

PART 177

Aeronautical Charts Service

This new part of Jordanian Civil Aviation Regulations is hereby Adopted under the authority and provisions of the Civil Aviation Law No. (41) 2007



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<u>Section No.</u>	<u>Contents</u>	<u>Page No.</u>
	<u>Subject</u>	
	Subpart -A	
	General	
177.1	Applicability	
177.3	Definitions	
	Subpart – B	
	Standards and Requirements	
177.05	Requirement for approval	
177.7	Standards for Aeronautical Chart production.	
177.9	Availability	
177.11-177.19	Reserved	
	Subpart - C	
	Application for Aeronautical Charts services Provision	
177.21	Applications for an approval.	
177.23	Grant of an approval	
177.25	Compliance Demonstration.	
177.27	Inspection and auditing.	
177.29	The privileges of an approval.	
177.31	Duration of an approval.	
177.33	Renewal of approval	
177.35	Limitations on approval holder	
177.35-177.39	Reserved	
	Subpart -D	
	Approval Requirements	
177.41	Organizational structure and management	
177.43	Staffing and personnel requirements	
177.45	Periodic inspection and testing	
177.47	Input and output provisions	
177.49	Reference Documents.	
177.51	Reports and records.	
177.53	Continued compliance	
177.55-59	Reserved	

Subpart- E Operating Requirements

177.61 [Charts provisions](#)
177.63-177.69 Reserved

Subpart -F General Requirements

177.71 [Internal quality assurance.](#)
177.73 [Security programme](#)
177.75 [Quality of Services.](#)
177.77-177.79 Reserved

Subpart -G Approvals issues

177. 81 [Approvals.](#)
177. 83 [Approval comes into effect.](#)
177.85 [CARC power to vary condition of an approval.](#)
177.87-177.89 Reserved

Subpart- H Suspension And Cancellation Of Approvals

177.91 [Suspension, cancellation and revoke of the approval.](#)
177.93 [Notice to an approved service provider to show cause.](#)
177.95 [Grounds for cancellation of approval.](#)
177.97 [Cancellation at request of service provider.](#)
177.99 Reserved

Subpart- I General Specifications

177.101 [Operational requirements for charts](#)
177.103 [Titles](#)
177.105 [Miscellaneous information](#)
177.107 [Symbols](#)
177.109 [Units of measurement](#)
177.111 [Scale and projection](#)
177.113 [Date of validity of aeronautical information](#)

- 177.115 [Spelling of geographical names](#)
- 177.117 [Abbreviations](#)
- 177.119 [Political boundaries](#)
- 177.121 [Colours](#)
- 177.123 [Relief](#)
- 177.125 [Prohibited, restricted and danger areas](#)
- 177.127 [Air traffic services airspaces](#)
- 177.129 [Magnetic variation](#)
- 177.131 [Aeronautical data](#)
- 177.133 [Common reference systems](#)
- 177.135-177.139 Reserved

Subpart- J
Aerodrome Obstacle Chart Type A (Operating Limitations)

- 177.141 [Function](#)
- 177.143 [Availability](#)
- 177.145 [Units of measurement](#)
- 177.147 [Coverage and scale](#)
- 177.149 [Format](#)
- 177.151 [Identification](#)
- 177.153 [Magnetic variation](#)
- 177.155 [Aeronautical data](#)
- 177.157 [Accuracy](#)
- 177.159 Reserved

Subpart -K
Aerodrome Obstacle Chart TYPE B

- 177.161 [Function](#)
- 177.163 [Availability](#)
- 177.165 [Units of measurement](#)
- 177.167 [Coverage and scale](#)
- 177.169 [Format](#)
- 177.171 [Identification](#)
- 177.173 [Culture and topography](#)
- 177.175 [Magnetic variation](#)
- 177.177 [Aeronautical data](#)
- 177.179 [Accuracy](#)

Subpart -L
Aerodrome Terrain And Obstacle Chart –ICAO (Electronic)

177.181	Function
177.183	Availability
177.185	Identification
177.187	Chart coverage
177.189	Chart content
177.191	Accuracy and resolution
177.193	Electronic functionality
177.195	Chart data product specifications
177.197-177.199	Reserved

Subpart -M
Precision Approach Terrain Chart

177.201	Function
177.203	Availability
177.205	Scale
177.207	Identification
177.209	Plan and profile information

Subpart- N
Enroute Chart

177.211	Function
177.213	Availability
177.215	Coverage and scale
177.217	Projection
177.219	Identification
177.221	Culture and topography
177.223	Magnetic variation
177.225	Bearings, tracks and radials
177.227	Aeronautical data
177.229	Reserved

Subpart -O
Area Chart

177.231	Function
177.233	Availability
177.235	Coverage and scale

- 117.237 [Projection](#)

- 177.239 [Identification](#)
- 177.241 [Culture and topography](#)
- 177.243 [Magnetic variation](#)
- 177.245 [Bearings, tracks and radials](#)
- 177.247 [Aeronautical data](#)
- 177.249 Reserved

Subpart- P
Standard Departure Chart –Instrument (SID)

- 177.251 [Function](#)
- 177.253 [Availability](#)
- 177.255 [Coverage and scale](#)
- 177.257 [Projection](#)
- 177.259 [Identification](#)
- 177.261 [Culture and topography](#)
- 177.263 [Magnetic variation](#)
- 177.265 [Bearings, tracks and radials](#)
- 177.267 [Aeronautical data](#)
- 177.269 Reserved

Subpart- Q
Standard Arrival Chart –Instrument (STAR)

- 177.271 [Function](#)
- 177.273 [Availability](#)
- 177.275 [Coverage and scale](#)
- 177.277 [Projection](#)
- 177.279 [Identification](#)
- 177.281 [Culture and topography](#)
- 177.283 [Magnetic variation](#)
- 177.285 [Bearings, tracks and radials](#)
- 177.287 [Aeronautical data](#)
- 177.289 Reserved

Subpart -R
Instrument Approach Chart

- 177.291 [Function](#)
- 177.293 [Availability](#)
- 177.295 [Coverage and scale](#)

- 177.297 [Format](#)
- 177.299 [Projection](#)
- 177.301 [Identification](#)
- 177.303 [Culture and topography](#)
- 177.305 [Magnetic variation](#)
- 177.307 [Bearings, tracks and radials](#)
- 177.309 [Aeronautical data](#)

**Subpart- S
Visual Approach Chart**

- 177.311 [Function](#)
- 177.313 [Availability](#)
- 177.315 [Scale](#)
- 177.317 [Format](#)
- 177.319 [Projection](#)
- 177.321 [Identification](#)
- 177.323 [Culture and topography](#)
- 177.325 [Magnetic variation](#)
- 177.327 [Bearings, tracks and radials](#)
- 177.329 [Aeronautical data](#)

**Subpart -T
Aerodrome/Heliport Chart**

- 177.331 [Function](#)
- 177.333 [Availability](#)
- 177.335 [Coverage and scale](#)
- 177.337 [Identification](#)
- 177.339 [Magnetic variation](#)
- 177.341 [Aerodrome/heliport data](#)
- 177.343-177.349 Reserved

**Subpart- U
Aerodrome Ground Movement Chart**

- 177.351 [Function](#)
- 177.353 [Availability](#)
- 177.355 [Coverage and scale](#)
- 177.357 [Identification](#)
- 177.359 [Magnetic variation](#)

177.361 [Aerodrome data](#)

177.363-177.369 Reserved

**Subpart -V
Aircraft Parking/Docking Chart**

177.371 [Function](#)
177.373 [Availability](#)
177.375 [Coverage and scale](#)
177.377 [Identification](#)
177.379 [Magnetic variation](#)
177.381 [Aerodrome data](#)
177.383-177389 Reserved

**Subpart -W
World Aeronautical Chart 1 : 1 000 000**

177.391 [Function](#)
177.393 [Availability](#)
177.395 [Scales](#)
177.397 [Format](#)
177.399 [Projection](#)
177.401 [Identification](#)
177.403 [Culture and topography](#)
177.405 [Magnetic variation](#)
177.407 [Aeronautical data](#)
177.409 Reserved

**Subpart X
Aeronautical Chart 1 : 500 000**

177.411 [Function](#)
177.413 [Availability](#)
177.415 [Scales](#)
177.417 [Format](#)
177.419 [Projection](#)
177.421 [Identification](#)
177.423 [Culture and topography](#)
177.425 [Magnetic variation](#)
177.427 [Aeronautical data](#)
177.429 Reserved

Subpart -Y
Aeronautical Navigation Chart –SMALL SCALE

177.431	Function
177.433	Availability
177.435	Coverage and scale
177.437	Format
177.439	Projection
177.441	Culture and topography
177.443	Magnetic variation
177.445	Aeronautical data
177.447-177.449	Reserved

Subpart- Z
Plotting Chart

177.551	Function
177.553	Availability
177.555	Coverage and scale
177.457	Format
177.459	Projection
177.461	Identification
177.463	Culture and topography
177.465	Magnetic variation
177.467	Aeronautical data
177.469	Reserved.

Subpart -AA
Electronic Aeronautical Chart Display

177.471	Function
177.473	Information available for display
177.475	Display requirements
177.477	Provision and updating of data
177.479	Performance tests, malfunction alarms and indications
177.481	Back-up arrangements
177.483-177.489	Reserved

Subpart -BB
ATC Surveillance Minimum Altitude Chart

177.491	Function
177.493	Availability
177.495	Coverage and scale

177.497	<u>Projection</u>
177.499	<u>Identification</u>
177.501	<u>Culture and topography</u>
177.503	<u>Magnetic variation</u>
177.505	<u>Bearings, tracks and radials</u>
177.507	<u>Aeronautical data</u>

APPENDICIES

APPENDIX-A	<u>Marginal Note Layout</u>
APPENDIX-B	<u>Coloure Guide</u>
APPENDIX-C	<u>Hypsometrictint Guide</u>
APPENDIX-D	<u>Aeronautical Data Quality Requirements</u>
APPENDIX-E	<u>ATS Airspace Classes — Services Provided and Flight Requirements</u>

**Subpart A
General**

177.1 Applicability.

(a) This Part sets out:

(1) The rules and standards governing the operation of organizations providing Aeronautical Charts production used for air navigation within The Hashemite Kingdom of Jordan as designated by the Authority; and

(2) The specifications requirements governing the production of Aeronautical Charts for aviation transport including operators, flight crew members, air traffic services units, search and rescue services units, airport managements and others concerned with those charts necessary for the performance of their respective functions in Amman FIR.

(3) The requirements for a person to be approved as Aeronautical Charts services provider; and

(b) However, this Part does not apply to:

(1) A person who is producing Aeronautical Charts in the course of his duties for the Jordan Armed forces; or

(2) Any Aeronautical Charts services provided by the Jordan Armed forces.

177.3 Definitions

When the following terms are used in this Part they have the following meanings:

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

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

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

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

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

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

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

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

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

Air taxiway: A defined path on the surface established for the air taxiing of helicopters.

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

Air transit route: A defined path on the surface established for the air transiting of helicopters.

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

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

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

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

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

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

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

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

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

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

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

Canopy: Bare Earth supplemented by vegetation height.

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

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

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

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

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

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

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

Data quality: A degree or level of confidence that the data provided meet the requirements of the data user in terms of accuracy, resolution and integrity.

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

Data set series: Collection of data sets sharing the same product specification (ISO 19115*).

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

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

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

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

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

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

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

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

Final approach: That part of an instrument approach procedure which commences at the specified final approach fix or point, or where such a fix or point is not specified, a) at the end of the last procedure turn, base turn or inbound turn of a racetrack procedure, if specified; or b) at the point of interception of the last track specified in the approach procedure; and ends at a point in the vicinity of an aerodrome from which:

- 1) a landing can be made; or
- 2) a missed approach procedure is initiated.

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

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

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

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

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

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.

The terms “height” and “altitude”, used above, indicate altimetric rather than geometric heights and altitudes.

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

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

system/frame.

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

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

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

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

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

Helicopter stand: An aircraft stand which provides for parking a helicopter and, where air taxiing operations are contemplated, the helicopter touchdown and lift-off.

Heliport: An aerodrome or a defined area on a structure intended to be used wholly or in part for the arrival, departure and surface movement of helicopters.

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

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

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

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

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

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

Instrument approach procedure: A series of predetermined maneuvers by reference to flight instruments with specified protection from obstacles from the initial approach fix, or where applicable, from the beginning of a defined arrival route to a point from which a landing can be a position at which holding or enroute obstacle clearance criteria apply.

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

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

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

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

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

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

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

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

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

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

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

Metadata: Data about data (ISO 19115*).

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

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

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 centered on a radio aid to navigation.

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

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

Movement area: That part of an aerodrome to be used for the take-off, landing and taxiing of aircraft, consisting /of the maneuvering area and the apron(s).

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.

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.

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 frangible mounted one required for air navigation purposes.

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

Point light: A luminous signal appearing without perceptible length.

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

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

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

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

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

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

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

Required navigation performance (RNP): A statement of the navigation performance necessary for operation within a defined airspace.

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

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

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

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:

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

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

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

- a) to reduce the risk of damage to aircraft running off a runway; and
- b) to protect aircraft flying over it during take-off or landing operations:

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

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

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

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

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

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

- a) Aircraft stand taxilane. A portion of an apron designated as a taxiway and intended to provide access to aircraft stands only:
- b) Apron taxiway. A portion of a taxiway system located on an apron and intended to provide a through taxi route across the apron:
- c) Rapid exit taxiway. A taxiway connected to a runway at an acute angle and designed to allow landing aeroplanes to turn off at higher speeds than are achieved on other exit taxiways thereby minimizing runway occupancy times:

Terminal arrival altitude (TAA): The lowest altitude that will provide a minimum clearance of 300 m (1 000 ft) above all objects located in an arc of a circle defined by a 46-km (25 NM) radius centered on the initial approach fix (IAF), or where there is no IAF on the intermediate approach fix (IF), delimited by straight lines joining the extremity of the arc to the IF. The combined TAAs associated with an approach procedure shall account for an area of 360 degrees around the IF.

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.

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

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

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

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

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

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

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

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.

Subpart – B
Standards and Requirements

177.05 Requirement for approval

(a) No person shall provide an Aeronautical Charts production services except under the authority of, and in accordance with the provisions of an Aeronautical Charts services approval issued under this Part.

(b)The Chief Commissioner / CEO may grant an approval for an Aeronautical Charts production services authorizing the provision of Aeronautical Charts services intended for interacting with the Jordan air navigation system.

177.07 Standards for Aeronautical Chart production.

(a)For the purpose of this Part, the total flight is divided into the following phases:

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

(b)The provisions of Aeronautical Charts shall be according to the standards, procedures and the rules set out in:

- (1) Annex 15 "Aeronautical Information Services" to the Chicago Convention
- (2) ICAO Doc. 8126.
- (3) Annex 4 to the Chicago Convention “Aeronautical Charts.
- (4) ICAO DOC .8697

(c)All charts coming within the scope of this part shall conform to the Standards relevant to the particular chart.

(d) The specifications in this part shall be applicable to all ICAO aeronautical charts unless otherwise stated in the specifications of the chart concerned

177.9 Availability

(a) CARC shall on request by another Chicago Convention Contracting State provide all information relating to The Hashemite Kingdom of Jordan that is necessary to enable the Standards contained in Annex-4 to be met.

(b) CARC shall, when so specified, ensure the availability of charts entirely contained within the territory of a Jordan, and the territory having jurisdiction over as per regional agreements.

(c) Charts or single sheet of a chart series entirely contained within The Hashemite Kingdom of Jordan territory shall be produced by CARC or an approved entity in accordance with this Part. For chart or single sheet of a chart series, which includes the territory of another Contracting State(s), CARC the State having jurisdiction over the territory so included shall determine the manner in which the chart or sheet will be made available based on regional air navigation agreements and to any programme of allocation established by the ICAO Council.

(d) CARC shall ensure that the information provided and the aeronautical charts made available are adequate and accurate and that they are maintained up to date by an adequate revision service.

177.11-177.19 Reserved.

Subpart - C
Application for Aeronautical Charts services Provision

177.21 Applications for an approval.

(a) An application for a Aeronautical Charts production services approval, shall be submitted in writing to the Chief Commissioner / CEO and shall include:

- (1) The applicant's name and address; and
- (2) A copy of the applicant's operations manual, prepared as if the applicant were a service provider; and
- (3) A statement showing each kind of Aeronautical Charts services for which the application is being made; and
- (4) A description of the facility and evidence that the equipment meets the performance requirements.
- (5) A statement of intention to meet the requirements of this subpart.
- (6) A organization structure.
- (7) If an application is made to provide an Aeronautical Charts services that would not comply with 1 or more of the standards set out in this part; the application shall also describe the reasons for and consequences of the non-compliance.

(b) An applicant shall produce the detailed procedures, regarding:

- (1) The training to provide accurate Aeronautical Charts services through maintaining competence of personnel; and
- (2) The control of documentation; and
- (3) Periodic inspections and testing of facilities; and
- (4) The control, calibration, and maintenance of inspection, measuring, and test equipment; and
- (5) The identification, collection, indexing, storage, maintenance, and disposal of records; and

(c) The Chief Commissioner/CEO may not grant Aeronautical Charts services approval unless the Chief Commissioner/CEO is satisfied that the applicant's description complies with this Part.

177.23 Grant of an approval

(a) Based on CARC inspections and evaluations of the facility, the applicant shall be advised of the results and of any required changes in the facility or the proposed operational and organizational manuals. The applicant shall then correct the deficiencies, if any, and operate the facility for an in-service evaluation by CARC.

(b) CARC shall verify the Aeronautical Charts services provider's compliance with the general requirements before issuing an approval to that provider.

(c) The Chief commissioner / CEO shall issue Aeronautical Charts services approval to an applicant if the Chief Commissioner / CEO is satisfied that:

- (1) The applicant meets the requirements of Subpart B; and
- (2) The applicant senior persons required are fit and competent persons; and
- (3) The granting of the approval is not contrary to the interests of aviation safety.

(d) An applicant for Aeronautical Charts services approval, shall be able to demonstrate that its working methods and operating procedures are according to the standards and applicable system characteristics prescribed in this Part as far as they are relevant to the provision of Aeronautical Charts services in the airspace of concerned.

(e) An approved Aeronautical Charts services Providers operating Aeronautical Charts production used for air navigation service shall have in operations an acceptable Internal Quality Assurance within 2 years of the approval.

177.25 Compliance Demonstration.

(a) The Aeronautical Charts Service Providers shall:

- (1) At the request of CARC, provide all the relevant evidence to demonstrate compliance with the applicable general requirements.

(2) Notify CARC of planned changes to its provision of services which may affect its compliance with the general requirements or with the conditions attached to the approval.

(3) Where the provider does not comply any longer with the applicable general requirements or with the conditions attached to the approval, CARC shall take a decision within a time period not exceeding one month. By this decision, CARC shall:

(i) Require the Aeronautical Charts Service Provider to take corrective action.

(ii) The decision, immediately be notified to the relevant Aeronautical Charts Service Providers.

(iii) Check that the corrective action has been implemented before notifying its approval to the relevant Aeronautical Charts Service Providers.

(iv) Take appropriate enforcement measures where CARC considers that corrective action has not been properly implemented within the agreed timetable.

(4) Meanwhile consider the need to ensure the continuity of services.

177.27 Inspection and auditing.

(a) An approved Aeronautical Charts Service provider shall facilitate inspections and surveys by CARC or by recognized entity acting on CARC behalf, including site visits and visits without prior notice. The authorized persons shall be empowered to:

(1) Examine the relevant records, data, procedures and any other material relevant to the provision of Aeronautical Charts Service;

(2) Take copies of or extracts from such records, data, procedures and other material;

(3) Ask for an oral explanation on site;

(4) Enter relevant facilities related to the Aeronautical Charts Service provisions.

(b) To this end, CARC shall establish and update annually an indicative inspection programme and based on an assessment of the risks associated with the different operations constituting the services provided, it shall consult the Aeronautical Charts Service provider concerned before establishing such a programme.

177.29 The privileges of an approval.

(a) The services of charts production shall be provided in accordance with the services and their types specified in the granted approval and the service provider's operations manual.

(b) The approved Aeronautical Charts Service provider may provide the Aeronautical Charts Service listed on the approval provided that each Aeronautical Chart and information supplied for each Chart, and the location and airspace covered by each Aeronautical Charts service is listed in the approval.

(d) The approval shall specify which Aeronautical Charts Service specified in subpart E, the holder shall be authorized to provide:

177.31 Duration of an approval.

(a) Aeronautical Charts Service approval:

- (1) May be granted or renewed for a period of up to 3 years.
- (2) Remains in force until it expires, or is suspended or revoked.

(b) The holder of Aeronautical Charts Service approval that:

- (1) Expires or is revoked shall surrender the approval to the Chief Commissioner / CEO immediately.
- (2) Is suspended shall produce the approval to the Chief Commissioner/CEO for appropriate endorsement immediately.

177.33 Renewal of approval

(a) The renewal of Aeronautical Charts Service approval application shall be made:

- (1) In writing using the appropriate CARC form.

(2) Before the application renewal date specified on the approval or, if no such date is specified, not less than 30 days before the approval expires.

177.35 Limitations on approval holder .

(a) The holder of an Aeronautical Charts Service approval shall not provide Aeronautical Charts information where:

- (1) The Aeronautical Charting input information required to provide that Aeronautical Charts Service information is not available; or
- (2) The operational performance of the Aeronautical Charting office or facility providing or producing that Aeronautical Charting information does not meet the applicable requirements; or
- (3) Any integrity monitoring system associated with that Aeronautical Charting information is not fully functional; or
- (4) Any required verification, inspection, test or calibration relating to that Aeronautical Charting information has not been completed; or
- (5) There is any cause whatsoever to suspect the integrity of that Aeronautical Charting information.

177.35-177.39 Reserved

Subpart -D
Approval Requirements

177.41 Organizational structure and management.

(a) An applicant for an Aeronautical Charts service provision approval shall provide the Chief Commissioner / CEO with a description of the applicant's organization containing:

(1) A statement signed by the applicant chief executive, on behalf of the applicant's organization:

(i) Defining the organization and demonstrates its means and methods for ensuring ongoing compliance with this Part; and

(ii) Confirming that all associated manuals, operating, and maintenance instructions related to Aeronautical charts provisions, shall be complied with by the organization's personnel at all times; and

(2) The authority, duties and responsibilities of the nominated post holders, in particular personnel in charge of quality, security and human resources related functions;

(3) An organization chart showing the relationship and reporting lines between different parts and lines of responsibility of the senior persons and processes of the organization covering each aeronautical related service listed in the approval; and

(4) A summary of the organization's staffing structure; and

(b) Regarding the organizational management, an applicant shall produce a comprehensive plan which shall:

(2) Contain appropriate performance objectives in terms of quality.

(3) Detail of the security programme; and

(4) Provide the detailed procedures regarding internal quality assurance and level of service; and

177.43 Staffing and personnel requirements

(a) An approved aeronautical charts service provider shall be able to provide services in a safe, efficient, continuous and sustainable manner maintaining adequate technical and operational capacity and expertise employing, contracting, or otherwise engaging:

(1) A senior person authorized within the applicant's organization to ensure the performance of all activities undertaken by the organization to ensure the organization compliance with the requirements of this Part; and

(2) Sufficient personnel to supervise, operate and maintain the facility to ensure the safety of the facility and its operations.

(b) An aeronautical charts service provider shall:

(1) Establish policies for the recruitment and training of personnel. and

(2) Ensure that each personnel are competent and holds the qualifications required.

(3) Employ appropriately skilled and trained personnel to ensure efficient provision of its services.

(c) An applicant for an Aeronautical Charts Service provider approval shall establish procedures to:

(1) Assess the competence of the authorized personnel; and

(2) Maintain the competence of the authorized personnel; and

177.45 Periodic inspection and testing

(a) An applicant for an Aeronautical Charts Service approval shall establish procedures for the periodic inspection and testing of the Aeronautical Charts Service facility to verify the facility adherence with the applicable requirements and performance specifications. The established procedures shall include:

(1) The periodic inspection, testing and calibration of the facility.

(2) The routine verification of aeronautical charting information obtained and provided by the applicant; and

(3) The periodic inspection of the aeronautical charting office; and

(b) An applicant for an Aeronautical Charts Service provisions approval shall establish a programme of periodic inspections and periodic tests for the Aeronautical Charts Service facility; and

(c) The procedures shall ensure that the systems required for the routine verification of aeronautical charting information have the capability and integrity necessary for verifying the aeronautical information.

177.47 Input and output provisions

(a) An applicant for an Aeronautical Charts Service provision approval shall establish procedures to:

(1) Obtain input aeronautical charting information appropriate for the aeronautical charting provisions being provided and verify its integrity.

(2) Ensure that the Aeronautical information supplied complies with the standards and formats defined under this Part.

(3) Ensure that aeronautical charts production is provided in accordance with standards and requirements of this Part and verification of its integrity.

177. 49 Reference Documents.

(a) An applicant for an Aeronautical Charts Service approval shall maintain copies of operational manual including relevant technical standards, practices, instructions, legislation and any other documentation that are necessary for the provision of services specified in the applicant's approval; an Aeronautical Charts Service provider shall, at all times, maintain the following reference materials:

(1) Annex 15 "Aeronautical Information Services" to the Chicago Convention.

(2) Annex 4 to the Chicago Convention "Aeronautical Charts";

(3) ICAO Doc. 8126 (Aeronautical Information Services Manual);

(4) Jordanian amended AIP;

(5) JCAR related to the performance of its functions, Part 175 Aeronautical Information Services, Part 172 Air Traffic Services;

(6) ICAO Aeronautical Chart Manual (Doc 8697).

(b) An Aeronautical Charts Service provider shall ensure that the manuals contain instructions and information required by the personnel to perform their duties;

(c) The approved Aeronautical Charts Service provider shall:

(1) Maintain the documentation up to date including all amendments bearing the date of the development or revision and in a readily accessible form.

(2) Ensure that all the amendments are approved by CARC and incorporated in all copies of the manuals; and

(3) Ensure the authorization of revision and changes of all documentation by an appropriate senior person; and

(4) The immediate removal of all obsolete documentation promptly from all points of issue or use; and

(5) Ensure that copies of the amendments are given to concerned employees and concerned parties.

177.51 Reports and records.

(a) An applicant for an Aeronautical Charts Service approval shall establish procedures to identify, collect, index, store, maintain, and dispose of the records that are necessary for the Aeronautical Charts Service provisions as listed in the approval.

(b) The procedures shall ensure:

(1) That the Aeronautical Charts Service office provides a history of the periodic inspections and tests of the Aeronautical Charts Service facility, traceable to the person or persons responsible for each of the recorded activities; and

(2) That there is a record of the input an aeronautical charting information and all output aeronautical charting information related to charting; and

(3) That the records specified are retained for a period of at least 3 years or for such longer period as may be required by the Chief Commissioner/ CEO; and

(4) The providing of a record of each occurrence of erroneous of aeronautical charting information reported and detected under the procedures required by 177.27. The record shall detail the nature of the erroneous an aeronautical charting information and the findings of the investigation and the follow-up corrective actions; and

(5) That there is a record of each internal audit required and performed under 177.71, and of each management review required under 177.71; and

(6) That there is a record of each personnel experience, qualifications, training, competence assessments, and current authorizations, for each person who is authorized to provide aeronautical charting service,

(c) All Aeronautical Charts Service records related to CARC Aeronautical Charts services shall be retained for a period of at least three years unless a longer period is required for retrieval if needed for an aviation safety investigation:

(1) By the Chief Commissioner/CEO; or

(2) To establish a performance history for the an Aeronautical Charts Service facility.

(d) On a case-by-case basis, the Chief Commissioner/CEO may accept any report in a format other than CARC form required by this part if satisfied that the report contains all the information required by CARC and can be processed by CARC as conveniently as CARC requires.

177.53 Continued compliance

The holder of an Aeronautical Charts Service approval shall:

(1) Continue to meet the standards and comply with the requirements prescribed for approval under this Part; and

(2) Comply with all procedures and instructions referred to in its description; and

(3) Notify by writing the Chief Commissioner/CEO of any change of address for service, telephone number, or facsimile number within 28 days of the change.

177.55-59 Reserved

Subpart- E
Operating Requirements

177.61 Charts provisions.

(a)The holder of the Aeronautical charts service approval for the Aeronautical charts production shall comply with requirements of subpart I while providing:

- (1)The Aerodrome Obstacle Chart Type A. (Operating Limitations) in accordance with Subpart J.
- (2)The Aerodrome Obstacle Chart Type B in accordance with Subpart K.
- (3)The Aerodrome Terrain and Obstacle Chart (Electronic) in accordance with Subpart L.
- (4)The Precision Approach Terrain Chart in accordance with Subpart M.
- (5)The Enroute Chart in accordance with Subpart N; and
- (6)The Area Chart in accordance with Subpart O; and
- (7)The Standard Departure Chart- Instrument (SID) in accordance with Subpart P; and
- (8)The Standard Arrival Chart- Instrument (STAR) in accordance with Subpart Q; and
- (9)The Instrument Approach Chart in accordance with Subpart R; and
- (10)The Visual Approach Chart in accordance with Subpart S; and
- (11)The Aerodrome/Heliport Chart in accordance with Subpart T; and
- (12)The Aerodrome Ground Movement Chart in accordance with Subpart U; and
- (13)The Aircraft Parking/Docking Chart in accordance with Subpart V; and
- (14)The World Aeronautical Chart 1:1 000 000 in accordance with Subpart W; and

(15)The Aeronautical Chart 1:500 000 in accordance with Subpart X; and

(16)The Aeronautical Navigation Chart Small Scale in accordance with Subpart Z; and

(17)The 19. Plotting Chart in accordance with Subpart Z; and

(18)The Electronic Aeronautical Chart Display in accordance with Subpart A1; and

(19)The ATC Surveillance Minimum Altitude Chart in accordance with Subpart A2; and

177.63-17769 Reserved

Subpart -F
General Requirements

177.71 Internal quality assurance.

(a) An approved Aeronautical Charts Service provider shall have in place an Internal quality assurance system covering all approved Aeronautical Charts services to ensure compliance with, and the adequacy of, the procedures required under this Part, quality system established shall be in conformity with the International Organization for Standardization (ISO) 9000 series of quality assurance standards and should be certified by an approved organization and shall:

- (1) Define the quality policy in such a way as to meet the needs of users as closely as possible;
- (2) Set up a quality assurance programme that contains procedures designed to verify that all operations are being conducted in accordance with applicable requirements, standards and procedures;
- (3) Include procedures to ensure monitoring of quality indicators, including equipment availabilities, malfunctions, faults, and personnel and customer feedback, to identify existing problems and potential causes of problems within the internal quality assurance system; and
- (4) Provide evidence of the functioning of the quality system by means of manuals and monitoring documents;
- (5) Include a procedure for corrective and preventive action to ensure existing problems and potential causes of problems that have been identified within the internal quality assurance system are corrected and remedied; and
- (6) Establish an internal audit programme for the applicant's organization to ensure conformity with the procedures in the applicant's description and to achieve the goals set in the safety and quality policy which shall; and
 - (i) Specify the frequency and location of the audits taking into account the nature of the activity to be audited; and
 - (ii) Measure the effectiveness of any preventative or corrective action taken by the personnel responsible for the activity being audited since the last audit; and
 - (iii) Require preventative or corrective action to be taken by the personnel responsible for the activity being audited if problems are found by the audit; and
- (7) Revise the quality system in place and take remedial actions, as appropriate.

(8) Review the procedures using the statistical analysis if appropriate, to ensure the continuing suitability and effectiveness of the internal quality assurance system in satisfying the requirements of this Part.

(d) The Aeronautical Charts Service provider shall accept the disclosure of the documentation related to the approval to CARC upon the latter's request.

177.73 Security programme

(a) An applicant for an Aeronautical Charts Service approval shall establish a security programme for the applicant's facility approved by CARC.

(b) The security programme required under paragraph (a) shall:

(1) Specify the physical security requirements, practices, and procedures to be followed for the purposes of minimizing the risk of destruction of, damage to, or interference with the operation of the Aeronautical Charts Service facility operated under the authority of the said approval, if such destruction, damage, or interference could affect the charting services and endanger the safe operation of aircraft:

(2) Ensure that the Aeronautical Charts Service facility is subject to positive access control at all times to prevent unauthorized entry; and

(3) Restrict the access to the operational data only to those authorized.

(4) Include procedures to notify, investigate and report security incidents to the Chief Commissioner/CEO.

(c) The Aeronautical Charts Service provider shall ensure the security clearance of its personnel, if appropriate, through coordination with the relevant civil and military public security authorities to ensure the security of its facilities, personnel and data.

177.75 Quality of Services.

An approved Aeronautical Charts Service provider shall provide its services in an open and transparent manner publishing the conditions of access to its services and establishing a formal consultation process with CARC of its services on a regular basis, either individually or collectively, and at least once a year.

177.77-177.79 Reserved

Subpart -G
Approvals Issues

177. 81 Approvals.

(a) The Chief Commissioner / CEO shall issue Aeronautical Charts services approval to an applicant once CARC is satisfied that the applicant shall meet the requirements of this Part setting out:

- (1)What the approval is; and
- (2) Any conditions applicable to it; and
- (3)When it came into effect, and when it will end (if not sooner cancelled); and
- (4)Any other information CARC thinks should be included.

(b) CARC may issue a replacement approval if anything set out on an approval is no longer correct.

(c) CARC may approve an application subject to 1 or more conditions, including a condition that restricts the kind of Aeronautical Charts Service to be provided; or

177. 83 Approval comes into effect.

An approval comes into effect on the date of the notice of the decision.

177.85 CARC power to vary condition of an approval.

(a) CARC may impose a condition on, or vary a condition of an approval in the interests of the aviation safety.

(b)CARC shall give the service provider written notice of the imposition or variation, and shall specify a reasonable period within which the approval holder may make a submission in relation to the imposition or implement variation.

(c)Unless CARC withdraws the condition or variation, the condition or variation has effect at:

- (1)The end of that period; or
- (2)A later time stated for the purpose in the notice.

177.87-177.89 reserved

Subpart- H
Suspension And Cancellation of Approvals

177.91 Suspension, cancellation and revoke of the approval.

(a) CARC may:

(1) State, in writing, that an approval is suspended if CARC reasonably considers that not suspending the approval would be likely to have an adverse effect on the aviation safety.

(2) Revoke the suspension at any time.

(b) If CARC states that the approval is suspended:

(1) And if the approval is already suspended when the statement notice is given to the service provider - the approval continues to be suspended until CARC revokes the suspension, or the suspension lapses under paragraph (d); or

(2) The approval is suspended from when the statement notice is given to the holder.

(c) If CARC has not cancelled the approval within 3 months after the day the statement notice is given to the service provider, the suspension lapses at the end of that period.

177.93 Notice to an approved service provider to show cause.

(a) The CARC may give an approval holder a notice in writing, if there are reasonable grounds for believing that there are facts or circumstances that amount to grounds for the cancellation of the approval.

(b) A show cause notice shall:

(1) Inform the approval holder of the facts and circumstances that justify the cancellation of the approval; and

(2) Invite the holder to show in writing, within a reasonable period stated in the notice, why the approval should not be cancelled.

(c) For paragraph (b) (2), the period must not be less than 2 weeks.

177.95 Grounds for cancellation of approval.

It is grounds for the cancellation of an approval if the holder has:

- (a) Breached a condition of the approval; or
- (b) Contravened the Act or these Regulations; or
- (c) Otherwise been guilty of conduct that renders the holder's continued holding of the approval likely to have an adverse effect on the safety of air navigation.

177.97 Cancellation at request of service provider.

(a) Despite anything else in this Part, CARC shall cancel a service provider's approval if asked to do so, in writing by the provider.

(b) The cancellation takes effect when the request is given to CARC, or if a later day is stated in the request, on the later day.

177.99 reserved

Subpart- I
General Specifications

The standards contained in this Subpart are applicable to all Aeronautical Charts unless otherwise stated in the specifications of the Chart concerned.

177.101 Operational requirements for charts

(a) Each type of chart shall provide information:

(1) Relevant to the function of the chart and its design shall observe Human Factors principles which facilitate its optimum use.

(2) Accurate, free from distortion and clutter, unambiguous, and be readable under all normal operating conditions appropriate to the phase of flight, to ensure the safe and expeditious operation of the aircraft.

(3) In a form which enables the pilot to acquire it in a reasonable time consistent with workload and operating conditions.

(4) Which permits smooth transition from chart to chart as appropriate to the phase of flight.

(5) Can be easily read and interpreted by the pilot in varying conditions of natural and artificial light due to colors or tints and type size used on that the chart.

(b) The charts shall be True North orientation.

(c) The size of the basic sheet of the charts should be (A5) 210 X 148 mm (8.27 X 5.82 in) or any other suitable size keeping legibility factors into account.

177.103 Titles

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

177.105 Miscellaneous information.

(a) The marginal note layout shall be as given in Appendix A, except as otherwise specified for a particular chart.

(b) The following information shall be shown on the face of each chart unless otherwise stated in the specification of the chart concerned:

(1) Designation or title of the chart series;

(2) Name and reference of the sheet;

(3) On each margin an indication of the adjoining sheet (where and when applicable).

(c) A legend to the symbols and abbreviations used shall be provided and 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.

(d) The name and adequate address of the producing approved 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.

177.107 Symbols.

Symbols used shall conform to those shown in annex 4 to the Chicago Convention Appendix B – ICAO Chart Symbols, except that where it is desired to show on an aeronautical chart special features or items of importance to civil aviation for which no ICAO symbol is at present provided, any appropriate symbol may be chosen for this purpose, provided that it does not cause confusion with any existing ICAO chart symbol or impair the legibility of the chart.

(a) The same basic symbol shall be used on all charts on which they appear to represent ground-based navigation aids, intersections and waypoints, regardless of chart purpose.

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

177.109 Units of measurement.

- (a) Distance shall be derived as geodesic distances.
- (b) Distance shall be expressed either kilometers or nautical miles or both, provided that the units are clearly differentiated.
- (c) Altitudes, elevations and heights shall be expressed in either meters or feet or both, provided that the units are clearly differentiated.
- (d) Linear dimensions on aerodromes and short distances shall be expressed in meters.
- (e) The order of resolution of distances, dimensions, elevations and heights shall be that as specified for a particular chart.
- (f) The units of measurement used to express distances, altitudes, elevations and heights shall be clearly stated on the face of each chart.
- (g) Conversion scales (kilometers/nautical miles, meters/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.

177.111 Scale and projection.

- (a) The name, the basic parameters and scale of the projection shall be indicated for large areas charts.
- (b) For charts of small areas, a linear scale only shall be indicated.

177.113 Date of validity of aeronautical information.

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

177.115 Spelling of geographical names.

- (a) The symbols of the Roman alphabet shall be used for all writing.

(b) 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 English language, in respect of the most important example of each type.

(c) Punctuation marks shall not be used in abbreviations within the body of a chart.

177.117 Abbreviations.

Abbreviations shall be used on aeronautical charts whenever they are appropriate.

177.119 Political boundaries.

(a) International boundaries shall be shown, but may be interrupted if data more important to the use of the chart would be obscured.

(b) Where the territory of more than one State appears on a chart, the names identifying those States shall be indicated.

177.121 Colours.

The colour used on charts shall conform to Appendix C – Color Guide.

177.123 Relief.

(a) Relief, where shown, shall be portrayed in a manner that will satisfy the chart users' need for:

- (1) Orientation and identification;
- (2) Safe terrain clearance;
- (3) Clarity of aeronautical information when shown;
- (4) Planning.

(b) Where relief is shown by hypsometric tints, the tints used shall be based on those shown in Appendix D to this Part the Hypsometric Tint Guide.

(c) Where spot elevations are used they shall be shown for selected critical points.

(d) The value of spot elevations of doubtful accuracy shall be followed by the sign \pm .

177.125 Prohibited, restricted and danger areas.

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

177.127 Air traffic services airspaces.

(a) The ATS airspace information shown on a chart, including the class of airspace, the type, name or call sign, the vertical limits and the radio frequency(ies) shall be indicated and the horizontal limits depicted in accordance with Annex 4 To the Chicago Convention Appendix B - ICAO Chart Symbols.

(b) On charts used for visual flight, those parts of the ATS Airspace Classes table in Appendix 7 to this Part applicable to the airspace depicted on the chart shall be on the face or reverse of each chart.

177.129 Magnetic variation.

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

(b) When magnetic variation is shown on a chart, the values shown shall be those for the year nearest to the date of publication that is divisible by 5, i.e. 1980, 1985, etc.

(c) 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 should be quoted.

177.131 Aeronautical data.

(a) The Aeronautical Charts Service provider shall ensure the introduction of a properly organized quality system containing procedures, processes and resources necessary to implement quality management at each function stage.

(b) The execution of such quality management system shall be made demonstrable for each function stage, when required.

(c) The Aeronautical Charts Service provider:

(1) Quality system established procedures shall ensure that the aeronautical data at any moment is traceable to its origin so to allow any data anomalies or errors, detected during the production/ maintenance phases or in the operational use, to be corrected.

(2) Shall ensure that 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 to this Part.

(3) Shall ensure that integrity of aeronautical data is maintained throughout the data process from survey/ origin to the next intended user.

(d) The Aeronautical data integrity requirements shall be based upon:

(1) The potential risk resulting from the corruption of data and

(2) The use to which the data item is put.

(e) Consequently, the following classification and data integrity level shall apply 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:

(1) Critical data, integrity level 1×10^{-8} with a high probability.

(2) Essential data, integrity level 1×10^{-5} with a low probability; and

(3) Routine data, integrity level 1×10^{-3} with a very low probability.

(f) Aeronautical data quality requirements related to the integrity and data classification shall be as provided in Tables 1 to 5 in Appendix 6 to this Part.

(g) Based on the applicable integrity classification, the validation and verification procedures shall:

(1) For routine data: avoid corruption throughout the processing of the data;

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

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

(h) Protection of electronic aeronautical data while stored or in transit shall be totally monitored by the Cyclic Redundancy Check (CRC).

A 32- or 24-bit CRC algorithm shall apply respectively, to achieve protection of the integrity level of critical and essential aeronautical data as classified in section 177.131 Para (c) (3).

(i) A 16-bit CRC algorithm shall apply to achieve protection of the integrity level of routine aeronautical data as classified in section 177.131 Para (c) (3)

177.133 Common reference systems.

(a) World Geodetic System -- 1984 (WGS-84) shall be used as the horizontal (geodetic) reference system; expressing published aeronautical geographical coordinates (latitude and longitude) in terms of the WGS-84 geodetic reference datum.

(b) Geographical coordinates which have been transformed into WGS-84 coordinates but whose accuracy of original field work does not meet the requirements in Annex 11 Air traffic Services, Chapter 2, and Annex 14 Aerodromes, Volumes I and II, Chapter 2 to the Chicago Convention, shall be identified by an asterisk, shall be identified by an asterisk.

(c) 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.

(d) 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.

(e) Geoid undulation (referenced to the WGS-84 ellipsoid) for the specific surveyed ground positions, shall be published as specified for a particular chart.

(f) The order of chart resolution of elevation and geoid undulation shall be that specified for a particular chart series and in accordance with Appendix 6, Table 2 to this Part.

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

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

177.135-177.139 Reserved

Subpart -J
Aerodrome Obstacle Chart Type A (Operating Limitations)

177.141 Function

Aerodrome Obstacle Chart Type A, in combination with the relevant information published in the AIP, shall provide the data necessary to enable an operator to comply with the operating limitations of Annex 6 to the Chicago Convention, Part I, Chapter 5, and Part III, Section II, Chapter 3.

177.143 Availability

(a) Aerodrome Obstacle Chart Type A shall be made available as prescribed in section 177.9 (b) and (c) 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.

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

177.145 Units of measurement

(a) Elevations shall be shown to the nearest half-meter or to the nearest foot.

(b) Linear dimensions shall be shown to the nearest half-meter.

177.147 Coverage and scale

(a) The extent of each plan shall be sufficient to cover all obstacles.

Isolated distant obstacles 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 is given.

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

(c) The vertical scale shall be ten times the horizontal scale.

(d) Horizontal and vertical linear scales showing both meters and feet shall be included in the charts.

177.149 Format.

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

(b) 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.

(c) 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.

(d) The vertical grid should have intervals of 30 m (100 ft) and the horizontal grid should have intervals of 300 m (1000 ft).

(e) The chart shall include:

- (1) A box for recording the operational data specified in section 177.155 (d);
- (2) A box for recording amendments and dates thereof.

177.151 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).

177.153 Magnetic variation.

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

177.155 Aeronautical data

(a) Obstacles

- (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.

(2) obstacles lying wholly below the shadow of other obstacles as defined in (4) below need not be shown.

(3) 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) 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 (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.

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

(b) 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:

(1) 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);

(2) 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;

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

(c) 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 (b) (3) shall be increased to not less than 12.0 km (6.5 NM) and the slope of the plane surface specified in (a) (1) and (a) (2) shall be reduced to 1.0 per cent or less.

(d) Declared distances

(1) The following information for each direction of each runway shall be entered in the space provided:

- (i) take-off run available;
- (ii) accelerate-stop distance available;
- (iii) take-off distance available;
- (iv) landing distance available.

(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”.

(e) The plan view shall show:

- (1) 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;
- (2) The outline of the clearways by a broken line, including the length and identification as such;
- (3) Take-off flight path areas by a dashed line and the centre line by a fine line consisting of short and long dashes;
- (4) When alternative take-off flight path areas not centered on the extension of the runway centre line are shown, notes shall be provided explaining the significance of such areas;
- (5) Obstacles, including:

- (i) the exact location of each obstacle together with a symbol indicative of its type;
- (ii) the elevation and identification of each obstacle;
- (iii) the limits of penetration of obstacles of large extent in a distinctive manner identified in the legend.

(f) The nature of the runway and stopway surfaces should be indicated.

(g) Stopways should be identified as such and should be shown by a broken line.

(h) When stopways are shown, the length of each stopway shall be indicated.

(i) The profile view shall show:

- (1) 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;
- (2) 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;
- (3) Obstacles, including:
 - (i) each obstacle by a solid vertical line extending from a convenient grid line over at least one other grid line to the elevation of the top of the obstacle;
 - (ii) identification of each obstacle;
 - (iii) the limits of penetration of obstacles of large extent in a distinctive manner identified in the legend.

177.157 Accuracy

- (a) The order of accuracy attained shall be shown on the chart.
- (b) 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).
- (c) 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.
- (d) Where no accurate datum for vertical reference is available, the elevation of the datum used shall be stated and shall be identified as assumed.

177.159 Reserved

Subpart -K
Aerodrome Obstacle Chart TYPE B

177.161 Function

Aerodrome Obstacle Chart TYPE B shall provide information to satisfy:

- (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.

177.163 Availability

- (a) Aerodrome Obstacle Chart TYPE B should be made available, as prescribed in section 177.9 (b) and (c) for all aerodromes regularly used by international civil aviation except for those aerodromes where the Electronic Aerodrome Terrain and Obstacle Chart (Electronic) is provided in accordance with subpart (L).
- (b) Aerodrome Obstacle Chart Comprehensive shall combine the specifications of Subpart J and K.

177.165 Units of measurement

- (a) Elevations shall be shown to the nearest half-meter or to the nearest foot.
- (b) Linear dimensions shall be shown to the nearest half-meter.

177.167 Coverage and scale

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

177.169 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 Annex 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.

177.171 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.

177.173 Culture and topography.

- (a) Drainage and hydrographic details shall be kept to a minimum.
- (b) Buildings and other salient features associated with the aerodrome shall be shown. Wherever possible, they shall be shown to scale.
- (c) All objects, either cultural or natural, that project above the take-off and approach surfaces specified in section 177.177 below or the clearing and marking surfaces specified in Annex 14 to the Chicago Convention, Volume I, Chapter 4, shall be shown.
- (d) 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.

177.175 Magnetic variation.

The Aerodrome Obstacle Chart TYPE B 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.

177.177 Aeronautical data.

- (a) The Aerodrome Obstacle Chart TYPE B shall show:

- (1) The aerodrome reference point and its geographical coordinates in degrees, minutes and seconds;
- (2) The outline of the runways by a solid line;
- (3) The length and width of the runway;
- (4) The magnetic bearing to the nearest degree of the runway and the runway number;
- (5) 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;
- (6) Taxiways, aprons and parking areas identified as such, and the outlines by a solid line;
- (7) Stopways identified as such and depicted by a broken line;
- (8) The length of each stopway;
- (9) Clearways identified as such and depicted by a broken line;
- (10) The length of each clearway;
- (11) Take-off and approach surfaces identified as such and depicted by a broken line;
- (12) Take-off and approach areas;
- (13) Obstacles at their exact location, including:
 - (i) A symbol indicative of their type;
 - (ii) Elevation;
 - (iii) Identification;
 - (iv) Limits of penetration of large extent in a distinctive manner identified in the legend;
- (14) Any additional obstacles, as determined by 177.155 (a) (1) including the obstacles in the shadow of an obstacle, which would otherwise be exempted.

- (b) The nature of the runway and stopway surfaces should be given.
- (c) 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.
- (d) The extent of tree areas and relief features, part of which constitute obstacles, should be shown.

177.179 Accuracy.

- (a) The order of accuracy attained shall be shown on the chart.
- (b) The horizontal dimensions and the elevations of the movement area, stopways and clearways to be printed on the chart shall be determined to the nearest 0.5 m (1 ft).
- (c) The order or accuracy of the field work and the precision of chart production shall be such that the resulting data will be within the maximum deviations indicated herein:
 - (1) Take-off and approach areas:
 - (i) Horizontal distances: 5 m (15 ft) at point of origin increasing at a rate of 1 per 500;
 - (ii) Vertical distances: 0.5 m (1.5 ft) in the first 300 m (1 000 ft) and increasing at a rate of 1 per 1 000.
 - (2) Other areas:
 - (i) Horizontal distances: 5 m (15 ft) within 5 000 m (15 000 ft) of the aerodrome reference point and 12 m (40 ft) beyond that area;
 - (ii) Vertical distances: 1 m (3 ft) within 1 500 m (5 000 ft) of the aerodrome reference point increasing at a rate of 1 per 1 000.
- (d) Where no accurate datum for vertical reference is available, the elevation of the datum used shall be stated and identified as assumed.

Subpart- L
Aerodrome Terrain And Obstacle Chart –ICAO (Electronic)

177.181 Function

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

- (a) Enable an operator to comply with the operating limitations of Annex 6, to the Chicago Convention Part I, Chapter 5, and Part III, Section II, Chapter 3 by developing contingency procedures for use in the event of an emergency during a missed approach or take-off, and by performing aircraft operating limitations analysis; and
- (b) Support the following air navigation applications:
 - (1) Instrument procedure design (including circling procedure);
 - (2) Aerodrome obstacle restriction and removal; and
 - (3) Provision of source data for the production of other aeronautical charts.

177.183 Availability.

- (a) From 12 November 2015, Electronic Aerodrome Terrain and Obstacle Charts shall be made available as prescribed in section 177.9 (b) and (c) for all aerodromes regularly used by international civil aviation.
- (b) The Electronic Aerodrome Terrain and Obstacle Chart shall also be made available in hard copy format upon request.
- (c) The ISO 19100 series of standards for geographic information shall be used as a general data modeling framework.

177.185 Identification

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

177.187 Chart coverage

The extent of each chart shall be sufficient to cover Area 2 as specified in Annex 15 to the Chicago Convention paragraph 10.2.

177.189 Chart content.

(a) General

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

(2) Symbols used to portray features shall be in accordance with section 177.107.

(b) Terrain feature

(1) The terrain feature, and associated attributes, to be portrayed and database linked to the chart shall be based on the electronic terrain data sets which satisfy the requirements of Annex 15 to the Chicago Convention, Chapter 10 and Appendix 8.

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

(3) Representation of terrain surface should be provided as a selectable layer of contour lines in addition to the DEM.

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

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

(i) Horizontal positions of grid points in geographic coordinates and elevations of the points;

(ii) Surface type;

(iii) Contour line values, if provided; and

(iv) Names of cities, towns and other prominent topographic features.

(6) Other terrain attributes specified in Annex 15 to the Chicago Convention, Appendix 8, Table A8-3 and provided in the database(s) should be linked to the portrayed terrain feature.

(c) Obstacle features

(1) Obstacle features, and associated attributes, portrayed or database-linked to the chart shall be based on electronic obstacle data sets which satisfy the requirements of Annex 15, Chapter 10 and Appendix 8.

(2) Each obstacle shall be portrayed by an appropriate symbol and obstacle identifier.

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

(i) Horizontal position in geographic coordinates and associated elevation;

(ii) Obstacle type; and

(iii) Obstacle extent, if appropriate.

(4) Other obstacle attributes specified in Annex 15, Appendix 8, Table A8-4 and provided in the database(s) should be linked to the portrayed obstacle feature.

(d) Aerodrome features:

(1) Aerodrome features, and associated attributes, portrayed and database-linked to the chart shall be based on aerodrome data which satisfy the requirements of Annex 14, Volume I, Appendix E and Annex 15, Appendix 7.

(2) The following aerodrome features shall be portrayed by an appropriate symbol:

(i) Aerodrome reference point;

(ii) Runway(s), with designation numbers, and if available, stopway(s) and clearway(s); and

(iii) Taxiways, aprons, large buildings and other prominent aerodrome features.

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

(i) Geographical coordinates of the aerodrome reference point;

(ii) Aerodrome magnetic variation, year of information and annual change;

(iii) Length and width of runway(s), stopway(s) and clearway(s);

(iv) Type of surface of runway(s) and stopway(s);

(v) Magnetic bearings of the runway(s) to the nearest degree;

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

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

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

177.191 Accuracy and resolution.

(a) The order of accuracy of aeronautical data shall be as specified in the Annexes to the Chicago Convention (Annex 11, Appendix E as amended by amendments 49 applicable 14 Nov. 2013 and Annex 14, Volume I, Appendix E and Volume II, Appendix AH). The order of accuracy of terrain and obstacle data shall be as specified in Annex 15 to the Chicago Convention, Appendix 8.

(b) The aeronautical data resolution shall be as specified in Annex 15 to the Chicago Convention, Appendix 7 while the resolution for terrain and obstacle data shall be as specified in Annex 15 to the Chicago Convention, Appendix 8.

177.193 Electronic functionality.

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

177.195 Chart data product specifications.

- (a) A comprehensive statement of the data sets comprising the chart shall be provided in the form of data product specifications on which basis air navigation users will be able to evaluate the chart data product and determine whether it fulfills the requirements for its intended use.
- (b) The chart data product specifications shall include an overview, a specification scope, data product identification, data content information, the reference systems used, the data quality requirements, and information on data capture, data maintenance, data portrayal, data product delivery, as well as any additional information available, and metadata.
- (c) The overview of the chart data product specifications shall provide an informal description of the product and shall contain general information about the data product.

(d) The specification scope of the chart data product specifications shall contain the spatial (horizontal) extent of the chart coverage. The chart data product identification shall include the title of the product, a brief narrative summary of the content and purpose, and a description of the geographic area covered by the chart.

(e) The data content of the chart data product specifications shall clearly identify the type of coverage and/or imagery and shall provide a narrative description of each.

(f) The chart data product specifications shall:

(1) Include information that defines the reference systems used. This shall include the spatial reference system (horizontal and vertical) and, if appropriate, temporal reference system.

(2) Identify the data quality requirements. This shall include a statement on acceptable conformance quality levels and corresponding data quality measures. This statement shall cover all the data quality elements and data quality sub-elements, even if only to state that a specific data quality element or sub-element is not applicable.

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

(4) Contain information on how data are portrayed on the chart, as detailed in

(5) Contain data product delivery information which shall include delivery formats and delivery medium information.

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

177.197-177.199 Reserved.

Subpart -M
Precision Approach Terrain Chart

177.201 Function.

The Precision Approach Terrain 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.

177.203 Availability.

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

(b) The Precision Approach Terrain Chart shall be revised whenever any significant change occurs.

177.205 Scale

(a) The horizontal scale should be 1:2 500, and the vertical scale 1:500.

(b) When the chart includes a profile of the terrain to a distance greater than 900 m (3000 ft) from the runway threshold, the horizontal scale should be 1:5 000.

177.207 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.

177.209 Plan and profile information.

(a) The chart shall include:

(1) 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;

(2) An indication where the terrain or any object thereon, within the plan defined in (1) above, differs by ± 3 m (10 ft) in height from the centre line profile and is likely to affect a radio altimeter;

(3) 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.

(b) 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.

(c) The ILS reference datum height should be shown to the nearest half meter or foot.

**Subpart- N
Enroute Chart**

177.211 Function.

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

177.213 Availability.

(a) The Enroute Chart shall be made available as prescribed in section 177.9 (b) and (c) for all areas where flight information regions have been established.

(b) 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.

177.215 Coverage and scale.

(a) The layout of sheet lines should be determined by the density and pattern of the ATS route structure.

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

(c) An adequate overlap of charts shall be provided to ensure continuity of navigation.

177.217 Projection.

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

(b) Parallels and meridians shall be shown at suitable intervals.

(c) Graduation marks shall be placed at consistent intervals along selected parallels and meridians.

177.219 Identification.

Each sheet shall be identified by chart series and number.

177.221 Culture and topography

(a) 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.

(b) Within each quadrilateral formed by the parallels and meridians the area minimum altitude shall be shown, except as provided for in 7.6.3.

(c) The selected orientation used and where charts are not True North orientated, shall be clearly indicated.

177.223 Magnetic variation.

The isogonals should be indicated and the date of the isogonic information given.

177.225 Bearings, tracks and radials.

(a) Bearings, tracks and radials shall be magnetic,

(b) Bearings, tracks or radials given with reference to True North or Grid North, shall be clearly indicated.

(c) When Grid North is used its reference grid meridian shall be identified.

177.227 Aeronautical data.

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

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

(c) Where appropriate, the components of the established air traffic services system shall be shown, including 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, the elevation of the transmitting antenna of the DME to the nearest 30 m (100 ft), additionally;

- (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) or RNAV 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:
 - (i) the station identification and radio frequency of the reference VOR/DME;
 - (ii) the bearing to the nearest tenth of a degree and the distance to the nearest two tenths of a kilometer (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 kilometer or nautical mile between significant points constituting turning points or reporting points;
- (9) Change-over points on route segments defined by reference to very high frequency omnidirectional radio ranges, indicating the distances to the nearest kilometer or nautical mile to the navigation aids;
- (10) Minimum en-route altitudes and minimum obstacle clearance altitudes, on ATS routes to the nearest higher 50 meters or 100 feet (see Annex 11, 2.22);
- (11) Communication facilities listed with their channels and, if applicable, logon address;
- (12) Air defense identification zone (ADIZ) properly identified.

(d) 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) or a Standard Arrival Chart — Instrument (STAR).

(e) Where established, altimeter setting regions shall be shown and identified.

177.229 Reserved.

Subpart- O Area Chart

177.231 Function.

The Area 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.

177.233 Availability.

- (a) The Area Chart shall be made available as prescribed in section 177.9 (b) and (c) where the air traffic services routes or position reporting requirements are complex and cannot be adequately shown on an Enroute Chart.
- (b) 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.

177.235 Coverage and scale.

- (a) The coverage of each chart shall extend to points that effectively show departure and arrival routes.
- (b) The chart shall be drawn to scale showing scale-bar.

117.237 Projection.

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

177.239 Identification.

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

177.241 Culture and topography.

(a) 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.

(b) All relief exceeding 300 m (1000 ft) above the elevation of the primary aerodrome should be shown by smoothed contour lines, contour values and layer tints printed in brown.

(c) Appropriate spot elevations, including the highest elevation within each top contour line, should be shown printed in black.

(d) Obstacles should be shown, to improve situational awareness in areas where significant relief exists.

177.243 Magnetic variation.

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

177.245 Bearings, tracks and radials.

(a) Bearings, tracks and radials shall be magnetic.

(b) Bearings, tracks or radials given with reference to True North or Grid North, shall be clearly indicated. When Grid North is used, its reference grid meridian shall be identified.

177.247 Aeronautical data.

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

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

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

(d) The components of the established relevant air traffic services system shall be shown, including 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, 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,

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

(ii) the bearing to the nearest tenth of a degree and the distance to the nearest two tenths of a kilometer (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 kilometer or nautical mile between significant points constituting turning points or reporting points;

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

(11) Minimum en-route altitudes and minimum obstacle clearance altitudes, on each ATS routes to the nearest higher 50 meters or 100 feet;

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

(13) Area speed and level/altitude restrictions where established;

(14) Communication facilities listed with their channels and, if applicable, logon address.

177.249 Reserved.

Subpart- P
Standard Departure Chart –Instrument (SID)

177.251 Function.

The Standard Departure Chart –Instrument (SID) shall provide the flight crew with information to enable the crew to comply with the designated standard departure route — instrument from take-off phase to the enroute phase.

177.253 Availability.

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

177.255 Coverage and scale.

(a) 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.

(b) The Standard Departure Chart –Instrument (SID) should be drawn to scale; and.

(c) A scale-bar shall be shown if the chart is drawn to scale; otherwise the annotation “NOT TO SCALE” shall be shown on the chart.

(d) The “NOT TO SCALE” chart shall use the symbol for scale break on tracks and other aspects of the chart.

177.257 Projection.

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

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

(c) Graduation marks shall be placed at consistent intervals along the neat lines.

177.259 Identification.

The Standard Departure Chart –Instrument (SID) 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 (PANSOPS, Doc 8168), Volume II, Part I, Section 3, Chapter 5.

177.261 Culture and topography.

(a) Where the Standard Departure Chart –Instrument (SID) 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.

(b) To improve situational awareness in areas where significant relief exists:

(1)The Standard Departure Chart –Instrument (SID) should be drawn to scale and

(2)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.

(c)Appropriate spot elevations, including the highest elevation within each top contour line, should be shown printed in black. Obstacles should also be shown.

177.263 Magnetic variation.

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

177.265 Bearings, tracks and radials.

(a) Bearings, tracks and radials shall be magnetic.

(b) Bearings, tracks or radials given with reference to True North or Grid North, shall be clearly indicated. When Grid North is used its reference grid meridian shall be identified.

177.267 Aeronautical data.

- (a) The aerodrome of departure shall be shown by the runway pattern.
- (b) All aerodromes which affect the designated standard departure route — instrument shall be shown and identified. Where appropriate the aerodrome runway patterns shall be shown.
- (c) Prohibited, restricted and danger areas which may affect the execution of the procedures shall be shown with their identification and vertical limits.
- (d) The established minimum sector altitude shall be shown with a clear indication of the sector to which it applies.
- (e) 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.
- (f) The components of the established relevant air traffic services system shall be shown comprising the following:
 - (1) A graphic portrayal of each standard departure route— instrument, including:
 - (i) Route designator;
 - (ii) Significant points defining the route;
 - (iii) Track or radial to the nearest degree along each segment of the route;
 - (iv) Distances to the nearest kilometer or nautical mile between significant points;
 - (vi) Minimum obstacle clearance altitudes, along the route or route segments and altitudes required by the procedure to the nearest higher 50 m or 100 ft and flight level restrictions where established;
 - (v) Where the chart is drawn to scale and vectoring on departure is provided, established minimum vectoring altitudes to the nearest higher 50 m or 100 ft, clearly identified;
 - (2) The radio navigation aid(s) associated with the route(s) including:

- (i) Plain language name;
 - (ii) Identification;
 - (iii) Frequency;
 - (iv) Geographical coordinates in degrees, minutes and seconds;
 - (vi) 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 kilometer (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 1000 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;
- (7) Area speed restrictions, where established;
- (8) All compulsory and “on-request” reporting points;
- (9) Radio communication procedures, including:
- (i) Call sign(s) of ATS unit(s);
 - (ii) Frequency;
 - (iii) Transponder setting, where appropriate.
- (g) A textual description of standard departure route(s) - instrument (SID) and relevant communication failure procedures should be provided and should, whenever feasible, be shown on the chart or on the same page which contains the chart.
- (h) Aeronautical database requirements Appropriate data to support navigation database coding shall be published in accordance with the Procedures for Air Navigation Services - Aircraft Operations (PANS-OPS, Doc 8168), Volume II,

Part III, Section 5, Chapter 2, 2.1, on the verso of the chart or as a separate, properly referenced sheet.

177.269 Reserved.

Subpart- Q

Standard Arrival Chart –Instrument (STAR)

177.271 Function

The Standard Arrival Chart –Instrument (STAR) 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.

177.273 Availability

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

177.275 Coverage and scale

- (a) The coverage of the chart shall be sufficient to indicate the points where the en-route phase ends and the approach phase begins.
- (b) The chart should be drawn to scale.
- (c) A scale-bar shall be shown if the chart is drawn to scale; otherwise the annotation “NOT TO SCALE” shall be shown on the chart.
- (d) The “NOT TO SCALE” chart shall use the symbol for scale break on tracks and other aspects of the chart.

177.277 Projection

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

177.279 Identification

The Standard Arrival Chart — Instrument (STAR) 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 (PANSOPS, Doc 8168), Volume II, Part I, Section 4, Chapter 2.

177.281 Culture and topography

(a) 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.

(b) To improve situational awareness in areas where significant relief exists:

(1) The chart should be drawn to scale and

(2) All relief exceeding 300 m (1000 ft) above the aerodrome elevation should be shown by smoothed contour lines, contour values and layer tints printed in brown.

(3) Appropriate spot elevations, including the highest elevation within each top contour line, should be shown printed in black. Obstacles should also be shown.

177.283 Magnetic variation

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

177.285 Bearings, tracks and radials

(a) Bearings, tracks and radials shall be magnetic.

(b) Bearings, tracks or radials given with reference to True North or Grid North, shall be clearly indicated. When Grid North is used its reference grid meridian shall be identified.

177.287 Aeronautical data

(a) The aerodrome of landing shall be shown by the runway pattern.

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

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

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

(e) 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.

(f) The components of the established relevant air traffic services system shall be shown comprising the following:

(1) A graphic portrayal of each standard arrival route — instrument, including: route designator;

(i) Significant points defining the route;

(ii) Track or radial to the nearest degree along each segment of the route;

(iii) Distances to the nearest kilometer or nautical mile between significant points;

(iv) Minimum obstacle clearance altitudes, along the route or route segments and altitudes required by the procedure to the nearest higher 50 m or 100 ft and flight level restrictions where established;

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

(2) The radio navigation aid(s) associated with the route(s) including:

(i) Plain language name;

(ii) Identification;

(iii) Frequency;

(iv) Geographical coordinates in degrees, minutes and seconds;

(v) For DME, the channel and the elevation of the transmitting antenna of the DME to the nearest 30 m (100 ft);

(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 kilometer (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:

(i) Call sign(s) of ATS unit(s);

(ii) Frequency;

(iii) Transponder setting, where appropriate.

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

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

177.289 Reserved

Subpart- R

Instrument Approach Chart

177.291 Function

The Instrument Approach 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.

177.293 Availability

(a) Instrument Approach Charts shall be made available for all aerodromes used by international civil aviation where instrument approach procedures have been established by ANSP /CARC.

(b) A separate Instrument Approach Chart shall normally be provided for each:

(1) Precision approach procedure established by the ANSP/CARC.

(2) Non-precision approach procedure established by the ANSP/CARC.

(c) 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.

(d) Instrument Approach Charts shall be revised whenever information essential to safe operation becomes out of date.

177.295 Coverage and scale

(a) 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.

(b) The scale selected shall ensure optimum legibility consistent with the procedure shown on the chart and sheet size.

(c) Except where this is not practicable, a distance circle with a radius of 20 km (10 NM) centered 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.

(d) A distance scale should be shown directly below the profile.

177.297 Format

The sheet size should be 210 × 148 mm (8.27 × 5.82 in).

177.299 Projection

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

(b) The graduation marks should be placed at consistent intervals along the neat lines.

177.301 Identification

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

177.303 Culture and topography

(a) Culture and topographic information pertinent to the safe execution of the instrument approach procedure, including the missed approach procedure, associated holding procedures and visual maneuvering (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.

(b) 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.

(c) In areas where relief is lower than specified in (b):

- (1) 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.
- (2) Appropriate spot elevations, including the highest elevation within each top contour line, should also be shown printed in black.

177.305 Magnetic variation

- (a) The magnetic variation should be shown.
- (b) When shown, the value of the variation, indicated to the nearest degree, shall agree with that used in determining magnetic bearings, tracks and radials.

177.307 Bearings, tracks and radials

- (a) Bearings, tracks and radials shall be magnetic.
- (b) Bearings, tracks or radials given with reference to True North or Grid North, shall be clearly indicated. When Grid North is used its reference grid meridian shall be identified.

177.309 Aeronautical data**(a) Aerodromes**

- (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.
- (2) The runway pattern, at a scale sufficiently large to show it clearly, shall be shown for:
 - (i) The aerodrome on which the procedure is based;
 - (ii) 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.
 - (iii) The aerodrome elevation shall be shown to the nearest meter or foot in a prominent position on the chart.

(iv) The threshold elevation or, where applicable, the highest elevation of the touchdown zone shall be shown to the nearest meter or foot.

(b) Obstacles

(1) Obstacles shall be shown on the plan view of the chart.

(2) Obstacles which are the determining factor of an obstacle clearance altitude/height, should be identified.

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

(4) The heights of obstacles above a datum other than mean sea level (see 3) should be shown. When shown, they should be given in parentheses on the chart.

(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.

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

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

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

(d) Radio communication facilities and navigation aids

(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.

(2) The Initial Approach Fix (IAF), the Intermediate approach Fix (IF), the Final Approach Fix (FAF) (or Final Approach Point (FAP) for an ILS approach procedure), the missed approach point (MAPt), where established, and other essential fixes or points comprising the procedure shall be shown and identified.

(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) 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.

(5) Radio communication frequencies, including call signs that are required for the execution of the procedures shall be shown.

(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 kilometer or nautical mile. When no track defining aid indicates the bearing of the aerodrome, the bearing shall also be shown to the nearest degree.

(e) 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. (f) Portrayal of procedure tracks

(f) Portrayal of procedure tracks.

(1) The plan view shall show the following information in the manner indicated:

(i) The approach procedure track by an arrowed continuous line indicating the direction of flight;

(ii) The missed approach procedure track by an arrowed broken line;

(iii) Any additional procedure track, other than those specified in a) and b), by an arrowed dotted line;

(iv) Bearings, tracks, radials to the nearest degree and distances to the nearest two-tenths of a kilometer or tenth of a nautical mile or times required for the procedure;

- (v) 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;
 - (vi) The boundaries of any sector in which visual maneuvering (circling) is prohibited;
 - (vii) Where specified the holding pattern and minimum holding altitude/height associated with the approach and missed approach;
 - (viii) Caution notes where required, prominently displayed on the face of the chart.
- (2) The plan view should show the distance to the aerodrome from each radio navigation aid concerned with the final approach.
- (3) A profile shall be provided normally below the plan view showing the following data:
- (i) The aerodrome by a solid block at aerodrome elevation;
 - (ii) The profile of the approach procedure segments by an arrowed continuous line indicating the direction of flight;
 - (iii) The profile of the missed approach procedure segment by an arrowed broken line and a description of the procedure;
 - (iv) The profile of any additional procedure segment, other than those specified in (ii) and (iii), by an arrowed dotted line;
 - (v) bearings, tracks, radials to the nearest degree and distances to the nearest two-tenths of a kilometer or tenth of a nautical mile or times required for the procedure;
 - (vi) Altitudes/heights required by the procedures, including transition altitude procedure altitudes/heights, and heliport crossing height (HCH) where established;
 - (vii) Limiting distance to the nearest kilometer or nautical mile on procedure turn, when specified;
 - (viii) The intermediate approach fix or point, on procedures where no course reversal is authorized;

- (ix) 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) The heights required by procedures should be shown in parentheses, using the height datum selected in accordance with section 177.309 (b) (5).
- (5) The profile view should include a ground profile or a minimum altitude/height portrayal as follows:
- (i) 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
 - (ii) Minimum altitudes/heights in the intermediate and final approach segments indicated within bounded shaded blocks.
- (g) Aerodrome operating minima when established by the State shall be shown.
- (h) 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.
- (i) Supplementary information
- (1) When the missed approach point is defined by:
 - (i) A distance from the final approach fix, or
 - (ii) A facility or a fix and the corresponding distance from the final approach fix, the distance to the nearest two tenths of a kilometer 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.
 - (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.
 - (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) A rate of descent table should be shown.

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

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

(7) When a final approach fix is specified at the final approach point for ILS, a clear indication shall be given whether it applies to the ILS, the associated ILS localizer only procedure, or both.

(8) If the final approach descent gradient/angle for any type of instrument approach procedure exceeds the maximum value specified in the Procedures for Air Navigation Services Aircraft Operations (PANS-OPS, Doc 8168), Volume II, Part I, Section 4, Chapter 5, a cautionary note shall be included.

(j) Appropriate Aeronautical data to support navigation database coding shall be published in accordance with the Procedures for Air Navigation Services — Aircraft Operations (PANS-OPS, Doc 8168), Volume II, Part III, Section 5, Chapter 2, 2.3 for RNAV procedures and Volume II, Part I, Section 4, Chapter 9, 9.4.1.4 for non-RNAV procedures, on the verso of the chart or as a separate, properly referenced sheet.

Subpart- S

Visual Approach Chart

177.311 Function

The Visual Approach Chart shall provide flight crews with information which will enable them to transit from the enroute/ descent to approach phases of flight to the runway of intended landing by means of visual reference.

177.313 Availability

The Visual Approach Chart shall be made available as prescribed in section 177.9 (b) and (c) for all aerodromes used by international civil aviation where:

- (i) Only limited navigation facilities are available; or
- (ii) Radio communication facilities are not available; or
- (iii) No adequate aeronautical charts of the aerodrome and its surroundings at 1:500 000 or greater scale are available; or
- (iv) visual approach procedures have been established.

177.315 Scale

(a) The scale shall be sufficiently large to permit depiction of significant features and indication of the aerodrome layout.

(b) The scale should not be smaller than 1:500 000.

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

177.317 Format

The sheet size should be 210 × 148 mm (8.27 × 5.82 in).

177.319 Projection

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

(b) Graduation marks should be placed at consistent intervals along the neat lines.

177.321 Identification

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

177.323 Culture and topography

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

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

(b) Shore lines, lakes, rivers and streams shall be shown.

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

(d) When shown, spot elevations should be carefully selected.

(e) The figures relating to different reference levels shall be clearly differentiated in their presentation.

177.325 Magnetic variation

The magnetic variation shall be shown.

177.327 Bearings, tracks and radials

(a) Bearings, tracks and radials shall be magnetic.

(b) Bearings, tracks or radials given with reference to True North or Grid North, shall be clearly indicated. When Grid North is used its reference grid meridian shall be identified.

177.329 Aeronautical data

(a) Aerodromes

(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 neighboring aerodromes this shall be indicated. Abandoned aerodromes shall be identified as abandoned.

(2) The aerodrome elevation shall be shown in a prominent position on the chart.

(b) Obstacles

(1) Obstacles shall be shown and identified.

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

(3) The heights of obstacles above the aerodrome elevation should be shown.

(4) 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.

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

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

(e) Visual approach information

(1) Visual approach procedures shall be shown where applicable.

(2) Visual aids for navigation shall be shown as appropriate.

(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.

(f) Radio navigation aids together with their frequencies and identifications shall be shown as appropriate.

(g) Radio communication facilities with their frequencies shall be shown as appropriate.

Subpart- T
Aerodrome/Heliport Chart

177.331 Function

The Aerodrome/Heliport chart shall provide flight crews with information which will facilitate the ground movement of aircraft:

- (1) From the aircraft stand to the runway; and
- (2) From the runway to the aircraft stand;
and helicopter movement:
- (3) From the helicopter stand to the touchdown and lift-off area and to the final approach and take-off area;
- (4) From the final approach and take-off area to the touchdown and lift-off area and to the helicopter stand;
- (5) Along helicopter ground and air taxiways; and
- (6) Along air transit routes;

The Aerodrome/Heliport shall also provide essential operational information at the aerodrome/heliport.

177.333 Availability

The Aerodrome/Heliport Chart shall be made available as prescribed in section 177.9 (b) and (c) for all aerodromes/heliports regularly used or available for use by international civil aviation.

177.335 Coverage and scale

The coverage and scale shall be sufficiently large to show clearly all the elements listed in section 177.341 (a) showing the linear scale.

177.337 Identification

The Aerodrome/Heliport 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.

177.339 Magnetic variation.

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

177.341 Aerodrome/heliport data.

(a) The Aerodrome/Heliport chart shall show:

(1) Geographical coordinates in degrees, minutes and seconds for the aerodrome/ heliport reference point;

(2) Elevations, to the nearest meter 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;

(3) Elevations and geoid undulations, to the nearest halfmeter 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;

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

(5) 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;

(6) 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);

(7) All taxiways, helicopter air and ground taxiways with type of surface, helicopter air transit routes, with designations, width, lighting, markings (including runway-holding positions and, where established, intermediate holding positions), stop bars, other visual guidance and control aids, and

bearing strength or aircraft type restrictions where the bearing strength is less than that of the associated runways;

(8) Where established, hot spot locations with additional information properly annotated;

(9) Geographical coordinates in degrees, minutes, seconds and hundredths of seconds for appropriate taxiway centre line points and aircraft stands;

(10) Where established, standard routes for taxiing aircraft with their designators;

(11) The boundaries of the air traffic control service;

(12) Position of runway visual range (RVR) observation sites;

(13) Approach and runway lighting;

(14) 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;

(15) Relevant communication facilities listed with their channels and, if applicable, logon address;

(16) Obstacles to taxiing;

(17) Aircraft servicing areas and buildings of operational significance;

(18) VOR checkpoint and radio frequency of the aid concerned;

(19) Any part of the depicted movement area permanently unsuitable for aircraft, clearly identified as such.

(b) In addition to the items in (a) above relating to heliports, the chart shall show:

(1) Heliport type;

(2) Touchdown and lift-off area including dimensions to the nearest meter, slope, type of surface and bearing strength in tones;

- (3) Final approach and take-off area including type, true bearing to the nearest degree, designation number (where appropriate), length and width to the nearest meter, slope and type of surface;
- (4) Safety area including length, width and type of surface;
- (5) Helicopter clearway including length and ground profile;
- (6) Obstacles including type and elevation of the top of the obstacles to the nearest (next higher) meter or foot;
- (7) Visual aids for approach procedures, marking and lighting of final approach and take-off area, and of touchdown and lift-off area;
- (8) Declared distances to the nearest meter for heliports, where relevant, including:
 - (i) take-off distance available;
 - (ii) rejected take-off distance available;
 - (iii) landing distance available.

177.343-177.349 Reserved

Subpart- U
Aerodrome Ground Movement Chart

177.351 Function.

The Aerodrome Ground Movement 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.

177.353 Availability.

The Aerodrome Ground Movement Chart should be made available as prescribed in section 177.9 (b) and (c) 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.

177.355 Coverage and scale.

(a) The coverage and scale shall be sufficiently large to show clearly all the elements listed in section 177.361 below.

(b) A linear scale should be shown.

177.357 Identification

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

177.359 Magnetic variation

(a) A True North arrow shall be shown.

(b) Magnetic variation to the nearest degree and its annual change should be shown.

177.361 Aerodrome data

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

(1) Apron elevation to the nearest meter or foot;

- (2) 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;
- (3) Geographical coordinates in degrees, minutes, seconds and hundredths of seconds for aircraft stands;
- (4) Taxiways with designations, width to the nearest meter, bearing strength or aircraft type restrictions where applicable, lighting, markings (including runway-holding positions and, where established, intermediate holding positions), stop bars, and other visual guidance and control aids;
- (5) Where established, hot spot locations with additional information properly annotated;
- (6) Where established, standard routes for taxiing aircraft, with their designators;
- (7) Geographical coordinates in degrees, minutes, seconds and hundredths of seconds for appropriate taxiway centre line points;
- (8) The boundaries of the air traffic control service;
- (9) Relevant communication facilities listed with their channels and, if applicable, logon address;
- (10) Obstacles to taxiing;
- (11) Aircraft servicing areas and buildings of operational significance;
- (12) VOR checkpoint and radio frequency of the aid concerned;
- (13) Any part of the depicted movement area permanently unsuitable for aircraft, clearly identified as such.

177.363-177.369 Reserved

Subpart -V
Aircraft Parking/Docking Chart

177.371 Function.

The Aircraft Parking/Docking 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.

177.373 Availability.

The Aircraft Parking/ Docking Chart should be made available as prescribed in section 177.9 (b) and (c) where, due to the complexity of the terminal facilities, the information cannot be shown with sufficient clarity on the Aerodrome/Heliport Chart or on the Aerodrome Ground Movement Chart.

177.375 Coverage and scale.

(a) The coverage and scale shall be sufficiently large to show clearly all the elements listed in section 177.381.

(b) A linear scale should be shown.

177.377 Identification.

The Aircraft Parking/Docking chart shall be identified by the name of the city or town, or area, which the aerodrome serves and the name of the aerodrome.

177.379 Magnetic variation.

(a) A True North arrow shall be shown.

(b) Magnetic variation to the nearest degree and its annual change should be shown.

177.381 Aerodrome data.

The Aircraft Parking/Docking chart shall show in a similar manner all the information on the Aerodrome/Heliport Chart and the Aerodrome Ground Movement Chart relevant to the area depicted, including:

(a) Apron elevation to the nearest meter or foot;

- (b) Aprons with aircraft stands, bearing strengths or aircraft type restrictions, lighting, marking and other visual guidance and control aids, where applicable, including location and type of visual docking guidance systems;
- (c) Geographical coordinates in degrees, minutes, seconds and hundredths of seconds for aircraft stands;
- (d) Taxiway entries with designations, including runway holding positions and, where established, intermediate holding positions, and stop bars;
- (e) Where established, hot spot locations with additional information properly annotated;
- (f) Geographical coordinates in degrees, minutes, seconds and hundredths of seconds for appropriate taxiway centre line points;
- (g) The boundaries of the air traffic control service;
- (h) Relevant communication facilities listed with their channels and, if applicable, logon address;
- (i) Obstacles to taxiing;
- (j) Aircraft servicing areas and buildings of operational significance;
- (k) VOR checkpoint and radio frequency of the aid concerned;
- (l) Any part of the depicted movement area permanently unsuitable for aircraft, clearly identified as such.

177.383-177389 reserved

Subpart- W
World Aeronautical Chart 1 : 1 000 000

177.391 Function

The World Aeronautical chart shall provide information to satisfy the requirements of visual air navigation.

177.393 Availability

(a) The World Aeronautical Chart 1:1 000 000 shall be made available as prescribed in section 177.9 (b) and (c) for all areas delineated in Appendix E.

(b) 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.

177.395 Scales

(a) Linear scales for kilometers and nautical miles arranged in the following order:

(1) Kilometers,

(2) Nautical miles, with their zero points in the same vertical line shall be shown in the margin.

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

(c) A conversion scale (meters/feet) shall be shown in the margin.

177.397 Format

(a) The title and marginal notes should be in English language.

(b) 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.

(c) The method of folding should be through folding 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.

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

(e) 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.

177.399 Projection

(a) Graticules and graduations shall be shown as follows:

(1) Parallels:

Latitude	Distance between parallels	Graduations on parallels
0° to 72°	30'	1'

2) Meridians:

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

(b) 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.

(c) 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.

(d) 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.

(e) The name and basic parameters of the projection shall be indicated in the margin.

177.401 Identification

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

177.403 Culture and topography

(a) Built-up areas

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

(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.

(b) Railroads

(1) All railroads having landmark value shall be shown.

(2) Important tunnels should be shown.

(c) Highways and roads

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

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

(d) 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.

(e) Political boundaries. International boundaries shall be shown. Undemarcated and undefined boundaries shall be distinguished by descriptive notes.

(f) Hydrography.

(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.

(2)The tint covering large open water areas should be kept very light.

(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.

(g) Contours

(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.

(2) The values of the contours used shall be shown.

(h) Hypsometric tints

(1) When hypsometric tints are used the range of elevations for the tints shall be shown.

(2) The scale of the hypsometric tints used on the chart shall be shown in the margin.

(i) Spot elevations

(1) Spot elevations shall be shown at selected critical points.

(2)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.

(3) The elevation (in meters 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)The spot elevation of the highest point in any sheet should be cleared of hypsometric tinting.

(j) Incomplete or unreliable relief

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

(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.”

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

(l) Wooded areas should be shown, and where shown, the approximate extreme northern or southern limits of tree growth shall be indicated by a dashed black line and shall be appropriately labeled.

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

177.405 Magnetic variation

(a) Isogonic lines shall be shown.

(b) The date of the isogonic information shall be indicated in the margin.

177.407 Aeronautical data

(a) Aeronautical data shown shall be kept to a minimum consistent with the use of the chart for visual navigation and the revision cycle (see 16.9.6).

(b) Aerodromes

(1) Land 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.

(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 B, provided they do not cause undesirable clutter on the chart, shall be indicated.

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

(c) Obstacles

(1) Obstacles shall be shown.

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

(d) Prohibited, restricted and danger areas shall be shown.

(e) Air traffic services system

(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.

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

(f) 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.

(g) Aeronautical ground lights together with their characteristics or their identifications or both shall be shown.

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

(1) not less distinguishable than more powerful marine lights in the vicinity;

(2) readily distinguishable from other marine or other types of lights in the vicinity of built-up coastal areas;

(3) the only lights of significance available.

177.409 reserved

Subpart -X
Aeronautical Chart 1 : 500 000

177.411 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.

177.413 Availability

The Aeronautical Chart 1:500 000 should be made available as prescribed in section 177.9 (b) and (c) for all areas delineated in Appendix E to Annex 4 to the Chicago Convention.

177.415 Scales

- (a) Linear scales for kilometers and nautical miles arranged in the following order:
- (1) Kilometers,
 - (2) Nautical miles, with their zero points in the same vertical line shall be shown in the margin.
- (b) The length of the linear scale should be not less than 200 mm (8 in).
- (c) A conversion scale (meters/feet) shall be shown in the margin.

177.417 Format

- (a) The title and marginal notes shall be in English language.
- (b) 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.
- (c) The method of folding should be through folding the chart on the long axis near the mid-parallel of latitude, face out, with the bottom part of the chart face upward. Then fold inwards near the meridian and fold both halves backward in accordion folds.
- (d) Whenever practicable, sheets should be quarter sheets of the World Aeronautical Chart 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.

(e) 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.

177.419 Projection

(a) A conformal (orthomorphic) projection shall be used.

(b) It is recommended that the projection of the World Aeronautical Chart 1:1 000 000 should be used.

(c) Parallels shall be shown at intervals of 30'.

(d) Meridians shall normally be shown at intervals of 30'.

(e) Graduation marks shall be shown at 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.

(f) 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.

(g) All meridians and parallels shown shall be numbered in the borders of the chart.

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

(i) The name and basic parameters of the projection shall be indicated in the margin.

177.421 Identification

(a) 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.

(b) Where applicable, sheets should also be identified by the reference number of the corresponding World Aeronautical Chart 1:1 000 000, with the addition of one or more of the following letter suffixes indicating the quadrant or quadrants:

Letter	Chart quadrant
A	North-West
B	North-East
C	South-East
D	South-West

177.423 Culture and topography

(a) Built-up areas

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

(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.

(b) Railroads

(1) All railroads having landmark value shall be shown.

(2) Tunnels shall be shown when they serve as prominent landmarks.

(c) Highways and roads

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

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

(d) 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.

(e) International Political boundaries shall be shown. Un demarcated or undefined boundaries shall be distinguished by descriptive notes.

(f) Hydrography

(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.

(2) The tint covering large open water areas should be kept very light.

(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.

(g) Contours

(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.

(2) The values of the contours used shall be shown.

(h) Hypsometric tints. The range of elevations for the tints shall be shown, when hypsometric tints are used, showing the scale of the hypsometric tints used in the margin.

(i) Spot elevations

(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.

(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.

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

(j) Incomplete or unreliable relief

(1) Areas that have not been surveyed for contour information shall be labeled “Relief data incomplete”.

(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.”

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

(l) Wooded areas should be shown. And when shown, the approximate northern or southern limits of tree growth shall be indicated by a dashed black line and shall be appropriately labeled.

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

177.425 Magnetic variation

(a) Isogonic lines shall be shown.

(b) The date of the isogonic information shall be indicated in the margin.

177.427 Aeronautical data

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

(b) Aerodromes

(1) Land 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.

(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 B, provided they do not cause undesirable clutter on the chart, shall be indicated.

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

(c) Obstacles

(1) Obstacles shall be shown.

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

(d) Prohibited, restricted and danger areas shall be shown.

(e) Air traffic services system

(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.

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

(f) 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.

(g) Aeronautical ground lights together with their characteristics or their identifications or both shall be shown.

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

(1) Not less distinguishable than more powerful marine lights in the vicinity;

(2) Readily distinguishable from other marine or other types of lights in the vicinity of built-up coastal areas;

(3) The only lights of significance available.

Subpart- Y
Aeronautical Navigation Chart –SMALL SCALE

177.431 Function

(a) The Aeronautical Navigation 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.

177.433 Availability

The Aeronautical Navigation Chart Small Scale should be made available as prescribed in section 177.9 (b) and (c) for all areas delineated in Appendix E to this Part.

177. 435 Coverage and scale

- (a) The Aeronautical Navigation Chart Small Scale should provide, as a minimum, complete coverage of the major land masses of the world.
- (b) The scale shall be in the range of 1:2 000 000 to 1:5 000 000.
- (c) The scale of the chart shall be substituted in the title for the words “Small Scale”.
- (d) 4 Linear scales for kilometers and nautical miles arranged in the following order:
 - (1) Kilometers,

- (2) Nautical miles, with their zero points in the same vertical line shall be shown in the margin.
- (e) The length of the linear scale should be not less than 200 mm (8 in).
- (f) A conversion scale (meters/feet) shall be shown in the margin.

177.437 Format

- (a) The title and marginal notes shall be in English language.
- (b) 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.

177.439 Projection

- (a) A conformal (orthomorphic) projection shall be used, showing the name and basic parameters of the projection in the margin.
- (b) Parallels shall be shown at intervals of 1°; and the Graduations on the parallels shall be shown at sufficiently close intervals compatible with the latitude and the scale of the chart.
- (c) Meridians shall be shown at intervals compatible with the latitude and the scale of the chart; and the Graduations on the meridians shall be shown at intervals not exceeding 5'.
- (d) The graduation marks shall extend away from the Greenwich Meridian and from the Equator.
- (e) 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.

177.441 Culture and topography

- (a) Built-up areas
- (1) Cities, towns and villages shall be selected and shown according to their relative importance to visual air navigation.

(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.

(b) Railroads

(1) All railroads having landmark value shall be shown.

(2) Important tunnels should be shown.

(c) Highways and roads

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

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

(d) 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.

(e) International Political boundaries shall be shown. Un demarcated and undefined boundaries shall be distinguished by descriptive notes.

(f) Hydrography

(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.

(2) The tint covering large open water areas should be kept very light.

(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.

(g) Contours

(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.

(2) The values of the contours used shall be shown.

(h) Hypsometric tints. The range of elevations for the tints shall be shown, when hypsometric tints are used, showing the scale of the hypsometric tints used in the margin.

(i) Spot elevations

(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.

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

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

(j) Incomplete or unreliable relief

(1) Areas that have not been surveyed for contour information shall be labeled "Relief data incomplete".

(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."

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

(l) Wooded areas of large extent should be shown.

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

(n) Colours

- (1) Subdued colours should be used for the chart background to facilitate plotting.
- (2) Good colour contrast should be ensured to emphasize features important to visual air navigation.

177.443 Magnetic variation

- (a) Isogonic lines shall be shown.
- (b) The date of isogonic information shall be indicated in the margin.

177.445 Aeronautical data

- (a) Land 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.
- (b) Obstacles shall be shown.
- (c) Prohibited, restricted and danger areas should be shown when considered to be of importance to air navigation.
- (d) Air traffic services system
 - (1) Significant elements of the air traffic services system should be shown when considered to be of importance to air navigation.
 - (2) Where appropriate, the air defense identification zone (ADIZ) should be shown and properly identified.
- (e) Radio navigation aids, may be shown by the appropriate symbol and named.

177.447-177.449 Reserved

Subpart- Z Plotting Chart

177.551 Function

The Plotting 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.

177.553 Availability

The Plotting Chart should be made available, as prescribed in section 177.9 (b) and (c) to cover major air routes over oceanic areas and sparsely settled areas used by international civil aviation.

177.555 Coverage and scale

(a) Where practicable, the chart for a particular region should cover major air routes and their terminals on a single sheet governing the scale by the area to be covered.

177.457 Format

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

177.459 Projection

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

(b) Parallels and meridians shall be shown.

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

(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.

(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) 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.

177.461 Identification

Each sheet shall be identified by chart series and number.

177.463 Culture and topography

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

(b) Spot elevations for selected features constituting a hazard to air navigation shall be shown.

(c) Particularly hazardous or prominent relief features should be emphasized.

177.465 Magnetic variation

(a) 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.

(b) The date of the isogonic information shall be shown.

177.467 Aeronautical data

(a) 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;

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

177.469 Reserved.

Subpart -AA
Electronic Aeronautical Chart Display

177.471 Function

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

177.473 Information available for display

(a) The Electronic Aeronautical Chart Display shall be capable of displaying all aeronautical, cultural and topographic information required by Subpart L and Subparts N through Z.

(b) The Electronic Aeronautical Chart Display should be capable of displaying all aeronautical, cultural and topographic information recommended by Subpart L and Subparts N through Z.

177.475 Display requirements

(a) Display categories

(1) Information available for display shall be subdivided into the following categories:

(i) basic display information, permanently retained on the display and consisting of the minimum information essential for the safe conduct of flight; and

(ii) 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.

(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.

(b) Display mode and generation of neighboring area

(1) The Electronic Aeronautical Chart Display 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.

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

(c) Scale. It shall be possible to vary the scale at which a chart is displayed.

(d) Symbols

Symbols used shall conform to those below and specified for electronic charts in Appendix B to the Annex 4 to the Chicago Convention, 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:

- (1) Employ a minimum use of lines, arcs and area fills;
- (2) Do not cause confusion with any existing aeronautical chart symbol;
- (3) Do not impair the legibility of the display.

ADDITIONAL SYMBOLS FOR USE ON PAPER AND ELECTRONIC CHARTS (171–180)

	Symbol No
Collocated DME fix and marker beacon	180
Collocated radio navigation aid and marker beacon	178
DME fix	179
Holding pattern	173
Minimum sector altitude	171
Missed approach track	174
Radio marker beacon	177
Radio navigation aid	176
Runway	175
Terminal arrival altitude	172

(e) Display hardware

(1) The effective size of the chart presentation shall be sufficient to display the information required by section 177.473 without excessive scrolling.

(2) The display shall have the capabilities required to accurately portray required elements of Annex 4 Appendix B —ICAO Chart Symbols.

(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) The display luminance shall be adjustable by the flight crew.

177.477 Provision and updating of data

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

(b) 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.

(c) 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.

(d) A record shall be kept of all updates, including date and time of application.

(e) 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.

177.479 Performance tests, malfunction alarms and indications

(a) 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.

(b) A suitable alarm or indication of system malfunction shall be provided.

177.481 Back-up arrangements

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

(1) Facilities enabling a safe takeover of display functions in order to ensure that a failure does not result in a critical situation; and

(2) A back-up arrangement facilitating the means for safe navigation of the remaining part of the flight.

177.483-177.489 Reserved

Subpart- BB
ATC Surveillance Minimum Altitude Chart

177.491 Function

(a) This supplementary chart shall provide information that will enable flight crews to monitor and cross-check altitudes assigned by a controller using an ATS surveillance system.

(b) A note indicating that the chart may only be used for cross-checking of altitudes assigned while the aircraft is identified shall be prominently displayed on the face of the chart.

177.493 Availability

The ATC Surveillance Minimum Altitude Chart should be made available, as prescribed in section 177.9 (b) and (c), where vectoring procedures are established and minimum vectoring altitudes cannot be shown adequately on the Area Chart, Standard Departure Chart — Instrument (SID) or Standard Arrival Chart — Instrument (STAR).

177.495 Coverage and scale

(a) The coverage of the chart shall be sufficient to effectively show the information associated with vectoring procedures.

(b) The chart shall be drawn to scale.

177.497 Projection

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

(b) The graduation marks should be placed at consistent intervals along the neat lines, as appropriate.

177.499 Identification

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

177.501 Culture and topography

(a) 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.

(b) Appropriate spot elevations and obstacles shall be shown.

177.503 Magnetic variation

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

177.505 Bearings, tracks and radials

(a) Bearings, tracks and radials shall be magnetic.

(b) Bearings, tracks or radials given with reference to True North or Grid North, shall be clearly indicated. When Grid North is used its reference grid meridian shall be identified.

177.507 Aeronautical data

(a) Aerodromes

(1) All aerodromes that affect the terminal routings shall be shown and where appropriate a runway pattern symbol shall be used.

(2) The elevation of the primary aerodrome to the nearest meter or foot shall be shown.

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

(c) Air traffic services system

(1) The chart shall show components of the established air traffic services system including:

(i) Relevant radio navigation aids together with their identifications;

(ii) Lateral limits of relevant designated airspace;

(iii) Relevant significant points associated with standard instrument departure and arrival procedures;

(iv) Transition altitude, where established;

(v) Information associated with vectoring including:

(A) Minimum vectoring altitudes to the nearest higher 50 m or 100 ft, clearly identified;

(B) Lateral limits of minimum vectoring altitude sectors normally defined by bearings and radials to/from radio navigation aids to the nearest degree or, if not practicable, geographical coordinates in degrees, minutes and seconds and shown by heavy lines so as to clearly differentiate between established sectors;

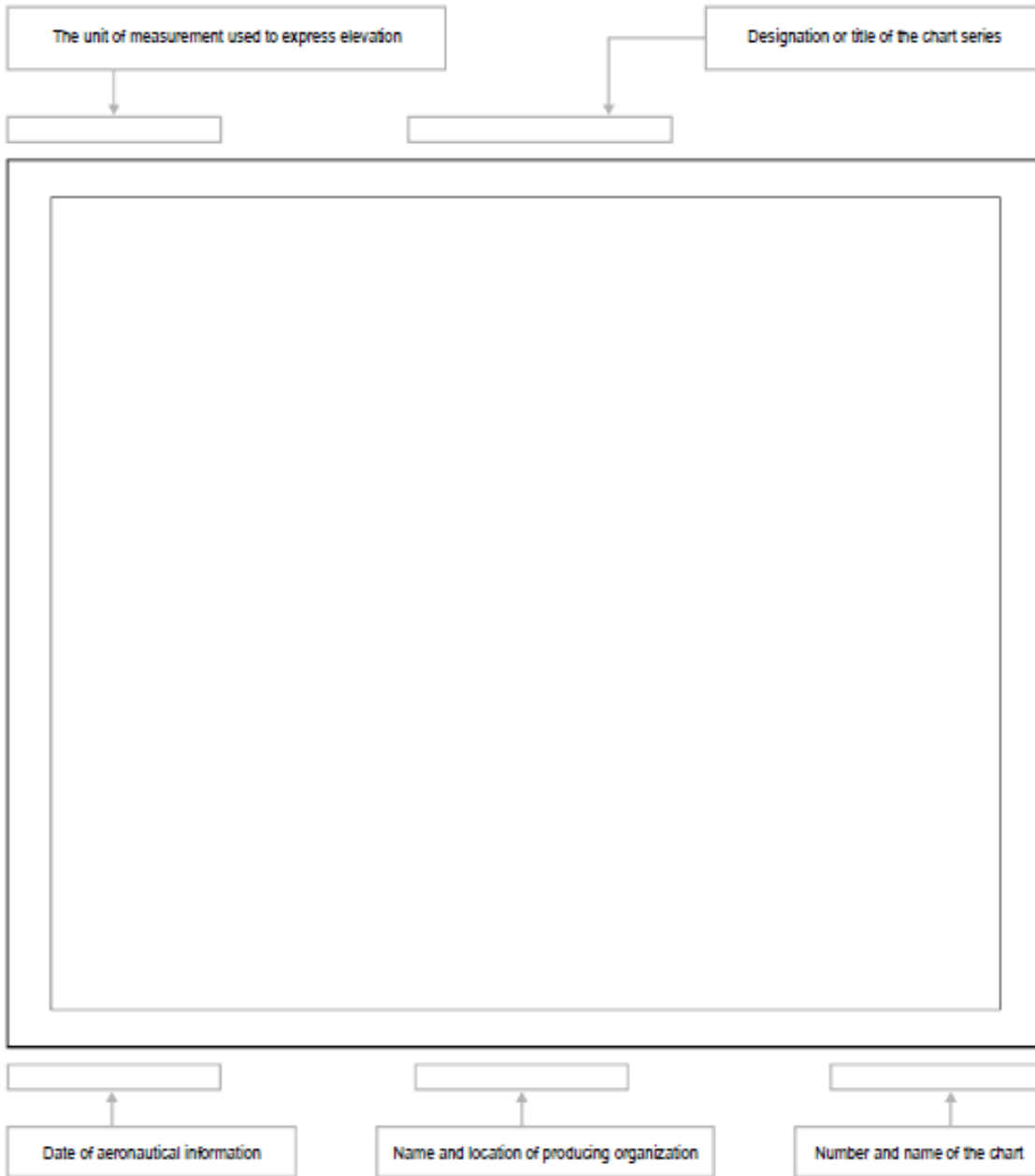
(C) Distance circles at 20-km or 10-NM intervals or, when practicable, 10-km or 5-NM intervals shown as fine dashed lines with the radius indicated on the circumference and centered on the identified aerodrome main VOR radio navigation aid or, if not available, on the aerodrome/heliport reference point;

(D) Notes concerning correction for low temperature effect, as applicable;











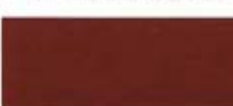

(vi) communications procedures including call sign(s) and channel(s) of the ATC unit(s) concerned.

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

**APPENDIX -A
Marginal Note Layout**



**APPENDIX –B
Coloure Guide**

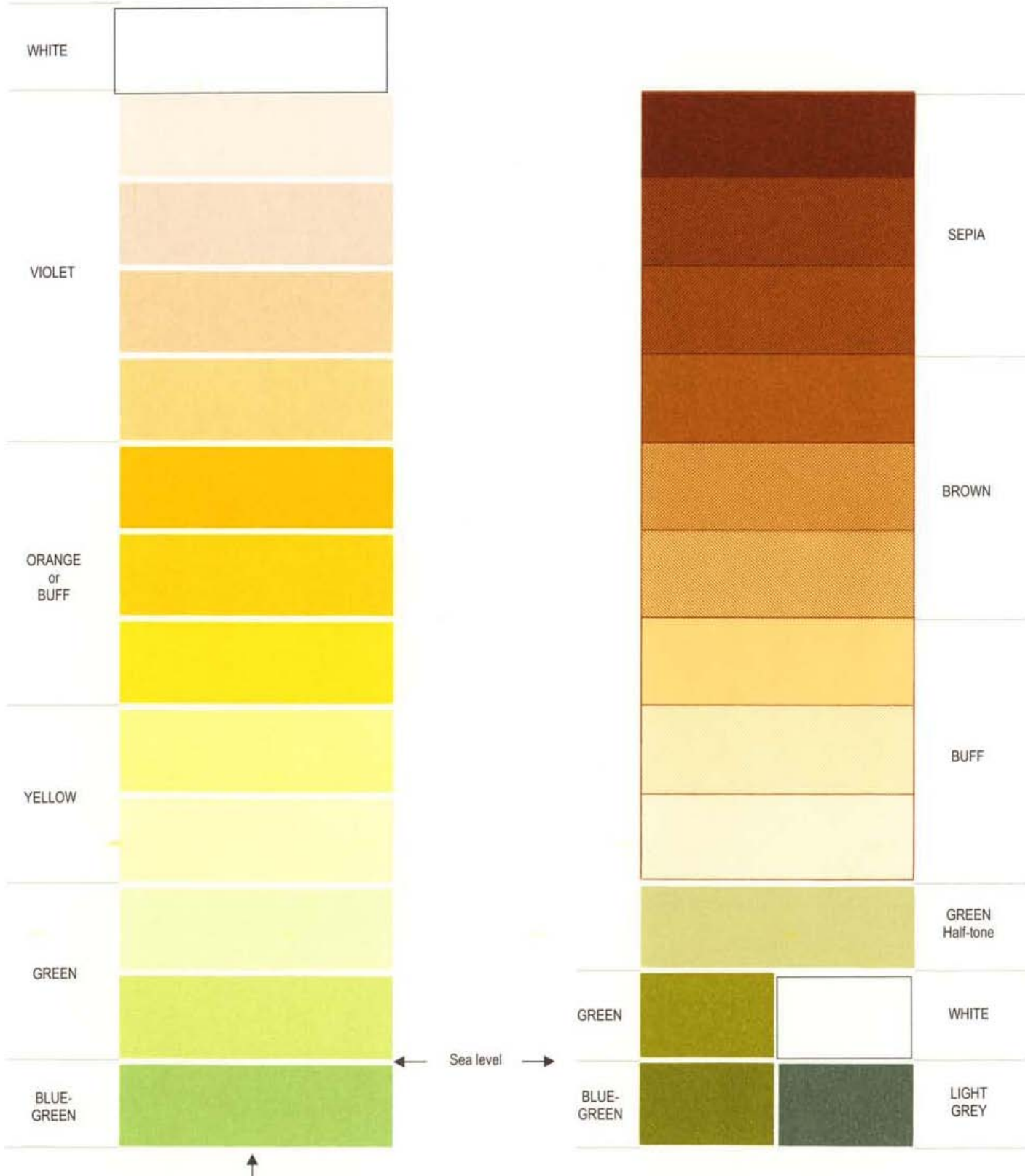
<p>BLACK: Culture, except high ways and roads; outlines of large cities, grids and graticules, spot elevations and danger lines and off shore rocks; names and lettering except for aeronautical and hydrographic features</p>	<p>BLACK </p>
<p>BLACK Stipple: Built up areas of cities</p>	<p>BLACK Stipple </p>
<p>BLACK } half tone Highways and roads</p>	<p>BLACK Half-tone </p>
<p>RED</p>	<p>RED </p>
<p>YELLOW Built up areas for Stipple cities (alternative for BLACK</p>	<p>YELLOW </p>
<p>BROWN Contours and topographic features: items 1 to 10 of appendix B. Hydrographic features items 39 to 41 appendix B</p>	<p>BROWN </p>
<p>BLUE Shore lines drainage river lakes contours and Hydrographic features including their and description</p>	<p>BLUE </p>
<p>BLUE half tone open water areas</p>	<p>BLUE Half-tone </p>
<p>BLUE stipple Salt lake and salt pans</p>	<p>BLUE Stipple </p>
<p>BLUE stipple Large non perennial rivers and lakes</p>	<p>BLUE Stipple </p>
<p>MAGENTA. } Aeronautical data except for enroute and area charts where different colors may be required. Both contours may be used on the same sheet, but where only one color is used dark blue is preferred</p>	<p>MAGENTA </p>
<p>DARK BLUE</p>	<p>DARK BLUE </p>

HYPSONOMETRIC TINTS

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

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

APPENDIX -C Hypsometric Tint Guide



APPENDIX -D Aeronautical Data Quality Requirements

Table 1. Latitude and longitude

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

Table 2. Elevation/altitude/height

Elevation/altitude/height	Chart resolution	Integrity Classification
Aerodrome/heliport elevation	1 m or 1 ft	Essential
WGS-84 geoids undulation at aerodrome/heliport elevation position	1 m or 1 ft	Essential
Runway or FATO threshold, non-precision approaches	1 m or 1 ft	Essential
WGS-84 geoids undulation at runway or FATO threshold, TLOF geometric centre, non-precision approaches	1 m or 1 ft	Essential
Runway or FATO threshold, precision approaches	0.5 m or 1 ft	Critical
WGS-84 geoids undulation at runway or FATO threshold, TLOF geometric centre, precision approaches	0.5 m or 1 ft	Critical
Threshold crossing height (Reference datum height), precision approaches	0.5 m or 1 ft	Critical
Obstacle clearance altitude/height (OCA/H)	as specified in PANS-OPS (Doc 8168)	Essential
Obstacles in Area 1 (the entire State territory)	3 m (10 ft)	Routine
Obstacles in Area 2	1 m or 1 ft	Essential
Obstacles in Area 3	1 m or 1 ft	Essential
Distance measuring equipment (DME)	30 m (100 ft)	Essential
Instrument approach procedures altitude	as specified in PANS-OPS (Doc 8168)	Essential
Minimum altitudes	50 m or 100 ft	Routine
Heliport crossing height. PinS approaches	1 m or 1 ft	Essential

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

Table 3. Gradients and angles

Type of gradient/angle	Chart resolution	Integrity / Classification
Non-precision final approach descent gradient.....	0.1 per cent	1 × 10 ⁻⁸ / critical
Final approach descent angle (Non-precision approach or approach with vertical guidance).....	0.1 degree	1 × 10 ⁻⁸ / critical
Precision approach glide path/elevation angle.....	0.1 degree	1 × 10 ⁻⁸ / critical

Table 4. Magnetic variation

Magnetic variation	Chart resolution	Integrity / Classification
Aerodrome/heliport magnetic variation.....	1 degree	1 × 10 ⁻⁵ / essential

Table 5. Bearing

Bearing	Chart resolution	Integrity / Classification
Airway segments	1 degree	1×10^{-3} / routine
En-route and terminal fix formations	1/10 degree	1×10^{-3} / routine
Terminal arrival/departure route segments	1 degree	1×10^{-3} / routine
Instrument approach procedure fix formations	1/10 degree	1×10^{-5} / essential
ILS localizer alignment	1 degree	1×10^{-5} / essential
MLS zero azimuth alignment	1 degree	1×10^{-5} / essential
Runway and FATO bearing	1 degree	1×10^{-3} / routine

Table 6. Length/distance/dimension

Length/distance/dimension	Chart resolution	Integrity / Classification
Airway segment length	1 km or 1 NM	1×10^{-3} / routine
En-route fix formation distance	2/10 km (1/10 NM)	1×10^{-3} / routine
Terminal arrival/departure route segment length	1 km or 1 NM	1×10^{-5} / essential
Terminal and instrument approach procedure fix formation distance	2/10 km (1/10 NM)	1×10^{-5} / essential
Runway and FATO length, TLOF dimensions	1 m	1×10^{-8} / critical
Runway width	1 m	1×10^{-5} / essential
Stopway length and width	1 m	1×10^{-8} / critical
Landing distance available	1 m	1×10^{-8} / critical
Take-off run available	1 m	1×10^{-8} / critical
Take-off distance available	1 m	1×10^{-8} / critical
Accelerate-stop distance available	1 m	1×10^{-8} / critical
ILS localizer antenna-runway end, distance	as plotted	1×10^{-3} / routine
ILS glide slope antenna-threshold, distance along centre line	as plotted	1×10^{-3} / routine
ILS marker-threshold distance	2/10 km (1/10 NM)	1×10^{-5} / essential
ILS DME antenna-threshold, distance along centre line	as plotted	1×10^{-5} / essential
MLS azimuth antenna-runway end, distance	as plotted	1×10^{-3} / routine
MLS elevation antenna-threshold, distance along centre line	as plotted	1×10^{-3} / routine
MLS DME/P antenna-threshold, distance along centre line	as plotted	1×10^{-5} / essential

APPENDIX- E
ATS Airspace Classes — Services Provided And
Flight Requirements

Class	Type of flight	Separation provided	Service provided	Speed limitation*	Radio communication requirement	Subject to an ATC clearance
A	IFR only	All aircraft	Air traffic control service	Not applicable	Continuous two-way	Yes
B	IFR	All aircraft	Air traffic control service	Not applicable	Continuous two-way	Yes
	VFR	All aircraft	Air traffic control service	Not applicable	Continuous two-way	Yes
C	IFR	IFR from IFR IFR from VFR	Air traffic control service	Not applicable	Continuous two-way	Yes
	VFR	VFR from IFR	1) Air traffic control service for separation from IFR; 2) VFR/VFR traffic information (and traffic avoidance advice on request)	250 kt IAS below 3 050 m (10 000 ft) AMSL	Continuous two-way	Yes
D	IFR	IFR from IFR	Air traffic control service, traffic information about VFR flights (and traffic avoidance advice on request)	250 kt IAS below 3 050 m (10 000 ft) AMSL	Continuous two-way	Yes
	VFR	Nil	IFR/VFR and VFR/VFR traffic information (and traffic avoidance advice on request)	250 kt IAS below 3 050 m (10 000 ft) AMSL	Continuous two-way	Yes
E	IFR	IFR from IFR	Air traffic control service and, as far as practical, traffic information about VFR flights	250 kt IAS below 3 050 m (10 000 ft) AMSL	Continuous two-way	Yes
	VFR	Nil	Traffic information as far as practical	250 kt IAS below 3 050 m (10 000 ft) AMSL	No	No
F	IFR	IFR from IFR as far as practical	Air traffic advisory service; flight information service	250 kt IAS below 3 050 m (10 000 ft) AMSL	Continuous two-way	No
	VFR	Nil	Flight information service	250 kt IAS below 3 050 m (10 000 ft) AMSL	No	No
G	IFR	Nil	Flight information service	250 kt IAS below 3 050 m (10 000 ft) AMSL	Continuous two-way	No
	VFR	Nil	Flight information service	250 kt IAS below 3 050 m (10 000 ft) AMSL	No	No

* When the height of the transition altitude is lower than 3 050 m (10 000 ft) AMSL, FL 100 should be used in lieu of 10 000 ft.