



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

1 March

2004

Dear Colleagues,

Subject: Draft revision M-4 Section B100

The former CSC began the revision of M-4 Part B, and the CSPCWG is tasked to take this forward. I have included, at Annex A, a slightly revised version of Annex B to CSC CL 4/2001, as this gives useful background to the aims underlying this revision of M-4 Part B, which may be new to some members.

Annex B is a draft revision of M-4 Section B-100. Revised Specifications B-100-160 had already been drafted and circulated by CSC (CSC CL 4/2001 refers). Annex B is therefore based on the latest version prepared by CSC, but includes some suggested amendments by CSC members in response to CSC CL 4/2001, and also some updating, simplification and other editorial amendments by CSPCWG Secretary. Proposed changes since the CSC draft are shown in red (with some additional comments or queries in red italic which are not intended to be part of the final document).

Additionally, a first draft revision of Specifications B-170-180 has now been added, including a new specification to cover Zone of Confidence (ZOC) diagrams and a specification B-181 (Catalogues; Index Charts) based on TR B1.12. The specification for ZOC diagrams is adapted from one originally supplied by Australia who pioneered the use of such diagrams. No ZOC diagram example has been included at present; it is hoped that Australia will be able to supply a suitable one.

CSC also suggested that the specification for Source Diagrams would be better included in Section 200, and this view was endorsed by 7 out of 12 respondents to CSC CL 4/2001, including IHB. We can agree the wording now, and move the specification when section 200 is revised.

I would be grateful if members would examine Annex B, and compare it carefully with the existing version of M-4 Part B-100, paying particular attention to the proposed wording in red and associated comments and queries. I will assume that any upright red wording which is not commented on can be incorporated in the specification without further consultation.

Please also provide your view on the following specific queries:

1. B-103.5: Where should the information from TR B 1.10 be included? And should “small craft” be amended to “leisure craft”?
2. B-110.6: Do any HOs still produce lattice charts?
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?
4. B-174.3: Is there a better way of applying a qualitative measure to digital surveys?
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)?
6. B-178: Now that Australia is changing to ZOC diagrams, will there be any requirement to retain the specification for Reliability Diagrams?
7. B-180.8: How to show dates of surveys on ZOC diagrams.

Please send me your views and any suggestions for improvements **by 11 May 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,



Peter G. B. Jones,
Chairman

Annex A: Review and Revision of M-4, Part B

Annex B: Draft revised section B-100.

IHB Technical Resolutions referred to in draft section B100:

A 1.8, A 1.19, A 2.1, A 3.4

B 1.1, B 1.10, B 1.12, B 3.3, B 3.18

K 1.1, K 2.11

**Annex A
to CSCPWG CL 06/2004**

REVIEW AND REVISION OF M-4, PART B

1. The current edition of M-4 Part B (formerly designated Part 1 - IHO CL 21/2000 refers), was issued in loose leaf format in 1988, and with a few notable exceptions, has remained largely unchanged since that date.
2. The intention was that it should provide an internationally-agreed, product specification, albeit loosely worded, for both national and international charts at medium and large-scale.
3. At the time it was written, however, the term 'charts' actually referred to paper charts; digital charts were yet to become a viable reality.
4. The subsequent development of digital charts presented additional requirements which were met by the development of S-52 and S-57. 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.
5. The current role of M-4 Part B is therefore two-fold, in that it provides:
 - a. an explanation of the general concepts and rationale behind the symbology used in charting, much of which is relevant to both digital and paper charts and
 - b. specific guidance for paper charts, including the use of text and symbology.
6. To enable M-4 Part B to provide the internationally-agreed, product specification referred to in paragraph 2 above, some amendments are necessary to reflect better the existence and content of digital charts, S-52 and S-57.
7. The aims of the review and revision of M-4 Part B are therefore five-fold:
 - a. to insert new specifications, and update existing specifications, where necessary. As a wide range of other publications (both national and international, including INT 1, S-52, S-57) are based on, or contain references to, M-4 Part B, any changes to paragraph numbers will need to be done only in extremis.
 - b. to clarify the two-fold role of M-4 Part B and its links with both paper and digital charts. Although references to digital charts, S-52 and S-57 will be included in the introductory sections, it is not considered appropriate in this revision to re-organize the entire content of M-4 Part B to reflect its two-fold role; rather, it is the intention of this review and revision to ensure that the specifications are factually complete providing a base-line to define specifications for charts now. This is needed to allow us to move forward; re-organization, if appropriate, can then be carried out at a later date.
 - c. to improve M-4 Part B's compatibility with S-52 and S-57.
 - d. 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.
 - e. The original aim of the CSC was to complete the overall assessment before the International Hydrographic Conference in April 2002.

**Annex B
to CSPCWG CL 06/2004**

CSC draft amended by Chairman & Secretary CSPCWG in red
(with comments or questions in italic red).

(The section 170-180 will be moved to Section 200 when that section is revised. It was not included in the original draft that CSC members reviewed, so the red parts are suggested changes from existing B-170-179. Sections 180-181 are entirely new).

PART B

SECTION 100

GENERAL

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- B-178** Reliability diagrams
- B-179** Dual-purpose diagrams, etc.
- B-180** ZOC diagrams

- B-181** Catalogues; index charts.

(some amendments to this list may be required when the final version of B-100 is approved. For example, it may be possible to replace the reliability diagram section with the new ZOC diagram section).

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-101 and B-101.1 provide detailed background to the initial preparation of the Specifications; B-102 and B-103 detail the purpose and scope, respectively, of the Specifications; and B-160 describes the correction system. (see contents list)~~

B-100.2 When **M-4 Part B** was originally prepared, the term ‘charts’ actually referred, ~~de facto,~~ 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 ~~electronic or~~ 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 (see B-103.4). 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 ~~(ie electronic)~~ and ~~analogue (ie~~ paper charts.
- b. **specific guidance for paper charts**, including the use of text and symbology.

~~As indicated in B-100.2, specific guidance for digital (vector) charts is provided by S-52 and S-57 (see B-103.4).~~

B-101 SPECIFICATIONS: ORIGIN AND METHOD

The Specifications for charts at medium- and large-scale were originally compiled by two groups of member countries of the IHO, forming successively, the **North Sea International Chart Commission** (NSICC, 1972-1977) and the **Chart Specifications Committee** (1977-1982). ~~The NSICC's members were Canada, Denmark, France, Germany, Iceland, Netherlands, Norway, Sweden, UK and USA (Defense Mapping Agency and National Ocean Service). The Chart Specifications Committee consisted of the same countries with the exception of Iceland, Norway and Sweden, and the addition of Australia, Brazil, Chile, Egypt, India, Indonesia, Italy, Japan, New Zealand and USSR.~~ At the XIIth IH Conference (April 1982) the Chart Specifications Committee was renamed the **Chart Standardization Committee** (CSC) ~~with an unchanged membership~~ 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). They were subsequently ~~coordinated by the Secretariat which prepared a revised draft, which was reviewed by NSICC and CSC members before and since 1977 respectively.~~ Comments were reconciled as far as possible ~~by the Secretariat and preliminary editions of each Section were published between 1979 and 1982, which compiled the final version of each Section.~~

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 ~~at all times~~ avoided;
- d. the need was recognized to ensure that each separate item fitted logically into a consistent whole;
 - e. symbols, preferably self-explanatory, were ~~in general~~ preferred to legends requiring translation;
 - f. innovations, ie. symbols not appearing in any national chart, were occasionally 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, ~~was subsequently carried out by the CSC before the XVIth International Conference in 2002. Changes which resulted from this review included 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.

~~CSC membership at that time [August 2001] comprised: Australia, Brazil, Canada, Chile, Croatia, Cuba, Denmark, Egypt, Finland, France, Germany, Greece, IHB, India, Indonesia, Italy, Japan, Netherlands, New Zealand, Republic of South Africa, Russian Federation, UK and USA.~~

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 countries 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) ~~2001 Amendments provides the first definition of a nautical chart in an international convention after hundreds of years of use and~~ 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 can also** provide a basis on which to build digital cover ~~for a nation’s waters~~ (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 which they present may in themselves serve to accelerate the move to standardization. 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. ~~It should be noted that, in the electronic world, there will be~~ many variations which may not confuse the mariner ~~but which~~ would confuse the computer. 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. ~~In 2001, it is illustrated by the charts at 1:2 000 000 detailed below:~~

~~————— M-4 Part B is appropriate for INT 556 (Indonesia 151) in International Charting Region K medium-scale scheme;~~

~~————— M-4 Part C is appropriate for INT 900 909, supplemental charts (for Antarctica) to the 1:3 500 000 small-scale International chart series.~~

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 ~~prerequisite requirement~~ is agreement on the place of charts in the full ~~repertory 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 ~~essential requirement~~ is agreement on the definition, and real significance to chart users, of the individual features charted. ~~; for instance, the extent of the information which a chart should convey to the mariner about a fog detector light, an offshore platform, a buried gas pipe, or a Deep Water Route.~~

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 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 S-61 IHO 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).~~

~~**Electronic or Digital (vector) charts.** As indicated in B-100.3 and B-103.3, M-4 Part B provides the explanation of the general concepts and rationale behind the symbology used in charting, much of which is relevant to both digital [ie electronic] and analogue [ie paper] charts. In digital charts, the background information included in the chart itself can be significantly greater than is possible in the case of a paper chart. This may reduce the need for complex coded descriptions of features on the digital chart because such information is readily available. The specific guidance necessary for digital (vector) 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).~~

~~Digital charts fall into three main categories:~~

~~— raster~~

~~— vector~~

~~— hybrid raster/vector (are there such things?)~~

~~The term digital in these Specifications (M-4 Part B) is used in general terms or specifically, to refer to vector digital charts. As raster digital charts directly reflect the content of the paper chart, they do not require further specific mention in these Specifications (M-4 Part B). Specifications for raster charts are detailed in S-61 IHO Product Specification for Raster Navigational Charts (RNC).~~

B-103.5 Charts for small craft. Charts designed especially for use by small craft should follow the Specifications for the compilation of charts as far as possible. ~~There shall be no requirement for the issuing authority to incorporate, on small craft charts sold, the corrections as reported in the Notices to Mariners between printings of these charts, but a warning should be inserted on them clearly stating that they have not been corrected from Notices to Mariners.~~ (Technical Resolution B 1.10 refers). *The sentence dealing with correctional practice for small craft charts is not appropriate within the "Scope of the specifications" section. However, it is not clear where else in M-4 specific guidance for small craft charts should belong (perhaps at A-403?). Also, should "small-craft" be amended to "Leisure" as some small (commercial) craft now fall under SOLAS?*

B-110 STANDARDIZATION LEVELS

~~As indicated in B-102.1,~~ 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 can provide a basis on which to build digital cover ~~for a nation's waters,~~ 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 ~~Part A refers~~).

Despite this, complete standardization is unlikely to be achieved between all member countries even on new charts, for good reason, because 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' conveys this sense. Publication of S-52 and S-57 for digital charts, ~~which must be much of which is~~ prescriptive, may tend to lead to more prescriptive specifications for paper charts.

It is important to recognize that, in the 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. ~~Some recommendations are made in the Specifications and it is hoped~~ It is recommended that nations revising their chart cover completely will take the opportunity to make any 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 ~~this is reflected in B-2??~~ ~~for TR~~ (in accordance with Technical Resolutions A 1.8, A 2.1 and B 1.1.) ~~this is reflected in B-130.~~ 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) ~~in Part A,~~ 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 the ~~se~~ 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, ~~Appendix A (the IHO Object Catalogue)~~ which includes the relevant references to M-4 Part B paragraph numbers and to INT 1 symbols for each object class. 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: the Specifications necessarily cover this aspect in a rather general way.

Agreement on features included or excluded cannot be easily achieved in a smaller number of cases, particularly where a nation has a different dividing line from ~~most~~ other nations between whether information be shown on charts or in other publications. For instance, many countries indicate restricted areas such as no anchoring areas, cable areas, exercise areas, ~~ete~~; 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. The Specifications ~~try~~ 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 ~~treated dealt with~~ in B-600. (*Please advise whether any countries still produce ~~new~~ latticed charts*)

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, eg 0,1mm
- Commas are not used to separate thousands, eg 150 000 not 150,000
- No spaces are used between figures and abbreviations for units, eg 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.

Terminology

- ‘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, eg 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 ~~or there is no need for exceptions;~~
- ‘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;

(‘must be’ (done) has been introduced to cover mandatory requirements to tie in with terminology used in S-57.)

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 country’s national language. ~~See also B-500.~~

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. ~~See B-540.1.~~

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 on the black plate~~. 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 (~~on~~ black and colour-~~plates~~); 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, eg B-351.1-I. (Note: in the original ‘Part 1’ version, before the prefix B was used, the ‘I’ was a prefix, eg 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 paper charts ~~ones~~. A separate set of symbols are also available for ECDIS purposes ~~in S-52~~.

B-126 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.

- 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

~~A New Chart does not necessarily contain newly received information and all information contained may have been previously made available in other national charts. Reference should always be made to the Source / Reliability / Zones of Confidence (ZOC) Diagram (see B-170 to B-180) which will contain details of the original survey data used to compile the New Chart. Where a New Chart does contain newly received information, the Source / Reliability / ZOC Diagram will not always reflect certain extensive changes, for example to symbology, buoyage or lights.~~

- b. **New Edition and/or Large Correction (NE, LC):** A new issue of an existing chart, containing amendments **essential 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. ~~However, it should be noted that considerable parts of the chart may remain unchanged. The chart number normally remains unchanged except for the addition of INT number when the chart becomes INT. Reference should be made to the Source / Reliability / ZOC Diagram (see B-170 to B-178) which will contain details of the survey data used to amend the chart. However, the Source / Reliability / ZOC Diagram will not always reflect certain extensive changes, for example to symbology, buoyage or lights.~~

~~It should be noted that~~ A Large Correction, a type of correction used by a limited number of nations, is a particularly restricted (or partial) New Edition.

Exceptionally, ~~certain~~ 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-128 edited to reduce duplication)*

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 **velocity 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 ~~—see B-131.~~

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 the four colours **black, magenta, buff (or grey) and blue.** *(order changed to agree with re-numbered paragraphs)* Additional colours may be used, and will be necessary for lattice overprints for electronic position-fixing systems.

The use of alternative or additional colours, eg 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. Additional colours may also be useful in clarifying local navigational complexities, eg the light sectors marking intricate inshore channels in Scandinavian waters are shown in red, green, and yellow. 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 ~~both printed paper charts and plates.~~

It is important that all colours shall be visible under the coloured filters used to subdue bridge lighting: this requirement is often met by the mixing of 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 ~~structure~~ cartographic framework (eg **border, graticule, title**) of charts.
- ~~for all basic charted features.-(unspecified; not defined in M-4)~~
- for all physical (solid) features (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 ~~plate (B-439 etc).~~ **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.

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’
- Positions of tidal stream/current observations (ie 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 ~~way (reporting)~~ points
 - Designated anchorages and berths, including berth numbers at buoys, quays and in anchorages
 - Other designated areas, eg 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 ~~'included'~~ 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
 - ~~Exceptionally, electronic positioning lattices where necessary.~~

~~B-1432.3 Comparable details to be shown in black are those associated with depth information and permanent physical obstructions, such as channel limits, dredged areas, spoil grounds, groynes, outfall pipes, works in progress; see B-140.2. (no longer required now we have a specification for black)~~

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 OR GREY

A colour, usually buff or grey, but others are possible, shall be used **solely** as a land tint. The shade of colour shall be carefully selected so that a satisfactory tint over inter-tidal areas is derived from printing the land tint over the shallow water blue tint; ~~see B-301 and B-413.~~

B-144 BLUE

The colour blue shall be used as a tint to emphasize **shallow water**; ~~see B-411.~~ It should be combined with that used for land, as described in B-143, to produce an appropriate tint for inter-tidal areas. Blue may also be used for depth contours, particularly in intricate waters. *(This will need adding to the relevant passage at B-411.1 when that section is revised. See also question at B-177 related to Preferred Areas Source Diagrams, where blue is currently used for a very different purpose).*

B-145 CAUTIONARY NOTES

Cautionary notes shall normally be shown in the same colour as the charted features to which they refer, see B-242.3. The only exception (*are there any other known cases?*) 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).

Paragraphs on colour renumbered so that new entry for Black is B-141, Magenta is B-142, Buff is B-143, Blue is B-144 and Cautionary notes is B-145. I cannot find any references to spec B-140-145 in INT 1, so renumbering may not cause many problems with cross referencing. There are one or two in the body of M-4, which can be resolved easily on the digital version, and when the relevant sections are revised.

B-150 ASSOCIATED PUBLICATIONS

A number of other publications are complementary to these Specifications (M-4 ~~Part B and Part C~~). 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 (~~vector~~) 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 it 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.~~

B-151.1 ~~Former~~ Technical Resolution B3.3 (~~now cancelled~~) 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 are used for those items appearing in Chart INT 1, and that letters are 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 country’s standard list, including, in their proper place, those terms for which the country 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. ~~Digital versions will become available in due course.~~

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

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 Countries', 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 need to 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 ~~for discussion by the Committee, which will give appropriate advice to the IHB.~~ The CSPCWG will recommend amendments to the Specifications to the IHB. ~~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 **such** 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 **any** 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.

~~See also TR K1.1.~~

B-170 SOURCE DIAGRAMS

(This entire section will be moved to Section 200 when that section is revised. It was not included in the original draft that CSC members reviewed, so the red parts are suggested changes from existing B-170-179. Sections 180-181 are entirely new.)

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 routing measures appear to 'direct' vessels into waters where surveys are inadequate, diagrams are particularly important to alert navigators ~~of deep draught vessels to the need~~ to allow adequate underkeel clearances.

B-170.1 The term '**Source diagram**' ~~or simply '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 entitled 'SOURCES', or the equivalent, on charts.

B-170.2 The term '**Reliability diagrams**' is ~~to be~~ reserved for the special cases described in B-178. **Dual-purpose Diagrams** are described at B-179. The term '**ZOC Diagram**' is used for diagrams based on the S-57 Categories of Zones of Confidence, see B-180.

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 eg:

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~~ ~~ment as a formality~~. If so they may be stated in the explanatory note, following the first sentence, eg:

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

See B-176.2 ~~if it is wished to list~~ 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 ~~through unfamiliar waters~~. It should be made clear that they 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** is to guide navigators, and those planning 'navigational operations' (including the planning of new routes and official routing measures), on the degree of confidence they should have in the adequacy and accuracy of charted depths and positions. A 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. (Sentence moved from B-179.2, which seemed an inappropriate place for this information.)**

- B-171.2** **As a useful by-product**, source diagrams provide an easily accessible, but not necessarily comprehensive, record which 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 countries, may have to be listed as sources where details of their component surveys are not known. In such cases the purpose of the 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 (eg ‘from leadline surveys’) should be given.
- B-171.4** **Own larger-scale charts:** the limits of these may be shown, eg as in B-179.1, 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 the diagrams will be defeated if they are not updated when new editions of charts are compiled.

B-172 **SCALES OF CHARTS WHICH SHOULD HAVE DIAGRAMS**

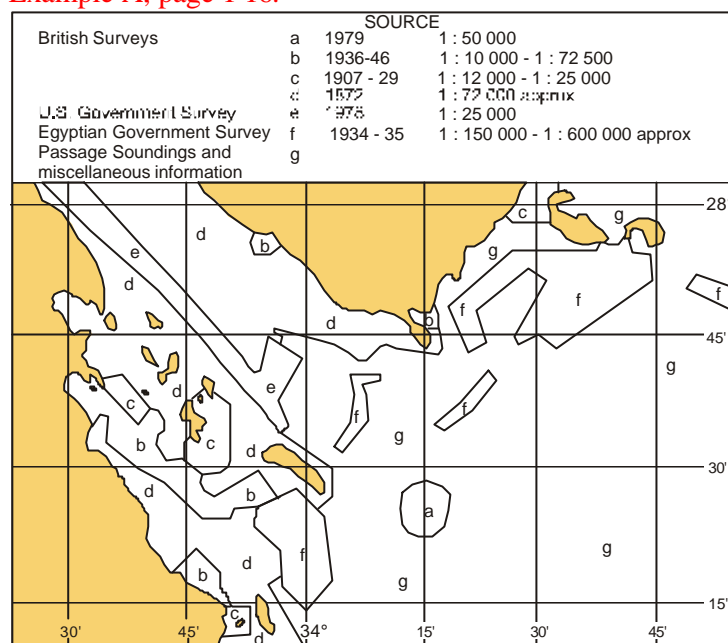
- B-172.1** Regional differences make it **inappropriate** to specify precisely which scales of charts should always have diagrams. They are most useful on relatively large scales, particularly those with potentially hazardous rocky seabed areas, which have not been **fully-surveyed to modern standards, 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 diagrams, special attention being paid to the largest coastal scales and those which carry routing measures **in depths of about 30 metres or less.**
- 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 diagram.** In such cases the explanatory note under the chart title may be adequate, eg,

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

B-173

GRAPHICAL REPRESENTATION OF LIMITS OF SURVEYS

See Example A, page 1-16.



EXAMPLE A: SOURCE DIAGRAM

(This will be replaced by a more modern diagram)

- B-173.1** The **linear dimensions** of the graphic 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. **Full-Reliability and Dual Purpose** Diagrams, see B-178-179, may need to be larger: eg. one-eighth scale may be ~~preferred~~ **necessary to adequately portray the additional detail.**
- B-173.2** **Continuous black lines** should be used for the diagram's borders, coastline and, ~~preferably,~~ area limits. Identifying letters should be black and may be repeated as necessary: ~~see Example A, page 1-16. Coral reef outlines may also be shown (now at B-173.6)~~
- B-173.3** **Land tint** should cover land areas, sea areas **normally** being left white (but see **B173.6 for special measures** and B-177 for the use of blue).
- B-173.4** **Graduation** of diagrams is advisable for ease of use, but to avoid confusion, ~~the~~ **any internal** graticule should have finer lines than the area limits.
- B-173.5** **Inset plans** should be included in the diagrams, with limits being shown as bold single lines; graduation ticks and figures may be added if thought necessary.
- B-173.6** **Special measures** may be taken in cases of particular importance, eg,
- Coral reef outlines may be shown
 - intertidal and shallow water tints may be inserted in the same geographical areas on the 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 routing 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 ~~(governing)~~)
- the likelihood of later changes in depths, particularly in areas of mobile seabed or coral growth.

The date of the edition of a published chart used can be misleading but may have some value. Year dates only should be used.

B-174.2 **Guidance** on the practical significance of survey dates should be given in a national publication which advises users on the reliability of charts ~~(such as the British 'Mariner's Handbook', Chapter 2).~~

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 details of a survey, eg '200 m', under the heading 'Line-spacing', or equivalent. For digital surveys, especially those gathered by swathe systems (eg. multibeam, interferometric or Lidar), scale has little relevance and a measure of 'Sounding Density' could be used instead. *(Can anyone suggest a better way of explaining this?)*

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, eg:

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, 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. ~~written in the appropriate areas of the diagrams (but not listed).~~
- Qualifying comments such as **'(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.

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 say**, 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, eg,

‘French surveys 1978-83 1:20 000-1:30 000’.

Surveys of different types, eg 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. 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 SOURCE DIAGRAMS WITH ‘PREFERRED AREAS’

B-177.1 Preferred areas for navigation may be overprinted in blue on source diagrams to give more effective guidance, if guidance seems required, because inadequate surveys present abnormal risks in certain areas of the charts. Care must be taken not to encourage a concentration of all sizes of vessel unnecessarily in narrow blue routes, so increasing collision risks, and not to add blue solely to areas of full modern survey. In some regions it may be desirable to distinguish the ‘better’ surveys from the ‘poor’ ones, and to add blue to areas where depths and nature of the bottom are such that the risk of undetected shoals is negligible, even though such areas have not been thoroughly surveyed, rather than show discontinuous blue ‘routes’, except in very deep water. See also B-171.1 (*does any HO use this? It could be confusing, and possibly attract liability, as blue generally means shallow, possibly dangerous, areas in normal charting terms? See B-144*).

B-177.2 The explanatory note under the chart title shall be altered to read, where preferred areas are shown, either as follows or on similar lines:

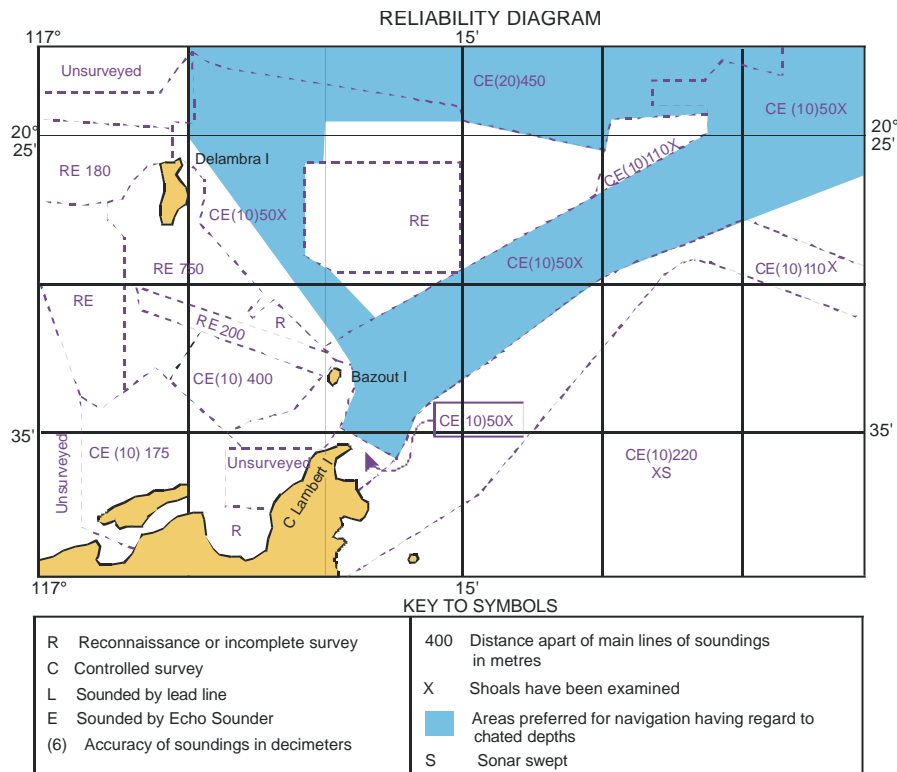
Sources and preferred areas: See the Source Diagram for information which may affect your use of this chart. The areas left white on the diagram may contain undiscovered dangers, or positions may be unreliable. The blue areas have been better surveyed or for other reasons are less likely to include undetected dangers and are preferred for navigation by all/larger vessels, charted depths permitting.

Notes: 1. ‘All’ or ‘larger’ to be deleted as appropriate. *If larger is retained, some definition (eg of draught) would be useful.*

2. If necessary, refer the user to the more detailed information given on larger-scale charts *or in publications.*

B-178. RELIABILITY DIAGRAMS

Where surveyed routes pass through inadequately surveyed, dangerous areas it may be preferable to provide reliability diagrams instead of source diagrams. Reliability diagrams give an assessment of accuracy as well as advising on preferred areas for navigation. In cases where it seems prudent to give more positive guidance than can be provided by source diagrams, hydrographic offices should consider using diagrams modelled on the Australian style, as shown see Example B, page 1-16, adding survey dates where these are useful, especially in areas of mobile seabed.



EXAMPLE B: (NON-STANDARD) RELIABILITY DIAGRAM
(1:50 000 scale chart of part of the coast of Australia)

Insert updated diagram here, if this section to be retained. Do any HOs use “reliability diagrams? Australian example may no longer be valid, as Australia now replacing them with ZOC diagrams. If retained, need new category for “multibeam”? Spelling of “charted” needs amending.

B-179 DUAL-PURPOSE DIAGRAMS, ETC

B-179.1 Diagrams for other purposes, eg to show the limits of larger-scale charts, the cover provided by an electronic position-fixing system or the incidence of grid reference letters, may occasionally be combined with source diagrams where there is insufficient space to show both separately. The source diagram should remain in black, with the other information overprinted in another colour, preferably magenta.

~~**B-179.2 Specification B-417** gives a summary of the ways in which the inadequacy of surveys may be indicated on charts. (Moved to B-171.1 as a more appropriate place for this cross reference)~~

B-180 ZONES OF CONFIDENCE DIAGRAMS

(Insert example diagram, with category box – Australia to provide?)

B-180.1 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 footnotes, is included at the end of this section.

B-180.3 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.

B-180.4 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. 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-180.5 Guidance on the significance of the quality categories should be given in a national publication which advises users on the reliability of charts.

B-180.6 The higher ZOC categories, ZOC 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-180.7 Additional categories to those listed in S-57 may be added to ZOC diagrams for paper charts, eg:

- **MD and DA** stand for 'Maintained depth' and 'Dredged Area' respectively. Such areas often do not accurately indicate actual depths, but do indicate minimum depths at the time of dredging.
- **'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 ZOC Diagram.

B-180.8 **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 Regional Co-ordinators of International Chart Schemes - M-11).

(CATZOCs, as defined in S-57 Version 3.1, do not include any information about the date of the survey, the importance of which to the user is explained at B-174. On ENC’s, it may be possible to “point and click” to obtain additional information about the source data, but this is not possible on paper charts. It is assumed that the survey is assessed for a CATZOC rating when it is rendered; the meaningfulness of such a rating clearly declines with time, especially in areas of mobile seabed. This seems to undermine the suitability of ZOC categories for use on paper charts. Does any member have a suggested resolution to this problem?)

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 assessed due to lack of information.

Note: The CATZOC attribute definitions are currently the subject of review and the results of this review will be promulgated as soon as possible in the S-57 Corrections Document.

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 table have the following meanings:

- ¹ The allocation of a ZOC indicates that particular data meets minimum criteria for position and depth accuracy and seafloor coverage defined in this Table. Data may be further qualified by Object Class 'Quality of Data' (M_QUAL) sub-attributes as follows:
- a. Positional Accuracy (POSACC) and Sounding Accuracy (SOUACC) may be used to indicate that a higher position or depth accuracy has been achieved than defined in this Table (e.g. a survey where full seafloor coverage was not achieved could not be classified higher than ZOC B; however, if the position accuracy was, for instance, ±15 metres, the sub-attribute POSACC could be used to indicate this).
 - b. Swept areas where the clearance depth is accurately known but the actual seabed depth is not accurately known may be accorded a 'higher' ZOC (i.e. A1 or A2) providing positional and depth accuracies of the swept depth meets the criteria in this Table. In this instance, Depth Range Value 1 (DRVAL1) may be used to specify the swept depth. The position accuracy criteria apply to the boundaries of swept areas.
 - c. SURSTA, SUREND and TECSOU may be used to indicate the start and end dates of the survey and the technique of sounding measurement.

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 = $a + (b \times d)/100$ 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:

	<u>Depth</u>	<u>Significant Feature</u>
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-181 CATALOGUES; INDEX CHARTS

B-181.1 It is strongly recommended (Technical Resolution B 1.12) that every Hydrographic Office publish a **catalogue** of its charts and nautical publications and keep 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-181.2 It is strongly recommended that all countries publish, at a legible scale, **index charts** showing the geographical limits of all charts they produce.

(IHB to cancel TR B 1.12?)