INTERNATIONAL HYDROGRAPHIC ORGANIZATION

ORGANISATION HYDROGRAPHIQUE INTERNATIONALE

CHART STANDARDIZATION & PAPER CHART WORKING GROUP (CSPCWG)

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

Chairman: Peter JONES
Secretary: Andrew HEATH-COLEMAN

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

Telephone:
(Chairman) +44 (0) 1823 337900 ext 3020
(Secretary) +44 (0) 1823 337900 ext 3656
Facsimile: +44 (0) 1823 325823
E-mail: peter.jones@ukho.gov.uk
andrew.coleman@ukho.gov.uk

CSPCWG Letter: 06/2008

UKHO ref: HA317/010/031-05 & HA317/004/058-06

To CSPCWG Members Date 15 April 2008

Dear Colleagues,

Subject: Draft revision M-4 Section B-450 to B-479 – Round 3

We are grateful to 15 WG members who responded to CSPCWG Letter 3/2008, covering the second draft revision of M-4 sections B-450 to B-479. We also received some suggestions for minor improvements from one of UK's lighthouse authorities (Trinity House). Annex A shows how the members responded to the specific questions which were included as a response form, plus numerous additional comments.

Andrew and I have worked our way through all the responses, reviewing all the comments and amending the draft as we believe to be appropriate; this has again been a very significant and time consuming task. Our conclusions on the specific questions are noted on Annex A.

In addition to the above, many other points were raised. These can be found in the second part of Annex A, or in the original 'track change' versions by AU and FR (which you will have seen via 'reply to all' emails). We also received very interesting information from Norway about 'Varde', which resulted in a few email exchanges which have been added to Annex A. We have studied all suggestions carefully and arrived at what we believe to be the appropriate decision, taking account of all the members' responses. To respond individually to every suggestion would make this letter far too long, so if we have not made a change based on a suggestion which you still feel to be important, please ask for an explanation of our reasoning.

Please review all the changes in the 3rd draft (Annex C, sent separately). Where the change is significant, we have included a brief comment in the margin. We have attempted to clarify some specifications which evidently caused some confusion, eg B-458 'Special Purpose Beacons'. There are also some specific questions, which we have included on the response form at Annex B.

As usual, we show earlier changes and minor editorial corrections in blue, so please concentrate your examination on the new insertions and deletions labelled as made in February, March or April 2008.

Please respond by 13 May 2008, using the response form at Annex B.

Yours sincerely,

Peter G.B. Jones,
Chairman

Annex A: Summary of responses to CSPCWG Letter 3/2008
Annex B: Response from, including questions arising from the responses to Letter 3/2008
Annex C: B-450 to B-479 draft, third round (sent separately).

Summary of responses Annex B to CSPCWG Letter 03/2008

Specification	Question	YES	NO
All	Do you agree to retain the existing order of specifications? *AU: See comment below.* *NO: Seems to be a very large job to alter the order of the whole chapter. Should we do that?* *Chairman: No change. Diversionary from 'meat' of revision, most users dip in and out, precedence, cross refs to other pubs, vote.*	CA, DE, DK, ES, FI, FR, GR, IN, IT, JP, NL, NO, SE, UK, ZA	AU
B455.4	Do you agree that the colour abbreviations for beacons should include topmark and structure (when known)? *AU: this would be a major change for paper charts and clutter may become a real issue if we were to abbreviate the colours of all of the components, which in the extreme may include the topmark, daymark, beacon body and the light characteristics where fitted. However M-12 (section 4.7) refers to this amount of detail in the Lists of Lights. Our NtM Officer points out that a red lateral topmark on a white beacon would result in RW which then may be mistaken for a safe water mark, rather than a lateral. (more details in comment below).* *CA: We use a dot for lit beacons, not the star symbol.* *NO: There might be misunderstandings when mixing colour of topmark and colour of structure. 'RW' under a beacon symbol will tell the mariner that the body of the beacon is red and white. Or?* *Chairman: We are convinced by the arguments that our original draft creates ambiguity and is potentially unsafe. A new suggestion is included in round 3 which, if adopted, would eliminate ambiguity and be safer:* Where the structure and topmark are coloured differently, the colour(s) of the structure must be charted, if required, as being the more prominent feature. *INT1 may need to make this explicit.*	DK, ES, FR, IN, JP, NL, SE, ZA	AU, CA, DE, FI, GR, IT, NO, UK
B-457.1	a. Should lit beacons always use the small light star (FR suggests the large star, and consequently there is a difference in depiction at P4/5 in the official INT1s)? *AU: Yes for light beacons BSH P4i (where space permits), otherwise BSH P4ii (large light star without any beacon body).* *Chairman: no consensus, so reverted to original text (ie, no 'small')*	AU, ES, GR, IN, IT, JP, NL, ZA	DE, DK, FI, FR, NO, SE

Specification	Question	YES	NO
B-470.5	When we drafted the specification for a wind turbine with a navigational light attached (B-445.8) we agreed to extend the principle to other landmarks. We propose examples should be included in INT1 at P7, eg water towers, tower. Do you agree to include these symbols at INT1 P7? *AU: see below concerning signal stations.* *Chairman: good consensus. The reference to signal stations will be retained for now (as true) pending review of B-490.2. INT1 editors please note new entry for P7.*	AU, DE, DK, ES, FI, FR, GR, IN, IT, JP, NL NO, SE, UK, ZA	
B-470.8	FR proposed a new symbol for bearing lines to lights off chart limits. We have included this in a new specification at B-470.8, although we have described it slightly differently from the version in FR INT1, having examined several examples. We propose an example should be shown in INT1 at P8. Do you agree to include this symbol at INT1 P8? *FR (from track change): I think that the sectored light could also need short magenta bearing line.* *NO: This way of presenting all-round lights off chart limits seems very complicated and could easily clutter the chart.* *ZA: This is ineffective chart scheming principles and secondly there are competent navigators onboard ships. Navigators should have adjoining charts readily at hand. Chart overlaps take in account important visual aids. Strongly opposed.* *Chairman: Clear consensus. Some changes incorporated to acknowledge views expressed. INT1 editors please note new entry for P8.*	AU, CA, DE, DK, ES, FI, FR, GR, IN, IT, JP, NL, (NO), SE, UK	ZA
B-471.2	Do you agree with NO that all the illustrations of light characters should begin with a lit phase (means changing Oc, Group Oc and Composite Group Oc)? (This would have consequences for INT1). *AU: see below* *ZA: This will have consequences for INT 1 and national List of Lights publications. We should seek input from Lighthouse Authorities.* *Chairman: Clear consensus. INT1 editors please note. AU please note for S57/100. (Also SNPWG for M-12 when approved)*	AU, CA, DE, DK, FI, FR, GR, IN, IT, JP, NL, NO, SE, UK	ES, ZA

Specification	Question	YES	NO
B-471.3, B-471.9, B-475.1	CSPCWG4 Action 22 requested comments on DK's proposals (CSPCWG4 Inf 2) to reduce the number of colour abbreviations used on multi-colour charts. It was agreed that they should be retained on sector arcs (in case the actual colours were not clear under bridge lights) but that in such cases they could be omitted from the light description. WG members were asked to comment in their responses to the first round, but in fact no such comments were received. Do you agree that on multicoloured charts, the colour abbreviations of lights can be omitted from the description at the light star, if shown on the sector arcs? *DK: We have been in contact with the Royal Danish Navy regarding the question on omitting colour abbreviations on multi coloured charts (B-471.3, B-471.9, and B-475.1). The response was that the red colour, we use on our charts, disappears under bridge light so there was a strong need to retain the abbreviations on the sector lights, but they wouldn't mind if we omitted the colour abbreviations from the description on the light star.* *Chairman: Clear consensus. Option included at B-472.3, with cross references in the appropriate paragraphs. The note from DK, however, is a useful warning about over-dependence on colours.*	AU, CA, DE, DK, ES, FI, IN, IT, JP, NL, NO, SE, UK, ZA	FR, GR
B-472.1	Do you agree with the proposed definition of a major light? *AU: Yes but modified. 'intended for use at sea' could be improved by 'intended mainly for offshore use' and by adding the range at the end of the sentence. Great to have a definition at last.* *Chairman: Clear consensus. Original draft retained.*	AU, CA, DE, DK, ES, FI, FR, GR, IN, IT, JP, NL, NO, UK, ZA	SE
B-475.6	NO and AU ask which light (or mark) should be given first when describing the marks on a leading line. Which light should be given first? *AU: …usually the rear… the feature most likely to be observed first from seaward should be portrayed first. See more detailed comment below.* *FI: Rear first by convention.* *ZA: From speaking to masters and navigators on naval vessels, all seem to agree with 'Front' first and then the 'Rear'.* *Chairman: No clear consensus. National conventions are well established and INT1 editors differ. Consider not worth pursuing resolution.*	Front DE, ES, GR, IN, JP, NO, SE, ZA	Rear (AU), DK, FI, FR, IT, NL, UK
B-475.7b	Do you agree with AU's proposal for an option to chart the centre line as well as the sectors in the second example of a Dir Lt (P30.3)? *Chairman: Clear consensus.*	AU, CA, DE, DK, ES, FI, FR, GR, IT, NL, NO, SE, ZA	IN, JP

Specification	Question	YES	NO
B-478.2	Should we adopt '(illum)' as an International abbreviation for illuminated? French, Spanish and English equivalents all begin with 'illum'. *ES: Please note that in Spanish it is spelt as 'ilum', with a single 'l'.* *Chairman: Clear consensus. INT1 editors please note.*	AU, CA, DE, DK, ES, FI, FR, GR, IN, IT, JP, NL, NO, SE, UK, ZA	

Further comments:

AUSTRALIA

Order of specifications: I think many of us agree that the specifications could be better ordered in places. CSPCWG originally agreed to try and avoid changing the numbering of sections because of the flow-on effect to other IHO specifications. AU has found through the preparation of a report listing the potential changes to S-57 (S-100), that there will be hundreds of issues that need to be considered for S-100 resulting from the M-4 review. Many of these changes include additional M-4 and INT1 references, as well as revised definitions, descriptions, as well as a few changes to numbers. It therefore appears that our original concerns are no longer an issue because we have made so many enhancements, that those WGs responsible for standards that reference M-4, will almost certainly need to review any cross referencing to M-4 and INT1 numbering. Jeff Wootton from this office spend a couple of hours looking at the order of B-450 to 479 in particular and has come up with a newly ordered list of content which is attached for your information and consideration if other members agree to re-ordering. Perhaps this is an issue for discussion at CSPCWG5?

Additional comments for Round 2:
B-453.1 both CA and US have requested the term 'shall' but this is no longer a term used for M-4 in this whole review (see B-120.4 Strength of wording). It is suggested that is individual HOs want to enhance the specification for their own internal use, there is no problem with this as long as the minimum specifications in M-4 are followed.

B-454.3 the re-worded note after the R22 symbol is supported by AU but should a similar note also be added further up in B-453.3?

B-455.1 AU supports the information about daymarks being given a new number B-455.9 together with an improved description. However there is now no guidance on how an individual daymark should be symbolized on the paper chart. The original M-4 has a diagram of leading boards sitting on the ground, without beacon structures supporting them. If there is no prominent supporting structure, should a beacon in general symbol be adopted for the paper chart with a shape added for the daymark (original spec). AU does not support this approach as the situation is not real world. If there is no supporting structure or it is not prominent from seaward, why not just portray the daymark. This approach has been taken by the CSMWG using a rectangular coloured shape for the daymark symbol. The ref in B-340 to B-455 for daymarks, can be amended to B-455.9. Is there now a requirement to review B-340.6 which provides 2 examples of daymarks (beacons and lighthouses). Also B-340.6 also refers to B-455, which could now be changed to B-455.9, but I cannot see any ref in B-471.6 to daymarks, so this ref may be deleted from B-340.6?

B-455.4 Revised wording regarding structure and topmarks with different colours: although the addition explains these situations for the paper chart, if adopted it will cause confusion for ENC encoders. For ENCs the topmark and the supporting structure (the beacon) are currently encoded separately. If the beacon structure is not in the correct IALA colour, even if the topmark is correct, it should not be encoded as IALA A or B, but as "no system" or "other system". If paper charts portray the abbreviations for colour as RW (red topmark on a white pole), and if there is no light fitted, conversion of the paper chart to an ENC will more than likely result in the incorrect encoding of the colour of either or both the beacon and or the topmark, as more detailed information may not be available the lights list if there is no light fitted. Is there any way we can avoid this possible confusion? We certainly don't want the beacon encoded as a safe water which RW usually infers. Also, consider cardinal marks – a south cardinal would become BYB, which is a east cardinal (or would the east cardinal become BBYB?)

B-455.5 a beacon in general symbol may be required for more than just where the actual shape is unknown. It may also apply where the or 'purpose' is unknown. Can we add this outside the 'must' statement? Eg. 'It may also be used when the purpose of the beacon is unknown.' See also comments below for S-458.
It is suggested also that consideration be given to combining this section with B-456.3, which also covers the use of the beacon in general symbol.

B-455.6 AU supports the stronger wording for this section.

B-455.8 In the replies to Round 1, DE and US explained that all buoys they chart are radar conspicuous (either by the nature of construction or by the addition of a radar reflector). AU also charts smaller buoys made of plastic or fibgreglass which by nature are not radar conspicuous and we have no indication if radar reflectors are fitted (but unlikely). For the paper chart there is a problem when converting to ENCs which use the attribute 'radar conspicuous' (CONRAD). Value 1 is radar conspicuous, but value 3 is radar conspicuous (has radar reflector). S-57 encodes the real world (what exists). If some national charts don't indicate radar reflectors because all buoys have them, and other nations do not chart radar reflectors as the buoy doesn't have one, there is inconsistency. To symbolize radar reflectors for beacons but not for buoys is also inconsistent. Perhaps this matter needs further discussion with TSMAD? Note that further details about buoys are usually not included in the lights lists, as many do not carry a light. B-459.2 provides yet another exception to the rule about radar reflectors not normally charted on buoyant beacons, which further muddies the water. AU suggests simplifying the rules by either portraying them when clutter is not an issue or adding a chart note if they are not symbolised.

B-455.9 Daymarks (see comments above for B-455.1 and for B-456.3 below)

B-456 As the fist paragraph refers to beacons conforming with IALA, the first 2 examples (BW) should be deleted as these do not comply. The ref to colour abbreviations (in red) should be B-450.2 not B-455.4.
There should also be a statement here similar to B-462.1 for charted positions of buoys and B-470.5 for charted positions of lights.

B-456.2 Coloured or white marks: could these also be regarded as a type of daymark as some are used to aid navigation, such as parts of breakwaters? If not, there needs to be a clear distinction between these marks and daymarks. May require further discussion with TSMAD?

B-456.3 AU supports the wording from CSPCWG4 Action 22 but this comment would equally apply to light buoys for standardisation of colours. It could be added at B-466.
The feature called a daymark in S-57 is getting more prominence in M-4 which AU supports. The example Q102.2 is exactly what we would encode as a DAYMAR for our ENCs, but other nations such as the US have had problems with this in the past. There are also painted boards mentioned in this section, which from my experience may also be encoded as daymarks depending on their purpose (why else would we chart them if they have no navigational significance). For example, if they were painted red and green, one would expect them to be lateral beacons or lateral daymarks, but if blue or pink, they may be considered as daymarks or even special purpose beacons if used as leads, rather than painted boards for which S-57 has no attribute value at present. Painted boards, beacons in general and daymarks are features that could be further discussed with TSMAD for enhancement and distinction in S-100.

B-456.4 (see remarks in B-457.1 below)

B-457.1 AU only uses a small light star for the light beacon symbol in accordance with BSH INT1 P4i. Large stars are used less often when the underlying light support is unknown or on small scale charts. AU does NOT support removing the word 'small'.
S-57 defines a beacon tower as 'a solid structure of the order of 10 metres in height used as a navigational aid'. As they are substantial features, perhaps someone thought they required a larger and more prominent symbol than a normal pile beacon Q80 (this is only a guess). Should CSPCWG more precisely describe 'a major structure' in B-456.4 as 'generally more than 10 metres in height (above chart datum), to explain to cartographers what is meant by 'major'?
(For comment C20, I presume you are referring to the light beacon symbol (with a small star and no topmark). AU is not fussed if the topmark is shown or not in INT1 P4 (B-457.1) provided the small light star beacon with flare is included.
Probably of importance for B-457.1, is to include an example of light character as per the last sentence. In addition, what about Inger's suggestion to include more multi-coloured examples such as Q8iii (only light beacon example). If agreed, this would be an appropriate location.

B-457.3 **Lighthouses:** there does not appear to be any distinction in M-4 between a beacon tower and a lighthouse. AU suggests guidance should be provided in M-4. S-57 has no attribute value specifically for lighthouses which I always thought was an oversight. The S-57 Use of the Object Catalogue, clause 12.3.2 states:

> 'If it is required to encode a lighthouse, it must be done using a **LNDMRK** object (see clause 4.8.15), with attributes CATLMK = *17* (tower) and FUNCTN = *33* (light support) for towers, or using a **BUISGL** object (see clause 4.8.15), with the attribute FUNCTN = *33*, for any other shapes'.

Perhaps another topic for TSMAD for S-100?

B-458 Special-purpose beacons: AU has reviewed the S-57 extensions regarding special beacons (BCNSPP) and beacons in general (BCNGEN) taking into consideration the revised wording within M-4 for both features. It now appears that the S-57 BCNSPP can still be used to encode both special-purpose or 'special IALA' beacons and beacons in general if the S-

57 definition is refined. In L03/2008 under B-458 you mentioned that 'Beacon in general' is a very different concept from a special-purpose beacon. From B-455.5 it appears to me that the beacon in general is the category used when there is very little information available on the beacon or details cannot be shown on the actual paper chart. For example in bullet point 1, when there is no topmark or the existence of a topmark is unknown; bullet point 2 where there is insufficient space (chart clutter) to show full details about a beacon, by leaving off any known topmark and colour text, and possibly even leaving off transits that would help to identify its purpose, or if the colour is unknown?; and by the third bullet, when the actual shape of the beacon is unknown. I do not see any clear distinction between a beacon in general and a special-purpose beacons, except that the beacon in general is the most basic skeleton symbol. Andrew, I think I am coming around to your way of thinking, but please try and flesh out this beacon in general a bit more for me. Can you give examples when UKHO would adopt it as I'm looking for clear distinctions. From the information now in M-4 I think a beacon in general could in some cases be a special-purpose beacon and vice versa.

B-459.2 Buoyant beacons and radar reflectors: see 455.8 above. As buoyant beacons are treated as beacons, why do we reference B-465 (for buoys), surely this ref should be B-455.8?

B-460.4 spelling of superbuoy in this section and in B-462.9 and 466.4 is one word, whereas in B-445.4 it is 2 words 'super buoy' and in B-462.1 and **C-414.1** it is hyphenated. In S-57 it is hyphenated. Need IHO consistency but not sure which is correct as it is not in S-32. I was unable to find it in any other nautical dictionaries. If we agree on the spelling, it is suggested that the IHO CHD be requested to add it to S-32, or at least raise the matter in the CSPCWG Report to CHRIS20.

B-460.4b second bullet point, appreciate the new last sentence, very useful to compilers, but also to chart standard reviewers.

B-460.7 (new proposal). M-4 does not mention retroreflectors (except in B-464), which by night may be part of the visual buoyage aids. S-57 included these as a separate object class for ENCs following their publication in NP 735, but they are usually(?) not portrayed on paper charts. As they may be encoded for ENCs it is suggested that we add a new section to at least describe these features. If you agree, as a starting point for further discussion, here are some words for consideration (Ref is NP 735 and S-57):

> **B-460.7 Retroreflectors** aid identifying navigational marks at night by reflecting back certain colours from a retro-reflective material added to various structures, when illuminated by a spot light. IALA has identified various specific colours for the IALA Maritime Buoyage System, but these should not usually be portrayed on paper charts.

B-461.3 Excellent additions from THE source itself.√√√ Andrew, do you have access to Chapter 2 of the 'International Dictionary of Aids to Navigation' published by IALA in English. We only have a German edition from the 1970's?

B-462, 462.1 and 462.8 has light-float hyphenated, whereas S-32 and S-57 show this as 2 words. IHO consistency again?

B-462.2 to 462.7 each include an IALA definition, but only a few mention the significance (or not) of their shapes. NP735 on the other hand has information of importance to the compiler. The following are examples that AU consider useful to the compiler, but it may be better included in a separate section (B-462.10?): Some of this information has now been included within B-464, but AU suggests more detail being provided.
Note the buoy shape is important for IALA lateral buoys, but colour is more important for IALA cardinal, isolated danger, safe water and emergency wreck buoys. This proposed section could just as easily be added to B464 rather than for B-462, with suitable cross referencing.

> **B-462.10 Significance of buoy shapes and colours for the IALA Maritime Buoyage System:**
> a. For IALA lateral buoys, the most common buoy shape is can or conical. Can shaped buoys are used to indicate that the preferred channel is to starboard, and conical shaped buoys indicate the preferred channel is to port. Lateral buoys may also be pillar or spar shaped and for IALA, must have distinctive colours (red or green depending whether IALA A or B), and when fitted have specifically shaped and coloured topmarks and lights, that each indicate that the buoy has the function of being a lateral mark.
>
> b. For IALA cardinal buoys, the shape is not significant but is usually a pillar or spar. Again, the order and colour of the horizontal bands (only black and yellow), usually with distinctly shaped topmarks (specifically configured pairs of black coloured cones) and lights (when fitted), each indicate that the buoy has the function of being a cardinal mark.
>
> c. For IALA isolated danger buoys, the shape is not significant but is usually a pillar or spar. The colour must be black with one or more red horizontal bands, usually with distinctly shaped topmarks (2 black spheres) and lights (when fitted), each indicate that the buoy has the function of being an isolated danger mark.
>
> d. For IALA safe water buoys, only spherical, pillar or spar shaped buoys are used. Their colour must be red and white

vertical stripes (distinguishing them from the red-banded isolated danger buoys), usually with distinctly shaped topmark (1 red sphere) and lights (when fitted), each indicate that the buoy has the function of being a safe water mark.

Comment: incidentally, for NP 735 for the safe water marks on page 11 of Edition 6, there are 2 errors. The shape under the heading only lists pillar and spar, whereas the body of the text correctly indicates spherical, pillar or spar. Under colours, the distinction is made with the 'black-banded danger marks', but these are actually described as 'red-banded' on page 10. You may like to point these out to the relevant section at UKHO.

e. For IALA special buoys, the shape is optional, but they must not conflict with those used for IALA lateral or safe water buoys. For example, an IALA outfall buoy on the port hand side of a channel could be can-shaped, but not conical. Occasionally compilers may find that so called 'IALA buoys' do not strictly comply with the IALA Maritime Buoyage System and in such cases the cartographer may need to have the mark thoroughly investigated to ensure that conflicting information is not symbolised on the chart. All IALA special marks must be yellow in colour. If a topmark is fitted, it is usually a single yellow cross (X St Andrew's cross). Lights (when fitted), must have a rhythm that does not conflict with IALA cardinal, isolated danger nor safe water marks. It should also be noted that IALA special buoys, with can or conical shapes, may be used in conjunction with the standard IALA lateral marks for special types of channel marking.

f. For IALA emergency wreck marking buoys, the shape should be pillar or spar and its colour must be yellow and blue vertical stripes. If a topmark is fitted, it should be a standing/upright yellow cross (St George's cross) and lights (when fitted), each indicate that the buoy has the function of being an emergency wreck marking buoy (on trial from 2006).

AU also suggests the addition of a summary table to B-461 similar to S-57 Appendix B.1, Annex A – Use of the Object Catalogue, Table 12.1, which lists the various characteristics for IALA marks. This could be enlarged to separate IALA beacons and buoys (which could include the beacon of buoy shapes as well) and be a good short cut table for those compilers experienced with IALA marks. If adopted the statement at the end of B-464 could be modified referring to this table in particular.

The modified table for M-4. Legend / means not applicable:

Beacons or buoys	**INT 1**	**Colour**	**Pattern**	**IALA system**
North cardinal mark	Q 130.3	*Black & yellow*	*Horizontal bands*	IALA A and B
East cardinal mark	Q 130.3	*Black, yellow, black*	*Horizontal bands*	(IALA A and B)
South cardinal mark	Q 130.3	*Yellow & black*	*Horizontal bands*	IALA A and B
West cardinal mark	Q 130.3	*Yellow, black, yellow*	*Horizontal bands*	IALA A and B
Isolated danger mark	Q 130.4	*Black, red, black*	*Horizontal bands*	IALA A and B
Port lateral mark	Q 130.1	*Red*	/	IALA A
Starboard lateral mark	Q 130.1	*Green*	/	IALA A
Preferred channel to starboard lateral mark	Q 130.1	*Red, green, red*	*Horizontal bands*	IALA A
Preferred channel to port lateral mark	Q130.1	*Green, red, green*	*Horizontal bands*	IALA A
Port lateral mark	Q130.1	*Green*	/	IALA B
Feature	**INT 1**			

		Colour	Pattern	IALA system
Starboard lateral mark	Q130.1	*Red*	/	IALA B
Preferred channel to starboard lateral mark	Q130.1	*Green, red, green*	*Horizontal bands*	IALA B
Preferred channel to port lateral mark	Q130.1	*Red, green, red*	*Horizontal bands*	IALA B
Safe water mark	Q130.5	*Red & white*	*Vertical stripes*	IALA A and B
Special purpose mark	Q130.6	*Yellow*	/	IALA A and B
Emergency wreck marking buoy		Yellow & blue	*Vertical stripes*	IALA A and B
Topmarks	**INT 1**	**Colour**	**Shape**	**IALA system**
North cardinal	Q 130.3	*Black*	*2 cones both pointing upward*	IALA A and B
East cardinal	Q 130.3	*Black*	*2 cones base to base*	IALA A and B
South cardinal	Q 130.3	*Black*	*2 cones both pointing downward*	IALA A and B
West cardinal	Q 130.3	*Black*	*2 cones apex to apex*	IALA A and B
Isolated danger	Q130.4	*Black*	*2 spheres*	IALA A and B
Safe water	Q130.5	*Red*	*Sphere*	IALA A and B
Port lateral	Q130.1	*Red*	*Can*	IALA A
Starboard lateral	Q130.1	*Green*	*Cone pointing upward*	IALA A
Port lateral	Q130.1	*Green*	*Can*	IALA B
Starboard lateral	Q130.1	*Red*	*Cone pointing upward*	IALA B
Special purpose	Q130.6	*Yellow*	*Diagonal cross (St Andrews)*	IALA A and B
Emergency wreck marking		*Yellow*	*Upright cross (St Georges)*	IALA A and B

B-463.1f Although M-4 introduces a new term 'criciform' for the standing/upright topmark for the IALA emergency wreck marking buoys, S-57 has used the term 'St George's cross' for almost 2 decades. It is suggested we adopt 'upright St George's cross' for M-4 to be consistent or is there a strong enough case to change S-100? Also it appears that the full IALA term is 'emergency wreck marking buoys', suggest we add 'marking' to this section as the heading.

B-463.2 (new proposal) special-purpose marks: AU suggests that as leading marks are so important to navigation and are not specifically part of IALA, they need a special mention in M-4 and this appears to be the best location under topmarks. Suggested draft wording follows (which will need some wordsmithing to be consistent with the rest of M-4):

> B-463.2 **Leading topmarks** are often added to leading beacons (B-458), which are usually constructed in pairs and provide a leading line to be followed into ports and harbours (see B-433). Leading beacons usually have topmarks and/or daymarks, or are constructed solely as daymarks, which when aligned, indicate the direction of navigation along a recommended track or leading line into the harbour. The most common topmarks used for leading marks are triangular shaped structures pointing upward and downward. The taller mark, usually the rear mark, points down, while the front mark (usually shorter) points up, so that the mariner aligns the two apexes of the triangles as he gets closer to shore. When further offshore, the whole marks are aligned. However in some ports where ship bridges are quite high, the front leading mark may be higher than the rear mark. There is currently no guidance on the standard shapes or colours of topmarks for leading marks. Other commonly constructed topmarks include square or rectangular coloured boards. Triangular boards are often bound by coloured florescent strip lights by night.

It is also suggested that if this new additional section is adopted, that a cross reference in B-433.3 be made to this section.

B-464.1a AU would prefer this sentence to be reversed with green first as most new charts adopt the filled symbol for green lateral buoys and only occasionally for black buoys. AU does not follow the point being made in the second half of this sentence, so would an example clarify issues (perhaps the spar buoy is the example and if so, can we clarify the wording):

a. A filled symbol must be used to represent a totally green or black buoy. All spar buoys must be symbolised as a filled symbol, irrespective of its actual colour.

B-464.1b aren't mooring buoys Q40 another exception here?

B-464.1e The last sentence incudes 'predominantly black' but black is not an IALA colour for any buoy except for horizontal bands which are already covered in d above. Suggest 'black or' be deleted.

B-464.3a: add 'cardinal' to the first 4 examples and 'lateral' to the fifth example as these are the IALA terms.

B-465.1 see comments above for B-455.8.

B-466 The detail provided for IALA light buoys is excellent. It was noted that each rhythm commences with the light phase before the eclipse, which from AU understanding is the correct order (as was suggested by NO in Round 1).

B-470.1 2nd paragraph, 1st sentence, suggest using term /may' instead of 'can'. "…(such as lighthouses) may be shown." This agrees with our approved strength of wording.

B-470.4a second last bullet for floodlight symbol, should be 'floodlit or illuminated symbol'.

B-470.4b The second sentence mentions fairway sectors, which is quite different to the new INT1 M18 symbology for fairways designated by regulatory authority. Do we need to add a distinction for the latter in this section to avoid confusion of new cartographers?

B-470.5, AU feels that the intention of the introductory paragraph has been lost. We suggest changing the order and adding light beacons as follows:

B-470.5 **Charted position of lights.** The exact position of a light is normally the centre of a five-pointed star in one of two sizes.

P1

The larger star should be given preference. The smaller star may be used where there are numerous minor lights (eg the corners of quays and dolphins in a harbour), or for light beacons.

There is still a problem with the 2nd bullet point. The last sentence states that this should be indicated, but the opening sentence in Positions of lights – special cases states that the light star must not be used for… There is a problem here with strength of wording. AU also wonders if this is going to be the new convention for depiction of light houses – as we feel that this is what is inferred here.
On another topic for this section, you had comments for the review of B-490.2 regarding the display of light symbols and flares for lights displayed at signal stations. AU does NOT support the current wording in B-490.2. If there is a light there in the real world, it should be shown on the paper chart in the conventional way, with a light star symbol and flare. If this is agreed, the bullet referring to signal station can be deleted from B-470.5 and the mention in B-470.6 deleted as well.
Regarding the last paragraph, 1st sentence to B-470.5, to make the terminology more consistent with our strength of wording on B-120.4, it is suggested that 'must' be replaced with 'should', as 'must' is mandatory and we provide exceptions here.

B-470.6 Orientation of flares: there appears to be a convention in INT1 that for the major light star, flares are usually upright from north (P50-53) or leaning from the NW (P1). For light beacons, these appear to lean from the SW (P4, 5), whereas for light buoys, they are usually leaning from the SE (but P6 is from SW? It is suggested that the conventions should be included in this section as part of paragraph 3.

B-470.7 Minor lights: AU agrees that front, rear, upper and lower should not be inserted on paper charts, but if this is agreed, there should NOT be an example of what not to do here, so remove P22 and P23 from both M-4 and INT1 (INT1 SubWg please note).

B-470.8 all round lights together with P8. AU has not used this method before and would like to see an example before finalising the wording. We agree with the idea and support its inclusion in M-4, but without an actual diagram, it is difficult to fully visualise.

B-471.1 in the margin of Round 2 is a deleted statement about occasional lights. Although there is a section (B-473.2) for occasional, there doesn't appear to be any statement about lights which are not always exhibited throughout the hours of darkness. This classification is used in S-57 and is regarded as important so AU suggests it be added to M-4 in another location?

B-471.2 table, comment 49: AU can see the logic in the comments and if other members agree with this approach (different format for INT1 compared to M-4), AU suggests that the M-4 entry at least be in alphabetical order, but also grouped. Eg have all types of occulting together. Contrary to the statement in B-470.2, the character of the lights wording is not identical to M-12. As a compiler I cannot recall ever using M-12, so suggest the descriptions (rather than definitions) in M-12 be adopted in this table as they better explain what the terms mean.
For the fixed and flashing example, delete the 'I' from the INT1 ref P10.10.
Note that the S-57 attribute SIGSEQ commences occulting lights with the eclipse, whereas all others commence with a light.

B-472.2 Lights note: this seems to be a very unusual note as AU has not encountered vertically disposed lateral lights. Does the wording of this note actually reflect the sentiment of d? I was a little confused?

B-473.1 Will P53 now be deleted from INT1 (INT1 SubWg please note).

B-473.4 Daytime lights. The text states with the word 'Day' (capital D) whereas the example uses a lower case 'd'. BSH INT1 shows correctly capital 'D', which also corresponds with P52.

B-474 There is no mention of superbuoy in this section. Suggest we at least make a cross reference to B-460.4b, but is a LANBY and example of a superbuoy?

B-475.2 Now states that light descriptions on sector arcs should not be inverted, yet the P40.1 example in 475.1 has an inverted 'R'. P46 (second example) on the next page has superimposed 'R' (lower one) to read the right way up, which does comply. It would be nice to provide further guidance here. My old carto presentation rule was always to read from the right (when vertical) and avoid inverted text. However for light sectors, it may be better to have all text reading the same way such as in P40.1, rather than inverting one colour such as in P46. If I portrayed P46 I would have the two 'R' reading from the right. Perhaps a convention for vertical lines should also be included if we can reach agreement.

B-475.5 'fine firm lines…' should be altered to 'fine continuous lines …' as per B-475.1

B-475.6 Other conventions indicate that we show the feature we would most likely see first when approaching from seaward (eg leading bearings on recommended tracks). For a pair of leading lights, it would probably be the light with the

greatest range (in example P20.2 the rear lights at 12M). When a light isn't fitted, it would probably be the tallest mark, usually the rear, but not always, but occasionally the rear mark may be quite some distance from the front mark and any daymark or topmark on the front mark may become visible before the rear mark. I would suggest a guideline that the feature most likely to be observed first from seaward should be portrayed first, or words of a similar nature.

Para referring to P20.3 (comment c67): As this rule only applies to paper charts, suggest the addition of text as follows:
If the scale of the paper chart is too small to show both light stars, a light star should be shown in the mean of the two positions, with the description linked by '&', eg: Oc.W&R.

B-475.7b example P30.4 should be P30.3 and the new coloured sectored version should be P30.4 in accordance with the FR INT1.

B-478.3 Synchronized lights. Note spelling here is with a 'z' (twice) whereas in B-473.5 it is spelt with an 's'. The 'English' is with an 's' from my understanding. It would appear that 'aggregations' may not apply to S-101 ENCs and are currently not handled with any intelligence in ECDIS. Suggest the red sentence 'Such lights may be linked as an 'aggregation' in ENC', be deleted.

CANADA

Canada-Re: B-470.5: "We have removed the use of a dot for a light, in accordance with the majority view. This depiction has been 'not recommended' in M-4 for many years, so we believe it is time to remove it as a permitted international variant." We are not against it and we consider that we should not change our way of doing. It is not necessary to adopt the use of star for the representation of lights on the charts of the CHS.

NORWAY

B-456.2 Minor marks, usually on land

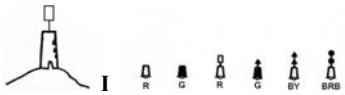
Cairns (piles of stones) must, if required, be charted by the symbol below (on the largest scale charts). Most cairns have no navigational significance; those that do will usually be distinguished by a leading, clearing or transit line, see B-433.

Q100

NO comments: 'must' should be substituted by 'should'.
'Most cairns have no navigational significance;' For the Norwegian coast the cairns along the fairway have large navigational significance.

B-456.4 **Beacons which are major structures,** should be charted in their true position by the symbols below, or by pictorial sketch or image (size at compiler's discretion); see B-456.5, eg:

Beacon towers.



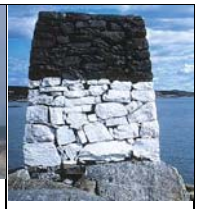
I **Q110**

NO comments: Are the Norwegian 'varde' to be considered as a Cairn or a Beacon? See below

What are they? CAIRNS or BEACONS







The pictures above show five of the more than 300 fixed aids to navigation of this kind along the coast of Norway. The above are big solid constructions painted mostly black or white, or a combination of the two, but may also be in other colours. The pattern and the combination of colours have no other mission than to identify one from another. They are not conforming to the IALA buoyage system.

These kinds of structures (varde in Norwegian) are very common along the coast of Norway, and NHS is using cairn as the English translation for these stone (and concrete) structures.

These structures are of large navigational significance. To show the fairway they may have an arrow/pointer on top (not topmark). They can also be fitted with a regular sector light or a 360° minor light. NHS has decided not to use the INT1 Q100 cairn symbol (piles of stones). Instead we use a four point star and text in the Norwegian charts to make the mariners pay attention to these aids to navigation.

Cairn (not lit) as shown in a Norwegian chart

NHS has not used the beacon tower symbol for these structures because the picture in M-4 B-456.4 gives the impression that this is a building with door and windows, and not a solid stone construction.

We have not used the beacon in general either, because: We know the shape of the beacon, and the scale is not too small (M-4 B-455.5). And does it adequately represent the feature?

NHS finds that the text in M-4 B-455 excludes the Norwegian varde.

Question:
Is it possible to adjust the text in M-4 to make more room for these Norwegian structures in the beacon section so it would be easier for us to change to the beacon symbol?
Can anybody give us their comments on this? We are grateful to hear your opinion.

AU's response to NO re 'Varde'

Cairns and beacons:
I love photos of features as it tells the whole story (usually). I saw a documentary on TV recently about those stone Viking marks along the Norwegian coast comprising huge flat stones weighing tonnes stacked on top of one another, with the top stone being much larger. They have a Nordic term which I cannot recall, but they are very important historically if not navigationally. Perhaps these are cairns as they are literally a mound of stones designating a point of importance, which fits very well with the IHO S-32 definition and S-57 (CATLMK = 1 (cairn)).

But I believe your photos of painted structures comprising piles of stones are an entirely different feature. The old S-57 definition for CAIRNS (which has been replaced by the attribute CATLMK) has a remark which states: 'If a cairn bears the colour(s) specified by a navigational mark system, it is to be encoded as a beacon', which fits better to your features in the photos. If I was encoding these features in an ENC I would definitely encode these as Beacon, Special purpose/general (BCNSPP). The S-57 definition is as follows:

A beacon is a prominent specially constructed object forming a conspicuous mark as a fixed aid to navigation or for use in

hydrographic survey (IHO Dictionary, S-32, 5th Edition, 420).

> A special purpose beacon is primarily used to indicate an area or feature, the nature of which is apparent from reference to a chart, Sailing Directions or Notices to Mariners. (UKHO NP 735, 5th Edition)

For me this fits very well with your features. If they were concrete there would be no conflict, but as the painted stone structures appearance would be the same as concrete when viewed from sea, I also consider them beacons. I would not portray them as tower beacons unless they are in the order of 10 metres in height. Again S-57 attribute beacon shape (BCNSHP) includes beacon tower as "a solid structure of the order of 10 metres in height used as a navigational aid". There is no mention of doors nor windows in these definitions. But note there is also a beacon shape 'cairn' defined as "a mound of stones, usually conical or pyramidal, raised specifically for maritime navigation". This I would suggest is a very good fit for ENCs BCNSPP with BCNSHP = 6. I have used the definitions in S-57 as a guide for portrayal on the paper chart, which I think very few people do. This highlights the importance of clear distinct definitions for all charted features.

For paper charts, I would still be inclined towards a beacon symbol, with colours, but you may also consider the new B-455.9 for daymark, but my preference would be as a beacon. When used as leading marks for fairways, I would definitely portray them as leading beacons (NO INT1 Q120).

I also noticed in your INT1 you show in Q100 a Varde (or cairn) but also in Q110 as Varde (or beacon tower). Again my preference for the photographed features would be the latter Q110, but as a beacon symbol, unless the structure was in the order of 10 metres in height, and then as a tower beacon. See the Norwegian INT1 has come in very handy.

The German INT1 (which AU uses all the time) has Q81 beacon with colour (BW), no distinctive topmark. Again this appears to fit very well with your structures and they portray this as the beacon in general symbol with colour indicated under the symbol. Note that shape is not mentioned in this INT1 example. I hope this is useful.

As B-455 already mentions other nations terminology (eg in 455.9 daybeacons in North America), I can see no reason for not also adding something about Norwegian Vardes. You should propose some words and if adopted, clarify your INT1.

UK's response to NO re 'Varde'

Thank you for your response to Letter 03/08 about the revision of B-450. Peter and I are working our way through a considerable number of comments, and the next round will take some time to prepare. However, I thought it would be useful to respond to you immediately and specifically on the 'varde' topic, which we found very interesting. Thank you for the excellent illustrative pictures.

As soon as we saw the pictures (before we read any of your text) we saw 'Beacon Towers'. There are similar structures in Britain, especially in the Channel Islands, and in France. The BnTr symbol was produced to look exactly like a miniature version of one of these structures and is therefore intuitive. So we agree with Chris that these are beacons (as they are specially built for marine navigation), but disagree that they should not be portrayed as beacon towers. We can find no provenance for the S-57 definition which implies beacon towers are 'of the order of 10m in height'. This is simply not the case; a beacon tower that high would be unusual - it would more likely be a lighthouse. So, we recommend you use the BnTr symbol (or abbreviation where the symbol will not fit).

The translation of varde as 'cairn' is wrong. Cairns, as defined in English dictionaries, the Mariner's Handbook and S-32 are 'mounds of stones'. They are not constructed or painted. They normally have no maritime significance, but mark ancient burial sites, or the tops of hills, and small ones are used by walkers to mark a route through wild country. Occasionally, temporary cairns are piled up for surveying purposes, but they are not marine navigational marks. Of course, as prominent landmarks, they can be useful to mariners and sometimes, by accident rather than design, can be used as a transit mark. Do you have a separate Norwegian word for this feature, or does 'varde' cover both?

We have made some changes to the draft to make this clearer, excerpt attached. Of course, there may be further changes to this section as we work through other members' comments, but we would be interested in your initial reaction.

The S-57 definition under BCNSHP for a cairn is wrong and we suggest should be deleted; the phrase 'raised specifically for maritime navigation' has been added to the definition derived from S-32. The correct and appropriate definition is given at CATLMK. We are glad that, as Chris mentions, few people use S-57 definitions as a guide for portrayal on the paper chart! This is not the first case of misleading definitions found in S-57; 'tideway' springs to mind. We are becoming increasingly concerned about the derivation of definitions in S-57. When we need a definition in M-4, we use dictionaries, including S-32, and also consult available navigation practitioners (including you, Inger, when we are in session). We wonder who advised the authors of S-57. We suggest that S-57 definitions should be examined and approved by a small panel, including paper chart specialists and mariners, before being transferred to S-100 or S-32.

UK (Trinity House, Lighthouse authority)

B450.2 Does the use of blue lights, in addition to the EWMB, as a fixed light in leading light applications need to be highlighted?

B-451 Should reference to the importance of fog signals often been in place as "hazard warning" as opposed to Aids to Navigation. For example on offshore platforms we feel the major importance of the FS is to stop vessels (fishing vessels) from running into the installation, rather than as a positioning aid?

B-460.3
Several types of buoy do not have topmarks when the buoy shape adequately covers the requirement - 2 photo's attached.

B478.1 I do not agree to omit the description of the light at the light star, even on a coloured chart.

UK: (Light officer)

Light float, light vessel – 2 words, no hyphen. Superbuoy one word.
Light description for EWMB should be: *Al.Oc. BuY. 3s*

UK (internal cartographer)

Need explanation of how to chart change of direction of buoyage, ie two direction of buoyage arrows in opposition, but not touching (which has the effect of looking like a different symbol).

See also further suggestions and comments in France and Norway 'track-change' versions.

QUESTIONS ARISING FROM THE RESPONSES TO CSPCWG LETTER 3/2008

Response form

(please return to CSPCWG Secretary by 13 May 2008)
andrew.coleman@ukho.gov.uk

Specification	Question	YES	NO
B-450	Do you agree with AU suggestion to change b, c and d from 'should' to 'must'?		
B-450.2	Do you agree with the revised 'table' of colours?		
B-456.3	Do you agree to make symbols Q102.1 and Q102.2 obsolescent? (For more details see comment in text in Annex C).		
B-456.4	a. Do you agree with the inclusion of occasional example pictures in M-4, such as this Norwegian 'Varde' (and the buoy at B-460.3)?		
	b. Do you agree that the picture shown is an example of a BnTr? (please refer to the discussions by NO, AU and UK in Annex A)		
B-460.7	Do you agree with the new specification for 'retroreflectors', as proposed by AU?		
B-461.5	Do you agree with the new paragraph for charting two opposing directions of buoyage, as proposed by UK?		
B-462.2, B-462.3 B-462.4	Do you agree with the FR suggestion to add: '…so the conical/can/spherical buoy should only be used where this applies.'?		
B-462.10	Do you agree with the AU proposed new specification (noting that if approved, some editing would be required)?		
B-462.10 Please vote for one only of a, b, or c.	a. Do you agree that the 'summary table' suggested by AU would be useful? or		
	b. do you consider INT1 Q130 to be adequate? or		
	c. would you prefer Q130 to be inserted in M4 in preference to the table?		
B-463.2	Do you agree with the proposed new specification about leading beacon topmarks?		
B-478.3	We would be interested to hear how different HOs address encoding groups of synchronized lights in ENC. Please comment below.		

Further comments:

Name:
Member State:

B-450 AIDS TO NAVIGATION, AUDIBLE (SOUND) AND VISUAL: GENERAL

In the following paragraphs, aids to navigation refer to man-made features specifically constructed to assist navigation. Audible (sound) and visual aids are ~~considered as~~ divided into the following categories ~~listed below~~:

a. Fog signals, which are usually associated with a lighthouse, major floating light or buoy. Associated lettering ~~of the abbreviations for fog signals~~ may be upright or sloping, depending on whether the supporting structure is fixed or floating.

b. Beacons, cairns, towers, and minor fixed marks, specially erected for navigational purposes. Associated lettering should be upright.

c. Buoys, including minor light floats. Associated lettering should be sloping.

d. Major floating lights. Associated lettering should be sloping.

e. Lights on fixed structures and lighthouses of all sizes. Associated lettering must be upright.

Commentaire [c1] : AU proposes b-d be changed to 'must'. This is the convention, and has been for a long time, but is not universally applied.

For electronic aids to navigation, see B-480 and for signal stations, see B-490.

B-450.1 Aids to navigation ~~shall~~ have **international abbreviations** ~~when used~~ for:

- Colours of lights exhibited and colours of structures (ie the bodies and/or topmarks of buoys and beacons and, where required, lighthouses); see B-450.2. In certain cases, as described under the different types of aids to navigation, colour abbreviations may be omitted.
- Types of fog signals; see B-452.
- Characteristics of lights; see B-466.2 and B-471.

~~In certain cases, as described under the different types of aids, abbreviations may be omitted.~~

B-450.2 The international abbreviations for colour are:

Colour	INT1 Abbreviation	INT1 number	
		Light	Structure
White	W	**P11.1,**	**Q5**
Red	R	**P11.2,**	**Q3**
Green	G	**P11.3,**	**Q2**
Blue	Bu	**P11.4**	
Violet	Vi	**P11.5**	
Yellow	Y	**P11.6**	**Q3**
Orange	Or	**P11.7***	
Amber	Am	**P11.8***	
Black	B		**Q2**

*Orange and amber lights may be charted as 'Y'.

Commentaire [c2] : There seems no value in distinguishing between colours used in IALA, and between 'principal' and 'subsidiary' colours. Blue and violet are used for leading lights, but are nonIALA. We suggest a table, in INT1 section P order.

Colour abbreviations must be in capital letters in all cases except for the second letter of two-letter abbreviations. These abbreviations must be used for the colours of lights and structures.

Multicoloured structures. Where the colours are in bands, the sequence of colour abbreviations must be from top to bottom. Where the colours are in stripes (vertical or diagonal) or the sequence of horizontal bands is not known, the darker colour must be given first.

For the application of colours to fixed and floating aids to navigation, see B-464.

B-450.3 **Legends and abbreviations associated with aids to navigation** should be inserted as close as possible to the symbol, but clear of any coloured circles around it if possible. They should also be placed clear of navigationally important detail, eg outside the navigation channel for lateral buoys if possible. Legends should usually be arranged in the following order:

Light description, eg:	*Fl.G.3s*
Fog signal	*Whis*
Any designation	*No 2*
Electronic aid (in magenta)	*Racon(Z)*

For **major fixed lights**, the name (if named separately from the feature on which it stands), may be the most important detail, and should be at the top of the list, see B-470.1 and B-470.7.

Designations should ideally be as shown on the structure, see B-455.7 and B-460.6.

Abbreviations for the colour of structures must be placed under the symbol if space permits.

B-450.4 **For information about buoyage systems**, including the IALA buoyage system which may also apply to fixed marks, see B-461.

B-450.5 **Charting considerations.** Charted aids to navigation should normally be updated by Notice to Mariners. Details that are of little or no use to the mariner should not be charted, as this may result in unnecessary chart maintenance and/or chart clutter. Whether to include particular aids to navigation and their detailed description must be part of a general assessment on how to portray an area at the chart scale; they should not be considered in isolation. For example:

- It would be inconsistent to include buoys in the upper reaches of an estuary if the depths were not shown in sufficient detail to navigate in that area of the chart. However, lights with ranges that will make them visible in areas that are navigable when using the chart should be included.
- If it is known that a channel is stable and the aids to navigation rarely moved or changed, they should be considered for inclusion on charts. However, if they are subject to frequent change it may be better to omit them, especially on smaller scales. In such cases, consideration should be given to the inclusion of a legend, eg:

Channel marked by buoys and/or beacons

When considering the omission of aids to navigation from smaller scale charts, the following should be taken into account:

- Vessels may not carry all the largest scale charts but may be forced by circumstance (eg adverse weather, equipment malfunction) to approach the coast, perhaps to shelter in a bay or to reach a port or harbour, on a smaller scale chart.

- Though pilotage may be compulsory, the master is responsible for the safety of his vessel and should be provided with enough detail to safely monitor the performance of the pilot or to take over if necessary.

- If the chart is of sufficient scale to be used in an emergency, at least the principal aids to navigation should be shown, with the most important details (see B-472).

B-451 AUDIBLE (SOUND) FOG SIGNALS

The term 'fog signal' refers to the sound emitted, not the apparatus. Fog signals are ~~fairly~~ short range aids to navigation, principally as hazard warnings. ~~and are, f~~For various reasons they are unreliable as indicators of position. Their importance relative to other aids to navigation has declined but they are still considered useful for the safe navigation of vessels with very limited (or non-functioning) electronic equipment~~, and also of well-equipped vessels whose equipment is not functioning~~.

Commentaire [c3] : Insertion suggested by LtHo authority (Trinity House)

Brief details of the type and characteristics of fog signals may be shown on charts on which vessels may navigate within range of the fog signals. The type of fog signal should be indicated by a legend (see B-452), at least on buoys (see B-454).

If it is appropriate to show only the existence of a fog signal on charts, without specifying the type of fog signal, it must be portrayed by the ~~should do so preferably by using the~~ magenta symbol (see B-452.8):

R1

Fog signals on shore are usually described in List of Lights and Fog Signals (LL), unlike fog signals carried by buoys, which are not always listed in LL.

For ~~charting of~~ fog detector lights, see B-477.

For more details of fog signals, see IHO publication M-12 'Standardization of List of Lights and Fog Signals'.

B-451.1 **Whether to chart a fog signal** depends on some definition of its probable range. IALA defines the 'usual' range of a fog signal as:

> 'the distance at which, in foggy weather, an observer has a 50% probability of hearing a sound signal when he is situated on the wing of a ship's bridge [on a vessel with an average ambient noise level]… in relatively calm weather, with no intervening obstacles'

Although not precise enough to chart, for the guidance of cartographers, the following 'usual' ranges are assumed;

- Powerful diaphone: 4 to 5 miles,
- Horn: up to 3 miles (but signals at harbour entrances are usually much weaker).
- Wave actuated bell or whistle: about 1/2 mile or less.

B-451.2 **The position** from which a fog signal is emitted is usually on a buoy, or close enough to a light ~~as~~ to be treated as sounded from the same position as the light. In cases where a fog signal is **not** closely associated with a light, its position should be shown by a small position circle and the magenta symbol **R1** (see B-451), with the type and/or name added if appropriate, eg:

Siren(1) **R1**

B-451.3 **Abbreviations** for type, characteristic and period of a fog signal are the same for all **automatic** signals, whether ashore or afloat. For wave actuated signals on buoys, see B-454.1.

B-451.4 **Reserve fog signals,** eg a gong sounded when the normal siren is not functioning, should not ~~normally~~ be charted. For wave-actuated signals on buoys sounded in conjunction with automatic signals, see B-454.3.

B-452 TYPES OF FOG SIGNAL

It is impossible to indicate on charts all the variations in the sounds emitted but some major differences can ~~easily~~ be conveyed to the mariner by distinguishing the following types of fog signal.

If it is required to include the type of fog signal, ~~Where a nation states the type of fog signal on its charts,~~ the following **international abbreviations** or legends must be used. To avoid clutter, where a fog signal is co-located with another aid to navigation, the fog signal legend or the symbol **R1** should be shown, but not both.

Commentaire [c4] : INT editors please note need to delete R1 at R20, 21 and 22, also amend note 'may' to 'should'.

B-452.1 Explosive:

Explos **R10**

A sound signal produced by the detonation of an explosive charge. It is ~~now~~ mainly used as a reserve signal and, if so, should not to be charted.

B-452.2 Diaphone:

Dia **R11**

A generally powerful, one or two-tone ~~lowpitched~~ sound (a one-tone sound ends in a suddenly lowered pitch known as a 'grunt'). It is produced by release of compressed air ~~controlled by a piston actuated by compressed air~~.

B-452.3 Siren:

Siren **R12**

A sound produced by the release of compressed air through a rotating disc. Power and pitch vary considerably; it may emit a wailing sound.

B-452.4 Horn:

Horn **R13**

A sound produced by a vibrating membrane or reed within a tube, it varies greatly in strength and pitch. The nautophone, reed, tyfon and klaxon are types of horn.

B-452.5 Bell:

Bell **R14**

A ringing sound with a short range. The apparatus may be operated automatically ~~, by hand,~~ or by wave action.

B-452.6 Whistle:

Whis **R15**

A shrill sound made by releasing compressed air or steam across an opening. The apparatus may be operated automatically ~~, by hand,~~ or by air being forced up a tube by waves acting on a buoy.

B-452.7 Gong:

Gong **R16**

A sound produced by vibration of a disc, or discs, when struck. The apparatus may be operated automatically ~~by hand,~~ or by wave action.

B-452.8 Type of signal not stated. In these cases, the magenta symbol **R1** (~~three arcs of concentric circles within an angle of 45°,~~ oriented and placed as necessary for clarity) must be shown on the appropriate scale charts (see B-451.1). Examples of its use, alone or in conjunction with other aids to navigation are given below:

Alone	With floating navigational aids	With shore lights	With electronic aid ~~radio station~~
		Fl.3s	Rc Racon **R1**

Commentaire [c5] : DID: please change Rc to AIS

~~**B-452.9 Submarine sound signals** are no longer used.~~

B-453 FOG SIGNALS: RHYTHM AND PERIOD

The characteristic rhythm of fog signals (other than those actuated by waves, which are irregular) may ~~well~~ be more important than their type when mariners are attempting to identify them. The number of sound emissions (eg blasts, strokes) and the period may be charted, ~~together with the period if thought useful,~~ as described below. ~~In cases where the symbol R1 is used, instead of an abbreviation for the type of signal, it is preferable **not** to give the characteristics of the signal (to avoid confusion with the characteristics of the lights with which most fog signals are co-located).~~

B-453.1 **A single sound (blast)** repeated at intervals should be shown by '(1)' following the type of signal, eg:

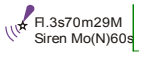
Horn (1).

Unless (1) is shown, it may not be clear to the mariner whether a single blast is implied or merely that the scale of the chart is considered too small to show the number of blasts. At a buoy, it also helps to distinguish from a wave-actuated sound signal, see B-454.1.

B-453.2 **Multiple sounds (blasts)** (other than Morse or composite signals) repeated at intervals must be shown by '(2)', '(3)', etc, following the type of signal, eg:

Horn (3)

B-453.3 **Morse code rhythms** must be shown by 'Mo' followed by the Morse letter in brackets, eg:



R20

Commentaire [c6] : DID: please delete the 3 arcs from the graphic.

Note: there is no R1 symbol included as the type of fog signal is shown; see B-452.

B-453.4 **Composite rhythms** (other than Morse) where groups of blasts are sounded must be shown as the full sequence, eg:

Siren (2+3).

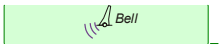
B-453.5 **The period** of a fog signal is the time taken for a complete sequence of sound emissions. Where space permits, it must be charted for major signals (and on the largest scale charts for minor signals where considered useful) following the number of blasts. The period must be given in seconds, even for periods of one minute or longer, eg:

Dia(1)30s Horn(2+3)90s.

B-454 FOG SIGNALS ON BUOYS

The existence of fog signals on buoys must be indicated, on appropriate scales (see B-451.1), by legends such as '*Bell*', '*Whis*' or '*Gong*' ~~rather than by the symbols for buoys' shapes,~~ or the symbol R1 if there is no requirement to define the type of fog signal. For general characteristics of buoys, see B-460 to B-469.

B-454.1 **Wave-actuated fog signals** have no regular rhythm and must be charted by a legend indicating the type of signal eg '*Bell*', '*Whis*', '*Gong*' against the buoy symbol, eg:



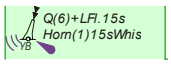
R21

Commentaire [c7] : DID: please delete the 3 arcs from the graphic

B-454.2 **Fog signals operated automatically** should be charted ~~on appropriate scales (see B-451.1)~~ by a

legend which includes the number of blasts (or strokes) and the period~~, where space permits~~. Legends must follow the specifications in B-452 and B-453.

B-454.3 **Wave-actuated signals in conjunction with automatic signals** should be charted as in the following example:



R22

Commentaire [c8] : DID: please delete the 3 arcs from the graphic, and insert a space between 15s and Whis.

Note: there is no R1 symbol included as the type of fog signal is shown; see B-452.

B-455 **VISUAL AIDS TO NAVIGATION: BEACONS AND DAYMARKS, IN GENERAL**

The features described below are all types of fixed structures erected primarily in order to assist navigation by day. Most of these features (except leading marks) are included in the IALA Maritime Buoyage System (see B-461). The specifications for IALA floating ~~marks~~ aids to navigation are given in more detail from B-460 onwards but generally also apply to those fixed ~~marks~~ aids which are part of the IALA System.

For natural and artificial landmarks, see B-340.
For light beacons, see B-457.
For buoyant beacons, see B-459.
For topmarks, see B-463.
For colours, see B-450.2 and B-464.

B-455.1 **The term 'beacon'** and equivalents, eg 'balise','bake' **(international abbreviation 'Bn')** is ~~used as~~ a generic nautical term for a specially constructed object forming a conspicuous mark as a fixed aid to navigation. Beacons include a wide range of structures from simple poles to built-up towers. There are numerous other terms for particular types of beacon, but for the purposes of international standardization, ~~it is recommended that~~ such features should be classified primarily by their appearance and represented by symbols rather than legends.

Beacons should be charted in sufficient detail on the largest scale charts to permit positive identification. Where the appearance is not adequately known to the cartographer, a symbol for a 'beacon in general' must be used; see B-455.5.

For an explanation of the terms **'daymark'** and **'daybeacon',** see B-455.9. The following specifications for beacons apply equally to daymarks and daybeacons.

B-455.2 ~~**Distinctive features**~~**Shapes of beacons.** ~~Shapes and colours of beacons are standardized in the IALA Maritime Buoyage System (see B-461) but this s~~Standardization regarding shapes of beacons applies principally to topmarks, permitting great variations in the shapes of supporting structures. Topmarks should be shown on at least the largest scale charts. ~~Beacons painted in distinctive colours and those having special topmarks should generally be charted in sufficient detail on the largest scale charts to permit positive identification.~~

B-455.3 **Symbols** and associated legends for beacons must be ~~used~~ upright ~~for fixed structures~~(except those on submerged or drying rocks, see B-455.6), to help distinguish them from floating spar buoys (see B-462.6), which are less reliable for position fixing.~~; see B-462.6. Except for impermanent features (see B-456.1 and B-456.2), each symbol shall includes a small position circle (without central dot).~~

B-455.4 **Colours of beacons,** which are standardized in the IALA Maritime Buoyage System,~~**Colours of beacons**~~ must be indicated by the appropriate **international abbreviations** ~~as used for buoys~~ (see B-450.2 and for placement see B-450.3). For use of colours in the IALA System, see B-464. The colour(s) of a beacon is/are to be shown by symbol Q82. Where the structure and topmark are coloured differently, the colour(s) of the structure must be charted, if

required, as being the more prominent feature.

B-455.5 The symbol for a **'Beacon in general'** is:

Q80

and must be used where:

- it adequately represents the feature,
- when the scale is too small to show additional detail,
- where the actual shape of the beacon is unknown.

The symbol (without legend 'Bn') should be used if space permits.

B-455.6 **Beacons on submerged or drying rocks.** Spars or poles placed on submerged or drying rocks should be charted as follows (topmark and rock symbol as appropriate), so that the rock symbol is retained, eg:

Q83

The symbol should be ~~shown~~ sloping to the right unless this is precluded by the need to avoid other detail.

B-455.7 **Numbered or lettered beacons** should, on at least the largest scales, have the numbers or letters placed alongside in upright figures, where space permits, in the form painted on the actual beacons if known. However, if necessary for clarity (eg to avoid the risk of a beacon number being mistaken for a sounding) they may be surrounded by single quotation marks, or preceded by the abbreviation 'No' (for number) or equivalent. Where there is a sequence of numbered beacons, all the designations in the sequence should be depicted in the same manner.

B-455.8 **Radar reflectors** are not generally charted on buoys and buoyant beacons within the IALA System as they are commonly constructed to be radar reflective, see B-465. However, beacons do not consistently have radar reflectors, therefore where it is known that a beacon has a radar reflector installed, it should be charted by the symbol **S4,** placed above the beacon if space allows, eg:

Q10

B-455.9 **Daymark** refers to the identifying characteristics of an aid to navigation which are visible in daylight. On structures that are indistinct at the required distance, the aid is made more visible by affixing a daymark to the structure. It will have a distinctive colour and shape depending upon the purpose of the aid and must be portrayed by the appropriate colour abbreviation and symbol (eg topmark, painted mark). The term '**daymark**' may also simply refer to any unlighted aid to navigation. In North America, the term '**daybeacon**' is used for an unlit beacon. For charting daymarks outside chart limits, see B-470.8.

B-456 **SYMBOLS FOR VARIOUS TYPES OF BEACON ~~, OR DAYMARK~~**

Beacons conforming to the IALA Maritime Buoyage System should be represented by ~~an upright~~ 'supports' and topmark symbols similar to those used for IALA ~~System~~ buoys (see B-463.1) but ~~generally~~ upright instead of sloping (see B-455.6 for exception), eg:

Q81

Q82

The position of a beacon (except a painted mark, see B-456.2) is indicated by the centre of the base of the symbol, usually a small position circle.

For the associated colour abbreviations, see B-455.4.

Commentaire [c9] : Revised following responses to Round 2

Commentaire [c10] : DID: please insert Q10 symbol.

Commentaire [c11] : Definitions derived from S-32

Commentaire [c12] : DID: the symbols in B-456 appear to be fuzzy and small compared with 5011. Please check clarity and size.

The following illustrations cover 'non-standard' structures and indicate the type of structure on the left and the chart symbol (for the largest scales) on the right.

B-456.1 **Minor impermanent marks, usually in drying areas.** Perches, withies, poles, etc, without topmarks and usually marking one or both sides of minor channels must, if required, be charted by symbols as shown below. Alternatively, a legend, eg 'Marked by poles', or equivalent, may be shown.

Commentaire [c13] : DID: the following symbols are contained in an invisible table. Please achieve a similar layout when converting to InDesign.

Pole  **Q90**

Perch  Port Hand Starboard Hand **Q91**

The symbols for withy  (Q92) are obsolescent; Q90 or Q91 should be used instead.

B-456.2 **Minor marks, usually on land**

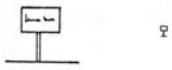
Cairns (mounds of stones forming a memorial or landmark, typically on a hilltop or skyline) must, if required, be charted by the symbol ~~shown~~ below (on the largest scale charts). Cairns are not built for marine navigational purposes, but may occasionally be used as a transit mark, see B-433.

Q100

Coloured (or white) marks on cliffs, rocks, walls, etc, must, if required, be charted by a fine outline of the patch and the international abbreviation 'Mk', see symbol below. The actual colour may be shown, usually underneath, using the appropriate **international abbreviation**, see B-450.2. The position of the mark is indicated by the centre of the symbol.

Q101

Notice boards indicating speed restrictions, cable landings, etc, must, if required, be charted ~~scale permitting,~~ by the symbol below. For leading beacons in the shape of painted boards ~~should be charted as beacons with rectangular topmarks and position circles to indicate the precise position;~~, see B-456.3.



Q126

B-456.3 **Beacons** ~~(proper)~~ are usually individually identifiable by colour and shape; in particular, they usually have distinctive topmarks. They should be charted by the 'Beacon in general' symbol Q80 plus topmark, unless one of the following special symbols is appropriate.

International abbreviations for colour must ~~normally~~ be used, if required, see B-450.2. On multicoloured charts, the symbol (or just the topmark) may be shown in the actual colour, but the abbreviations will still be useful, as the colour may not be readily distinguishable under certain vessels' bridge lighting conditions. Illustrations of some typical beacons below show the appropriate symbol (for the largest scales) to the right of each drawing or picture.

Commentaire [c14] : DK report that red colour on their charts cannot be read under bridge lights on Danish naval vessels.

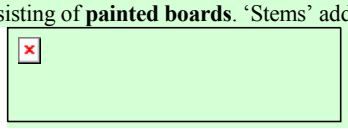
Beacon with no distinctive topmark. Use symbol for 'beacon in general', with colour abbreviations:

Q81

Beacon, colour known or unknown, with topmark (ie daymark, see B-455.9) emphasised:

Q102.1

Leading beacons consisting of **painted boards**. 'Stems' added to show that these are beacons:



Q102.2

B-456.4 **Beacons which are major structures,** ~~having a support as distinctive as the topmark,~~ should be charted in their true position by the symbols below, ~~charted in their true position as shown below,~~ or by pictorial sketch or image (size at compiler's discretion); see B-456.5, eg:

a. **Beacon towers** are major solid constructions of stone or brick, built for marine navigational purposes, often painted distinctively, eg:

Q110

The example shown is a Norwegian 'varde'. Some beacon towers may have topmarks and/or lights added (see also B-457.1). The **international abbreviation** 'BnTr' may be used if space does not permit the symbol to be shown.

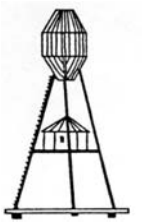
b. **Refuge beacon**. The symbol includes the **international abbreviation** 'Ref' ~~(T14)~~ alongside.

Commentaire [c15] : DID, please transfer graphic from existing M-4

Commentaire [c16] : AU suggests (and UK agrees) to make symbols Q102.1 & 102.2 obsolete. The distinction between Q102.1 and Q82 is very fine and unlikely to be understood by the chart user. For Q102.2 we suggest using Q101 instead, as more 'real world' (as the boards do not in fact have stems). Do you agree to simplify the portrayal of these marks and amend M-4 and INT1 accordingly?

Commentaire [c17] : DID please insert the picture, with a single open BnTr symbol alongside, with BW underneath.

Commentaire [c18] : DID: please replace the rather fuzzy symbols by eps versions, in this whole section.



Q124

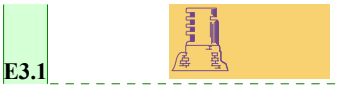
Note: This abbreviation should also be used for refuges in the Antarctic region (T14).

Commentaire [c23] : Noted for inclusion at B-370.8 (from CSPCWG2) and for consideration during revision of B-493.

c. **Lattice beacon.**

Q111

B-456.5 **Beacons with distinctive shape and colour** may be shown by a small pictorial sketch, in black, with a small position circle showing the actual position of the beacon. Alternatively, a small pictorial sketch or image may be placed nearby, normally in magenta but a different colour (other than black) may be used, and having no position circle at the base. ~~(~~The use of colour is necessary to indicate that the sketch is not in its true position~~)~~. If the sketch is placed some distance from the symbol (eg in a group of sketches), the name and geographic position of the beacon should be inserted in the same colour close to the sketch.



E3.1 **E3.2**

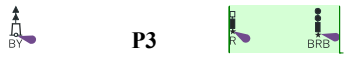
Commentaire [c24] : DID: insert the same graphic as in the latest M-4 edition, but removing the lighthouse. Also include a black version with a small position circle at the centre of the bottom, with number E3.1 alongside.

B-457 **LIGHT BEACONS**

Some structures which may primarily be considered beacons (particularly those marking leading lines) also exhibit lights. On large-scale charts important light beacons should be charted in such a way as to indicate the colour and shape of the features when used ~~as daymarks~~by day, in addition to showing the characters of the lights exhibited.

Commentaire [c25] : This exception is current practice. Does anyone know why and is there any reason to change it? FR responded 'No', AU does not use.

B-457.1 **On large-scale charts** the same symbols as specified in B-456.3 and B-456.4 should be used for light beacons, but with ~~small~~ light stars in place of position circles, except for beacon towers, eg:



P3 **P4** (see also Q7 and 8)

Commentaire [c26] : DID: please add version without topmarks or colour.

Commentaire [c27] : In view of AU comments, we suggest a 'beacon in general' example should be added to INT1 at P4 – INT1 editors please note (Q80 + star + flare).

The details of the light character must be charted in the usual way, see B-471. For details of the rhythms of lights for light beacons in the IALA Maritime Buoyage System, see B-466.2.

B-457.2 **On smaller scale charts** on which navigation within recognition range of a beacon by day is unlikely, light beacons must be charted solely as lights **(P1)**, unless the scale is so small that they should be omitted altogether.

Commentaire [c28] : It is only intended to delete the symbols with Bn or BnTr from this specification, because they contradict the wording. The symbols are still valid for use where it is possible to navigate within range of the daymark.

P3 **P4**

B-457.3 **Lighthouses,** ie structures built to house major marine navigational lights~~large structures with distinctive shape and colour,~~ must be shown as light stars (see B-470). As they are usually distinctive structures, in size, shape and colour, ~~but may in addition have~~ a small pictorial sketch may be placed nearby. It should normally be in magenta, but a different colour (other than black) may be used; see B-456.5.

E3.2

~~This practice is best suited to offshore lights.~~

Commentaire [c29] : DID: insert magenta versions of the lighthouse sketch from existing M-4 B-456.5

B-458 SPECIAL-PURPOSE BEACONS

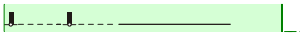
Commentaire [c30] : Specification retained following responses to round 1. Cannot improve on Special-Purpose Beacons for title. That is not same as 'Special marks' in IALA. These should not be located at B-455.5 as they are not 'beacons in general', but ones having a specific function (which may or may not be shown by a beacon in general symbol, depending on circumstances).

Special-purpose beacons are beacons which are not part of a cardinal or lateral system. They may conform to IALA special marks (see B-461.3), or to a national or other standard system, eg cones placed point up on front leading marks and point down on rear leading marks. Full details (if known) should be shown on charts. However, if special-purpose beacons ~~which~~ conform to a standard shape and colour throughout a nation's waters, they may be charted in less detail ~~(eg colour abbreviations may be omitted)~~ where an adequate description of the standard system is in the Sailing Directions (eg colour abbreviations may be omitted, or be charted simply by a 'beacon in general' symbol, Q80).

The functions of beacons marking leading lines, cables, outfalls or measured distance ~~should be~~will be clear from the associated line symbols~~; this is~~, so ~~there is no need for such~~ legends such as 'Cable Beacons', 'Leading Beacons', or equivalents should not be added.

~~Some, but not all, such beacons may conform to IALA yellow Special Marks.~~

An isolated danger mark is an example of a special-purpose beacon which conforms to an international (ie the IALA) system. The following are some other examples of special-purpose beacons, the purpose of which is identifiable by reference to other charted features.

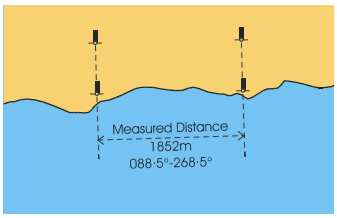


Q120 Leading beacons

Commentaire [c31] : DID: please add cones to beacons, point up on front, point down on rear.

Commentaire [c32] : INT1 editors: please note to amend Q120 at next edition.

Q121 Beacons marking a clearing line



Q122 Beacons marking measured distance with quoted bearings

Q123 Cable landing beacon (example)

B-459 BUOYANT BEACONS

B-459.1 **A buoyant beacon** has a tall, spar-like body, fitted with a permanently submerged buoyancy chamber. The lower end of the body is secured to a seabed sinker either by a flexible joint or by a cable under tension. Other terms sometimes used for buoyant beacons include: resilient or elastic

beacon, pivoted beacon, floating light beacon, Sarus tower and articulated light. The beacon usually carries a light and topmark and conforms with the rules of the IALA Maritime Buoyage System. A buoyant beacon has very little freedom of movement; it does not rise and fall with the tide and normally remains in a vertical or nearly vertical position, so should be charted as other beacons, not as buoys.

B-459.2 **The symbols used for buoyant beacons** must be the same as those used for fixed beacons, eg:

Q81 **Q82**

The symbols used for buoyant light beacons must be the same as those used for fixed light beacons, eg:

P5

In all cases, the symbol and associated legends must be upright.

Radar reflectors should not normally be charted but the qualifications in B-465 ‘Radar reflectors on buoys’, are appropriate for buoyant beacons also.

B-460 VISUAL AIDS: BUOYAGE

The following paragraphs apply to ~~to navigational and special purpose~~all buoys, except mooring buoys. For mooring buoys, see B-431.5-7 and B-445.4b. ~~Some of the remarks may not apply to spar buoys.~~

Commentaire [c33] : This ref is to the draft revised version of B-445.

The physical characteristics of buoys affect charting practice and are therefore briefly described below.

All associated legends should be in sloping text.

B-460.1 **The mooring ground tackle** of a buoy usually consists of a sinker and chain, the length of the chain being generally about three times the depth of water, where tides are significant. Accordingly, there may be a difference between flood and ebb positions of a buoy, which may be plottable at chart scale. Also, buoys are liable to drag their moorings out of position at times. **The position to be charted** is the position assigned by the buoyage authority. This is generally the mean of flood and ebb positions, and the position to which the mooring will be returned if the buoy is found to have dragged it away.

B-460.2 **The body** of a buoy is principally a float which may be given a distinctive shape (see B-462), or may be a support for a superstructure which can be given a distinctive shape by means of lattice-work 'wings' or 'cages'. Some buoys, eg a fairway entrance buoy, have a tall superstructure to carry a light, fog signal, radar reflector, and possibly topmark. In such cases, the superstructure may not have been given any special shape; ~~it is recommended that~~ such buoys should be charted as pillar buoys, see B-462.5.

B-460.3 **Topmarks** are fitted to most buoys and are ~~invariably~~ distinctively shaped ~~and may be intended either~~ for identification; for details see B-463 ~~of a particular buoy in a line of channel marking buoys, or to be the principal means (other than colour and light character) of showing where safe water lies in relation to the buoy. Radar reflectors may be almost as prominent on buoys as topmarks but are to be charted, if at all, solely by the special symbol~~

~~S4~~

~~not as a topmark. In the case of the IALA Maritime Buoyage System buoyage, it is recommended that radar reflector symbols should normally be omitted; see B-465.~~ Topmarks are liable to be damaged by ice, and so buoys in areas where the sea freezes may not be fitted with topmarks. For radar reflectors, which may be almost as prominent on buoys as topmarks, see B-465. Where a buoy's structure adequately covers the shape requirement, it may have no topmark, eg:

B-460.4 **The size** of buoys varies with both the range of visibility required and the difficulties of the location (deep water and strong tidal streams need longer, heavier moorings and therefore larger floats). It is considered practicable to distinguish on charts between only two sizes of buoys (apart from major floating lights - see B-474, and spar buoys - see B-462.2):

a. 'Standard' buoys, including ~~those~~ tall buoys sometimes described as 'high focal plane'.

b. Superbuoys. Very large buoys, generally more than 5 m in diameter, which should be distinguished on charts because their unusually large size renders them a potential hazard even to large vessels and/or their function or attachments render them unusually costly, or are such that their destruction could result in a disaster. The three principal types of superbuoy are:

- Offshore tanker loading/discharge buoys, often known as Single Point Moorings (SPM). ~~(~~Very large floating offshore oil terminals, incorporating oil storage and regularly

manned, should not be classified as superbuoys - they usually resemble fixed platforms rather than buoys: see B-445.2~~)~~.

- ~~Certain v~~Very large Oceanographic Data Acquisition System (ODAS) buoys, usually moored in deep water, for the automatic collection of oceanographic and meteorological information. See B-462.9. Note: not all ODAS buoys are of superbuoy size.

- Large Automatic Navigation Buoys (LANBY) designed to take the place of a light vessel where construction of an offshore light station is not feasible. A LANBY generally has a principal dimension of 8m or more in the water-plane, and the elevation of the light is generally at least 10m above the waterline, see B-474.

B-460.5 **Seasonal buoyage.** In certain waters many buoys and major floating lights are withdrawn for the duration of adverse seasonal conditions eg ice conditions in winter and heavy seas associated with monsoons. Charts must show buoyage as found in summer or fair weather. Details of withdrawal in winter, heavy seas etc, should not normally be given on paper charts, although these details may be mentioned in a chart note. Their withdrawal and subsequent re-establishment is more usually the subject of a temporary Notice to Mariners.

Some buoys are laid seasonally in coastal waters, eg: ~~as~~ racing marks~~, or f~~ in summer, fish traps and tunny nets in fishing seasons. Such buoys ~~are of real interest for navigation they~~ may be charted with an appropriate legend, eg:

Q71

B-460.6 **Names or numbers** of buoys are normally painted on them. Names are sometimes abbreviated. W~~H charts, w~~here space permits, the names, letters or numbers should be shown in sloping text, in the form painted on the buoys themselves if known, eg *Banc Fairy Sud, No3, NR3.E, ODAS*. However, if necessary for clarity (eg to avoid the risk of a buoy number being mistaken for a sounding) numbers or letters may be surrounded by single quotation marks, or preceded by the abbreviation '*No*' (for number) or equivalent. Where there is a sequence of numbered buoys, all the designations in the sequence should be depicted in the same manner.

B-460.7 **Retroreflectors.** Retroreflective material may be secured to unlit marks to aid their identification at night. The material is coloured according to one of two recognized IALA codes ('Standard' and 'Comprehensive'). In any specified area only one of the codes will be used and this may be given in Sailing Directions. To avoid clutter, these retroflectors must not be depicted on paper charts. The Mariner will know what colour to expect from the charted buoy symbol (colour and shape).

Commentaire [c34] : Proposed addition by AU.

B-461 **BUOYAGE SYSTEMS**

Systems of buoyage are ~~basically~~ described as **lateral, cardinal,** or a combination of lateral and cardinal. Lateral systems depend on a **direction of buoyage** being defined, generally in accordance with the direction of the flood tide or an approach from seaward. The cardinal system depends solely on the main **points of the compass.**

Special-purpose buoys often mark the limits or centre of an area (eg an exercise area, a dumping ground) and do not necessarily have lateral or cardinal system characteristics.

B-461.1 **The 1936 Agreement for a uniform system of maritime buoyage,** commonly referred to as the 'Geneva Convention', provided for both lateral and cardinal systems. Its origins were an agreement in 1889 when some countries standardized on red conical buoys to mark the starboard hand and black can buoys to mark the port hand. Unfortunately, when lights for buoys were first introduced, some European countries placed red lights on the black port hand buoys to conform with the red lights to mark the port side of harbour entrances, whilst in North America red lights were placed on the red starboard buoys. The 1936 Agreement stated that lights should be red to port and white to starboard, but the USA and others were not signatories, and preferred their own system of using red

lights and red daymarks to mark the starboard side of a channel.

The Geneva Convention was not ratified. However, ~~prevented by World War II but the~~ aids to navigation ~~re-~~established from 1946 onwards in Europe were broadly based on the Convention, though fairly wide differences in interpretation ~~which have~~ caused difficulties.

B-461.2 **The International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA)** set up a committee in 1965 to harmonize the existing rules. By 1976 the rules for System 'A' (red to port) were completed and implementation began in 1977. The rules for System 'B' (red to starboard) were completed early in 1980 but were so similar to those for 'A' that the two were combined to become **'The IALA Maritime Buoyage System'**. Within the single system, lighthouse authorities are allowed the choice of using red to port or red to starboard on a regional basis, the two regions being known as Region A and B, respectively. To achieve this single set of rules some minor additions to System A rules were implemented and adopted in November 1980.

IALA definitions are taken from the 'International Dictionary of Aids to Marine Navigation' published by IALA in several languages.

B-461.3 **The IALA Maritime Buoyage System** details, including the extent of Regions A and B, are given in other publications (eg UK's booklet NP 735 'IALA Maritime Buoyage System'). The following specifications apply to both Regions. Although it is called a buoyage system, it applies to all fixed and floating marks except lighthouses, some sector lights, leading lights and marks, major floating lights and lights on offshore structures. Five types of marks are provided by the system: Lateral, Cardinal, Isolated danger, Safe water and Special marks, which may be used in any combination. Emergency Wreck Marking Buoys were added on a trial basis in 2006.

a. **Lateral marks** are generally used for well defined channels, in conjunction with a direction of buoyage (see B-461.4). They indicate the port and starboard sides of the route to be followed. A preferred channel mark is a modified lateral mark.

b. **Cardinal marks** are used in conjunction with the compass to indicate where a mariner may find best navigable water, taking their name from the quadrant in which they are placed in relation to the point marked. The mariner should pass N of a North mark, E of an East mark, etc.

c. **Isolated danger marks** are erected on, or moored above, isolated dangers of limited extent with navigable water all around them. As the danger must be charted in its correct position, the symbol for an isolated danger buoy will inevitably be slightly displaced on paper charts.

d. **Safe water marks** are used to indicate there is safe water all around the mark. It may be used as a centre-line, mid-channel or landfall buoy, or to mark the best point of passage under a bridge.

e. **Special marks** are used to indicate to the mariner a special area or feature, the nature of which is usually apparent from the chart or associated publication. They are also used to mark channels within channels, eg yellow buoys marking a deep channel within a channel for normal navigation marked by lateral buoys. In such cases, the special marks will conform with lateral shapes.

f. **Emergency Wreck Marking Buoys (EWMB)** (on trial from 2006) are used to mark new dangers until a permanent form of marking has been established and the danger itself has been promulgated by Notice to Mariners, or removed.

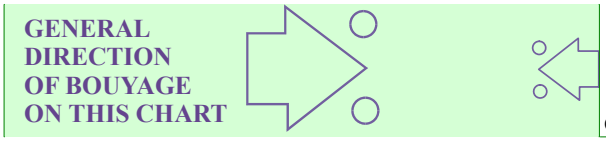
B-461.4 **IALA System: Direction of buoyage.** The conventional direction of buoyage for lateral marks is defined by IALA as being governed by two principles:

> 'A direction specified for an area of sea or inland water in order to define the port and starboard sides of navigable water in the area. It may be indicated on charts or in other appropriate nautical documents. It is either:

- the general direction taken by a vessel on approaching a harbour, river, estuary or other waterway from seaward, or
- the direction determined by the appropriate authority, but it should be based wherever possible on the principle of following a clockwise direction around continents'.

Each hydrographic office should therefore consider issuing a suitable diagram (in Sailing Directions or elsewhere) to illustrate the second principle in its area of interest.

B-461.5 **Charting the direction of buoyage.** If it is required to chart the direction of buoyage, the symbol below should be used:



Q130.2

Commentaire [c35] : DID: please correct spelling of BUOYAGE.

The symbol may be accompanied by an explanatory legend (in magenta), particularly if both general and local direction arrows are included on the same chart. The size of the arrows is at the discretion of the cartographer; however, usually a single 'general direction' arrow should be significantly larger than 'local direction' arrows. On 'multicoloured' charts (see B-140), the circles may be coloured red and green as appropriate.

Where two opposing local directions meet, two arrows (size at cartographer's discretion) should be inserted, point to point but with a gap of at least 5mm between them. Additionally, a dashed magenta line (N1.2), may be inserted perpendicular to the arrows' direction, across the channel, with a magenta explanatory legend, eg: '*Change of buoyage direction*'.

Commentaire [c36] : DID: please insert example based on the specification above.

When considering the requirement for buoyage direction arrows, ~~On charts are concerned~~, the following assumptions are made ~~herein~~:

1. In harbour approaches and estuaries, a knowledge of the first general principle quoted above, together with the channel buoy symbols, give competent navigators a clear indication of the conventional direction of buoyage without the need for a special arrow or other means of indication.

2. Isolated offshore buoys will generally be cardinal buoys (which do not depend on a conventional direction of buoyage).

3. Difficulties for navigators may arise:
   - if a lateral system is used in a one-way traffic lane where the direction of buoyage is opposed to the traffic direction;
   - where 'straight through' buoyage of a strait overrides the 'approach from seaward' convention; ~~or~~
   - where two opposing directions meet;
   - where the lateral system extends a long way offshore and, at its outer part, has a local direction opposed to the general direction (eg, as occurs in the northern part of the outer River Thames estuary in UK);
   - knowing which side to pass when confronted with a 'new danger' (described by IALA as one which has been marked by buoys but not yet charted).

   For such potentially confusing situations, it is advisable to include an arrow ~~magenta~~ symbol (**Q130.2**) to indicate the direction of lateral buoyage.

B-462 **SHAPES OF BUOYS**

The principal shapes are those recommended in the IALA Maritime Buoyage System, namely: conical, can (cylindrical), spherical, pillar and spar. As far as possible, variants of these basic shapes must be classified under these headings, for symbolization on charts. In practice, there will remain some additional shapes, eg minor light floats and barrel buoys, which will require their own symbols. Special marks may have any shape but must not conflict with those used for lateral or safe water marks, eg an outfall buoy on the port hand side of a channel could be can-shaped, but not conical.

Many buoys carry topmarks (see B-463) and lights (see B-466).

~~Nations adopting the new buoyage rules are recommended to adopt the standard symbols shown below.~~

~~The reference 'IALA Dictionary', refers to the 'International Dictionary of Aids to Marine Navigation' published by IALA in several languages.~~

B-462.1 **Features common to all buoys.** The position of the buoy must be indicated by a small circle (without central dot) in the middle of the base of the buoy symbol.

Q1

The buoy symbol must be a stylized pictorial representation of the actual shape seen in profile from sea level.

Buoy symbols, excluding major floating lights, light floats and superbuoys, should normally be shown sloping to the right. To avoid other detail, the slope may be varied in particular instances, but the base of the buoy symbol must always be horizontal.

B-462.2 **Conical.** ~~France: Bouée conique. Germany: Spitztonne.~~

Q20

IALA definition:

> 'A buoy of which the part of the body above the waterline, or the greater part of the superstructure, has approximately the shape or the appearance of a pointed cone with the point upwards'.

In the IALA System, a conical buoy indicates that the buoy should be left to starboard when following the direction of buoyage, so the conical buoy should only be used where this applies. The '**ogival**' shape (a shape in profile like that of a pointed arch) and the American '**nun**' buoy must also be represented by the conical symbol. ~~The American '**nun**' buoy is a variation of the conical shape and should be represented by the conical symbol.~~

Commentaire [c37] : At suggestion of FR. However, what should the cartographer do if, in the real world, the 'wrong' buoy shape has been used? Applies also to B-462.3/4.

The conical symbol must not be used for the type of tall framework structure used **solely** as a support for a light and other aids to navigation: for this type of buoy, see **Pillar** B-462.5.

B-462.3 **Can (cylindrical).** ~~France: Bouée cylindrique. Germany: Stumpftonne.~~

Q21

IALA definition:

> 'A buoy of which the part of the body above the waterline, or the

greater part of the superstructure, has the shape or the appearance of a cylinder, or of a truncated cone that approximates to a cylinder, with a flat end uppermost'.

In the IALA System, a can buoy indicates that the buoy should be left to port when following the direction of buoyage, so the can buoy should only be used where this applies. Tall cylindrical spar buoys must not be charted as can buoys; see B-424.6.

B-462.4 **Spherical.** ~~France: Bouée sphérique. Germany: Kugeltonne.~~

 Q22

IALA definition:

'A buoy of which the part of the body above the waterline, or the greater part of the superstructure, has the shape or the appearance of a part of a sphere'.

In the IALA System, a spherical buoy indicates that there is navigable water all around its position, so the spherical buoy should only be used where this applies.

B-462.5 **Pillar.** ~~France: Bouée charpente; bouée pylône. Germany: Bakentonne.~~

 **Q23**

IALA definition:

'A buoy of which the part of the body above the waterline is a pillar, or of which the greater part of the superstructure is a pillar or a lattice tower'.

Buoys (other than spars) which are relatively tall in relation to their diameter, but otherwise have no distinctive shape, must be charted by the symbol shown. This symbol should be used for both 'high focal plane' and similar, smaller pillar buoys. ~~In the cardinal system, most such buoys will be fitted with topmarks and many with lights.~~

In the IALA System, the shape of a pillar buoy has no navigational significance.

B-462.6 **Spar.** ~~France: Bouée espar. Germany: Spierentonne. Sweden: Prick.~~

 **Q24**

IALA definition:

'A buoy in the form of a pole, or a very long cylinder, floating upright'.

~~Many such buoys carry topmarks; a few carry lights; the representation of these is shown in B-466.~~

The term 'floating beacon' should not be used. See B-459 for Buoyant Beacons.

Spindle buoys ~~(France: Fuseau. Germany: Spindeltonne)~~ are ~~fairly~~ similar in shape to spar buoys, but pointed, and should be charted by the same symbol.

In the IALA System, the shape of a spar or spindle buoy has no navigational significance.

Commentaire [j38] : The fact that the IALA definition is quoted above does not imply that the following paragraph(s) are also relevant to IALA.

B-462.7 **Barrel.** ~~France: Bouée tonne. Germany: Fasstonne.~~

 Q25

IALA definition:

'A buoy in the form of a barrel or cylinder floating horizontally'.

~~It~~ A barrel buoy may be used in the IALA ~~Maritime Buoyage~~ System, but only as a special mark. For mooring buoy symbols, see B-431.5.

B-462.8 **Light float**. A boat-shaped structure used instead of a light buoy in waters where strong streams or currents are experienced, or when a greater elevation than that of a light buoy is necessary, eg:

Q30 ~~(part of IALA System)~~

~~**Q31** (not part of IALA System)~~

Formerly, unmanned light vessels were called 'major light floats'. These are now charted as major floating lights, see B-474 ~~for larger light floats serving as major floating lights~~.

B-462.9 **Superbuoy.**

~~The basic symbol~~ **Q26**

Very large buoys (generally larger than 5m in diameter) are referred to as 'superbuoys', see B-460.4b ~~for major floating lights (see B-474).~~

The purpose of an Ocean Data Acquisition System (ODAS) buoy should be indicated by a legend.:

Q58

Note: not all ODAS buoys are of superbuoy size; the appropriate buoy symbol should be used.

For a superbuoy ~~is~~ used as a tanker loading mooring, see B-445.4b.

For major floating lights (see B-474).

B-462.10 Significance of buoy shapes and colours for the IALA Maritime Buoyage System:

a. For IALA lateral buoys, the most common buoy shape is can or conical. Can shaped buoys are used to indicate that the preferred channel is to starboard, and conical shaped buoys indicate the preferred channel is to port. Lateral buoys may also be pillar or spar shaped and for IALA, must have distinctive colours (red or green depending whether IALA A or B), and when fitted have specifically shaped and coloured topmarks and lights, that each indicate that the buoy has the function of being a lateral mark.

b. For IALA cardinal buoys, the shape is not significant but is usually a pillar or spar. Again, the order and colour of the horizontal bands (only black and yellow), usually with distinctly shaped topmarks (specifically configured pairs of black coloured cones) and lights (when fitted), each indicate that the buoy has the function of being a cardinal mark.

c. For IALA isolated danger buoys, the shape is not significant but is usually a pillar or spar. The colour must be black with one or more red horizontal bands, usually with distinctly shaped topmarks (2 black spheres) and lights (when fitted), each indicate that the buoy has the function of being an isolated danger mark.

d. For IALA safe water buoys, only spherical, pillar or spar shaped buoys are used. Their colour must be red and white vertical stripes (distinguishing them from the red-banded isolated danger buoys), usually with distinctly shaped topmark (1 red sphere) and lights (when fitted), each indicate that the buoy has the function of being a safe water mark.

Commentaire [c39] : INT1 editors, please note to add another example (eg red with can topmark) to Q30 and remove ref to IALA and Q31

Commentaire [c40] : DID, please add example of red (open) light float, with can topmark.

Commentaire [c41] : AU propose a new section providing the compiler with more details on buoy shapes and colours within the IALA system. Please advise whether you consider this a useful addition to M4. (It would need some editing and formatting).

e. For IALA special buoys, the shape is optional, but they must not conflict with those used for IALA lateral or safe water buoys. For example, an IALA outfall buoy on the port hand side of a channel could be can-shaped, but not conical. Occasionally compilers may find that so called 'IALA buoys' do not strictly comply with the IALA Maritime Buoyage System and in such cases the cartographer may need to have the mark thoroughly investigated to ensure that conflicting information is not symbolised on the chart. All IALA special marks must be yellow in colour. If a topmark is fitted, it is usually a single yellow cross (X St Andrew's cross). Lights (when fitted), must have a rhythm that does not conflict with IALA cardinal, isolated danger nor safe water marks. It should also be noted that IALA special buoys, with can or conical shapes, may be used in conjunction with the standard IALA lateral marks for special types of channel marking.

f. For IALA emergency wreck marking buoys, the shape should be pillar or spar and its colour must be yellow and blue vertical stripes. If a topmark is fitted, it should be a standing/upright yellow cross (St George's cross) and lights (when fitted), each indicate that the buoy has the function of being an emergency wreck marking buoy (on trial from 2006).

Commentaire [c42] : AU also suggests 'the addition of a summary table to B-461 similar to S-57 Appendix B.1, Annex A – Use of the Object Catalogue, Table 12.1, which lists the various characteristics for IALA marks. This could be enlarged to separate IALA beacons and buoys (which could include the beacon and buoy shapes as well) and be a good short cut table for those compilers experienced with IALA marks. If adopted the statement at the end of B-464 could be modified referring to this table in particular.'
Please advise whether you:
1. consider this a useful addition to M4 or
2. whether you consider INT1 Q130 to be adequate, or
3. whether you would prefer Q130 to be inserted in M4 in preference to the table.

The modified table for M-4. Legend / means not applicable:

Beacons or buoys	**INT 1**	**Colour**	**Pattern**	**IALA system**
North cardinal mark	Q 130.3	*Black & yellow*	*Horizontal bands*	IALA A and B
East cardinal mark	Q 130.3	*Black, yellow, black*	*Horizontal bands*	(IALA A and B)
South cardinal mark	Q 130.3	*Yellow & black*	*Horizontal bands*	IALA A and B
West cardinal mark	Q 130.3	*Yellow, black, yellow*	*Horizontal bands*	IALA A and B
Isolated danger mark	Q 130.4	*Black, red, black*	*Horizontal bands*	IALA A and B
Port lateral mark	Q 130.1	*Red*	/	IALA A
Starboard lateral mark	Q 130.1	*Green*	/	IALA A
Preferred channel to starboard lateral mark	Q 130.1	*Red, green, red*	*Horizontal bands*	IALA A
Preferred channel to port lateral mark	Q130.1	*Green, red, green*	*Horizontal bands*	IALA A
Port lateral mark	Q130.1	*Green*	/	IALA B
Feature	**INT 1**	**Colour**	**Pattern**	**IALA system**
Starboard lateral mark	Q130.1	*Red*	/	IALA B
Preferred channel to starboard lateral mark	Q130.1	*Green, red, green*	*Horizontal bands*	IALA B
Preferred channel to port lateral mark	Q130.1	*Red, green, red*	*Horizontal bands*	IALA B
Safe water mark	Q130.5	*Red & white*	*Vertical stripes*	IALA A and B
Special purpose mark	Q130.6	*Yellow*	/	IALA A and B
Emergency wreck marking buoy		Yellow & blue	*Vertical stripes*	IALA A and B

Topmarks	INT 1	Colour	Shape	IALA system
North cardinal	Q 130.3	Black	2 cones both pointing upward	IALA A and B
East cardinal	Q 130.3	Black	2 cones base to base	IALA A and B
South cardinal	Q 130.3	Black	2 cones both pointing downward	IALA A and B
West cardinal	Q 130.3	Black	2 cones apex to apex	IALA A and B
Isolated danger	Q130.4	Black	2 spheres	IALA A and B
Safe water	Q130.5	Red	Sphere	IALA A and B
Port lateral	Q130.1	Red	Can	IALA A
Starboard lateral	Q130.1	Green	Cone pointing upward	IALA A
Port lateral	Q130.1	Green	Can	IALA B
Starboard lateral	Q130.1	Red	Cone pointing upward	IALA B
Special purpose	Q130.6	Yellow	Diagonal cross (St Andrews)	IALA A and B
Emergency wreck marking		Yellow	Upright cross (St Georges)	IALA A and B

B-463 TOPMARKS ON BUOYS (AND BEACONS)

Many different topmarks are used on buoys (and on beacons) but in the IALA Maritime Buoyage System the variations are reduced to a few important shapes: can, conical, spherical, and X-shaped. The trial emergency wreck marking buoy has a new upright cross (cruciform) shape. The term 'daymark' may be used instead of 'topmark' in the US.

A topmark must be in the same orientation as the symbol to which it is attached, eg, a buoy topmark must slope at the same angle as the rest of the buoy and a beacon topmark must normally be upright (for exception, see B-455.6).

B-463.1 IALA Maritime Buoyage System - Topmarks

a. Lateral marks may have a single can (cylindrical) topmark on the port hand and a single conical topmark (point up) on the starboard hand, coloured red or green as appropriate for Region A and Region B. Can and conical buoys indicate by their shape which is the correct side to pass, so these buoys may not be fitted with topmarks. If the buoy does not have a distinctive shape, a

topmark will usually be fitted.

 **Q9**

The order of the topmarks above is Region A: red to port, green to starboard, Region B: green to port, red to starboard.

b. Cardinal marks have ~~double topmarks~~two black cone topmarks, one above the other. ~~Examples of recommended symbols are shown.~~ There must be a clear separation between each cone; in particular, two cones base to base must not be shown as a diamond shape. ~~The topmarks are all painted black.~~ ~~See also B-464.1.~~

 **Q9**

The order of the topmarks above is North, South, East, West. It helps to remember that the point of the cone reflects the position of the black band(s) on the body of the buoy (or beacon), eg for a West cardinal mark, the black band is in the middle.

c. Isolated danger marks, which indicate the location of an isolated danger of limited size that is completely surrounded by navigable water ~~all around~~, have two black sphere topmarks, one above the other~~, painted black~~.

 Q9

d. Safe water marks, as used for centre-lines of channels or as landfall marks, may have a single red sphere ~~as a~~ topmark. Spherical buoys indicate by their shape that there is navigable water all around them, so such buoys may not be fitted with topmarks.

 Q9

~~**d. Lateral marks** may have a single can (cylindrical) topmark on the port hand and a single conical topmark (point up) on the starboard hand, coloured red or green as appropriately for Region A and Region B. Can and conical buoys indicate by their shape which is the correct side to pass. If the buoy does not have a distinctive shape, a topmark will usually be fitted.~~

~~ Q9~~

~~The order of the topmarks above is Region A: port, starboard, Region B: port, starboard.~~

e. Special marks, not primarily intended to assist navigation but indicating a special area or feature, may have a single yellow diagonal 'X' shaped topmark (St Andrew's cross).

 Q9

Special marks may also be used to mark Traffic Separation Schemes, or channels within channels (eg a Deep Water route within a wider navigation channel marked by standard lateral buoys) or special purpose channels (eg for small craft).

f. Emergency wreck marking buoys, intended for the temporary marking of a new wreck (on trial from 2006), may have a yellow standing/upright '+' ~~(cruciform)~~ ~~cross~~shaped topmark (St George's cross).

Q9

B-463.2 **Leading topmarks** are often added to leading beacons (B-458), which are usually constructed in pairs and provide a lead to be followed (see B-433). There is currently no guidance on the standard shapes or colours of topmarks for leading marks. However, leading topmarks are commonly triangular shaped structures pointing upwards (front) and downwards (rear), but other shapes may be used.

Commentaire [c43] : To duplicate S57 term.

Commentaire [c44] : To duplicate S57 term.

Commentaire [c45] : To duplicate S57 term.

Commentaire [c46] : DID, please create a new topmark, consisting of a cross, sloping 15° to the right.

Commentaire [c47] : AU suggests that as leading marks are so important to navigation and are not specifically part of IALA, they need a special mention in M-4 and this appears to be the best location under topmarks.

B-464 COLOUR OF BUOYS (AND BEACONS)

These paragraphs refer only to the colour of buoy (or beacon) bodies, ~~and topmarks,and any retroreflective material applied to them, but~~ not to the colour of any lights exhibited. Retroreflective material must not be charted, see B-460.7.

Where buoys (or beacons) are painted in more than one colour, '**stripes**' are vertical (or exceptionally on non-IALA buoys, diagonal) and '**bands**' are horizontal.

Within the IALA Maritime Buoyage System:

- red and green are used for lateral marks,
- black and yellow bands are used for cardinal marks,
- black and red bands are used for isolated danger marks,
- red and white stripes are used for safe-water buoys,
- yellow is used for special marks,
- blue and yellow stripes are used for emergency wreck marking buoys (on trial from 2006).

Commentaire [c48] : Black omitted following query raised with IALA re Q130 (note), whether black is permitted for lateral marks. Impacts INT1.

Red and green on lateral marks have different meanings in IALA Regions A and B, therefore the applicable region must be stated on charts – see B-241.8.

B-464.1 **Colour representation** is ~~very~~ effective in the case of filled and open (ie ~~unshaded~~unfilled outline) symbols. The old scheme of lines, dots and chequers to represent colour(s) is obsolete and should no longer be used, as it cannot satisfactorily be used for topmarks and some types of buoy symbols (eg spar buoys and most multicoloured buoys). On multicoloured charts, buoys may be shown in their actual colour, or follow the rules for 'standard' coloured charts, which are:

~~**For the IALA System, and possibly other systems, it is recommended that:**~~

a. **A black or green buoy** must be represented by a ~~black (ie~~ filled~~ in)~~ symbol ~~must be used to represent a black buoy and, where green and black buoys have exactly the same significance to a navigator, it must also represent a green buoy~~,eg:

Q2

Note: a spar buoy is always charted filled, irrespective of its actual colour, eg:

Q5

b. **Any other colour of buoy, or multicoloured buoy** (except spar buoys, see (a) above, and some preferred channel buoys, see (e) below) must be represented by an open symbol (ie unfilled outline)~~ must be used to represent any other colour of buoy, or multi-coloured buoy (except spar buoys and some preferred channel buoys),~~, eg:

Q3

c. **A striped buoy** ~~A buoy symbol~~must normally be represented by an open buoy symbol with a single line from top to bottom (except for the case of a spar buoy, see (a) above), ~~must be used to represent a striped buoy (if it is an open symbol),~~ eg:

Q5

d. **A banded buoy** must normally be represented by an open buoy symbol (except for the case of a predominantly green preferred channel buoy, see (e) below). No change is made to the buoy

symbol to represent bands. This can be deduced from the multiple letter abbreviations, the topmark and lack of vertical line, eg:

Q4

e. **Preferred channel (or bifurcation) buoys** are modified lateral marks within the IALA Maritime Buoyage System (ie green with red band, or red with green band). The symbol used should follow the lateral convention, ie a filled symbol must represent a predominantly ~~black or~~ green mark, and an open symbol must represent a predominantly red mark, eg:

Q130.1

Commentaire [c49] : DID, please add open can buoy with letters RGR, a open conical buoy with letters RGR and a filled in can buoy with letters GRG underneath. (There are examples in Q130.1)

B-464.2 **International abbreviations for colours** are specified in B-450.2. Where there is insufficient space on charts for abbreviations, the topmarks alone (for cardinal buoys and beacons) or the filled and open symbols (for lateral buoys) may be considered adequate to indicate colours, without abbreviations.

B-464.3 **Abbreviations for multiple colours** on buoys (and beacons) must be shown in accordance with the following conventions:

a. Where the colours are in bands the sequence of colour abbreviations must be from top to bottom, eg in the IALA System:

- a north cardinal mark (black above yellow): *BY*
- an east cardinal mark (black with single broad horizontal yellow band): *BYB*
- a south cardinal mark (yellow above black): *YB*
- a west cardinal mark (yellow with a single broad horizontal black band): *YBY*
- a preferred channel lateral mark: *GRG* or *RGR*.
- an isolated danger mark (black with one or more broad horizontal red bands): *BRB*

Q4

Note: It helps to remember that the points of the topmark cones (for cardinal marks) reflect the position of the black band(s) on the body of the buoy (or beacon), eg for a north cardinal mark, the black band is at the top.

b. Where the colours are in stripes (vertical or diagonal) or the sequence of horizontal bands is not known, the darker colour must be given first, eg in the IALA System:

- a safe water buoy (red and white vertical stripes): *RW*

Q5

- an emergency wreck marking buoy (blue and yellow vertical stripes): *BuY*

~~As an aide-memoire, it may be noted that the black topmarks on a cardinal buoy are a 'pointer' to the position of the black bands on the body of the buoy, ie, N topmarks point up, and black is above yellow; E topmarks point up and down, and black is above and below yellow; and so on.~~

B-465 **RADAR REFLECTORS ON BUOYS**

Note: this section also applies to buoyant beacons, but not to other beacons; see B-455.8.

B-465.1 **Areas where radar reflectors are fitted to most buoys.** In many areas of the world, radar

reflectors are ~~commonly~~ fitted to nearly all major buoys and to many minor ones. In such areas, the symbol~~, or abbreviation,~~ for a radar reflector should not be shown on buoy symbols in order to reduce the complexity of buoy symbols and associated legends.

In these areas, nations wishing to show the radar reflector symbol on **unlit** buoys may, exceptionally, do so but should ~~insert on each~~include a chart note explaining why they are not shown on light buoys.

B-465.2 **In other areas** where radar reflectors are not widely fitted to buoys, the existence of a radar reflector should be indicated by the symbol **S4** (in black), eg:

Q11

B-466 **LIGHT~~ED~~ BUOYS**

Some nations give full details of their light buoys in their Lists of Lights and Fog Signals (LL); others do not. The largest scale charts should show the rhythm, colour (unless white) and period ~~full characteristics~~ of lights on buoys, if scale permits, ~~including rhythm, colour (unless white) and period,~~ irrespective of LL practice.

B-466.1 **The symbol for a light~~ed~~ buoy** must be the same as that for an unlit buoy but with the addition of the light description and light ~~"patch" (or "~~flare symbol. ~~The star, which duplicates the latter, should no longer be shown so as not to confuse the important information conveyed by the topmarks.~~

a. Light descriptions on floating marks, including the order of the various elements, should be the same as those used for fixed marks (see B-471). Height and range should not generally be charted for buoys, except superbuoys (see B-466.4). The text should be sloping.

b. The flare should be in magenta, or in the appropriate colour on multicoloured charts. It should be positioned about 1 millimetre from the point indicating the exact position of the buoy, orientated to avoid other charted detail, eg:

Q7 and 8

Q41

Commentaire [c50] : DID: these graphics are badly cropped, please replace.

B-466.2 **Rhythm of lights on light buoys.** The special features of the IALA Maritime Buoyage System require ~~some extension of~~ the following range of abbreviations (and definitions). (Note: these also apply to light beacons which are part of the IALA System).

a. Lateral marks may exhibit red or green lights of any rhythm (but not fixed), including Long Flashing lights. A composite group flashing red or green light (eg Fl(2+1)R) is exhibited only from modified lateral (preferred channel) buoys, see B-464.1e.

Commentaire [c51] : Section reordered for consistency with other sections, ie lateral first, etc

Commentaire [c52] : DID: please insert graphic Q130.1. (both panels) with the coloured graphic bars from NP735 in columns underneath the appropriate regions.

Q130.1

b. Cardinal marks:

Where two similar cardinal buoys are laid fairly close to each other, a Buoyage Authority may distinguish them from each other by different flashing rates.

North Cardinal mark. A white light that is either ~~uninterrupted~~ 'very quick flashing' (either 120 or

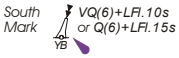
100 flashes per minute) or 'quick flashing' (either 60 or 50 flashes per minute), without interruption. ~~Where two North (or other cardinal) buoys are laid fairly close to each other, certain Buoyage Authorities wish them to be distinguishable from each other by the different flashing rates.~~ The **international abbreviations** are: VQ (for Very Quick Flashing) and Q (for Quick Flashing):

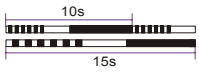
Q130.3

East Cardinal mark. The VQ or Q white light is interrupted after 3 flashes, the total period of a sequence of flashes followed by an eclipse being 5 or 10 seconds respectively ~~for the VQ and Q lights~~. The **international abbreviations** are VQ(3) and Q(3), with periods ~~also~~ being added on the largest scale charts, where space permits:

Q130.3

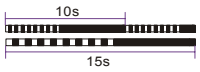
South Cardinal mark. The first phase of the white light is 6 VQ or Q ~~for 6~~ flashes, followed immediately by a 'long flash' of two seconds or more, and then an eclipse; the total period of a sequence of flashes followed by an eclipse being ~~either~~ 10 or 15 seconds respectively. ~~(VQ) or 15 seconds (Q).~~ The **international abbreviations** are VQ(6)+LFl and Q(6)+LFl, with periods being added on the largest scale charts, where space permits.





Q130.3

West Cardinal mark. The VQ or Q white light is ~~either VQ or Q,~~ interrupted after 9 flashes, the total period of a sequence of flashes followed by an eclipse being ~~either~~ 10 ~~seconds (VQ)~~ or 15 seconds respectively. The **international abbreviations** are VQ(9) and Q(9), with periods being added on the largest scale charts, where space permits:



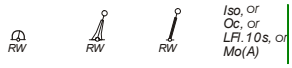
Q130.3

The unique character of these lights is such that periods could be omitted to avoid excessive length.

As an aide-memoire, the numbers of flashes: 3, 6 and 9, were chosen by IALA to correspond to the positions of figures on a clock face.

c. Isolated Danger mark**.** A white light that exhibits a group of two flashes (Fl(2)).

d. Safe Water mark. A white light that may be Isophase (Iso), or ~~Single~~ Occulting (Oc), or a single Long Flash~~ing~~ with a period of 10 seconds (LFl.10s), or Morse (A) (Mo(A)).
~~It is proposed to use, in the last case, the abbreviation: LFl with the period.~~



Q130.5

e. Special marks. A yellow light is exhibited, which may have any rhythm except those used for white lights on Cardinal, Isolated Danger or Safe Water marks. An ODAS buoy has a group of five flashes in a period of 20s (*Fl(5)Y.20s*).

f. Emergency Wreck Marking buoy. (On trial from 2006). The proposed light is an Alternating Occulting blue and yellow light, with 1 second periods of light separated by 0.5 second eclipses

Commentaire [c53] : DID please replace the graphic bars with ones similar to 5011 for all the cardinal marks (ie triangles for quick flashes and thinner triangles for very quick). Retain the period time bars on the E, S and W marks.

Commentaire [c54] : DID: please add graphic Q130.4 and time bar from NP735

Commentaire [c55] : DID: please add flares to buoys

Commentaire [c56] : DID: please add graphic bars (could be taken from NP735), but add a period time bar to the LFl 10s bar.

(*Al.Oc.BuY.3s*) .

Commentaire [c57] : UK's Lights Officer advises that the (2) is inappropriate.

B-466.3 **The colour of a light on a light buoy** must be shown by the **international abbreviations**~~abbreviations~~ listed in B-450.2, except that the omission of a colour abbreviation from the chart ~~shall~~ means that a light is white. ~~See also B-450.3 for capitalization of the letters of the abbreviation.~~ The abbreviation for colour (if any) must follow the abbreviation for the rhythm.

B-466.4 **The period of a light on a light buoy** is the time taken to exhibit one full sequence of phases. It must be expressed in seconds, using the **international abbreviation** 's', eg 15s (with no space between figure and letter). Periods of less than 3 seconds may be given to the nearest 0.1 of a second, eg *2,4s*.

Commentaire [c58] : To be consistent with B-471.5

The period should normally be the final part of the light-description for buoys, except in the case of 'superbuoys' (see B-460.4b and B-462.9) where height and/or range may be added. For periods of light buoys in the IALA System see B-466.2 and B-471.5. In general, the period is the least important part of a light description and must be omitted first if there is no space to give full details, or if the chart is on a relatively small scale. However, the positive identification of a single aid to navigation is often vital to mariners. If, for example, adjacent buoys have Iso 4s and Iso 8s lights respectively, they should not both be abbreviated simply to 'Iso', but should also include the period of the light.

B-470 LIGHTS: GENERAL ~~POINTS~~

These specifications include lights of all types other than those on buoys and minor light floats. Major floating lights (light vessels, major light floats and Large Automatic Navigation Buoys (LANBY) have functions similar to those of major lights on land; ~~points relating particularly to them are given in~~see B-474.

B-470.1 Charts and other publications. Positions of lights, and bearings of leading and sectored lights, are best shown graphically, but full details of a major light and its structure cannot easily be charted. There is inevitably duplication of some information on charts and in ~~the~~ Lists of Lights and Fog Signals (LL) and Sailing Directions.

Full (or abridged – see B-472) descriptions of lights should be shown on charts, but ~~very~~ limited information about light structures (such as lighthouses) can be shown. Details of the structure and additional details about the light (eg intensity, phases) should be given in LL, so the name of a light or its location should be shown to facilitate reference between the chart and the LL. ~~together with an effective means of finding a charted light in the other publications. Normally a light is found first by looking up its name or the name of the locality and then, if necessary, by latitude and longitude.~~

B-470.2 Definitions of the technical terms used in these specifications are given in IHO publication M-12 'Standardization of List of Lights and Fog Signals'~~, and are repeated or expanded here only where special distinctions are needed in chart symbols and abbreviations~~.

Charts and LL should ~~obviously~~ agree in definitions, names and abbreviations used, as well as in the characteristics of the aids to navigation. However, short term differences may have to be tolerated, due to different maintenance mechanisms. ~~when major changes, such as in the definition of the range at which a light is visible, are in progress.~~

B-470.3 The IALA Maritime Buoyage System rules will apply to minor lights but not to leading lights, some sector~~ed~~ lights, landfall lights or major floating lights. Increasingly sector lights follow IALA convention when used for marking a channel. General information on the IALA System is ~~primarily concerned with buoyage, so general information is~~ given in B-461.

B-470.4 Colours of lights~~: use of colour plates~~

a. General rules on 'multicoloured' charts:

The use of colours additional to the minimum four colours (see B-140) is particularly useful for depicting light sectors marking intricate inshore channels. For further guidance on placing sectors, see B-475. The following specifications should be adhered to on multi-coloured charts, to achieve conformity:

- Colours for flares and sector arcs should be chosen to be easily distinguishable from any background tint. They should also be tested for visibility under vessels' bridge lighting.
- Light flares must be in the appropriate colour:
  - Yellow/orange should be used for white, yellow, amber and orange lights.
  - Red should be used for red lights. Alternatively, magenta may be used.
  - Green should be used for green lights.
  - Blue/cyan should be used for blue lights.
  - Magenta may be used for violet lights.
- Sector limits should be fine dashed lines, but may be shown as fine continuous lines. Emphasis may be provided by 1mm wide colour bands where marking the sides of a fairway (see B475.1, 475.5 and INT1 P41.2).
- Sector arcs should be fine dashed lines, but may be shown solely by coloured arcs. The

international abbreviation for the colour or character of the light (see B475.1 and INT1 P40.2) should be added, in case the colour is difficult to distinguish under vessels' bridge lights.

- Coloured sector arcs should be situated to avoid conflict with significant detail. If colour arcs (including circles for all-round, ie 360° lights) are placed within 30mm of the light star, the flare(s) may be omitted. Where this cannot be achieved, coloured arcs should be broken to clear significant detail, or the arc moved further from the light, but not beyond the range of the light. In the latter case, coloured flares should be located at the light star.
- Coloured sector arcs (or circles for all-round lights) should be 1mm wide. Faint sectors may be 0.5mm wide. In very narrow sectors, a wider wedge of colour should be shown, so that it is clearly visible.
- Coloured sector arcs (or circles for all-round lights) should be used on all major lights~~, including un-sectored lights~~. Leading lights (with narrow sectors) and minor lateral lights should usually be shown by flares.
- Alternating and oscillating lights should be shown by parallel or overlapping different coloured arcs (or circles for all-round lights).
- The floodlit (illuminated) symbol (**P63**) should be yellow/orange.
- The Moiré effect symbol (**P31**) and strip light symbol (**P64**) should be coloured as appropriate to the light.
- For omission of colours in the light description, see B-472.3

b. On 'four-colour' charts.

Complex sector lights must be charted in black, with magenta light flares. Sectors marking shipping channels may be emphasised by using continuous lines (see B-475.5). ~~(as on many Swedish charts).~~

This economical representation does not prevent navigators from hand colouring sectors of interest to them and, indeed, may be quite adequate for the masters of piloted ships. This portrayal has some advantages relative to multicoloured portrayal: it is easier for the user to correct charts, and is not subject to changing appearance under certain types of vessels' bridge lighting. ~~, and printing is easier and cheaper. In charting the tidal estuaries of the German and Netherlands coasts, where complex light sectors are also common, the correctional problem is very significant, especially for "multi-coloured charts".~~

~~In the specifications which follow, emphasis is given to standardizing legends and line symbols on the black plate. The meaning of the terms "multi-coloured chart" and "standard chart" should be clear from the above.~~

B-470.5 **Position of lights.** The ~~exact~~ position of a light (including lighthouses) should normally be shown by a five-pointed star in one of two sizes~~, the size depending on the relative importance of the light~~. ~~The larger star should be used for the majority of lights. The smaller star may be used where there are numerous minor lights, eg the corners of quays and dolphins in a harbour.~~

P1

The larger star should be used for the majority of lights. The smaller star may be used where there are numerous minor lights, eg the corners of quays and dolphins in a harbour.

~~A bold dot in lieu of a light star, is permissible but is not recommended because the star symbol is more distinctive (dots are used for spot heights, posts, small islets, etc) and widely used on the charts of many nations.~~

Commentaire [c59] : Use of a dot, which has been 'not recommended' for many years, should not be retained in INT specs, and this is supported by a clear majority.

~~Dots can be hand-drawn more easily on compilation drawings but, lacking a coloured flare, they are not sufficiently distinctive when editing and revising drawings and single colour proofs.~~

~~**Position of lights - special cases.** A light star must not be used for:~~

- Floating lights, see B-460 (light buoys) and B-474 (major floating lights);
- Navigational lights on landmarks (except lighthouses) or other structures charted by pictorial symbols, eg water towers, stranded wrecks, wind turbines. These should be indicated by a light flare from the small position circle (similar to the depiction of a light buoy), eg:

P7

Commentaire [c60] : DID, please insert 5011 Pc.

- Offshore platforms, see B-445.2;
- Air obstruction lights on masts, chimneys, etc which are to be indicated only by legends in brackets against the features, see B-476.2;
- Strip lights, see B-478.5;
- Signal stations, see B-490.2.

To avoid clutter and to give precedence to the symbol, the term 'light', or its equivalent, must not normally be inserted against the position of a light. When a light description is unavoidably sited some distance from the light star (eg: to avoid obscuring detail close to the light; the light falls outside the chart limits - see B-470.8), it is permissible to include the **international abbreviation 'Lt' (P1)** in the name, eg Eddystone Lt. The abbreviation may also be used in ~~such~~ legends: eg '(R Lts)' against masts, indicating air obstruction lights, 'LtHo (disused)' where no light is now exhibited.

B-470.6 **Light flares.** The point of a light flare **P11** should be about 1 mm from ~~the point showing~~ the charted position of the light.

On 'multicoloured' charts, the flare(s) should be in the colour(s) of the light, see B-470.4.

The orientation of flares should be such as to avoid obscuring other detail. In the case of a leading

light (see B-475.6), lights in line (see B-475.6) and direction lights (see B-475.7), the flares should be oriented to seaward along the line, provided this does not obscure the front light star, or other detail.

Flares must not be inserted against ~~minor~~ air obstruction lights (see B-476.2) ~~or~~, traffic signal stations (see B-490.2) or strip lights (see B-478.5) where light stars are usually omitted.

B-470.7 **Names of major lights** are very important, as stated in B-450.3 and B-470.1. If a light has a name which is unrelated to any other charted feature, the name must be inserted against the position of the light on at least the largest scale charts, above or preceding the light description ~~of the character of the light~~, and should be in the same style as the light description.

If the name of a light is ~~fairly~~ obviously that of the named feature on which the light stands, eg Saint Catherine's Point, the name of the light need not be repeated above the light description. The name must be in the style appropriate to the feature, eg a headland or a shoal, and in many cases can be sited immediately above the light description. Where, as mentioned in B-470.5, a light description is unavoidably sited some distance from the light star, the name of the light should ~~normally~~ be repeated above the light description, in the same style as the light description.

Minor lights may be identifiable in the List of Lights and Fog Signals by a charted general name and a (possibly uncharted) descriptive term, eg Royal Pier~~, SE Head~~. Names or descriptions of individual lights of a pair of leading lights, eg 'Rear' or 'Upper', 'Front' or 'Lower', can normally be deduced from the positions shown on the chart and, to save clutter and translation, should not be inserted on paper charts.

~~Rear Lt or Upper Lt~~ **~~P22~~** ~~Front Lt or Lower Lt~~ **~~P23~~**

Commentaire [c61] : INT1 editors please note deletion of P22, P23

For names of major floating lights, see B-474.

B-470.8 **Lights off chart limits.** There are occasions when a light falls outside the limits of a chart and:

- it cannot be shown in a border break (see B-212.11), and
- the chart cannot be re-schemed to include it within limits.

If it is required as an aid to navigation for a mariner using the chart, it is necessary to provide the chart user with a means of plotting bearings to that light.

If the light is a **sectored light**, the sectors should be charted as normal. Sufficient details about the light should be shown on the sector arcs for identification purposes, usually including the name of the light, in addition to the light description.

For **leading lights and lights in line**, the transit lines should be charted as normal. Sufficient details about the lights should be shown on the transits for identification purposes, usually including the name of the lights, in addition to the light description.

For **all-round lights**, or lights where only one sector is visible, short magenta bearing lines at regular intervals (eg 1°) should be placed along the chart border or at some other convenient point in the portion of the chart where the light might be used for navigation. These bearing lines can be used in conjunction with a compass rose; however, if there is no convenient compass rose, two sets of bearing lines should be portrayed, which can be joined up by the chart user. The interval of bearings selected will depend on the distance the light plots off chart limits. The value of the bearing should be added for every tenth line. The length of the lines is at the cartographer's discretion, but the tenth and fifth lines should be emphasized in the same pattern as the compass rose. The name of the light, and its description, should be inserted in magenta along the spread of lines, eg:

P8

Commentaire [c62] : DID: please insert symbol in accordance with the agreed wording. The legend should read: Cape Lt. Fl.5s12m23M

This device may also be used for a major landmark or daymark.

B-471 LIGHT DESCRIPTIONS

The various elements of a complete (but abbreviated) description of a light must be charted in the order of the following paragraphs. Light descriptions may ~~in many instances~~ be **abridged** but the characteristic rhythm, number of flashes or occultations in a group, and colour (unless white) must all be charted if any details of the light are shown. ~~Minor lights may be omitted entirely from some medium scale charts, see B-472.~~

B-471.1 **The type** of light must only be shown on charts ~~only~~ in a few special cases, in particular:

- Aeronautical lights (Aero), see B-476.
- Direction lights (Dir), see B-475.7 and B-475.8.
- Leading lights (Ldg), only where, because of scale, the two lights appear at a single position on the paper chart, and the leading line cannot be charted, see B-475.6.

~~(Some lights are not always exhibited throughout the hours of darkness and must have, for example, a warning that they are 'occasional'. This should follow the rest of the light description. See B-473).~~

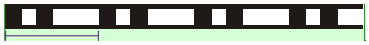
B-471.2 The principal character of a light is its rhythm (although, strictly, fixed lights and some alternating lights are not 'rhythmic'). The basic **international abbreviations** are:

Character **of light**	**Abbreviation**	**Illustration** (period shown)	**INT1 ref.**
Fixed	F		P10.1
Occulting (total duration of light longer than total duration of eclipse)	Oc		P10.2
Isophase (duration of light and eclipse equal)	Iso		P10.3
Flashing (total duration of light shorter than total duration of darkness)	Fl		P10.4
Long-flashing (flash 2s or longer)	LFl		P10.5
Quick (repetition rate of 50 to 79 - usually either 50 or 60 - flashes per minute)	Q		P10.6
Very quick (repetition rate of 80 to 159 - usually either 100 or 120 - flashes per minute)	VQ		P10.7
Ultra quick (repetition rate of 160 or more - usually 240 to 300 - flashes per minute)	UQ		P10.8
Morse code	eg Mo(K)		P10.9
Fixed and flashing	FFl		P10.10
Alternating	eg Al.WR		P10.11

Commentaire [c63] : AU suggests rearranging columns below as INT1. However, they serve a different purpose: INT1 the user has an abbreviation and needs to know what it means, M-4 the compiler has a light and needs to know what abbreviation to use.

Commentaire [c64] : DID: use improved version of tables in current M-4, but reverse letters in the diagram for alternating, to agree with description, ie W/R/W/R etc

Some examples of abbreviations derived from the basic ones:

Character of light	Abbreviation	Illustration (⊢⊣ period shown)	INT1 ref.
Group occulting (showing 2 occultations)	Oc(2)		P10.2
Composite group occulting (showing 2 + 3 occultations)	Oc(2 + 3)		P10.2
Group flashing (showing 3 flashes)	Fl(3)		P10.4
Composite group flashing (showing 2 + 1 flashes)	Fl(2 + 1)		P10.4
Group quick (showing 3 quick flashes)	Q(3)		P10.6
Interrupted quick	IQ		P10.6
Group very quick (showing 3 very quick flashes)	VQ(3)		P10.7
Interrupted very quick	IVQ		P10.7
Interrupted ultra quick	IUQ		P10.8

Commentaire [c65] : See above re Oc. Lt

One of the principles on which the abbreviations above are based is that a capital letter is always used for the first letter of any word abbreviated; other letters are lower case. Another principle is to keep the abbreviations as compact as possible; see B-471.9.

B-471.3 **The colour(s)** of a light must always be charted by the **international abbreviations** listed in B-450.2. They must be charted in capital letters (except for the second letter of two-letter abbreviations).

The omission of a colour abbreviation signifies that a light is white, except for sectored lights on multicoloured charts, see B-472.3. However, where there is more than one colour exhibited, as in some sector lights and in alternating lights, the abbreviation W must be included. In the case of sector lights, the longest range colours (as listed in the List of Lights and Fog Signals (LL)) are given first, eg WRG. For the charting of colours on the sectors, see B-475.

B-471.4 **Appropriately coloured flares** ~~**or circular "patches"**~~ may be used on 'multicoloured charts', **in addition to the abbreviations,** to indicate the colour of ~~red, green and white (shown as yellow)~~ lights (see B-470.4a). For the additional use of colours on sector~~ed~~ lights see B-475.

B-471.5 **The period.**

IALA definition:

'The time taken for the completion of all the different **phases** of a light signal.'

IALA defines a phase as:

'A visually discrete part of a light signal. It is bounded by changes between darkness and light, or between different colours, or between distinctly different luminous intensities, and it may be further discriminated by its duration.'

The period must be expressed in seconds, even where it is one minute or more, and the **international abbreviation** 's' must be used, eg:

1.2s 90s **P12**

Where periods are quoted in the LL to an accuracy of better than one second, they may be quoted on the chart to 0,1s, eg 1,3s, 7,5s to accord with the LL. ~~These specifications also apply to lighted buoys (B-466.4).~~

Navigators may time the period of an observed light to confirm an identification obtained firstly from the character (rhythm) and colour. The period is important in identifying a simple flashing light but less important when a light has a more distinctive character, eg group occulting. This should be taken into account when abridging a light description by omission of the period. Where practicable, periods of all lights should be shown on the largest scale charts at least.

B-471.6 **The elevation** of a light is the vertical distance between the light source and the plane of reference for lights, as quoted in the chart title notes. It must be expressed in metres, using the **international abbreviation** 'm', eg:

12m **P13**

~~The elevation must be measured from mean sea level where there is little appreciable tide at the adjacent shoreline. Elsewhere, an appropriate High Water datum must be used.~~The elevations of lights must normally be referred to a High Water datum. Elevations should be referred to Mean Sea Level where the tidal range is not appreciable. The datum used should be clearly stated on all charts, see B-241.6.

Commentaire [c66] : Derived from the revised TR A2.5 (IHO CL 98/2007 refers)

The height of a light structure is the vertical distance between its top and ground level and should not normally be shown on paper charts. Exceptionally, where the height of the structure is particularly remarkable, it may be shown as specified in B-303, but not as part of the light description.

To a mariner, the significance of a charted elevation may be:

- In estimating or looking up (in the Geographical Range Table in LL) the distance at which a landfall light should first be sighted ~~(the elevation becomes more important as charted geographical ranges are replaced by luminous ranges, see B-471.7)~~.
- In identifying particular lights, eg leading lights, where they could be confused with other lights.
- In warning him that a light is at a relatively high elevation and is more likely to be obscured by cloud than one at a lower elevation.
- In enabling distance off a headland to be calculated, by day, if radar or other aids are not available.

~~It follows that the e~~Elevations of landfall lights should be charted, at least on the largest scale charts. Elevations of other lights where the elevation seems significant, eg leading lights, should also be charted on the largest scale charts. The elevations of minor lights are of little significance and should be omitted from charts.

B-471.7 **The range** (distance) at which a light will be visible can be calculated either from its brightness (giving a **luminous range)** or from the eclipsing effect of the earth's curvature (giving a **geographical** range). Luminous range depends not only on the intensity of the light but on the variable conditions or meteorological visibility. IALA defines **nominal range** as:

'the luminous range of a maritime signal light in a homogeneous atmosphere having a meteorological optical range of 10 nautical miles for an observer of conventional threshold of illuminance.'

The nominal range is given in LL and must normally be used for charts. It must be expressed in sea miles, rounded to the nearest whole mile (0,5M rounded down) using the **international abbreviation** 'M', eg:

15M **P14**

Exceptionally, where the 'normal' visibility of an area differs widely from 10 miles, a non-standard luminous range may be charted (agreeing with that given in the LL), provided a note defining the range is given on the charts affected.

Geographical range (standardized on an observer's height of eye of 5 metres) should not normally be charted because it does not indicate a light's intensity and the arbitrary height of eye does not apply to all vessels. However, in areas where geographical range is known to be useful it may be inserted, where it is less than nominal range, in place of or in addition to nominal range, with a suitable explanatory note.

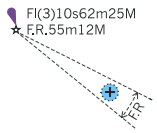
The ranges of minor lights within very restricted waters are of little significance and should generally be omitted. Where space permits, ranges of all other lights are useful to the mariner and should be charted on at least the largest scales. Ranges of landfall lights should be shown on all appropriate large and medium scale charts.

For ranges of sector lights, including those intensified on certain bearings, see B-475.

For lights with more than one range, see B-471.9.

B-471.8 **Lights exhibited from the same structure** (or charted at the same light star).

a. If more than one light is exhibited from a light structure the description of the main one (eg a light visible from all directions) should ~~preferably~~ be shown on one line and the subsidiary light (eg a red sector of different character, covering a danger) on a line below.



P42

Two short descriptions ~~they~~ may be shown on one line linked by '&'. This also applies where two separate lights which are close together are charted by one light star, because of scale, eg:

Ldg Oc.R & F.R **P20.3**

Emergency lights should not be shown on paper charts.

b. Disposition of lights. Lights exhibited from the same structure which are disposed horizontally or vertically must be charted by the abbreviation '(hor)' or '(vert)' **P15**, as appropriate, immediately following the colour in the light description.

Two (or more) fixed lights **of the same colour** disposed horizontally or vertically must be charted, ~~respectively,~~ eg:

- 2F.G(hor) means that two fixed green lights are disposed horizontally
- 2F.R(vert) means that two fixed red lights are disposed vertically
- 3F.R(vert) means that three fixed red lights are disposed vertically

It is possible to show lights exhibited from the same structure arranged in other ways by means of a geometric symbol, eg:

- 3F.R(Δ) means 3 fixed red lights disposed in the shape of a triangle (the appropriate way up).

Two (or more) lights **of different colour** disposed horizontally or vertically must be charted, eg:

- F.GR(vert) means that 2 fixed lights are disposed vertically, the uppermost being green, the lower being red.
- F.RGR(hor) means that 3 fixed lights are disposed horizontally, the middle one being green.

The '&' sign is not required, as the qualifier (vert) or (hor) clearly indicates that there is more than one light. These conventions must not be used for Traffic Signals (see B-495).

c. If a fixed light is varied at intervals by a flash of greater intensity, it is charted as FFl, **P10.10.**

B-471.9 **Combining the elements of a light description** must be achieved in a way that enables complex descriptions to be shown compactly. However, some spacing of the elements is needed for ease of interpretation. Full stops are specified below to ensure spacing, but the full stops may be omitted providing the spacing is retained: ~~spacing alone is adequate if desired, it is recommended that the following rules be applied:~~

a. Insert full stops (or spaces):

- at the end of the characteristic rhythm (except where there is a bracket);
- at the end of all colours (not between colours);
- after Al (Alternating) - although Al is not a rhythmic characteristic it is often juxtaposed with one.

b. Omit full stops:

- after s (seconds);
- after m (elevation);
- after M (range);
- where there is a bracket;
- at the end of the light description.

c. If more than one range is given in the light description for a single light, show as follows:

eg	15/10M	P14	Light with two different ranges (use forward slash).
eg	15-7M	P14	Light with three or more different ranges (use hyphen).

Colours of a light must be arranged in the same order as the ranges, with the longest range normally given first (see B-471.3). However, in the case of a FFl light, where the flash is always brighter, the ranges should be shown in the same order as the character to which they refer, eg: FFl.10/15M

Commentaire [c67] : Paragraph rearranged to improve comprehension

d. Example of a full light description:

Name
Fl(3)WRG.15s21m15-11M **P16**

Fl(3) *Character of light: group flashing repeating a group of three flashes*

WRG. *Colours: white, red, green, exhibiting the different colours in defined sectors (in this example, with full stop, see B-471.9a)*

15s *Period: the time taken to exhibit one full sequence of 3 flashes and all eclipses: 15 seconds*

21m *Elevation of focal plane above height datum: 21 metres*

15-11M *Nominal range: white 15 miles, red between15 and 11 miles, green 11 miles*

(For additional remarks see B-475.5).

B-472 LIGHT DESCRIPTIONS: ABRIDGING, OMISSION ~~OF ALL DETAILS~~

T~~In B-471 t~~he significance of the various elements of a light description is stated in B-471. For paper charts, the order of omission of details in an abridged (shortened) description is given below. It is not ~~quite~~ the same for all types of lights. For light buoys, see B-466.4.

B-472.1 Major lights (ie lights intended for use at sea, usually with a range of 15 miles or more, and in outer approaches to harbours). When reducing the detail to be charted as the chart scale decreases, the following must be the order of omission:

a. Elevation of light, eg 23m
b. Period of light, eg 10s
c. Range (visibility) eg 22M
d. Character and colour.

Where useful on some smaller scale charts, a light star, major floating light symbol, or offshore platform symbol may be shown with flare and possibly name but without light description; see also C-414.1.

B-472.2 Lights within harbours and in restricted channels. It may be advisable to abridge light descriptions even on the largest scale charts to eliminate details of little interest to the mariner, especially where space is very limited. The order of omission must be:

a. Range
b Elevation
c. Period
d. Character and colour.

Where numerous ~~end of~~ quays, wharves, etc, ~~are uniformly lighted~~ along a river channel have similar lights, the light star and flare may be retained and a standard note covering them all may be used, eg:

LIGHTS
Light stars without legends represent two fixed lights displayed vertically. They are seen as red to port *[or starboard]* and green to starboard *[or port]* when proceeding upriver.

B-472.3 On multicoloured charts, the colour may be omitted from the light description, provided the colour abbreviation is shown on the sector arcs.

B-472.4 Omission of all details (including light stars). In general, the lights selected for insertion on a chart should be those within range of which navigation on the particular chart is possible. As a ~~rough~~ guide, only those lights visible from 15 miles and over should be inserted on charts at scales smaller than 1:500 000. B-401 to B-404 deals generally with full and partial depiction of chart detail. A well designed chart should not require any warning about omission of certain lights, but if ~~a nation wishes~~ particular~~ly to draw~~ attention to omissions is required, ~~it is recommended that~~ a brief note such as 'Only the principal lights are shown on this chart', or equivalent, is sufficient.

B-473 LIGHTS: TIME OF EXHIBITION

Lights are normally exhibited from about sunset to about sunrise, although, in fog, some lights may be shown during the day also. The following paragraphs refer to circumstances in which charts may~~, or need not,~~ carry warnings that a light cannot be relied on, or that its characteristics may differ from those charted. Usually such comments will be contained in List of Lights and Fog Signals (LL), but if required, may be added to the chart.

B-473.1 **Unwatched (unmanned) lights** have in some instances been noted as such on charts. The reliability of unwatched lights is now such that using the former abbreviation '(U)' is no longer needed on charts. ~~Lights may still be accidentally extinguished but important unwatched lights are likely to have standby arrangements that can be brought into service automatically. There may also be an emergency light for service when the permanent or standby light has failed, often providing a reduced intensity or possibly different characteristics.~~

~~Where no standby or emergency arrangements are available, important lights that are unwatched (unmanned) may be indicated by means of a suitable abbreviation (U).~~

~~eg~~  ~~**P53**~~

~~The characteristics of temporary lights put into service for a limited period eg during repair work, are not to be charted.~~

Commentaire [c68] : INT1 editors please note P53 to become obsolescent.

B-473.2 **Occasional and private lights.** Some lights are exhibited only in response to a specific request or during the occurrence of a particular local condition. Examples are harbour lights shown only when required by particular vessels, eg fishing vessels, ferries and lights exhibited during military exercises. Privately-maintained lights which are not regularly exhibited, eg leading lights to a private quay, are also considered 'occasional'. **The international abbreviation** '(occas)' ~~in brackets,~~ must be inserted at the end of the light description, for all types of occasional lights, where required to be charted, eg:

 **P50**

Private lights required to mark a danger such as an outfall, which are regularly exhibited, are not 'occasional'. **The international abbreviation** '(priv)', must be inserted at the end of the light description, for all types of private lights, where required to be charted, eg: ~~They may have the **international abbreviation** '(priv)', or equivalent added, eg:~~

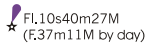
 **P65**

Commentaire [j69] : Consistency with following paragraphs.

For descriptions of lights used for signalling purposes, see B-490.4.

B-473.3 **In high latitudes** lights may not be exhibited in the midsummer period, or in winter when ice closes an area to traffic. For such lights, a~~No~~ charted note is not required.

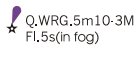
B-473.4 **Daytime lights** of high intensity may be used in ports for such purposes as marking a leading line. Where lights are shown throughout the 24 hours without change of character no special note is required on the chart. **Where the character shown by day differs from that shown at night,** the former together with the word 'Day', or equivalent, must be shown in brackets beneath the night-time character, eg:

 **P51**

Commentaire [c70] : DID: use graphic from latest version of M-4, including use of Univers type

B-473.5 **Fog lights** may be exhibited by day in reduced visibility. They can be synchronized with audible (sound) fog signals so that an estimate of range can be made. The fog light description, together

with the word 'Fog', or equivalent, must be shown in brackets beneath the main light character, eg:



P52

Commentaire [c71] : DID: use graphic from latest version of M-4

For Fog detector lights, see B-477.

B-473.6 **Temporary lights** should not normally be charted. However, if required to be charted, the **international abbreviation** '(temp)' may be added to the light description.

P54

B-473.7 **Extinguished lights.** A light which is known to be temporarily extinguished, or even destroyed, may be marked by the **international abbreviation** '(exting)' if there is a possibility that it will be re-established, eg:

P55

B-474 MAJOR FLOATING LIGHTS

B-474.1 **Major floating lights** are generally classed as those with a nominal range in excess of 10 nautical miles. Special circumstances, eg an isolated location, may mean that a floating light of lower range is given this status. The structure on which the light is fixed will ~~usually~~ be a light vessel, a major light float or a LANBY (Large Automatic Navigational Buoy~~), circular float diameter approximately 12 metres, unmanned.~~, which is a type of superbuoy; see B-460.4).

B-474.2 **The symbol for a major floating light** must be

P6

The colour of the structure does not indicate on which side it should be passed and therefore should not be charted (this is consistent with the omission of colour from major shore light structures on paper charts). Details of the structure may be found in List of Lights and Fog Signals (LL).

B-474.3 **The name of the light** must be given, in sloping lettering, on all large and medium-scale charts and must be in the same form as that painted on the structure. It should ~~normally~~ be placed above the light description, space permitting.

B-474.4 **The light description**, which should be in sloping lettering, must otherwise conform to the specifications for shore lights, including the charting of both height and range on larger-scale charts (see B-470 to B-473). The heights of lights are, of course, above sea level rather than above a fixed datum. Riding lights (lights shown by an anchored or moored vessel), which are of relatively low power, should not be charted.

~~**B-474.5** **Watch (or station) buoys** are sometimes moored near manned light-vessels to give crews an indication of dragging. They are normally unlit and may be moored up to a mile from the light-vessel. They should be shown on at least the largest scale charts because they are a collision hazard at night or in fog.~~

B-475 SECTOR LIGHTS AND OTHERS NOT VISIBLE ALL ROUND

Commentaire [c72] : This section has been rearranged. INT1 editors need to check the M-4 references.

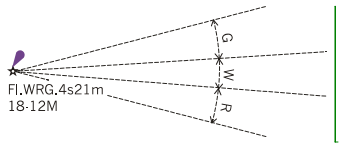
An all-round (or omni-directional) light is one that presents the same character over the whole horizon of interest to marine navigation. Where a large-scale chart shows a light without sector or leading lines (or where the light description does not indicate different sectors, 'Ldg' or 'Dir') the mariner will assume that it is an all-round light. If a light is not visible on some bearings, or changes

its character as the bearing changes, this must be shown, usually by inserting sector limits and arcs on at least the largest scale charts.

In the following specifications ‘sector limit’ is used to denote the line or bearing of a light where the character changes or the light is obscured. ‘Sector arc’ is used to denote the curved line against which the character of the light in that sector is inserted. In practice, on most lights there is a small ‘angle of uncertainty’ between sectors where, for example, the colour is indefinite, or at the edge of the arc of visibility, the intensity appears to be reduced. It is impracticable to indicate the angle of uncertainty on charts although, exceptionally a ‘faint sector’ may be represented, see B-475.3. It is possible, on certain lights which are specially designed to show a narrow sector with very small angles of uncertainty, to indicate this fact by using the abbreviation ‘Dir’ for ‘Directional light’: see B-475.7.

There are many different types of light visible on certain bearings only. The following specifications list the main ones, starting with the simpler cases.

B-475.1 **Symbols for sector limits and sector arcs.** Limits of sectors and arcs should be charted as fine dashed lines (about 10 dashes to 10mm), except for fairway sector limits, see B-475.5. Small arrowheads should be inserted at the ends of the sector arcs, eg:



P40.1

Commentaire [c73] : DID: use latest version of graphic from M-4 (currently shown as P40)

Sector limits should cover the area where they are useful to mariners. They must not extend beyond the nominal range of a light. Very short sector arcs may be omitted.

Where light is deliberately restricted from a sector, it must be shown without an arc, eg:

P44

Commentaire [c74] : DID: please insert P44 graphic

On 'multicoloured' charts, the sector limits may be shown as fine continuous lines, emphasized by colour if required. Sector arcs may be shown solely by coloured arcs, (together with an abbreviation for the colour or character of the light, see B-475.5), eg:

P40.2

Commentaire [c75] : DID: please insert multicolour version of graphic.

For details of lights on multicoloured charts, see B-470.4a. ~~No sector limits may extend beyond the nominal range of a light.~~

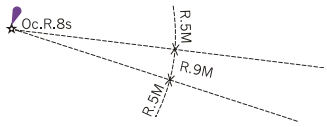
B-475.2 **Legends on sector arcs**~~, as specified in the following paragraphs,~~ must be ~~in abbreviated form, preferably using only the~~ **international abbreviations**, see B-450.2 and B-471.

Where sectors are differentiated by colour only, the abbreviations for colours must be inserted on the sector arcs, (including on 'multicoloured' charts where coloured arcs may be used **in addition** to the abbreviations, see B-470.4a). Where sectors are very wide and there is a risk of a single abbreviation being 'lost' in the charted detail, the abbreviation may be repeated at intervals. Light descriptions on sector arcs should not be significantly inverted (to avoid reading upside down).

Where sectors are differentiated by the use of various rhythms, the abbreviations for the rhythms must be inserted on the sector arcs, together with the colour where necessary.

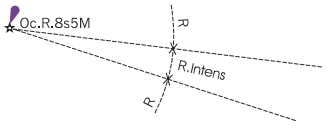
The range of each sector may also be inserted on the sector arcs, following the character or colour, and omitted from the light description at the light star.

Where a light is intensified in a sector, the ranges of all the sectors should be shown on the sector arcs, eg:



P46

If this is impracticable for any reason, the **international abbreviation** 'Intens' ~~or equivalent~~ should be used, as appropriate, eg:

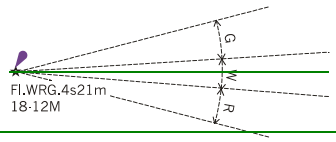


P46

Commentaire [c76] : DID: please amend light description in this graphic to Oc.R.8s9/5M

In exceptional cases where there could be confusion, full details including the name of the light may be shown on a sector arc. This also applies where it is necessary to show a sector of a light although the light itself lies beyond the limit of the chart, see B-470.8.

~~**Legends (light descriptions) at positions of lights:** Light descriptions at light stars must generally follow the specifications in B-471 and B-472. Colours must be charted in the order WRG eg:~~



~~**P40**~~

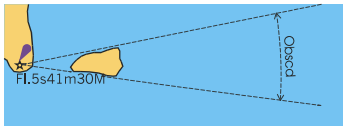
~~Ranges may be omitted when shown on sector arcs (and in restricted waters where the ranges are of little significance). Where ranges are given in the main light description it is recommended that if two different ranges only are concerned they be shown, eg:~~

~~15/10 M **P14**~~

~~and if three or more ranges are concerned they be shown, eg:~~

~~15-7 M **P14** (longest to shortest)~~

B-475.3 **All-round lights partially obscured by obstructions.** The arc over which a ~~particular (major)~~ light is visible may be obscured by an obstruction, such as higher land. To alert the mariner to this deficiency (unless it is obvious) a sector limit, corresponding as closely as practicable to the bearing on which the light disappears, should be inserted on ~~the~~ large-scale charts, together with the **international abbreviation** 'Obscd' ~~, or equivalent,~~ on the obscured sector arc, eg:



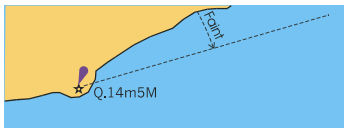
P43

Commentaire [c77] : DID, use graphic from latest version of M-4

Details of obscured arcs are normally ~~to be~~ taken from List of Lights and Fog Signals (LL). Where visibility is obscured by sloping land close to the light, the arc of visibility will increase with distance offshore so this should be taken into account when deciding where the lines should be drawn.

Where an arc of visibility is deliberately restricted (ie the light is not an all-round one) the above representation must not be used; see B-475.1.

A decrease in the apparent intensity of a light may occur in the case of partial obstructions, such as vegetation. Where particularly important, an arc may be labelled with the word 'Faint' or equivalent, eg:

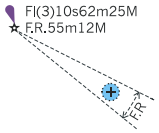


P45

For faint sectors on multicoloured charts, see B-470.4a.

B-475.4 **Sector light marking a danger.** In some waters it is common to use a red subsidiary light to 'cover' a danger; see also B-471.8. The sector limits should extend at least as far as the danger, but must not extend beyond the nominal range of the subsidiary light. The character of the subsidiary light, eg 'F.R', should be inserted on the arc of visibility. The full description of the subsidiary light, including its range, must be given at the position of the light, below the description of the main (all-round) light, eg:

Commentaire [j78] : To be consistent with B-475.1 above.

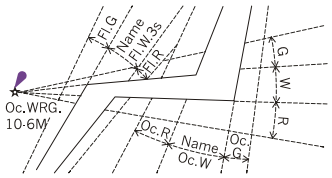


P42

In other cases, the main light itself may have a red sector over the danger; in such cases a single light description, eg 'Fl.WR', must be used and all sectors portrayed if scale permits.

B-475.5 **Sector lights marking fairways.** ~~**White fairway sectors flanked by red and green sectors, or sectors with different rhythms**~~

Sector limits and sector arcs: where a narrow light ~~fairway~~ sector marks a fairway ~~leads~~ between off-lying dangers, the sector limits marking the edges of the fairway should be long enough to show the extent of the channel, see B-432.1. The fairway may include a number of 'legs' demarcated by white sectors from more than one light. In such cases, ~~and the approximate margin of safety provided by keeping to the fairway sector. O~~on charts where the sector limits are normally shown by fine dashed lines, those lengths of the sector limits which mark the sides of the fairway should be shown by fine continuous lines, in order to highlight the channel. Sector limits may also be omitted where they cross the fairway, eg:



P41.1

On 'multicoloured' charts the fairway edges may be emphasized by the use of a yellow/orange line in addition to and inside of the black continuous lines, eg:

P41.2.

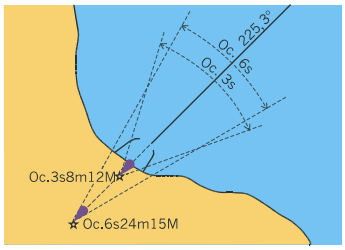
Commentaire [c79] : DID: please insert multicolour version

B-475.6 **Leading lights and lights in line.** For guidance on the portrayal of leading lines and associated legends, see B-433~~ specifies the charting of leading lines and associated legends on the lines but does not cover the charting of arcs of visibility and legends specific to lights.~~

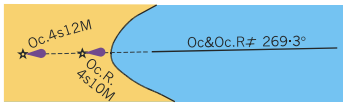
The 'in-line' symbol should not be used where only the bearing is shown on the transit.

Light flares should be oriented along the transit line for all leading lights or lights in line, unless the flare would thereby obscure the front light or other important detail. Where detail may otherwise be obscured, the flare should be orientated as close as possible to the transit line.

Where a chart shows lights with a leading line it will be assumed by the mariner that the lights are, to some extent, special purpose ones and not necessarily all-round lights; therefore it is not necessary to show the arcs of visibility unless there is a good reason for doing so (eg: the light has other sectors which are not visible on the leading line, the leading sectors are much wider than the actual lead). Where it is required to show the arcs of visibility, the legends on the sector arcs must repeat as much of the light description as necessary (including, possibly, the names of the lights), see B-475.2. Relatively uninformative legends such as 'Arc of visibility' must be avoided if possible.



P20.1



P20.2

In the examples above, the cartographer will determine how much of the light details will be shown on the arc, on the lead and at the light star. (The order of the marks is unimportant). It should not usually be necessary to duplicate the information, see B-433.2.

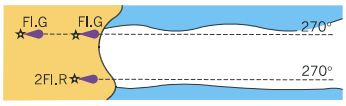
Commentaire [c80] : No consensus established.

If the scale is too small to show both light stars on a paper chart, a light star should be shown in the ~~mean of the two positions~~position of the rear light, with the description linked by '&', eg: Oc.W&R. Where the representation may leave the mariner in doubt whether a light is a leading light (eg if the scale is too small to show the leading line), the **international abbreviation 'Ldg'** must precede the light description, eg:

Commentaire [c81] : AU's comment accepted, ie 'Suggest this should be the rear lead. Taking the mean does not support database chart compilation. Also, in some cases the rear lead is used as the rear lead for more than one leading line, and taking the mean will displace one of the leading lines.'

P20.3 (on small-scale charts)

Lights in line marking a danger or a limit may be charted similarly except that the abbreviation 'Ldg' must not be used, and the transit (or clearing) line must be dashed throughout, eg:

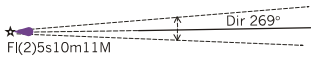


P21

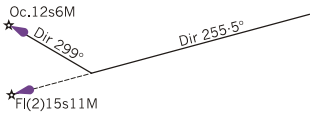
For leading lights and lights in line which are off chart limits, see B-470.8.

B-475.7 ~~Direction~~ **Direction (or directional) lights** of several types are in use but all have in common a very narrow sector intended to mark a direction to be followed. The narrow sector may be flanked by: ~~(a) darkness or unintensified light, or (b) sectors of different colour or character.~~

a. Unlit sectors or unintensified light. The centre line of the sector must be charted in a manner similar to a leading line (see B-433) but with the **international abbreviation** 'Dir', and the course to be followed, against the line, eg:



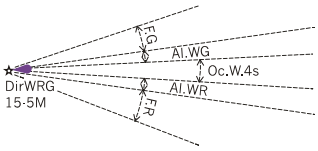
P30.1



P30.2

The abbreviation 'Dir' should only be used in the light description at the position of the light ~~only~~ if the course line cannot be charted.

b. Sectors of different colour or character. Some direction lights are so precise that a complete colour change at a sector boundary occurs over an angle of less than 1 minute (0.02°) ~~in most models~~. This corresponds to a lateral distance of just 1 metre at a viewing distance of 3.5 km. In addition the intensity may be maintained right to the edge of the beam, and does not reduce the further the observer is away from the axis. The sector limits and arcs must be charted, if possible, in the same way as a sectored light (see B-475.1). However, 'Dir' may be inserted at the beginning of the light description, where appropriate, to inform the navigator that the fairway sector has a particularly precise 'cut-off' or very small angle of uncertainty (unlike the average fairway sector), eg:



P30.3

P30.4

Commentaire [c82] : DID: please insert additional coloured version below, as example in French INT 1, but include abbreviations on arcs, against P30.4, and without flare.

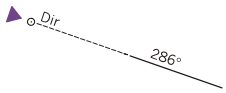
In the example shown, the light oscillates from side to side, so that between the fixed colour sectors, there is a narrow sector of alternating colour.

In addition to the sectors, the centre line of the leading sector may be charted in a manner similar to a leading line (see B-433), but with the **international abbreviation** 'Dir', and the course to be followed, against the line.

B-475.8 **A moiré effect mark (or variable arrow mark)** is a short-range (normally up to 2 km)

type of direction ‘light’. Sodium lighting gives a yellow background to a screen (up to 3 m square) on which a vertical black line will be seen by an observer on the centreline, or variable arrow marks when course alteration is needed. The system can be used by day and night. It can also be used as a stop line (seen abeam) for vessels berthing along quays; it should not normally be charted when used for this function (except on very large-scale berthing plans).

The symbol must be a small black position circle with a magenta triangle (all sides of 2.5 mm) pointing in the direction which the mark faces, with the abbreviation ‘Dir’ (in black), eg:



P31

The triangle is charted instead of a conventional light flare. On multicoloured charts, it should be in the appropriate colour for the light.

B-476 AERONAUTICAL AND AIR OBSTRUCTION LIGHTS

B-476.1 **Aeronautical (Aero) lights,** established for aeronautical navigation, may be of higher power than marine lights and visible from well offshore. Where this is known or thought likely to be the case, their characteristics should be charted (with light star and flare), eg:

P60

The **international abbreviation** ~~prefixed by the **international abbreviation**~~ **'**Aero**'** is a warning that they could be altered or extinguished without notification to mariners. ~~The cautionary note to that effect is given in the preface to LL. Eg:~~

~~Aero Al.Fl.WG.7,5s11M **P60**~~

B-476.2 **Air obstruction lights** marking such features as radio towers and chimneys may, if likely to be visible from seaward, be charted ~~in one of two ways:~~

~~a. If of high intensity their characteristics should be charted in the same way as aeronautical navigation lights, ie they should be prefixed 'Aero', eg:~~

~~Aero F.R.353m11M
RADIO MAST (353) **P61.1**~~

~~b. If of low intensity they should be charted~~ (without light star or flare) by the appropriate ~~**descriptive legend, preferably in**~~ **international abbreviations** ~~eg R Lts~~, in brackets, against the structure, eg:

P61.2

B-477 FOG DETECTOR LIGHTS

Fog detector lights may be fitted to the structure of a major light or may be established some distance from the light. Their purpose is to detect fog automatically and to switch on fog signals. There are a variety of types in use, some only visible over a narrow arc; in some cases they are liable to alteration without notice. For these reasons ~~it is recommended that~~ their characteristics should not usually be charted. However, as they may be powerful lights and, in some cases, sweep back and forth so that they could be mistaken for signals, ~~it is recommended that~~ the **international abbreviation** 'Fog Det Lt' should be inserted where appropriate on at least the larger scale charts.

P62

If not at the same position as a charted light, a small position circle, **B22,** should be used.

B-478 VARIOUS SPECIAL FORMS OF LIGHTING

B-478.1 Not currently used ~~A bearing light is one which enables its approximate bearing to be obtained without the use of a compass. Various systems can be employed, but all involve multiplying the interval of time between two specified flashes from two separate optical systems in the same light structure by a given factor, to give the bearing or its reciprocal.~~

~~It is recommended that the light is charted with standard characteristics and is not identified on the chart in any special way.~~

B-478.2 **Floodlighting** of a structure (eg a pier, pier-head lighthouse) or a danger close to navigable water, should be indicated ~~either~~ by the symbol:

 or **P63**

The symbol must be in magenta, or yellow/orange on 'multicoloured' charts. Alternatively it may be indicated ~~or~~ by the legend '(illuminated)', the **international abbreviation** '(illum)', or equivalent, against the structure or feature being lit, on the appropriate side if known. ~~The symbol should be in magenta, but may be in yellow/orange on 'multi-coloured' charts.~~

Exceptionally on very large scale charts, if it is required to chart the actual floodlight, this should be by means of a small position circle and the legend 'Floodlight', or equivalent.

B-478.3 **Synchronized lights.** A group of lights, usually on buoys or beacons, which:

- all flash at the same time (synchronous),
- flash one after another in series (sequential),
- are a combination of the above,

are referred to as 'synchronized' lights. They often occur on lateral marks in a channel, or special marks marking an area or feature. Such lights may be linked as an 'aggregation' in ENC. Details of their type of synchronicity are best given in Lists of Lights and Fog Signals, Sailing Directions and/or a chart note. The **international abbreviation** '(sync)' may be added to the light description, eg:

P66

B-478.4 Not currently used
~~For light structures as daymarks, see B-457.~~

B-478.5 **A Strip light~~s (bordures lumineuses).~~** ~~These are found mainly in French waters. A "bordure lumineuse" is described~~ ~~is a light whose source~~ has a linear form, usually horizontal, which can reach a length of several metres. This type of light may be used, eg on heads of piers, along quay walls, at the corners of quays, on dolphins, replacing or in addition to a painted strip. Occasionally they are disposed vertically to enable bearings to be taken from them; in such cases, the legend '(vert)' should be included in the light description. A strip light may have a rhythmic character and may be coloured. The light-description should be in conventional form.

The symbol for a strip light must be a small black position circle ~~and normal light-description in abbreviated form,~~ with a serrated (zig-zag) line in magenta, or the appropriate colour on 'multicoloured' charts, instead of the conventional flare, eg:

P64

Commentaire [c83] : DID, please insert additional yellow version of the symbol.

Commentaire [c84] : This sentence was added in round 2 from a comment by AU. However, AU now suggests deleting it. How do other HOs encode synchronized lights in ENC (that is, is a linkage or 'aggregation' made between the objects)?