INTERNATIONAL HYDROGRAPHIC ORGANIZATION

ORGANISATION HYDROGRAPHIQUE INTERNATIONALE

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

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

CSPCWG Circular Letter: 12/2004

UKHO ref: HA317/010/031-01 & HA 317/004/013-02

To CSPCWG Members Date 14 June 2004

Dear Colleagues,

Subject: Draft revision M-4 Section B100 (further to CL 06/2004)

We received comments on the draft at CL 06/2004 from 13 CSPCWG members. Thank you all for your helpful comments. Most of these comments were direct replies to the 7 questions I asked in that letter, so I will deal with these first:

1. *B-103.5: Where should the information from TR B 1.10 be included? And should "small craft" be amended to "leisure craft"?* Most of you considered that there is no better place in M-4 to include the information from TR B 1.10. Nearly all preferred to retain the term "Small-craft" rather than "Leisure", but several suggested it should be qualified by the addition of "(non-SOLAS)". Some views were expressed on whether M-4 should, or should not, provide specifications for small craft charts; we have noted this as an issue to be discussed at our meeting in November.
2. *B-110.6: Do any HOs still produce lattice charts?* None of the respondents produce latticed sales charts, so the cross-reference to Section B-600 has been deleted, in anticipation that we may be able to remove the whole section from M-4 in due course.
3. *B-145: Are there any other known cases where a cautionary note should be in a different colour from the feature to which it refers?* One or two "local" examples were mentioned, so "The only example" has been changed to "An example", and a paragraph added drawing attention to notes which combine information from two (or more) different coloured features, as possible in the case of environmental areas.
4. *B-174.3: Is there a better way of applying a qualitative measure to digital surveys?* No clear consensus emerged, but we have added an extra piece of advice about "full seafloor coverage".
5. *B-177.1: Should the option to use blue to highlight "preferred areas" on Source diagrams be retained (noting that blue generally implies shallow, possible dangerous, areas)?* There was near unanimity that this option should be deleted.

6. *B-178: Now that Australia is changing to ZOC diagrams, will there be any requirement to retain the specification for Reliability Diagrams?* No CSPCWG member HO uses Reliability diagrams now, and the consensus was to remove the specification. Some changes to the numbers of the specifications result from deleting the paragraphs for preferred areas and reliability diagrams.

7. *B-180.8: How to show dates of surveys on ZOC diagrams.* Nearly all members are convinced that including the date of survey sources on any type of diagram is important. Various methods were suggested; the additional paragraph 177.8 covers what emerged as the preferred solution.

A few other comments were made, the more significant ones as follows:

B-140. It was pointed out that the existing specifications were designed specifically for printing methods that are no longer used by many HOs. Consequently, they were weighted to discourage the use of additional colours which may clarify charts. We have made some changes to try and address the balance, including adding a specific paragraph for the use of green.

B-126. This specification is only intended to be an explanation of the terms used for scale, not a full explanation of the use of different scales. Such information as it gives has been amended to agree with M-11 Part A (as currently drafted), and a cross reference added. Although the terms have been amended to agree with S-57, the reference to the use of radar ranges in the draft S-57 v4 is not necessary in M-4, and has been omitted. This significantly shortens and simplifies B-126.

B-127. It was suggested that line weights and dashed lines should be made prescriptive for all new symbols. This has not been included in the draft at Annex, but we would be interested in your opinions for discussion at our Working Group meeting in November.

B-175.2 It was suggested that a definition of "Inadequately surveyed" should be added here, and the definition of "unsurveyed" should be amended to "no regular, controlled or systematic hydrographic survey has been carried out in the area indicated". We do not believe it is appropriate to define "inadequate", as this is a subjective judgment – i.e. inadequate for which type of vessel? In a sense, all surveys that do not completely cover the seafloor are inadequate; it is a question of degree. If any areas are inadequate in a specific way, or for specific types of vessels, this is more appropriately explained in a note, or reference in an associated publication. The proposed definition for 'unsurveyed" would be confusing if the area contains depths (perhaps from a "sketch survey", or several lines of passage soundings). Again, such cases should be clear from the Source diagram.

All significant amendments have been shown in red on the new draft B-100 (at Annex). We are grateful to Australia for suggesting numerous minor changes in style and improved wording; most of these have been included, but not highlighted as they are not substantive alterations. A more up-to-date Source diagram has been included, also an example of a Dual-purpose diagram, and a ZOC diagram supplied by Australia.

I would be grateful if you would review the revised draft, and let me have any further comments **by 12 July 2004.**

Yours sincerely,

Peter G.B. Jones,
Chairman

Annex: New draft revised section B-100.

Annex B
to CSPCWG CL xx/2004

(The section 170-180 will be moved to Section 200 when that section is revised. Significant changes from the previous draft are highlighted in red)

PART B

_____

SECTION 100

GENERAL

SECTION B-100 – GENERAL

RECORD OF CORRECTIONS

Specification Number	Amendment Number	IHO Circular Letters		Remarks
		Promul-gated by	Approved by	
Section 100 Preliminary Edition	—	9/82	—	Adopted by 1982 Conference, Decision No. 23
130	1/85	30/85	4/86	
131	1/85	30/85	4/86	
130/131	—	—	—	Included in Cumulative corr. 1/86
130	—	6/87	—	Corrected typing error in Cumulative corr. 1/86
160	—	—	—	Amended by 1987 Conference, Decision No. 24
170-179	1/87	16/87	27/87	
Section 100 1988 Edition	—		—	New loose-leaf edition — including editorial updating.
128	1/90	47/90	—	New specification
B-101	1-2003	75/2003	---	CSC replaced with CSPCWG
B-160	1-2003	75/2003	---	CSC replaced with CSPCWG
Section 100 2004 Edition				To be completed

Specification Number	Amendment Number	IHO Circular Letters		Remarks
		Promul-gated by	Approved by	

CONTENTS

SECTION 100 — GENERAL

B-100 CHART SPECIFICATIONS OF THE IHO FOR MEDIUM- AND LARGE-SCALE NATIONAL AND INTERNATIONAL (INT) CHARTS

B-100.1 **M-4 Part B provides** an internationally-agreed product specification, for both national and international (INT) charts, at medium- and large-scale.

B-100.2 **When M-4 Part B was originally prepared**, the term 'charts' actually referred to paper, sometimes called analogue, charts; digital, sometimes called electronic, charts were yet to become a viable reality. (See B-103.4 for more detailed definitions of different types of digital charts).

The subsequent development of digital charts presented additional Specification requirements, which were met by the development of S-52 and the Electronic Navigational Chart (ENC) Product Specification within S-57 for vector charts, and S-61 for raster charts. Both S-52 and S-57 make full use of the background information already contained in M-4 Part B and include cross-references where appropriate. Similarly, adjustments have been made to M-4 Part B, to reflect better the existence and content of digital (vector) charts.

B-100.3 The role of M-4 Part B is therefore twofold**, in that it provides:**

a. An explanation of the **general concepts and rationale** behind the portrayal of features on charts, much of which is relevant to both digital and paper charts.

b. **Specific guidance for paper charts**, including the use of text and symbology.

B-101 SPECIFICATIONS: ORIGIN AND METHOD

The Specifications for charts at medium- and large-scale were originally compiled by two groups of member nations of the IHO, forming successively, the **North Sea International Chart Commission** (NSICC, 1972-1977) and the **Chart Specifications Committee** (1977-1982). At the XIIth International Hydrographic (IH) Conference (April 1982) the Chart Specifications Committee was renamed the **Chart Standardization Committee** (CSC) and following the XVIth IH Conference (April 2002) the CSC was replaced by the **Chart Standardization and Paper Chart Working Group** (CSPCWG) in 2003. The CSPCWG is a working group of the IHO Committee on Hydrographic Requirements for Information Systems (CHRIS), and has a number of functions, one of which is the responsibility for updating these Specifications.

B-101.1 The **working procedure** followed in the initial compilation of the Specifications was, firstly, the establishment of guidelines for each section by UK, which provided the Secretariat. Preliminary drafts were prepared by France (500), Germany (300), Netherlands (200), UK (100, part 400, 600) and USA (part 400). These were subsequently reviewed by NSICC and CSC members. Comments were reconciled as far as possible and preliminary editions of each Section were published between 1979 and 1982.

B-101.2 **Basic compilation principles** followed by the NSICC and CSC in compiling the Specifications were:

a. The starting point was the former Technical Resolutions on charted detail (M-3 Chapter B), now mostly cancelled; but these covered only about one-third of the full range of features to be found on charts.

b. The charting practices of a wide range of IHO members were reviewed by examining their symbols and abbreviations guides and their latest charts.

c. Change for its own sake was avoided.

d. The need was recognized to ensure that each separate item fitted logically into a consistent whole.

e. Symbols, preferably self-explanatory, were preferred to legends requiring translation.

f. Innovations, i.e. symbols not appearing in any national chart, were introduced when necessary.

g. The effects of new automated drafting techniques were borne in mind, but greatest weight was given to the realities of the existing approach to charting of most IHO members.

h. The layout of each group of items as shown by the Table of Contents follows the principle of working from the general to the particular.

B-101.3 **A general review** of the Specifications was proposed by the CSC Chairman at the XVth IH Conference in 1997, to include developments which had taken place since the Specifications were first written, together with those identified as a result of the development of digital charts. This review is now being progressed by the CSPCWG.

B-102 PURPOSE OF THE SPECIFICATIONS

The Chart Specifications of the IHO, M-4 Part B, are intended to provide a framework for the **standardization** by member nations of all nautical charts at medium- and large-scale, both in their national series and in the international (INT) series of the IHO. They shall be used in all such chart compilation as far as nautical practices and requirements permit. Technical Resolution B 3.18 refers.

Regulation 2 (**Definitions**) of Chapter V (Safety of Navigation - as amended 2000) of the International Convention on Safety of Life at Sea 1974 (SOLAS 1974) states:

> '*Nautical chart* or *nautical publication* is a special-purpose map or book, or a specially compiled database from which such a map or book is derived, that is issued officially by or on the authority of a Government, authorized Hydrographic Office or other relevant government institution and is designed to meet the requirements of marine navigation.*'
>
> '* Refer to appropriate resolutions and recommendations of the International Hydrographic Organization concerning the authority and responsibilities of coastal States in the provision of charting in accordance with regulation 9.'

B-102.1 The IHO has striven to increase **standardization** since its inception. Standardization is desirable for navigators who may need to use the charts of two or more nations, in order that transfers from chart to chart can be made without unnecessary hazard or confusion. A high level of standardization is essential for the international chart concept, which may also provide a basis on which to build digital cover (see A-102.8).

Regulation 9 (**Hydrographic Services**) of Chapter V (Safety of Navigation – as amended 2000) of SOLAS 1974 states that Contracting Governments undertake:

> 'to co-operate in carrying out, as far as possible, the following nautical and hydrographic services ... to prepare and issue nautical charts ... and other nautical publications, where applicable, satisfying the needs of safe navigation ...'
>
> '... to ensure the greatest possible uniformity in charts and nautical publications and to take into account, whenever possible, relevant international resolutions and recommendations.*'
>
> '* Refer to the appropriate resolutions and recommendations adopted by the International Hydrographic Organization.'

and:

> 'to co-ordinate their activities to the greatest possible degree in order to ensure that hydrographic and nautical information is made available on a world-wide scale as timely, reliably, and unambiguously as possible.'

B-102.2 **Complete standardization** has not yet been achieved. However, as digital charts become more widely used, the more stringent requirements that they present may in themselves serve to accelerate the move to standardization. (It should be noted that, in the electronic world, many variations which may not confuse the mariner would confuse the computer.) The Specifications attempt to distinguish between the fundamental elements of a chart, where standardization is of great importance, and those features where variation would not mislead a navigator. B-110 defines the various levels of standardization which can be identified throughout the Specifications.

B-103 SCOPE OF THE SPECIFICATIONS

B-103.1 **Scale of charts covered by the Specifications.** These Specifications (M-4 Part B) apply to medium- and large-scale charts, i.e. scales 1:2 000 000 and larger.

Smaller-scale charts (1:2 000 000 and smaller) are covered by the Chart Specifications of the IHO for Small-scale International (INT) charts; see M-4 Part C.

Note: Charts at scale of 1:2 000 000 may be considered to be either Medium-scale charts or Small-scale charts according to the nature of charting in that specific area. Such charts should be compiled in accordance with the Specifications which are appropriate to the purpose of the chart.

B-103.2 **General content of charts**. The standardization of nautical charts is a more profound matter than the adoption of a standard set of symbols and abbreviations. One requirement is agreement on the place of charts in the full range of navigational documents, and on the extent to which a nautical chart is the appropriate medium for particular categories of information, for example, tidal data. As a general principle, nautical charts should show as much relevant navigational detail as can be clearly represented in graphical form. Another requirement is agreement on the definition, and real significance to chart users, of the individual features charted

B-103.3 **Detailed content of charts**. The Specifications are intended to be as comprehensive as possible, covering every aspect of chart content and endeavouring to provide a groundwork of reasoned argument to support the rules and recommendations made. Detailed as the Specifications are, they cannot provide a complete and automatic answer to all the questions the chart compiler may ask~~: Nautical realities do not~~ as they will not always easily fit into a system of cartographic rules. However, the introductory paragraphs in many of the separate Specifications will allow cartographers to see the underlying intention and deal with anomalous features satisfactorily.

B-103.4 **Digital charts** fall into two main categories: raster and vector. As **raster digital charts** directly reflect the content of the paper chart, they do not require further mention in these Specifications. Specifications for raster charts are detailed in the IHO publication S-61 (Product Specification for Raster Navigational Charts (RNC)). The term **digital** in these Specifications (M-4 Part B) is therefore used to refer to **vector digital charts**. The specific guidance necessary for vector digital charts is provided by IHO publications S-52 (Specifications for Chart Content and Display Aspects of ECDIS) and S-57 (IHO Transfer Standard for Digital Hydrographic Data).

B-103.5 Charts for small craft. Charts designed especially for use by small craft (non-SOLAS) should follow the Specifications for the compilation of charts as far as possible.

Note: If a producer of small craft charts decides not to maintain them by Notices to Mariners, a warning should be inserted on them clearly stating that they have not been updated from Notices to Mariners. (Technical Resolution B 1.10 refers).

B-110 STANDARDIZATION LEVELS

Standardization is the IHO's ideal and much progress has been made since 1972, to the benefit of chart users. Increasing numbers of International charts are now available; these may provide a basis on which to build digital cover, and also provide a framework for the agreement of cover suitable for adoption of charts by one nation in another's waters under the terms of bilateral arrangements (see M-4 Part A-104.6 and Technical Resolution A 3.4).

Despite this, complete standardization is unlikely to be achieved between all member nations even on new charts, for good reason, as some aspects of their existing cartographic practice may be of unusual significance. Standards are set in some cases to encourage uniformity rather than enforce it, and consequently such terms as 'preferably' and 'normally' sometimes occur in the Specifications where it is unlikely that variations from the recommended practice will be misleading, as in the depiction of topographic relief. Complete uniformity is, however, a desirable objective in the case of essentials, for example the definition and use of a submerged rock symbol, and the use of 'shall' within these Specifications conveys this sense. Publication of S-52 and S-57 for digital charts, much of which is prescriptive, may tend to lead to more prescriptive specifications for paper charts.

It is important to recognize that, in these Specifications, standardization operates on a number of different levels in the various sections, as detailed below.

B-110.1 **Standardization of certain fundamentals,** particularly units of measurement and horizontal and vertical datums, is incomplete between nations. It is recommended that nations revising their chart cover will take the opportunity to make any of the necessary ~~radical~~ changes required for standardization. S-57 includes numerous mandatory requirements, e.g. times must be referred to UTC; depth, height and positional accuracy units must be metres; horizontal datum of reference must be WGS 84 (in accordance with Technical Resolutions A 1.8, A 2.1 and B 1.1.). It is hoped, in the light of this, that standardization of such fundamentals can be achieved in time.

B-110.2 **Standardization of chart scales and limits of International charts** is covered in M-4 Part A (Regulations of the IHO for International (INT) Charts), and in M-11 (Catalogue of International (INT) Charts); it is therefore outside the scope of these Specifications (M-4 Part B). Regional or international agreement on chart scales and limits is part of the concept of international charts at medium- and large-scales. Such considerations will probably influence national chart scheming.

B-110.3 **Standardization of chart sizes and formats,** including the more general aspects of chart design and content, is dealt with in B-200.

B-110.4 **Standardization of symbols and abbreviations** in B-300 and B-400 constitutes the largest part of these Specifications, affecting the majority of chart content. It must be preceded by agreement on the meaning, for charts, of the terms used: for example, there are various interpretations of 'restricted area', 'route', 'track', 'pilot station', 'tidal stream'. For this reason, many paragraphs start with explanations and definitions. Concise explanations of terms may also be found in the IHO's Hydrographic Dictionary (S-32) and in the case of digital charts, S-57, which includes the relevant references to M-4 Part B paragraph numbers and to INT 1 symbols for most object classes. It also includes for each object class, a concise definition taken from a variety of sources including M-4, S-32 and various other publications.

The degree of generalization appropriate to smaller-scale charts varies considerably with the relative significance to the mariner of features in the area in question; these Specifications necessarily cover this aspect in a rather general way.

Agreement on features included or excluded cannot be easily achieved in a small number of cases, particularly where a nation has a different dividing line from other nations between whether information be shown on charts or in other publications. For instance, many nations indicate restricted areas (such as anchoring prohibited areas, cable areas, and exercise areas) by the symbology in Section 400; some choose to omit such details from their charts, preferring to provide it in other publications such as Sailing Directions. These Specifications are designed to take such differences into account.

B-110.5 **Standardization of geographic names** in B-500 conforms to relevant international cartographic practice. General guidelines are given on the use of type styles. With the purpose of obtaining uniformity in the coding of country names, the IHO has agreed to use the two-letter (alpha-2) codes of the International Organization for Standardization (ISO) as published in their International Standard ISO 3166 (see Technical Resolution A 1.19).

~~**B-110.6 Standardization of navigational lattice overprints** for the Decca Navigator, Loran-C, and Omega systems is dealt with in B-600.~~

B-120 TERMS AND CONVENTIONS USED IN THE SPECIFICATIONS

B-120.1 **Conventions** used in writing the Chart Specifications of the IHO for National and International charts are detailed below.

B-120.2 **Punctuation**

- Decimal places are indicated by commas, e.g. 0,1mm
- Commas are not used to separate thousands, e.g. 150 000 not 150,000
- No spaces are used between figures and abbreviations for units, e.g. 5m not 5 m
- No full stop after abbreviations (unless at end of sentence or in light descriptions)
- Single quotation marks are used except where quotations occur within quotations, when double marks are used
- Single quotation marks are used around typed abbreviations, but not around drawn ones.

erminology

- 'Dashed' is used rather than 'pecked'
- 'Sans serif' is used rather than 'Egyptian'
- 'Upright' is used rather than 'Roman'
- 'Sloping' is used rather than 'Italic'
- 'Continuous' line is used rather than 'firm' or 'solid' line
- 'Bold' is used rather than 'heavy' for line weights
- 'Fine' is used rather than 'light-weight' for line weights
- 'International' chart is used rather than 'INT' chart, except when referring to a specific INT Chart number, e.g. INT 1403.
- 'Tint' is used rather than 'stipple' for continuous and screened colours.

B-120.4 **Strength of wording**

- 'must be' (done) for mandatory requirements
- 'shall be' (done) where standardization is essential
- 'normally' where one alternative is the most likely to be appropriate/used
- 'shall preferably' where one alternative is preferred
- 'should be' (done) where standardization is less important or unobtainable
- 'may be' (done) where entirely optional.

B-120.5 **Cross references** are normally included in the form 'see B-123'. However, as these are not exhaustive, the Table of Contents and Index should be consulted.

B-121 TRANSLATION TERMS

The phrase '... or equivalent' means that the legend or abbreviation in question may be in the member nation's national language.

B-122 INTERNATIONAL ABBREVIATIONS

The term 'international abbreviation' is used to identify those abbreviations which have been agreed internationally and are recommended for use on all nautical charts. Some of the abbreviations selected were already common to several languages. Alternatively, English language abbreviations were adopted or devised, in accordance with the long term policy of the IHO and because the International Maritime Organization (IMO) suggests the use of English as the language of navigators.

B-123 TERMS FOR COLOURS

Where no colour is specified for a feature, it shall be assumed that it is to be shown in black. For details of the use of colour, see B-140.

B-123.1 **'Tint'** is used both for continuous colours and screened (or stippled) tints (black and colour); the context should make the meaning clear. **'Solid'**, as in 'solid blue', is used to indicate a flat (unscreened) colour.

B-124 SPECIFICATIONS FOR INTERNATIONAL CHARTS

Although the Chart Specifications of the IHO, Part B (originally published as Part 1), are published for use in compiling all medium- and large-scale charts, both national and international, a few paragraphs or sub-paragraphs are applicable only to international charts. These are distinguished by the suffix 'I' to the paragraph number, e.g. B-351.1-I. (Note: in the original 'Part 1' version, before the prefix B was used, the 'I' was a prefix, e.g. I-351.1).

B-125 DEPICTION OF SYMBOLS

The symbols shown in the text of the Specifications correspond to those in INT 1 (see B-151), with the INT 1 reference numbers alongside. There is a corresponding reference in INT 1 to the specification number in M-4 Part B. The symbols being referred to are for paper charts. A separate set of symbols is also available for ECDIS purposes; see S-52 Appendix 2.

B-126 TERMS FOR CHART SCALES

The scale of a chart is determined by the type of navigation for which it is intended, the nature of the area to be covered and the quantity of information to be shown. Various scale terms are used in the Specifications, such as medium-scale, large-scale, continuous coastal series. These are intended to indicate the type of chart rather than actual scale, which may vary from area to area; the specific scale of charts cannot be defined by universally prescriptive rules.

In the case of paper charts, very generally, the terms 'medium-scale' and 'large-scale', as in the title of M-4 Part B, cover the following types of chart:

Medium-scale: General: passage/landfall ..... 1:2 000 000 — 1:350 000
Coastal: coastal navigation..... 1:350 000 — 1:75 000

Large-scale: Approach: port approach/intricate or congested coastal waters..... 1:75 000 — 1:30 000
Harbour: harbour/anchorage/narrow straits larger than 1:30 000
Berthing .....very large scales

Note: Charts in the established small-scale series (covered in M-4 Part C) are called 'Overview'. For more details, see Guidance for the Preparation and Maintenance of International Chart Schemes (M-11 part A). ~~The same terms are used in S-57 Appendix B.1 for ENCs. However, for ENCs, the scales are related to radar ranges, and do not exactly equate to the paper chart scale bands above. In the case of digital charts, ENC data is compiled for a variety of navigational purposes:~~

- ~~overview~~
- ~~general~~
- ~~coastal~~
- ~~approach~~
- ~~harbour~~
- ~~berthing~~

~~As the ENC Product Specification (S-57 Appendix B.1) does not define the bands of navigational purpose by specific ranges of scale, comparable data may be allocated to different bands by different ENC producers, whilst remaining in accordance with the Product Specification.~~

~~Both paper and digital charts, therefore, reflect the fact that charts are designed to meet the requirements of the type of navigation and the nature of the area to be covered;~~

B-127 LINE WEIGHTS AND DASHED LINES

It is not yet considered feasible to attempt full international standardization of line weights and dashed lines. It is therefore left to national discretion to make use of differing line widths and numbers of dashes per centimetre to distinguish the varying significance of different charted lines and limits.

In a number of paragraphs, where some distinction is particularly important, the terms 'fine' or 'bold' are used: the appropriate recommended widths are 0,1mm for fine lines and 0,2mm for bold lines. In a few instances, dashed lines are specified, such as 10 dashes per cm for light sector limits.

B-128 TERMS USED WHEN ISSUING CHARTS

The following terms are used when referring to the issue of charts:

a. **New Chart (NC):** The first publication of a national chart which will either:

- embrace an area not previously charted by that nation to the scale shown; or
- embrace an area different from any existing chart of that nation; or
- consist of a modernised version (in terms of symbology and general presentation) of an existing chart; or
- consist of the adoption by that nation of an international (INT) or national chart, first published by another nation

b. **New Edition and/or Large Correction (NE, LC):** A new issue of an existing chart, containing amendments significant to navigation which will normally have been derived from newly received information. It will include changes additional to those previously promulgated in Notices to Mariners, and will render the existing edition obsolete.

A Large Correction, a type of correction used by a limited number of nations, is a particularly restricted (or partial) New Edition.

Exceptionally, charting authorities may issue a New Edition or Large Correction including only Notices to Mariners.

c. **Revised Reprint:** A new print of the current edition of a chart incorporating no amendments of navigational significance other than those previously promulgated in Notice to Mariners (if any). It may, however, contain amendments from other sources provided they are not essential to navigation. Previous printings of the current edition of the chart always remain in force.

d. **Chartlet/Block/Patch:** A small auxiliary chart giving new details of a particular area, to be pasted on the chart by the user. Chartlets are normally included in Notices to Mariners.

See M-4 Part A-401.2 for fuller definitions of these terms.

B-130 UNITS

The standard units for **depths** and **heights** shall be metres (m) and decimetres (dm).

The standard units for **positional accuracy** shall be metres (m).

The standard units for **distance** 'on the ground' shall be nautical miles (M) and cables, or metres (m).

The standard units for **dimensions of charts** shall be millimetres (mm).

The standard units for **time** shall be hours (h), minutes (min or m) and seconds (sec or s), referred to Universal Time Co-ordinated (UTC).

The standard units for **speed** shall be knots (kn).

The standard units for **geographical positions** shall be degrees (°) minutes (') and decimals of a minute. Degrees (°), minutes (') and seconds (") may be used if appropriate.

B-131 GEOGRAPHICAL POSITIONS

Geographical positions quoted on charts and related publications should preferably be expressed in degrees, minutes and decimals of a minute unless the system of graduation of the largest-scale chart concerned is such that degrees, minutes and seconds must be used to avoid confusion.

B-131.1 The four cardinal points **should always be denoted by the following symbols whenever their names are not inserted in full:**

North = N	South = S
East = E	West = W

B-140 USE OF COLOUR

All charts shall be printed in a minimum of four colours: black, magenta, buff (or grey) and blue. Additional colours may be used. ~~and will be necessary for lattice overprints for electronic position fixing systems.~~ They may be useful in clarifying local navigational complexities, e.g. on some charts, the light sectors marking intricate inshore channels in Scandinavian waters are shown in red, green, and yellow. Charts using additional colours are often called 'multicoloured' charts; see INT 1 IP41.

The use of alternative ~~or additional~~ colours, e.g. red ~~or green~~ instead of magenta, and of screened colours, tends to reduce the level of possible standardization. However, such colour variations can, if desired, produce an element of national individuality without affecting the comprehensibility of a chart as much as, for example, a non-standard symbol. ~~Many hydrographic offices seek to minimize the number of colours used and avoid screens, in order to keep down the costs of chart production and allow easier correction of paper charts.~~

It is important that all colours shall be visible under the coloured filters used to subdue bridge lighting. This requirement is often met by mixing a certain amount of black into colours, such as red and magenta, which might otherwise prove difficult to see.

B-141 BLACK

The general principles for the use of black are that it shall be used:

- For all the details which provide the basic cartographic framework of charts (e.g. border, graticule, title).
- For all physical (solid) features, including depth information (but see B-142.2(2) for submarine cables and pipelines and B-144 for some depth contours).

In the Specifications, the use of black is the default choice. Where no colour is specified for a feature, it shall be assumed that it is to be shown in black.

B-142 MAGENTA

The Specifications state which individual features shall be shown in magenta. **The general principles** for the use of magenta are that it should be reserved for:

- Drawing attention to symbols for features which have a significance extending beyond their immediate location.
- Distinguishing information superimposed on the physical features and not implying any permanent physical obstruction (but see B-145 for the use of green for environmental information).

The detailed application of these two principles is as follows:

B-142.1 To draw attention to certain features having a significance extending beyond their immediate location. This includes symbols for:

- Pilot stations (and any associated legends)
- Light flares or 'patches' (except on multicoloured charts)
- Positions of tidal stream/current observations (i.e. diamonds and reference letters but not the tabulated figures)
- Radio and radar stations — large circles and abbreviations (but the small circle marking the precise position to remain in black, like light stars).

B-142.2 To distinguish information superimposed on the physical features. This includes symbols, associated legends, abbreviations and cautionary notes which indicate:

(1) Features representing transitory physical hazards, such as:

- Ferry routes
- Submarine exercise areas and transit lanes
- Firing danger and other military practice areas (but associated beacons, buoys and targets in black)
- Sea ice limits (but limit of land ice, representing 'coastline', in black)
- Miscellaneous (dredging areas, where vessels exploit sand and shingle deposits; incineration areas, etc).

(2) Features representing a restriction on seabed operations, including anchoring, such as:

- Submarine cables and cable areas (but associated beacons and buoys in black)
- Submarine pipelines and pipeline areas (but sewers and outfalls, and any pipeline which could be a physical obstruction to navigation in black; see B-444)
- Explosives dumping grounds (but spoil grounds in black)
- Miscellaneous areas where anchoring and/or fishing are prohibited (shellfish beds, ground chains of moorings, 'protected' historic wrecks, etc).

(3) Features representing control or regulation of vessel movement, such as:

- Entry restricted and prohibited areas such as safety zones around offshore installations, IMO 'Areas to be Avoided', mined areas and controlled areas near military installations
- Routeing features such as traffic separation schemes, IMO Deep Water routes, safety fairways, radar-guided tracks and limits of radar surveillance, and reporting points
- Designated anchorages and berths, including berth numbers at buoys, quays and in anchorages
- Other designated areas, e.g. seaplane landing areas.

(4) Maritime boundaries of legal authority, such as:

- Fishery limits, territorial waters limits, etc.
- Harbour and dockyard port limits, customs boundaries in 'free ports'.

(5) Certain marginal or other information to be distinguished or emphasized, such as:

- Compass roses
- Isogonic lines or isogonals
- References to other charts, and their limits
- INT chart number
- 'DEPTHS IN METRES', 'WGS 84 DATUM', as appropriate, and possibly other important marginal notes
- Certain rectangular grid marks and their co-ordinates.

B-142.3 **Magenta tint** may be used in congested areas where it is important not to obscure black detail, and for specific symbols such as Traffic Separation Zones, Particularly Sensitive Sea Areas and Archipelagic Sea Lanes.

B-143 BUFF (YELLOW) OR GREY

A colour, usually buff (for metric charts) or grey (for imperial charts), shall be used as a land tint. If the minimum four colours are used, the colour may be carefully selected so that a satisfactory colour over inter-tidal areas is derived from printing the land tint over the shallow water blue tint.

B-144 BLUE

The colour blue shall be used as a tint to emphasize **shallow water**. It may be combined with that used for land, as described in B-143, to produce an appropriate colour for inter-tidal areas. Blue may also be used for depth contours, particularly in intricate waters.

B-145 GREEN

The colour green may be used as a tint for **inter-tidal areas**. This may be achieved by combining the land colour with the shallow water blue colour, as described in B-143. Green may also be used, instead of magenta, for environmental information; see B-437.2.

B-146 CAUTIONARY NOTES - COLOUR

Cautionary notes shall normally be shown in the same colour as the charted features to which they refer, see B-242.3. An exception is that referring to differences between horizontal datums on adjoining or different scale charts, where the note is in black (as it refers to positions) and the legend 'see Note' is in magenta (as chart limits and references are in magenta).

If a note refers to two or more features which are charted in different colours, the note should be in the colour of the most navigationally significant feature. For example, when a note about an Environmentally Sensitive Sea Area (charted in green) is combined with a magenta note (e.g. about an associated restriction), then the entire note should be in magenta; see B-437.2.

B-150 ASSOCIATED PUBLICATIONS

A number of other publications are complementary to these Specifications. They are available from the IHB. They include INT 1, INT 2 and INT 3, the content of which are detailed in the following paragraphs. For the latest edition dates, and details of publications related to digital charts, see P-4, Catalogue of IHO Publications.

B-151 INT 1 — SYMBOLS, ABBREVIATIONS, TERMS USED ON CHARTS

INT 1 provides the chart user with a key to symbols and abbreviations used on charts compiled in accordance with the Chart Specifications of the IHO. Although INT 1 may be used by cartographers as a quick reference, these Specifications should always be used for detailed guidance. Cross references to the relevant specifications in M-4 Part B are included in the right-hand column of INT 1.

B-151.1 Technical Resolution B3.3 resolves that **each Hydrographic Office shall publish** its list of symbols and abbreviations arranged according to Chart INT 1, which follows the system used in M-4 'Chart Specifications of the IHO'. Three language versions of INT 1 are published by the IHO:

- English - produced by Germany
- French - produced by France
- Spanish - produced by Spain

In national symbols and abbreviations lists, it is recommended that figures be used for those items appearing in Chart INT 1, and that letters be used for any additional items. The lettered entries may be placed in the list in an appropriate position or collated at the end of each section or sub-section. One column should be used to show those symbols and abbreviations that have been internationally agreed, with a second column showing national symbols where different, or where no internationally-agreed symbol yet exists.

It is recommended that all numbered items included in INT 1 should be shown in each nation's standard list, including in their proper place those terms for which the nation concerned has no symbol or abbreviation. This will enable a navigator who possesses a standard booklet, written in a familiar language, to interpret foreign standard booklets.

It is recommended that an index of all abbreviations used be given in alphabetical order as in INT 1 Section IV, with cross references showing the section and number.

The list of symbols and abbreviations is most conveniently published in the form of a booklet, although a sheet format may be used.

It is recommended that the list of symbols and abbreviations be kept up to date by means of Notices to Mariners, particularly for the introduction of new symbols.

Technical Resolution K1.1 resolves that the IHB shall compile a list of the sheets of chart symbols and abbreviations produced by the various nations and distribute this list to Member States. It shall be brought up to date periodically by notification in the monthly Bulletin or by other appropriate means. Until 1992, the list constituted a separate publication (MP-008); from 1993-1999, it was published in the IH Bulletin at the beginning of each year. From 2004, it has been published as M-15, 'List of Booklets on Chart Symbols and Abbreviations Published by Various Maritime Nations', posted on the IHO website and amended from time to time.

B-152 INT 2 — BORDERS, GRADUATION, GRIDS AND LINEAR SCALES

INT 2 shows specimens of the various patterns of border graduation and linear scales. INT 2 is produced by The Netherlands.

B-153 INT 3 — USE OF SYMBOLS AND ABBREVIATIONS

INT 3 is a standard reference chart of a fictitious area with as many examples as possible of the use of these Specifications (M-4 Part B and Part C). INT 3 is produced by UK.

B-160 CORRECTION SYSTEM FOR THE SPECIFICATIONS

The Chart Specifications of the IHO shall be amended from time to time in response to the developing requirements of nautical charting, including changing navigational procedures and developments in cartographic techniques. The IHO Chart Standardization and Paper Chart Working Group (CSPCWG) is responsible for the updating of the Specifications (Technical Resolution K 2.11 refers). A Member State finding it necessary to adopt a new specification or use a new symbol for a feature for which there is no existing symbol, should advise the IHB of the action taken at the earliest opportunity. All such proposals for changes will be referred by the IHB to the CSPCWG for advice. Members of the CSPCWG, in their capacity as a standing group of experts, will also identify new points requiring standardization action. The CSPCWG will recommend amendments to the Specifications to the IHB, who will communicate them to all IHO Members by Circular Letter, asking Members to make known any major objection within three months. After three months, in the absence of objections from one or more Members, the IHB will update the on-line version of M-4 and announce, by a second Circular letter, that the amendments have come into force and that members should consequently correct their copies of the Specifications. In the event of disagreement, the proposed amendments will be modified, if appropriate, to take account of objections or suggestions received, and an explanation will be given in the second Circular Letter, which will also promulgate the final version.

B-170 SOURCE DIAGRAMS

Consideration should be given to providing **Source diagrams** on appropriate new charts, and to adding them to existing charts when the opportunity arises. On charts where routeing measures appear to 'direct' vessels into waters where surveys are inadequate, diagrams are particularly important to alert navigators of the need to allow adequate under-keel clearances.

B-170.1 The term '**Source diagram'**, as used in the following paragraphs, includes both the graphic showing the limits of the source data used, and the accompanying text. The diagram should be titled 'SOURCES', or equivalent, on charts.

B-170.2 ~~The term '**Reliability diagrams'** is to be reserved for the special cases described in B-178.~~The term **'ZOC diagram'** is used for diagrams based on the S-57 Categories of Zones of Confidence, see B-177. **Dual-purpose diagrams** are described at B-178.

B-170.3 The **Explanatory notes** under the chart title should draw attention to the presence of a diagram on a chart as mentioned in B-241.9 e.g.:

> **Source:** See the Source diagram for information which may affect the use of this chart.
>
> **Source:** The origin, scale, date and limits of the hydrographic information used to compile the chart are shown in the Source diagram.

B-170.4 **Sources of topography** may need to be acknowledged. If so they may be stated in the explanatory note, following the first sentence, e.g.:

> The topography is derived chiefly from Ordnance Survey and Institut Géographique National maps.

See B-176.2 for listing topographic source data in the Source diagram.

B-170.5 **National navigation manuals** should draw attention to Source diagrams and the need to examine them when planning passages. It should be made clear that Source diagrams cannot be expected to convey definitive information about the updating of such charted features as major navigational aids.

B-171 PURPOSE OF SOURCE DIAGRAMS

B-171.1 **The purpose** of Source diagrams is to guide navigators, and those planning 'navigational operations' (including the planning of new routes and official routeing measures), on the degree of confidence they should have in the adequacy and accuracy of charted depths and positions. A Source diagram should ideally give details of the survey from which each part of the chart has been compiled. See B-417 for a summary of the ways in which the inadequacy of surveys may be indicated on charts.

B-171.2 **As a useful by-product**, Source diagrams provide an easily accessible, but not necessarily comprehensive, record that will assist cartographers in chart revision and alert all concerned to the need for further surveys. It will also alert users to the main areas updated from new sources at New Editions. Some charting organizations add such details as archive numbers of documents, or the names of survey ships. It is not desirable to make such details, which are mainly of 'internal' interest, standard requirements in these Specifications.

B-171.3 **Charts,** especially those published by other nations, may have to be listed as sources where details of their component surveys are not known. In such cases the purpose of the Source diagram, or some part of it, cannot be fully achieved because the possibility that the surveys may not fully meet modern standards may not be apparent from the dates and scales of the charts. Wherever possible, qualifying comments on likely deficiencies (e.g. 'from leadline surveys') should be given.

B-171.4 **Larger-scale charts:** The limits of these may be shown, e.g. as in B-178.1, but not as a way of excluding a statement of sources within those areas. No information need be given for areas of 'partial depiction' (see B-402) on the chart. If the sources are complex, the details may be generalized.

B-171.5 **Updating:** The purpose of Source diagrams will be defeated if they are not updated when new editions of charts are compiled.

B-172 SCALES OF CHARTS WHICH SHOULD HAVE SOURCE DIAGRAMS

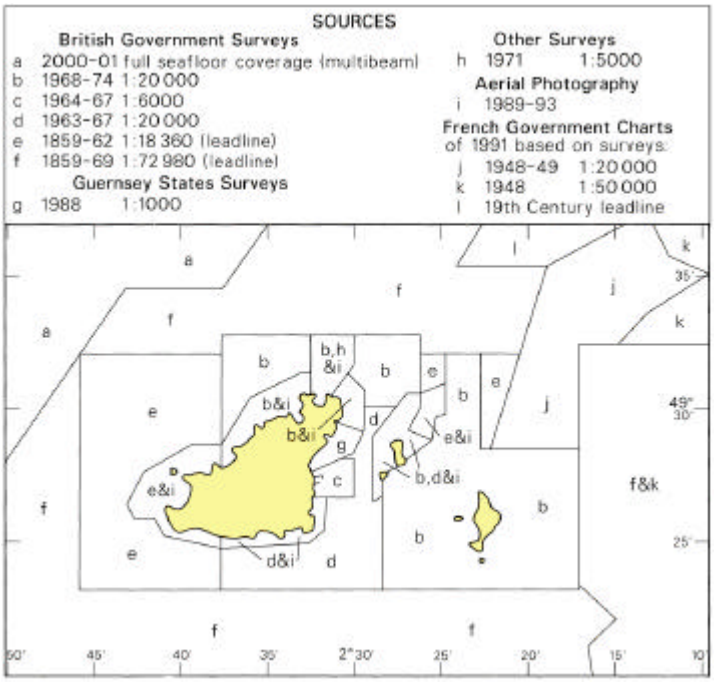
B-172.1 Regional differences make it inappropriate to specify precisely which scales of charts should always have Source diagrams. They are most useful on relatively large scales, particularly those with potentially hazardous rocky seabed areas, which have not been surveyed to modern standards, or areas of mobile seabed that have not been surveyed recently.

B-172.2 **Charts of scale 1: 500 000 and larger** should be considered for Source diagrams, special attention being paid to the largest coastal scales and those which carry routeing measures.

B-172.3 A large-scale chart compiled from a single survey, or from routine re-surveys by a single authority, **may not require a Source diagram**. In such cases the explanatory note under the chart title may be adequate, e.g.:

> **Source:** All the hydrography is derived from Medway Port Authority surveys 2002-2003.

B-173 GRAPHICAL REPRESENTATION OF LIMITS OF SURVEYS



EXAMPLE A: SOURCE DIAGRAM

B-173.1 **The linear dimensions** of the graphic should be one-tenth those of the chart's neatline dimensions, but may be reduced further if space is too limited for the preferred size. ZOC diagrams and Dual Purpose diagrams, see B-177-178, may need to be larger: e.g. linear dimensions one-eighth those of the chart's neatline dimensions may be necessary to adequately portray the additional detail.

B-173.2 **Continuous black lines** should be used for the Source diagram's borders, coastline and area limits. Identifying letters should be black and may be repeated as necessary.

B-173.3 **Land tint** should cover land areas, sea areas normally being left white (but see B173.6 for special measures).

B-173.4 **Graduation** of Source diagrams, which should correspond with the main chart, is advisable for ease of use. To avoid confusion, any internal graticule should have finer lines than the area limits.

B-173.5 **Inset plans** should be included in Source diagrams, with limits being shown as bold single lines; graduation ticks and figures may be added if considered necessary.

B-173.6 **Special measures** may be taken in cases of particular importance, e.g.:

- Coral reef outlines may be shown.
- Intertidal and shallow water tints may be inserted in the same geographical areas on the Source diagram as they are shown on the chart, to highlight more clearly where channels lie in relation to the limits of the source data.
- Magenta tint may be included to highlight where routeing measures, such as Traffic Separation Schemes, lie in relation to the limits of the source data.

B-174 DETAILS OF SOURCES: DATE AND SCALE

B-174.1 **The date** of a survey should always be given. It gives an indication of:

- The adequacy of the equipment used.
- The thoroughness of examinations of dangers at particular depths (based on the maximum draught of vessels afloat at that date).
- The likelihood of later changes in depths, particularly in areas of mobile or unstable seabed or coral growth.

The date of the edition of a published chart used can be misleading (as the source data may be much older) but may have some value. Year dates only should normally be used.

B-174.2 **Guidance** on the practical significance of survey dates should be given in a national publication that advises users on the reliability of charts; see B-170.5.

B-174.3 **The scale** of a controlled survey (see B-175.2) is some indication of the thoroughness and the line-spacing, and should be stated in the form 1:5 000, 1:15 000, etc. The scale of a chart source may have some value. If considered useful, line-spacing may be added to the details of a survey, e.g. '200m', under the heading 'Line-spacing', or equivalent. For digital surveys, especially those gathered by swathe systems (e.g. multibeam, interferometric, laser or Lidar), scale has little relevance and a measure of 'Sounding Density' may be used instead. However, a statement of whether full seafloor coverage has been achieved will be more informative.

B-175 DETAILS OF SOURCES: ORIGIN AND TYPE

B-175.1 **The country of origin** should be given explicitly when compiling from foreign data, but may be implicit when using one's own data, e.g.:

Foreign data	**Own data**
French surveys	Levés du SHOM
Canadian surveys	CHS (or Canadian Hydrographic Service) surveys
British surveys/charts	Admiralty surveys/charts

B-175.2 **The type of 'survey'** should be stated (the terms being translated as necessary):

- **'Survey'** implies a regular, controlled, or systematic hydrographic survey of any date.
- '**Sketch survey'** or '**Reconnaissance survey'** implies that there is a significant risk of undetected dangers, even if the 'survey' is of recent date.
- '**Passage soundings'** implies soundings acquired on an uncoordinated basis over a period of years.
- '**Unsurveyed'** indicates no data of any kind; it should be evident from the face of the chart (see B-417), but may also be indicated on the Source diagram.
- Qualifying comments, e.g. '(**leadline**)', '(**no sonar**)' and '(**multibeam**)', may be added after the type of survey where the date does not give sufficient indication of the survey methods.
- Where a charted survey is supplemented by occasional soundings from older or later sources, only the main survey should normally be listed.

B-175.3 **Guidance** on the practical significance of survey types should be given in a national publication which advises users on the reliability of charts; see B-170.5.

B-175.4 **Surveys made by non-government agencies,** such as port authorities, may be identified as such. However, it is usually preferable to use the description 'Commercial Survey' or 'Other surveys' for surveys made, for example, by oil companies.

B-176 SOURCE LISTS

B-176.1 **Sources of similar type, date and scale** may have to be grouped together to avoid too long a list or too complex a diagram, e.g.:

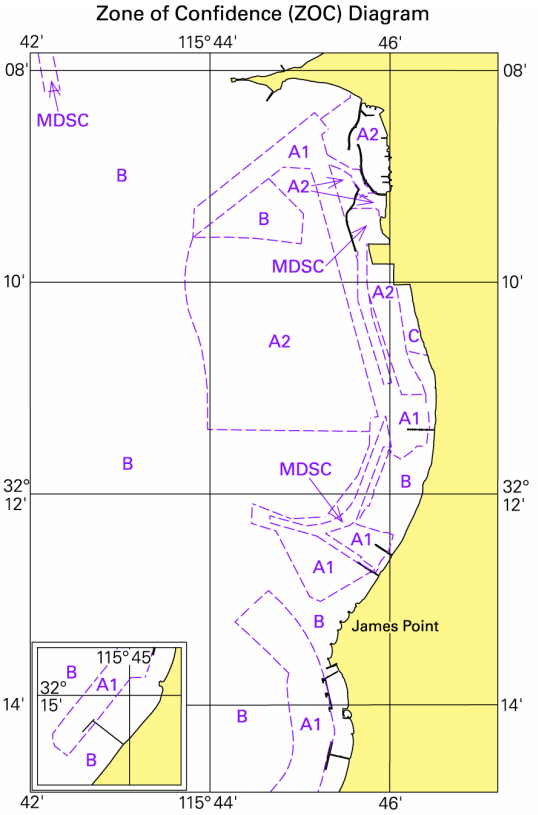
'French surveys 1978-83 1:20 000-1:30 000'.

Surveys of different types, e.g. leadline and echo-sounder surveys, should not be grouped together.

B-176.2 **The sources** in each category of similar origin and type should be listed chronologically, preferably with the most recent first. Hydrographic surveys should normally precede references to charts, and in some cases the relative importance of a major survey may require it to be placed first. Sources of topographic detail, if included, should appear last.

B-176.3 **The source list**, headed **'SOURCES'** or equivalent, may be placed on any side of the graphic, but preferably above it where available space permits. It is recommended that the list should be 'tied' to the graphic with an enclosing line.

B-177 ZONES OF CONFIDENCE (ZOC) DIAGRAMS



ZOC CATEGORIES
(For details see Australian Notice to Mariners No 25)

ZOC	POSITION ACCURACY	DEPTH ACCURACY	SEAFLOOR COVERAGE
A1	±5m	=0·50m + 1%d	All significant seafloor features detected.
A2	±20m	=1·00m + 2%d	All significant seafloor features detected.
B	±50m	=1·00m + 2%d	Uncharted features hazardous to surface navigation are not expected but may exist.
C	±500m	=2·00m + 5%d	Depth anomalies may be expected.
D	Worse than ZOC C	Worse than ZOC C	Large depth anomalies may be expected.
U	Unassessed - The quality of the bathymetric data has yet to be assessed.		
MDSC	Maintained Depth See Chart		

EXAMPLE B: ZONES OF CONFIDENCE DIAGRAM

B-177.1 **Zones of Confidence (ZOC) diagrams** enable mariners to assess the quality of the hydrographic data from which the chart was compiled. The use of ZOC diagrams provide consistency in the display of source data between digital and paper charts, as the Category of Zones of Confidence (CATZOC) definitions are derived from S-57. A copy of the CATZOC table from S-57, with relevant footnotes, is included at the end of this section.

B-177.2 **The linear dimensions** of the ZOC diagram shown on paper charts should normally be one-tenth those of the chart's neatline dimensions, but they may be reduced further if space is too limited for the preferred size, or enlarged if the detail is complex; see B-173.1.

B-177.3 **The quality** of the hydrographic source data is assessed according to six categories: five quality categories for assessed data (A1, A2, B, C and D) and a sixth category (U) for data which has not been assessed. If none of the hydrographic sources used on a chart have been assessed, a ZOC diagram indicating only 'U' values should not be used, as it would not include any information of use to the mariner.

The assessment of hydrographic data quality and classification into zones is based on:

a. Position accuracy,

b. Depth accuracy, and

c. Seafloor coverage (certainty of significant feature detection).

B-177.4 **Guidance** on the significance of the quality categories should be given in a national publication which advises users on the reliability of charts; see B-170.5.

B-177.5 **The higher ZOC categories**, A1 and A2, demand full seafloor ensonification or sweep and require very high accuracy standards which have only been achievable with the technology available since about 1980. Therefore many sea lanes which have hitherto been regarded as adequately surveyed may carry a ZOC B classification. Modern surveys of critical areas can be expected to carry ZOC A2 classification whilst ZOC A1 will cover only those areas surveyed under exceptionally stringent conditions for very special reasons.

B-177.6 **Additional categories** to those listed in S-57 may be added to ZOC diagrams for paper charts, e.g.:

- **Maintained Depth** (abbreviation MD) and **Dredged Area** (abbreviation DA). Such areas often do not accurately indicate actual depths, but do indicate minimum depths at the time of dredging.
- **Unsurveyed** (abbreviation UNS) indicates no data of any kind; it should be evident from the face of the chart (see B-417), but may also be indicated on the ZOC Diagram.

B-177.7 I **When there is a plan** or inset within the chart boundary, the ZOC categories should normally be shown on the section of the ZOC diagram of the plan or inset, a note being added to the main chart area of the ZOC diagram stating 'see Plan'. Similarly, when there is a larger-scale chart within the area, ZOC information may be omitted and a reference to the larger-scale chart inserted instead. However, if the smaller scale chart is the largest scale International chart, the ZOC information should be included as 'the content of INT charts must be complete and comprehensive for use by international mariners. They should not require reference to other national charts for any information required by the international mariner' (Quoted from Guidance for the Preparation and Maintenance of International Chart Schemes - M-11 Part A).

B-177.8 **The date of a survey is important**, particularly in areas of mobile or unstable seafloor; see B-174.1. The survey date should be inserted in parentheses against the ZOC value on the face of the diagram. To avoid too complex a diagram, dates of surveys may be grouped; see B-176.1.

CATEGORY OF ZONES OF CONFIDENCE IN DATA - ZOC TABLE
(S-57 Version 3.1 Appendix A Chapter 2)

1	2	3		4	5
ZOC [1]	Position Accuracy [2]	Depth Accuracy [3]		Seafloor Coverage	Typical Survey Characteristics [5]
A1	± 5 m	a = 0.5 b = 1		Full seafloor ensonification or sweep. All significant seafloor features detected [4] and depths measured.	Controlled, systematic high accuracy Survey on WGS 84 datum; using DGPS or a minimum three lines of position (LOP) with multibeam, channel or mechanical sweep system.
		Depth (m)	Accuracy (m)		
		10 30 100 1000	± 0.6 ± 0.8 ± 1.5 ± 10.5		
A2	± 20 m	a = 1.0 b = 2		Full seafloor ensonification or sweep. All significant seafloor features detected [4] and depths measured.	Controlled, systematic survey to standard accuracy; using modern survey echosounder with sonar or mechanical sweep.
		Depth (m)	Accuracy (m)		
		10 30 100 1000	± 1.2 ± 1.6 ± 3.0 ± 21.0		
B	± 50 m	a = 1.0 b = 2		Full seafloor coverage not achieved; uncharted features, hazardous to surface navigation are not expected but may exist.	Controlled, systematic survey to standard accuracy.
		Depth (m)	Accuracy (m)		
		10 30 100 1000	± 1.2 ± 1.6 ± 3.0 ± 21.0		
C	± 500 m	a = 2.0 b = 5		Full seafloor coverage not achieved, depth anomalies may be expected.	Low accuracy survey or data collected on an opportunity basis such as soundings on passage.
		Depth (m)	Accuracy (m)		
		10 30 100 1000	± 2.5 ± 3.5 ± 7.0 ± 52.0		
D	Worse than ZOC C	Worse than ZOC C		Full seafloor coverage not achieved, large depth anomalies may be expected.	Poor quality data or data that cannot be quality asses-sed due to lack of information.

To decide on a ZOC Category, all conditions outlined in columns 2 to 4 of the table must be met.

Footnote numbers quoted in the CATZOC table have the following meanings:

[1] This footnote is not applicable to paper charts.

[2] Position Accuracy of depicted soundings at 95% CI (2.45 sigma) with respect to the given datum. It is the cumulative error and includes survey, transformation and digitizing errors etc. Position accuracy need not be rigorously computed for ZOCs B, C and D but may be estimated based on type of equipment, calibration regime, historical accuracy etc.

[3] Depth accuracy of depicted soundings = a + (b x d)/100 at 95% CI (2.00 sigma), where d = depth in metres at the critical depth. Depth accuracy need not be rigorously computed for ZOCs B, C and D but may be estimated based on type of equipment, calibration regime, historical accuracy etc.

[4] Significant seafloor features are defined as those rising above depicted depths by more than:

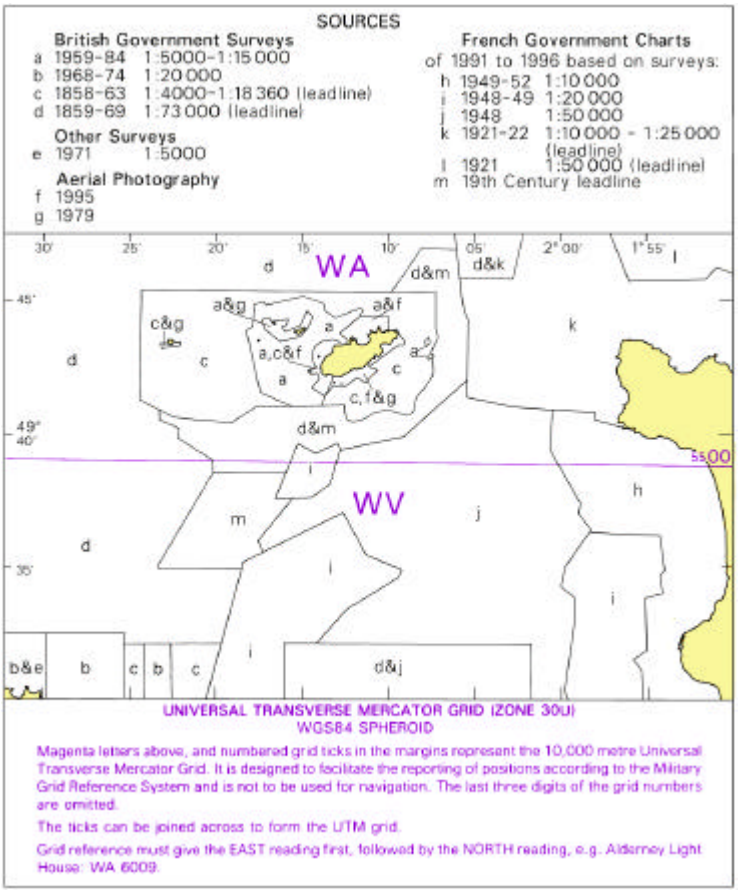
	Depth	Significant Feature
a.	<10 metres	>0.1 x depth,
b.	10 to 30 metres	>1.0 metre,
c.	>30 metres	>(0.1 x depth) minus 2.0 metres

[5] Controlled, systematic (high accuracy) survey (ZOC A1, A2 and B) - a survey comprising planned survey lines, on a geodetic datum that can be transformed to WGS 84.

Position fixing (ZOC A1) must be strong with at least three high quality Lines of Position (LOP) or Differential GPS.

Modern survey echosounder - a high precision surveying depth measuring equipment, generally including all survey echosounders designed post 1970.

B-178 DUAL-PURPOSE DIAGRAMS~~, ETC~~



EXAMPLE C: DUAL-PURPOSE DIAGRAM

B-178.1 **Dual-purpose diagrams** combine diagrams for other purposes with Source diagrams where there is insufficient space to show both separately, e.g. to show the limits of larger-scale charts (see B-254.2)~~, the cover provided by an electronic position fixing system~~ or the incidence of grid reference letters (see B-233.2)~~, may occasionally be combined with Source diagrams~~. The Source diagram should remain in black, with the other information overprinted in another colour, preferably magenta.

B-180 CATALOGUES; INDEX CHARTS

B-180.1 It is strongly recommended (Technical Resolution B 1.12) that every hydrographic office publishes a **catalogue** of its charts and nautical publications and keeps the catalogue up-to-date by regular new editions. It is further recommended that this information be made available on-line using the World Wide Web such that this information is continuously maintained and made available in a timely manner.

All catalogues shall contain ~~not only the linear but also~~ the natural scale of each chart.

The date of publication of the chart and the date of the last new edition may be contained in one column if desired.

It is recommended that catalogues of charts which are published in languages other than English, French or Spanish be translated into one of these languages in order that they may be read and more easily understood by mariners of any nationality. If this is not possible, at least the introduction, preface, headings of columns, etc, should be translated.

B-180.2 It is strongly recommended that all nations publish, at a legible scale, **index charts** showing the geographical limits of all charts they produce.