall be indicated in the margin.

18.8 Aeronautical Data

18.8.1 Aerodromes

Land and water aerodromes and heliports shall be shown with their names, to the extent that they do not produce undesirable congestion on the chart, priority being given to those of greatest aeronautical significance.

18.8.2 Obstacles

Obstacles shall be shown.

18.8.3 Prohibited, restricted and danger areas

Prohibited, restricted and danger areas shall be shown when considered to be of importance to air navigation.

18.8.4 Air traffic services system

18.8.4.1 Significant elements of the air traffic services system shall be shown when considered to be of importance to air navigation.

18.8.4.2 Where appropriate, the air defence identification zone (ADIZ) shall be shown and properly identified.

18.8.5 Radio navigation aids

Radio aids to navigation may be shown by the appropriate symbol and named

19. PLOTTING CHART — ICAO

19.1 Function

This chart shall provide a means of maintaining a continuous flight record of the aircraft position by various fixing methods and dead reckoning in order to maintain an intended flight path.

19.2 Availability

This chart shall be made available, in the manner prescribed in 1.3.2, to cover major air routes over oceanic areas and sparsely settled areas used by international civil aviation.

19.3 Coverage and Scale

19.3.1 The chart for a particular region shall cover major air routes and their terminals on a single sheet where practicable.

19.3.2 The scale shall be governed by the area to be covered.

19.4 Format

The sheet shall be of a size that can be adapted for use on a navigator's plotting table.

19.5 Projection

19.5.1 A conformal projection on which a straight line approximates a great circle shall be used.

19.5.2 Parallels and meridians shall be shown.

19.5.2.1 The intervals shall be arranged to permit accurate plotting to be carried out with a minimum of time and effort.

19.5.2.2 Graduation marks shall be shown at consistent intervals along an appropriate number of parallels and meridians. The interval selected shall, regardless of scale, minimize the amount of interpolation required for accurate plotting.

19.5.2.3 Parallels and meridians shall be numbered so that a number appears at least once every 15 cm (6 in) on the face of the chart.

19.5.2.4 If a navigational grid is shown on charts covering the higher latitudes, it shall comprise lines parallel to the Meridian or anti-Meridian of Greenwich.

19.6 Identification

Each sheet shall be identified by chart series and number.

19.7 Culture and Topography

19.7.1 Generalized shore lines of all open water areas, large lakes and rivers shall be shown.

19.7.2 Spot elevations for selected features constituting a hazard to air navigation shall be shown.

19.8 Magnetic Variation

19.8.1 Isogonals or, in higher latitudes, isogrivs, or both, shall be shown at consistent intervals throughout the chart. The interval selected shall, regardless of scale, minimize the amount of interpolation required.

19.8.2 The date of the isogonic information shall be shown.

19.9 Aeronautical Data

19.9.1 The following aeronautical data shall be shown:

- (a) aerodromes regularly used by international commercial air transport together with their names;
- (b) selected radio aids to navigation that will contribute to position-finding together with their names and identifications;
- (c) lattices of long-range electronic aids to navigation, as required;
- (d) boundaries of flight information regions, control areas and control zones necessary to the function of the chart;
- (e) designated reporting points necessary to the function of the chart;
- (f) ocean station vessels.

19.9.2 Aeronautical ground lights and marine lights useful for air navigation shall be shown where other means of navigation are non-existent

20. ELECTRONIC AERONAUTICAL CHART DISPLAY — ICAO

20.1 Function

The Electronic Aeronautical Chart Display — ICAO, with adequate back-up arrangements and in compliance with the requirements of Civil Aviation (Operations of Aircraft) Regulations for charts, shall enable 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 Electronic Aeronautical Chart Display — ICAO shall be capable of displaying all aeronautical, cultural and topographic information required by 5.0 and 7.0 through 19.0

20.3 Display Requirements

20.3.1 Display categories

20.3.1.1 Information available for display shall be subdivided into the following categories:

- (a) basic display information, permanently retained on the display and consisting of the minimum information essential for the safe conduct of flight; and
- (b) other display information, which may be removed from the display or displayed individually on demand, and consisting of information not considered essential for the safe conduct of flight.

20.3.1.2 It shall be a simple function to add or remove other display information but shall not be possible to remove information contained in the basic display.

20.3.2 Display mode and generation of neighbouring area

20.3.2.1 The Electronic Aeronautical Chart Display — ICAO shall be capable of continuously plotting the aircraft's position in a true motion mode where reset and generation of the surrounding area shall take place automatically.

20.3.2.2 It shall be possible manually to change the chart area and the position of the aircraft relative to the edge of the display.

20.3.3 Scale

It shall be possible to vary the scale at which a chart is displayed.

20.3.4 Symbols

Symbols used shall conform to those specified for electronic charts in IS: 2.4.1 — ICAO Chart Symbols except where it is desired to show items for which no ICAO chart symbol is provided. In these cases, electronic chart symbols 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.

20.3.5 Display hardware

20.3.5.1 The effective size of the chart presentation shall be sufficient to display the information required by 20.2 without excessive scrolling.

20.3.5.2 The display shall have the capabilities required to accurately portray required elements of IS: 2.4.1 — ICAO Chart Symbols.

20.3.5.3 The method of presentation shall ensure 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 display luminance shall be adjustable by the flight crew.

20.4 Provision and Updating of Data

20.4.1 The provision and updating of data for use by the display shall be in conformance with the aeronautical data quality system requirements.

20.4.2 The display shall be capable of automatically accepting authorized updates to existing data. A means of ensuring that authorized data and all relevant updates to that data have been correctly loaded into the display shall be provided.

20.4.3 The display shall be capable of accepting updates to authorized data entered manually with simple means for verification prior to final acceptance of the data. Updates entered manually shall be distinguishable on the display from authorized data and its authorized updates and shall not affect display legibility.

20.4.4 A record shall be kept of all updates, including date and time of application.

20.4.5 The display shall allow the flight crew to display updates so that the flight crew may review the contents of the updates and determine that they have been included in the system.

20.5 Performance tests, malfunction alarms and indications

20.5.1 A means shall be 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 A suitable alarm or indication of system malfunction shall be provided.

20.6 Back-up Arrangements

To ensure safe navigation in case of a failure of the Electronic Aeronautical Chart Display— ICAO, the provision of adequate back-up arrangements shall 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.

21. ATC SURVEILLANCE MINIMUM ALTITUDE CHART — ICAO

21.1 Function

- 21.1.1 This supplementary chart shall provide information that will enable flight crews to monitor and cross-check altitudes assigned by a controller using an ATS surveillance system.
- 21.1.2 A note indicating that the chart may only be used for cross-checking of altitudes assigned while the aircraft is identified shall be prominently displayed on the face of the chart.

21.2 Availability

The ATC Surveillance Minimum Altitude Chart — ICAO shall be made available, in the manner prescribed in 1.3.2, where vectoring procedures are established and minimum vectoring altitudes cannot be shown adequately on the Area Chart — ICAO, Standard Departure Chart — Instrument (SID) — ICAO or Standard Arrival Chart — Instrument (STAR) — ICAO.

21.3 Coverage and Scale

- 21.3.1 The coverage of the chart shall be sufficient to effectively show the information associated with vectoring procedures.
- 21.3.2 The chart shall be drawn to scale.
- 21.3.3 The chart shall be drawn to the same scale as the associated Area Chart — ICAO.

21.4 Projection

- 21.4.1 A conformal projection on which a straight line approximates a geodesic line shall be used.
- 21.4.2 Graduation marks shall be placed at consistent intervals along the neat lines, as appropriate.

21.5 Identification

The chart shall be identified by the name of the aerodrome for which the vectoring procedures are established or, when procedures apply to more than one aerodrome, the name associated with the airspace portrayed.

21.6 Culture and Topography

- 21.6.1 Generalized shorelines of all open water areas, large lakes and rivers shall be shown except where they conflict with data more applicable to the function of the chart.

21.6.2 Appropriate spot elevations and obstacles shall be shown.

21.7 Magnetic Variation

The average magnetic variation of the area covered by the chart shall be shown to the nearest degree.

21.8 Bearings, Tracks and Radials

21.8.1 Bearings, tracks and radials shall be magnetic, except as provided for in 21.8.2.

21.8.2 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, shall be used.

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

21.9 Aeronautical Data

21.9.1 Aerodromes

21.9.1.1 All aerodromes that affect the terminal routings shall be shown. Where appropriate, a runway pattern symbol shall be used.

21.9.1.2 The elevation of the primary aerodrome to the nearest metre or foot shall be shown.

21.9.2 Prohibited, restricted and danger areas

Prohibited, restricted and danger areas shall be depicted with their identification.

21.9.3 Air traffic services system

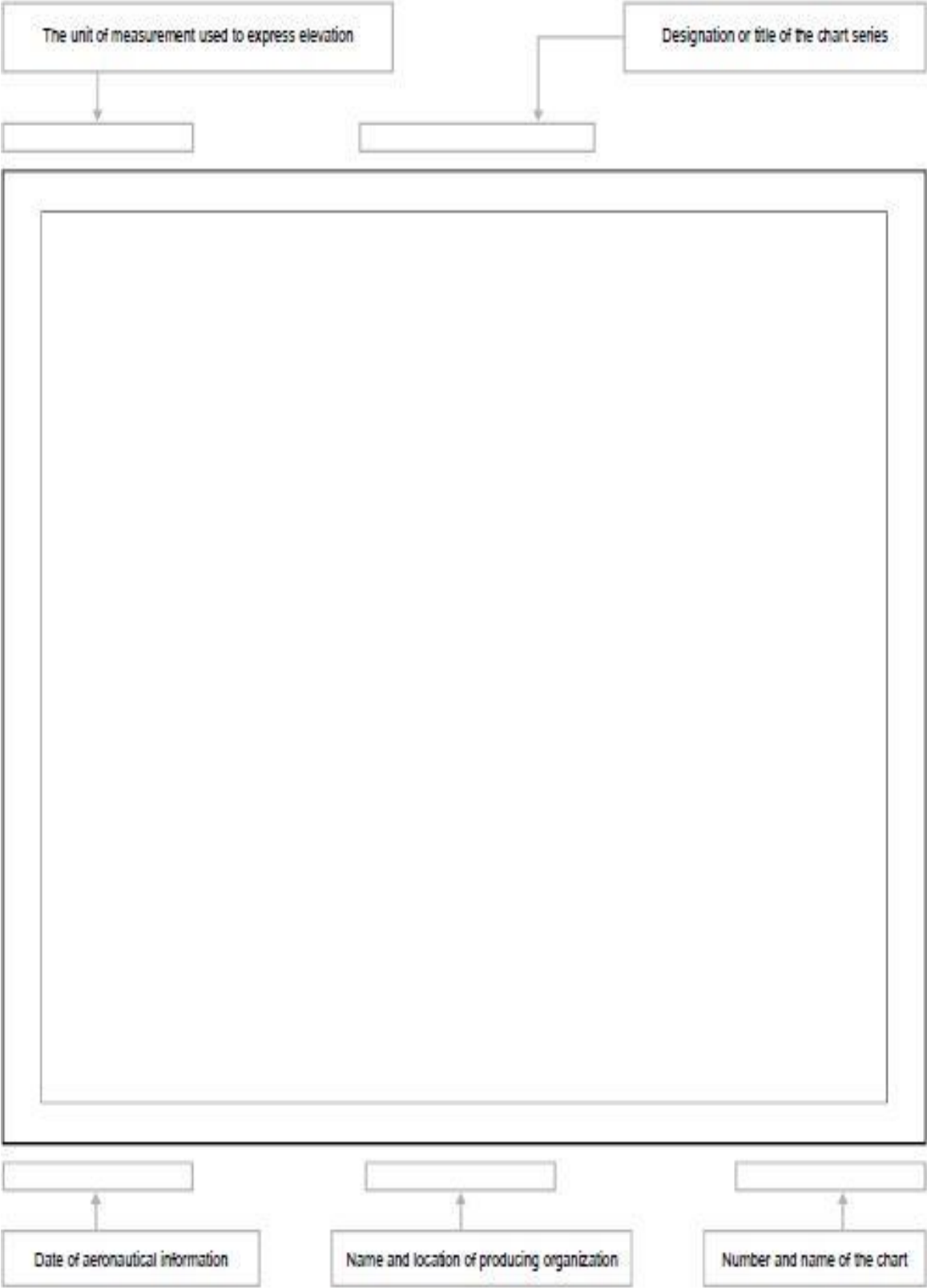
21.9.3.1 The chart shall show components of the established air traffic services system including:

- (a) relevant radio navigation aids together with their identifications;
- (b) lateral limits of relevant designated airspace;
- (c) relevant significant points associated with standard instrument departure and arrival procedures;
- (d) transition altitude, where established;
- (e) information associated with vectoring including:
 - (1) minimum vectoring altitudes to the nearest higher 50 m or 100 ft, clearly identified;
 - (2) lateral limits of minimum vectoring altitude sectors normally defined by bearings and radials to/from radio navigation aids to the nearest degree or, if not practicable, geographical coordinates in degrees, minutes and seconds and shown by heavy lines so as to clearly differentiate between established sectors;
 - (3) distance circles at 20-km or 10-NM intervals or, when practicable, 10-km or 5-NM intervals shown as fine dashed lines with the radius indicated on the circumference and centred on the identified aerodrome main VOR radio navigation aid or, if not available, on the aerodrome/heliport reference point;

- (4) notes concerning correction for low temperature effect, as applicable;
- (5) communications procedures including call sign(s) and channel(s) of the ATC unit(s) concerned.

21.9.3.2 A textual description of relevant communication failure procedures shall be provided and shall, whenever feasible, be shown on the chart or on the same page that contains the chart.

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IS: 2.4.1 ICAO CHART SYMBOLS

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Dry lake bed	39
Falls	28
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Lakes (non-perennial)	32
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Large river (perennial)	23
Rapids	27
Reservoir	38
Rice field	36
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Rock awash	45
Salt lake	33
Salt pans (evaporator)	34
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Shore line (reliable)	19
Shore line (unreliable)	20
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Oil or gas field	70
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2	Approximate contours		9	Levee or esker	Alternative 	13	Spot elevation		.6397 .8975
3	Relief shown by hachures		10	Unusual land features appropriately labelled	 	14	Spot elevation (of doubtful accuracy)		.6370±
4	Bluff, cliff or escarpment			Active volcano		15	Coniferous trees		
5	Lava flow		11	Mountain pass		16	Other trees		
6	Sand dunes					17	Palms		
7	Sand area								
18	Areas not surveyed for contour information or relief data incomplete							Caution	

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19	Shore line (reliable)		30	Abandoned canal <i>Note.— Dry canal having landmark value.</i>		38	Reservoir		
20	Shore line (unreliable)		31	Lakes (perennial)		39	Dry lake bed	Alternative	
21	Tidal flats		32	Lakes (non-perennial)	Alternative 	40	Wash	Alternative	
22	Coral reefs and ledges		33	Salt lake		41	Shoals		
23	Large river (perennial)		34	Salt pans (evaporator)		42	Glaciers and ice caps		
24	Small river (perennial)		35	Swamp		43	Danger line (2 m or one fathom line)		
25	Rivers and streams (non-perennial)	Alternative 	36	Rice field	Alternative 	44	Charted isolated rock		
26	Rivers and streams (unsurveyed)		37	Spring, well or water hole	perennial intermittent 	45	Rock awash		
27	Rapids					46	Unusual water features appropriately labelled		
28	Falls								
29	Canal								

CULTURE

BUILT-UP AREAS

47	City or large town	
48	Town	
49	Village	
50	Buildings	

HIGHWAYS AND ROADS

57	Dual highway	
58	Primary road	
59	Secondary road	
60	Trail	
61	Road bridge	
62	Road tunnel	

MISCELLANEOUS (Cont.)

69	Pipeline	
70	Oil or gas field	
71	Tank farms	
72	Nuclear power station	
73	Coast guard station	
74	Lookout tower	
75	Mine	
76	Forest ranger station	
77	Race track or stadium	
78	Ruins	
79	Fort	
80	Church	
81	Mosque	
82	Pagoda	
83	Temple	

RAILROADS

51	Railroad (single track)	
52	Railroad (two or more tracks)	
53	Railroad (under construction)	
54	Railroad bridge	
55	Railroad tunnel	
56	Railroad station	

MISCELLANEOUS

63	Boundaries (international)	
64	Outer boundaries	
65	Fence	
66	Telegraph or telephone line (when a landmark)	
67	Dam	
68	Ferry	

AERODROMES

84	Civil	Land	
85	Civil	Water	
86	Military	Land	
87	Military	Water	

88	Joint civil and military	Land	
89	Joint civil and military	Water	
90	Emergency aerodrome or aerodrome with no facilities		
91	Abandoned or closed aerodrome		

92	Sheltered anchorage		
93	Aerodrome for use on charts on which aerodrome classification is not required e.g. Enroute Charts		
94	Heliport Note.— Aerodrome for the exclusive use of helicopters		

95	<i>Note.— Where required by the function of the chart, the runway pattern of the aerodrome may be shown in lieu of the aerodrome symbol, for example:</i>		
----	--	--	--

AERODROMES (Cont.)
AERODROME DATA IN ABBREVIATED FORM WHICH MAY BE
IN ASSOCIATION WITH AERODROME SYMBOLS
(Reference: 16.9.2.2 and 17.9.2.2)

96	Elevation given in the units of measurement (metres or feet) selected for use on the chart Minimum lighting – obstacles, boundary or runway lights and lighted wind indicator or landing direction indicator <i>Note.— A dash (–) is to be inserted where L or H do not apply.</i>	Name of aerodrome LIVINGSTONE 357 L H 95 Length of longest runway in hundreds of metres or feet (whichever unit is selected for use on the chart) Runway hard surfaced, normally all weather

AERODROME SYMBOLS FOR APPROACH CHARTS

97	Aerodromes affecting the traffic pattern on the aerodrome on which the procedure is based		98	The aerodrome on which the procedure is based	
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RADIO NAVIGATION AIDS*

99	Basic radio navigation aid symbol <i>Note.— This symbol may be used with or without a box to enclose the data.</i>			107	Collocated VOR and TACAN radio navigation aids	VORTAC	
100	Non-directional radio beacon	NDB		108	Instrument landing system	ILS	PLAN VIEW
101	VHF omnidirectional radio range	VOR					Electronic
102	Distance measuring equipment	DME					FRONT COURSE
103	Collocated VOR and DME radio navigation aids	VOR/DME					BACK COURSE
104	DME distance	Distance in kilometres (nautical miles) to DME → 15 km Identification of radio navigation aid → KAV		109	Radio marker beacon	Elliptical	
105	VOR radial	Radial bearing from, and identification of, VOR R 090 KAV				Bone Shape	
106	UHF tactical air navigation aid	TACAN				<i>Note.— Marker beacon may be shown by outline, or stipple, or both.</i>	

110	Compass rose To be orientated on the chart in accordance with the alignment of the station (normally Magnetic North)		Compass rose to be used as appropriate in combination with the following symbols:	VOR	
<i>Note.— Additional points of compass may be added as required.</i>				VOR/DME	
				TACAN	
				VORTAC	

*Note.— Guidance material on the presentation of radio navigation aid data is given in the Aeronautical Chart Manual (Doc 8697).

AIR TRAFFIC SERVICES

111	Flight information region	FR		117	Air defence identification zone	ADIZ	
112	Aerodrome traffic zone	ATZ		118	Advisory route	ADR	
113	Control area Airway Controlled route	CTA ANY		119	Visual flight path		
114	Uncontrolled route			120	Scale-break (on ATS route)		
115	Advisory airspace	ADA					
116	Control zone	CTR					

Significant Point Functionality								
			Significant point depiction for conventional navigation		Significant point depiction for area navigation			
121	Basic Symbols with functionality	REPORTING FLY-BY/FLY-OVER	On request (NA)	Compulsory (NA)	On request fly-by	Compulsory fly-by	On request flyover	Compulsory flyover
		VFR reporting point						
		Intersection INT						
		VORTAC						
		TACAN						
		VOR						
		VORDME						
		NDB						
		Waypoint WPT	Not used	Not used				

For details on use and meaning of these symbols,

AIR TRAFFIC SERVICES (cont.)

125	Altitudes/flight levels	Altitude/flight level "window"	<u>17 000</u> <u>10 000</u>	<u>FL 220</u> <u>10 000</u>
		"At or above" altitude/flight level	<u>7 000</u>	<u>FL 70</u>
		"At or below" altitude/flight level	<u>5 000</u>	<u>FL 50</u>
		"Mandatory" altitude/flight level	<u>3 000</u>	<u>FL 30</u>
		"Recommended" procedure altitude/flight level	5 000	FL 50
		"Expected" altitude	Expect 5 000	Expect FL 50
Note.— For use only on SID and STAR charts. Not intended for depiction of minimum obstacle clearance altitude.				

AIRSPACE CLASSIFICATIONS

126	Airspace classifications		Aeronautical data in abbreviated form to be used in association with airspace classification symbols:
		127 Alternative TMA DONLON 119.1 C 200m AGL - FL 245 Type Name or call sign Radio frequency(ies) Airspace classification Vertical limits C TMA DONLON FL 245 200m AGL 119.1	

AIRSPACE RESTRICTIONS

128	Restricted airspace (prohibited, restricted or danger area)		Common boundary of two areas	
Note.—The angle and density of rulings may be varied according to scale and the size, shape and orientation of the area.				
129	International boundary closed to passage of aircraft except through air corridor			

OBSTACLES

130	Obstacle		134	Exceptionally high obstacle (optional symbol)	
131	Lighted obstacle		135	Exceptionally high obstacle — lighted (optional symbol)	
132	Group obstacles		Note.— For obstacles having a height of the order of 300 m (1 000 ft) above terrain.		
133	Lighted group obstacles		136	Elevation of top (italics) 52 (15) Height above specified datum (upright type in parentheses)	

MISCELLANEOUS

137	Prominent transmission line		140	Wind turbine— unlighted and lighted	
138	Isogonic line or isogonal		141	Wind turbines— minor group and group in major area, lighted	
139	Ocean station vessel (normal position)				

VISUAL AIDS

142	Marine light <i>Note 2.— Characteristics are to be indicated as follows:</i>		<i>Note 1.— Marine alternating lights are red and white unless otherwise indicated. Marine lights are white unless colours are stated.</i>	F1 G Gp	Flashing Green Group	Occ R SEC	Occulting Red Sector	sec (U) W	Second Unwatched White
143	Aeronautical ground light		Electronic						
144	Lightship								

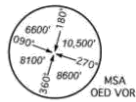
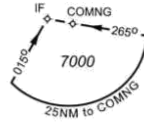
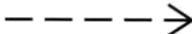
SYMBOLS FOR AERODROME/HELIPORT CHARTS

145	Hard surface runway		154	Point light	
146	Pierced steel plank or steel mesh runway		155	Obstacle light	
147	Unpaved runway		156	Landing direction indicator (lighted)	
148	Stopway SWY		157	Landing direction indicator (unlighted)	
149	Taxiways and parking areas		158	Stop bar	
150	Helicopter alighting area on an aerodrome		159	Runway-holding position <i>Note.— For application, see Annex 14, Volume I, 5.2.10.</i>	
151	Aerodrome reference point ARP		160	Intermediate holding position <i>Note.— For application, see Annex 14, Volume I, 5.2.11.</i>	
152	VOR check-point		161	Hot spot <i>Note.— Hot spot location to be circled.</i>	
153	Runway visual range (RVR) observation site				

SYMBOLS FOR AERODROME OBSTACLE CHARTS - TYPE A, B AND C

	Plan	Profile		Plan	Profile
162	Tree or shrub		167	Terrain penetrating obstacle plane	
163	Pole, tower, spire, antenna, etc.		168	Escarpment	
164	Building or large structure		169	Stopway SWY	
165	Railroad		170	Clearway CWY	
166	Transmission line or overhead cable				

ADDITIONAL SYMBOLS FOR USE ON PAPER AND ELECTRONIC CHARTS

PLAN VIEW		Electronic	
171	Minimum sector altitude <i>Note.— This symbol may be modified to reflect particular sector shapes.</i> MSA		
172	Terminal arrival altitude <i>Note.— This symbol may be modified to reflect particular TAA shapes.</i> TAA		
173	Holding pattern		
174	Missed approach track		
PROFILE			
175	Runway		
176	Radio navigation aid (type of aid and its use in the procedure to be annotated on top of the symbol)		
177	Radio marker beacon (type of beacon to be annotated on top of the symbol)		
178	Collocated radio navigation aid and marker beacon (type of aid to be annotated on top of the symbol)		
179	DME fix (distance from DME and the fix use in the procedure to be annotated on top of the symbol)		
180	Collocated DME fix and marker beacon (distance from DME and the type of beacon to be annotated on top of the symbol)		

IS: 2.11 COLOUR GUIDE

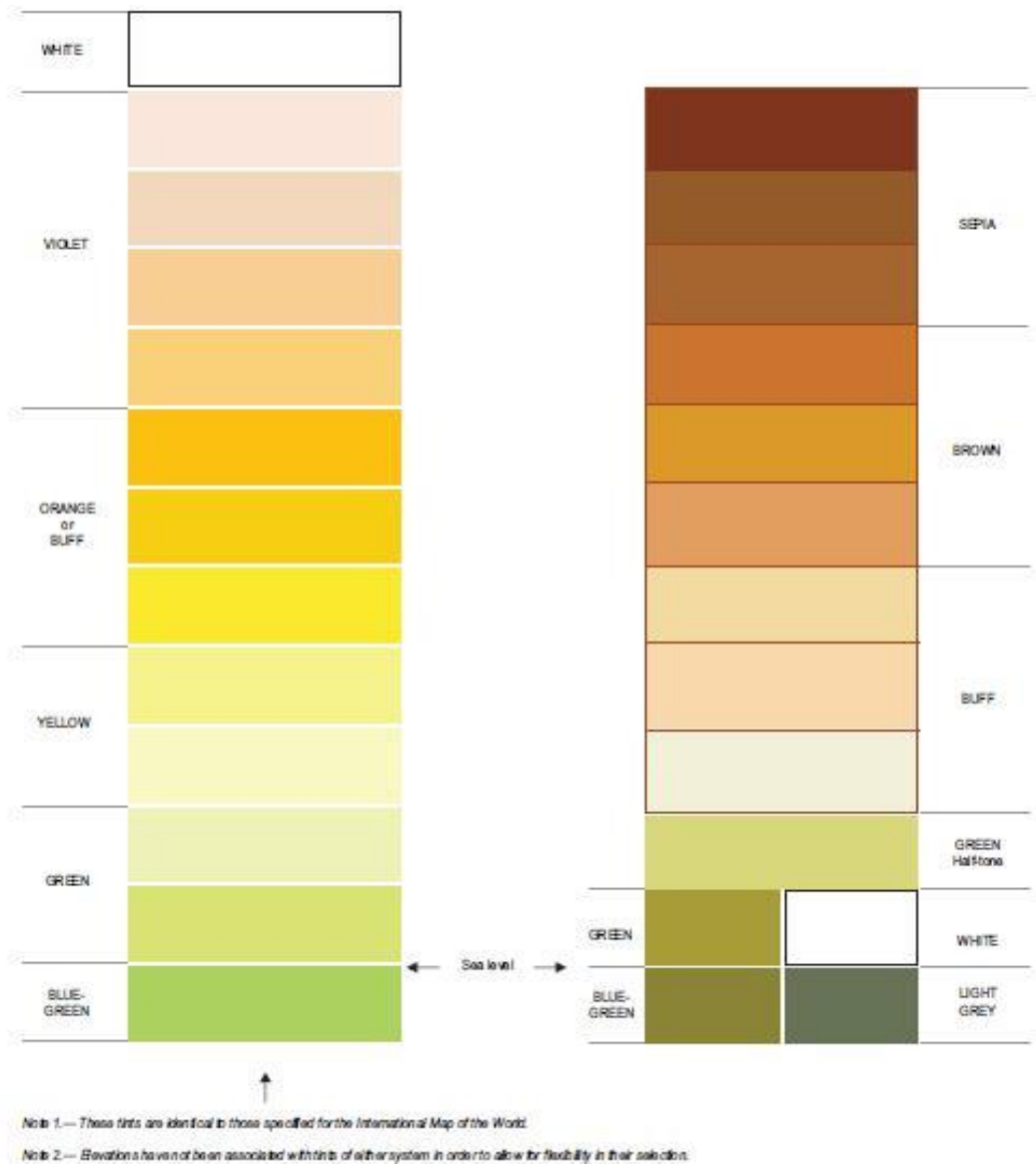
Culture, except highways and roads; outlines of large cities, grids and graticules; spot elevations; danger lines and off-shore rocks; names and lettering except for aeronautical and hydrographic features		BLACK	
Built-up areas of cities		BLACK Stipple	
Highways and roads	Optional colours	BLACK Half-tone	
		RED	
Built-up areas for cities (alternative to black stipple)		YELLOW	
Contours and topographic features: Items 1 through 10 of Appendix 2 Hydrographic features: Items 39 through 41 of Appendix 2		BROWN	
Shore lines, drainage, rivers, lakes, bathymetric contours and other hydrographic features including their names or description		BLUE	
Open water areas		BLUE Half-tone	
Salt lakes and salt pans		BLUE Stipple	
Large non-perennial rivers and non-perennial lakes		BLUE Stipple	
Aeronautical data, except for Enroute and Area Charts — ICAO, where different colours may be required. Both contours may be used on the same sheet but, where only one colour is used, dark blue is preferred	Optional colours	MAGENTA	
		DARK BLUE	

Woods		GREEN	
Areas which have not been surveyed for contour information or relief data are incomplete	Optional colours	GOLDEN BUFF	
		WHITE	

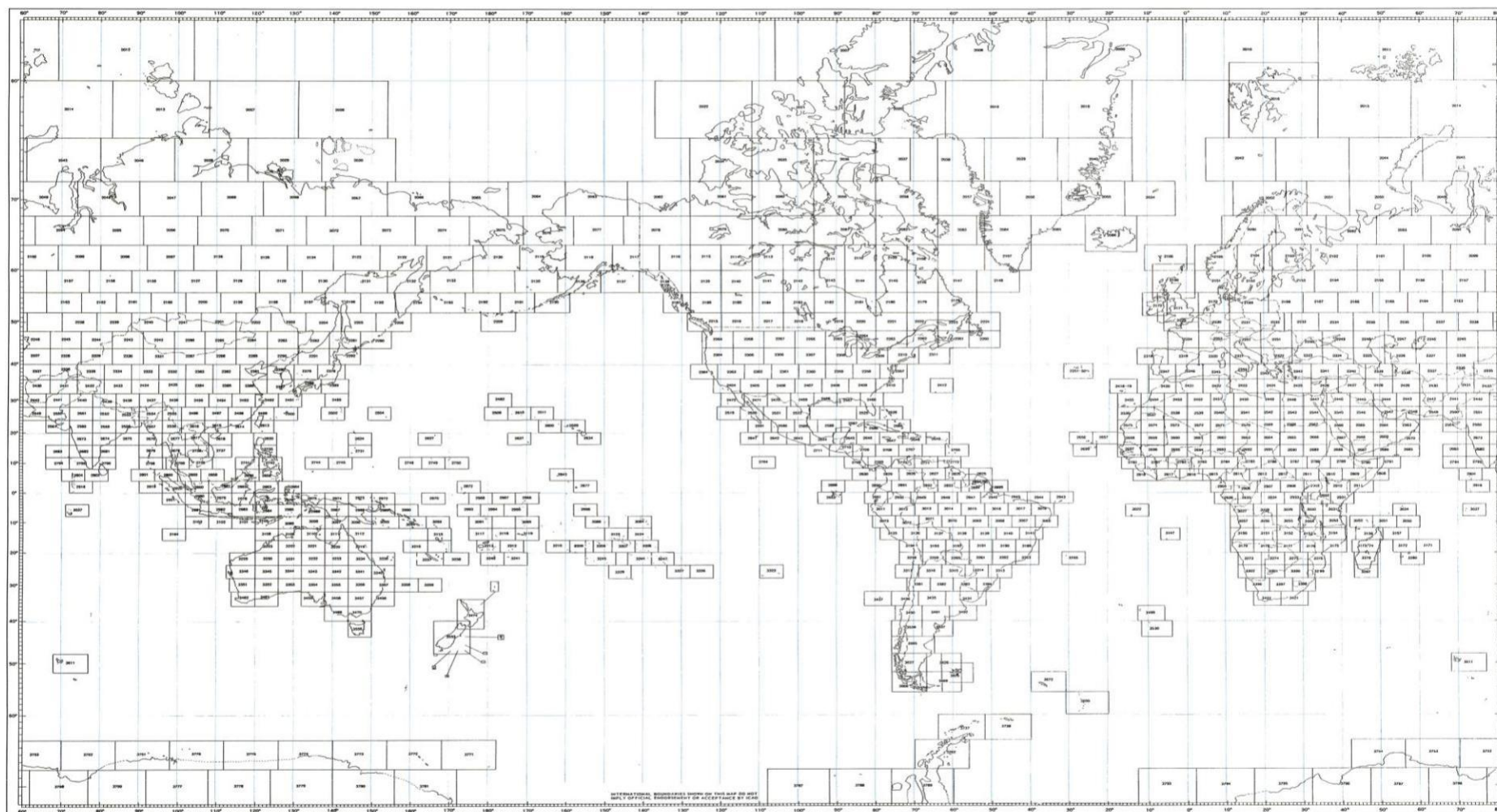
	WHITE	Tint for extreme elevations		SEPIA	
	VIOLET				
	ORANGE or BUFF	Tint for higher range elevations		BROWN	
	YELLOW	Tint for middle range elevations		BUFF	
	GREEN	Tint for lower range elevations	Optional colours	GREEN	
				WHITE	
	BLUE-GREEN	Tint for areas below sea level	Optional colours	BLUE-GREEN	
				LIGHT GREY	

Note.— Basic tints are identical to those specified for the International Map of the World.

IS: 2.12.2 HYPSONETRIC TINT GUIDE



IS: 16.2.1 SHEET LAYOUT FOR THE WORLD AERONAUTICAL CHART – ICAO 1:1 000 000



IS: 2.17.3 AERONAUTICAL DATA QUALITY REQUIREMENTS

Table 1 Latitude and Longitude

LATTUDE AND LONGITUDE	PUBLICATION RESOLUTION	INTEGRITY CLASSIFICATION
Flight information region boundary points.	as plotted	routine
P, R, D area boundary points (outside CTA/CTR boundaries)	as plotted	routine
P, R, D area boundary points (inside CTA/CTZ boundaries).	as plotted	essential
CTA/CTR boundary points.	as plotted	essential
En-route NAVAIDS, intersections and waypoints, and holding, and STAR/SID points	1sec	essential
Obstacles in Area 1 (the entire State territory)	as plotted	routine
Aerodrome/ heliport reference point.	1sec	routine
NAVAIDS located at the aerodrome/heliport.	as plotted	essential
Obstacles in Area 3.	1/10sec	essential
Obstacles in Area 2.	1/10sec	essential
Final approach fixes/points and other essential fixes/points comprising the instrument approach procedure.	1 sec	essential

Runway thresholds	1 sec	critical
Runway end (flight path alignment point)	1 sec	critical
Runway holding position.	1 sec	critical

Taxiway centre line/ parking guidance line points.	1/100sec	essential
Taxiway intersection marking line.	1 sec	essential
Exit guidance line.	1 sec	essential
Aircraft stand points/INS checkpoints	1/100sec	routine
Geometric centre of TLOF or FATO thresholds, heliports.	1 sec	critical
Apron boundaries (polygon)	1 sec	Routine

Table -2 Elevation/ altitude/ height

Elevation/altitude/height	PUBLICATION RESOLUTION	INTEGRITY CLASSIFICATION
Aerodrome/heliport elevation	1 m o r 1 ft.	essential
WGS84 geoid undulation at aerodrome/heliport elevation position.	1m or 1ft	essential
Heliport crossing height, PinS approaches.	1m or 1ft	essential
Runway or FATO threshold, non-precision approaches.	1m or 1ft	essential
world geodetic system — 1984geoid undulation at runway or FATO threshold, TLOF geometric centre, non-precision approaches	1m or 1ft	essential
Runway or FATO threshold, precision approaches	0.5m or 1ft	critical
world geodetic system — 1984geoid undulation at runway or FATO threshold, TLOF geometric centre, precision approaches	0.5m or 1ft	critical
Threshold crossing height (Reference datum height) precision approaches	0.5m or 1ft	critical
Obstacle clearance altitude/height	As specified in (Doc 8168)	essential
Obstacles in Area 1 (the entire state territory).	3m (10 ft)	routine
Obstacles in Area 2.	1m or 1ft	essential
Obstacles in Area 3.	1m or 1ft	essential
Distance measuring Equipment/precision	30m (100ft)	essential

Instrument approach procedures altitude	As specified in (Doc 8168)	essential
Minimum altitudes	50m or 100ft	routine

Table 3 Gradients and Angles

<i>Type of gradient/angle</i>	<i>Chart resolution</i>	<i>Integrity Classification</i>
Non-precision final approach descent gradient	0.1 per cent	critical
Final approach descent angle (Non-precision approach or approach with Vertical guidance).	0.1 degree	critical
Precision approach glide path/elevation angle	0.1 degree	critical

Table 4 Magnetic Variation

<i>Magnetic variation Chart</i>	<i>Chart resolution</i>	<i>Integrity Classification</i>
Aerodrome/heliport magnetic variation	1 Degree	essential

Table 5 Bearing

BEARING	PUBLICATION RESOLUTION	INTEGRITY CLASSIFICATION
Airway segments	1 degree	routine
Bearing used for the formation of an en route and of a terminal fix	1/10 degree	routine
Terminal arrival/departure route segment	1 degree	routine
Bearing used for the formation of an instrument approach procedure fix	1/10 degree	essential
ILS localizer alignment (True)	1 degree	essential
MLS zero azimuth (True)	1 degree	essential
Runway and FATO bearing (True)	1 degree	routine

Table 6 Length/Distance/Dimension

LENGTH/DISTANCE/DIMENSION	PUBLICATION RESOLUTION	INTEGRITY CLASSIFICATION
Airway Segment Length	1 km or 1 NM	routine
Distance Used for The formation of an Enroute Fix	2/10 km (1/10 NM)	routine
Terminal Arrival/Departure Route Segment	1 km or 1 NM	essential

Distance Used For The Formation Of A Terminal And Instrument Approach	2/10 km (1/10 NM)	essential
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Procedure Fix		
Runway And FATO Length TLOF Dimensions	1m	critical
Runway Width	1m	essential
Stopway Length and Width	1m	critical
Landing Distance Available	1m	critical
Take-Off Run Available	1m	critical
Take Distance Available	1m	critical
Accelerate Stop Distance Available	1m	critical
ILS Localizer antenna-Runway End, Distance	As plotted	routine
ILS Glide Slope antenna-Threshold, Distance Along Centre Line	As plotted	routine
ILS Marker - Threshold Distance	2/10 km (1/10 NM)	essential
ILS DME Antenna-Threshold Distance, Along Centre Line 1×10^{-5} / essential.	as plotted	essential
MLS Azimuth antenna-Runway End, Distance 1×10^{-3} / routine	as plotted	routine
MLS Elevation antenna Threshold, Distance Along Centre Line	as plotted	routine
MLS DME/P antenna-Threshold Distance Along Centre Line	as plotted	essential