



CHART STANDARDIZATION & PAPER CHART WORKING GROUP (CSPCWG)

[A Working Group of the Committee on Hydrographic Requirements for Information Systems – CHRIS]

Chairman: Peter JONES
Secretary: Andrew HEATH-COLEMAN

UK Hydrographic Office
Admiralty Way, Taunton, Somerset
TA1 2DN, United Kingdom

CSPCWG Circular Letter: 02/2005

UKHO ref: HA317/010/031-03 & HA317/004/057-02

Telephone:
(Chairman) +44 (0)1823 723343
(Secretary) +44 (0) 1823 337900 x 3656
Facsimile: +44 (0)1823 325823
E-mail: peter.jones@ukho.gov.uk
andrew.coleman@ukho.gov.uk

To CSPCWG Members

09 February 2005

Dear Colleagues,

Subject: Revision M-4 Section B-200, Third Draft (further to CL20/2004)

We received twelve responses to CL 20/2004 (including UKHO), for which we are grateful. In general, the changes from the original draft (CL 17/2004) were accepted, and direct answers were provided for the questions at Annex D to CL 20/2004. Annex A to this letter gives an indication of the balance of answers to those questions. A few other helpful comments and suggestions were made.

Consequently, we have amended the draft taking account of the responses to CL 20/2004 and a revised draft (with track changes and explanatory comments where necessary) is at Annex B. We invite you to consider this draft, which we hope will be the final draft before submission to Member States for endorsement.

If you have any significant reservations about anything in this third draft, please advise me of them **not later than 9 March 2005**. If you are content with this draft, there is no need to respond to this letter.

Now that the revision of B-200 is nearly complete, it is timely to remind WG members that Netherlands took an action to revise INT 2 'Borders, Graduation, Grids and Linear Scales' (CSPCWG 1 Action 37). To assist them in the revision of the official INT 2, I would be grateful if you would supply directly to Netherlands any examples of national versions of INT 2.

Yours sincerely,

Peter G. B. Jones,
Chairman

Annex A: Responses to CL 20/2004 (Annex D - Questionnaire)

Annex B: B-200 revision (3rd Draft) with track changes

Annex A to CSPCWG CL 02/2005

Response by (in order of receipt):

ZA, FR, AU, NO, DK, ES, FI, NL, BR, NZ, DE, UK

No	Paragraph	Question	YES	NO
1	212.6b	Are you content with the revised test? If 'NO', please suggest alternative.	12	0
2a	213.1	Is it your practice to omit meridians or parallels close to the neatline?	3	9
2b		Should this option be included in the specifications, as drafted?	6	6
3	222	Can we now be prescriptive about the maximum size for chart paper size? (<i>Not all responses were clear, as there was some confusion between paper and chart size</i>)	8	4
4	222.5	Do you agree that the deleted advice should be included in M-11 (Part A) if opportunity arises?	9	3
5	242.3	Should the reference legend 'see Note' always be in the same colour as the note to which it refers?	11	1
6	252.4	Do you agree that we consider the issues of print dates, thumb labels and related information in a new 'maintenance' section? (Work item A.8 refers)	12	0
7a	255.3	Is the amended paragraph acceptable pending further consideration?	12	0
7b		Should the standardization of marginal references to horizontal datum be considered further by Circular Letter?	3	9
8	263	Do you agree that the specifications about bearings should be moved to B-132, as it is a convention?	11	1

ANNEX B to CSPCWG CL02/2005

PART B

SECTION 200

**CHART FRAMEWORK
(FORMATS, POSITIONS, COMPASS ROSES, SOURCE DIAGRAMS)**

Page intentionally left blank

CONTENTS

Section 200 – CHART FRAMEWORK (FORMAT, POSITIONS, COMPASS ROSES, SOURCE DIAGRAMS)

- B-201** Ellipsoid (spheroid) of reference and horizontal datum
- B-202** Indication on charts of relationship of horizontal datum to world-wide and other datums
- B-203** Projections

- B-210** Chart construction
- B-211** Scale
- B-212** Graduation
- B-213** Graticule
- B-214** Corner co-ordinates
- B-215** Rectangular grids

- B-220** Linear scales, dimensions
- B-221** Linear (graphical) scales
- B-222** Dimensions

- B-230** Not currently used

- B-240** Title, notes
- B-241** Title block
- B-242** Cautionary and explanatory notes
- B-243** Reference to other publications

- B-250** Chart numbering, marginal information
- B-251** Chart numbering
- B-252** Date of publication and updates
- B-253** Copyright legend
- B-254** References to other charts
- B-255** Other marginal information

- B-260** Compass roses
- B-261** Compass roses: patterns, true and magnetic
- B-262** Compass roses: size and position

- B-270** Magnetic data
- B-271** Magnetic data: source material
- B-272** Magnetic data: symbols
- B-273** Magnetic data: corrections
- B-274** Abnormal magnetic variation

- B-280** Depth unit conversion table
- B-281** Other tables

- B-290** Source Diagrams....etc – to be added before publication

Page intentionally left blank

**SECTION 200 - CHART FRAMEWORK
(FORMAT, POSITIONS, COMPASS ROSES, SOURCE DIAGRAMS)**

B-201 ELLIPSOID (SPHEROID) OF REFERENCE AND HORIZONTAL DATUM

B-201.1 IMO Safety of Navigation Circular 213 defines a horizontal datum (also known as a geodetic datum) as follows:

‘A horizontal datum is a reference system for specifying positions on the Earth’s surface. Each datum is associated with a particular reference spheroid that can be different in size, orientation and relative position from the spheroids associated with other horizontal datums. Positions referred to different datums can differ by several hundred metres.’

B-201.2 The **World Geodetic System (1984) (WGS84)** should be used as a basic worldwide reference system for nautical charts until an adequate alternative geodetic datum is adopted by the relevant international organizations to be used as the international geodetic reference system for cartographic work on land and sea areas.

Note: WGS84 is the system to which the Global Positioning System (GPS) is referred and it is therefore essential that nautical charts use this reference.

B-201.3 Internationally recognized **regional datums or local datums** may continue to be used for the graduation of paper charts in areas where they apply; however, a transformation adjustment to WGS84 should be included on any such chart (see B-202). For ENCs, the horizontal datum must be WGS84 Datum.

B-201.4 **IHO Publication S-60 ‘User’s Handbook on Datum Transformations Involving WGS84’**, contains transformation constants and formulae to relate local and regional geodetic datums to WGS84. (S-60 has been derived from a comprehensive Technical Report (TR8350.2, 3rd edition, 4 July 1997, corrected to 6/03) published by the National Geospatial Agency (NGA) of the United States and provided to the IHB).

Reproduction of formulae, transformation constants and related local and regional datums does not imply that these data have been officially adopted by the concerned States or by the IHO. Member States are encouraged to refine their own transformation parameters and to report these to the IHB.

B-202 INDICATION ON CHARTS OF RELATIONSHIP OF HORIZONTAL DATUM TO WORLD-WIDE AND OTHER DATUMS

B-202.1 All charts at scales larger than 1:500 000 must include a legend in the title block (see B-241.7) indicating the name (and date, if appropriate) of the geodetic datum upon which the graticule is based. The WGS year, for example WGS84, must be stated on charts of a scale larger than 1:50 000.

B-202.2 **Appropriate transformation notes** (commonly titled **SATELLITE-DERIVED POSITIONS**) must be inserted, normally in black, on all charts at scales larger than 1:500 000 to enable the navigator to use directly, or to convert to chart datum and vice-versa, satellite-derived geographical positions which are in the world-wide datum. They should also be inserted on smaller-scale charts if the difference between the datum used and WGS84 datum is plottable at the scale of the chart. In the plotting of geographic positions on charts, for the purposes of these specifications, a plottable difference is considered to be 0.3mm or greater. Where differences are insignificant, or the chart is not based on a single homogeneous datum, the note should so state. Transformation notes should also be included to facilitate transfer between charts on different datums within the same area.

B-202.3 The following standardized wording, to be shown in black, is recommended for transformation notes. Similar wording may be used for other transformation notes, if required, e.g. to a national mapping datum. Examples:

- a. An optional note for charts based on WGS84 datum, or a datum compatible with WGS84, or where the shift is not plottable at chart scale:

SATELLITE-DERIVED POSITIONS

Positions obtained from satellite navigation systems, such as GPS, are normally referred to WGS84 Datum. Such positions can be plotted directly on this chart.

- b. For charts on which the relationship between WGS84 Datum and the local datum cannot be determined:

SATELLITE-DERIVED POSITIONS

Positions obtained from satellite navigation systems, such as GPS, are normally referred to WGS84 Datum. The differences between satellite-derived positions and positions on this chart cannot be determined. Mariners are warned that these differences MAY BE SIGNIFICANT TO NAVIGATION and are therefore advised to use alternative sources of positional information, particularly when closing the shore or navigating in the vicinity of dangers.

- c. For charts on internationally accepted regional or local datums (including charts on previous World Geodetic Datums, such as WGS72):

SATELLITE-DERIVED POSITIONS

Positions obtained from satellite navigation systems, such as GPS, are normally referred to WGS84 Datum. Such positions must be adjusted by 0.XX minutes NORTHWARD/SOUTHWARD and 0.XX minutes EASTWARD/WESTWARD to agree with this chart.

- d. To facilitate transfer between charts on different datums within the same area:

POSITIONS

To agree with the larger scale / smaller scale / adjoining charts which are referred to [name] Datum, positions read from chart [number] must be adjusted by 0.XX minutes NORTHWARD / SOUTHWARD, and 0.XX minutes EASTWARD / WESTWARD.

Notes for examples c) and d), above:

- i. The figure to be inserted at XX is the mean value over the charted area, normally to two decimal places of a minute, of the adjustment to be applied. On scales larger than 1:15 000 the datum shift values should be given to three decimal places of a minute, provided the datum shift is accurate enough to support it. On scales of 1:500 000 and smaller, the values should be given to one decimal place of a minute, if the difference between the datums is plottable at the scale of the chart (see B202.2).
- ii. Where the shift is in one direction only, the reference to the other direction should be omitted.
- iii. The datum shift value may also be quoted as a unit of distance, in addition to minutes of latitude/longitude, e.g. 0.08 minutes (approximately 96 metres).
- iv. A worked example may be included to illustrate the application of the shifts.

B-202.4 Chart Accuracy. In many parts of the world, even the most recent data available may have been gathered when survey methods were less sophisticated than they are now and the achievement of accuracy currently available with GPS was not possible. In these areas, GPS positions available to the navigator may be more accurate than the charted detail. Therefore, in such circumstances, the following note may be combined with the appropriate note at B-202.3:

However, due to the age and quality of some of the source information, such positions may be more accurate than the charted detail.

B-203 PROJECTIONS

A projection can generally be regarded as suitable for large scales if the chart will be identified within fractions of a mm to the chart that might have been drawn on any other survey projection, and any suitable grid will plot as a system of practically straight lines on the chart. This will be the case when the projection meets the conditions that its rectangular grid (N,E) or (X,Y) is a function of the Earth's graticule ($f ?$) or ($? f$) and that it has its central meridian, standard parallel, or point of origin within a few hundred km of the area charted.

B-203.1 Charts of scale 1:50 000 and larger may be compiled on any suitable projection, taking into account the possible advantages of using the surveying projection or the rectangular grid used by the national mapping authorities. In latitudes approaching 75° , the limiting scale may be larger than 1:50 000, to minimize apparent distortions.

B-203.2 Charts of scale smaller than 1:50 000 must normally be compiled on the Mercator projection. Exceptions to this rule may be necessary in high latitudes, where the Mercator projection is unsuitable because of gross distortions. For example, the conformal Polar Zenithal Stereographic projection, which shows parallels as concentric circles and meridians as equally-spaced lines radiating from the pole, may be suitable for charts in high latitudes (beyond about 70°).

B-210 CHART CONSTRUCTION

Note: For high latitudes it may be necessary to make exceptions to the specifications in paragraphs B211-213.

B-211 SCALE

The **natural scale** is the ratio between the linear dimensions on the chart and the actual linear dimensions represented, taken at the intersection of spheroid and projection-plane(s); usually the mid-latitude or central meridian of the chart. Natural scales which are multiples of 1 000 or 2 500 e.g. 1:100 000; 1:12 500 should be used for all charts.

The **latitude of reference** should be specified for charts on the Mercator projection. As far as possible this latitude should be the middle latitude of the chart, or in the case of a series of adjoining charts, the middle latitude of the area concerned.

See B-241.4 for the description of chart scale as it appears in the title block.

B-212 GRADUATION

The graduation is the division and subdivision of latitude and longitude shown in the borders of a chart at the outside of the neatline. All charts must be graduated. Plans should also be graduated, but may be graduated on 2 sides only; exceptionally, they may be left ungraduated if of very small size or if the numbering of the graduation becomes impracticable, e.g. if successive half-minute ticks do not occur within the limits.

B-212.1 The pattern of graduation varies with the scale of the chart. See INT 2 for the particulars and for graphical illustration of the various intervals, dicing length (i.e. highlighting of alternate subdivisions), and mitred corners.

B-212.2 The neatlines of charts should be located on exact graduation (sub) divisions.

B-212.3 Minor subdivisions of border graduations may show, where appropriate to the scale, tenths of a minute and, where considered useful, hundredths of a minute. Where only small portions of minor sub-divisions are shown, these should be applied adjacent to meridians and parallels:

- in N latitudes above and in S latitudes below the parallel
- in W longitudes to the left and in E longitudes to the right of the meridian.

On a plan where there is no meridian (or parallel), one suitable tenth-minute division should be subdivided into hundredths of a minute, preferably near the centre of the border graduation.

B-212.4 Equal intervals of subdivision, numbering and dicing should normally be used for latitude and longitude. All meridians and parallels shown must be numbered. The interval of graduation numbering must be chosen from the sequence 00,5' ? 01' ? 02' ? 05' ? 10' ? 30' ? 1° ? 5°, such that the numbers are not less than about 20mm apart.

B-212.5 High latitudes. If the chart extends to a latitude beyond 70° it may be necessary to subdivide the longitude graduation at a greater interval than the latitude. In these instances, similar patterns should not be used to denote dissimilar intervals unless the ratio of the lengths of latitude units to longitude units is 5:2 or greater. The dicing must continue to represent the same interval of latitude and longitude (see B-212.1).

B-212.6 Graduation numbering.

a. **Degrees:** At scales larger than 1:500 000, degree values should be quoted in the form 51°00' rather than 51°, for example. Additional degree values should be inserted (preferably at a meridian or parallel) to satisfy the following requirements:

- The degree value should appear in each half of a folded chart
- Where there is only one whole degree value falling within the limits, one appropriate graduation tick should be additionally numbered with the next lower degree value, as well as the minutes value
- Where the one whole degree value on a side not requiring folding occurs close to a corner, the degree value should be shown again at one of the numbered minutes.

b. **Minutes:** To encourage the correct reporting of positions, minute values lower than 10' should be expressed in the form 01', 02', 03', etc. If space is limited however, the leading zeros may be omitted.

c. **Tenth-minute values:** Where two whole minute divisions do not fall within limits (e.g. on a small plan), certain tenth-minute ticks should be numbered as follows:

- If neither a whole degree nor whole minute tick falls within limits, the degree value should be added at a half-minute tick (if there is one), or otherwise at a tenth-minute tick near the centre of the border graduation.
- The numbering of tenth-minute ticks must be in minutes and decimals, the decimal value not appearing without its minute value and being on the same line as it, e.g. 02,4'. A whole minute occurring in a border graduation containing tenth-minute values should be in the form 02,0', not 02'. Decimal points may be used in lieu of commas, in accordance with national practice.

B-212.7 Hemisphere labelling. The **longitude** of the chart must be referred to the Greenwich meridian. A reference to the hemisphere may be shown, preferably in the lower border. This may be the letter E or W, as appropriate, or the full reference may be given, in the form 'Longitude East/West from Greenwich'. It should be positioned on a meridian (preferably a graduated one if there is supplementary graduation, see B-212.8) near the centre of the border graduation. On charts comprised only of plans, one hemisphere label on a plan which forms the lowest border of the chart will usually be sufficient (unless there is potential for confusion with plans located on both sides of the Greenwich meridian).

The **latitude** of the chart must be referred to the Equator. Hemisphere labels N or S, as appropriate, may be included in the border.

B-212.8 Supplementary (subsidiary) internal graduation may be used for skewed charts (see B-212.9). They may also be inserted on other charts (particularly those with additional folds) to facilitate plotting. This is particularly useful for users when the chart is folded back, so that the border graduation is not accessible.

Supplementary graduated meridians and parallels should be spaced not more than 450mm apart. Any plans with a side longer than 450mm should also include additional internal graduation. The graduations should be labelled at the same interval and using the same style as in the main border graduation, with longitude labels normally above the parallel and latitude labels normally to the right of the meridian. At intersections of graduated meridians and parallels, latitude labels (with N/S qualifier to differentiate them from longitude labels) should be inserted to the right of the meridian and below the parallel, while longitude labels (with E/W qualifier) should be inserted above the parallel and to the left of the meridian. This may be varied to avoid important chart detail. At the intersection of a graduated line with an ungraduated line, the latter may be broken to insert a label.

B-212.9 Skewed charts. Charts should normally be oriented 'North up', whichever hemisphere they are in. However, it may occasionally be necessary to configure a chart off North, e.g. for a water area which trends NW-SE. The graduation of such skewed charts must follow the pattern of the supplementary graduation (see B-212.8).

B-212.10 Insets (including larger-scale and continuation plans, see B-254) should be oriented with their outer borders parallel to the neatline of the main chart and at equal distances from it when near its corners.

B-212.11 Border breaks. Border breaks to insert significant features lying just outside the limits of the neatline should not extend beyond the thick outer border line, and must not extend beyond the outer marginal information. In such cases, the neatline should be broken for a whole number of graduation units, with the graduation divisions indicated on the inside of the outer border wherever possible.

B-213 GRATICULE

The **graticule** is the network of lines representing meridians and parallels on the chart.

- B-213.1 Meridians and parallels** must be shown not more than 230mm apart and not closer than 100mm. They should be numbered and shown at equal intervals and preferably at values which are multiples of the interval, e.g. 24', 28', 32', not 25', 29', 33'. If a meridian or parallel falls very close to the inner neatline (ie within 15mm) it may be omitted, but this practice is not recommended as it may cause plotting errors by the user.
- B-213.2 Meridians and parallels** should be as unbroken as possible and names, legends and notes should be placed clear of them. Where this is unavoidable, meridians and parallels may be broken, e.g: for the title of the chart, names, symbols, small reefs, compass roses, notes, diagrams and tables.
- B-213.3 On graduated plans,** at least one meridian and one parallel should be shown.
- B-213.4 On charts with a non-rectangular graticule** the neatline should follow the graticule. However, if the neatline is drawn as a rectangle, additional meridians and parallels may be drawn close to the border, to draw attention to the curvature of the graticule. The central meridian must be drawn perpendicular to the N and S borders of the chart, or as near to that as possible.

B-214 CORNER CO-ORDINATES

The geographical co-ordinates of the inner neatline of the chart should be labelled, if possible in the lower left - and upper right - hand neatline corners, as shown in INT 2, to facilitate cataloguing of the charts for both manual and automated cataloguing systems. They should be rounded outwards, where necessary, and normally be expressed to 0,01' but may be expressed to 0.001 on larger scales (i.e. = 1:10 000) or to 0,1' on smaller scales (i.e. = 1:500 000).

B-215 RECTANGULAR GRIDS

A (rectangular) grid, as distinguished from a graticule, is a referencing system on a flat plane in which points are defined by their distances from two straight axes at right angles to one another; these two distances, measured usually in the same unit, are called grid co-ordinates.

Rectangular Grids may be distinguished as Primary or Construction-Grids and Secondary or Reference-Grids.

The Primary Grid is the grid relating to the projection used; it may serve as the construction-framework of the chart. The Mercator projection does not need a construction-grid, as its graticule is rectangular and straight-lined.

A Secondary Grid is one that is superimposed on the chart for other (e.g. military) reference purposes. Grids usually have no practical interest for the marine navigator and a grid note should make this clear.

- B-215.1 If the primary grid** is shown, it must be shown in black, by short ticks in the chart border (see INT 2). The ticks should be 100 mm apart on the chart and the two ticks nearest each corner should be labelled.

B-215.2 **If a secondary grid** (e.g. Universal Transverse Mercator (UTM) or a national mapping grid) is shown, this should be portrayed in magenta with longer ticks, possibly all labelled, at distances representing 1000m or multiples, appropriate to the scale of the chart. A grid note, also in magenta, should be added to the chart's explanatory notes, explaining the incidence of grid letters, the number of last digits omitted, an example, etc. The note may be included in a diagram showing the incidence of grid letters. Sometimes this diagram can conveniently be combined with a source diagram (see B-178).

Secondary grid ticks and accompanying explanatory notes may be shown in black, especially where no primary grid ticks are charted. If two secondary grids are shown on one chart, e.g. because of a change in zone, the labelling of one of these should be distinct, e.g. in italics, or one should be shown in black and the other in magenta.

Grids should not be shown on charts of scale smaller than 1: 100 000.

B-220 LINEAR SCALES, DIMENSIONS

B-221 LINEAR (GRAPHICAL) SCALES

Linear scales should be in metres and normally shown in accordance with the following rules (see INT 2 for patterns, etc):

- Charts on scales smaller than 1:80 000: no scales.
- Charts on scales 1:80 000 and larger: metre scales in the borders.
- Insets: linear scales.

Linear scales shall-should be sited clear of folds and important detail; a folded chart shall-should carry the appropriate scales in each half. The length of the scales depends on the space available, and the labelling interval on the length.

B-221.1 Border scales should be between 200 and 450 mm long. The exact length is calculated for the scale at the mid-latitude of the chart.

The main advantage of border scales is that scales can be longer without obscuring chart detail. Scales should be placed in both borders, for convenience when using the chart folded back.

B-221.2 Additional linear scales may be shown (eg sea miles/cables and feet). The dicing (see B-212.1) of scales is only appropriate where the unit is directly related to the graticule (i.e. sea-miles/cables) to avoid potential confusion.

B-221.3 In high latitudes exceptions may be made to the above specification, e.g. a sliding scale as shown below, or the showing of more than one scale, each of which must be used in a specified latitude zone.

Scale



B-222 DIMENSIONS

A0 (1189 x 841mm) must be the maximum paper size used for nautical charts.

B-222.1 The neatline dimensions should be either 1100 x 750mm or 980/1100 x 630/650mm, subject to the minor variations required to locate charts' neatlines on exact graduation sub-divisions (see B-212.2).

In exceptional cases the maximum neatline dimensions permissible may be 1110 x 760mm. In such cases, border breaks (see B-212.11) must not extend beyond the outer border.

B-222.2 Charts having titles outside their north border should have the N/S neatline dimension 25 mm shorter than standard, to accommodate the title.

B-222.3 To facilitate accurate reproduction of charts **the dimensions must be quoted** in brackets in the lower right-hand corner in millimetres to one decimal place. The east-west dimension must be quoted first, eg (649,7 x 980,3 mm) is an upright ('portrait') chart, whereas (980,3 x 649,7mm) is a landscape chart.

B-222.4 **Where convergence is measurable** and the neatline follows the meridian, the lengths of both borders should be quoted, the length of the north border being given above that of the south, e.g.

$$\begin{array}{c} (648,2 \\ \quad \quad \quad \times 979,6\text{mm}) \\ (650,3 \end{array}$$

~~**B-222.5** Charts with the longer side running east-west are in 'landscape' format. They are convenient for use on chart plotting tables and are therefore the preferred format in scheming decisions.~~

B-230 Not used

B-240 TITLE, NOTES

B-241 TITLE BLOCKS

The titles of charts, including associated notes, should be arranged in one block, located in the land area if possible, clear of essential detail. It should be translated into English or French and if the more important information cannot be inserted on the front of the chart, it may be printed on the back. The title block should include the following items, reading from top to bottom:

B-241.1 Seal (or Crest). Most Hydrographic Offices print their seal on the chart, usually above the chart title.

B-241.2(I) On international charts the seal of the producer nation and the IHO seal must be placed above the title, side by side and of equal height, with the producer nation's seal on the left. In the case of a reproduced international chart, the printer nation's seal must be placed between the seals of the producer nation (to the left) and the IHO (to the right); the latter two seals must be smaller in height than the seal of the printer nation (about 0.8 of the height).

The words 'INTERNATIONAL', or equivalent, above and 'CHART SERIES', or equivalent, below the seals must also be shown on international charts.

B-241.3 General geographical area (e.g. FRANCE– NORTH COAST) and the formal unique **chart title**, i.e. specific geographical description of the location. Countries which do not use the Roman alphabet should print an additional title of the chart in Roman characters.

B-241.4 Scale. The natural scale of the chart must be shown using a colon, thus:

SCALE (or equivalent) 1:10 000

For Mercator projections, the mid-latitude or scale parallel must be added, in brackets or in the form 'at lat 21°30' (Note: no hemisphere identifier is required). See also B-211.

B-241.5 Unit of measure for depths with a general statement about the vertical chart datum used (see B-405).

B-241.6 Unit of measure for heights with a general statement about the plane(s) of reference used (see B-302). Distinctions should be made as appropriate for drying heights (B-413), clearance heights (B-380) and heights of lights (B-471.6), if these are referred to a different datum.

B-241.7 The name (and date) of the horizontal datum used with a statement, as appropriate, about the conversion of geographical positions to the international reference system and the internationally recognized regional datum. See B-201 and B-202

- B-241.8** **The IALA Maritime Buoyage** region, e.g. 'IALA Maritime Buoyage System - Region A (Red to port)'. If the navigational marks within the chart area, or part of it, have not been converted to comply with the IALA system, this should be stated in a cautionary note.
- B-241.9** **The name of the projection** used (see B-203).
- B-241.10** **A note citing the sources.** This may be either noted in the title or the note may refer to a separate Source Diagram. See B-170.
- B-241.11** **Titles blocks of insets** should be limited to information that is not contained in, or differs from, the main chart title block.

B-242 CAUTIONARY AND EXPLANATORY NOTES

In addition to those already mentioned in B-241, cautionary and explanatory notes should be added to or put near to the title block. Such a block-arrangement has cartographic advantages and assists the mariner in locating important information.

Notes should be kept to a minimum and be as concise as is compatible with accuracy and intelligibility. Hydrographic terminology (jargon) should be avoided, giving preference to easily understood words, e.g. 'depths' rather than 'bathymetry'.

- B-242.1** **Headings.** Notes, especially cautionary notes, should have an informative title heading for reference. This title should, where possible, be derived from the description as used in the chart, e.g. 'Restricted Area', 'Deep Water Route'. This practice is regarded as being more informative and easier for reference than having numbered notes or cautions.
- B-242.2** **Specimens** of various notes are given elsewhere in these specifications.
- B-242.3** **Cautionary notes** must normally be printed in the same colour as their subject, e.g. notes about wrecks, currents, magnetic anomalies, etc, in black; notes about exercise areas, anchorages, reporting points, etc, in magenta. Exceptions include notes referring to differences between horizontal datums and notes which refer to two or more features which are charted in different colours. (See B-140 to B-146 for more information about colour conventions). In any case, the reference legend '(see Note)' should be in the colour of the note, to aid identification.
- B-242.4** **Translation.** If space permits, cautionary notes on non-English language charts should be duplicated in English under the national wording. See also B-241.
- B-242.5** **Explanatory notes,** as distinguished from cautionary notes, include those mentioned in B-241 and also notes on the kind of light-ranges shown, glossaries of terms, etc.

B-243 REFERENCE TO OTHER PUBLICATIONS

A reference to other publications may be added as marginal information, e.g. outside the border in the upper right-hand corner. A specimen is given below:

Refer to relevant Sailing Directions, List of Lights and other publications to supplement the information shown on this chart. For general information on navigation, charts and hydrographic publications see The Mariners' Handbook. For an explanation of chart symbols and abbreviations see Chart INT 1.

For references to other charts and other marginal information, see B-250 to B-255.

B-250 CHART NUMBERING, MARGINAL INFORMATION

B-251 CHART NUMBERING

The numbering of charts within national chart series is a matter for national discretion. As a minimum, national numbers should be printed in black in the lower right-hand corner of the chart and, inverted, in the upper left-hand corner. The national prefix (ISO two-letter code, see Technical Resolution A1.19) may be included.

B-251.1(I) International charts must carry international chart numbers shown in magenta, in Arabic figures, with the prefix ‘INT’. The international number should be placed next to or above the national number.

B-251.2(I) International numbering must follow the principles described in M-4 A-204 and M-11 (Part A).

B-252 DATES OF PUBLICATION AND UPDATES

Charts must bear the date of their original publication, that of the latest edition, and the year date and numbers of the Notices to Mariners, if any, which originated updates (formerly termed corrections).

The wording of these notes is left to national discretion. See A-401 for the definitions of terms referring to the issue of charts.

B-252.1 The publication note (publisher's imprint), which should include the date of the chart's original publication (i.e. Edition 1), should be placed in the centre of the lower margin of the chart. Copyright acknowledgements (see B-253), or reference to the original chart in the case of reproduced charts (see B-252.4), should be placed underneath the publication note.

B-252.2 Edition date and numbers. Notes giving the edition publication date, and if desired the edition number, of the chart must be shown in accordance with national practice. The preferred position is to the right of the publication note or in the lower left-hand corner of the chart, with other updating details.

B-252.3 Notices to Mariners. Charts must bear the legend ‘Notices to Mariners’, or equivalent, in the lower left-hand corner, outside the border of the chart, where the mariner can insert the relevant references for updates carried out on the chart following their appearance in Notices to Mariners (NMs).

Charts should be brought up to date to the day they leave the Hydrographic Office. At the time of despatch, each chart must have a stamp or note indicating the last NM included, or the date of the last group of NMs consulted for its correction, even if this group and possibly preceding groups did not in fact contain any updates to be made to the chart in question. This stamp or notation should state very clearly the name of the Hydrographic Office concerned.

B-252.4 On reproduced (adopted) charts the publication note must be amplified by the following, or equivalent, note:

For international charts:

‘Modified reproduction of INT (...INT number...), published (...date of the edition of the producer’s chart which has been reproduced...) by (...name of the producer nation...)’.

For national charts:

‘Modified reproduction of (...country...) chart (...producer’s national number...), published (...date of the edition of the producer’s chart which has been reproduced...)’.

B-253 COPYRIGHT LEGEND

This may be shown in accordance with national practice. When data has been included from other nations’ charts, acknowledgment of the owner’s copyright should be made in accordance with any bilateral arrangement between the Hydrographic Offices. It should be located under the publication note, see B-252.1.

B-254 REFERENCES TO OTHER CHARTS

Hydrographic Offices should include on their charts references to similar or larger scale charts published by their own nation. These fall into two categories:

- a. References in the border of the chart to adjoining charts of the same or similar scale and to continuation insets.
- b. References to larger scale charts or plans which cover part of the area covered by the chart.

Note: **Insets**, including continuation insets and large-scale plans, are small charts with their own borders included within the limits of a larger chart. A **plan** is a large scale inset of a nautical chart (e.g. a port plan). For more detailed definitions, see the Hydrographic Dictionary, S-32.

For references to insets on Source diagrams see B-173.6. For references to foreign charts see B-254.4.

B-254.1 Border references should be shown in magenta and be worded ‘Adjoining chart...’ or ‘Continued in inset’, or equivalent, as appropriate.

B-254.2 The limits of larger scale charts or plans should be identified by numbered outlines in magenta, or by the legend ‘see Plan’ if the plan is on the same sheet. If there is more than one inset on a chart, they should be labelled A, B, C etc, and have letter identifiers added to the reference on the main chart, or in its border.

A charted outline may be other than the actual neatline limits, to show that a water area is not charted in detail at the larger scale (e.g. because it is cut off from the main sea area, or is an area covered by title, notes or diagrams).

A legend such as ‘see Chart...’ may be inserted (e.g. under the place name which is covered by the chart or plan) instead of limits if the area is so small that the limits and number cannot be shown with clarity.

An index of larger scale charts may be used in place of charted outlines in some instances, e.g. in the case of numerous charts forming a coastal series, where the exact limits of each one are of less consequence. This may be combined with another diagram if space is limited, see B-178.

B-254.3(I) References to INT chart numbers may be included in brackets alongside the national number, e.g. Adjoining Chart 1234 (INT4321).

B-254.4 References to foreign charts. When a Hydrographic Office considers that its own chart coverage is not adequate for all navigation needs, reference **should** be made to those foreign charts, preferably original national charts, which would usefully supplement the coverage. Such references must include the identity of the publishing office in front of the chart number. This should be the two-letter ISO national code, see Technical Resolution A1.19 and IHO publication S-62. A different colour may be used to differentiate references to foreign charts from the Hydrographic Office’s own charts.

In particularly important cases, the national Chart Catalogue and Sailing Directions should also refer to the foreign charts mentioned above.

B-254.5 If there is a plottable (see B-202.2) **horizontal datum** difference between scales or adjoining charts, the legend ‘(see Note – POSITIONS)’ or equivalent should be added to the chart number reference, in black, and the relevant note included on the chart (see B-202.3).

B-255 OTHER MARGINAL INFORMATION

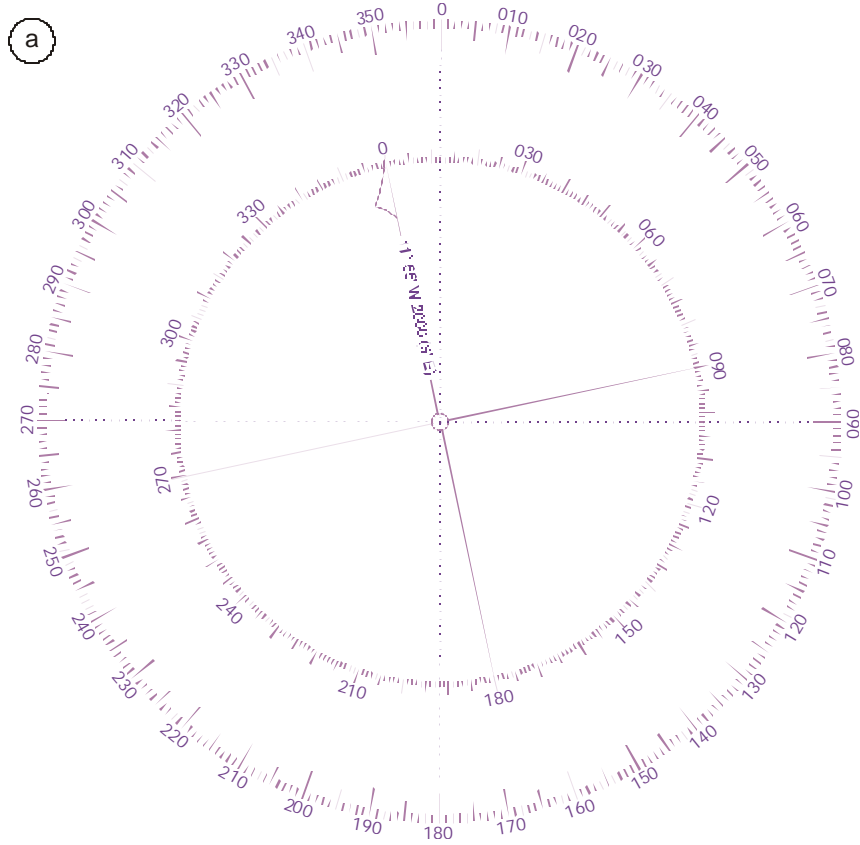
B-255.1 The term marginal information, as used here, refers to all information shown between the neatline and the outer edge of the paper. Most marginal information has been covered in the preceding specifications.

B-255.2 Units. Those member countries whose chart series contain charts showing depths in fathoms and/or feet may wish to include a note, e.g. ‘DEPTHS IN METRES’, ‘DEPTHS IN FATHOMS’, or equivalent, on their charts and this is left to national discretion. Such notes should be shown in large magenta capitals, in the top and bottom margins.

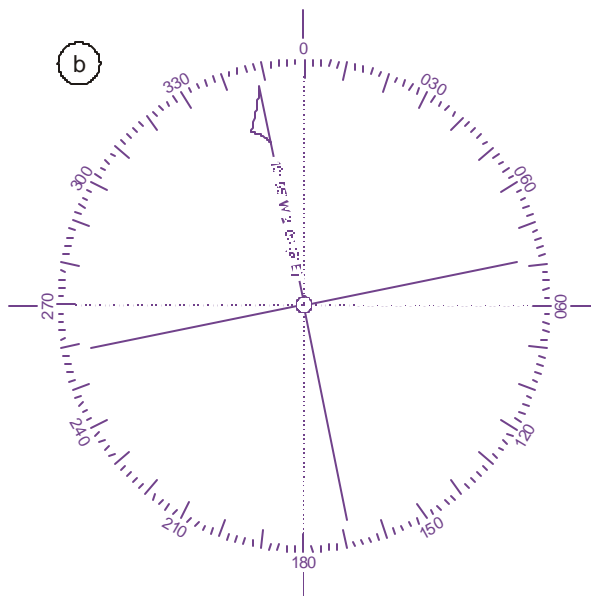
B-255.3 Horizontal datum. A legend to quickly draw the mariner's attention to the horizontal datum, for its use with satellite navigation equipment, (e.g. 'WGS84 POSITIONS can be plotted directly on this chart' or simply 'WGS84'), may be inserted in large magenta type, in the margins. An alternative is to state in correspondingly large format the actual datum to which the chart is referred.

B-260 COMPASS ROSES

SPECIMENS OF COMPASS ROSES:



10



B-261 COMPASS ROSES: PATTERNS, TRUE AND MAGNETIC

In this specification ‘pattern’ means (sub)division, labelling and centre indication.

One or more compass roses should be shown on each chart in places particularly selected for their use, see B-262.2.

The value of the magnetic variation, together with the year date and the annual rate of change, must be shown on charts, see B-272.

Compass roses should be in **magenta** in the form shown at B-260, taking note of the fact that these specimens also illustrate **optional** features.

B-261.1 The true circle, where combined with a magnetic circle, must be the outer circle; its pattern is illustrated by the specimens at B-260.

These specimens also show optional additions, which are:

- the outward extensions of the 0°-180° and 090°-270° axes,
- the dotted lines joining 0°-180° and 090°-270°.

Another optional addition, not illustrated, is a ‘North Star’.

B-261.2 The magnetic circle is optional: its pattern is illustrated by specimen a. For further particulars on magnetic data, see B-272.

B-262 COMPASS ROSES: SIZE AND POSITION

B-262.1 The diameter of the rose should normally be 100 to 140 mm, depending on the size and configuration of the chart – see B-260 specimen a. Smaller roses of 65 to 100 mm diameter may be used on insets, or in order to facilitate positioning. Specimen b is recommended for sizes smaller than 80 mm diameter.

B-262.2 Position. Compass roses should be distributed so as to limit the sliding distance of parallel rulers etc as much as possible. Ideally, it should be possible to reach all service areas of a chart, including inland fixing marks, by moving a 450mm rolling parallel ruler (aligned on both the bearing and its reciprocal across a compass rose) without any part of the ruler crossing the limits of the chart paper (which takes account of the limitation in size of chart tables, and the possibility of raised edges). For this reason, no part of a rose should be closer than 50mm to the inner neatline of the chart.

If possible, the centre of the compass rose should either coincide with the intersection of a parallel and a meridian or with one of these lines, or alternatively it should be amply clear of them. They should be kept clear of internally graduated meridians and parallels. On projections with converging meridians, care must be taken to ensure that compasses are oriented on North, wherever they are placed.

When practicable, roses should be placed clear of chart folds and of critical features, (e.g. dangers, navigational aids, etc). The coincidence of a sounding with a degree label in the rose or with the magnetic variation legend must be avoided, e.g. by selecting a suitable alternative sounding, or displacing a critical sounding using symbol I 11.

Compass roses should not be placed in the approaches to harbour entrances.

Compass roses may be placed in the land area, but for clarity should not be partly inside and partly outside the land or coloured areas.

Small craft mariners rarely use 450mm parallel rulers and they often fold charts; more and smaller compass roses are therefore appropriate in areas popular with these users.

B-270 MAGNETIC DATA

Of the various magnetic data, **magnetic variation** (also called magnetic declination) is the most important element for the mariner, and the only one to be shown on standard navigational charts. (See B-274 for abnormal magnetic variation.) Magnetic variation is defined in the Hydrographic Dictionary (S-32) as:

‘The angle between the magnetic and geographical meridians at any place, expressed in degrees east or west to indicate the direction of magnetic north from true north.’

Magnetic models are typically replaced every five years (e.g. 2005, 2010... termed epochs). Magnetic variation can be calculated from computer models, or derived from charts produced by certain Hydrographic Offices or mapping authorities, which show the spatial distribution of magnetic variation values worldwide for the current epoch, by means of lines of equal magnetic variation (termed isogonals). The rate-of-change curves, which are over-printed on such charts, enable values for any point to be extrapolated for any time within the current epoch.

B-271 MAGNETIC DATA: SOURCE MATERIAL

The variation and its annual change should be based on a reliable world model (e.g. derived from an authoritative computer program or the current issue of Magnetic Variation Charts).

B-272 MAGNETIC DATA: SYMBOLS

B-272.1 On charts of scale smaller than 1:750 000 and on charts where the charting of magnetic legends inside compass roses is impracticable, (e.g. due to the closeness of isogonals, or to the irregularity of their pattern), the variation must normally be shown as follows:

- a. **Magnetic variation lines (isogonals)** must be shown in magenta by unbroken lines connecting points of equal variation at 1°, 2°, or 5° intervals so that spacing does not generally exceed 150mm. These lines must be labelled with appropriate values of variation and annual change. Isogonals should not normally be inserted at intervals of less than 1°, because diurnal and seasonal fluctuations in the earth's magnetic field can change the stated variation by up to 1° and, in some parts of the world, the data on which isogonals are based may not ensure the accuracy of charted values to better than ±2°. For similar reasons, if the spacing of isogonals (at 1° intervals) is greater than about 150mm on the chart, the magnetic variation should be charted as a legend within each compass rose (see B-272.2).
- b. The magnetic variation must be shown in degrees followed by the letter E or W as appropriate. Where the isogonal of 0° is charted, it must be so labelled. The annual rate of change, expressed in minutes and followed by the letter E or W as appropriate, must immediately follow the variation, in brackets.



IB 71

- c. A note (in magenta) indicating the 5-year epoch date of the lines must be shown, preferably in or near the title block.

MAGNETIC VARIATION LINES ARE FOR (YEAR)
 The Magnetic Variation is shown in degrees, followed by the letter W or E, as appropriate, at certain positions on the lines. The annual change is expressed in minutes with the letter W or E and is given in brackets, immediately following the variation.

IB 71

- d. When isogonals are shown, compass roses must consist of the true circles only.

B-272.2 On charts of scale larger than or equal to 1:750 000, magnetic data must normally be shown in magenta, as a legend within each compass rose. These legends may be amplified by the addition of magnetic circles or Magnetic North arrows. However, in cases where this proves impracticable, the magnetic data may be shown:

- By isogonals (see B-272.1)
- By a boxed note in position (INT 1 IB 68.1)
- By an out-of-position note (INT 1 IB 68.2: exceptionally, in black when forming part of the title notes, e.g. of a plan)

B-272.3 **Magnetic legends** inside compass roses must be in the same colour as the rose, usually magenta as in the specimens at B-260.

The Magnetic North arrow must be labelled with the value of the variation, the year to which the value applies and, in brackets, the rate of annual change of variation. Variation must be given to the nearest 5', change to the nearest 1'. To both, values E or W must be added as appropriate. Where the increase or decrease in the rate of annual change is 0.5' or less, it must be shown as (0').

B-273 **MAGNETIC DATA: CORRECTIONS**

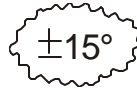
If a hydrographic office finds the values based on its national data differ by more than 45' for variation or more than 3' for annual change from the charts in B-271, the publisher of the latter should be notified, giving the supporting observations accompanied by an overlay showing the proposed correction. If and when the correction is accepted, the publisher will should promulgate details as appropriate.

B-274 **ABNORMAL MAGNETIC VARIATION**

Abnormal magnetic variation or local magnetic anomalies are local effects superimposed on the Earth's normal magnetic field which cause anomalous variation values. Reports of abnormal magnetic variation should be referred to one of the World Data Centres which exist under the auspices of the International Association of Geomagnetism and Aeronomy (IAGA), to establish whether it is a long-lasting feature, or relates to a temporary phenomenon, usually due to a magnetic storm.

B-274.1 Permanent anomalies are caused by concentrations of ferromagnetic material in the Earth's crust or, to a more limited extent, by wrecks or man made structures on the sea bed. They should not be charted unless they vary by at least 3° from the norm for the area, because diurnal and seasonal fluctuations in the Earth's magnetic field can change the stated variation by up to 1°, and, in some parts of the world, the data on which isogonals are based may not ensure the accuracy of charted values to better than ±2°.

Where the magnitude and extent of permanent local magnetic anomalies have been established to be 3° or greater, they should be shown by a limiting undulating line with the value of the anomalous variation:



IB 82.1

Within the enclosed area the magnetic variation may deviate from the normal by the value shown. Where the magnetic compass is known to be deflected either to the west alone or to the east alone, 5°W or 5°E should be quoted, rather than +5° or -5°, to reduce the ambiguity resulting from either a W or E 'normal' variation in the general area. Where the deflection may be in either direction it is expressed as ±5°. In all cases, the value quoted for the anomaly must be the deviation from the normal magnetic variation expected for the area.

B-274.2 **Where local magnetic anomalies have not been investigated** in detail, an appropriate legend should be shown, e.g. Local Magnetic Anomaly (see Note) or Area of Magnetic Disturbance (see Note), with further information in an accompanying note.

Local Magnetic Anomaly
(see Note)

IB

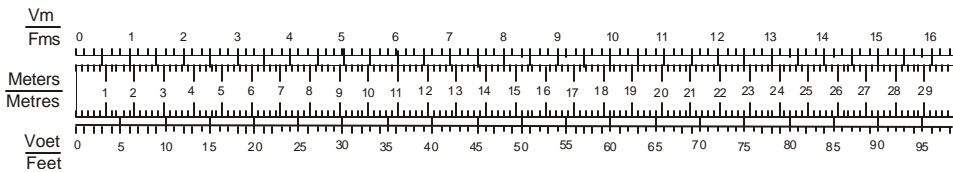
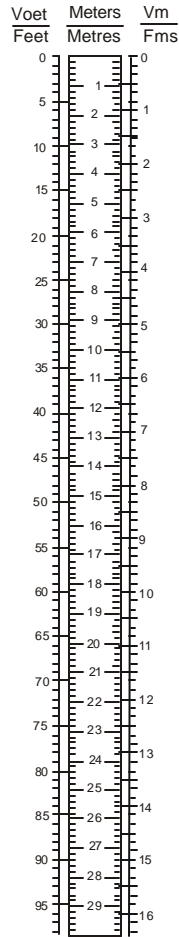
82.2

B-274.3 **Magnetic poles.** Charts of those areas in the vicinity of the Magnetic Poles, where the magnetic compass becomes so disturbed as to be erratic or valueless, should have cautionary notes to this effect inserted in the compass rose, in magenta. The notes should, if possible, refer the user to an appropriate magnetic chart for fuller information.

B-280 DEPTH UNIT CONVERSION TABLE

Those member countries whose chart series contain charts showing depths in fathoms and/or feet may wish to include a depth unit conversion table (metres/fathoms/feet) on their charts. The inclusion of such a table is left to national discretion.

Where shown, the conversion table should be in black, in the form of the following specimens, preferably the upright version, along one or both of the E/W borders of the chart or near the title. The table should be placed clear of folds and chart detail.



Examples of bilingual English-Dutch conversion table.

B-281 OTHER TABLES

Depicting other information on charts in tabular form may be considered. In many circumstances, the inclusion of such details in associated publications, such as Sailing Directions, will be more appropriate; however, examples of tables on charts include the following:

- Table of depths in maintained sections of river channels and canals
- Key to berths, jetties and mooring areas
- Table of clearances under bridges
- Key to new or non-standard symbols
- Glossaries of foreign words, particularly on adopted charts
- Table, in magenta, showing marina facilities (see INT 1 IU 32) may be used on large scale charts covering small craft centres.

For tidal levels and tidal stream tables, see B-406.

B-290 SOURCE DIAGRAMS *[To be transferred from B-170 on publication]*

Page intentionally left blank