



## CHART STANDARDIZATION & PAPER CHART WORKING GROUP (CSPCWG)

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

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To CSPCWG Members

6 August 2004

Dear Colleagues,

### **Subject: Draft revision M-4 Section B-200**

Annex A is a draft revision of M-4 Section B-100. It is based on the latest digital version of M-4 prepared by IHB, and includes updates from IHO Technical Resolutions (TR), and also some updating, additions, simplification and other editorial amendments by the CSPCWG Secretary. Proposed changes are shown in red (or purple if derived from TR) with some additional comments or queries in blue italic which are not intended to be part of the final document.

Annex B provides more detailed explanations. It calls for members to comment on particular issues, which are highlighted by bold text; of course, members are free to comment on anything else, as well.

I would be grateful if members would examine Annex A, and compare it carefully with the existing version of M-4 Part B-200, paying particular attention to the proposed wording in red and purple and associated comments and queries. I will assume that any proposed change which is not commented on can be incorporated in the specification without further consultation.

Please send me your views and any suggestions for improvements **by 15 October 2004**. Please note that, owing to the size of this document and use of colour, hard copies will not be posted unless specifically requested. Recipients are respectfully requested to print their own copies, as necessary.

Yours sincerely,

for Peter G. B. Jones,  
Chairman

Annex A: Draft revised section B-200

Annex B: Explanation of proposed changes to B-200

# **PART B**

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## **SECTION 200**

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

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**SECTION 200 – CHART FRAMEWORK  
(FORMAT, POSITIONS, COMPASSES, SOURCE DIAGRAMS)**

**RECORD OF CORRECTIONS**

Specification Number	Amendment Number	Circular Letters		Remarks
		Promulgated by	Approved by	
Section 200 Preliminary Edition	?	33/1981	?	Adopted by 1982 Conference, Decision No. 23.
B-212.C-B-213.B B-232-INT 2 B-254.2-B-260 B-262.1-B-272.3	?	?	?	Included in Cumulative Correction No. 1/1986
Section 200 1988 edition	?		?	New loose-leaf edition - including symbols from chart INT 1 and editorial updating.
B-252	1/1990	47/1990	?	New sentence added to the paragraph.
Section B-200				Draft revision July 2004



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**SECTION 200 - CHART FRAMEWORK  
(FORMAT, POSITIONS, COMPASSES, 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 It is recommended that the **World Geodetic System (1984) (WGS84)** 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: ~~The~~ WGS84 is the system ~~upon~~ to which the Global Positioning System (GPS) is ~~referenced~~ referred and it is therefore essential that nautical charts should also 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 shall be included on any such chart (see B202). It is a requirement that ENC’s are referred to WGS84 Datum.

B-201.4 ~~The International Hydrographic Bureau will act as the central point for distributing WGS transformation constants provided by Hydrographic Offices.~~

**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 to be published as an IHO Special Publication).

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-201.4 derived from preface to S-60 (Ed 3). IHB to Cancel TR B1.1 (Purple wording from TR)]*



**B-202 INDICATION ON CHARTS OF RELATIONSHIP OF HORIZONTAL DATUM TO WORLD-WIDE AND OTHER DATUMS ~~THE INTERNATIONAL REFERENCE DATUM~~**

B-202.1 **All charts at scales larger than 1:500 000** shall 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. ~~It is recommended that charts at scales larger than 1:500 000 shall bear a legend indicating the name and date (if appropriate) of the geodetic datum upon which the graticule is based.~~ The WGS year, WGS72 or WGS84, shall be stated on charts of a scale larger than 1:50 000.

B-202.2 **Appropriate transformation notes** (commonly titled **SATELLITE-DERIVED POSITIONS** notes) shall be inserted, in black, on ~~It is recommended that~~ all charts at scales larger than 1:500 000 ~~shall carry appropriate transformation notes~~ 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.~~ 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.~~

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~~It is recommended that, where a chart is based on a local datum rather than the regional datum, an additional transformation note shall be added to enable the navigator to convert positions on the regional datum to chart datum and vice-versa.~~

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: ~~It is recommended that the following standardized wording be used for the appropriate transformation notes:~~

- a. 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 ~~the World Geodetic System (WGS)~~ 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 ~~the World Geodetic System (WGS)~~ WGS84 Datum. The differences between satellite-derived positions and positions on this chart cannot be determined ~~for this chart~~. 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 ~~the World Geodetic System (WGS)~~ 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, ~~all latitudes~~ positions read from ~~this chart~~ [number] ~~should be decreased~~ must be adjusted by 0.XX minutes NORTHWARD / SOUTHWARD, and ~~all longitudes should be increased~~ adjusted by 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 the nearest hundredth of a minute, of the correction to be applied. On scales larger than 1:15 000 the datum shift values should be given to three decimal places, 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.
- 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.

~~In the notes at a. and b. above, the WGS year, WGS72 or WGS84, shall be stated on charts of a scale larger than 1:50 000.~~

**B-202.4** The note recommended in paragraph B-202.3c may be expanded to include also the name of any **earth-based electronic navigation system** in those exceptional cases in which such a system both:

a. provides positions of very high accuracy in the charted area, and

b. refers those positions to ~~the~~ WGS84.

*[Is B-202.4 still relevant? Original wording was inserted in TR at request of Portugal, for differential Omega, which is now discontinued. Loran C is still in use and receivers may have the ability to output position in WGS84.]*

*[IHB to Cancel TR B2.10 (Purple wording from TR)]*

**B-202.5** **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 drawn on any suitable projection, taking into account the possible advantages of using the surveying projection or **the rectangular grid ~~that~~** used by the national mapping authorities. In latitudes approaching 75 ° the limiting scale should possibly be larger than 1:50 000, **to minimize apparent distortions.**

**B-203.2** **Charts of scale smaller than 1:50 000** shall be drawn 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 latitudes above about 70°.

## B-210 SCALE, GRADUATION, GRATICULE

**Note:** For high latitudes it may be necessary to make exceptions to the guidance in paragraphs B211-213 ~~paragraph~~.

## B-211 SCALE

The **natural scale** to be cited 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**. ~~scale parallel(s)~~. ~~Normally~~, Natural scales which are multiples of 1 000 or 2 500 e.g. 1:100 000; 1:12 500 ~~are to should normally~~ be used for all charts.

~~On charts on Mercator projection~~ The **latitude of reference** should be specified ~~for charts on 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 mid-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 and most plans ~~are should be~~ graduated. A plan may be graduated on 2 sides only; **exceptionally**, it may be left ungraduated if it is 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 illustration of the terms used, e.g. the various intervals, dicing length, mitred corners ~~in examples T and U~~.

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

**B-212.3** **Minor subdivisions of border graduations** are to show, where appropriate to the scale, tenths of a minute and, where considered useful, hundredths of a minute, ~~or seconds~~. *[Can we try to eliminate seconds, to try and standardize on the use of decimals of a minute?]* Sub-divisions into hundredths of a minute are normally appropriate for charts or plans at a scale of 1:15 000 or larger. Where only small portions of such 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 are normally given for latitude and longitude. All meridians and parallels shown are to be numbered. The interval of graduation numbering is 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 higher than 70° it may be necessary to subdivide the longitude graduation at a ~~wider~~ **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.

**B-212.6 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.

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 shall 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'.

**B-212.7 Hemisphere labelling.** A reference to the hemisphere should be shown, preferably in the lower border. This may be in the form 'Longitude East/West from Greenwich' or the letter E or W, as appropriate, may be used instead of the full legend. It should be positioned on a meridian (preferably a graduated one if there is supplementary graduation, see B-212.10) near the centre of the border graduation. On charts comprised of plans, one hemisphere label on the 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).

**B-212.8 Border breaks.** Border graduation breaks to insert significant features lying just outside the limits of the neatline should preferably not extend beyond the thick outer border line, and certainly not 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-212.9 ~~Charts with a second fold and~~ Skewed charts.** ~~Charts with a length in excess of 980 mm may carry a subsidiary graduation along a meridian or parallel. See example N in diagram INT 2.~~ The graduation of skewed charts (i.e. not North/South oriented charts) ~~will~~ shall follow the pattern of the supplementary graduation (see B-212.9).

**B-212.10 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 larger than 450mm should also include additional internal graduation. The graduations are to 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) are to 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. At the intersection of a graduated line with an ungraduated line, the latter may be broken to insert a label.

**B-212.11 Inset plans** should preferably be drawn with their outer borders parallel to the neatline of the main chart sheet and at equal distances from it when near its corners.

## **B-213 GRATICULE**

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

**B-213.1 Meridians and parallels** shall be shown not more than ~~20 cm~~ 230mm apart and not closer than ~~10 cm~~ 130mm. 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'.

**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, however, meridians and parallels will may be interrupted, e.g. for the title of the chart, for names, figures, buoys, and small reefs, and also for compass roses, notes, diagrams and tables.

**B-213.3 On graduated plans,** at least one meridian and one parallel should ~~are to~~ be shown; ~~also on ungraduated plans if practicable.~~

**B-213.4 On charts with a non-rectangular graticule** the neatline shall normally 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 shall be drawn perpendicular to the N and S borders of the chart, or as near to that as possible.

## B-220 LINEAR SCALES, DIMENSIONS

### B-221 LINEAR (GRAPHICAL) SCALES

Linear scales shall be **in metric units** and should normally be 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.
- Plans, graduated and ungraduated: linear scales.

Linear scales shall be sited clear of folds and important detail; a folded chart shall 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 **the** saving of space by having the scale tucked away in a convenient place. Having scales in both borders is convenient when using the chart folded back.

**B-221.2 Additional scales** may be shown if desired. The dicing of scales is not recommended, except where the unit is directly related to the graticule (sea-miles, cables).

**B-221.3 In high latitudes** exceptions may be made to the above specification, eg 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

It is recommended that A0 (1189 x 841mm) should be the maximum paper size used for nautical charts.

**B-222.1 The neatline dimensions** should ideally be either 1100 x 750mm or 980/1100 x 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 are 1110 x 760mm.

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

**B-222.3** The dimensions are quoted in brackets in the lower right-hand corner in millimetres to one decimal place. The east-west dimension is quoted first, eg (649,7 x 980,3 mm) is an upright ('portrait') chart.

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

(648,2  
x 979,6mm)  
(650,3

**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 GEOGRAPHICAL POSITIONS, GRIDS

## B-231 GEOGRAPHICAL POSITIONS, DIFFERENCES BETWEEN CHARTS

*See B-202. [this has now been included at B-202, so that the examples of transformation notes are grouped together, and excessive repetition is avoided]*

## B-232 CORNER CO-ORDINATES

The geographical co-ordinates of the inner neatline of the chart shall be labelled, preferably 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 shall be expressed either to 0,01' or the nearest second on scales greater than 1:500 000 and 0,1' on scales = 1:500 000, and rounded outwards, where necessary.

## B-233 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 co-ordinates.

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

**The Primary Grid** is the grid appertaining relating to the projection used; it serves as the construction-framework of the chart. The Mercator projection does not need a construction-grid, its graticule itself being 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 ~~could~~ should make this clear.

**B-233.1** If the primary grid is shown, it shall be shown in black, by short ticks in the chart borders ~~of large-scale charts~~ (see INT 2), ~~example S~~. The ticks shall normally be 100 mm apart on the chart and the 8 ~~corner~~ ticks nearest the corners shall be labelled.

**B-233.2** If a secondary grid (e.g. Universal Transverse Mercator (UTM) or a national mapping grid) is shown, this should be ~~done~~ 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 then 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 ~~note diagram~~ can conveniently be combined with a source diagram (see B-178).

Secondary grid ticks and accompanying explanatory notes may, if preferred, 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 in italics, or one should be shown in black and one in magenta.

It is not recommended that grids be shown on charts of scale smaller than 1:~~80 000~~ 100 000.

**B-240 TITLE, NOTES**

**B-241 TITLE BLOCK**

The titles of charts shall preferably be arranged in one block, located in the land area if possible, clear of essential detail. ~~It is recommended that if the translation into English or French of the title and of the more important information cannot be inserted on the chart, it be printed on a slip of paper pasted on the back.~~ *IHB to Cancel TR B2.15 (Purple wording from TR)* The title block shall 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 shall 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 an adopted international chart, the printer nation's seal is to be placed between the seals of the producer nation **(to the left)** and the IHO **(to the right)**; the latter two seals shall be 1/5 smaller in height than the seal of the printer nation.

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

**B-241.3 General geographical area** (e.g. **FRANCE – NORTH COAST**) and **the** specific geographical ~~reference to~~ description of the area shown, i.e. the **formal unique chart title proper**. It is recommended that countries which do not use the Roman alphabet print an additional title of the chart in Roman characters. *IHB to Cancel TR B2.15 (Purple wording from TR)*

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

SCALE (or equivalent) 1:10 000

~~Where applicable~~ For Mercator projections, the mid-latitude or scale parallel shall 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 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 ~~and B-231~~.

**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 ~~or authorities~~. This may be either noted in the title or the note may refer to a separate Source Diagram. See B-170.

## **B-242 CAUTIONARY AND EXPLANATORY NOTES**

~~Other than~~ In addition to those already mentioned in B-241, cautionary and explanatory notes shall if possible be added to or put near to the title block. Such a block-arrangement has cartographic advantages ~~and assists the user in locating important information~~.

~~For obvious reasons~~ Notes shall be kept ~~down~~ 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.** It is recommended that ~~these~~ notes, especially cautionary notes, have a title heading for reference. This title should, where possible, be derived from the description as used in the chart, e.g. ~~'Gas Pipelines' or 'Production Platforms'~~ '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 the ~~pertinent~~ specifications.

**B-242.3** **Cautionary notes** shall 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.)

**B-242.4** **Translation.** If space permits, it is recommended that on non-English language charts cautionary notes 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 NUMBERING, MARGINAL INFORMATION

### B-251 CHART NUMBERING

The numbering of charts within national chart series is a matter for national discretion. It is recommended that national numbers be printed in black in the lower right-hand corner of the chart and, inverted, in the upper left-hand corner.

~~For the identification of latticed charts see B-603.~~

**B-251.1(I) International medium and large scale charts** shall carry international chart numbers shown in magenta, in Arabic figures, with the prefix 'INT'. The international number shall be placed next to the national number in the lower right-hand corner of the chart and, inverted, in the upper left-hand corner.

**B-251.2(I) International numbering numbers** shall be agreed by the groups of hydrographic offices who devise the regional schemes of medium and large scale international charts, e.g. the MBSHC. This numbering shall follow the principles described in paragraphs 2.8 to 2.13 of the 'Regulations of the IHO for International (INT) Charts' (see Part 3) M-4 A-204.

### B-252 DATE OF PUBLICATION AND UPDATES (CORRECTIONS)

~~It is resolved that~~ Charts shall always bear the date of their original publication, that of the ~~last~~ latest edition, and the year date and numbers of the Notices to Mariners, if any, which originated updates (corrections). *IHB to Cancel TR B2.14 (Purple wording from TR)*

The wording of these notes shall be left to national discretion. See ~~B-128~~ 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, shall normally 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 adopted charts (see B-252.4), should be placed underneath the publication note.

**B-252.2 New editions.** Notes giving the date, and if desired the number, of the current edition shall 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** ~~Small corrections~~ **Notices to Mariners**. Charts shall ~~also~~ bear the legend ‘Notices to Mariners’ in the lower left-hand corner, outside the border of the chart, where the mariner can insert the relevant references for corrections carried out on the chart following their appearance in Notices to Mariners (NMs).

It is recommended that charts shall be brought up to date to the day they leave the Hydrographic Office. At the time of despatch, each chart shall 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 corrections to be made to the chart in question. This stamp or notation should give very clearly the name of the Hydrographic Office concerned. ~~All particulars about corrections, either by reprint or manually, are to be shown in the lower left hand corner of the chart.~~ *IHB to Cancel TR B2.14 (Purple wording from TR)*

**B-252.4** ~~(+) Adopted International charts~~. On adopted ~~international~~ charts the publication note shall be amplified by the following, or equivalent, note:

For international charts:

‘Modified reproduction of INT (...INT number...), **originally** published (...date of the ~~producer's~~ edition of the producer’s chart which has been adopted..) 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 adopted...)’.

## **B-253** **COPYRIGHT LEGEND**

This shall be shown or omitted in accordance with national practice. **When data has been included from other nations’ charts, acknowledgment of the owner’s copyright should be made, normally underneath the publication note, in accordance with any bilateral arrangement between the hydrographic offices.**

## **B-254** **REFERENCES TO OTHER CHARTS**

It is recommended that, whenever the need is felt and the clarity of the chart would not be impaired thereby, hydrographic offices include on charts for normal navigation purposes reference to other charts published by their own nation, either adjoining or at other scales, for the area concerned. *IHB to Cancel TR B2.13 (Purple wording from TR)* These fall into two categories:

- a. References in the border of the chart to adjoining charts of about the same scale or of the most appropriate scale available.
- b. References to larger scale charts or plans which cover part of the area covered by the chart.

**B-254.1** **Border references** should be shown in magenta and preferably be worded ‘Adjoining chart...’, or equivalent.

**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 plan on a chart, the plans should be labelled A, B, C etc, and have letter identifiers added to the reference on the main chart.

A charted outline may be other than the actual sheet limit where it is desired 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).

A legend such as 'see Chart...' may be inserted ~~useful~~ if the limits are not extensive, so that ~~(e.g. if~~ a chart number cannot be shown within or immediately adjacent to the limits.

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 with the national number, in brackets, e.g. Adjoining Chart 1234 (INT4321).

**B-254.4** References to foreign charts. It is recommended that, when a hydrographic office considers that its own chart coverage, at various scales, is not adequate for all navigation needs, reference be made to those foreign charts, preferably original national charts, which would usefully supplement the coverage. Reference shall include the identity of the publishing office (as a two-letter ISO national code), in front of ~~with~~ the chart number. [*ref TR A1.19*]

It is recommended that, in particularly important cases, the national Chart Catalogue and Sailing Directions also refer to the foreign charts mentioned ~~in paragraph 2~~ above. *IHB to Cancel TR B2.13 (Purple wording from TR)*

**B-254.5** If there is a horizontal datum difference between scales or adjoining charts, the legend '(see Note – POSITIONS)' or equivalent should be added to the chart number reference, in magenta, and the relevant note included on the chart (see B-231).

## **B-255 OTHER MARGINAL INFORMATION**

**B-255.1** Marginal information, as used here, is all information shown between the neatline and the outer edge of the paper. ~~Paragraphs B-212.8, B-221.1, B-222.3&4, B-233.1&2, B-243, B-251 to B-254 refer. See also B-603 for marginal information on latticed charts. Most marginal information has been covered in the preceding specifications.~~

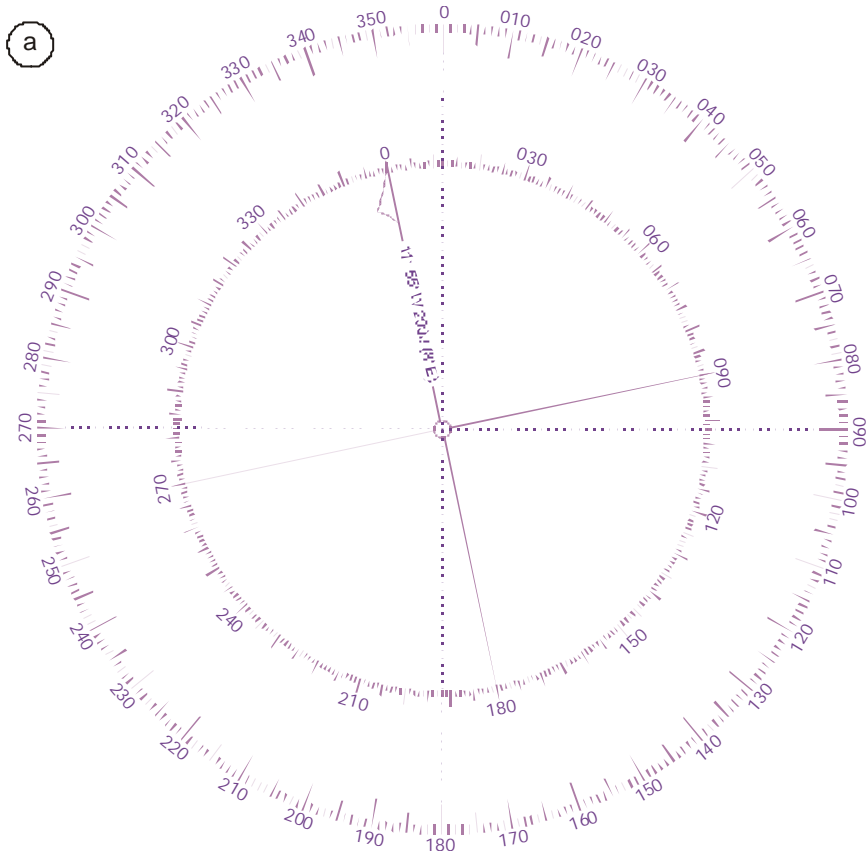
~~**Graticule and grid.** For the border and all figures connected with the graticule and grid, see B-2102, B-22033 and INT-2.~~

**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.

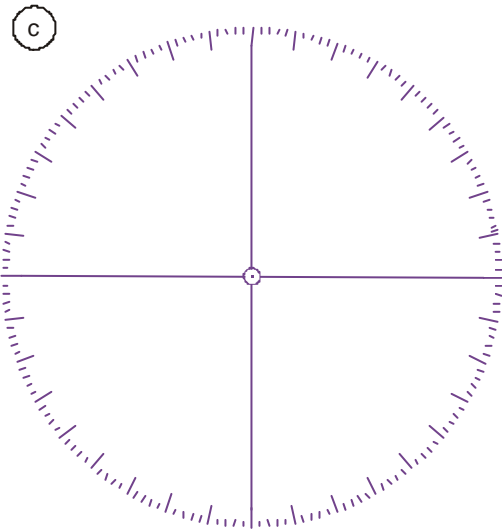
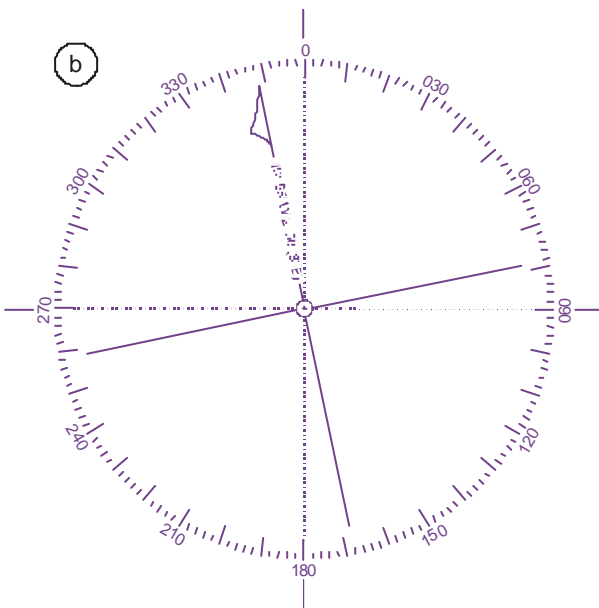
**B-255.3 Horizontal datum.** A legend to quickly draw the mariner's attention to the horizontal datum, for its use with satellite navigation equipment, (e.g. 'WGS84 POSITIONS can be plotted directly on this chart' or simply 'WGS84'), may be inserted in large magenta type, in the top and bottom margins. A note stating the reverse may be read quickly and misunderstood, and is therefore not recommended.



**B-260 SPECIMEN COMPASS ROSES, COMPASS ROSES, BEARINGS**



**IB 70**



## B-261 COMPASS ROSES: PATTERNS, TRUE AND MAGNETIC

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

It is strongly recommended that one or more ~~true~~ compass roses 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, shall always be shown on charts, see B-272.

Compass roses shall be shown in **magenta** in the form shown at B-260 ~~on page 1-200.14~~, taking note of the fact that these specimens are also illustrating **optional** features.

**B-261.1** The **true circle rose** shall, ~~where combined with a magnetic circle~~, always be the outer circle; its pattern shall be as shown in the specimens a. and b.

These specimens also show ~~the~~ optional additions, which are:

- ~~the 'North Star' and~~ 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 rose** is optional, ~~but para B-261 above must be complied with~~. For further particulars on the showing of magnetic data, see also B-272.

When it is desired to add a magnetic circle, the pattern shall normally be as in specimen a.

**B-261.3** A 'points' **circle rose**, as in specimen c, may be shown in exceptional cases, if required. *[Does anyone still include points circles on charts? Note that the specimen in the digital version of M-4 is not a points circle]*

## B-262 COMPASS ROSES: SIZE AND POSITION

**B-262.1** The **diameter** of the ~~true~~ rose shall 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 plans, 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, roses should be at least 50mm from 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 preferably be kept clear of internally graduated meridians and parallels.

If possible, roses should be placed free clear of folds and of critical features, (e.g. dangers, buoys, etc). In any all cases, the coincidence of a depth figure with a degree label in the rose or with the variation note is to be avoided. ~~Coincidence of a depth figure with the degree graduation should be avoided if possible~~, e.g. by selecting a suitable alternative sounding.

Compass roses should never be placed in the approaches to harbour entrances.

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

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

## **B-263 ~~QUOTED~~-BEARINGS: CONVENTIONS**

Bearings shall be given in degrees from 0° (North) to 360° reckoned clockwise. Bearings should be quoted, with the exception of 0°, as three figures, eg 230°, 095°, 005°. This is in accordance with usual navigational practice. Bearings may be quoted to ~~within half~~ tenths of a degree, e.g. 096,4°. The value of the TRUE bearing, and only the true bearing, shall always be indicated on charts.

**B-263.1 Bearings from seaward.** The bearings of the limits of sectors of lights, arcs of visibility of lights and alignments of leading lights or of other conspicuous objects shall be given from seaward. When this procedure is not adhered to, the fact shall be expressly stated in each case. In directions for passing off-lying dangers, bearings shall be given from seaward.

**B-263.2 Bearings from landward.** ~~It is resolved that~~ When, in the description of dangers, (e.g. in a Notice to Mariners), the position of an object is given by distance and bearing, the bearing shall always be given from some well-defined and, if possible, permanent mark, and from landward, and that the word 'from' or its equivalent shall be inserted.

*IHB to Cancel TR A2.6 (Purple wording from TR)*

~~Bearings shall always be quoted such as they appear to the observer from seaward.~~

**B-263.3 Reciprocal Bearings.** Any line drawn on a chart, or observed, bears in two reciprocal directions (e.g.  $030^\circ$  and  $210^\circ$ ). Most bearings given on charts shall be expressed from seaward (as stated at B-263.1). Therefore, in most cases, the figure given is that which the mariner will observe from his ship or measure to plot on the chart. There are a few exceptions to this (as stated at B-263.2, e.g. in the plotting of NM corrections; also, when leaving port a ship's heading on a leading line will be the reciprocal of the charted value). However, in certain cases, both bearings should be charted e.g. ' $120^\circ$ - $300^\circ$ ', for example:

- Some reaches of fairway channels which are marked by a pair of leading marks at either end.
- Recommended tracks not defined by fixed marks.
- Measured distance courses.

## 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 that shall be shown on standard navigational charts. 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. 19950, 19952000... termed epochs). Magnetic variation can be calculated from computer models, or derived from charts produced by certain hydrographic offices, 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

It is strongly recommended that the calculation of the variation and its annual change should be based on a reliable world model (e.g. derived from ~~the UK or US~~ 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 showing of magnetic legends inside compass roses is impracticable, (e.g. due to the quick succession closeness of isogonals lines, or to the irregularity of their pattern), the variation shall be shown by lines of equal magnetic variation, as follows:

- a. **Magnetic variation lines (isogonals)** shall be shown on the in magenta plate by unbroken lines connecting points of equal variation at 1°, 2°, or 5° intervals so that spacing does not generally exceed 15 cm. These lines shall 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, it is recommended that the magnetic variation be charted as a legend within each compass rose (see B-272.2).
- b. The magnetic variation shall be shown in degrees followed by the letter E or W as appropriate. Where the isogonal line of 0° must be charted, it shall be so labelled. The annual rate of change, expressed in minutes and followed by the letter E or W as appropriate, shall immediately follow the variation, in parenthesis brackets.



**IB 71**

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

MAGNETIC VARIATION CURVES 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 curves 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 lines are shown, the compass roses shown shall consist of the true rose circle only.

**B-272.2** On charts of large and medium scale up to greater than 1:750 000, magnetic data shall be shown in magenta, normally as a legend within each compass rose. legends, inside the compass roses where roses are shown. 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 are normally to be shown, **in magenta**, as in the specimens ~~on page 1-200.14~~ at B-260.

The Magnetic North arrow shall be labelled with the value of the variation, the year to which the value ~~appertains~~ applies and, in ~~parenthesis~~ brackets, the rate of annual change of variation. Variation ~~is shall be~~ given to the nearest 5', change to **the nearest 1'**. To both, values E or W shall be added as appropriate. Where the increase or decrease in the rate of annual change is ~~30"~~ 0.5' or less, it shall be shown as (0').

## **B-273** **MAGNETIC DATA: CORRECTIONS**

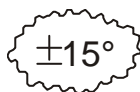
If a hydrographic office finds the values based on its national data differ **by** more than 0° 45' for variation or more than 3' for annual change from the charts in B-271, the publisher of the latter should be notified, giving the supporting observations accompanied by an overlay showing the proposed correction. If and when the correction is accepted, the publisher will 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 exceed 3°, 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 is 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**

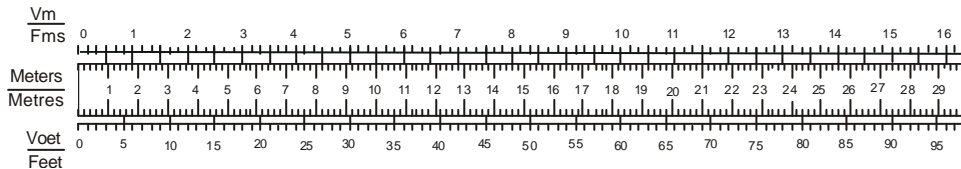
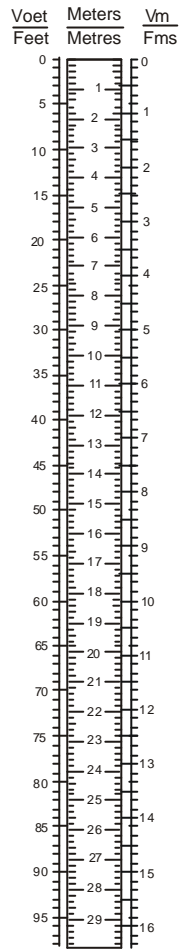
**B-274.3** **Magnetic poles.** It is recommended that charts of those areas in the vicinity of the Magnetic Poles, where the magnetic compass becomes so disturbed as to be erratic or valueless, should have cautionary notes to this effect inserted in the compass rose, **in magenta**. The notes should, 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, it is recommended that the conversion table be in black, in the form of the following specimens, preferably in the upright version, along one or both of the E/W borders of the chart or near the title. The table shall be placed **free clear** of folds and **of charted** detail.



Examples of bilingual English-Dutch conversion table.

## **B-281 OTHER TABLES**

The possibilities for 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 which have been used successfully 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 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.

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## **B-290 SOURCE DIAGRAMS** *[To be transferred from B-170?]*

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## EXPLANATIONS FOR CHANGES TO B-200

### General

1. Unlike Section B-100, CSC did not leave a copy of Section B-200 which had already been drafted and circulated around members. The Secretary has therefore started afresh. He has researched various sources for changes and additions, the most significant being IHO's Technical Resolutions (TR) in M-3, various CSC "consultancy papers" and UKHO's internal interpretations of the existing specifications. Some minor editorial amendments have been included, to improve or clarify the wording, and change format or style.
2. The IHO TR have generally been inserted verbatim. Occasionally, sentences have been reorganized to enable the main subject to be emboldened at, or near, the beginning of a paragraph. **Words derived from TR are in purple.**
3. The CSC accumulated a large number of proposals submitted by CSC members and other Member States, over many years. Most of these had been filed, pending revision of the relevant section of M-4. Meanwhile, a consultancy report had been prepared on many of them, and the Secretary has been able to draw on that for this revision of B-200.
4. One of the aims of the current revision (see Annex A to CSPCWG CL 06/2004) was to make the wording "more prescriptive where possible, continuing the progress which has been made towards greater international standardization over the last 15-20 years, exemplified by the publication of S-52 and S-57". No doubt most hydrographic offices have had to interpret, amplify and update the existing M-4 guidance over the years, perhaps with written notes. In order to fulfil the stated aim, the Secretary has drawn on such guidance as exists in UKHO, accumulated since M-4 was originally drafted. It is recognised that such guidance has been created to fulfil the needs of one particular HO, but so far as possible, the Secretary has edited this source to make it non-UKHO specific. CSPCWG members will have to judge to what degree he has been successful, and offer their own perspectives, in order to arrive at a common viewpoint.
5. **Changes, except those derived from TR, are in red.** The reason for many proposed changes will be self-evident and need no further comment. For other changes, it is helpful to explain the reason, and this is done below, referred to the particular specification or paragraph.
6. Some paragraphs require a response from members; these have been highlighted with bold text.

### Explanations referred to specification numbers

7. B-201: In keeping with other new specifications, a definition has been included. The rest of the specification is derived from TR B1.1 (updated in recognition of the fact that ENC are required to be referred to WGS84), and S-60 (which fulfils IHO's responsibility under TR B1.1).

8. B-202: Derived from TR B2.10 (including the amended title line). The content of the former B-231 has been included here, to avoid repetition and enable the sample POSITIONS notes to be grouped together. The rest of the proposed amendments are largely self-evident in the light of some years experience with the application of WGS to charts. However, the following notes from the CSC consultancy may help:

1. One of a number of long-standing tasks for the CSC has been the incorporation of IHO Technical Resolutions (TR) B1.1 (WORLD WIDE & REGIONAL HORIZONTAL DATUMS) and B2.10 (INDICATION ON CHARTS OF THE RELATIONSHIP TO THE INTERNATIONAL REFERENCE DATUM) in Sections 201 and 202 respectively of the IHO Chart Specifications. The approved versions of these TR were originally promulgated in IHB CL 46/1984, although a few minor editorial amendments have subsequently been made.

2. Also of relevance is the review carried out by the UKHO, concerning the methodology for informing the mariner of the relationship between the World Geodetic Datum 1984 (WGS84) and the horizontal datum used on navigational charts. The more significant changes introduced on UK charts as a result of this review were as follows:

(a) The inclusion of a reference to the Global Positioning System (GPS) in the `Satellite-Derived Positions note` as an example of a satellite navigation system. Strange as it may seem, it had become apparent that some users of UK charts were unaware that the `Satellite-Derived Positions notes` had been provided to enable them to accurately plot GPS positions on the charts!

(b) The introduction of worked examples, showing how the shifts should be applied, and the use of the wording "positions must be adjusted by 0.xx minutes NORTHWARD/SOUTHWARD . . . ." etc in place of the slightly more ambiguous "positions should be moved . . . ."

(c) On charts where the relationship between WGS84 Datum and the regional or local chart datum could not be determined, the previous guidance had followed IHO TR B2.10 and simply stated that the adjustments could not be determined, but with the added caveat that "it should not be assumed that they [ie the shifts] are negligible". This wording has been strengthened and mariners are now "warned that these differences **MAY BE SIGNIFICANT TO NAVIGATION**" and are "advised to use alternative sources of positional information, particularly when closing the shore or navigating in the vicinity of dangers".

~~(d) The use of the full terminology for the World Geodetic Datum 1984, rather than the abbreviation WGS 84 or the omission of the year date on smaller scale charts.~~

(e) The use of `Satellite-Derived Positions notes` on smaller scale charts if the differences between the local chart datum and WGS84 is plottable at chart scale. This is defined as a difference of 0.3 mm or greater at chart scale.

9. B-203: an explanation of the exception, and suggested solution added.

10. B-210: clarification of what was otherwise a meaningless paragraph.

11. B-212:

- a. Extensive additional advice on graduation styles to fill in missing detail.
- b. References to seconds excluded to encourage the more general use of decimals of a minute.
- c. Extract from CSC consultancy report on Internal Graduation:

The existing IHO Chart Specifications (B-212.G) allow for the insertion of a subsidiary internal graduation along either a meridian or parallel on charts with a length in excess of 980 mm, ie charts that normally require a second

fold.

CSC Members may be aware that the UKHO has introduced the practice of graduating additional meridians and parallels on their charts. This requirement, which was requested by users of UKHO charts, came about as a consequence of the introduction of electronic position-fixing systems which computed and displayed the ship's position in latitude and longitude. The best known systems were the US Navy Navigational Satellite System (NNSS) and its successor, the GPS. However, the requirement also stemmed from the introduction of on-board computers which converted the signals received from earth-based electronic navigational systems (such as Decca, Loran-C and Omega) directly into geographical positions. As the requirement for navigational charts with lattice overprints diminished, the demand for additional internally graduated meridians and parallels increased.

Guidance on the insertion of supplementary internal graduations has been developed for use within the UKHO [and has been included in the draft revision of B-200].

My purpose in circulating details of these UKHO specifications is twofold. **Firstly, I would like to enquire whether or not other Members of the CSC [CSPCWG] have experienced similar requests from the users of their charts for the insertion of supplementary internal graduations. Secondly, I would value your opinion on the desirability of [including] guidance, based on that now used in the UKHO, for inclusion [as Specification B-212.9].**

12. B-222: The frequently used terms “portrait” and “landscape” added and explained.
13. B-231: Transferred to B-202, cross reference retained to avoid numbering problems in associated documents.
14. **B-232: would this be better renumbered B-214, to bring it into the Graduation & Gaticule section?** Amendment would be required to INT 1 cross reference.
15. B-241: Wording included from TR B 2.15 and some other clarifications in line with general practice. The addition of a reference to the IALA region has been included.
16. B-242: The issue of the colour of notes was discussed during the revision of B-100; a cross reference here suffices.
17. B-252: ‘Updates’ is preferred to the word ‘Corrections’ which implies that an error has been corrected. TR B2.14 has been included. Adoptions now frequently include non-INT charts, so B-252.4 has been expanded to include this, and the (I) removed. The word “originally” has been removed as it introduces an unnecessary ambiguity; i.e. does it refer to the date or the publisher? While the specifications make it clear that it refers to the publisher, the chart user will not understand this.
18. B-254: TR B2.13 and A1.19 have been included. Other clarifications also included.
19. Existing B-255.1 seems pointless, as it is already covered more generally in the introduction to B-255. The introduction has therefore been made more general, and numbered 255.1, to avoid re-numbering the other sub-paragraphs.
20. B-261: The North Star has been missing from the specimen compasses since IHB issued the digital version of M-4, so a slight change of wording became necessary. The digital version of specimen c is NOT a points circle. **If the reference to a points circle needs to be retained, a new specimen will be needed. Does any HO still chart points circles?**

The specimens have been repositioned more logically, so that B-260 does not now follow B-263. This is consistent with the way we have shown Source/ZOC diagrams at the beginning of the relevant sections in B-100, instead of grouped together at the end.

21. B-262: Some additional guidance on the positioning of compass roses added.
22. B-263: TR A2.6 has been included. It is assumed that the section about bearings from landward (B-263.2) is intended primarily for use when updating the chart by NM.
23. B-270: A definition of magnetic variation with advice about where the information can be obtained has been added.
24. B-271: TR A1.6 has been included here. It could alternatively be added at B-274 (or possibly not at all); **your views would be welcomed.**
25. B-272: The word “curves” has been replaced by “lines” in the note at B-272.1c, for consistency with a) and S-32. A clarification on the use of isogonals has been included. The following extract from the CSC consultancy explains:

It has been brought to CSC’s attention that existing IHO Chart Specification 272.1 is somewhat ambiguous in the guidance that it provides on the insertion of isogonals. It stipulates that isogonals should be inserted on all "charts of scale smaller than 1:750 000". However, it also implies that isogonals should not be charted at an interval of less than 1°, and that their spacing on the chart should not exceed about 15 cm. These two statements are not always compatible and I therefore believe that some clarification is required.

While it is possible to insert isogonals at 1° (or greater) intervals on many charts on scales smaller than 1:750 000 and still satisfy the criteria that the spacing between lines should not exceed about 15 cm, there are also many examples where this is not possible and, in these instances, many Hydrographic Offices have sensibly opted to show the magnetic variation as legends within compass roses. 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's oceans, the data from which the isogonals are derived may not ensure the accuracy of charted values to better than  $\pm 2^\circ$ . I do not therefore consider that isogonals should be inserted at a more frequent interval than 1°, or at spacing that exceeds about 15 cm on the chart.

26. NL pointed out that the existing wording of B-272.2 was ambiguous, so the wording has been clarified to imply that on such charts, the magnetic variation should be shown as a legend (and if there are compass roses, the legends should be inside the roses).
27. FR proposed that the colour and character set for magnetic data should be standardized as follows:
  - a. Use magenta for the representation of all data.
  - b. Use normal (i.e. upright) characters for all text and values: i.e. in roses, isogonals, variation values and anomalies.
  - c. For all notes on the main body of the chart to use italics [sloping type], but notes in the title to be upright.

We have tried to apply these suggestions in the revised B-200, e.g. changing the note at B-272.1d to upright, and using magenta throughout, except for Mag. Var. legends which are part of the title notes of a plan and the issue of magnetic anomalies (see below). However, we cannot see any need to amend the magnetic anomaly legend to sloping; this is a cartographic nicety which would be lost on the chart user and it is debatable whether a

magnetic anomaly is a “water feature”. We recommend such legends remain in upright, to be consistent with all other magnetic data, leaving current practice unchanged.

More controversial is the colour used for magnetic anomalies. The CSC consultancy commented as follows:

At present, all magnetic data are shown in magenta with the notable exception of that relating to magnetic anomalies. Magnetic anomalies have been shown in black to avoid any possible confusion of the limiting undulating line with the symbol for submarine cables. While this risk is minimal in small areas, in more extensive areas it could lead to confusion. For this reason, I would prefer to continue to portray this feature in black.

**For the moment we have left magnetic anomalies in black, but would welcome your advice.** We have also added some further clarifications to how and when they should be charted.

28. B-281: We have included a list of other tables which sometimes appear on charts.
29. B-290: The CSC had agreed that the sections dealing with Source and ZOC Diagrams, which we recently approved for section B-100, should be transferred to section B-200, when that section is revised. Presumably it would become B-290. **Please advise whether you agree to make the transfer.**

**30. IHB Technical Resolutions referred to in draft section B-200:**

A 1.6, 1.19, 2.6

B 1.1, 2.10, 2.13, 2.14, 2.15