



**AIR NAVIGATION
TECHNICAL REGULATIONS
VOLUME III
PART 04**

AERONAUTICAL CHARTS

03 May 2024

INSTRUMENT PAGE

DOCUMENT CHANGE RECORD

The following table records the complete history of the successive editions of the present document.

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3	03 May 2024	Amendments 60 and 61	16, 21, 27-29 38-111

CHECK LIST OF PAGES

Pa ge	Date	Pa ge	Date	Pa ge	Date	Pa ge	Date
COVER		27	03 May 2024	54	03 May 2024	APPENDICES TO BCAR REGULATION III	
1	03 May 2024	28	03 May 2024	55	03 May 2024	81	3 rd January 2016
Instrument		CHAPTER 3		56	03 May 2024	APPENDIX 1	
2	26 th August 2018	29	03 May 2024	57	03 May 2024	82	3 rd January 2016
DOCUMENT CHANGE RECORD		30	03 May 2024	58	03 May 2024	APPENDIX 2	
3	03 May 2024	31	03 May 2024	CHAPTER 12		83	03 May 2024
RECORD OF AMENDMENTS		32	03 May 2024	59	03 May 2024	84	03 May 2024
4	03 May 2024	CHAPTER 4		60	03 May 2024	85	03 May 2024
CHECK LIST OF PAGES		33	03 May 2024	61	03 May 2024	86	03 May 2024
5	03 May 2024	CHAPTER 4 A		CHAPTER 13		87	03 May 2024
Blank		34	03 May 2024	62	03 May 2024	88	03 May 2024
6	03 May 2024	35	03 May 2024	63	26 th August 2018	89	03 May 2024
TABLE OF CONTENTS		36	03 May 2024	64	26 th August 2018	90	03 May 2024
7	03 May 2024	CHAPTER 5		CHAPTER 14		91	03 May 2024
8	03 May 2024	37	03 May 2024	65	03 May 2024	92	03 May 2024
9	03 May 2024	CHAPTER 6		66	03 May 2024	93	03 May 2024
10	03 May 2024	38	03 May 2024	CHAPTER 15		94	03 May 2024
11	03 May 2024	CHAPTER 7		67	03 May 2024	95	03 May 2024
12	03 May 2024	39	26 th August 2018	68	03 May 2024	96	03 May 2024
FOREWORD		40	26 th August 2018	CHAPTER 16		97	03 May 2024
13	03 May 2024	41	26 th August 2018	69	03 May 2024	98	03 May 2024
Remarks		CHAPTER 8		70	03 May 2024	99	03 May 2024
14	03 May 2024	42	03 May 2024	71	03 May 2024	100	03 May 2024
CHAPTER 1		43	03 May 2024	72	03 May 2024	101	03 May 2024
15	03 May 2024	44	03 May 2024	73	03 May 2024	102	03 May 2024
16	03 May 2024	CHAPTER 9		74	03 May 2024	APPENDIX 3	
17	03 May 2024	45	03 May 2024	CHAPTER 17		103	03 May 2024
18	03 May 2024	46	03 May 2024	75	03 May 2024	104	03 May 2024
19	03 May 2024	47	03 May 2024	CHAPTER 18		105	03 May 2024
20	03 May 2024	48	03 May 2024	76	03 May 2024	APPENDIX 4	
21	03 May 2024	CHAPTER 10		CHAPTER 19		110	03 May 2024
22	03 May 2024	49	03 May 2024	77	03 May 2024		
23	03 May 2024	50	03 May 2024	78	03 May 2024		
CHAPTER 2		51	03 May 2024	CHAPTER 20			
24	03 May 2024	52	03 May 2024	79	03 May 2024		
25	03 May 2024	CHAPTER 11		CHAPTER 21			
26	03 May 2024	53	03 May 2024	80	03 May 2024		

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TABLE OF CONTENTS

ITEM		PAGE
	DOCUMENT CHANGE RECORD.....	3
	RECORD OF AMENDMENTS	4
	CHECK LIST OF PAGES	5
	TABLE OF CONTENTS	8
A	FOREWORD	14
B.	Remarks	15
CHAPTER 1.	DEFINITIONS, APPLICABILITY AND AVAILABILITY	16
1.1	Definitions	16
1.2	Applicability	23
1.3	Availability.....	23
CHAPTER 2.	GENERAL SPECIFICATIONS.....	25
2.1	Operational requirements for charts.....	25
2.2	Titles	25
2.3	Miscellaneous information	25
2.4	Symbols.....	26
2.5	Units of measurement.....	26
2.6	Scale and projection	26
2.7	Date of validity of aeronautical information	26
2.8	Spelling of geographical names	27
2.9	Abbreviations	27
2.10	Political boundaries	27
2.11	Colours	27
2.12	Relief.....	27
2.13	Prohibited, restricted and danger areas	28
2.14	Air traffic services airspaces	28
2.15	Magnetic variation.....	28
2.16	Typography.....	28

2.17	Aeronautical data	28
2.18	Common reference systems	29
CHAPTER 3.	AERODROME OBSTACLE CHART - ICAO TYPE A (OPERATING LIMITATIONS)	30
3.1	Function	30
3.2	Availability.....	30
3.3	Units of measurement.....	30
3.4	Coverage and scale.....	30
3.5	Format	30
3.6	Identification	31
3.7	Magnetic variation.....	31
3.8	Aeronautical data	31
3.9	Accuracy	33
CHAPTER 4.	(intentionally left blank).....	34
CHAPTER 4A.	AERODROME OBSTACLE CHART - ICAO TYPE C.....	35
4A.1	Function	35
4A.2	Availability.....	35
4A.3	Coverage and scale.....	35
4A.4	Format	35
4A.5	Identification	36
4A.6	Magnetic variation.....	36
4A.7	Units of measurement.....	36
4A.8	Aeronautical data	36
4A.9	Accuracy	37
CHAPTER 5.	(intentionally left blank).....	38
CHAPTER 6.	PRECISION APPROACH TERRAIN CHART - ICAO.....	43
6.1	Function	43
6.2	Availability.....	43
6.3	Scale	43
6.4	Identification	43

6.5	Plan and profile information.....	43
CHAPTER 7.	ENROUTE CHART - ICAO	44
7.1	Function	44
7.2	Availability.....	44
7.3	Coverage and scale.....	44
7.4	Projection	44
7.5	Identification	44
7.6	Culture and topography.....	44
7.7	Magnetic variation	45
7.8	Bearings, tracks and radials	45
7.9	Aeronautical data	45
CHAPTER 8.	AREA CHART - ICAO	47
8.1	Function	47
8.2	Availability.....	47
8.3	Coverage and scale.....	47
8.4	Projection	47
8.5	Identification	47
8.6	Culture and topography.....	47
8.7	Magnetic variation	48
8.8	Bearings, tracks and radials	48
8.9	Aeronautical data	48
CHAPTER 9.	STANDARD DEPARTURE CHART INSTRUMENT (SID) - ICAO.....	50
9.1	Function	50
9.2	Availability.....	50
9.3	Coverage and scale.....	50
9.4	Projection	50
9.5	Identification	50
9.6	Culture and topography.....	50
9.7	Magnetic variation.....	51
9.8	Bearings, tracks and radials	51

9.9	Aeronautical data	51
CHAPTER 10.	STANDARD ARRIVAL CHART - INSTRUMENT (STAR) - ICAO	54
10.1	Function	54
10.2	Availability.....	54
10.3	Coverage and scale.....	54
10.4	Projection	54
10.5	Identification	54
10.6	Culture and topography.....	54
10.7	Magnetic variation	55
10.8	Bearings, tracks and radials	55
10.9	Aeronautical data	55
CHAPTER 11.	INSTRUMENT APPROACH CHART - ICAO	58
11.1	Function	58
11.2	Availability.....	58
11.3	Coverage and scale.....	58
11.4	Format	58
11.5	Projection	58
11.6	Identification	59
11.7	Culture and topography.....	59
11.8	Magnetic variation	59
11.9	Bearings, tracks and radials	59
11.10	Aeronautical data	60
CHAPTER 12.	VISUAL APPROACH CHART - ICAO.....	64
12.1	Function	64
12.2	Availability.....	64
12.3	Scale	64
12.4	Format	64
12.5	Projection	64
12.6	Identification	64
12.7	Culture and topography.....	64

12.8	Magnetic variation	65
12.9	Bearings, tracks and radials	65
12.10	Aeronautical data	65
CHAPTER 13.	AERODROME/HELIPORT CHART - ICAO	67
13.1	Function	67
13.2	Availability.....	67
13.3	Coverage and scale.....	67
13.4	Identification	67
13.5	Magnetic variation	67
13.6	Aerodrome/heliport data.....	68
CHAPTER 14.	AERODROME GROUND MOVEMENT CHART - ICAO.....	70
14.1	Function	70
14.2	Availability.....	70
14.3	Coverage and scale.....	70
14.4	Identification	70
14.5	Magnetic variation.....	70
14.6	Aerodrome data	70
CHAPTER 15.	AIRCRAFT PARKING/DOCKING CHART - ICAO	72
15.1	Function	72
15.2	Availability.....	72
15.3	Coverage and scale.....	72
15.4	Identification	72
15.5	Magnetic variation	72
15.6	Aerodrome data	72
CHAPTER 16.	WORLD AERONAUTICAL CHART- ICAO 1:1 000 000.....	74
16.1	Function	74
16.2	Availability.....	74
16.3	Scales	74
16.4	Format	74
16.5	Projection	75

16.6	Identification	76
16.7	Culture and topography	76
16.8	Magnetic variation	78
16.9	Aeronautical data	78
CHAPTER 17.	(intentionally left blank)	80
CHAPTER 18.	(intentionally left blank)	81
CHAPTER 19.	PLOTTING CHART - ICAO	82
19.1	Function	82
19.2	Availability	82
19.3	Coverage and scale	82
19.4	Format	82
19.5	Projection	82
19.6	Identification	82
19.7	Culture and topography	83
19.8	Magnetic variation	83
19.9	Aeronautical data	83
CHAPTER 20.	(intentionally left blank)	84
CHAPTER 21.	(intentionally left blank)	85
Appendices to BCAR Regulation III PART4		86
Appendix 1	MARGINAL NOTE LAYOUT	87
Appendix 2	ICAO CHART SYMBOLS	88
Appendix 3	COLOUR GUIDE	108
Appendix 4	HYPSONETRIC TINT GUIDE	110

A FOREWORD

In accordance with Annex 4 to the Chicago Convention (1944)¹ and other international obligations the Civil Aviation Affairs of the Kingdom of Bahrain (CAA) is responsible to manage and process the necessary data base; compile and print aeronautical charts and related products and services; and compile and print aeronautical charts and related products and services covering international airspace. This includes, but is not limited to the adoption of rules concerning the design, validation, production and maintenance of aeronautical charts.

The ICAO Council, on 13 April 1948, adopted a resolution inviting the attention of Contracting States to the desirability of using in their own national regulations, as far as is practicable, the precise language of those ICAO Standards that are of a regulatory character and also of indicating departures from the Standards, including any additional national regulations that are important for the safety or regularity of air navigation. Wherever possible, the provisions of the Annexes to the Chicago Convention have been written in such a way as would facilitate incorporation, without major textual changes, into national legislation.²

Therefore, the Regulation at hand reproduces the provision of ICAO Annex 4 “Aeronautical Charts” unchanged wherever possible and adapts it to the needs of the Kingdom of Bahrain wherever necessary.

The text does not take into account any (existing or planned) difference applicable in the Kingdom of Bahrain. According to Art. 38 of the Chicago Convention the Kingdom of Bahrain is obliged to communicate any difference between their national regulations and practices and the related ICAO Standards and Recommended Practices to ICAO and to publish in the AIP.

Any reference in the text to ICAO documents may be substituted by a reference to any existing CAA document (Manual, Instruction, Handbook) covering the same matters.

Hereinafter, wherever a reference is made to an ICAO Annex followed by a number, it shall refer to the Annex to the Chicago Convention (1944) corresponding to that number.

¹ Hereinafter: ICAO Annex (number).

² ICAO Annex 3, Foreword, p. (ix).

B. Remarks

To avoid any misunderstanding within this document:

1. The words 'shall' and 'must' indicate that compliance is compulsory.
2. The word 'should' indicates a recommendation. It does not mean that the compliance is optional but rather that, where insurmountable difficulties exist, the BCAA may accept an alternative means of compliance, and provided that an acceptable safety assurance from the authority shows that the safety requirements will not be reduced below that intended by the requirement.
3. The word 'can' or 'may' is used in a permissive sense to state authority or permission to do the act prescribed.
4. The word 'will' is used to express the future.
5. The "Notes" contained in the ICAO Annex 4 have not been included into the regulatory part of this Regulation. They have no regulatory function and, therefore, they may form a part of the handbooks, manuals etc. to Part 04 only.

CHAPTER 1 DEFINITIONS, APPLICABILITY AND AVAILABILITY

1.1 Definitions

When the following terms are used in this Regulation for aeronautical charts, they have the following meanings:

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

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

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

- a) take-off, expressed in terms of runway visual range and/or visibility and, if necessary, cloud conditions;
- b) landing in precision approach and landing operations, expressed in terms of visibility and/or runway visual range and decision altitude/height (DA/H) as appropriate to the category of the operation;
- c) landing in approach and landing operations with vertical guidance, expressed in terms of visibility and/or runway visual range and decision altitude/height (DA/H); and
- d) landing in non-precision approach and landing operations, expressed in terms of visibility and/or runway visual range, minimum descent altitude/height (MDA/H) and, if necessary, cloud conditions.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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.

CAA. Bahrain Civil Aviation Affairs. The Civil aviation authority of the Kingdom of Bahrain.

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

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

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

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

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

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

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

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
- c) ends at a point in the vicinity of an aerodrome from which:
 - 1) a landing can be made; or
 - 2) a missed approach procedure is initiated.

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

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

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

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

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

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 ground taxi operations are completed or where the helicopter touches down and lifts off for air taxi operations.

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

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

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

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

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

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

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

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.

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

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

Metadata. Data about data (ISO 19115*).

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

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

Minimum sector altitude. The lowest altitude which may be used which will provide a minimum clearance of 300 m (1 000 ft) above all objects located in an area contained within a sector of a circle of 46 km (25 NM) radius centred on a radio aid to navigation.

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

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

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

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

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

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

Obstacle. All fixed (whether temporary or permanent) and mobile objects, or parts thereof, that:

- a) are located on an area intended for the surface movement of aircraft; or
- b) extend above a defined surface intended to protect aircraft in flight; or
- c) stand outside those defined surfaces and that have been assessed as being a hazard to air navigation.

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 frangibly mounted one required for air navigation purposes.

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

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

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

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

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

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

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 the Kingdom of Bahrain, within which the flight of aircraft is restricted in accordance with certain specified conditions.

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

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

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

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.

Taxi-route. A defined path established for the movement of helicopters from one part of a heliport to another. A taxi-route includes a helicopter air or ground taxiway which is centred on the taxi-route.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

1.2 Applicability

1.2.1 The specifications in this Regulation are applicable on and after 1st November 2015

1.2.2 All charts coming within the scope of this Regulation and bearing the aeronautical information date of 1st November 2015 or later shall conform to the provisions relevant to the particular chart.

1.2.2.1 All such charts shall in addition conform to the provisions relevant to the particular chart.

1.3 Availability

1.3.1 *Information.* The CAA shall on request by another Contracting State provide all information relating to the territory of the Kingdom of Bahrain that is necessary to enable the provisions of this Regulation to be met.

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

1.3.2.1 For any chart or single sheet of a chart series entirely contained within the territory of the Kingdom of Bahrain, the CAA shall either:

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

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

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

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

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

CHAPTER 2 GENERAL SPECIFICATIONS

2.1 Operational requirements for charts

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

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

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

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

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

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

2.1.7 The charts shall be True North orientated.

2.1.8 The basic sheet size of the charts shall be 210 × 148 mm (8.27 × 5.82 in) (A5).

2.2 Titles

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

2.3 Miscellaneous information

2.3.1 The marginal note layout shall be as given in Appendix 1, except as otherwise specified for a particular chart.

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

- a) designation or title of the chart series;
- b) name and reference of the sheet;
- c) on each margin an indication of the adjoining sheet (when applicable).

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

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

2.4 Symbols

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

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

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

2.4.4 The CAA shall ensure that symbols are shown in the manner specified in 2.4.2, 2.4.3 and Appendix 2 - ICAO Chart Symbols, symbol number 121.

2.4.5 (*Intentionally left blank*)

2.5 Units of measurement

2.5.1 Distances shall be derived as geodesic distances.

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

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

2.5.4 Linear dimensions on aerodromes and short distances shall be expressed in metres.

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

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

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

2.6 Scale and projection

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

2.6.2 For charts of small areas, a linear scale only shall be indicated.

2.7 Date of validity of aeronautical information

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

2.8 Spelling of geographical names

2.8.1 The symbols of the Roman alphabet shall be used for all writing.

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

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

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

2.9 Abbreviations

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

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

2.10 Political boundaries

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

2.10.2 Where the territory of more than one State appears on a chart, the names identifying the countries shall be indicated.

2.11 Colours

Colours used on charts shall conform to Appendix 3 - Colour Guide.

2.12 Relief

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

- a) orientation and identification;
- b) safe terrain clearance;
- c) clarity of aeronautical information when shown;
- d) planning.

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

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

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

2.13 Prohibited, restricted and danger areas

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

2.14 Air traffic services airspaces

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

2.14.2 On charts used for visual flight, those parts of the ATS Airspace Classes table (Appendix 4) in ICAO Annex 11 applicable to the airspace depicted on the chart shall be on the face or reverse of each chart.

2.15 Magnetic variation

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

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

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

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

2.16 Typography

2.17 Aeronautical data

2.17.1 The CAA shall take all necessary measures to introduce a properly organized quality system containing procedures, processes and resources necessary to implement quality management at each function stage as outlined in ICAO Annex 15, 3.6. The execution of such quality management shall be made demonstrable for each function stage, when required. In addition, the CAA shall ensure that established procedures exist in order that aeronautical data at any moment is traceable to its origin so to allow any data anomalies or errors, detected during the production/maintenance phases or in the operational use, to be corrected.

2.17.2 The CAA shall ensure that the order of chart resolution of aeronautical data shall be that as specified for a particular chart.

2.17.3 Contracting States shall ensure that integrity of aeronautical data is maintained throughout the data process from origination to distribution to the next intended user.

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

2.18 Common reference systems

2.18.1 Horizontal reference system

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

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

2.18.1.3 The chart resolution of geographical coordinates shall be that specified for a particular chart series.

2.18.2 Vertical reference system

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

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

2.18.2.3 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.

2.18.3 Temporal reference system

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

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

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

3.1 Function

This chart, in combination with the relevant information published in the AIP of the Kingdom of Bahrain, shall provide the data necessary to enable an operator to comply with the operating limitations of ICAO Annex 6, Part I, Chapter 5, and Part III, Section II, Chapter 3.

3.2 Availability

3.2.1 Aerodrome Obstacle Charts - ICAO Type A (Operating Limitations) shall be made available in the manner prescribed in 1.3.2 for all aerodromes regularly used by national and international civil aviation, except for those aerodromes where there are no obstacles in the take-off flight path areas.

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

3.3 Units of measurement

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

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

3.4 Coverage and scale

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

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

3.4.3 The horizontal scale shall be 1:10 000.

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

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

3.5 Format

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

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

3.5.3 A profile grid shall be ruled over the entire profile area exclusive of the runway. The zero for vertical coordinates shall be mean sea level. The zero for horizontal coordinates shall be the end of the runway furthest from the take-off flight path area concerned. Graduation marks

indicating the sub-divisions of intervals shall be shown along the base of the grid and along the vertical margins.

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

3.5.4 The chart shall include:

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

3.6 Identification

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

3.7 Magnetic variation

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

3.8 Aeronautical data

3.8.1 Obstacles

3.8.1.1 Objects in the take-off flight path area which project above a plane surface having a 1.2 per cent slope and having a common origin with the take-off flight path area shall be regarded as obstacles, except that obstacles lying wholly below the shadow of other obstacles as defined in 3.8.1.2 need not be shown. Mobile objects such as boats, trains and trucks, which may project above the 1.2 per cent plane, shall be considered obstacles but shall not be considered as being capable of creating a shadow.

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

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

3.8.2 Take-off flight path area

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

- a) it commences at the end of the area declared suitable for take-off (i.e. at the end of the runway or clearway as appropriate);
- b) its width at the point of origin is 180 m (600 ft) and this width increases at the rate of 0.25D to a maximum of 1 800 m (6 000 ft), where D is the distance from the point of

origin;

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

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

3.8.3 Declared distances

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

- a) take-off run available;
- b) accelerate-stop distance available;
- c) take-off distance available;
- d) landing distance available.

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

3.8.4 Plan and profile views

3.8.4.1 The plan view shall show:

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

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

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

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

3.8.4.2 The profile view shall show:

- a) the profile of the centre line of the runway by a solid line and the profile of the centre

line of any associated stopways and clearways by a broken line;

- b) the elevation of the runway centre line at each end of the runway, at the stopway and at the origin of each take-off flight path area, and at each significant change in slope of runway and stopway;
- c) obstacles, including:
 - 1) each obstacle by a solid vertical line extending from a convenient grid line over at least one other grid line to the elevation of the top of the obstacle;
 - 2) identification of each obstacle;
 - 3) the limits of penetration of obstacles of large extent in a distinctive manner identified in the legend.

3.9 Accuracy

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

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

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

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

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

CHAPTER 4 *(Intentionally left blank)*³

³ „Reserved“ for “Aerodrome Obstacle Chart - ICAO Type B”.

CHAPTER 4A AERODROME OBSTACLE CHART - ICAO TYPE C⁴

4A.1 Function

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

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

4A.2 Availability

This chart is not required where:

- a) the obstacle data specified in 4A.1 are published in the AIP of the Kingdom of Bahrain;
or
- b) no significant obstacles exist and notification of this is published in the AIP of the Kingdom of Bahrain.

4A.3 Coverage and scale

4A.3.1 The extent of each chart shall be sufficient:

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

4A.3.2 The horizontal scale shall be within the range of 1:20 000 to 1:100 000.

4A.4 Format

The chart shall include:

- a) any necessary explanation of the projection used;
- b) any necessary identification of the grid used;

⁴ „Reserved“ for “Aerodrome Obstacle Chart - ICAO Type B”.

- c) a box for recording amendments and dates thereof;
- d) a box for recording the declared distances specified in 4A.8.2;
- e) graduation marks at consistent intervals outside the neat line, at least every 10 minutes of latitude and longitude and marked in degrees and minutes.

4A.5 Identification

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

4A.6 Magnetic variation

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

4A.7 Units of measurement

4A.7.1 Elevations shall be shown to the nearest metre or foot.

4A.7.2 Linear dimensions shall be shown to the nearest metre.

4A.8 Aeronautical data

4A.8.1 The chart shall show:

- a) the aerodrome reference point and its geographical coordinates in degrees, minutes and seconds;
- b) the runways and the extended runway centre lines;
- c) significant obstacles as specified in 4A.3.1 a) and b); the extent of each plan shall be sufficient to cover all significant obstacles except that isolated distant obstacles that would unnecessarily increase the sheet size may be indicated by an arrow, provided that the distance and bearing from a reference point and their elevation and geographical coordinates in degrees, minutes, seconds and tenths of seconds are given;
- d) the exact position of each significant obstacle by a symbol and its geographical coordinates in degrees, minutes, seconds and tenths of seconds;
- e) the elevation of each significant obstacle;
- f) an indication of the type of each significant obstacle;
- g) the limits of penetration of significant obstacles of large extent in a distinctive manner identified in the legend;
- h) the positions of all radio navigation aids.

4A.8.2 Declared distances

4A.8.2.1 The following information for each direction of each runway shall be entered in the space provided:

- a) take-off run available;

- b) accelerate-stop distance available;
- c) take-off distance available;
- d) landing distance available.

4A.8.2.2 Where a declared distance is not provided because a runway direction cannot be used for take-off or landing or both, then this shall be indicated and the words “not usable” or the abbreviation “NU” entered.

4A.9 Accuracy

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

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

5.1 Function

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

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

5.2 Availability

- 5.2.1 Aerodrome Terrain and Obstacle Charts — ICAO (Electronic) shall be made available in the manner prescribed in 1.3.2 for aerodromes regularly used by international civil aviation.
- 5.2.2 Aerodrome Terrain and Obstacle Charts — ICAO (Electronic) shall be made available in the manner prescribed in 1.3.2 for all aerodromes regularly used by international civil aviation.
- 5.2.3 The Aerodrome Terrain and Obstacle Chart — ICAO (Electronic) shall also be made available in hard copy format upon request.
- 5.2.4 The ISO 19100 series of standards for geographic information shall be used as a general data modelling framework.

5.3 Identification

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

5.4 Chart Coverage

The extent of each chart shall be sufficient to cover Area 2 as specified in Annex 15, Chapter 5.

5.5 Chart content

5.5.1 General

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

5.5.1.2 Symbols used to portray features shall be in accordance with 2.4 and Appendix 2 — ICAO Chart Symbols.

5.5.2 Terrain feature

5.5.2.1 The terrain feature, and associated attributes, to be portrayed and database-linked to the chart shall be based on the terrain data sets which satisfy the requirements of Annex 15, Chapter 5.

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

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

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

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

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

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

5.5.3 Obstacle features

5.5.3.1 Obstacle features, and associated attributes, portrayed or database-linked to the chart shall be based on obstacle data sets which satisfy the requirements of Annex 15, Chapter 5.

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

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

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

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

5.5.4 Aerodrome features

5.5.4.1 Aerodrome features, and associated attributes, portrayed and database-linked to the chart shall be based on aerodrome data which satisfy the requirements of Annex 15, Chapter 5.

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

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

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

- a) geographical coordinates of the aerodrome reference point;
- b) aerodrome magnetic variation, year of information and annual change;
- c) length and width of runway(s), stopway(s) and clearway(s);
- d) type of surface of runway(s) and stopway(s);
- e) magnetic bearings of the runway(s) to the nearest degree;
- f) elevations at each end of runway(s), stopway(s) and clearway(s), and at each significant change in slope of runway(s) and stopway(s);
- g) declared distances for each runway direction, or the abbreviation "NU" where a runway direction cannot be used for take-off or landing or both.

5.5.5 Radio navigation aid features

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

5.6 Accuracy and resolution

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

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

5.7 Electronic functionality

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

5.8 Chart data product specifications

- 5.8.1 A comprehensive statement of the data sets comprising the chart shall be provided in the form of data product specifications on which basis air navigation users will be able to evaluate the chart data product and determine whether it fulfils the requirements for its intended use (application).
- 5.8.2 The chart data product specifications shall include an overview, a specification scope, a data product identification, data content information, the reference systems used, the data quality requirements, and information on data capture, data maintenance, data portrayal, data product delivery, as well as any additional information available, and metadata.
- 5.8.3 The overview of the chart data product specifications shall provide an informal description of the product and shall contain general information about the data product. The specification scope of the chart data product specifications shall contain the spatial (horizontal) extent of the chart coverage. The chart data product identification shall include the title of the product, a brief narrative summary of the content and purpose, and a description of the geographic area covered by the chart.
- 5.8.4 The data content of the chart data product specifications shall clearly identify the type of coverage and/or imagery and shall provide a narrative description of each.
- 5.8.5 The chart data product specifications shall include information that defines the reference systems used. This shall include the spatial reference system (horizontal and vertical) and, if appropriate, temporal reference system. The chart data product specifications shall identify the data quality requirements. This shall include a statement on acceptable conformance quality levels and corresponding data quality

measures. This statement shall cover all the data quality elements and data quality sub-elements, even if only to state that a specific data quality element or sub-element is not applicable.

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

CHAPTER 6 PRECISION APPROACH TERRAIN CHART - ICAO

6.1 Function

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

6.2 Availability

6.2.1 The Precision Approach Terrain Chart - ICAO shall be made available for all precision approach runways Categories II and III at aerodromes used by national and international civil aviation.

6.2.2 The Precision Approach Terrain Chart - ICAO shall be revised whenever any significant change occurs.

6.3 Scale

6.3.1 The horizontal scale shall be 1:2 500, and the vertical scale 1:500.

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

6.4 Identification

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

6.5 Plan and profile information

6.5.1 The chart shall include:

- a) a plan showing contours at 1 m (3 ft) intervals in the area 60 m (200 ft) on either side of the extended centre line of the runway, to the same distance as the profile, the contours to be related to the runway threshold;
- b) an indication where the terrain or any object thereon, within the plan defined in a), differs by ± 3 m (10 ft) in height from the centre line profile and is likely to affect a radio altimeter;
- c) a profile of the terrain to a distance of 900 m (3 000 ft) from the threshold along the extended centre line of the runway.

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

6.5.3 The ILS reference datum height shall be shown to the nearest half metre or foot.

CHAPTER 7 ENROUTE CHART - ICAO

7.1 Function

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

7.2 Availability

7.2.1 The Enroute Chart - ICAO shall be made available in the manner prescribed in 1.3.2 for all areas where flight information regions have been established.

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

7.3

7.3 Coverage and scale

7.3.1 Layout of sheet lines shall be determined by the density and pattern of the ATS route structure.

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

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

7.4 Projection

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

7.4.2 Parallels and meridians shall be shown at suitable intervals.

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

7.5 Identification

Each sheet shall be identified by chart series and number.

7.6 Culture and topography

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

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

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

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

7.7 Magnetic variation

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

7.8 Bearings, tracks and radials

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

7.8.2 In areas of high latitude where it is determined by CAA that reference to Magnetic North is impractical, another suitable reference, i.e. True North or Grid North, should be used.

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

7.9 Aeronautical data

7.9.1 Aerodromes

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

7.9.2 Prohibited, restricted and danger areas

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

7.9.3 Air traffic services system

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

7.9.3.1.1 The components shall include the following:

- a) the radio navigation aids associated with the air traffic services system together with their names, identifications, frequencies and geographical coordinates in degrees, minutes and seconds;
- b) in respect of DME, additionally the elevation of the transmitting antenna of the DME to the nearest 30 m (100 ft);
- c) an indication of all designated airspace, including lateral and vertical limits and the appropriate class of airspace;
- d) All ATS routes for en-route flight including route designators, the track to the nearest degree in both directions along each segment of the routes and, where established, the designation of the navigation specification(s) including any limitations and the direction of traffic flow;
- e) all significant points which define the ATS routes and are not marked by the position of a radio navigation aid, together with their name-codes and geographical coordinates in

degrees, minutes and seconds;

- f) in respect of waypoints defining VOR/DME area navigation routes, additionally,
 - 1. the station identification and radio frequency of the reference VOR/DME;
 - 2. the bearing to the nearest tenth of a degree and the distance to the nearest two-tenths of a kilometre (tenth of a nautical mile) from the reference VOR/ DME, if the waypoint is not collocated with it;
- g) an indication of all compulsory and “on-request” reporting points and ATS/MET reporting points;
- h) the distances to the nearest kilometre or nautical mile between significant points constituting turning points or reporting points;
- i) change-over points on route segments defined by reference to very high frequency omnidirectional radio ranges, indicating the distances to the nearest kilometre or nautical mile to the navigation aids;
- j) minimum en-route altitudes and minimum obstacle clearance altitudes, on ATS routes to the nearest higher 50 metres or 100 feet (see ICAO Annex 11, 2.22);
- k) minimum en-route altitudes and minimum obstacle clearance altitudes, on ATS routes to the nearest higher 50 metres or 100 feet (see Annex 11, 2.22);
- l) air defence identification zone (ADIZ) properly identified.

7.9.4 Supplementary information

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

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

CHAPTER 8 AREA CHART - ICAO

8.1 Function

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

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

8.2 Availability

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

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

8.3 Coverage and scale

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

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

8.4 Projection

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

8.4.2 Parallels and meridians shall be shown at suitable intervals.

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

8.5 Identification

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

8.6 Culture and topography

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

8.6.2 To improve situational awareness in areas where significant relief exists, all relief exceeding 300 m (1 000 ft) above the elevation of the primary aerodrome shall be shown by smoothed contour lines, contour values and layer tints printed in brown. Appropriate spot

elevations, including the highest elevation within each top contour line, shall be shown printed in black. Obstacles shall also be shown.

8.7 Magnetic variation

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

8.8 Bearings, tracks and radials

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

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

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

8.9 Aeronautical data

8.9.1 Aerodromes

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

8.9.2 Prohibited, restricted and danger areas

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

8.9.3 Area minimum altitudes

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

8.9.4 Air traffic services system

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

8.9.4.1.1 The components shall include the following:

- a) the radio navigation aids associated with the air traffic services system, together with their names, identifications, frequencies and geographical coordinates in degrees, minutes and seconds;
- b) in respect of DME, additionally the elevation of the transmitting antenna of the DME to the nearest 30 m (100 ft);
- c) terminal radio aids which are required for outbound and inbound traffic and for holding

- patterns;
- d) the lateral and vertical limits of all designated airspace and the appropriate class of airspace;
 - e) the designation of the navigation specification(s) including any limitations, where established;
 - f) holding patterns and terminal routings, together with the route designators, and the track to the nearest degree along each segment of the prescribed airways and terminal routings;
 - g) all significant points which define the terminal routings and are not marked by the position of a radio navigation aid, together with their name-codes and geographical coordinates in degrees, minutes and seconds;
 - h) in respect of waypoints defining VOR/DME area navigation routes, additionally,,
 - 1. the station identification and radio frequency of the reference VOR/DME;
 - 2. the bearing to the nearest tenth of a degree and the distance to the nearest two-tenths of a kilometre (tenth of a nautical mile) from the reference VOR/DME, if the waypoint is not collocated with it;
 - i) an indication of all compulsory and “on-request” reporting points;
 - j) the distances to the nearest kilometre or nautical mile between significant points constituting turning points or reporting points;
 - k) change-over points on route segments defined by reference to very high frequency omnidirectional radio ranges, indicating the distances to the nearest kilometre or nautical mile to the radio navigation aids;
 - l) minimum en-route altitudes and minimum obstacle clearance altitudes, on ATS routes to the nearest higher 50 metres or 100 feet (see ICAO Annex 11, 2.22);
 - m) established minimum vectoring altitudes to the nearest higher 50 m or 100 ft, clearly identified;
 - n) area speed and level/altitude restrictions where established;
 - o) communication facilities listed with their channels and, if applicable, logon address and SATVOICE number; and.
 - p) an indication of “flyover” significant points.

CHAPTER 9 STANDARD DEPARTURE CHART INSTRUMENT (SID) - ICAO

9.1 Function

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

9.2 Availability

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

9.3 Coverage and scale

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

9.3.2 The chart shall be drawn to scale.

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

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

9.4 Projection

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

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

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

9.5 Identification

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

9.6 Culture and topography

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

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

9.7 Magnetic variation

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

9.8 Bearings, tracks and radials

9.8.1 Bearings, tracks and radials shall be magnetic, except as provided for in 9.8.2. Where bearings and tracks are additionally provided as true values for RNAV segments, they shall be shown in parentheses to the nearest tenth of a degree, e.g. 290° (294.9°T).

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

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

9.9 Aeronautical data

9.9.1 Aerodromes

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

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

9.9.2 Prohibited, restricted and danger areas

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

9.9.3 Minimum sector altitude

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

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

9.9.4 Air traffic services system

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

9.9.4.1.1 The components shall comprise the following:

- a. graphic portrayal of each standard departure route - instrument, including:
 - 1) for departure procedures designed specifically for helicopters, the term "CAT H" shall be depicted in the departure chart plan view;
 - 2) route designator;
 - 3) significant points defining the route;
 - 4) track or radial to the nearest degree along each segment of the route;
 - 5) distances to the nearest kilometre or nautical mile between significant points;
 - 6) minimum obstacle clearance altitudes, along the route or route segments and altitudes required by the procedure to the nearest higher 50 m or 100 ft and flight level restrictions where established;
 - 7) where the chart is drawn to scale and vectoring on departure is provided, established minimum vectoring altitudes to the nearest higher 50 m or 100 ft, clearly identified;
- b. the radio navigation aid(s) associated with the route(s) including: 1) plain language name; 2) identification; 3) frequency; 4) geographical coordinates in degrees, minutes and seconds; 5) for DME, the channel and the elevation of the transmitting antenna of the DME to the nearest 30 m (100 ft);
- c. significant points not marked by the position of a radio navigation aid including:
 - 1) when the significant point is used for conventional navigation:
 - i) name-code;
 - ii) geographical coordinates in degrees, minutes and seconds;
 - iii) bearing to the nearest tenth of a degree from the reference radio navigation aid;
 - iv) distance to the nearest two-tenths of a kilometre (tenth of a nautical mile) from the reference radio navigation aid; and
 - v) identification of the reference radio navigation aid;
 - 2) when the significant point is used for area navigation:
 - i) name-code;
- d. applicable holding patterns;
- e. transition altitude/height to the nearest higher 300 m or 1 000 ft;
- f. the position and height of close-in obstacles which penetrate the obstacle identification surface (OIS). A note shall be included whenever close-in obstacles penetrating the OIS exist but which were not considered for the published procedure design gradient;
- g. area speed restrictions, where established;
- h. the designation of the navigation specification(s) including any limitations, where established;
- I. all compulsory and "on-request" reporting points;
- J. radio communication procedures, including:

- 1) call sign(s) of ATS unit(s);
- 2) frequency and, if applicable, SATVOICE number;
- 3) transponder setting, where appropriate;

k an indication of “flyover” significant points.

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

9.9.4.3 Aeronautical database requirements

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

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

10.1 Function

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

10.2 Availability

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

10.3 Coverage and scale

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

10.3.2 The chart shall be drawn to scale.

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

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

10.4 Projection

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

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

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

10.5 Identification

The chart shall be identified by the name of the city or town or area which the aerodrome serves, the name of the aerodrome, and the identification of the standard arrival route(s) - instrument as established in accordance with the *Procedures for Air Navigation Services - Aircraft Operations* (PANS-OPS, Doc 8168), Volume II, Part I, Section 4, Chapter 2.

10.6 Culture and topography

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

10.6.2 To improve situational awareness in areas where significant relief exists, the chart shall be drawn to scale and all relief exceeding 300 m (1 000 ft) above the aerodrome elevation shall be

shown by smoothed contour lines, contour values and layer tints printed in brown. Appropriate spot elevations, including the highest elevation within each top contour line, shall be shown printed in black. Obstacles shall also be shown.

10.7 Magnetic variation

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

10.8 Bearings, tracks and radials

10.8.1 Bearings, tracks and radials shall be magnetic, except as provided for in 10.8.2. Where bearings and tracks are additionally provided as true values for RNAV segments, they shall be shown in parentheses to the nearest tenth of a degree, e.g. 290° (294.9°T).

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

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

10.9 Aeronautical data

10.9.1 Aerodromes

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

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

10.9.2 Prohibited, restricted and danger areas

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

10.9.3 Minimum sector altitude

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

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

10.9.4 Air traffic services system

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

10.9.4.1.1 The components shall comprise the following:

- a) a graphic portrayal of each standard arrival route - instrument, including:
 - 1) route designator;
 - 2) significant points defining the route;
 - 3) track or radial to the nearest degree along each segment of the route;
 - 4) distances to the nearest kilometre or nautical mile between significant points;
 - 5) minimum obstacle clearance altitudes, along the route or route segments and altitudes required by the procedure to the nearest higher 50 m or 100 ft and flight level restrictions where established;
 - 6) where the chart is drawn to scale and vectoring on arrival is provided, established minimum vectoring altitudes to the nearest higher 50 m or 100 ft, clearly identified;
- b) the radio navigation aid(s) associated with the route(s) including:
 - 1) plain language name;
 - 2) identification;
 - 3) frequency;
 - 4) geographical coordinates in degrees, minutes and seconds;
 - 5) for DME, the channel and the elevation of the transmitting antenna of the DME to the nearest 30 m (100 ft);
- c) significant points not marked by the position of a radio navigation aid including:
 - 1) when the significant point is used for conventional navigation:
 - i) name-code;
 - ii) geographical coordinates in degrees, minutes and seconds;
 - iii) bearing to the nearest tenth of a degree from the reference radio navigation aid;
 - iv) distance to the nearest two-tenths of a kilometre (tenth of a nautical mile) from the reference radio navigation aid;
 - v) identification of the reference radio navigation aid;
 - 2) when the significant point is used for area navigation:
 - i) name-code;
- d) applicable holding patterns;
- e) transition altitude/height to the nearest higher 300 m or 1 000 ft;
- f) area speed restrictions, where established;
- g) the designation of the navigation specification(s) including any limitations, where established;
- h) all compulsory and "on-request" reporting points;
- i) radio communication procedures, including:

- 1) call sign(s) of ATS unit(s);
- 2) frequency and, if applicable, SATVOICE number;;
- 3) transponder setting, where appropriate;
- j) an indication of “flyover” significant waypoints.
- k) for arrival procedures to an instrument approach designed specifically for helicopters, the term “CAT H” shall be depicted in the arrival chart plan view.

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

10.9.4.3 Aeronautical database requirements

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

CHAPTER 11 INSTRUMENT APPROACH CHART - ICAO

11.1 Function

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

11.2 Availability

11.2.1 Instrument Approach Charts - ICAO shall be made available for all aerodromes used by national and international civil aviation where instrument approach procedures have been established by the CAA.

11.2.2 A separate Instrument Approach Chart - ICAO shall normally be provided for each precision approach procedure established by the CAA.

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

11.2.4 When the values for track, time or altitude differ between categories of aircraft on other than the final approach segment of the instrument approach procedures and the listing of these differences on a single chart could cause clutter or confusion, more than one chart shall be provided.

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

11.3 Coverage and scale

11.3.1 The coverage of the chart shall be sufficient to include all segments of the instrument approach procedure and such additional areas as may be necessary for the type of approach intended.

11.3.2 The scale selected shall ensure optimum legibility consistent with: a) the procedure shown on the chart; b) sheet size.

11.3.3 A scale indication shall be given.

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

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

11.4 Format

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

11.5 Projection

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

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

11.6 Identification

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

11.7 Culture and topography

11.7.1 Culture and topographic information pertinent to the safe execution of the instrument approach procedure, including the missed approach procedure, associated holding procedures and visual manoeuvring (circling) procedure when established, shall be shown. Topographic information shall be named, only when necessary, to facilitate the understanding of such information, and the minimum shall be a delineation of land masses and significant lakes and rivers.

11.7.2 Relief shall be shown in a manner best suited to the particular elevation characteristics of the area. In areas where relief exceeds 1 200 m (4 000 ft) above the aerodrome elevation within the coverage of the chart or 600 m (2 000 ft) within 11 km (6 NM) of the aerodrome reference point or when final approach or missed approach procedure gradient is steeper than optimal due to terrain, all relief exceeding 150 m (500 ft) above the aerodrome elevation shall be shown by smoothed contour lines, contour values and layer tints printed in brown. Appropriate spot elevations, including the highest elevation within each top contour line, shall also be shown printed in black.

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

11.8 Magnetic variation

11.8.1 The magnetic variation shall be shown.

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

11.9 Bearings, tracks and radials

11.9.1 Bearings, tracks and radials shall be magnetic, except as provided for in 11.9.2. Where bearings and tracks are additionally provided as true values for RNAV segments, they shall be shown in parentheses to the nearest tenth of a degree, e.g. 290° (294.9°T).

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

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

11.10 Aeronautical data

11.10.1 Aerodromes

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

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

- a) the aerodrome on which the procedure is based;
- b) aerodromes affecting the traffic pattern or so situated as to be likely, under adverse weather conditions, to be mistaken for the aerodrome of intended landing.

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

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

11.10.2 Obstacles

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

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

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

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

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

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

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

11.10.3 Prohibited, restricted and danger areas

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

11.10.4 Radio communication facilities and navigation aids

11.10.4.1 Radio navigation aids required for the procedures together with their frequencies, identifications and track-defining characteristics, if any, shall be shown. In the case of a procedure in which more than one station is located on the final approach track, the facility to be used for track guidance for final approach shall be clearly identified. In addition, consideration

shall be given to the elimination from the approach chart of those facilities that are not used by the procedure.

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

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

11.10.4.3 The final approach fix (or final approach point for an ILS approach procedure) shall be identified with its geographical coordinates in degrees, minutes and seconds.

11.10.4.4 Radio navigation aids that might be used in diversionary procedures together with their track-defining characteristics, if any, shall be shown or indicated on the chart.

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

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

11.10.5 Minimum sector altitude or terminal arrival altitude

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

11.10.6 Portrayal of procedure tracks

11.10.6.1 The plan view shall show the following information in the manner indicated:

- a) the approach procedure track by an arrowed continuous line indicating the direction of flight;
- b) the missed approach procedure track by an arrowed broken line;
- c) any additional procedure track, other than those specified in a) and b), by an arrowed dotted line;
- d) bearings, tracks, radials to the nearest degree and distances to the nearest two-tenths of a kilometre or tenth of a nautical mile or times required for the procedure;
- e) where no track-defining aid is available, the magnetic bearing to the nearest degree to the aerodrome from the radio navigation aids concerned with the final approach;
- f) the boundaries of any sector in which visual manoeuvring (circling) is prohibited;
- g) where specified, the holding pattern and minimum holding altitude/height associated with the approach and missed approach;
- h) caution notes where required, prominently displayed on the face of the chart;
- i) an indication of "flyover" significant points.

11.10.6.2 The plan view shall show the distance to the aerodrome from each radio navigation aid concerned with the final approach.

11.10.6.3 A profile shall be provided normally below the plan view showing the following data:

- a) the aerodrome by a solid block at aerodrome elevation;
- b) the profile of the approach procedure segments by an arrowed continuous line indicating the direction of flight;
- c) the profile of the missed approach procedure segment by an arrowed broken line and a description of the procedure;
- d) the profile of any additional procedure segment, other than those specified in b) and c), by an arrowed dotted line;
- e) bearings, tracks, radials to the nearest degree and distances to the nearest two-tenths of a kilometre or tenth of a nautical mile or times required for the procedure;
- f) altitudes/heights required by the procedures, including transition altitude and procedure altitudes/heights, where established;
- g) limiting distance to the nearest kilometre or nautical mile on procedure turn, when specified;
- h) the intermediate approach fix or point, on procedures where no course reversal is authorized;
- i) a line representing the aerodrome elevation or threshold elevation, as appropriate, extended across the width of the chart including a distance scale with its origin at the runway threshold.

11.10.6.4 Heights required by procedures shall be shown in parentheses, using the height datum selected in accordance with 11.10.2.5.

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

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

11.10.7 Aerodrome operating minima

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

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

11.10.8 Supplementary information

11.10.8.1 When the missed approach point is defined by:

- a distance from the final approach fix, or
- a facility or a fix and the corresponding distance from the final approach fix,

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

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

11.10.8.3 For procedures in which DME is not required for use in the final approach segment but where a suitably located DME is available to provide advisory descent profile information, a table showing the altitudes/heights shall be included.

11.10.8.4 A rate of descent table shall be shown.

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

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

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

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

11.10.8.9 A note shall be included on the chart indicating the approach procedures that are authorized for simultaneous independent or dependent operations. The note shall include the runway(s) involved and if they are closely spaced.

11.10.9 Aeronautical database requirements

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

CHAPTER 12 VISUAL APPROACH CHART - ICAO

12.1 Function

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

12.2 Availability

The Visual Approach Chart - ICAO shall be made available in the manner prescribed in 1.3.2 for all aerodromes used by national and international civil aviation where:

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

12.3 Scale

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

12.3.2 The scale shall not be smaller than 1:500 000.

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

12.4 Format

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

12.5 Projection

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

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

12.6 Identification

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

12.7 Culture and topography

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

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

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

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

12.7.4 When shown, spot elevations shall be carefully selected.

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

12.8 Magnetic variation

The magnetic variation shall be shown.

12.9 Bearings, tracks and radials

12.9.1 Bearings, tracks and radials shall be magnetic except as provided for in 12.9.2.

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

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

12.10 Aeronautical data

12.10.1 Aerodromes

12.10.1.1 All aerodromes shall be shown by the runway pattern. Restrictions on the use of any landing direction shall be indicated. Where there is any risk of confusion between two neighbouring aerodromes, this shall be indicated. Abandoned aerodromes shall be identified as abandoned.

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

12.10.2 Obstacles

12.10.2.1 Obstacles shall be shown and identified.

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

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

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

12.10.3 Prohibited, restricted and danger areas

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

12.10.4 Designated airspace

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

.

12.10.5 Visual approach information

12.10.5.1 Visual approach procedures shall be shown where applicable.

12.10.5.2 Visual aids for navigation shall be shown as appropriate.

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

12.10.6 Supplementary information

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

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

CHAPTER 13 AERODROME/HELIPORT CHART - ICAO

13.1 Function

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

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

13.2 Availability

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

13.2.2 The Aerodrome/Heliport Chart - ICAO shall be made available also, in the manner prescribed in 1.3.2, for all other aerodromes/heliports available for use by national and international civil aviation.

13.3 Coverage and scale

13.3.1 The coverage and scale shall be sufficiently large to show clearly all the elements listed in 13.6.1.

13.3.2 A linear scale shall be shown.

13.4 Identification

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

13.5 Magnetic variation

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

13.6 Aerodrome/heliport data

13.6.1 This chart shall show:

- a) geographical coordinates in degrees, minutes and seconds for the aerodrome/heliport reference point;
- b) elevations, to the nearest metre or foot, of the aerodrome/heliport and apron (altimeter checkpoint locations) where applicable; and for non-precision approaches, elevations and geoid undulations of runway thresholds and the geometric centre of the touchdown and lift-off area;
- c) elevations and geoid undulations, to the nearest half-metre or foot, of the precision approach runway threshold, the geometric centre of the touchdown and lift-off area, and at the highest elevation of the touchdown zone of a precision approach runway;
- d) all runways including those under construction with designation number, length and width to the nearest metre, bearing strength, displaced thresholds, stopways, clearways, runway directions to the nearest degree magnetic, type of surface and runway markings;
- e) all aprons, with aircraft/helicopter stands, lighting, markings and other visual guidance and control aids, where applicable, including location and type of visual docking guidance systems, type of surface for heliports, and bearing strengths or aircraft type restrictions where the bearing strength is less than that of the associated runways;
- f) geographical coordinates in degrees, minutes and seconds for thresholds, geometric centre of touchdown and lift-off area and/or thresholds of the final approach and take-off area (where appropriate);
- g) all taxiways, helicopter air and ground taxiways with type of surface, helicopter air transit routes, with designations, width, lighting, markings (including runway-holding positions and, where established, intermediate holding positions), stop bars, other visual guidance and control aids, and bearing strength or aircraft type restrictions where the bearing strength is less than that of the associated runways;
- h) where established, hot spot locations with additional information properly annotated;
- i) geographical coordinates in degrees, minutes, seconds and hundredths of seconds for appropriate taxiway centre line points and aircraft stands;
- j) where established, standard routes for taxiing aircraft with their designators;
- k) the boundaries of the air traffic control service;
- l) position of runway visual range (RVR) observation sites;
- m) approach and runway lighting;
- n) location and type of the visual approach slope indicator systems with their nominal approach slope angle(s), minimum eye height(s) over the threshold of the on-slope signal(s), and where the axis of the system is not parallel to the runway centre line, the angle and direction of the displacement, i.e. left or right;
- o) relevant communication facilities listed with their channels and, if applicable, logon address and SATVOICE number;
- p) obstacles to taxiing;
- q) aircraft servicing areas and buildings of operational significance;
- r) VOR checkpoint and radio frequency of the aid concerned;
- s) any part of the depicted movement area permanently unsuitable for aircraft, clearly

identified as such.

13.6.2 For aerodromes accommodating aeroplanes with folding wing tips, the location where the wing tips may be safely extended should be shown on the chart.

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

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

CHAPTER 14 AERODROME GROUND MOVEMENT CHART - ICAO

14.1 Function

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

14.2 Availability

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

14.3 Coverage and scale

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

14.3.2 A linear scale shall be shown.

14.4 Identification

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

14.5 Magnetic variation

14.5.1 A True North arrow shall be shown.

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

14.6 Aerodrome data

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

- a) apron elevation to the nearest metre or foot;
- b) aprons with aircraft stands, bearing strengths or aircraft type restrictions, lighting, marking and other visual guidance and control aids, where applicable, including location and type of visual docking guidance systems;
- c) geographical coordinates in degrees, minutes, seconds and hundredths of seconds for aircraft stands;
- d) taxiways with designations, width to the nearest metre, bearing strength or aircraft type restrictions where applicable, lighting, markings (including runway-holding positions and, where established, intermediate holding positions), stop bars, and other visual guidance and control aids;

- e) where established, hot spot locations with additional information properly annotated;
- f) where established, standard routes for taxiing aircraft, with their designators;
- g) geographical coordinates in degrees, minutes, seconds and hundredths of seconds for appropriate taxiway centre line points;
- h) the boundaries of the air traffic control service;
- i) relevant communication facilities listed with their channels and, if applicable, logon address;
- j) obstacles to taxiing;
- k) aircraft servicing areas and buildings of operational significance;
- l) VOR checkpoint and radio frequency of the aid concerned;
- m) any part of the depicted movement area permanently unsuitable for aircraft, clearly identified as such.

14.6.2 For aerodromes accommodating aeroplanes with folding wing tips, the location where the wing tips may be safely extended shall be shown on the chart.

CHAPTER 15 AIRCRAFT PARKING/DOCKING CHART - ICAO

15.1 Function

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

15.2 Availability

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

15.3 Coverage and scale

15.3.1 The coverage and scale shall be sufficiently large to show clearly all the elements listed in 15.6.

15.3.2 A linear scale shall be shown.

15.4 Identification

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

15.5 Magnetic variation

15.5.1 A True North arrow shall be shown.

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

15.6 Aerodrome data

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

- a) apron elevation to the nearest metre or foot;
- b) aprons with aircraft stands, bearing strengths or aircraft type restrictions, lighting, marking and other visual guidance and control aids, where applicable, including location and type of visual docking guidance systems;
- c) geographical coordinates in degrees, minutes, seconds and hundredths of seconds for aircraft stands;
- d) taxiway entries with designations, including runway-holding positions and, where established, intermediate holding positions, and stop bars;

- e) where established, hot spot locations with additional information properly annotated;
- f) geographical coordinates in degrees, minutes, seconds and hundredths of seconds for appropriate taxiway centre line points;
- g) the boundaries of the air traffic control service;
- h) relevant communication facilities listed with their channels and, if applicable, logon address;
- i) obstacles to taxiing;
- j) aircraft servicing areas and buildings of operational significance;
- k) VOR checkpoint and radio frequency of the aid concerned;
- l) any part of the depicted movement area permanently unsuitable for aircraft, clearly identified as such.

CHAPTER 16 WORLD AERONAUTICAL CHART- ICAO 1:1 000 000

16.1 Function

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

16.2 Availability

16.2.1 The World Aeronautical Chart - ICAO 1:1 000 000 shall be made available in the manner prescribed in 1.3.2 for all areas delineated in Appendix 5.

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

16.3 Scales

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

- kilometres,
- nautical miles,

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

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

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

16.4 Format

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

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

16.4.3 The method of folding shall be as follows:

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

16.4.4 Whenever practicable, the sheet lines shall conform with those shown in the index in Appendix 5.

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

16.5 Projection

16.5.1 The projections shall be as follows:

- a) between the Equator and 80° latitude: the Lambert conformal conic projection, in separate bands for each tier of charts. The standard parallels for each 4° band shall be 40' south of the northern parallel and 40' north of the southern parallel;
- b) between 80° and 90° latitude: the Polar stereographic projection with scale matching that of the Lambert conformal conic projection at latitude 80°, except that in the northern hemisphere the Lambert conformal conic projection may be used between 80° and 84° latitude and the Polar stereographic projection between 84° and 90° with the scales matching at 84° North.

16.5.2 Graticules and graduations shall be shown as follows:

a) Parallels:

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

b) Meridians:

Latitude	Interval between meridians	Graduations on meridians
0° to 52°	30'	1'
52° to 72°	30'	1'
(Only on even numbered meridians)		
72° to 84°	1°	1'
84° to 89°	5°	1'
89° to 90°	15°	1'
(Only on every fourth meridian)		

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

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

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

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

16.6 Identification

Sheet numbering shall be in conformity with the index in Appendix 5.

16.7 Culture and topography

16.7.1 Built-up areas

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

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

16.7.2 Railroads

16.7.2.1 All railroads having landmark value shall be shown.

16.7.2.2 Important tunnels shall be shown.

16.7.3 Highways and roads

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

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

16.7.4 Landmarks

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

16.7.5 Political boundaries

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

16.7.6 Hydrography

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

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

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

16.7.7 Contours

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

16.7.7.2 The values of the contours used shall be shown.

16.7.8 Hypsometric tints

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

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

16.7.9 Spot elevations

16.7.9.1 Spot elevations shall be shown at selected critical points. The elevations selected shall always be the highest in the immediate vicinity and shall generally indicate the top of a peak, ridge, etc. Elevations in valleys and at lake surface levels which are of special value to the aviator shall be shown. The position of each selected elevation shall be indicated by a dot.

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

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

16.7.10 Incomplete or unreliable relief

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

16.7.10.2 Charts on which spot elevations are generally unreliable shall bear a warning note prominently displayed on the face of the chart in the colour used for aeronautical information, as follows:

"Warning - The reliability of relief information on this chart is doubtful and elevations should be used with caution."

16.7.11 Escarpments

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

16.7.12 Wooded areas

16.7.12.1 Wooded areas shall be shown.

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

16.7.13 Date of topographic information

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

16.8 Magnetic variation

16.8.1 Isogonic lines shall be shown.

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

16.9 Aeronautical data

16.9.1 General

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

16.9.2 Aerodromes

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

16.9.2.2 The aerodrome elevation, the lighting available, the type of runway surface and the length of the longest runway or channel, shown in abbreviated form for each aerodrome in conformity with the example given in Appendix 2, provided they do not cause undesirable clutter on the chart, shall be indicated.

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

16.9.3 Obstacles

16.9.3.1 Obstacles shall be shown.

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

16.9.4 Prohibited, restricted and danger areas

Prohibited, restricted and danger areas shall be shown.

16.9.5 Air traffic services system

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

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

16.9.6 Radio navigation aids

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

16.9.7 Supplementary information

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

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

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

CHAPTER 17 (Intentionally left blank)⁵

⁵ „Reserved“ for “Aeronautical Chart - ICAO 1:500 000”.

CHAPTER 18 (intentionally left blank)⁶

⁶ „Reserved“ for “Aeronautical Navigation Chart - ICAO Small Scale”.

CHAPTER 19 PLOTTING CHART - ICAO

19.1 Function

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

19.2 Availability

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

19.3 Coverage and scale

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

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

19.4 Format

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

19.5 Projection

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

19.5.2 Parallels and meridians shall be shown.

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

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

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

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

19.6 Identification

Each sheet shall be identified by chart series and number.

19.7 Culture and topography

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

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

19.7.3 Particularly hazardous or prominent relief features shall be emphasized.

19.8 Magnetic variation

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

19.8.2 The date of the isogonic information shall be shown.

19.9 Aeronautical data

19.9.1 The following aeronautical data shall be shown:

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

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

CHAPTER 20 (intentionally left blank)⁷

⁷ „Reserved“ for “Electronic Aeronautical Chart Display - ICAO”.

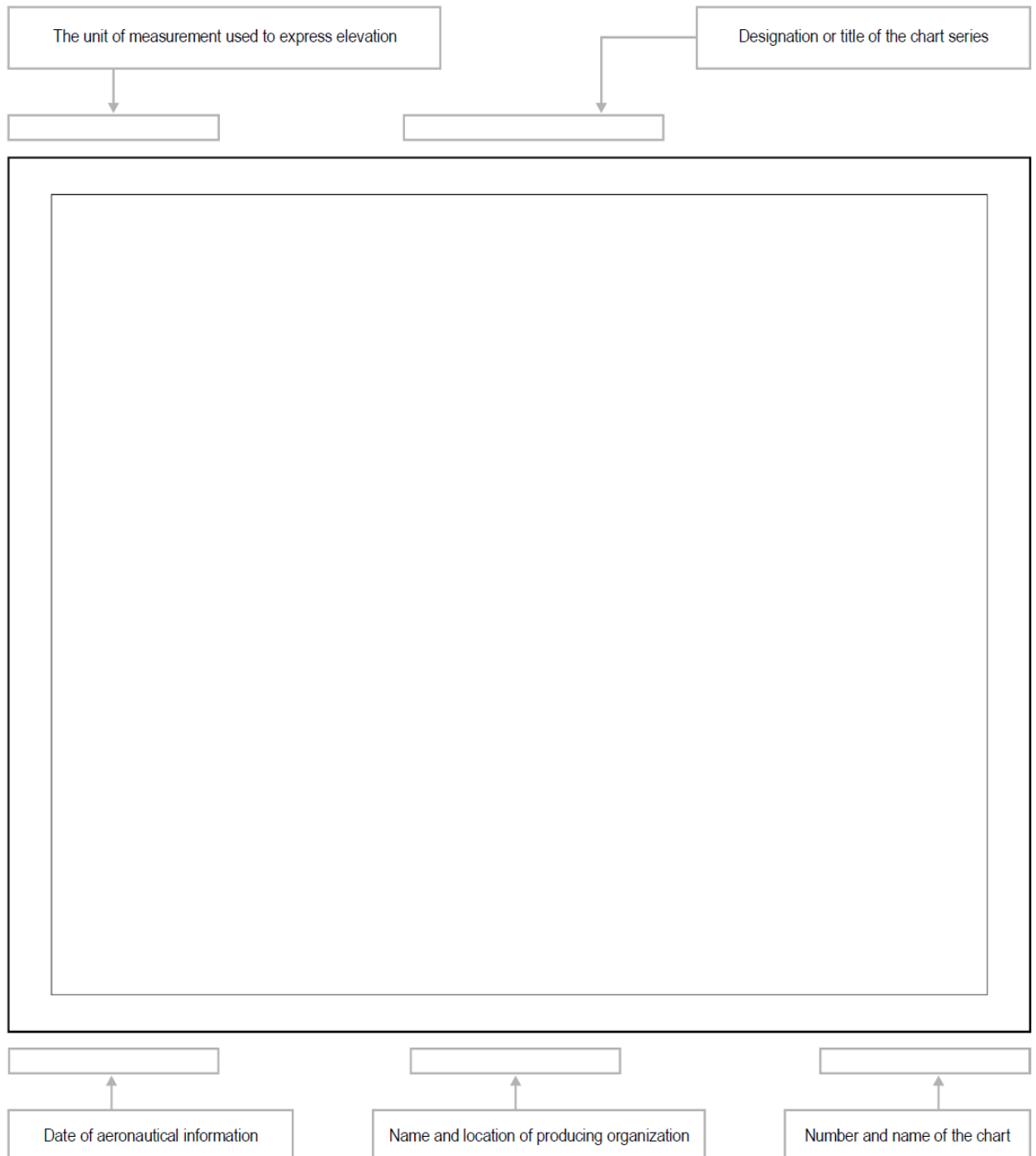
CHAPTER 21 (intentionally left blank)⁸

⁸ „Reserved“ for “ATC Surveillance Minimum Altitude Chart - ICAO”.

Appendices to PART 04⁹

⁹ All Appendices reproduced in this Regulation were taken from ICAO Annex 4 and form an integral part of this Regulation.

APPENDIX 1. MARGINAL NOTE LAYOUT



APPENDIX 2. ICAO CHART SYMBOLS

1. CATEGORY INDEX

	<i>Symbo No.</i>
TOPOGRAPHY (1–18)	
Approximate contours	2
Areas not surveyed for contour information or relief data incomplete	18
Bluff, cliff or escarpment.....	4
Coniferous trees.....	15
Contours	1
Gravel.....	8
Highest elevation on chart	12
Lava flow	5
Levee or esker.....	9
Mountain pass.....	11
Other trees	16
Palms	17
Relief shown by hachures.....	3
Sand area	7
Sand dunes.....	6
Spot elevation (of doubtful accuracy).....	14
Spot elevation	13
Unusual land features appropriately labelled.....	10
 HYDROGRAPHY (19–46)	
Abandoned canal	30
Canal.....	29
Charted isolated rock.....	44
Coral reefs and ledges.....	22
Danger line (2 m or one fathom line)	43
Dry lake bed	39
Falls	28
Glaciers and ice caps	42
Lakes (non-perennial)	32
Lakes (perennial)	31
Large river (perennial)	23
Rapids.....	27
Reservoir.....	38
Rice field	36
Rivers and streams (non-perennial)	25
Rivers and streams (unsurveyed).....	26
Rock awash.....	45
Salt lake	33
Salt pans (evaporator)	34

	<i>Symbo. No.</i>
Shoals	41
Shore line (reliable)	19
Shore line (unreliable)	20
Small river (perennial)	24
Spring, well or water hole.....	37
Swamp	35
Tidal flats.....	21
Unusual water features appropriately labelled.....	46
Wash.....	40
CULTURE (47-83)	
<i>Built-up Areas (47-50)</i>	
Buildings	50
City or large town.....	47
Town.....	48
Village	49
<i>Railroads (51-56)</i>	
Railroad (single track)	51
Railroad (two or more tracks).....	52
Railroad (under construction).....	53
Railroad bridge.....	54
Railroad station.....	56
Railroad tunnel	55
<i>Highways and Roads (57-62)</i>	
Dual highway	57
Primary road.....	58
Road bridge	61
Road tunnel.....	62
Secondary road.....	59
Trail	60
<i>Miscellaneous (63-83)</i>	
Boundaries (international)	63
Church.....	80
Coast guard station	73
Dam	67
Fence	65
Ferry	68
Forest ranger station	76
Fort	79
Lookout tower	74
Mine	75
Mosque	81
Nuclear power station.....	72
Oil or gas field.....	70
Outer boundaries	64
Pagoda	82

	<i>Symbol No.</i>
Pipeline.....	69
Race track or stadium.....	77
Ruins.....	78
Tank farms.....	71
Telegraph or telephone line (when a landmark).....	66
Temple.....	83
AERODROMES (84–95)	
Abandoned or closed aerodrome.....	91
Aerodrome for use on charts on which aerodrome classification is not required.....	93
Civil — Land.....	84
Civil — Water.....	85
Emergency aerodrome or aerodrome with no facilities.....	90
Heliport.....	94
Joint civil and military — Land.....	88
Joint civil and military — Water.....	89
Military — Land.....	86
Military — Water.....	87
Runway pattern in lieu of the aerodrome symbol.....	95
Sheltered anchorage.....	92
<i>Aerodrome data in abbreviated form which may be in association with aerodrome symbols.....</i>	<i>96</i>
<i>Aerodrome symbols for Approach Charts (97 and 98)</i>	
Aerodromes affecting the traffic pattern on the aerodrome on which the procedure is based.....	97
The aerodrome on which the procedure is based.....	98
RADIO NAVIGATION AIDS (99–110)	
Basic radio navigation aid symbol.....	99
Collocated VOR and DME radio navigation aids — VOR/DME.....	103
Collocated VOR and TACAN radio navigation aids — VORTAC.....	107
Compass rose.....	110
Distance measuring equipment — DME.....	102
DME distance.....	104
Instrument landing system — ILS.....	108
Non-directional radio beacon — NDB.....	100
Radio marker beacon.....	109
UHF tactical air navigation aid — TACAN.....	106
VHF omnidirectional radio range — VOR.....	101
VOR radial.....	105
AIR TRAFFIC SERVICES (111–144)	
Advisory airspace — ADA.....	115
Advisory route — ADR.....	118
Aerodrome traffic zone — ATZ.....	112
Air defence identification zone — ADIZ.....	117
Altitudes/flight levels.....	125

	<i>Symbol No.</i>
ATS/MET reporting point — MRP	123
Change-over point — COP	122
Control area, Airway, Controlled route	113
Control zone — CTR	116
Final approach fix — FAF	124
Flight information region — FIR	111
Reporting and Fly-by/Flyover functionality	121
Scale-break (on ATS route)	120
Uncontrolled route	114
Visual flight path	119
 <i>Airspace Classifications (126 and 127)</i>	
Aeronautical data in abbreviated form to be used in association with airspace classification symbols ..	127
Airspace classifications	126
 <i>Airspace Restrictions (128 and 129)</i>	
International boundary closed to passage of aircraft except through air corridor	129
Restricted airspace (prohibited, restricted or danger area)	128
 <i>Obstacles (130–136)</i>	
Elevation of top/Height above specified datum	136
Exceptionally high obstacle — lighted (optional symbol)	135
Exceptionally high obstacle (optional symbol)	134
Group obstacles	132
Lighted group obstacles	133
Lighted obstacle	131
Obstacle	130
 <i>Miscellaneous ((137–141)</i>	
Isogonic line or isogonal	138
Ocean station vessel (normal position)	139
Prominent transmission line	137
Wind turbine — unlighted and lighted	140
Wind turbines — minor group and group in major area, lighted	141
 <i>Visual Aids (142–144)</i>	
Aeronautical ground light	143
Lightship	144
Marine light	142
 SYMBOLS FOR AERODROME/HELIPORT CHARTS (145–161)	
Aerodrome reference point	151
Hard surface runway	145
Helicopter alighting area on an aerodrome	150
Hot spot	161
Intermediate holding position	160
Landing direction indicator (lighted)	156
Landing direction indicator (unlighted)	157
Obstacle light	155

	<i>Symbol No.</i>
Pierced steel plank or steel mesh runway	146
Point light	154
Runway-holding position	159
Runway visual range (RVR) observation site.....	153
Stop bar.....	158
Stopway	148
Taxiways and parking areas.....	149
Unpaved runway.....	147
VOR check-point.....	152
SYMBOLS FOR AERODROME OBSTACLE CHARTS — TYPE A, B AND C (162–170)	
Building or large structure.....	164
Clearway.....	170
Escarpment	168
Pole, tower, spire, antenna, etc.	163
Railroad	165
Stopway	169
Terrain penetrating obstacle plane.....	167
Transmission line or overhead cable	166
Tree or shrub.....	162
ADDITIONAL SYMBOLS FOR USE ON PAPER AND ELECTRONIC CHARTS (171–180)	
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

2. ALPHABETICAL INDEX

	<i>Symbol No.</i>
A	
Abandoned canal	30
Advisory airspace — ADA.....	115
Advisory route — ADR.....	118
Aerodrome data in abbreviated form.....	96
Aerodrome/Heliport Charts	145-161
Aerodrome Obstacle Charts.....	162-170
Aerodrome reference point.....	151
Aerodromes	84-98
Abandoned or closed aerodrome	91
Emergency aerodrome or aerodrome with no facilities.....	90
Aerodrome symbols for Approach Charts	97, 98
Aerodrome traffic zone — ATZ.....	112
Aeronautical ground light.....	143
Air defence identification zone — ADIZ	117
Airspace, advisory — ADA.....	115
Airspace classifications	126, 127
Airspace (prohibited, restricted or danger area), restricted, and common boundary of two areas.....	128
Airspace restrictions	128, 129
Air Traffic Services	111-144
Airway — AWY.....	113
Altitude	
Minimum sector	171
Terminal arrival.....	172
Altitudes/flight levels	125
Anchorage, sheltered	92
Antenna	163
Areas	
Built-up.....	47-50
Not surveyed for contour information or relief data incomplete	18
Prohibited	128
Restricted.....	128
ATS/MET reporting point — MRP (compulsory, on request)	123
B	
Bluff.....	4
Boundaries	
International.....	63
Outer.....	64
Building (on Aerodrome Obstacle Charts)	164
Buildings.....	50

	<i>Symbol No.</i>
C	
Cable, overhead	166
Canal.....	29
Canal, abandoned.....	30
Change-over point — COP.....	122
Charted isolated rock.....	44
Chart, highest elevation on	12
Chart symbols, electronic	108, 143, 171-180
Church	80
City or large town.....	47
Clearway — CWY.....	170
Cliff	4
Coast guard station	73
Collocated DME fix and marker beacon	180
Collocated radio navigation aid and marker beacon.....	178
Collocated VOR and DME radio navigation aids — VOR/DME	103, 110
Collocated VOR and TACAN radio navigation aids — VORTAC	107, 110
Compass rose.....	110
Coniferous trees.....	15
Contours	1
Contours, approximate.....	2
Control area — CTA	113
Controlled route.....	113
Control zone — CTR.....	116
Coral reefs and ledges.....	22
Culture	47-83
Culture, miscellaneous.....	63-83
D	
Dam	67
Danger area.....	128
Danger line	43
Distance measuring equipment — DME.....	102, 110, 176, 177
DME distance	104
DME fix.....	179
Collocated DME fix and marker beacon	180
Dry lake bed	39
Dual highway.....	57
Dunes, sand.....	6

	<i>Symbol No.</i>
E	
Electronic chart symbols	108, 143, 171–180
Elevation (of doubtful accuracy), spot.....	14
Elevation, spot	13
Escarpment	4
Escarpment (on Aerodrome Obstacle Charts)	168
Esker.....	9
F	
Falls	28
Fence	65
Ferry	68
Final approach fix — FAF.....	124
Flight information region — FIR	111
Flight levels	125
Forest ranger station	76
Fort	79
G	
Gas field.....	70
Glaciers.....	42
Gravel	8
H	
Hard surface runway.....	145
Helicopter alighting area on an aerodrome.....	150
Heliport.....	94
Highest elevation on chart	12
Highway, dual.....	57
Highways and roads.....	57-62
Holding pattern.....	173
Hot spot	161
Hydrography.....	19-46
I	
Ice caps	42
Instrument landing system — ILS.....	108
Intermediate holding position	160
International boundary closed to passage of aircraft except through air corridor.....	129
Intersection INT.....	121
Isogonic line or isogonal.....	138

	<i>Symbol No.</i>
L	
Lake bed, dry	39
Lakes	
Non-perennial	32
Perennial	31
Land	
Civil	84
Military	86
Joint civil and military	88
Land features appropriately labelled, unusual	10
Landing direction indicator	
Lighted	156
Unlighted	157
Large river (perennial)	23
Large structure	164
Lava flow	5
Ledges	22
Levee	9
Lightship	144
Lookout tower	74
M	
Marine light	142
Mine	75
Minimum sector altitude — MSA	171
Miscellaneous symbols	
Air Traffic Services	137-141
Culture	63-83
Missed approach track	174
Mosque	81
Mountain pass	11
N	
NDB	121
Non-directional radio beacon — NDB	100
Nuclear power station	72
O	
Obstacle light	155
Obstacles	130-136
Ocean station vessel	139
Oil field	70
Overhead cable	166

P

Pagoda	82
Palms	17
Parking areas	149
Pierced steel plank or steel mesh runway	146
Pipeline	69
Point light	154
Pole	163
Power station, nuclear.....	72
Primary road	58
Prohibited area.....	128
Prominent transmission line	137

R

Race track	77
Radio marker beacon.....	109, 177
Radio navigation aid.....	176
Basic	99
Collocated radio navigation aid and marker beacon.....	178
Collocated VOR and DME.....	103
Collocated VOR and TACAN.....	107
Radio navigation aids	99-110, 176, 178
Railroad (on Aerodrome Obstacle Charts)	165
Railroads (Culture)	51-56
Rapids.....	27
Relief data incomplete	18
Relief shown by hachures.....	3
Reporting and fly-by/flyover functionality.....	121
Reservoir.....	38
Restricted airspace (prohibited, restricted or danger area) and common boundary of two areas.....	128
Restricted area	128
Rice field	36
River	
(Perennial), small.....	24
(Perennial), large	23
Rivers and streams	
Non-perennial.....	25
Unsurveyed.....	26
Road bridge	61
Road, primary	58
Road, secondary	59
Roads (Highways and Roads).....	57-62
Road tunnel.....	62
Rock awash.....	45
Rock, charted isolated.....	44

	<i>Symbol No.</i>
Route	
Advisory — ADR.....	118
Controlled.....	113
Uncontrolled.....	114
Ruins.....	78
Runway.....	175
Hard surface	145
Unpaved	147
Runway-holding position	159
Runway visual range (RVR) observation site.....	153
S	
Salt lake	33
Salt pans (evaporator)	34
Sand area	7
Sand dunes.....	6
Scale-break (on ATS route)	120
Secondary road	59
Sheltered anchorage.....	92
Shoals	41
Shore line	
Reliable.....	19
Unreliable	20
Shrub	162
Small river (perennial)	24
Spire.....	163
Spot elevation	13
Spot elevation (of doubtful accuracy).....	14
Spring (perennial or intermittent)	37
Stadium.....	77
Steel mesh runway.....	146
Steel plank, pierced.....	146
Stop bar.....	158
Stopway — SWY (on Aerodrome/Heliport Charts)	148
Stopway — SWY (on Aerodrome Obstacle Charts)	169
Streams	25, 26
Structure, large	164
Swamp.....	35
T	
TACAN	121
TACAN (UHF tactical air navigation aid)	106, 110
Tank farms.....	71
Taxiways.....	149
Telegraph or telephone line (when a landmark)	66
Temple.....	83

	<i>Symbol No.</i>
Terminal arrival altitude — TAA	172
Terrain penetrating obstacle plane	167
Tidal flats	21
Topography	1-18
Tower	
Lookout	74
On Aerodrome Obstacle Charts	163
Town	48
Town, large	47
Trail	60
Transmission line	
On Aerodrome Obstacle Charts	166
Prominent	137
Tree	
Coniferous	15
On Aerodrome Obstacle Charts	162
Other	16
 U	
UHF tactical air navigation aid — TACAN	106, 110
Uncontrolled route	114
Unpaved runway	147
Unusual land features appropriately labelled	10
Unusual water features appropriately labelled	46
 V	
VFR reporting point	121
VHF omnidirectional radio range — VOR	101, 110
Village	49
Visual aids	142-144
Visual flight path	119
VOR	121
VOR check-point	152
VOR/DME	121
VOR/DME (collocated VOR and DME radio navigation aids)	103
VOR radial	105
VORTAC	121
VORTAC (collocated VOR and TACAN radio navigation aids)	107
VOR (VHF omnidirectional radio range)	101

	<i>Symbol No.</i>
W	
Wash.....	40
Water	
Civil.....	85
Military.....	87
Joint civil and military.....	89
Water features appropriately labelled, unusual.....	46
Water hole (perennial or intermittent)	37
Waypoint — WPT.....	121
Well (perennial or intermittent)	37
Wind turbine, unlighted and lighted	140
Wind turbines, minor group and group in major area, lighted.....	141

TOPOGRAPHY

1	Contours		8	Gravel		12	Highest elevation on chart	Alternative	17456
2	Approximate contours		9	Levee or esker	Alternative 	13	Spot elevation		.6397 .8975
3	Relief shown by hachures		10	Unusual land features appropriately labelled	 Rock Outcrop	14	Spot elevation (of doubtful accuracy)		.6370±
4	Bluff, cliff or escarpment					15	Coniferous trees		
5	Lava flow			Active volcano		16	Other trees		
6	Sand dunes		11	Mountain pass		17	Palms		
7	Sand area								

18	Areas not surveyed for contour information or relief data incomplete	Caution
----	--	---------

HYDROGRAPHY

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

CULTURE

BUILT-UP AREAS

47	City or large town	
48	Town	
49	Village	
50	Buildings	

HIGHWAYS AND ROADS

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

MISCELLANEOUS (Cont.)

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

RAILROADS

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

MISCELLANEOUS

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

AERODROMES

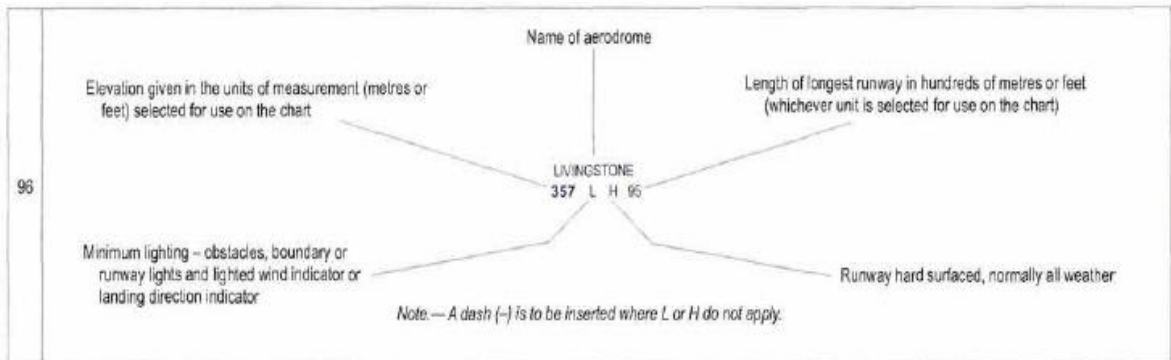
84	Civil	Land	
85	Civil	Water	
86	Military	Land	
87	Military	Water	

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

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

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







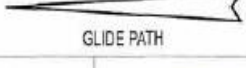



AERODROMES (Cont.)
AERODROME DATA IN ABBREVIATED FORM WHICH MAY BE
IN ASSOCIATION WITH AERODROME SYMBOLS
 (Reference: 16.9.2.2 and 17.9.2.2)
















AERODROME SYMBOLS FOR APPROACH CHARTS

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

RADIO NAVIGATION AIDS*

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

110	Compass rose To be orientated on the chart in accordance with the alignment of the station (normally Magnetic North)		Compass rose to be used as appropriate in combination with the following symbols:								
		<i>Note. — Additional points of compass may be added as required.</i>	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>VOR</td> <td style="text-align: center;"></td> </tr> <tr> <td>VOR/DME</td> <td style="text-align: center;"></td> </tr> <tr> <td>TACAN</td> <td style="text-align: center;"></td> </tr> <tr> <td>VORTAC</td> <td style="text-align: center;"></td> </tr> </table>	VOR		VOR/DME		TACAN		VORTAC	
VOR											
VOR/DME											
TACAN											
VORTAC											

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

AIR TRAFFIC SERVICES

111	Flight information region	FIR		117	Air defence identification zone	ADIZ	
112	Aerodrome traffic zone	ATZ		118	Advisory route	ADR	
113	Control area Airway Controlled route	CTA AWY	 	119	Visual flight path	compulsory with radio communication requirement compulsory, without radio communication requirement recommended	
114	Uncontrolled route			120	Scale-break (on ATS route)		
115	Advisory airspace	ADA					
116	Control zone	CTR					

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

For details on use and meaning of these symbols, refer to paragraph 2.4

122	Change-over point To be superimposed on the appropriate route symbol at right angles to the route	COP		123	ATSMET reporting point	MRP	Compulsory On request	124	Final approach fix	FAF	
-----	--	-----	--	-----	------------------------	-----	--------------------------	-----	--------------------	-----	--

AIR TRAFFIC SERVICES (cont.)

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

AIRSPACE CLASSIFICATIONS

126	Airspace classifications		<p>Aeronautical data in abbreviated form to be used in association with airspace classification symbols:</p>															
		<p>127</p> <p>Alternative</p> <table border="1"> <tr> <td>Type</td> <td>Name or call sign</td> <td>Radio frequency(ies)</td> <td>Airspace classification</td> <td>Vertical limits</td> </tr> <tr> <td></td> <td>TMA DONLON</td> <td>119.1</td> <td>C</td> <td>200m AGL - FL 245</td> </tr> </table> <table border="1"> <tr> <td colspan="2">TMA DONLON</td> </tr> <tr> <td colspan="2">FL 245</td> </tr> <tr> <td colspan="2">200m AGL</td> </tr> <tr> <td colspan="2">119.1</td> </tr> </table>		Type	Name or call sign	Radio frequency(ies)	Airspace classification	Vertical limits		TMA DONLON	119.1	C	200m AGL - FL 245	TMA DONLON		FL 245		200m AGL
Type	Name or call sign	Radio frequency(ies)	Airspace classification	Vertical limits														
	TMA DONLON	119.1	C	200m AGL - FL 245														
TMA DONLON																		
FL 245																		
200m AGL																		
119.1																		

AIRSPACE RESTRICTIONS

128	Restricted airspace (prohibited, restricted or danger area)		Common boundary of two areas	
129	International boundary closed to passage of aircraft except through air corridor			

Note.— The angle and density of rulings may be varied according to scale and the size, shape and orientation of the area.

OBSTACLES

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

MISCELLANEOUS

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

VISUAL AIDS

142	Marine light <i>Note 2. — Characteristics are to be indicated as follows:</i>	Alt B F	Alternating Blue Fixed	F G Gp	Flashing Green Group	Occ R SEC	Occulting Red Sector	sec (U) W	Second Unwatched White
143	Aeronautical ground light		Electronic		144	Lightship			

Note 1. — Marine alternating lights are red and white unless otherwise indicated. Marine lights are white unless colours are stated.

SYMBOLS FOR AERODROME/HELIPORT CHARTS

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

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

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

ADDITIONAL SYMBOLS FOR USE ON PAPER AND ELECTRONIC CHARTS

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

APPENDIX 3. COLOUR GUIDE (Ref. 2.11.1)

CHART SYMBOLS








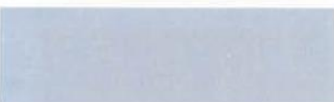
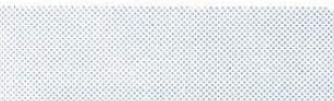












Culture, except highways and roads; outlines of large cities, grids and graticules; spot elevations; danger lines and off-shore rocks; names and lettering except for aeronautical and hydrographic features		BLACK	
Built-up areas of cities		BLACK Stipple	
Highways and roads	Optional colours	BLACK Half-tone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

CHART SYMBOLS (Cont.)

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

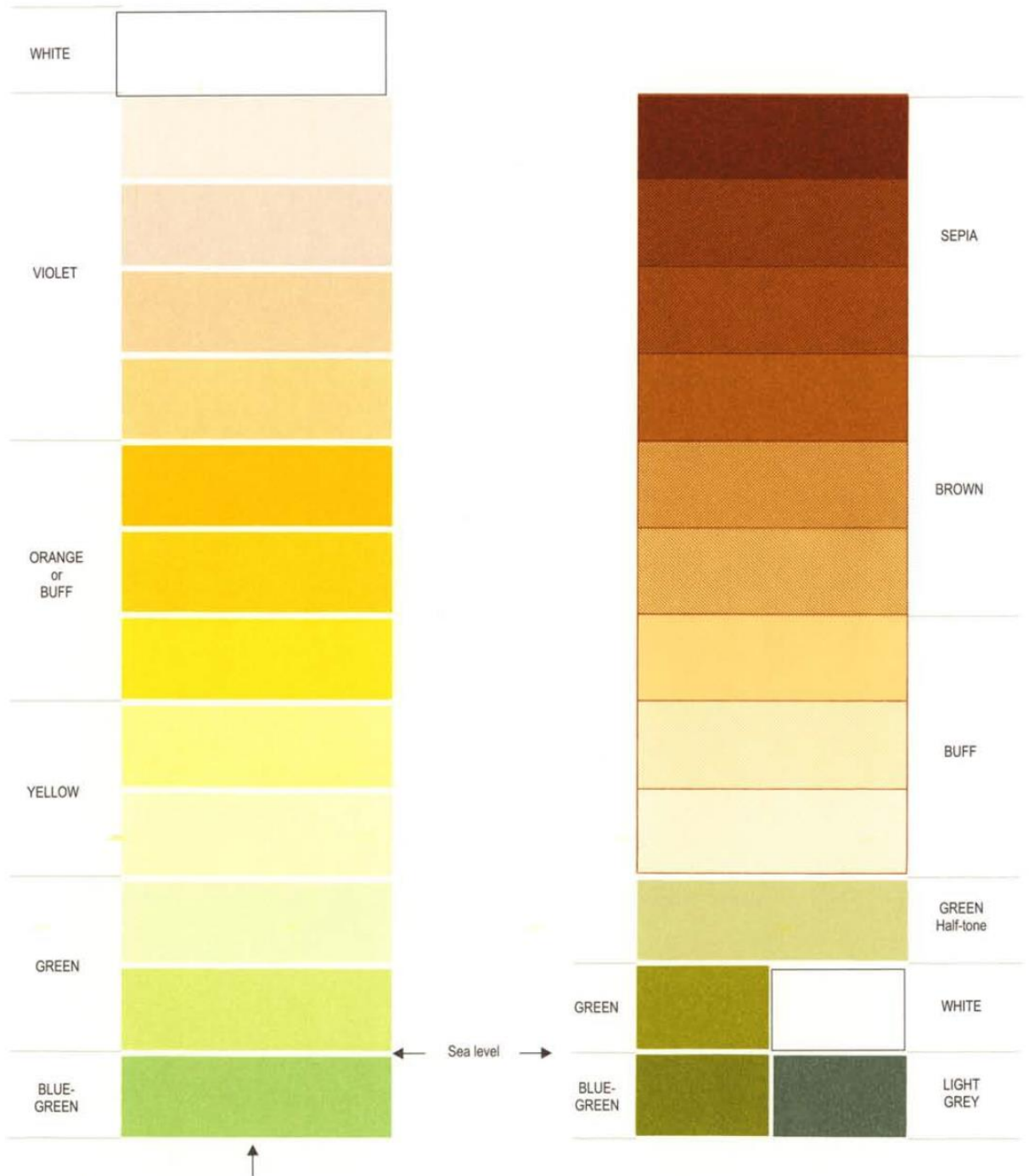
HYPSONOMETRIC TINTS

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

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

APPENDIX 4. HYPSONOMETRIC TINT GUIDE

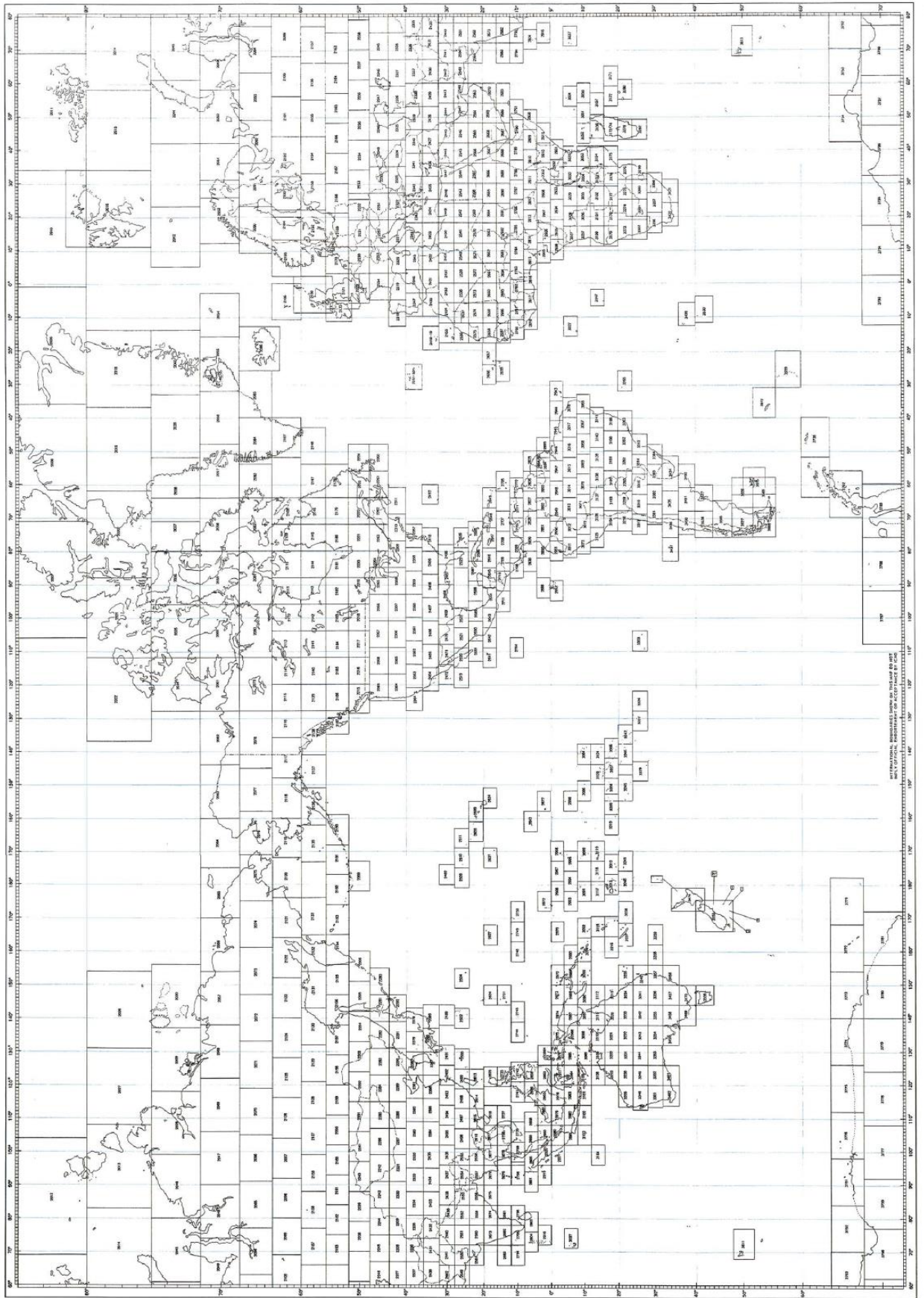
(Alternative systems, reference 2.12.2)



Note 1.— These tints are identical to those specified for the International Map of the World.

Note 2.— Elevations have not been associated with tints of either system in order to allow for flexibility in their selection.

APPENDIX 5. SHEET LAYOUT FOR THE WORLD AERONAUTICAL CHART — ICAO 1:1 000 000



WORLD AERONAUTICAL CHARTS — ICAO 1:1 000 000