HSSC10-05.4B

10th Meeting of the Hydrographic Services and Standards Committee

14-17 May 2018, Rostock, Germany

Changes to S-4 for Edition 4.8.0

Agreed at NCWG3 meeting and by subsequent NCWG correspondence

Submitted by:	Chairman, NCWG
Executive Summary:	In accordance with its Terms of Reference, the NCWG keeps under continuous review the IHO publication S-4 'Regulations of the IHO for International (INT) Charts and Chart Specifications of the IHO', in order to advise the HSSC on their updating, design and format and the portrayal of symbols. During the 3rd NCWG meeting, the following changes were agreed and subsequently refined by NCWG correspondence.
Related Documents:	S-4; NCWG3 Report; NCWG Letters 03, 04, 06/2017 and 01, 02/2018
Related Projects:	None

Changes for proposed next edition of S-4 (4.8.0)

Revisions agreed by NCWG, following NCWG3 meeting May 2017.

1. **NCWG3 Action 31** required amendments to S-4 Part A-500 to provide guidance for the exchange of digital repromat (vector and raster). It currently only provides guidance for the exchange of analogue repromat, which is now rare. This was an initiative from Italy, described in NCWG3-09.4A. However, although Italy proposed S-57 should be used for digital exchange, there was general agreement that repromat (as used for chart adoptions) would be better in a raster format, which includes cartographic elements not available in S-57. Accordingly, the draft revised A-500 deliberately changed the emphasis from analogue to digital repromat, as this is now the normal method of exchange in use. NCWG Letters 06/2017 and 02/2018 refer. Proposed new wording follows (with changes shown in red):

SECTION 500

EXCHANGE OF REPRODUCTION MATERIAL

A-501 GENERAL

A-501.1 Reproduction material (repromat) is material made by the producer nation ~~at some convenient stage in the preparation of an international chart,~~ from which the chart may be reproduced, without redrafting, in modified facsimile by a printer nation. ~~It may be in analogue or digital form.~~ While it may be in analogue or digital form, it is now more usual, convenient and cost effective to exchange digital repromat.

A-501.2 Repromat for New Charts, New Editions, ~~Large Corrections,~~ Limited New Editions, Reprints and Notice to Mariners Blocks (see A-401.2) is supplied by producers at the request of printers (see A-402.2 and A-404.1). The terms, conditions and procedures for the exchange of repromat~~, including automatic supply if appropriate,~~ will be established bilaterally between individual producer and printer nations (see A-601). These should consider, but not be limited to:

- Ordering process or automatic supply.
- Identification of charts (e.g. INT number, national number).
- Points of contact.
- Digital or analogue.
- Supply method:
    - For digital repromat, see A-502.
    - For analogue repromat: shipping method and packaging (to prevent damage in transit). See also A-503.
- Acknowledgement of receipt.
- Financial arrangements if required, see A-600.

A-502 DIGITAL REPROMAT

A-502.1 **Digital repromat** may be in vector (using the Transfer Standard for Digital Hydrographic Data, S-57) or raster format.

A-502.2 **S-57** data is useful for data exchange, but not suitable for paper chart adoptions.

A-502.3 **Raster** format is more useful for modified facsimile 'adoptions' of paper charts, as this includes the cartographic elements (chart framework, text placement) which is not included in S-57. Ideally, each colour layer should be a separate file, the file format (for example Tagged Image Format - TIF) and resolution (for example minimum 600 dpi) as agreed between producer and printer.

A-502.4 Digital repromat can be supplied via File Transfer Protocol (FTP) or for small NM blocks as an email attachment. The repromat should be accompanied by an image of the complete chart, for example in Portable Document Format (PDF).

A-503 ~~QUALITY OF~~ ANALOGUE REPROMAT

A-503.1 The producer nation shall ensure that the repromat being provided to another nation meets certain minimum standards given below. These represent a minimum specification and should permit the producer nation to use its normal work materials and procedures.

A-503.2 Material Characteristics: Analogue repromat will be prepared on stable base plastic or film. The size of the repromat will not vary from the computed chart size by more than ± 0,5 mm over the longest dimension of the chart graticule.

A-503.3 Image Quality: Repromat images will be precise and free of blemishes and holes, so as not to require opaquing or other touch-up work.

A-503.4 Amount and Form of Material: The most appropriate form and amount of repromat will be agreed as part of the bilateral arrangements between producer and printer nations. Repromat will be in negative or positive form depending upon the printing

processes used by the nations concerned. The repromat will be accompanied by a copy of the chart itself (see B-502.4).

~~**A-503 REPROMAT FOR NM BLOCKS**~~

~~**A-503.1** Printer nations will normally place a standing order with producer nations for the automatic supply of repromat of NM Blocks (chartlets, patches) affecting all charts adopted by the printer nation (see A-401.2d).~~

~~**A-504 PROCEDURES FOR ORDERING AND SUPPLYING REPROMAT**~~

~~**A-504.1 Analogue** repromat is sometimes ruined in the process of shipment, or delayed because the parcel was not properly identified. The following procedures should minimise such problems.~~

~~**A-504.2 Ordering repromat:** The printer nation requiring repromat of an international chart shall order such from the producer nation and shall identify the required repromat by the international number, followed by the national number.~~

~~**A-504.3 Point of Contact:** Each producer nation shall designate an addressee for requests for repromat.~~

~~**A-504.4 Ordering Procedures:** The printer nation shall order the repromat by letter or through the use of a requisition form. Requests shall specify that the repromat is being ordered under the relevant bilateral arrangement (see A-601.1).~~

~~**A-504.5 Wrapping and Packing:** Repromat shall be so packaged as to prevent damage in transit. A mailing tube or box of reinforced cardboard shall preferably be used.~~

~~**A-504.6 Supply Method:** The method of shipment shall be determined when the bilateral arrangement is established. Over long distances air shipment is recommended as, although relatively expensive, it is the fastest and least likely to result in damage. Appropriate identification on the parcel shall be made to preclude undue delay to the parcel in the Customs Clearing House of the receiving nation.~~

~~**A-504.7 Receipt for Material:** The receiving nation shall acknowledge receipt of each shipment of repromat and shall provide a documentary receipt to the producing nation.~~

~~**A-505 PAYMENT FOR REPROMAT**~~

~~**A-505.1** Where financial terms and conditions are agreed, they should in accordance with A-601.~~

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The following NCWG Actions propose revisions to S-4 Part B (and in some cases to INT1, not listed in this document) which need approval by HSSC10 and eventually Member States, in accordance with Resolution 2/2007 (as amended by IA-1).

2. **ACTION NCWG3/18: Secretary to draft letter explaining the proposals to extend the use of the yacht/small craft symbol in more detail and allow WG members to consider and vote as appropriate.**

NCWG3-08.2A proposed extending the use of the 'yacht' symbol (F11.2) for small craft in general. Initially the suggestion (from a UK compiler) was to use it with an 'anchor' symbol (N12) to represent a small craft anchorage symbolically where space was limited, instead of using a text legend with the anchor. Following on from this, it seemed possible to extend this usage to other composite symbols. At the NCWG3 meeting, it was decided that to work through all the possible options for a comparatively minor change would take up too much meeting time, so the Secretary was tasked to take it forward by correspondence.

The first and most basic question to consider is whether it would be appropriate to extend the use of F11.2 to mean 'small craft in general', instead of limiting it to sailing vessels (yachts).

Although F11.2 means 'yacht berths without facilities', F11.1 contains the same graphic enclosed in a circle and means 'Boat harbour, Marina'. It can therefore be argued that the symbol has already been extended to include other small craft such as 'boats', which would include motorboats and other leisure craft. Note that we extended the meaning of the explosives 'flame' symbol (N12.7) to include any dangerous cargo in a similar way.

NCWG members agreed that the answer is 'Yes', so further questions and possible extensions of use arose. These could allow some space saving on charts in harbour areas which are often cluttered. They would also conform to the convention of using intuitive symbols rather than words wherever possible. NCWG agreed revisions follow:

> S-4 B-431.2 amend as in red:
>
> **Designated anchor berths** must be shown, normally by means of a magenta anchor with a circle superimposed. The number or letter assigned to the berth, and/or possibly symbol describing the purpose (for example: small craft 'boat', dangerous cargo 'flame', quarantine cross) must be inserted within the circle. If necessary, to contain a 3-figure (or longer) designation, the circle may be extended to an oval:…
>
> S-4 B-431.3 amend as in red:
>
> … Numbered or named anchorage areas, or anchorages for particular vessels, should be identified as in the following examples (sloping text, anchor symbol upright, all magenta) where possible. These symbols may be adapted for other purposes or types of vessels, for example refuge area (*Ref*), small craft (). Size of text and associated anchor symbol may be adjusted to suit the size of the area.

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3. ACTION NCWG3/22: Secretary to draft amendments to S-4 for islet/above water rock symbol and circulate to WG members for review.

The background to this proposal is in NCWG3-08.6A (submitted by Italy) and a counter proposal NCWG3-08.6B (submitted by US). After discussing various options, the NCWG3 meeting agreed that there should be a paper chart equivalent to the S-52 LNDARE point symbol, and that it should be a small circle of coastline thickness filled with land tint.

However, it was noted that converting all existing 'dot' islets on paper charts to small circles filled with land tint would be a very long term project, and would also result in overcrowding in complex areas. For a paper chart, small black islets amongst other rock symbols within a danger line are useful to show that an area is encumbered by a mixture of underwater, drying and above water rocks. For isolated islets, the proposed larger land tint filled circle is useful (although a 'dot' can be effectively emphasised by a danger circle and associated text).

Draft revised text below:

S-4 B-310.2 (2nd sentence) amend as in red:

For an islet too small to be shown true to scale, see B-421.1.

S-4 B-421.1 amend as in red:

… An islet too small to be shown true to scale should be shown as a small circle of coastline thickness filled with land tint, emphasized if required by a danger circle (K1) and/or associated text. Scattered islets within a foul area (see B-422.8), delimited by a danger line (K1) and shallow water tint, may be shown as black dots, ideally with no dimension less than 0,5mm. Islets may be landmarks; for the charting of landmarks and conspicuous objects, see B-340.

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4. **ACTION NCWG3/27: Secretary to prepare revision consequent on Res 3/1919 (2017) for next edition of S-4 for HSSC10 and note possible changes to H20 for INT1subWG to consider.**

The draft text changes for S-4 provided in NCWG3-09.1A were approved by the NCWG3 meeting and subsequently approved by NCWG correspondence as below:

B-302.2 The plane of reference for all heights (including elevations of lights but excluding drying heights) must normally be a High Water (HW) datum, for example: Mean High Water Springs (MHWS); Mean Higher High Water (MHHW); Highest Astronomical Tide (HAT). Where there is little appreciable tide or change in water level at the adjacent shoreline, then Mean Sea Level (MSL) may be used.
~~**Comments:** TR~~ IHO Resolution 3/1919 (as amended 2017), contains the following guidance:

In oceanic tidal areas heights on shore, including elevations of lights, should be referred to a Highest Water (HW) datum (paragraph 5).

Highest Astronomical Tide (HAT), or a datum as closely equivalent to this level as is practical and acceptable to Hydrographic Offices, should be adopted as the datum for **vertical clearances**. Alternatively, another, similar datum may be used if high water levels in a specific area frequently deviate from HAT, or a different datum has been established by national policy (paragraph 7).

In geographical areas where the tidal range is negligible (for example less than 0.30m) and in non-tidal areas depths, **and all other navigational information**, should be referred to Mean Sea Level (MSL) or other level as closely equivalent to this as is practical and acceptable to Hydrographic Offices (paragraph 10). (Note: The adopted level may be a well-defined geodetic datum as used for heights in land survey applications or an observed local Mean Sea Level (MSL) based on long series of water level observations.)

~~1. It is resolved that heights on shore, including elevations of lights, should be referred to a HW datum. Heights should be referred to Mean Sea Level (MSL) where the tidal range is not appreciable. The datum used should be clearly stated on all charts.~~

~~2b. It is resolved that Highest Astronomical Tide (HAT) be adopted as the datum for vertical clearances where tides have an appreciable effect on the water level. Alternatively the differences between HAT and national datums for vertical~~

~~clearances may be specified on nautical documents. If high water levels in a specific area frequently deviate from HAT, the datum for vertical clearances may be adapted accordingly. It is further resolved that a HW datum be used for vertical clearances in non-tidal waters.~~

B-380 OVERHEAD OBSTRUCTIONS AND CLEARANCES: BRIDGES, CABLES, PIPES

On charts which include vertical clearances under overhead obstructions, a statement of the height datum from which the vertical clearance is measured must always be given in the title block, see B-241.6

B-380.1 Vertical clearance: IHO Resolution 3/1919 (as amended 2017), ~~states that~~ contains the following guidance:

> **Highest Astronomical Tide** (HAT), or a datum as closely equivalent to this level as is practical and acceptable to Hydrographic Offices, should be adopted as the datum for vertical clearances. Alternatively, another, similar datum may be used if high water levels in a specific area frequently deviate from HAT, or a different datum has been established by national policy (paragraph 7).
>
> However, in **geographical areas where the tidal range is negligible** (for example less than 0,30m) and in non-tidal areas depths, **and all other navigational information**, should be referred to Mean Sea Level (MSL) or other level as closely equivalent to this as is practical and acceptable to Hydrographic Offices (paragraph 10).

~~It is resolved that Highest Astronomical Tide (HAT) be adopted as the datum for vertical clearances where tides have an appreciable effect on the water level. Alternatively the differences between HAT and national datums for vertical clearances may be specified on nautical documents. If high water levels in a specific area frequently deviate from HAT, the datum for vertical clearances may be adapted accordingly. It is further resolved that a HW datum be used for vertical clearances in non-tidal waters.~~

Vertical clearances must be rounded **down** to the nearest whole metre (unless under 10m, when metres and decimetres may be quoted, if the measurements are considered to be sufficiently accurate). The principle aim is to chart the predicted minimum safe clearance.

B-405 CHART DATUM

Chart Datum (CD) is the plane of reference to which all charted depths and drying heights are related. In tidal areas CD is chosen to show the least depth of water found in any place under 'normal' meteorological conditions. CD will vary from place to place in relation to the land survey datum or mean sea level. For further information, see ~~Technical~~ IHO Resolution 3/1919 (as amended 2017).

B-405.1 Uniformity of formulae for establishing CD for different nations would be difficult to achieve and is not essential for practical purposes. On charts of scale 1:500 000 and larger a general statement of the datum used must be included in the explanatory notes close to the chart title (see B-241.5 and Resolution 3/1919 paragraph 2) ~~on charts of scale 1:500 000 and larger~~.

B-405.2 ~~**Where the tidal range is not appreciable** (that is: less than about 0.3m), CD may be Mean Sea Level (MSL)~~ **In geographical areas where the tidal range is negligible** (for example less than 0,30m) and in non-tidal areas, CD should be Mean Sea Level (MSL) or other level as closely equivalent to this as is practical and acceptable to Hydrographic Offices (Resolution 3/1919 paragraph 10).

B-405.3 In oceanic tidal areas, Lowest Astronomical Tide (LAT), or a datum as closely equivalent to this level as is practical and acceptable to Hydrographic Offices, must be adopted as CD. Alternatively, another, similar datum may be used if low water levels in a specific area frequently deviate from LAT, or a different datum has been established by national policy (Resolution 3/1919 paragraph 6). ~~**Where the tidal range is appreciable**, the Lowest Astronomical Tide (LAT), or as closely equivalent to this level as is practically acceptable to hydrographic offices, should be adopted as CD. Alternatively, the differences between LAT and national CD may be specified on nautical documents. If low water levels in a specific area frequently deviate from LAT, CD may be adapted accordingly.~~ Since LAT is the recommended CD with worldwide application, and has the additional merit of removing all negative values from tide tables, this should be adopted as a long term objective, and be considered when opportunity for change arises.

For vertical clearances, see B-380. ~~Highest Astronomical Tide (HAT) should be adopted as the datum for vertical clearances. Alternatively the differences between HAT and national datums for vertical clearances may be specified on nautical documents. If high water levels in a specific area frequently deviate from HAT, the datum for vertical clearances may be adapted accordingly. A HW datum should be used for vertical clearances in non-tidal waters (see Technical Resolution 3/1919 as amended 2008).~~

B-405.4 In some offshore areas, co-tidal charts and atlases may be available for use as a basis for reduction of soundings (for new surveys) to CD, for example co-tidal charts for the North Sea compiled under the auspices of the North Sea Hydrographic Commission. In depths greater than 200m, a reduction for tide is not necessary.

B-405.5 Tide Tables and Chart Datum. IHO Resolution 3/1919 (as amended 2017) states that the datum of tide/water level observations and predictions for mariners shall be the same as CD. ~~Whatever CD is used, it is essential that it is the same as the datum adopted for the predictions given in the authoritative Tide Tables.~~ Where, over a long period of time, datums are under adjustment to conform to LAT, or to take account of changes in sea level, the changes to Tide Tables and charts should be co-ordinated as far as possible.

B-405.6 The connection between Chart Datum and land survey datums should not be quoted on charts but should be readily available for the use of surveyors and engineers in national Tide Tables.

B-405.7 Rivers and estuaries. On the largest scale charts it may be desirable to indicate marked changes in CD over short distances by means of a diagram.

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5. **ACTION NCWG3/28: Secretary to prepare deletion of 'LORAN' section [B-480.2] for next edition of S-4 for HSSC10.**

NCWG3, supported by subsequent correspondence, agreed that it is now time to remove B-480.2 from S-4.

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6. **ACTION NCWG3/29: Secretary to draft change to S-4 to allow use of decimals of degrees for magnetic variation and circulate to WG members for review.**

Estonia asked NCWG Secretary a question:

S-4 says in B-130 (Units) that standard units for bearings, such as for a recommended track or magnetic variation, should be degrees (°) and decimals of a degree. Degrees (°) and minutes (') may be used if appropriate.

In B-270 and forward (Magnetic Data) it says that variation must be given to the nearest 5 minutes and annual change in the minutes.

What is the reason for the latter as in practical navigation the bearings are given in degrees (and decimals of a degree if needed), so it would be more convenient to add or subtract also degrees (or decimals of degrees)?

NCWG agreed that, for consistency with B-130 and ease of application for the mariner to the units used for bearings, to adjust B-270 onwards to allow use of degrees and decimals as an alternative to the more established use degrees and minutes.

Draft revised text agreed by NCWG by subsequent correspondence below:

B-260 Add new text under graphics:

Variation on the arrows may be expressed in degrees and decimals (to one decimal place) or in degrees and minutes to the nearest 5′ and rate of change in decimals of degrees (up to two decimal places) or in minutes.

B-272.1b & c (amend as in red):

b. The magnetic variation must be shown in degrees followed by the letter E or W as appropriate. Where the isogonal of 0° is charted, it must be so labelled. The annual rate of change, expressed in up to two decimals of degrees or in minutes and followed by the letter E or W as appropriate, must immediately follow the variation, in brackets….

c…..

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

B-272.3 (amend as in red):

The Magnetic North arrow must be labelled with the value of the variation, the year to which the value applies and, in brackets, the rate of annual change of variation. Variation must be given to one decimal place of a degree or 5′, change to two decimal places of a degree or 1′. To both, values E or W must be added as appropriate. Where the increase or decrease in the rate of annual change is 0,01° or 0,5′ or less, it must be shown as (0,0° or 0′).

[Note: see also clarification to this specification, NCWG3 Action 30]

B-273 (amend as in red):

If a hydrographic office finds the values based on its national data differ by more than 0,75° or 45′ for variation or more than 0,05° or 3′ for annual change…

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For information, NCWG has also approved the following **clarifications** to be included in the next edition of S-4:

NCWG3 Action 17:

Clarify B-470.4a.ix to read:

> **The floodlit** (illuminated) symbol (P63) should be in an appropriate colour where the colour is known and constant.

Clarify B-478.2 to read:

> **Floodlighting** of a structure (for example: a pier; pier-head lighthouse) or a danger close to navigable water, should be indicated by the symbol **P63.** The symbol must normally be in magenta or may be in an appropriate colour on 'multicoloured' charts where the colour is known and constant. Alternatively, it may be indicated by the **international abbreviation** '(illum)' against the structure or feature being lit, on the appropriate side if known.

NCWG3 Action 23:

Clarification to be added to B-431.2:

> If the actual anchor berth falls off the chart limits, the meaning of the dashed magenta arc may be clarified, if considered necessary, by the addition of at least one anchor berth symbol (with or without designation) placed between the dashes of the arc. Symbols should be inserted at intervals of approximately 40mm or closer and not exceeding 50mm. This addition will not usually be necessary if other complete swinging circles are charted in the vicinity.

As a consequence of the above clarification, introduce consistent wording for adding point symbols to a line symbol in the following specifications:

> B-435.2b … If required for clarity, the triangle symbol (sides 5mm) may be placed between the dashes in the limit symbol, …
>
> B-437.2e … Where symbols are placed between the dashes in an ESSA limit, they must be oriented to indicate the side of the line on which the area lies, …
>
> B-437.2f … such as anchoring and fishing prohibited which apply within the ESSA, they may be placed between the dashes in the symbolized charted limit.
>
> B-437.3 … combining the appropriate basic line style (see B-437.2e) with the appropriate symbol placed between the dashes and oriented in the line to indicate the side on which the area lies…
>
> B-439.6l …
>
> - No more than three point symbols should be placed between the dashes of a single line symbol.

NCWG3 Action 26:

Clarification to be added at the end of B-254.2:

> **Limits of larger scale ENC coverage** may be shown, if considered useful and especially where there is no equivalent paper chart, in the same way as larger scale paper charts described above. They must simply be labelled 'ENC' and the limits should indicate only the area of actual data coverage.

NCWG3 Action 30:

Clarification to be added at the end of B-272.3:

> The shape and placement (left or right for single-sided arrowheads) of the magnetic north arrow is optional and has no significance. It may be adjusted or broken to avoid clashes with detail.

NCWG3 Report item 11.1

Delete reference to ‘telegraphic or’ at B-431.5 (paragraph 5).

HSSC is invited to endorse the proposed revisions to S-4 reported above and approve the publication of a revised edition of S-4 as Version 4.8.0.

It is intended to include the clarifications agreed by NCWG and listed above in this proposed revision.