



## The Republic of Sudan Sudan Civil Aviation Regulations (SUCARs)

### FOREWORD

#### 1. Legal Background

Pursuant to Article 33 of the Civil Aviation Act, 2010 regarding the empowerment of the Board of Directors of Civil Aviation to issue and amend Sudan Civil Aviation Regulations (SUCAR) for the approval of the Competent Minister, Sudan Civil Aviation Safety Regulations are issued to ensure compliance with the Convention on International Civil Aviation, signed in Chicago on 7 December 1944 (Chicago Convention) to which the State of Sudan is a Party. The Convention, through its Annexes, provides for the minimum standards to ensure the safety of civil aviation activities and environmental protection throughout the application and implementation of common standards and technical requirements. Sudan Civil Aviation Regulations provide an appropriate and comprehensive framework for the definition and implementation of common technical requirements and administrative procedures in the field of civil aviation. Standards and Recommended Practices (SARPs) contained in ICAO Annexes as well as the technical information in its related publications form a main source in the making of Sudan Civil Aviation Regulations and therefore represent an acceptable guidance in the areas that are not covered by Sudan Civil Aviation Regulations.

- a) An aircraft, other than an aircraft registered in the State of Sudan, shall not fly over or land in the territories of the State of Sudan except under an authorization granted by the Civil Aviation Authority (CAA) on behalf of the Government of the State of Sudan.
- b) An aircraft other than an aircraft registered in the State of Sudan shall not take on-board or discharge any passengers or cargo at any location within the territories of the State of Sudan, being passengers or cargo carried or to be carried for hire or reward, without the permission of the CAA granted for the aircraft in accordance with any conditions and limitations to which such permission may be subjected.
- c) An aircraft shall not fly over or land in the territory of the State of Sudan unless it is registered in:
  - i. The State of Sudan; or
  - ii. An ICAO Contracting State; or
  - iii. Any other State where an agreement/arrangement between the State of Sudan and that State making provisions for over-flight or landing in the territory of the State of Sudan.
- d) In accordance with the provisions of **SUCAR Part 7**, an aircraft registered in the State of Sudan shall comply with the Sudan Civil Aviation Regulations.
- e) An Aircraft, registered outside the State of Sudan shall comply with the Sudan Civil Aviation Regulations while operating to/from or within the territories of the State of Sudan wherever is applicable.
- f) An aircraft registered in the State of Sudan should comply with the regulations of other States that it is overflying wherever is applicable.
- g) Sudan CAA accepts the codes of the Type Certification Authority of the State of Manufacturer and/or Design, for the purpose of issuing or Revalidation of Airworthiness Certificates, Airworthiness Directives (ADs), Minimum Equipment List (MEL), and all other related issues in that respect. The Sudan Civil Aviation Authority may impose additional requirements.



- h) Any difference that may exist between SUCAR requirements and corresponding ICAO Annex SARPs. Significant differences shall be published in the National AIP. The procedure for amending the SUCARs and filing of differences with ICAO are contained in paragraph 4 below and detailed information is found in the CAA Rule Making Manual.
- i) An effort has been made for SUCAR requirements to be fully compliant with corresponding ICAO Annexes; however, where an aviation activity for which a SUCAR regulation has not been promulgated is undertaken in the Sudan, the relevant Annex provisions shall be applicable until it is addressed in an amendment of the SUCAR.” Applicability date for SUCARs by users is set at six months after they have been promulgated (30 September 2011).

## 2. Layout of the SUCAR Document

Sudan Civil Aviation Regulations cover all aspects of aviation activities in the State of Sudan and comprise of the following parts;

|         |   |
|---------|---|
| Part 0  | SUCAR Index   |
| Part 1  | Personnel Licensing   |
| Part 2  | Rules of the Air  |
| Part 3  | Meteorological Service for International Air Navigation   |
| Part 4  | Aeronautical Charts   |
| Part 5  | Units of Measurement  |
| Part 6  | Operation of Aircraft   |
|         | <i><b>Note:</b> Designated as Volumes of SUCAR Part 6 in general; Standards contained in ANR Parts VII, Part VIII, Volumes 2, 3, 4, 5, 7 and ANR Part X, as amended, have been directly adopted as Volumes of SUCAR Part 6.</i> |
| Part 7  | Aircraft Registration or Cancellation   |
| Part 8  | Airworthiness of Aircraft and Continuing Airworthiness  |
|         | <i><b>Note:</b> Designated as Volumes of SUCAR Part 8 in general; Standards contained in ANR Parts III, IV, V, VI, and VIII, as amended, have been directly adopted as Volumes of SUCAR Part 8.</i>                             |
| Part 9  | RESERVED (Facilitation)   |
| Part 10 | Aeronautical Telecommunications   |
| Part 11 | Air Traffic Services  |
| Part 12 | Search and Rescue   |
| Part 13 | Aircraft Accident and Incident Investigation  |
| Part 14 | Aerodromes  |
| Part 15 | Aeronautical Information Services   |
| Part 16 | Environmental Protection  |
| Part 17 | Aviation Security   |
| Part 18 | The Safe Transportation of Dangerous Goods by Air   |

Each Part of SUCAR, but not necessarily all, is composed of :

- a) An introduction;
- b) Text;
- c) Definitions;
- d) Notes;
- e) Tables and figures;
- f) Appendices; and
- g) Attachments.



### 3 Rules of construction

In the Parts of these Regulations, unless the context requires otherwise:

1. Words importing the singular include the plural
2. Words importing the plural include the singular, and
3. Words importing the masculine gender include the feminine.
4. “Shall” is used in an imperative sense.
5. “May /should” is used in a permissive sense to state authority or permission to do the act prescribed, and the words “no person may....” Or “a person may not .....” means that no person is required, authorized or permitted to do the act prescribed, and
6. The word “Includes” means includes but is not limited to.
7. The word “Show” and its derivatives in these regulations have the exact intent as shown in the dictionary.

### 4 Amendment Rationale and Procedures

The existing Sudan Civil Aviation Regulations will from time to time be amended to reflect the latest updates of ICAO Standards and Recommended Practices (SARPs); it will also be amended to reflect the latest up to date aviation safety related matters detected by the Civil Aviation Authority, the aviation industry service providers or operators, and individuals and authorization holders; amendment may also be generated to ensure safety standardization and to accommodate new initiatives or technologies. The amendment procedure shall be as follows;

1. When the Civil Aviation Authority (**CAA**) receives an amendment to any of the current ICAO Annexes, the same will be routed by the Office of the Director General of Civil Aviation to the Standard and Safety Surveillance Committee (**SSSC**) which in turn will provide a copy to the concerned Directorate for their study and comments within a specified period of time and route the same back to the SSSC for final study and release.
2. When any of the different CAA Directorates requires a change to the applicable SUCAR parts, it will send a letter stating the required change along with its justified reasons for such change where it will then be studied and decided upon by the **SSSC**.
3. Any of the above mentioned change requests would then be prepared in draft form and sent to the concerned Directorate for further study and comments within a specified period of time.
4. All suggested changes will be drafted in the form of notices of proposed amendments and addressed to all concerned including industry representatives for comments prior to final release.
5. Any differences between the new regulations and ICAO standards and recommended practices will be reported and recorded as differences to ICAO and reflected in the Aeronautical Information Publications (**AIP**).
6. Entry into force time frame for any new regulations will be the responsibility of the **SSSC**. The SSSC will also be responsible for coordinating the identification of differences from corresponding ICAO Annexes in coordination with the concerned Directorates.
7. The Office of the Director General is responsible for filing differences with ICAO as soon as new regulations or amendments thereto have been promulgated.
8. All concerned parties will be given a copy of the new amendment and will be requested to update their copy of the regulations including their list of effective pages.
9. Approved amendments or corrigenda of SUCAR or part(s) thereof will be disseminated to the industry through hardcopies (news release circulars directives and other) and softcopies (online or database, Internet address, CD-ROM and other).



10. It is the responsibility of all concerned parties to keep their copy of the regulations up to date.
11. Where applicable, regulations contained in the Air Navigation Regulations (ANRs) that have not been revoked may be enforced should the need arise.
12. The State may release no regulation prior to the formal approval of the Competent Minister as determined in Civil Aviation Act 2010 or the Director General of Civil Aviation on delegation by the Competent Minister.

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## CHAPTER 1 DEFINITIONS, APPLICABILITY AND AVAILABILITY

### 4.1.1 Definitions

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

1. **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.
2. **Aerodrome elevation.** The elevation of the highest point of the landing area.
3. **Aerodrome operating minima.** The limits of usability of an aerodrome for:
  - a) take-off, expressed in terms of runway visual range and/or visibility and, if necessary, cloud conditions;
  - b) landing in precision approach and landing operations, expressed in terms of visibility and/or runway visual range and decision altitude/height (DA/H) as appropriate to the category of the operation; and
  - c) landing in approach and landing operations with vertical guidance, expressed in terms of visibility and/or runway visual range and decision altitude/height (DA/H); and
  - d) landing in non-precision approach and landing operations, expressed in terms of visibility and/or runway visual range, minimum descent altitude/height (MDA/H) and, if necessary, cloud conditions.
4. **Aerodrome reference point.** The designated geographical location of an aerodrome.
5. **Aeronautical chart.** A representation of a portion of the Earth, its culture and relief, specifically designated to meet the requirements of air navigation.
6. **Aircraft stand.** A designated area on an apron intended to be used for parking an aircraft.
7. **Air defence identification zone.** Special designated airspace of defined dimensions within which aircraft are required to comply with special identification and/or reporting procedures additional to those related to the provision of air traffic services (ATS).
8. **Air taxiway.** A defined path on the surface established for the air taxiing of helicopters.
9. **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).
10. **Air transit route.** A defined path on the surface established for the air transiting of helicopters.
11. **Airway.** A control area or portion thereof established in the form of a corridor.
12. **Altitude.** The vertical distance of a level, a point or an object considered as a point, measured from mean sea level (MSL).
13. **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.
14. **Area minimum altitude (AMA).** The lowest altitude to be used under instrument meteorological conditions (IMC) that will provide a minimum vertical clearance of 300 m (1 000 ft) or in designated mountainous terrain 600 m (2 000 ft) above all



obstacles located in the area specified, rounded up to the nearest (next higher) 30 m (100 ft).

15. **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.
16. **ATS route.** A specified route designed for channelling the flow of traffic as necessary for the provision of air traffic services.

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

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

17. **Bare Earth.** Surface of the Earth including bodies of water and permanent ice and snow, and excluding vegetation and man-made objects.
18. **Calendar.** Discrete temporal reference system that provides the basis for defining temporal position to a resolution of one day (ISO 19108\*).
19. **Canopy.** Bare Earth supplemented by vegetation height.
20. **Change-over point.** The point at which an aircraft navigating on an ATS route segment defined by reference to very high frequency omnidirectional radio ranges is expected to transfer its primary navigational reference from the facility behind the aircraft to the next facility ahead of the aircraft.

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

21. **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.
22. **Contour line.** A line on a map or chart connecting points of equal elevation.
23. **Culture.** All man-made features constructed on the surface of the Earth, such as cities, railways and canals.
24. **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.
25. **Danger area.** An airspace of defined dimensions within which activities dangerous to the flight of aircraft may exist at specified times.
26. **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.
27. **Datum.** Any quantity or set of quantities that may serve as a reference or basis for the calculation of other quantities (ISO 19104\*).
28. **Displaced threshold.** A threshold not located at the extremity of a runway.
29. **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.



- 30. Elevation.** The vertical distance of a point or a level, on or affixed to the surface of the earth, measured from mean sea level.
- 31. Ellipsoid height (Geodetic height).** The height related to the reference ellipsoid, measured along the ellipsoidal outer normal through the point in question.
- 32. Feature.** Abstraction of real world phenomena (ISO 19101\*).
- 33. Final approach.** That part of an instrument approach procedure which commences at the specified final approach fix or point, or where such a fix or point is not specified,
- a) at the end of the last procedure turn, base turn or inbound turn of a racetrack procedure, if specified; or
  - b) at the point of interception of the last track specified in the approach procedure; and ends at a point in the vicinity of an aerodrome from which:
    - 1) a landing can be made; or
    - 2) a missed approach procedure is initiated.
- 34. Final approach and take-off area (FATO).** A defined area over which the final phase of the approach manoeuvre to hover or landing is completed and from which the take-off manoeuvre is commenced. Where the FATO is to be used by performance Class 1 helicopters, the defined area includes the rejected take-off area available.
- 35. Final approach fix or point.** That fix or point of an instrument approach procedure where the final approach segment commences.
- 36. Final approach segment.** That segment of an instrument approach procedure in which alignment and descent for landing are accomplished.
- 37. Flight information region.** An airspace of defined dimensions within which flight information service and alerting service are provided.
- 38. Flight level.** A surface of constant atmospheric pressure which is related to a specific pressure datum, 1 013.2 hectopascals (hPa), and is separated from other such surfaces by specific pressure intervals.

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

- a) *when set to a QNH altimeter setting, will indicate altitude;*
  - b) *when set to a QFE altimeter setting, will indicate height above the QFE reference datum;*
  - c) *when set to a pressure of 1 013.2 hPa, may be used to indicate flight levels.*
- \* All ISO Standards are listed at the end of this chapter.*

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

- 39. Geodesic distance.** The shortest distance between any two points on a mathematically defined ellipsoidal surface.
- 40. 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.
- 41. Geoid.** The equipotential surface in the gravity field of the Earth which coincides with the undisturbed mean sea level (MSL) extended continuously through the continents.



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

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

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

43. **Glide path.** A descent profile determined for vertical guidance during a final approach.
44. **Gregorian calendar.** Calendar in general use; first introduced in 1582 to define a year that more closely approximates the tropical year than the Julian calendar (ISO 19108\*).

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

45. **Height.** The vertical distance of a level, a point or an object considered as a point, measured from a specified datum.
46. **Helicopter stand.** An aircraft stand which provides for parking a helicopter and, where air taxiing operations are contemplated, the helicopter touchdown and lift-off.
47. **48. 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.
49. **Holding procedure.** A predetermined manoeuvre which keeps an aircraft within a specified airspace while awaiting further clearance.
50. **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.
51. **Hypsometric tints.** A succession of shades or colour gradations used to depict ranges of elevation.
52. **Initial approach segment.** That segment of an instrument approach procedure between the initial approach fix and the intermediate approach fix or, where applicable, the final approach fix or point.
53. **Instrument approach procedure.** A series of predetermined manoeuvres by reference to flight instruments with specified protection from obstacles from the initial approach fix, or where applicable, from the beginning of a defined arrival route to a point from which a landing can be completed and thereafter, if a landing is not completed, to a position at which holding or en-route obstacle clearance criteria apply.
54. **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.
55. **Isogonal.** A line on a map or chart on which all points have the same magnetic variation for a specified epoch.





56. **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.
57. **Landing area.** That part of a movement area intended for the landing or take-off of aircraft.
58. **Landing direction indicator.** A device to indicate visually the direction currently designated for landing and for take-off.
59. **Level.** A generic term relating to the vertical position of an aircraft in flight and meaning variously, height, altitude or flight level.
60. **Magnetic variation.** The angular difference between True North and Magnetic North.

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

61. **Manoeuvring area.** That part of an aerodrome to be used for the take-off, landing and taxiing of aircraft, excluding aprons.
62. **Marking.** A symbol or group of symbols displayed on the surface of the movement area in order to convey aeronautical information.
63. **Metadata.** Data about data (ISO 19115\*).

*Note.*— Data that describes and documents data.

64. **Minimum sector altitude.** The lowest altitude which may be used which will provide a minimum clearance of 300 m (1 000 ft) above all objects located in an area contained within a sector of a circle of 46 km (25 NM) radius centred on a radio aid to navigation.
65. **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.
66. **Missed approach procedure.** The procedure to be followed if the approach cannot be continued.
67. **Movement area.** That part of an aerodrome to be used for the take-off, landing and taxiing of aircraft, consisting of the manoeuvring area and the apron(s).
68. **Obstacle.** All fixed (whether temporary or permanent) and mobile objects, or parts thereof, that are located on an area intended for the surface movement of aircraft or that extend above a defined surface intended to protect aircraft in flight.

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

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

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



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

*Note 3.*— See *Procedures for Air Navigation Services — Aircraft Operations (Doc 8168), Volume I, Part III, 1.5, and Volume II, Part III, 4.6.4, for specific applications of this definition.*

70. **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.
71. **Orthometric height.** Height of a point related to the geoid, generally presented as an MSL elevation.
72. **Point light.** A luminous signal appearing without perceptible length.
73. **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.
74. **Precision approach procedure.** An instrument approach procedure utilizing azimuth and glide path information provided by ILS or PAR.
75. **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. **Procedure turn.** A manoeuvre in which a turn is made away from a designated track followed by a turn in the opposite direction to permit the aircraft to intercept and proceed along the reciprocal of the designated track.

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

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

76. **77. 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.
78. **Radar vectoring.** Provision of navigational guidance to aircraft in the form of specific headings, based on the use of radar.
79. **Relief.** The inequalities in elevation of the surface of the Earth represented on aeronautical charts by contours, hypsometric tints, shading or spot elevations.
80. **Reporting point.** A specified geographical location in relation to which the position of an aircraft can be reported.
81. **Required navigation performance (RNP).** A statement of the navigation performance necessary for operation within a defined airspace.

*Note.*— Navigation performance and requirements are defined for a particular RNP type and/or application.

82. **Resolution.** A number of units or digits to which a measured or calculated value is expressed and used.
83. **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.



84. **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.
85. **RNP type.** A containment value expressed as a distance in nautical miles from the intended position within which flights would be for at least 95 per cent of the total flying time. Example.— RNP 4 represents a navigation accuracy of plus or minus 4.7.4 km (4 NM) on a 95 per cent containment basis.
86. **Runway.** A defined rectangular area on a land aerodrome prepared for the landing and take-off of aircraft.
87. **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.
88. **Runway strip.** A defined area including the runway and stopway, if provided, intended:
  - a) to reduce the risk of damage to aircraft running off a runway; and
  - b) to protect aircraft flying over it during take-off or landing operations.
89. **Runway visual range (RVR).** The range over which the pilot of an aircraft on the centre line of a runway can see the runway surface markings or the lights delineating the runway or identifying its centre line.
90. **Shoulder.** An area adjacent to the edge of a pavement so prepared as to provide a transition between the pavement and the adjacent surface.
91. **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.
92. **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.
93. **Taxiing.** Movement of an aircraft on the surface of an aerodrome under its own power, excluding take-off and landing.
94. **Taxiway.** A defined path on a land aerodrome established for the taxiing of aircraft and intended to provide a link between one part of the aerodrome and another, including:
  - a) Aircraft stand taxilane. A portion of an apron designated as a taxiway and intended to provide access to aircraft stands only.
  - b) Apron taxiway. A portion of a taxiway system located on an apron and intended to provide a through taxi route across the apron.
  - c) Rapid exit taxiway. A taxiway connected to a runway at an acute angle and designed to allow landing aeroplanes to turn off at higher speeds than are achieved on other exit taxiways thereby minimizing runway occupancy times.
95. **Terminal arrival altitude (TAA).** The lowest altitude that will provide a minimum clearance of 300 m (1 000 ft) above all objects located in an arc of a circle defined by a 46-km (25 NM) radius centred on the initial approach fix (IAF), or where there is no IAF on the intermediate approach fix (IF), delimited by straight lines joining the extremity of the arc to the IF. The combined TAAs associated with an approach procedure shall account for an area of 360 degrees around the IF.
96. **Terrain.** The surface of the Earth containing naturally occurring features such as mountains, hills, ridges, valleys, bodies of water, permanent ice and snow, and excluding obstacles.



*Note.*— In practical terms, depending on the method of data collection, terrain represents the continuous surface that exists at the bare Earth, the top of the canopy or something inbetween, also known as Afirst reflective surface @.

- 97. Threshold.** The beginning of that portion of the runway usable for landing.
- 98. Touchdown and lift-off area (TLOF).** A load bearing area on which a helicopter may touch down or lift off.
- 99. Touchdown zone.** The portion of a runway, beyond the threshold, where it is intended landing aeroplanes first contact the runway.
- 100. 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).
- 101. Transition altitude.** The altitude at or below which the vertical position of an aircraft is controlled by reference to altitudes.
- 102. Visual approach procedure.** A series of predetermined manoeuvres by visual reference, from the initial approach fix, or where applicable, from the beginning of a defined arrival route to a point from which a landing can be completed and thereafter, if a landing is not completed, a go-around procedure can be carried-out.
- 103. Waypoint.** A specified geographical location used to define an area navigation route or the flight path of an aircraft employing area navigation. Waypoints are identified as either:
- Fly-by waypoint. A waypoint which requires turn anticipation to allow tangential interception of the next segment of a route or procedure; or
  - Flyover waypoint. A waypoint at which a turn is initiated in order to join the next segment of a route or procedure.

#### **4.1.2 Applicability**

4.1.2.1 The specifications in this Part are applicable on and after 1 November 2001.

*Note.*— Chapter 20 Electronic Aeronautical Chart Display — ICAO is applicable on and after 28 November 2002.

4.1.2.2 All charts coming within the scope of this Part and bearing the aeronautical information date of 1 November 2001 or later shall conform to the Standards relevant to the particular chart.

4.1.2.2.1 All such charts should in addition conform to the Recommended Practices relevant to the particular chart.

#### **1.3 Availability**

4.1.3.1 *Information.* Sudan shall on request by another Contracting State provide all information relating to its own territory that is necessary to enable the Standards of this Part to be met.

4.1.3.2 *Charts.* Sudan shall, when so specified, ensure the availability of charts in whichever of the following ways is appropriate for a particular chart or single sheet of a chart series.

4.1.3.2.1 For any chart or single sheet of a chart series entirely contained within the territory of Sudan, Sudan shall either:

- 1) produce the chart or sheet itself; or
- 2) arrange for its production by another Contracting State or by an agency; or
- 3) provide another Contracting State prepared to accept an obligation to produce the chart or sheet with the data necessary for its production.



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

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

4.1.3.3 Sudan shall take all reasonable measures to ensure that the information it provides and the aeronautical charts made available are adequate and accurate and that they are maintained up to date by an adequate revision service.

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

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

\* ISO Standard

19101, *Geographic information — Reference model*

19104, *Geographic information — Terminology*

19108, *Geographic information — Temporal schema*

19115, *Geographic information — Metadata*



## CHAPTER 2 GENERAL SPECIFICATIONS

*Note.— The Standards and Recommended Practices contained in Chapter 2 of Annex 4 to the Convention on International Civil Aviation are applicable to all aeronautical charts implemented in Sudan, unless otherwise stated in the specifications of the chart concerned.*

### 2.1 Operational requirements for charts

*Note.— For the purposes of this SUCAR, the following phases are applicable:*

|                |   |   |
|----------------|---|---|
| <i>Phase 1</i> | — | <i>Taxi from aircraft stand to take-off point</i>         |
| <i>Phase 2</i> | — | <i>Take-off and climb to en-route ATS route structure</i> |
| <i>Phase 3</i> | — | <i>En-route ATS route structure</i>                       |
| <i>Phase 4</i> | — | <i>Descent to approach</i>                                |
| <i>Phase 5</i> | — | <i>Approach to land and missed approach</i>               |
| <i>Phase 6</i> | — | <i>Landing and taxi to aircraft stand.</i>                |

- 2.1.1 Each type of chart implemented in the Sudan shall provide information relevant to the function of the chart and its design shall observe Human Factors principles which facilitate its optimum use.

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

- 2.1.2 Each type of chart implemented in the Sudan 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 Colors 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 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 Charts developed in the Sudan shall be True North oriented.
- 2.1.8 Basic sheet size of charts developed in the Sudan shall conform to the size recommended by ICAO in the applicable Chapter of Annex 4 to the Convention.

### 2.2 Titles

The title of a chart or chart series prepared in accordance with the specifications contained in this SUCAR and intended to satisfy the function of the chart shall be that of the relevant chapter heading as modified by application of any Standard contained therein. The title shall include “ICAO” only in the event that the chart conforms with all Standards specified in Chapter 2 of Annex 4 to the Convention.

### 2.3 Miscellaneous information

- 2.3.1 The marginal note layout shall be as given in Appendix 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 in the Sudan shall conform to those shown in Appendix 2 — ICAO Chart Symbols, except that where it is desired to show on an aeronautical chart special features or items of importance to civil aviation for which no ICAO symbol is at present provided. When symbols other than those contained in Appendix 2 are used, they shall be appropriate and should not cause confusion with any existing ICAO chart symbol or impair the legibility of the chart.

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

- 2.4.2 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, and — waypoint symbol.  
A waypoint symbol shall be used only when a particular significant point does not already exist as either a ground-based navigation aid or intersection.
- 2.4.4 In the Sudan, symbols shall be shown in the manner specified in 2.4.2, 2.4.3 and Appendix 2 — ICAO Chart Symbols, symbol number 121.

## 2.5 Units of measurement

- 2.5.1 Distances on Charts developed in the Sudan shall be derived as geodesic distances.
- 2.5.2 Distances can be expressed in either kilometres or nautical miles or both, and the units shall be clearly differentiated.
- 2.5.3 Altitudes, elevations and heights shall be expressed in either metres or feet or both, and the units shall be 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 For charts of large areas, the name and basic parameters and scale of the projection shall be indicated.



2.6.2 For charts of small areas, a linear scale only shall be 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 Where a geographical term such as “cape”, “point”, “gulf”, “river” is abbreviated on any particular chart, that word shall be spelt out in full in the language used by the publishing agency, in respect of the most important example of each type. Punctuation marks shall not be used in abbreviations within the body of a chart.

## **2.9 Abbreviations**

Abbreviations selected from ICAO Document 8400 (Procedures for Air Navigation Services — ICAO Abbreviations and Codes shall be used on aeronautical charts whenever they are appropriate.

## **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 When the territory of a neighboring State appears on a Sudanese developed chart, the name of the State shall be indicated.

## **2.11 Colors**

Colors used on Sudanese developed charts shall conform to Appendix 3 — Color Guide of this SUCAR.

## **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 Depending on the nature and scale of the chart and its intended use, relief shall be portrayed by combinations of contours, hypsometric tints, spot elevations and hill shading.

2.12.3 Where relief is shown by hypsometric tints, the tints used shall be based on those shown in the Hypsometric Tint Guide in Appendix 4 of this SUCAR.

2.12.4 Where spot elevations are used, they shall be shown for selected critical points and where the value of spot elevations of doubtful accuracy shall be followed by the sign □.

## **2.13 Prohibited, restricted and danger areas**

When prohibited, restricted or danger areas are shown, the reference or other identification shall be included.

## **2.14 Air traffic services airspace**

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 Appendix 2 — ICAO Chart Symbols of this SUCAR.

## **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 Sudanese developed 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.
- 2.15.3 For instrument procedure charts, the publication of a magnetic variation change shall be completed within a maximum of six AIRAC cycles.

## **2.16 Typography**

Typography to be used in Sudanese developed aeronautical charts shall conform to samples included in the ICAO Aeronautical Chart Manual (Doc 8697).

## **2.17 Aeronautical data**

- 2.17.1 The Republic of Sudan shall introduce a quality system containing procedures, processes and resources necessary to implement quality management at each function stage. The execution of the quality management shall be made demonstrable for each function stage, when required. The Republic of Sudan shall also ensure that established procedures exist in order that aeronautical data at any moment is traceable to its origin so to allow any data anomalies or errors, detected during the production/maintenance phases or in the operational use, to be corrected. In introducing the quality system Sudan shall make use of specifications governing the quality system that are contained in Annex 15, Chapter 3 to the Convention on International Organization.
- 2.17.2 The order of chart resolution of aeronautical data shall be that as specified for a particular chart and as presented in a tabular form in Appendix 6 of this SUCAR.
- 2.17.3 The integrity of aeronautical data shall be maintained throughout the data process from survey/origin to the next intended user. Aeronautical data integrity requirements shall be based upon the potential risk resulting from the corruption of data and upon the use to which the data item is put. In the Sudan, the following classification and data integrity level shall apply:
  - a) critical data, integrity level  $1 \square 10^{-8}$ : there is a high probability when using corrupted critical data that the continued safe flight and landing of an aircraft would be severely at risk with the potential for catastrophe;
  - b) essential data, integrity level  $1 \square 10^{-5}$ : there is a low probability when using corrupted essential data that the continued safe flight and landing of an aircraft would be severely at risk with the potential for catastrophe; and
  - c) routine data, integrity level  $1 \square 10^{-3}$ : there is a very low probability when using corrupted routine data that the continued safe flight and landing of an aircraft would be severely at risk with the potential for catastrophe.
- 2.17.4 Aeronautical data quality requirements related to the integrity and data classification shall be as provided in Tables 1 to 6 in Appendix 6 of this SUCAR.
- 2.17.5 Electronic aeronautical data sets shall be protected by the inclusion in the data sets of a 32-bit cyclic redundancy check (CRC) implemented by the application dealing



with the data sets. This shall apply to the protection of all integrity levels of data sets as specified in 2.17.3.

*Note.— Guidance material on the aeronautical data quality requirements (accuracy, resolution, integrity, protection and traceability) is contained in the World Geodetic System — 1984 (WGS-84) Manual (Doc 9674). Supporting material in respect of the provisions of Appendix 6 related to chart resolution and integrity of aeronautical data is contained in RTCA Document DO-201A and European Organization for Civil Aviation Equipment (EUROCAE) Document ED-77 — Industry Requirements for Aeronautical Information.*

## **2.18 Common reference systems**

2.18.1 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.

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

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

2.18.3 The order of chart resolution of geographical coordinates shall be that specified for a particular chart series and in accordance with Appendix 6, Table 1 of this SUCAR.

*Note.— Specifications governing the determination and reporting (accuracy of field work and data integrity) of WGS-84-related aeronautical coordinates for geographical positions established by air traffic services are given in ICAO Annex 11, Chapter 2, and Appendix 5, Table 1; and for aerodrome/heliport-related positions, in Annex 14, Volumes I and II, Chapter 2, and in Table A5-1 of Appendix 5 and Table A1-1 of Appendix 1, respectively.*

2.18.4 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.

*Note 1.— The geoid globally most closely approximates MSL. It is defined as the equipotential surface in the gravity field of the Earth that coincides with the undisturbed MSL extended continuously through the continents.*

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

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

*Note.— Specifications governing the determination and reporting (accuracy of*



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*field work and data integrity) of elevation and geoid undulation at specific positions at aerodromes/heliports are given in ICAO Annex 14, Volumes I and II, Chapter 2, and in Table A5-2 of Appendix 5 and Table A1-2 of Appendix 1, respectively.*

- 2.18.6 The order of chart resolution of elevation and geoid undulation shall be that specified for a particular chart series and in accordance with Table 2 of Appendix 6.
- 2.18.7 The Gregorian calendar and Coordinated Universal Time (UTC) shall be used as the temporal reference system.
- 2.18.8 When a different temporal reference system is used for charting, this shall be indicated in the Aeronautical Information Publication (AIP).



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

### 4.3.1 Function

This chart, in combination with the Aerodrome Obstacle Chart — ICAO Type C or with the relevant information published in the AIP, shall provide the data necessary to enable an operator to comply with the operating limitations of SUCAR Part 6, Parts I and II, Chapter 5, and Part III, Chapter 3.

### 4.3.2 Availability

4.3.2.1 Aerodrome Obstacle Charts — ICAO Type A (Operating Limitations) shall be made available in the manner prescribed in 4.1.3.2 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.

4.3.2.2 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.

### 4.3.3 Units of measurement

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

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

### 4.3.4 Coverage and scale

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

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

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

4.3.4.3 — The horizontal scale should be 1:10 000.

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

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

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

### 4.3.5 Format

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

4.3.4.5.2 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.

4.3.4.5.3 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 subdivisions of intervals shall be shown along the base of the grid and along the vertical margins.

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

4.3.4.5.4 The chart shall include:

- a) a box for recording the operational data specified in 3.4.8.3;
- b) a box for recording amendments and dates thereof.

#### 4.3.6 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).

#### 4.3.7 Magnetic variation

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

#### 4.3.8 Aeronautical data

##### 4.3.4.8.1 Obstacles

4.3.4.8.1.1 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 4.3.4.8.1.2 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.

4.3.4.8.1.2 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 4.3.4.8.1.1 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.

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

##### 4.3.4.8.2 Take-off flight path area

4.3.4.8.2.1 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 (4.5.4 NM), whichever is the lesser.

4.3.4.8.2.2 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 takeoff flight path area specified in 3.4.8.2.1 c) shall be increased to not less than 12.0 km (4.6.5 NM) and the slope of the plane surface specified in 3.4.8.1.1 and 3.4.8.1.2 shall be reduced to 1.0 per cent or less.



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

#### 4.3.4.8.3 Declared distances

4.3.4.8.3.1 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.

**Note.**— *In SUCAR Part 14, Volume I, Attachment A, Section 3, guidance is given on declared distances.*

4.3.4.8.3.2 — Where a declared distance is not provided because a runway is usable in one direction only, that runway should be identified as “not usable for takeoff, landing or both”.

#### 4.3.4.8.4 Plan and profile views

4.3.4.8.4.1 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:
  - 1) the exact location of each obstacle together with a symbol indicative of its type;
  - 2) the elevation and identification of each obstacle;
  - 3) the limits of penetration of obstacles of large extent in a distinctive manner identified in the legend.

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

4.3.4.8.4.1.1 The nature of the runway and stopway surfaces should be indicated.

4.3.4.8.4.1.2 Stopways should be identified as such and should be shown by a broken line.

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

4.3.4.8.4.2 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 takeoff flight path area, and at each significant change in slope of runway and stopway;
- c) obstacles, including:
  - 1) each obstacle by a solid vertical line extending from a convenient grid line over at least one other grid line to the elevation of the top of the obstacle;



- 2) identification of each obstacle;
- 3) the limits of penetration of obstacles of large extent in a distinctive manner identified in the legend.

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

#### **4.3.9 Accuracy**

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

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

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

- 1) horizontal distances: 5 m (15 ft) at a 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.

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



## CHAPTER 4 AERODROME OBSTACLE CHART — ICAO TYPE B

### 4.4.1 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.

### 4.4.2 Availability

4.4.2.1 Aerodrome Obstacle Charts — ICAO Type B should be made available, in the manner prescribed in 1.3.2, for all aerodromes regularly used by international civil aviation.

4.4.2.2 When a chart combining the specifications of Chapters 3 and 4 is made available, it shall be called the Aerodrome Obstacle Chart — ICAO (Comprehensive).

### 4.4.3 Units of measurement

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

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

### 4.4.4 Coverage and scale

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

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

4.4.2 The 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.

### 4.4.5 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 SUCAR Part 14, Volume I, Chapter 4;
- d) a box for recording amendments and dates thereof;
- e) outside the neat line, every minute of latitude and longitude marked in degrees and minutes.

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





#### 4.4.6 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.

#### 4.4.7 Culture and topography

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

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

4.4.7.3 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 SUCAR Part 14, Volume I, Chapter 4, shall be shown.

4.4.7.4 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.

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

#### 4.4.8 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.

#### 4.4.9 Aeronautical data

4.4.9.1 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 takeoff and approach area, and at each significant change of slope of runway and stopway;
- f) taxiways, aprons and parking areas identified as such, and the outlines by a solid line;
- g) stopways identified as such and depicted by a broken line;
- h) the length of each stopway;
- i) clearways identified as such and depicted by a broken line;
- j) the length of each clearway;
- k) take-off and approach surfaces identified as such and depicted by a broken line;
- l) take-off and approach areas;

*Note.*— *The take-off area is described in 3.4.8.2.1. The approach area consists of an area on the surface of the earth lying directly below the approach surface as specified in SUCAR Part 14, Volume I, Chapter 4.*

- m) obstacles at their exact location, including:
  - 1) a symbol indicative of their type;
  - 2) elevation;
  - 3) identification;
  - 4) limits of penetration of large extent in a distinctive manner identified in the legend;



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

- n) any additional obstacles, as determined by 3.4.8.1.1 including the obstacles in the shadow of an obstacle, which would otherwise be exempted.

*Note.*— The specifications in SUCAR Part 14, Volume I, Chapter 4, are minimum requirements. Where the competent authority has established lower surfaces, they may be used in the determination of obstacles.

4.4.9.1.1 The nature of the runway and stopway surfaces should be given.

4.4.9.1.2 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 should be indicated in a prominent manner.

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

#### **4.4.10 Accuracy**

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

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

4.4.10.3 The order or accuracy of the field work and the precision of chart production should 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.

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



## CHAPTER 5 AERODROME OBSTACLE CHART— ICAO TYPE C

### 4.5.1 Function

When produced, this chart shall provide the obstacle data necessary to enable an operator to develop procedures to comply with the operating limitations of SUCAR Part 6, Parts I and II, Chapter 5, and Part III, Chapter 3, with particular reference to information on obstacles that limit the maximum permissible take-off mass, and also to:

- a) determine minimum safe heights including those for circling procedures;
- b) determine procedures for use in the event of an emergency during take-off or landing;
- c) provide source material for aeronautical charts and aeronautical data bases.

*Note.*— An explanation of the intended purpose and use of this chart is given in the Aeronautical Chart Manual (Doc 8697).

### 4.5.2 Availability

This chart is not required where:

- a) the obstacle data specified in 4.5.1 are published in the AIP; or
- b) no obstacles exist and notification of this is published in the AIP.

### 4.5.3 Coverage and scale

4.5.3.1 The extent of each chart shall be sufficient:

- a) to cover all obstacles, including obstacles in the shadow of an obstacle, 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. Account shall be taken of mobile obstacles such as boats, trains, trucks, etc., which may project above the 1.2 per cent plane;
- b) to cover all obstacles exceeding 120 m (400 ft) above the lowest elevation on the runway(s) which may influence the maximum permissible take-off mass or the choice of the aircraft's flight profile both straight ahead and in all areas where turning departures may occur;
- c) to provide topographical information covering a distance of approximately 45 km (24 NM) from the aerodrome reference point.

4.5.3.2 The horizontal scale shall be within the range of 1:20 000 to 1:100 000.

*Note.*— A scale of 1:50 000 is preferred.

### 4.5.4 Format

The chart shall include:

- a) any necessary explanation of the projection used;
- b) any necessary identification of the grid used;
- c) a box for recording amendments and dates thereof;
- d) a box for recording the declared distances specified in 4.5.4.8.2;
- e) graduation marks at consistent intervals outside the neat line, at least every 10 minutes of latitude and longitude and marked in degrees and minutes.

*Note 1.*— Lines of latitude and longitude may be shown across the face of the chart.



**Note 2.**— *Aerodrome Obstacle Chart — ICAO Type C may consist of any suitable topographical chart or series of charts available, overprinted with the necessary aeronautical data in a distinctive colour.*

#### 4.5.5 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 which the aerodrome serves and the name of the aerodrome.

#### 4.5.6 Magnetic variation

The chart should show the magnetic variation to the nearest degree with the date and annual change.

#### 4.5.7 Units of measurement

4.5.7.1 Elevations shall be shown to the nearest metre or foot.

4.5.7.2 Linear dimensions shall be shown to the nearest metre.

#### 4.5.8 Aeronautical data

4.5.8.1 The chart shall show:

- a) the aerodrome reference point and its geographical coordinates in degrees, minutes and seconds;
- b) the runways and the extended runway centre lines;
- c) obstacles as specified in 4.5.3.1 a) and b); the extent of each plan shall be sufficient to cover all obstacles except that isolated distant obstacles that would unnecessarily increase the sheet size may be indicated by an arrow, provided that the distance and bearing from a reference point and their elevation and geographical coordinates in degrees, minutes, seconds and tenths of seconds are given;
- d) the exact position of each obstacle by a symbol and its geographical coordinates in degrees, minutes, seconds and tenths of seconds;
- e) the elevation of each obstacle;
- f) an indication of the type of each obstacle;

**Note.**— *The obstacle type may be given in textual form or in areas where excessive clutter would ensue, the obstacle may be identified by a number on the chart and the number and type tabulated in the margin or on a separate sheet.*

- g) the limits of penetration of obstacles of large extent in a distinctive manner identified in the legend;

**Note.**— *This does not exclude the necessity for indicating the positions of critical spot elevations and their geographical coordinates in degrees, minutes, seconds and tenths of seconds within such an area.*

- h) the positions of all radio navigation aids.

4.5.8.2 Declared distances

4.5.8.2.1 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.



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*Note.— In SUCAR Part 14, Volume I, Attachment A, guidance is given on declared distances.*

4.5.8.2.2 Where a declared distance is not provided because a runway direction cannot be used for take-off or landing or both, then this should be indicated and the words “not usable” or the abbreviation “NU” entered.

#### **4.5.9 Accuracy**

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



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## CHAPTER 6

### PRECISION APPROACH TERRAIN CHART — ICAO

#### 4.6.1 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.

#### 4.6.2 Availability

4.6.2.1 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.

4.6.2.2 The Precision Approach Terrain Chart — ICAO shall be revised whenever any significant change occurs.

#### 4.6.3 Scale

4.6.3.1 The horizontal scale should be 1:2 500, and the vertical scale 1:500.

4.6.3.2 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 should be 1:5 000.

#### 4.6.4 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.

#### 4.6.5 Plan and profile information

4.6.5.1 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 1) above, differs by  $\pm 3$  m (10 ft) in height from the centre line profile and is likely to affect a radio altimeter;
- c) a profile of the terrain to a distance of 900 m (3 000 ft) from the threshold along the extended centre line of the runway.

4.6.5.2 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 should be shown to a distance not exceeding 2 000 m (6 500 ft) from the runway threshold.

4.6.4.3 The ILS reference datum height should be shown to the nearest half metre or foot.



## CHAPTER 7 ENROUTE CHART — ICAO

### 4.7.1 Function

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

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

### 4.7.2 Availability

4.7.2.1 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.

*Note.*— *Under certain conditions, an Area Chart — ICAO may have to be provided. (See Chapter 4.8.)*

4.7.2.2 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.

### 4.7.3 Coverage and scale

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

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

4.7.3.1 — *Layout of sheet lines should be determined by the density and pattern of the ATS route structure.*

4.7.3.2 Large variations of scale between adjacent charts showing a continuous route structure shall be avoided.

4.7.3.3 An adequate overlap of charts shall be provided to ensure continuity of navigation.

### 4.7.4 Projection

4.7.4.1 A conformal projection on which a straight line approximates a great circle should be used.

4.7.4.2 Parallels and meridians shall be shown at suitable intervals.

4.7.4.3 Graduation marks shall be placed at consistent intervals along selected parallels and meridians.

### 4.7.5 Identification

Each sheet shall be identified by chart series and number.

### 4.7.6 Culture and topography

4.7.6.1 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.

4.7.6.2 Within each quadrilateral formed by the parallels and meridians the area minimum altitude shall be shown, except as provided for in 4.7.4.6.3.



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

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

#### **4.7.7 Magnetic variation**

— *Isogonals should be indicated and the date of the isogonic information given.*

#### **4.7.8 Bearings, tracks and radials**

4.7.4.8.1 Bearings, tracks and radials shall be magnetic, except as provided for in 4.7.4.8.2.

4.7.4.8.2 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, should be used.

4.7.4.8.3 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.

#### **4.7.9 Aeronautical data**

##### **4.7.9.1 Aerodromes**

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

*Note.*— *Other aerodromes may be shown.*

4.7.9.2 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.

##### **4.7.9.3 Air traffic services system**

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

4.7.9.3.1.1 The components shall include the following:

- 1) 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;
- 2) in respect of DME, additionally the elevation of the transmitting antenna of the DME to the nearest 30 m (100 ft);
- 3) an indication of all designated airspace, including lateral and vertical limits and the appropriate class of airspace;
- 4) all ATS routes for en-route flight including route designators, required navigation performance (RNP) types, the track to the nearest degree in both directions along each segment of the routes and, where applicable, the direction of traffic flow;
- 5) 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;
- 6) in respect of waypoints defining VOR/DME area navigation routes, additionally,
  - a) the station identification and radio frequency of the reference VOR/DME;





- b) 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;
- 7) an indication of all compulsory and “on-request” reporting points and ATS/MET reporting points;
- 8) the distances to the nearest kilometre or nautical mile between significant points constituting turning points or reporting points;

*Note.*— Overall distances between radio navigation aids may also be shown.

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

*Note.*— Change-over points established at the midpoint between two aids, or at the intersection of two radials in the case of a route which changes direction between the aids, need not be shown for each route segment if a general statement regarding their existence is made.

- 10) minimum flight altitudes on ATS routes to the nearest higher 50 metres or 100 feet (see SUCAR Part 11, 2.21);
- 11) radio communication facilities listed with their frequencies;
- 12) air defence identification zone (ADIZ) properly identified.

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

#### 4.7.9.4 Supplementary information

4.7.9.4.1 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.

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

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

4.7.9.4.2 Where established, altimeter setting regions shall be shown and identified.



## CHAPTER 8 AREA CHART — ICAO

### 4.8.1 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 enroute phase of flight; and
- c) flights through areas of complex ATS routes or airspace structure.

*Note.*— *The function described in 4.8.1 c) may be satisfied by a separate chart or an inset on an Enroute Chart — ICAO.*

### 4.8.2 Availability

4.8.2.1 The Area Chart — ICAO shall be made available in the manner prescribed in 1.3.2 where the air traffic services routes or position reporting requirements are complex and cannot be adequately shown on an Enroute Chart — ICAO.

4.8.2.2 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.

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

### 4.8.3 Coverage and scale

4.8.3.1 The coverage of each chart shall extend to points that effectively show departure and arrival routes.

4.8.3.2 The chart shall be drawn to scale and a scale-bar shown.

### 4.8.4 Projection

4.8.4.1 — A conformal projection on which a straight line approximates a great circle should be used.

4.8.4.2 Parallels and meridians shall be shown at suitable intervals.

4.8.4.3 Graduation marks shall be placed at consistent intervals along the neat lines, as appropriate.

### 4.8.5 Identification

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

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

### 4.8.6 Culture and topography

4.8.6.1 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.



4.8.6.2 To improve situational awareness in areas where significant relief exists, all relief exceeding 300 m (1 000 ft) above the elevation of the primary aerodrome should 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, should be shown printed in black. Obstacles should also be shown.

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

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

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

#### **4.8.7 Magnetic variation**

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

#### **4.8.8 Bearings, tracks and radials**

4.8.8.1 Bearings, tracks and radials shall be magnetic, except as provided for in 4.8.4.8.2.

4.8.8.2 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, should be used.

4.8.4.8.3 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.

#### **4.8.9 Aeronautical data**

##### **4.8.9.1 Aerodromes**

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

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

##### **4.8.9.3 Area minimum altitudes**

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

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

##### **4.8.9.4 Air traffic services system**

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

4.8.9.4.1.1 The components shall include the following:

- 1) 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;



- 2) in respect of DME, additionally the elevation of the transmitting antenna of the DME to the nearest 30 m (100 ft);
- 3) terminal radio aids which are required for outbound and inbound traffic and for holding patterns;
- 4) the lateral and vertical limits of all designated airspace and the appropriate class of airspace;
- 5) 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;
- 6) 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;
- 7) in respect of waypoints defining VOR/DME area navigation routes, additionally,
  - a) the station identification and radio frequency of the reference VOR/DME;
  - b) 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;
- 8) an indication of all compulsory and “on-request” reporting points;
- 9) the distances to the nearest kilometre or nautical mile between significant points constituting turning points or reporting points;

*Note.*— Overall distances between radio navigation aids may also be shown.

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

*Note.*— Change-over points established at midpoint between two aids, or at the intersection of two radials in the case of a route which changes direction between the aids, need not be shown for each route segment if a general statement regarding their existence is made.

- 11) minimum flight altitudes on ATS routes to the nearest higher 50 m or 100 ft (see SUCAR Part 11, 2.21);
- 12) established radar minimum altitudes to the nearest higher 50 m or 100 ft, clearly identified;

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

*Note 2.*— Where excessive chart clutter will result, a Radar Minimum Altitude Chart — ICAO may be provided (see Chapter 21), in which case the elements indicated by 4.8.9.4.1.1, 12), need not be duplicated on the Area Chart — ICAO.

- 13) area speed and level/altitude restrictions where established;
- 14) radio communication facilities listed with their frequencies.



## CHAPTER 9

### STANDARD DEPARTURE CHART INSTRUMENT (SID) — ICAO

#### 4.9.1 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 enroute phase.

*Note 1.*— Provisions governing the identification of standard departure routes are in SUCAR Part 11, Appendix 3; guidance material relating to the establishment of such routes is contained in the Air Traffic Services Planning Manual (Doc 9426).

*Note 2.*— Provisions governing obstacle clearance criteria and details of the minimum information to be published are contained in the Procedures for Air Navigation Services — Aircraft Operations (PANS-OPS, Doc 8168), Volume II, Part II.

#### 4.9.2 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.

#### 4.9.3 Coverage and scale

4.9.3.1 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.

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

4.9.3.2 The chart should be drawn to scale.

4.9.3.3 If the chart is drawn to scale, a scale-bar shall be shown.

4.9.3.4 When the chart is not drawn to scale the annotation “NOT TO SCALE” shall be shown and the symbol for scalebreak shall be used on tracks and other aspects of the chart which are too large to be drawn to scale.

#### 4.9.4 Projection

4.9.4.1 A conformal projection on which a straight line approximates a great circle should be used.

4.9.4.2 When the chart is drawn to scale, parallels and meridians should be shown at suitable intervals.

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

#### 4.9.5 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* (PANS-OPS, Doc 8168), Volume II, Part II, Chapter 4.5.

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



#### **4.9.6 Culture and topography**

4.9.6.1 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.

4.9.6.2 To improve situational awareness in areas where significant relief exists, the chart should be drawn to scale and all relief exceeding 300 m (1 000 ft) above the aerodrome elevation should 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, should be shown printed in black. Obstacles should also be shown.

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

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

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

#### **4.9.7 Magnetic variation**

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

#### **4.9.8 Bearings, tracks and radials**

4.9.8.1 Bearings, tracks and radials shall be magnetic, except as provided for in 4.9.8.2.

*Note.— A note to this effect may be included on the chart.*

4.9.8.2 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, should be used.

4.9.8.3 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.

#### **4.9.9 Aeronautical data**

##### **4.9.9.1 Aerodromes**

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

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

##### **4.9.9.2 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.

##### **4.9.9.3 Minimum sector altitude**



4.9.9.3.1 The established minimum sector altitude, based on a navigation aid associated with the procedure, shall be shown with a clear indication of the sector to which it applies.

4.9.9.3.2 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.

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

4.9.9.4 Air traffic services system

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

4.9.9.4.1.1 The components shall comprise the following:

- 1) a graphic portrayal of each standard departure route — instrument, including:
  - a) route designator;
  - b) significant points defining the route;
  - c) track or radial to the nearest degree along each segment of the route;
  - d) distances to the nearest kilometre or nautical mile between significant points;
  - e) minimum flight 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;
  - f) where the chart is drawn to scale and radar vectoring on departure is provided, established radar minimum altitudes to the nearest higher 50 m or 100 ft, clearly identified;

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

*Note 2.*— Where excessive chart clutter will result, a Radar Minimum Altitude Chart — ICAO may be provided (see Chapter 21), in which case the elements indicated by 4.9.4.9.4.1.1, 1) f), need not be duplicated on the Standard Departure Chart — Instrument (SID) — ICAO.

- 2) the radio navigation aid(s) associated with the route(s) including:
  - a) plain language name;
  - b) identification;
  - c) frequency;
  - d) geographical coordinates in degrees, minutes and seconds;
  - e) for DME, the channel and the elevation of the transmitting antenna of the DME to the nearest 30 m (100 ft);
- 3) 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;
- 4) applicable holding patterns;
  - 5) transition altitude/height to the nearest higher 300 m or 1 000 ft;
  - 6) the position and height of close-in obstacles which penetrate the obstacle identification surface (OIS). A note shall be included whenever close-in obstacles penetrating the OIS exist but which were not considered for the published procedure design gradient;

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

- 7) area speed restrictions, where established;
  - 8) all compulsory and “on-request” reporting points;
  - 9) radio communication procedures, including:
    - a) call sign(s) of ATS unit(s);
    - b) frequency;
    - c) transponder setting, where appropriate.
- 4.9.9.4.2 A textual description of standard departure route(s) — instrument (SID) and communication failure procedures in relation to radar control should be provided and should, whenever feasible, be shown on the chart or on the same page which contains the chart.





## CHAPTER 10

### STANDARD ARRIVAL CHART — INSTRUMENT (STAR) — ICAO

#### 4.10.1 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.

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

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

#### 4.10.2 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.

#### 4.10.3 Coverage and scale

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

4.10.3.2 — The chart should be drawn to scale.

4.10.3.3 If the chart is drawn to scale, a scale-bar shall be shown.

4.10.3.4 When the chart is not drawn to scale the annotation “NOT TO SCALE” shall be shown and the symbol for scale break shall be used on tracks and other aspects of the chart which are too large to be drawn to scale.

#### 4.10.4 Projection

4.10.4.1 A conformal projection on which a straight line approximates a great circle should be used.

4.10.4.2 When the chart is drawn to scale, parallels and meridians should be shown at suitable intervals.

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

#### 4.10.5 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) C instrument as established in accordance with the *Procedures for Air Navigation Services — Aircraft Operations* (PANS-OPS, Doc 8168), Volume II, Part III, Chapter 3.

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



#### **4.10.6 Culture and topography**

4.10.4.6.1 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.

4.10.4.6.2 To improve situational awareness in areas where significant relief exists, the chart should be drawn to scale and all relief exceeding 300 m (1 000 ft) above the aerodrome elevation should 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, should be shown printed in black. Obstacles should also be shown.

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

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

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

#### **4.10.7 Magnetic variation**

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

#### **4.10.8 Bearings, tracks and radials**

4.10.8.1 Bearings, tracks and radials shall be magnetic, except as provided for in 4.10.8.2.

*Note.— A note to this effect may be included on the chart.*

4.10.8.2 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, should be used.

4.10.8.3 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.

#### **4.10.9 Aeronautical data**

##### **4.10.9.1 Aerodromes**

4.10.9.1.1 The aerodrome of landing shall be shown by the runway pattern.

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

4.10.9.2 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.

##### **4.10.9.3 Minimum sector altitude**

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



4.10.9.3.2 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.

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

#### 4.10.9.4 Air traffic services system

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

4.10.9.4.1.1 The components shall comprise the following:

- 1) a graphic portrayal of each standard arrival route — instrument, including:
  - a) route designator;
  - b) significant points defining the route;
  - c) track or radial to the nearest degree along each segment of the route;
  - d) distances to the nearest kilometre or nautical mile between significant points;
  - e) minimum flight 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;
  - f) where the chart is drawn to scale and radar vectoring on arrival is provided, established radar minimum altitudes to the nearest higher 50 m or 100 ft, clearly identified;

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

*Note 2.*— Where excessive chart clutter will result, a Radar Minimum Altitude Chart — ICAO may be provided (see Chapter 21), in which case the elements indicated by 10.4.9.4.1.1, 1) f), need not be duplicated on the Standard Arrival Chart — Instrument (STAR) — ICAO.

- 2) the radio navigation aid(s) associated with the route(s) including:
  - a) plain language name;
  - b) identification;
  - c) frequency;
  - d) geographical coordinates in degrees, minutes and seconds;
  - e) for DME, the channel and the elevation of the transmitting antenna of the DME to the nearest 30 m (100 ft);
- 3) 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;
- 4) applicable holding patterns;
- 5) transition altitude/height to the nearest higher 300 m or 1 000 ft;



- 
- 6) area speed restrictions, where established;
  - 7) all compulsory and “on-request” reporting points;
  - 8) radio communication procedures, including:
    - a) call sign(s) of ATS unit(s);
    - b) frequency;
    - c) transponder setting, where appropriate.
- 4.10.9.4.2 A textual description of standard arrival route(s) — instrument (STAR) and communication failure procedures in relation to radar control should be provided and should, whenever feasible, be shown on the chart or on the same page which contains the chart.



## CHAPTER 11 INSTRUMENT APPROACH CHART — ICAO

### 4.11.1 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.

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

### 4.11.2 Availability

4.11.2.1 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.

4.11.2.2 A separate Instrument Approach Chart — ICAO shall normally be provided for each precision approach procedure established by the State.

4.11.2.3 A separate Instrument Approach Chart — ICAO shall normally be provided for each non-precision approach procedure established by the State.

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

4.11.2.4 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.

*Note.*— For categories of aircraft, see Procedures for Air Navigation Services — Aircraft Operations (PANS-OPS, Doc 8168), Volume II, Part III, Chapter 1.

4.11.2.5 Instrument Approach Charts — ICAO shall be revised whenever information essential to safe operation becomes out of date.

### 4.11.3 Coverage and scale

4.11.3.1 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.

4.11.3.2 The scale selected shall ensure optimum legibility consistent with:

- 1) the procedure shown on the chart;
- 2) sheet size.

4.11.3.3 A scale indication shall be given.

4.11.3.3.1 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.

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



#### 4.11.4 Format

The sheet size should be 210 × 148 mm (4.8.27 × 4.5.82 in).

#### 4.11.5 Projection

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

4.11.5.2 Graduation marks should be placed at consistent intervals along the neat lines.

#### 4.11.6 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 III, Chapter 1.

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

#### 4.11.7 Culture and topography

4.11.7.1 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.

4.11.7.2 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.

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

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

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

4.11.7.3 In areas where relief is lower than specified in 4.11.7.2, all relief exceeding 150 m (500 ft) above the aerodrome elevation should 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, should also be shown printed in black.

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

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

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

#### **4.11.8 Magnetic variation**

4.11.8.1 The magnetic variation should be shown.

4.11.8.2 When shown, the value of the variation, indicated to the nearest degree, shall agree with that used in determining magnetic bearings, tracks and radials.

#### **4.11.9 Bearings, tracks and radials**

4.11.9.1 Bearings, tracks and radials shall be magnetic except as provided for in 4.11.9.2.

*Note.— A note to this effect may be included on the chart.*

4.11.9.2 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, should be used.

4.11.9.3 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.

#### **4.11.10 Aeronautical data**

##### **4.11.10.1 Aerodromes**

4.11.10.1.1 All aerodromes which show a distinctive pattern from the air shall be shown by the appropriate symbol. Abandoned aerodromes shall be identified as abandoned.

4.11.10.1.2 The runway pattern, at a scale sufficiently large to show it clearly, shall be shown for:

- 1) the aerodrome on which the procedure is based;
- 2) 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.

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

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

##### **4.11.10.2 Obstacles**

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

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



- 4.11.10.2.2 If one or more obstacles are the determining factor of an obstacle clearance altitude/ height, those obstacles should be identified.
- 4.11.10.2.3 The elevation of the top of obstacles shall be shown to the nearest (next higher) metre or foot.
- 4.11.10.2.4 The heights of obstacles above a datum other than mean sea level (see 4.11.10.2.3) should be shown. When shown, they should be given in parentheses on the chart.
- 4.11.10.2.5 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.
- 4.11.10.2.6 Where a datum other than mean sea level is used, it shall be stated in a prominent position on the chart.
- 4.11.10.2.7 Where an obstacle free zone has not been established for a precision approach runway Category I, this shall be indicated.
- 4.11.10.3 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.
- 4.11.10.4 Radio communication facilities and navigation aids
- 4.11.10.4.1 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.
- 4.11.10.4.2 The final approach fix (or final approach point for an ILS approach procedure) and other essential fixes or points comprising the procedure shall be shown and identified.
- 4.11.10.4.3 The final approach fix (or final approach point for an ILS approach procedure) should be identified with its geographical coordinates in degrees, minutes and seconds.
- 4.11.10.4.4 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.
- 4.11.10.4.5 Radio communication frequencies, including call signs, that are required for the execution of the procedures shall be shown.
- 4.11.10.4.6 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.
- 4.11.10.5 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.
- 4.11.10.6 Portrayal of procedure tracks
- 4.11.10.6.1 The plan view shall show the following information in the manner indicated:
- the approach procedure track by an arrowed continuous line indicating the direction of flight;
  - 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.
- 4.11.10.6.2 The plan view should show the distance to the aerodrome from each radio navigation aid concerned with the final approach.
- 4.11.10.6.3 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 and procedure altitudes/heights, 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.
- 4.11.10.6.4 Heights required by procedures should be shown in parentheses, using the height datum selected in accordance with 4.11.10.2.5.
- 4.11.10.6.5 The profile view should 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.

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



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

#### 4.11.10.7 Aerodrome operating minima

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

4.11.10.7.2 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.

#### 4.11.10.8 Supplementary information

4.11.10.8.1 When the missed approach point is defined by:

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

4.11.10.8.2 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 below the OCA/H.

4.11.10.8.3 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 should be included.

4.11.10.8.4 A rate of descent table should be shown.

4.11.10.8.5 Final approach descent gradient and, in parenthesis, descent angle to the nearest one tenth of a degree shall be shown for non-precision procedures with a final approach fix.

4.11.10.8.6 On charts depicting ILS/MLS and LNAV/ VNAV approach procedures, the height of the ILS/MLS and LNAV/VNAV reference datum to the nearest half metre or foot and the glide path/elevation/vertical path angle shall be shown. If the ILS/MLS glide path/elevation angle exceeds 3.5 degrees, a note shall be included referring to appropriate aircraft and flight crew qualification requirements for such a procedure. 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.

**Note.**— *See Procedures for Air Navigation Services — Aircraft Operations (PANS-OPS, Doc 8168), Volume II, about additional requirements when glide path angles/elevations exceed 3.5 degrees.*

4.11.10.8.7 Final approach descent angle shall be shown to the nearest one tenth of a degree for instrument procedures with vertical guidance.

#### 4.11.10.9 Aeronautical data base requirements

The following data shall be published in tabular form on the verso of the chart or as a separate, properly referenced sheet:

- a) final approach fixes/points and other essential fixes/ points comprising the instrument approach procedure identified with their geographical coordinates in degrees, minutes, seconds and tenths of seconds;



- 
- b) instrument approach procedure fix formation bearings to the nearest hundredth of a degree;
  - c) instrument approach procedure fix formations distance to the nearest hundredth of a nautical mile; and
  - d) for non-precision approaches, the final approach descent angle to the nearest hundredth of a degree.



## CHAPTER 12

### VISUAL APPROACH CHART — ICAO

#### 4.12.1 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.

#### 4.12.2 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:

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

#### 4.12.3 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 should not be smaller than 1:500 000.

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

4.12.3.3 When an Instrument Approach Chart is available for a given aerodrome, the Visual Approach Chart should be drawn to the same scale.

#### 4.12.4 Format

The sheet size should be 210 × 148 mm (4.8.27 × 4.5.82 in).

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

#### 4.12.5 Projection

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

4.12.5.2 Graduation marks should be placed at consistent intervals along the neat lines.

#### 4.12.6 Identification

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

#### 4.12.7 Culture and topography

4.12.7.1 Natural and cultural landmarks shall be shown (e.g. bluffs, cliffs, sand dunes, cities, towns, roads, railroads, isolated lighthouses, etc.).

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

4.12.7.2 Shore lines, lakes, rivers and streams shall be shown.

4.12.7.3 Relief shall be shown in a manner best suited to the particular elevation and obstacle characteristics of the area covered by the chart.

4.12.7.4 When shown, spot elevations should be carefully selected.



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

4.12.7.5 The figures relating to different reference levels shall be clearly differentiated in their presentation.

#### **4.12.8 Magnetic variation**

The magnetic variation shall be shown.

#### **4.12.9 Bearings, tracks and radials**

4.12.9.1 Bearings, tracks and radials shall be magnetic except as provided for in 4.12.9.2.

4.12.9.2 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, should be used.

4.12.9.3 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.

#### **4.12.10 Aeronautical data**

##### **4.12.10.1 Aerodromes**

4.12.10.1.1 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.

4.12.10.1.2 The aerodrome elevation shall be shown in a prominent position on the chart.

##### **4.12.10.2 Obstacles**

4.12.10.2.1 Obstacles shall be shown and identified.

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

4.12.10.2.3 The heights of obstacles above the aerodrome elevation should be shown.

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

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

4.12.10.4 Designated airspace Where applicable, control zones and aerodrome traffic zones shall be depicted with their vertical limits and the appropriate class of airspace.

##### **4.12.10.5 Visual approach information**

4.12.10.5.1 Visual approach procedures shall be shown where applicable.

4.12.10.5.2 Visual aids for navigation shall be shown as appropriate.

4.12.10.5.3 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.

##### **4.12.10.6 Supplementary information**

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

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



## CHAPTER 13 AERODROME/HELIPORT CHART — ICAO

### 4.13.1 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:
- c) from the helicopter stand to the touchdown and lift-off area and to the final approach and take-off area;
- d) from the final approach and take-off area to the touchdown and lift-off area and to the helicopter stand;
- e) along helicopter ground and air taxiways; and
- f) along air transit routes; it shall also provide essential operational information at the aerodrome/heliport.

### 4.13.2 Availability

4.13.2.1 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.

4.13.2.2 The Aerodrome/Heliport Chart — ICAO should be made available also, in the manner prescribed in 1.3.2, for all other aerodromes/heliports available for use by international civil aviation.

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

### 4.13.3 Coverage and scale

13.3.1 The coverage and scale shall be sufficiently large to show clearly all the elements listed in 13.4.6.1.

13.3.2 A linear scale shall be shown.

### 4.13.4 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.

### 4.13.5 Magnetic variation

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

### 4.13.6 Aerodrome/heliport data

4.13.4.6.1 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 halfmetre or foot, of the precision approach runway threshold, the geometric centre of the touchdown and lift-off area, and at the highest elevation of the touchdown zone of a precision approach runway;
- d) all runways including those under construction with designation number, length and width to the nearest metre, bearing strength, displaced thresholds, stopways, clearways, runway directions to the nearest degree magnetic, type of surface and runway markings;

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

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

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

- f) geographical coordinates in degrees, minutes and seconds for thresholds, geometric centre of touchdown and lift-off area and/or thresholds of the final approach and take-off area (where appropriate);
- g) all taxiways, helicopter air and ground taxiways with type of surface, helicopter air transit routes, with designations, width, lighting, markings, including runway-holding positions and stop bars, other visual guidance and control aids, and bearing strength or aircraft type restrictions where the bearing strength is less than that of the associated runways;

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

- h) geographical coordinates in degrees, minutes, seconds and hundredths of seconds for appropriate taxiway centre line points and aircraft stands;
- i) where established, standard routes for taxiing aircraft with their designators;
- j) the boundaries of the air traffic control service;
- k) position of runway visual range (RVR) observation sites;
- l) approach and runway lighting;
- m) 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;
- n) radio communication facilities;
- o) obstacles to taxiing;
- p) aircraft servicing areas and buildings of operational significance;
- q) VOR checkpoint and radio frequency of the aid concerned;
- r) any part of the depicted movement area permanently unsuitable for aircraft, clearly identified as such.

4.13.4.6.2 In addition to the items in 13.4.6.1 relating to heliports, the chart shall show:



- a) heliport type;

*Note.*— *Helicopter types are identified in SUCAR Part 14, Volume II, as surface-level, elevated or helideck.*

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





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## CHAPTER 14

### AERODROME GROUND MOVEMENT CHART — ICAO

#### 4.14.1 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.

#### 4.14.2 Availability

The Aerodrome Ground Movement Chart — ICAO should 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.

#### 4.14.3 Coverage and scale

4.14.3.1 The coverage and scale shall be sufficiently large to show clearly all the elements listed in 4.14.6.

4.14.3.2 A linear scale should be shown.

#### 4.14.4 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.

#### 4.14.5 Magnetic variation

4.14.5.1 A True North arrow shall be shown.

4.14.5.2 Magnetic variation to the nearest degree and its annual change should be shown.

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

#### 4.14.6 Aerodrome data

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 runwayholding positions and stop bars and other visual guidance and control aids;
- e) where established, standard routes for taxiing aircraft, with their designators;
- 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 radio communication facilities listed with their frequencies;
- i) obstacles to taxiing;
- j) aircraft servicing areas and buildings of operational significance;



- 
- k) VOR checkpoint and radio frequency of the aid concerned;
  - l) any part of the depicted movement area permanently unsuitable for aircraft, clearly identified as such.



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## CHAPTER 15

### AIRCRAFT PARKING/DOCKING CHART — ICAO

#### 4.15.1 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.

#### 4.15.2 Availability

The Aircraft Parking/ Docking Chart — ICAO should 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.

#### 4.15.3 Coverage and scale

4.15.3.1 The coverage and scale shall be sufficiently large to show clearly all the elements listed in 4.15.4.6.

4.15.3.2 A linear scale should be shown.

#### 4.15.4 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.

#### 4.15.5 Magnetic variation

4.15.4.5.1 A True North arrow shall be shown.

4.15.4.5.2 Magnetic variation to the nearest degree and its annual change should be shown.

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

#### 4.15.6 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 runwayholding positions and stop bars;
- e) geographical coordinates in degrees, minutes, seconds and hundredths of seconds for appropriate taxiway centre line points;
- f) the boundaries of the air traffic control service;
- g) relevant radio communication facilities listed with their frequencies;
- h) obstacles to taxiing;
- i) aircraft servicing areas and buildings of operational significance;
- j) VOR checkpoint and radio frequency of the aid concerned;
- k) any part of the depicted movement area permanently unsuitable for aircraft, clearly identified as such.



## CHAPTER 16

### WORLD AERONAUTICAL CHART — ICAO 1:1 000 000

#### 4.16.1 Function

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

*Note.*— *This chart may also serve:*

- 1) *as a basic aeronautical chart:*
  - a) *when highly specialized charts lacking visual information do not provide essential data;*
  - b) *to provide complete world coverage at a constant scale with a uniform presentation of planimetric data;*
  - c) *in the production of other charts required by international civil aviation;*
- 2) *as a pre-flight planning chart.*

#### 4.16.2 Availability

4.16.2.1 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 Appendix 4.5.

*Note.*— *When operational or chart production considerations indicate that operational requirements can be effectively satisfied by Aeronautical Charts — ICAO 1:500 000 or Aeronautical Navigation Charts — ICAO Small Scale, either of these charts may be made available instead of the basic 1:1 000 000 chart.*

4.16.2.2 To ensure complete coverage of all land areas and adequate continuity in any one coordinated series, the selection of a scale of other than 1:1 000 000 should be determined by regional agreement.

#### 4.16.3 Scales

4.16.3.1 Linear scales for kilometres and nautical miles arranged in the following order:

- kilometres,
- nautical miles,

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

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

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

#### 4.16.4 Format

4.16.4.1 The title and marginal notes should be in one of the ICAO working languages.

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

4.16.4.2 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.

4.16.4.3 The method of folding should be as follows:

Fold the chart on the long axis, near the mid-parallel of latitude, face out; with the bottom half of the chart face upward, fold inwards near the meridian, and fold both halves backward in accordion folds.



4.16.4.4 Whenever practicable, the sheet lines should conform with those shown in the index in Appendix 4.5.

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

*Note 2.— The value of adopting identical sheet lines for ICAO 1:1 000 000 Charts and the corresponding sheet of the International Map of the World (IMW), provided aeronautical requirements are not compromised, is recognized.*

4.16.4.5 The sheet lines used shall be notified to ICAO for publication in the ICAO *Aeronautical Chart Catalogue* (Doc 7101).

4.16.4.6 Overlaps should be provided by extending the chart area on the top and right side beyond the area given on the index. This overlap area should contain all aeronautical, topographical, hydrographical and cultural information. The overlap should extend up to 28 km (15 NM) if possible but in any case from the limiting parallels and meridians of each chart to the neat line.

#### **4.16.5 Projection**

4.16.5.1 The projections shall be as follows:

- 1) 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;
- 2) 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.

4.16.5.2 Graticules and graduations shall be shown as follows:



1) Parallels:

| <i>Latitude</i>                            | <i>Distance between parallels</i> | <i>Graduations on parallels</i> |
|--|-----------------------------------|---------------------------------|
| 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°) |                                   |                                 |

2) Meridians:

| <i>Latitude</i>                   | <i>Interval between meridians</i> | <i>Graduations on meridians</i> |
|-----------------------------------|-----------------------------------|---------------------------------|
| 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)   |                                   |                                 |

4.16.5.3 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.

4.16.5.3.1 The length of the graduation marks should be approximately 1.3 mm (0.05 in) for the 1' intervals, and 2 mm (0.08 in) for the 5' intervals and 2 mm (0.08 in) extending on both sides of the graticule line for the 10' intervals.

4.16.5.4 All meridians and parallels shall be numbered in the borders of the charts. In addition, each parallel shall be numbered within the body of the chart in such a manner that the parallel can be readily identified when the chart is folded.

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

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

**4.16.6 Identification**

Sheet numbering shall be in conformity with the index in Appendix 4.5.

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

**4.16.7 Culture and topography**

4.16.7.1 Built-up areas

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



4.16.7.1.2 Cities and towns of sufficient size should be indicated by the outline of their buildup areas and not of their established city limits.

#### 4.16.7.2 Railroads

4.16.7.2.1 All railroads having landmark value shall be shown.

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

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

4.16.7.2.2 Important tunnels should be shown.

*Note.— A descriptive note may be added.*

#### 4.16.7.3 Highways and roads

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

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

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

#### 4.16.7.4 Landmarks

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

*Note.— Descriptive notes may be added.*

#### 4.16.7.5 Political boundaries

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

#### 4.16.7.6 Hydrography

4.16.7.6.1 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.

4.16.7.6.2 The tint covering large open water areas should be kept very light.

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

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

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



#### 4.16.7.7 Contours

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

4.16.7.7.2 The values of the contours used shall be shown.

#### 4.16.7.8 Hypsometric tints

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

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

#### 4.16.7.9 Spot elevations

4.16.7.9.1 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.

4.16.7.9.2 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.

4.16.7.9.3 The spot elevation of the highest point in any sheet should be cleared of hypsometric tinting.

#### 4.16.7.10 Incomplete or unreliable relief

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

4.16.7.10.2 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 should be used with caution."

#### 4.16.7.11 Escarpments

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

#### 4.16.7.12 Wooded areas

4.16.7.12.1 Wooded areas should be shown.

*Note.— On high latitude charts, the approximate extreme northern or southern limits of tree growth may be shown.*

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

#### 4.16.7.13 Date of topographic information

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

### 4.16.8 Magnetic variation

4.16.8.1 Isogonic lines shall be shown.

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

### 4.16.9 Aeronautical data

4.16.9.1 Aeronautical data shown shall be kept to a minimum consistent with the use of the chart for visual navigation and the revision cycle (see 4.16.9.6).

#### 4.16.9.2 Aerodromes





- 4.16.4.9.2.1 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.
- 4.16.4.9.2.2 The aerodrome elevation, the lighting available, the type of runway surface and the length of the longest runway or channel, shown in abbreviated form for each aerodrome in conformity with the example given in Appendix 2, provided they do not cause undesirable clutter on the chart, shall be indicated.
- 4.16.4.9.2.3 Abandoned aerodromes which are still recognizable as aerodromes from the air shall be shown and identified as abandoned.
- 4.16.4.9.3 Obstacles
- 4.16.4.9.3.1 Obstacles shall be shown.

*Note.*— *Objects of a height of 100 m (300 ft) or more above ground are normally regarded as obstacles.*

- 4.16.9.3.2 When considered of importance to visual flight, prominent transmission lines and permanent cable car installations, which are obstacles, shall be shown.
- 4.16.9.4 Prohibited, restricted and danger areas Prohibited, restricted and danger areas shall be shown.
- 4.16.9.5 Air traffic services system
- 4.16.9.5.1 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.
- 4.16.9.5.2 Where appropriate, the air defence identification zone (ADIZ) shall be shown and properly identified.

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

#### 4.16.9.6 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.

#### 4.16.9.7 Supplementary information

- 4.16.9.7.1 Aeronautical ground lights together with their characteristics or their identifications or both shall be shown.
- 4.16.9.7.2 Marine lights on outer prominent coastal or isolated features of not less than 28 km (15 NM) visibility range shall be shown:
- 1) where they are not less distinguishable than more powerful marine lights in the vicinity;
  - 2) where they are readily distinguishable from other marine or other types of lights in the vicinity of built-up coastal areas;
  - 3) where they are the only lights of significance available.



## CHAPTER 17 AERONAUTICAL CHART — ICAO 1:500 000

### 4.17.1 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.

*Note 1.— This chart may be used:*

- a) to serve as a basic aeronautical chart;
- b) to provide a suitable medium for basic pilot and navigation training;
- c) to supplement highly specialized charts which do not provide essential visual information;
- d) in pre-flight planning.

*Note 2.— It is intended that these charts be provided for land areas where charts of this scale are required for civil air operations employing visual air navigation independently or in support of other forms of air navigation.*

*Note 3.— Where States produce charts of this series covering their national territories, the entire area being portrayed is usually treated on a regional basis.*

### 4.17.2 Availability

The Aeronautical Chart — ICAO 1:500 000 should be made available in the manner prescribed in 1.3.2 for all areas delineated in Appendix 4.5.

*Note.— The selection of this scale as an alternative to the World Aeronautical Chart — ICAO 1:1 000 000 is covered by 4.16.2.1 and 4.16.2.2.*

### 4.17.3 Scales

4.17.3.1 Linear scales for kilometres and nautical miles arranged in the following order:

- kilometres,
- nautical miles,

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

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

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

### 4.17.4 Format

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

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

4.17.4.2 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.

4.17.4.3 The method of folding should be as follows:

Fold the chart on the long axis near the mid-parallel of latitude, face out, with the bottom part of the chart face upward. Fold inwards near the meridian and fold both halves backward in accordion folds.



4.17.4.4 Whenever practicable, sheets should be quarter sheets of the World Aeronautical Chart — ICAO 1:1 000 000. An appropriate index to adjacent sheets, showing the relationship between the two chart series should be included on the face of the chart or on the reverse side.

*Note.*— Sheet lines may be varied to satisfy particular requirements.

4.17.4.5 Overlaps should be provided by extending the chart area on the top and right side beyond the area given on the index. This overlap area should contain all aeronautical, topographical, hydrographical and cultural information. The overlap should extend up to 15 km (8 NM), if possible, but in any case from the limiting parallels and meridians of each chart to the neat line.

**4.17.5 Projection**

4.17.5.1 A conformal (orthomorphic) projection shall be used.

4.17.5.2 The projection of the World Aeronautical Chart — ICAO 1:1 000 000 should be used.

4.17.5.3 Parallels shall be shown at intervals of 30'.

4.17.5.3.1 Meridians shall normally be shown at intervals of 30'.

*Note.*— At high latitudes this interval may be increased.

4.17.5.4 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.

4.17.5.4.1 The length of the graduation marks should be approximately 1.3 mm (0.05 in) for the 1' intervals, and 2 mm (0.08 in) for the 5' intervals and 2 mm (0.08 in) extending on both sides of the graticule line for the 10' intervals.

4.17.5.5 All meridians and parallels shown shall be numbered in the borders of the chart.

4.17.5.5.1 Each meridian and parallel should be numbered within the body of the chart whenever this data is required operationally.

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

**4.17.6 Identification**

4.17.6.1 Each sheet shall be identified by a name which should be that of the principal town or of a main geographical feature appearing on the sheet.

4.17.6.1.1 Where applicable, sheets should 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:

| <u>Letter</u> | <u>Chart quadrant</u> |
|---------------|-----------------------|
| A             | North-West            |
| B             | North-East            |
| C             | South-East            |
| D             | South-West            |

**4.17.7 Culture and topography**

4.17.7.1 Built-up areas

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



4.17.7.1.2 Cities and towns of sufficient size should be shown by the outline of their built-up areas and not of their established city limits.

#### 4.17.7.2 Railroads

4.17.7.2.1 All railroads having landmark value shall be shown.

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

*Note 2.— Railroads may be named.*

*Note 3.— Rail stations may be shown.*

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

*Note.— A descriptive note may be added, if necessary, to accentuate this feature.*

#### 4.17.7.3 Highways and roads

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

*Note.— Roads under construction may be shown.*

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

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

#### 4.17.7.4 Landmarks

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

*Note.— Descriptive notes may be added.*

#### 4.17.7.5 Political boundaries

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

*Note.— Other boundaries may be shown.*

#### 4.17.7.6 Hydrography

4.17.7.6.1 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.

4.17.7.6.2 The tint covering large open water areas should be kept very light.



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

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

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

#### 4.17.7.7 Contours

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

4.17.7.7.2 The values of the contours used shall be shown.

#### 4.17.7.8 Hypsometric tints

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

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

#### 4.17.7.9 Spot elevations

4.17.7.9.1 Spot elevations shall be shown at selected critical points. The elevation 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.

4.17.7.9.2 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.

4.17.7.9.3 The spot elevation of the highest point on any sheet should be cleared of hypsometric tinting.

#### 4.17.7.10 Incomplete or unreliable relief

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

4.17.7.10.2 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 should be used with caution.”

#### 4.17.7.11 Escarpments

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

#### 4.17.7.12 Wooded areas

4.17.7.12.1 Wooded areas should be shown.

*Note.*— On high latitude charts the approximate extreme northern or southern limits of tree growth may be shown.

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

#### 4.17.7.13 Date of topographic information

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



#### **4.17.8 Magnetic variation**

4.17.8.1 Isogonic lines shall be shown.

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

#### **4.17.9 Aeronautical data**

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

4.17.9.2 Aerodromes

4.17.9.2.1 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.

4.17.9.2.2 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 Appendix 2, provided they do not cause undesirable clutter on the chart, shall be indicated.

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

4.17.9.3 Obstacles

4.17.9.3.1 Obstacles shall be shown.

*Note.*— *Objects of a height of 100 m (300 ft) or more above ground are normally regarded as obstacles.*

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

4.17.9.4 Prohibited, restricted and danger areas Prohibited, restricted and danger areas shall be shown.

4.17.9.5 Air traffic services system

4.17.9.5.1 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.

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

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

4.17.9.6 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.

4.17.9.7 Supplementary information

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

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

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



## CHAPTER 18

### AERONAUTICAL NAVIGATION CHART — ICAO SMALL SCALE

#### 4.18.1 Function

This chart shall:

- 1) serve as an air navigation aid for flight crews of long range aircraft at high altitudes;
- 2) provide selective checkpoints over extensive ranges for identification at high altitudes and speeds, which are required for visual confirmation of position;
- 3) 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;
- 4) provide a general purpose chart series for long range flight planning and plotting.

#### 4.18.2 Availability

— The Aeronautical Navigation Chart

— ICAO Small Scale should be made available in the manner prescribed in 1.3.2 for all areas delineated in Appendix 4.5.

*Note.*— *The selection of this scale as an alternative to the World Aeronautical Chart — ICAO 1:1 000 000 is covered by 4.16.2.1 and 4.16.2.2.*

#### 4.18.3 Coverage and scale

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

*Note 1.*— *A sheet layout for this series is contained in the Aeronautical Chart Manual (Doc 8697).*

*Note 2.*— *The sheet size may represent the maximum press size available to the producing agency.*

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

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

4.18.3.4 Linear scales for kilometres and nautical miles arranged in the following order:

— kilometres,

— nautical miles,

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

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

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

#### 4.18.4 Format

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

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

4.18.4.2 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.



*Note.*— *There is no internationally agreed sheet numbering.*

#### **4.18.5 Projection**

4.18.5.1 A conformal (orthomorphic) projection shall be used.

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

4.18.5.2 Parallels shall be shown at intervals of 1°.

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

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

4.18.5.3.1 Graduations on the meridians shall be shown at intervals not exceeding 5'.

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

4.18.4.5.5 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.

#### **4.18.6 Culture and topography**

4.18.6.1 Built-up areas

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

4.18.6.1.2 Cities and towns of sufficient size should be indicated by the outline of their built-up areas and not of their established city limits.

4.18.6.2 Railroads

4.18.6.2.1 All railroads having landmark value shall be shown.

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

4.18.6.2.2 Important tunnels should be shown.

*Note.*— *A descriptive note may be added.*

4.18.6.3 Highways and roads

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

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

4.18.6.4 Landmarks

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

*Note.*— *Descriptive notes may be added.*

4.18.6.5 Political boundaries

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





#### 4.18.6.6 Hydrography

4.18.6.4.6.1 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.

4.18.6.4.6.2 The tint covering large open water areas should be kept very light.

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

4.18.6.6.3 Reefs and shoals including rocky ledges, tidal flats, isolated rocks, sand, gravel, stone and all similar areas should be shown by a symbol when of significant landmark value.

#### 4.18.6.7 Contours

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

4.18.6.7.2 The values of the contours used shall be shown.

#### 4.18.6.8 Hypsometric tints

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

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

#### 4.18.6.9 Spot elevations

4.18.6.9.1 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.

4.18.6.9.2 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.

4.18.6.9.3 The spot elevation of the highest point in any sheet should be cleared of hypsometric tinting.

#### 4.18.6.10 Incomplete or unreliable relief

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

4.18.6.10.2 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 should be used with caution.”

#### 4.18.6.11 Escarpments

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

#### 4.18.6.12 Wooded areas

— Wooded areas of large extent should be shown.

#### 4.18.6.13 Date of topographic information

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

#### 4.18.6.14 Colours

4.18.6.4.11 Subdued colours should be used for the chart background to facilitate plotting.



4.18.6.4.12 Good colour contrast should be ensured to emphasize features important to visual air navigation.

#### **4.18.7 Magnetic variation**

4.18.7.1 Isogonic lines shall be shown.

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

#### **4.18.8 Aeronautical data**

##### 4.18.8.1 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.

##### 4.18.8.2 Obstacles

Obstacles shall be shown.

##### 4.18.8.3 Prohibited, restricted and danger areas

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

##### 4.18.8.4 Air traffic services system

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

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

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

##### 4.18.4.8.5 Radio navigation aids

*Note.*— Radio aids to navigation may be shown by the appropriate symbol and named.



## CHAPTER 19 PLOTING CHART — ICAO

### 4.19.1 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.

### 4.19.2 Availability

This chart should 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.

*Note.*— *In areas where the Enroute Chart — ICAO is provided there may be no requirement for a plotting chart.*

### 4.19.3 Coverage and scale

4.19.3.1 Where practicable, the chart for a particular region should cover major air routes and their terminals on a single sheet.

4.19.3.2 — The scale should be governed by the area to be covered.

*Note.*— *Normally the scale will range from 1:3 000 000 to 1:7 500 000.*

### 4.19.4 Format

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

### 4.19.5 Projection

4.19.5.1 A conformal projection on which a straight line approximates a great circle should be used.

4.19.5.2 Parallels and meridians shall be shown.

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

4.19.5.2.2 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.

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

4.19.5.2.4 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.

### 4.19.6 Identification

Each sheet shall be identified by chart series and number.

### 4.19.7 Culture and topography

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

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

4.19.7.3 Particularly hazardous or prominent relief features should be emphasized.



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*Note.*— *Large cities and towns may be shown.*

#### **4.19.8 Magnetic variation**

4.19.8.1 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.

4.19.8.2 The date of the isogonic information shall be shown.

#### **4.19.9 Aeronautical data**

4.19.9.1 The following aeronautical data shall be shown:

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

*Note.*— *Other aeronautical data may be shown provided that they do not detract from the legibility of essential information.*

4.19.9.2 Aeronautical ground lights and marine lights useful for air navigation should be shown where other means of navigation are non-existent.



## CHAPTER 20

### ELECTRONIC AERONAUTICAL CHART DISPLAY — ICAO

#### 4.20.1 Function

The Electronic Aeronautical Chart Display — ICAO, with adequate back-up arrangements and in compliance with the requirements of SUCAR Part 6 for charts, shall enable flight crews to execute, in a convenient and timely manner, route planning, route monitoring and navigation by displaying required information.

#### 4.20.2 Information available for display

4.20.2.1 The Electronic Aeronautical Chart Display — ICAO shall be capable of displaying all aeronautical, cultural and topographic information required by SUCAR Part 4, Chapter 5 and Chapters 7 through 4.19.

4.20.2.2 The Electronic Aeronautical Chart Display — ICAO should be capable of displaying all aeronautical, cultural and topographic information recommended by SUCAR Part 4, Chapter 5 and Chapters 7 through 4.19.

*Note.*— *The Electronic Aeronautical Chart Display — ICAO may display supplementary information, in addition to that required for the equivalent paper chart, which may be considered useful for safe navigation.*

#### 4.4.20.3 Display requirements

##### 4.20.3.1 Display categories

4.20.3.1.1 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.

4.20.3.1.2 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.

##### 4.20.3.2 Display mode and generation of neighbouring area

4.20.3.2.1 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.

*Note.*— *Other modes, such as static chart displays, may be available.*

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

##### 4.20.3.3 Scale

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

##### 4.20.3.4 Symbols

Symbols used shall conform to those specified for electronic charts in Appendix 2 — ICAO Chart Symbols except where it is desired to show items for which no ICAO chart symbol is provided. In these cases electronic chart symbols shall be chosen which:

- a) employ a minimum use of lines, arcs and area fills;
- b) do not cause confusion with any existing aeronautical chart symbol;



- c) do not impair the legibility of the display.

*Note.*— *Additional details for each symbol may be added according to the resolution of the output media, but any enhancements may not change the basic recognizability of the symbol.*

#### 4.20.3.5 Display hardware

- 4.20.3.5.1 The effective size of the chart presentation shall be sufficient to display the information required by 4.20.2 without excessive scrolling.
- 4.20.3.5.2 The display shall have the capabilities required to accurately portray required elements of Appendix 2 — ICAO Chart Symbols.
- 4.20.3.5.3 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.
- 4.20.3.5.4 The display luminance shall be adjustable by the flight crew.

#### 4.20.4 Provision and updating of data

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

*Note.*— *For aeronautical data quality system requirements see Chapter 2, 2.17 and SUCAR Part 15, Chapter 3, 3.2.*

- 4.20.4.2 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.
- 4.20.4.3 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.
- 4.20.4.4 A record shall be kept of all updates, including date and time of application.
- 4.20.4.5 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.

### 4

#### 4.20.5 Performance tests, malfunction alarms and indications

- 4.20.5.1 A means shall be provided for carrying out onboard tests of major functions. In case of a failure, the test shall display information to indicate which part of the system is at fault.
- 4.20.5.2 A suitable alarm or indication of system malfunction shall be provided.

#### 4.20.6 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.

*Note.*— *A suitable back-up system may include the carriage of paper charts.*



## CHAPTER 21

### RADAR MINIMUM ALTITUDE CHART — ICAO

#### 4.21.1 Function

4.21.1.1 This supplementary chart shall provide information that will enable flight crews to monitor and cross-check altitudes assigned while under radar control.

*Note.*— *The objectives of the air traffic control service as prescribed in SUCAR Part 11 do not include prevention of collision with terrain. Therefore, pilots are at all times responsible to ensure that any clearances issued by air traffic control units are safe in this respect, except when an IFR flight is vectored by radar. See the Procedures for Air Navigation Services — Air Traffic Management (PANS-ATM, Doc 4444), Chapter 8, 4.8.4.6.4.5.2.*

4.21.1.2 A note indicating that the chart may only be used for cross-checking of altitudes assigned while under radar control shall be prominently displayed on the face of the chart.

#### 4.21.2 Availability

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

#### 4.21.3 Coverage and scale

4.21.3.1 The coverage of the chart shall be sufficient to effectively show the information associated with radar vectoring procedures.

4.21.3.2 The chart shall be drawn to scale.

4.21.3.3 The chart should be drawn to the same scale as the associated Area Chart — ICAO.

#### 4.21.4 Projection

4.21.4.1 A conformal projection on which a straight line approximates a geodesic line should be used.

4.21.4.2 Graduation marks should be placed at consistent intervals along the neat lines, as appropriate.

#### 4.21.5 Identification

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

*Note.*— *The name may be that of the city which the aerodrome serves or, when the procedures apply to more than one aerodrome, that of the air traffic services centre or the largest city or town situated in the area covered by the chart.*

#### 4.21.6 Culture and topography

4.21.6.1 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.



4.21.6.2 Appropriate spot elevations and obstacles shall be shown.

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

#### **4.21.7 Magnetic variation**

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

#### **4.21.8 Bearings, tracks and radials**

4.21.8.1 Bearings, tracks and radials shall be magnetic, except as provided for in 4.21.8.2.

4.21.8.2 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, should be used.

4.21.8.3 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.

#### **4.21.9 Aeronautical data**

##### **4.21.4.9.1 Aerodromes**

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

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

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

##### **4.21.4.9.3 Air traffic services system**

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

- 1) relevant radio navigation aids together with their identifications;
- 2) lateral limits of relevant designated airspace;
- 3) relevant significant points associated with standard instrument departure and arrival procedures;

*Note.*— *Routes used in the vectoring of aircraft to and from the significant points may be shown.*

- 4) transition altitude, where established;
- 5) information associated with radar vectoring including:
  - a) radar minimum altitudes to the nearest higher 50m or 100ft, clearly identified;
  - b) lateral limits of radar minimum 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 radar sectors;

*Note.*— *In congested areas geographical coordinates may be omitted in the interest of legibility.*

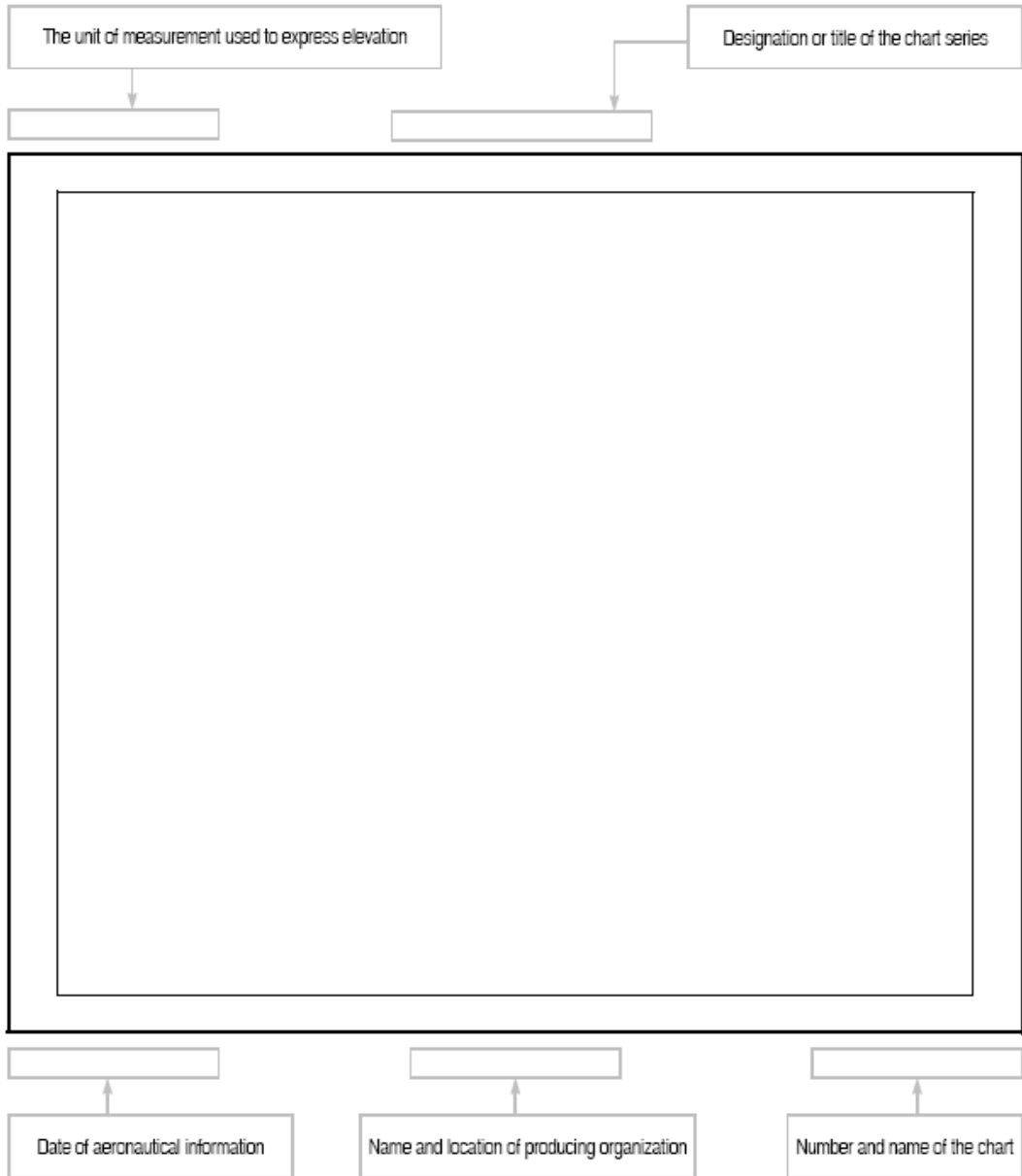




- 
- c) distance circles at 20-km or 10-NM intervals or, when practicable, 10-km or 5-NM intervals shown as fine dashed lines with the radius indicated on the circumference and centred on the identified aerodrome main VOR radio navigation aid or, if not available, on the aerodrome/heliport reference point;
  - d) notes concerning correction for low temperature effect, as applicable;
  - 6) radio communications procedures including call sign(s) and frequency(ies) of approach/radar unit(s).
- 4.21.4.9.3.2 A textual description of communication failure procedures in relation to radar control should be provided and should, whenever feasible, be shown on the chart or on the same page that contains the chart.



### APPENDIX 1 MARGINAL NOTE LAYOUT



**APP 1-1**



APPENDIX 2. ICAO CHART SYMBOLS

| <i>Index</i>   | <i>No.</i> | <i>Index</i>  | <i>No.</i>                      |
|--|------------|---|---------------------------------|
| Abandoned canal  | 30         | City or large town  | 47                              |
| Advisory airspace — ADA  | 115        | Clearway — CWY (on Aerodrome<br>Obstacle Charts)                                    | 167                             |
| Advisory route — ADR   | 118        | Cliff   | 4                               |
| Aerodrome/Heliport Charts  | 144-158    | Coast guard station   | 73                              |
| Aerodrome Obstacle Charts  | 159-167    | Collocated VOR and DME radio navigation aids —<br>VOR/DME                           | 103,110                         |
| Building or large structure  | 161        | Collocated VOR and TACAN radio navigation<br>aids — VORTAC                          | 107,110                         |
| Clearway — CWY   | 167        | Compass rose  | 110                             |
| Escarpment   | 165        | Contours  | 1                               |
| Pole, tower, spire, antenna  | 160        | Control area — CTA  | 113                             |
| Railroad   | 162        | Controlled route  | 113                             |
| Stopway — SWY  | 166        | Control zone — CTR  | 116                             |
| Terrain penetrating obstacle plane                                     | 164        | Coral reefs and ledges  | 22                              |
| Transmission line or overhead cable                                    | 163        | Culture   | 47-83                           |
| Tree or shrub  | 159        | Culture, miscellaneous  | 63-83                           |
| Aerodrome reference point — ARP (on<br>Aerodrome/Heliport Charts)      | 149        | Dam   | 67                              |
| Aerodromes   | 84-98      | Danger area   | 129                             |
| Abandoned or closed  | 91         | Danger line   | 43                              |
| Civil, land  | 84         | Distance measuring equipment — DME  | 102,110,176,177                 |
| Civil, water   | 85         | DME distance  | 104                             |
| Data in abbreviated form   | 96         | Dry lake bed  | 39                              |
| Emergency, or with no facilities                                       | 90         | Dual highway  | 57                              |
| For Approach Charts  | 97,98      | Electronic Chart Symbols  | 100,101,103,107,108,142,168-177 |
| For use on charts on which aerodrome<br>classification is not required | 93         | Escarpment  | 4                               |
| Joint civil and military, land   | 88         | Escarpment (on Aerodrome Obstacle Charts)   | 165                             |
| Joint civil and military, water  | 89         | Esker   | 9                               |
| Military, land   | 86         | Falls   | 28                              |
| Military, water  | 87         | Fence   | 65                              |
| Runway pattern in lieu of aerodrome symbol                             | 95         | Ferry   | 68                              |
| Runway   | 172        | Final approach fix — FAF  | 125                             |
| Aerodrome traffic zone — ATZ   | 112        | Flight information region — FIR   | 111                             |
| Aeronautical ground light  | 142        | Flight levels   | 126                             |
| Air defence identification zone — ADIZ                                 | 117        | Forest ranger station   | 76                              |
| Airspace Classifications   | 127,128    | Fort  | 79                              |
| Airspace Restrictions  | 129,130    | Gas field   | 70                              |
| Air Traffic Services — ATS   | 111-126    | Glaciers  | 42                              |
| Airway — AWY   | 113        | Gravel  | 8                               |
| Altitudes/flight levels  | 126        | Hard surface runway (on Aerodrome/Heliport Charts)                                  | 144                             |
| Antenna (on Aerodrome Obstacle Charts)                                 | 160        | Helicopter alighting area on an aerodrome<br>(on Aerodrome/Heliport Charts)         | 148                             |
| Approximate contours   | 2          | Heliport  | 94                              |
| Areas not surveyed for contour information                             | 18         | Highest elevation on chart  | 12                              |
| ATS/MET reporting point — MRP<br>(compulsory, on request)              | 123        | Highways  | 57-62                           |
| Basic radio navigation aid   | 99         | Holding pattern   | 170                             |
| Bluff  | 4          | Hydrography   | 19-46                           |
| Boundaries (international)   | 63         | Ice cap   | 42                              |
| Boundaries, other  | 64         | Instrument landing system — ILS   | 108                             |
| Building (on Aerodrome Obstacle Charts)                                | 161        | International boundary closed to passage of aircraft<br>except through air corridor | 130                             |
| Buildings  | 50         | Isogonic line or isogonal   | 139                             |
| Built-up areas   | 47-50      | Lakes (non-perennial)   | 32                              |
| Canal  | 29         | Lakes (perennial)   | 31                              |
| Change-over point — COP  | 122        | Landing direction indicator (lighted)   |                                 |
| Charted isolated rock  | 44         |   |                                 |
| Church   | 80         |   |                                 |

APP 2-1



| <i>Index</i>  | <i>No.</i>      | <i>Index</i>   | <i>No.</i> |
|---|-----------------|--|------------|
| (on Aerodrome/Heliport Charts)  | 155             | Restricted airspace (prohibited, restricted or danger area) and common boundary of two areas | 129        |
| Landing direction indicator (unlighted)                                 |                 | Restricted area  | 129        |
| (on Aerodrome/Heliport Charts)  | 156             | Rice field   | 36         |
| Large river (perennial)   | 23              | Rivers and streams (non-perennial)   | 25         |
| Large structure (on Aerodrome Obstacle Charts)                          | 161             | Rivers and streams (unsurveyed)  | 26         |
| Large town  | 47              | Road bridge  | 61         |
| Lava flow   | 5               | Road tunnel  | 62         |
| Levee   | 9               | Rock awash   | 45         |
| Lightship   | 143             | Ruins  | 78         |
| Lookout tower   | 74              | Runway   | 172        |
| Marine light  | 141             | Runway-holding position (on Aerodrome/Heliport Charts)                                       | 158        |
| Mine  | 75              | Runway visual range (RVR) observation site (on Aerodrome/Heliport Charts)                    | 151        |
| Minimum sector altitude — MSA   | 168             | Salt lake  | 33         |
| Miscellaneous symbols — aeronautical                                    | 138-140         | Salt pans (evaporator)   | 34         |
| Miscellaneous symbols — culture   | 63-83           | Sand area  | 7          |
| Missed approach track   | 171             | Sand dunes   | 6          |
| Mosque  | 81              | Scale-break (on ATS route)   | 120        |
| Mountain pass   | 11              | Secondary road   | 59         |
| Non-directional radio beacon — NDB                                      | 100             | Sheltered anchorage  | 92         |
| Nuclear power station   | 72              | Shoals   | 41         |
| Obstacle light (on Aerodrome/Heliport Charts)                           | 154             | Shore line (reliable)  | 19         |
| Obstacles   | 131-137         | Shore line (unreliable)  | 20         |
| Elevation of top  | 137             | Shrub (on Aerodrome Obstacle Charts)   | 159        |
| Exceptionally high  | 135             | Small river (perennial)  | 24         |
| Exceptionally high, lighted   | 136             | Spire (on Aerodrome Obstacle Charts)   | 160        |
| Group   | 133             | Spot elevation   | 13         |
| Height  | 137             | Spot elevation (of doubtful accuracy)  | 14         |
| Lighted   | 132             | Spring (perennial or intermittent)   | 37         |
| Lighted group   | 134             | Stadium  | 77         |
| Obstacle  | 131             | Steel mesh runway (on Aerodrome/Heliport Charts)   | 152        |
| Ocean station vessel  | 140             | Stop bar (on Aerodrome/Heliport Charts)  | 157        |
| Oil field   | 70              | Stopway — SWY (on Aerodrome/Heliport Charts)   | 146        |
| Other boundaries  | 64              | Stopway — SWY (on Aerodrome Obstacle Charts)   | 166        |
| Other trees   | 16              | Swamp  | 35         |
| Overhead cable (on Aerodrome Obstacle Charts)                           | 163             | TACAN (UHF tactical air navigation aid)  | 106,110    |
| Pagoda  | 82              | Tank farms   | 71         |
| Palms   | 17              | Taxiways (on Aerodrome/Heliport Charts)  | 147        |
| Parking areas (on Aerodrome/Heliport Charts)                            | 147             | Telegraph or telephone line (when a landmark)  | 66         |
| Pierced steel plank or steel mesh runway (on Aerodrome/Heliport Charts) | 152             | Temple   | 83         |
| Pipeline  | 69              | Terminal arrival altitude — TAA  | 169        |
| Point light (on Aerodrome/Heliport Charts)                              | 153             | Terrain penetrating obstacle plane (on Aerodrome Obstacle Charts)                            | 164        |
| Pole (on Aerodrome Obstacle Charts)                                     | 160             | Tidal flats  | 21         |
| Primary road  | 58              | Topography   | 1-18       |
| Prohibited area   | 129             | Tower (on Aerodrome Obstacle Charts)   | 160        |
| Prominent transmission line   | 138             | Town   | 48         |
| Race track  | 77              | Trail  | 60         |
| Radio marker beacon   | 109,174,175,177 | Transmission line (on Aerodrome Obstacle Charts)   | 163        |
| Radio navigation aid — basic  | 99,173          | Tree (on Aerodrome Obstacle Charts)  | 159        |
| Radio navigation aids   | 99-110,173-176  | Tree, coniferous   | 15         |
| Railroads   | 51-56           | Tree, other  | 16         |
| Bridge  | 54              | UHF tactical air navigation aid — TACAN  | 106,110    |
| Railroad (on Aerodrome Obstacle Charts)                                 | 162             | Uncontrolled route   | 114        |
| Single track  | 51              | Unpaved runway (on Aerodrome/Heliport Charts)  | 145        |
| Station   | 56              | Unusual land features, appropriately labelled  | 10         |
| Tunnel  | 55              | Unusual water features, appropriately labelled   | 46         |
| Two or more tracks  | 52              | VHF omnidirectional radio range — VOR  | 101,110    |
| Under construction  | 53              | Village  | 49         |
| Rapids  | 27              | Visual aids  | 141-143    |
| Relief data incomplete  | 18              | Visual flight path   | 119        |
| Relief shown by hachures  | 3               | VOR (VHF omnidirectional radio range)  | 101,110    |
| Reporting point — REP (compulsory, on request)                          | 121             |  |            |
| Reservoir   | 38              |  |            |

APP 2-2



| <i>Index</i>  | <i>No.</i> | <i>Index</i> | <i>No.</i> |
|---|------------|--------------|------------|
| VOR check-point (on Aerodrome/Heliport Charts)          | 150        |              |            |
| VOR/DME (collocated VOR and DME radio navigation aids)  | 103,110    |              |            |
| VOR radial  | 105        |              |            |
| VORTAC (collocated VOR and TACAN radio navigation aids) | 107,110    |              |            |
| Wash  | 40         |              |            |
| Water hole (perennial or intermittent)                  | 37         |              |            |
| Waypoint — WPT  | 124        |              |            |
| Well (perennial or intermittent)                        | 37         |              |            |

**AAPP 2-3**



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TOPOGRAPHY

|   |                            |  |    |  |                 |    |                            |             |                |                                       |                              |             |  |
|---|----------------------------|--|----|--|-----------------|----|----------------------------|-------------|----------------|---------------------------------------|------------------------------|-------------|--|
| 1 | Contours                   |  | 8  | Gravel   |                 | 12 | Highest elevation on chart | Alternative | <b>17456</b>   |                                       |                              |             |  |
| 2 | Approximate contours       |  | 9  | Levee or esker   | Alternative<br> | 13 | Spot elevation             |             | <b>.17456</b>  |                                       |                              |             |  |
| 3 | Relief shown by hachures   |  |    |  |                 |    |                            |             | 14             | Spot elevation (of doubtful accuracy) | <b>.4897</b><br><b>.8975</b> |             |  |
| 4 | Bluff, cliff or escarpment |  | 10 | Unusual land features appropriately labelled                         |                 | 15 | Coniferous trees           |             | <b>.4875</b>   |                                       |                              |             |  |
| 5 | Lava flow                  |  |    |  |                 |    |                            |             | Active volcano |                                       | 16                           | Other trees |  |
| 6 | Sand dunes                 |  |    |  |                 |    |                            |             |                |                                       |                              |             |  |
| 7 | Sand area                  |  | 18 | Areas not surveyed for contour information or relief data incomplete |                 |    |                            |             |                |                                       |                              |             |  |

HYDROGRAPHY

|    |                                    |                 |                  |  |                 |       |   |                 |
|----|------------------------------------|-----------------|------------------|--|-----------------|-------|---|-----------------|
| 19 | Shore line (reliable)              |                 | 30               | Abandoned canal<br>Note.— Dry canal having landmark value. |                 | 38    | Reservoir                                     |                 |
| 20 | Shore line (unreliable)            |                 |                  |  |                 |       |   |                 |
| 21 | Tidal flats                        |                 | 32               | Lakes (non-perennial)                                      | Alternative<br> | 40    | Wash  | Alternative<br> |
| 22 | Coral reefs and ledges             |                 |                  |  |                 |       |   |                 |
| 23 | Large river (perennial)            |                 | 34               | Salt pans (evaporator)                                     |                 | 42    | Glaciers and ice caps                         |                 |
| 24 | Small river (perennial)            |                 |                  |  |                 |       |   |                 |
| 25 | Rivers and streams (non-perennial) | Alternative<br> | 36               | Rice field   | Alternative<br> | 44    | Charted isolated rock                         | +               |
|    |                                    |                 |                  |  |                 |       |   |                 |
| 27 | Rapids                             |                 | intermittent<br> | 45   | Rock wash       | +<br> |   |                 |
| 28 | Falls                              |                 | 46               |  |                 |       | Unusual water features appropriately labelled |                 |
| 29 | Canal                              |                 |                  |  |                 |       |   |                 |

APP 2-5



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 | Pagode                |  |
| 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<br>Note.— Aerodrome for the exclusive use of helicopters                                 |       |  |

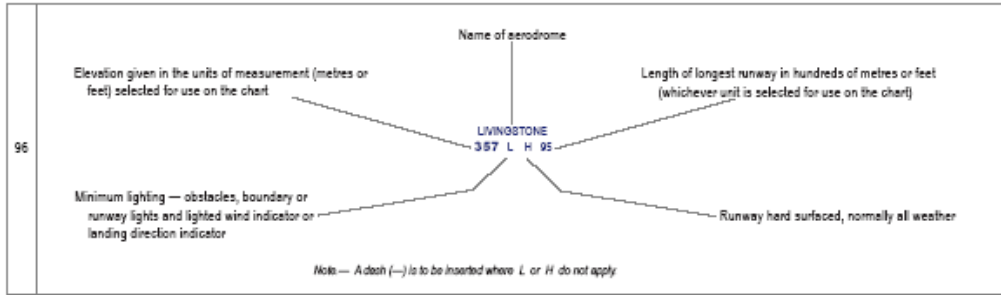
|    |  |  |
|----|--|--|
| 95 | Note.— Where required by the function of the chart, the runway pattern of the aerodrome may be shown in lieu of the aerodrome symbol, for example: |  |
|----|--|--|

APP 2-6





**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)



**AERODROME SYMBOLS FOR APPROACH CHARTS**

|  |  |  |  |
|--|--|--|--|
| 97 Aerodromes affecting the traffic pattern on the aerodrome on which the procedure is based |  | 98 The aerodrome on which the procedure is based |  |
|--|--|--|--|

**RADIO NAVIGATION AIDS\***

|   |  |   |            |
|---|--|---|------------|
| 99 Basic radio navigation aid symbol<br>Note — This symbol may be used with or without a box to enclose the data.           |  |   |            |
| 100 Non-directional radio beacon NDB  |  |   | Electronic |
| 101 VHF omnidirectional radio range VOR   |  |   |            |
| 102 Distance measuring equipment DME  |  |   |            |
| 103 Collocated VOR and DME radio navigation aids VOR/DME  |  |   |            |
| 104 DME distance  | Distance in kilometres (nautical miles) to DME — 15 km<br>Identification of radio navigation aid — KAV |   |            |
| 105 VOR radial  | Radial bearing from, and identification of, VOR<br>R 090 KAV   |   |            |
| 106 UHF tactical air navigation aid TACAN   |  |   |            |
| Note — Marker beacon may be shown by outline, or stipple, or both.  |  |   |            |
| 107 Collocated VOR and TACAN radio navigation aids  | VORTAC   |   | Electronic |
| 108 Instrument landing system ILS   | PLAN VIEW  |   |            |
|   | Electronic   |   |            |
|   | FRONT COURSE<br>BACK COURSE  |   |            |
|   | PROFILE  |   |            |
| 109 Radio marker beacon   | Elliptical   |   |            |
|   | Bone Shape   |   |            |
| Note — Marker beacon may be shown by outline, or stipple, or both.  |  |   |            |
| 110 Compass rose<br>To be orientated on the chart in accordance with the alignment of the station (normally Magnetic North) |  | Compass rose to be used as appropriate in combination with the following symbols: |            |
|   |  | VOR   |            |
|   |  | VOR/DME   |            |
|   |  | TACAN   |            |
|   |  | VORTAC  |            |
| Note — Additional points of compass may be added as required.   |  |   |            |

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



AIR TRAFFIC SERVICES

|     |  |            |                 |     |                         |  |   |
|-----|--|------------|-----------------|-----|-------------------------|--|---|
| 111 | Flight information region                  | FIR        |                 | 119 | Visual flight path      | compulsory with radio communication requirement                            | ..... (R) .....   |
| 112 | Aerodrome traffic zone                     | ATZ        |                 |     |                         | compulsory, without radio communication requirement                        | ..... (R) .....   |
| 113 | Control area<br>Airway<br>Controlled route | CTA<br>AWY | Alternative<br> |     | 120                     | Scale-break<br>(on ATS route)  | Alternative<br>   |
|     |  |            |                 |     |                         |  |   |
| 114 | Uncontrolled route                         |            |                 | 121 | Reporting point         | REP  | Compulsory  |
|     |  |            |                 |     |                         |  | On request  |
| 115 | Advisory airspace                          | ADA        |                 | 122 | Change-over point       | COP  |   |
|     |  |            |                 |     |                         |  | To be superimposed on the appropriate route symbol at right angles to the route |
| 116 | Control zone                               | CTR        |                 | 123 | ATS/MET reporting point | MRP  | Compulsory  |
|     |  |            |                 |     |                         |  | On request  |
| 117 | Air defence identification zone            | ADIZ       |                 | 124 | Waypoint<br>WPT         | Flyover WPT (also used for start point and end point of a controlled turn) |   |
|     |  |            |                 |     |                         |  | Fly-by WPT  |
| 118 | Advisory route                             | ADR        | Alternative<br> | 125 | Final approach fix      | FAF  |   |

|  |                         |   |               |               |
|--|-------------------------|---|---------------|---------------|
| 126  | Altitudes/flight levels | Altitude/flight level "window"                | <u>17 000</u> | <u>FL 220</u> |
|  |                         |   | <u>10 000</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. |                         |   |               |               |

APP 2-8



AIRSPACE CLASSIFICATIONS

|     |                          |     |             |  |   |
|-----|--------------------------|-----|-------------|--|---|
| 127 | Airspace classifications |     |             |  | Aeronautical data in abbreviated form to be used in association with airspace classification symbols: |
|     |                          | 128 | Alternative |  |   |

AIRSPACE RESTRICTIONS

|     |   |  |                              |  |
|-----|---|--|------------------------------|--|
| 129 | Restricted airspace (prohibited, restricted or danger area)<br><i>Note - The angle and density of rulings may be varied according to scale and the size, shape and orientation of the area.</i> |  | Common boundary of two areas |  |
| 130 | International boundary closed to passage of aircraft except through air corridor  |  |                              |  |

OBSTACLES

|     |                         |  |   |   |  |
|-----|-------------------------|--|---|---|--|
| 131 | Obstacle                |  | 135   | Exceptionally high obstacle (optional symbol)           |  |
| 132 | Lighted obstacle        |  | 136   | Exceptionally high obstacle - lighted (optional symbol) |  |
| 133 | Group obstacles         |  | <i>Note - For obstacles having a height of the order of 300 m (1 000 ft) above terrain.</i> |   |  |
| 134 | Lighted group obstacles |  | 137   |   |  |

MISCELLANEOUS

|     |                             |  |     |                           |  |     |  |  |
|-----|-----------------------------|--|-----|---------------------------|--|-----|--|--|
| 138 | Prominent transmission line |  | 139 | Isogonic line or isogonal |  | 140 | Ocean station vessel (normal position) |  |
|-----|-----------------------------|--|-----|---------------------------|--|-----|--|--|

VISUAL AIDS

|     |   |               |                              |        |  |                            |                 |                            |
|-----|---|---------------|------------------------------|--------|--|----------------------------|-----------------|----------------------------|
| 141 | Marine light<br><i>Note 2 - Characteristics are to be indicated as follows:</i> | Alt<br>B<br>F | Alternating<br>Blue<br>Fixed | F<br>• | <i>Note 1 - Marine alternating lights are red and white unless otherwise indicated. Marine lights are white unless colours are stated.</i> |                            |                 |                            |
|     |   |               |                              |        | Fl<br>G<br>Op  | Flashing<br>Green<br>Group | Occ<br>R<br>SEC | Occulting<br>Red<br>Sector |
| 142 | Aeronautical ground light   |               | Electronic                   |        | 143  | Lightship                  |                 |                            |

APP 2-9



**SYMBOLS FOR AERODROME/HELIPORT CHARTS**

|     |  |  |     |  |           |
|-----|--|--|-----|--|-----------|
| 144 | Hard surface runway                        |  | 152 | Pierced steel plank or steel mesh runway |           |
| 145 | Unpaved runway                             |  | 153 | Point light                              |           |
| 146 | Stopway SWY                                |  |     |  |           |
| 147 | Taxiways and parking areas                 |  | 154 | Obstacle light                           |           |
|     |  |  | 155 | Landing direction indicator (lighted)    |           |
| 148 | Helicopter alighting area on an aerodrome  |  | 156 | Landing direction indicator (unlighted)  |           |
| 149 | Aerodrome reference point ARP              |  | 157 | Stop bar                                 |           |
| 150 | VOR check-point                            |  | 158 | Runway-holding position                  | Pattern A |
| 151 | Runway visual range (RVR) observation site |  |     |  | Pattern B |

*Note. – For application, see Annex 14, Volume I, paragraph 5.2.10.*

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

|     | Plan                                | Profile |     | Plan                               | Profile |
|-----|-------------------------------------|---------|-----|------------------------------------|---------|
| 159 | Tree or shrub                       |         | 164 | Terrain penetrating obstacle plane |         |
| 160 | Pole, tower, spire, antenna, etc.   |         |     |                                    |         |
| 161 | Building or large structure         |         |     |                                    |         |
| 162 | Railroad                            |         |     |                                    |         |
| 163 | Transmission line or overhead cable |         |     |                                    |         |
|     |                                     |         | 165 | Escarpment                         |         |
|     |                                     |         | 166 | Stopway SWY                        |         |
|     |                                     |         | 167 | Cleanway CWY                       |         |

**APP 2-10**















ADDITIONAL SYMBOLS FOR USE ON PAPER AND ELECTRONIC CHARTS

| PLAN VIEW |  |         |
|-----------|--|---------|
| 168       | Minimum sector altitude<br><i>Note— This symbol may be modified to reflect particular sector shapes.</i>                       | MSA<br> |
| 169       | Terminal arrival altitude<br><i>Note— This symbol may be modified to reflect particular TAA shapes.</i>                        | TAA<br> |
| 170       | Holding pattern  |         |
| 171       | Missed approach track  |         |
| PROFILE   |  |         |
| 172       | Runway   |         |
| 173       | Radio navigation aid<br><i>(type of aid and its use in the procedure to be annotated on top of the symbol)</i>                 |         |
| 174       | Radio marker beacon<br><i>(type of beacon to be annotated on top of the symbol)</i>  |         |
| 175       | Collocated radio navigation aid and marker beacon<br><i>(type of aid to be annotated on top of the symbol)</i>                 |         |
| 176       | DME fix<br><i>(distance from DME and the fix use in the procedure to be annotated on top of the symbol)</i>                    |         |
| 177       | Collocated DME fix and marker beacon<br><i>(distance from DME and the type of beacon to be annotated on top of the symbol)</i> |         |

APP 2-11




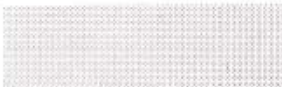










### APPENDIX 3 COLOUR GUIDE (Reference 2.11)

| CHART SYMBOLS  |                  |  |
|--|------------------|--|
| 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<br> |
|  |                  | RED<br>             |
| Built-up areas for cities (alternative to black stipple)   | YELLOW           |                     |
| Contours and topographic features: Items 1 through 10 of Appendix 2.<br>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 colours may be used on the same sheet but, where only one colour is used, dark blue is preferred | Optional colours | MAGENTA<br>       |
|  |                  | DARK BLUE<br>     |

**APP 3-1**




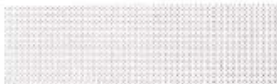










CHART SYMBOLS

|  |                  |                 |   |
|--|------------------|-----------------|---|
| 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.<br>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 colours may be used on the same sheet but, where only one colour is used, dark blue is preferred | Optional colours | MAGENTA         |  |
|  |                  | DARK BLUE       |  |

APP 3-2



## APPENDIX 4 HYSOMETRIC TINT GUIDE (Alternativesystems, reference 2.12.3)

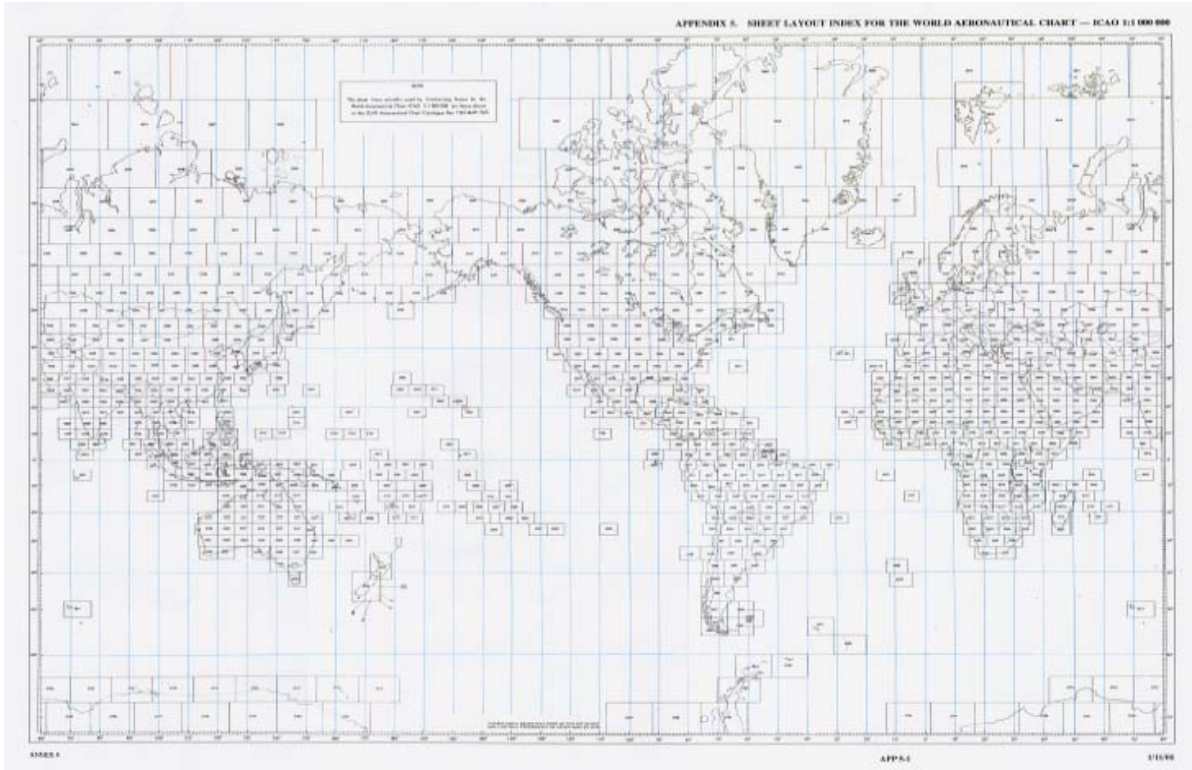
| CHART SYMBOLS  |                  |  |
|--|------------------|--|
| Culture, except highways and roads; outlines of large cities, grids and graticules; spot elevations; danger lines and off-shore rocks; names and lettering except for aeronautical and hydrographic features |                  | BLACK             |
| 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.<br>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 colours may be used on the same sheet but, where only one colour is used, dark blue is preferred | Optional colours | MAGENTA         |
|  |                  | DARK BLUE       |

**APP 4-1**





## APPENDIX 5 SHEET LAYOUT INDEX FOR THE WORLD AERONAUTICAL CHART —ICAO 1:1 000 00





## APPENDIX 6 AERONAUTICAL DATA QUALITY REQUIREMENTS

Table 1. Latitude and longitude

| Latitude and longitude   | Chart resolution | Integrity Classification        |
|--|------------------|---------------------------------|
| Flight information region boundary points .....  | as plotted       | $1 \times 10^{-3}$<br>routine   |
| P, R, D area boundary points (outside CTA/CTZ boundaries) .....  | as plotted       | $1 \times 10^{-3}$<br>routine   |
| P, R, D area boundary points (inside CTA/CTZ boundaries) .....   | as plotted       | $1 \times 10^{-5}$<br>essential |
| CTA/CTZ boundary points .....  | as plotted       | $1 \times 10^{-5}$<br>essential |
| En-route nav aids and fixes, holding, STAR/SID points .....  | 1 sec            | $1 \times 10^{-5}$<br>essential |
| Obstacles in Area 1 (the entire State territory) .....   | as plotted       | $1 \times 10^{-3}$<br>routine   |
| Aerodrome/heliport reference point .....   | 1 sec            | $1 \times 10^{-3}$<br>routine   |
| Nav aids located at the aerodrome/heliport .....   | as plotted       | $1 \times 10^{-5}$<br>essential |
| Obstacles in Area 3 .....  | 1/10 sec         | $1 \times 10^{-5}$<br>essential |
| Obstacles in Area 2 .....  | 1/10 sec         | $1 \times 10^{-5}$<br>essential |
| Final approach fixes/points and other essential<br>fixes/points comprising the instrument approach procedure ..... | 1 sec            | $1 \times 10^{-5}$<br>essential |
| Runway thresholds .....  | 1 sec            | $1 \times 10^{-8}$<br>critical  |
| Taxiway centre line/parking guidance line points .....   | 1/100 sec        | $1 \times 10^{-5}$<br>essential |
| Runway end (flight path alignment point) .....   | 1 sec            | $1 \times 10^{-8}$<br>critical  |
| Runway holding position .....  | 1 sec            | $1 \times 10^{-8}$<br>critical  |
| Taxiway intersection marking line .....  | 1 sec            | $1 \times 10^{-5}$<br>essential |
| Exit guidance line .....   | 1 sec            | $1 \times 10^{-5}$<br>essential |
| Apron boundaries (polygon) .....   | 1 sec            | $1 \times 10^{-3}$<br>routine   |
| De-/anti-icing facility (polygon) .....  | 1 sec            | $1 \times 10^{-3}$<br>routine   |
| Aircraft standpoints/INS checkpoints .....   | 1/100 sec        | $1 \times 10^{-3}$<br>routine   |
| Geometric centre of TLOF or FATO thresholds, heliports .....   | 1 sec            | $1 \times 10^{-8}$<br>critical  |

*Note.*— See Annex 15, Appendix 8, for graphical illustrations of obstacle data collection surfaces and criteria used to identify obstacles in the defined areas.

### APP 6-1



**Table 2. Elevation/altitude/height**

| Elevation/altitude/height  | Chart resolution                    | Integrity Classification        |
|--|-------------------------------------|---------------------------------|
| Aerodrome/heliport elevation .....   | 1 m or 1 ft                         | $1 \times 10^{-5}$<br>essential |
| WGS-84 geoid undulation at aerodrome/heliport elevation position .....                                     | 1 m or 1 ft                         | $1 \times 10^{-5}$<br>essential |
| Runway or FATO threshold, non-precision approaches .....   | 1 m or 1 ft                         | $1 \times 10^{-5}$<br>essential |
| WGS-84 geoid undulation at runway or FATO threshold, TLOF geometric centre, non-precision approaches ..... | 1 m or 1 ft                         | $1 \times 10^{-5}$<br>essential |
| Runway or FATO threshold, precision approaches .....   | 0.5 m or 1 ft                       | $1 \times 10^{-6}$<br>critical  |
| WGS-84 geoid undulation at runway or FATO threshold, TLOF geometric centre, precision approaches .....     | 0.5 m or 1 ft                       | $1 \times 10^{-6}$<br>critical  |
| Threshold crossing height, precision approaches .....  | 0.5 m or 1 ft                       | $1 \times 10^{-6}$<br>critical  |
| Obstacle clearance altitude/height (OCA/H) .....   | as specified in PANS-OPS (Doc 8168) | $1 \times 10^{-5}$<br>essential |
| Obstacles in Area 1 (the entire State territory) .....   | 3 m (10 ft)                         | $1 \times 10^{-3}$<br>routine   |
| Obstacles in Area 2 .....  | 1 m or 1 ft                         | $1 \times 10^{-5}$<br>essential |
| Obstacles in Area 3 .....  | 1 m or 1 ft                         | $1 \times 10^{-5}$<br>essential |
| Distance measuring equipment (DME) .....   | 30 m (100 ft)                       | $1 \times 10^{-5}$<br>essential |
| Instrument approach procedures altitude  | as specified in PANS-OPS (Doc 8168) | $1 \times 10^{-5}$<br>essential |
| Minimum altitudes .....  | 50 m or 100 ft                      | $1 \times 10^{-3}$<br>routine   |

*Note.— See Annex 15, Appendix 8, for graphical illustrations of obstacle data collection surfaces and criteria used to identify obstacles in the defined areas.*

**APP 6-2**

**-END-**