

9th CSPWG MEETING
Seoul, Republic of Korea, 13-16 November, 2012

Paper for Consideration by CSPCWG
Outstanding issues from CSPCWG Letter 08/2012

Submitted by:	Chairman
Executive Summary:	There are a few outstanding issues from Letter 08/2012 that can most easily be resolved by discussion
Related Documents:	S-4
Related Projects:	Other lights issues covered by papers A-C.

Introduction / Background.

CSPCWG Letter 08/12 dealt with CSPCWG8 actions 12, 14, 36 and 37 (all to do with lights). There were some suggestions for improving on the draft wording of B-470.5 (Action 12). Most of these can usefully be included and are not controversial; details are in Annex A to this paper. Two of the comments require further consideration. There was also a significant minority view in the response to question 37b.

These outstanding issues will be most easily resolved by discussion.

Analysis / Discussion.

Copy of Annex A to CSPCWG Letter 13/2012:

CSPCWG8 ACTIONS 12, 14, 36 and 37

CONSOLIDATED RESPONSES

CSPCWG8 Action No	Question	Yes	No
12	Do you agree with the draft rewording of B-470.4a?	BR, CA, ES, FR, IN, JP, LV, NL, NZ, SE, UA, UK, ZA	AU, DE, DK, FI, GR, NO, TR, US(NOAA),
	Do you agree that these changes are 'clarifications' in accordance with TR 2/2007?	BR, CA, DE, DK, ES, FR, GR, IN, JP, LV, NL, NO, NZ, SE, TR, UA, UK, US(NOAA), ZA	AU, FI,
14	Do you agree that nothing further should be done about defining 'major' lights, until IALA provide more advice?	AU, BR, CA, DE, DK, ES, FI, FR, GR, IN, JP, LV, NL, NO, NZ, SE, TR, UA, UK, US(NOAA), ZA	
36	Do you agree that nothing further should be done about defining 'Dir' light sector widths, until IALA provide more advice?	AU, BR, CA, DE, DK, ES, FI, FR, GR, IN, JP, LV, NL, NO, NZ, SE, TR, UA, UK, US(NOAA), ZA	
37	a. Do you agree that no specific symbol should be invented for the 'arc-pointer' light?	AU, BR, CA, DE, DK, ES, FI, FR, GR, IN, JP, LV, NL, NO, NZ, SE, TR, UA, UK, US(NOAA), ZA	
	b. Is there a need to devise a generic method to show on charts that a navigation	ES, GR, LV, NO, NZ, TR, US(NOAA)	AU, BR, CA, DE, DK, FI, FR, IN, JP,

	light is 'highlighted'? If you answer 'Yes', please provide your suggestion(s) in the comment section below.		NL, SE, UK, ZA
	c. Should detail of any 'highlighters' be described in an associated publication (eg Lights List or Sailing Directions)?	AU, BR, CA, DE, DK, ES, FI, FR, GR, IN, JP, LV, NL, NO, NZ, SE, TR, UA, UK, US(NOAA), ZA	

SUMMARY OF OUTSTANDING ISSUES

The two areas where there seem to be mixed views are Actions 12 and 37. See details of comments and responses at Annex A.

Action 12: most suggested changes are useful but minor detail, which can be easily resolved. The following stand out as requiring further consideration:

- The use of the generic magenta flare:
 - Is not yet approved by MS
 - Some WG members still have reservations. A potential solution may be to change 'must' to 'should' at vi: '*a single magenta flare should be used*'.
- Precedence of small dashes or coloured arcs for sector arcs (suggested by DK, GR, NO, SE)

Notes:

1. All the changes seem to be accepted as 'clarifications' apart from the 'generic flare'.
2. The draft wording of S-4 B-470.4a as proposed in CSPCWG Letter 08/2012 is at Annex B for reference.
3. The revised draft wording, amended from responses to Letter 08/2012, is at Annex C. Points still requiring discussion are highlighted in yellow below and in Annex C.

Action 37: although a small majority were content that no chart action is required for 'highlighted' lights (ie rely on List of Lights), there is a significant minority who consider that some legend adjacent to the light (or its description) would be useful. Whatever the outcome, some guidance should be given in S-4.

Conclusions.

1. Further discussion is needed to resolve outstanding reservations about the use of a 'generic' magenta light flare, before submission to Member States for approval.
2. Some change is required to the wording of draft B-470.4 to give precedence to coloured arcs over small dashes for sector arcs.
3. Some advice should be included in S-4 about the charting, if required, of 'highlighting' for navigation lights.

Recommendations.

1. Add sentence to B-470.4a ii:

If the light is multicoloured and the sectors are not charted, a single magenta flare must [or should?] be used.

2. Amend first sentence of B-470.4a v to read:

Sector arcs should be shown by coloured arcs, which may be supplemented by fine black dashes:

3. Include advice in S-4 on how to chart 'highlighted' aids to navigation, if at all. (Some suggested wording is included in Annex D. These may be more detailed than required for charting guidance alone, but as drafted serve to explain the reasoning behind highlighting and possible methods that may be used).

Justification and Impacts.

Improve consistency in the charting of light detail.

Action required of CSPCWG.

The CSPCWG is invited to discuss these issues and advise the CSPCWG officers how to proceed.

Further comments from respondents to CSPCWG Letter 08/12
with Chairman's responses

These are the comments which are relevant to the discussion points for the meeting. The full list of comments is in CSPCWG Letter 13/2012 Annex B.

AUSTRALIA

Action 12: The statement at paragraph a(ii) 5th bullet point - "For another use of magenta flares on multicoloured lights, see (vi) below" - is applicable for all colours of lights. Suggest a separate paragraph after the bullet points (see comment for paragraph a(vi) below).

Paragraph a(vi): While the first part of this paragraph describes a single multicoloured (sector) light (except for the reference to all-round lights), the bullet points following describe multiple lights exhibited from the same structure or from the same charted light star due to chart scale, which is a different circumstance. Australia suggests the following amendments to this paragraph:

- Move the first sentence to paragraph a(ii), after the bullet points as a separate (non-bulleted) paragraph reading: "If a light is multicoloured and the sectors are not charted, a single magenta flare must be used."

The concept of the use of a magenta flare as a generic flare for multicoloured sector lights on multicoloured charts where the sectors are not shown is new, and therefore cannot be classified as a "clarification" as defined in TR 2/2007. Australia considers that this is new specification, and as such constitutes a "revision" in terms of TR 2/2007 and should be presented to MS for approval, particularly as the statement at paragraph a(vi) in the draft is a "must".

Chairman: Agree – we had missed the fact that this has not yet been through the approval process. It will also affect B-494 and B-495.4. Of course, a generic magenta light flare has been used from at least when IHO chart specs were first developed.

Action 14: Discussions at TSMAD and DIPWG in regard to "major" lights reflects the discussions at CSPCWG8 and the summary of this discussion in the Minutes. As stated, the decision to define a "major" light in terms of ECDIS display as a light having a nominal range of 10M or more was made solely to improve the identification of these lights by the mariner, due to S-57 being frozen. For S-101 ENC's, a new Boolean attribute (major light) has been added in order to allow encoders to individually identify a light as a "major" light, regardless of other attribution for the light, which will contribute to the way the light will be displayed in ECDIS. This is consistent with the CSPCWG Secretary conclusion that the decision of whether a light is a "major" light comes down to cartographic judgement, considering all relevant factors. Any future modelling of lights for S-101 in this regard will also be based on further consideration by IALA.

Chairman: We will discuss this further at WG9. We are consulting with IALA.

Action 37: Given that, although it is stated that these pointer lights are not considered to be aids to navigation, but may be used as such as stated for the “arc pointer” type light, a reference to a chart Note would be appropriate. In terms of devising a generic method for indication of “pointers”, given that IALA have identified numerous methods of increasing the conspicuity of lights other than those currently used indicates that a generic symbol is not appropriate. The widely varying methods described could not be adequately described using a generic symbol, unless accompanied by a chart Note, and the reference to the chart Note itself would be considered to be sufficient.

Chairman: The ‘vote’ is 13/7 against a generic method of showing that a light is ‘highlighted’. Presumably the majority consider that a note in the List of Lights is sufficient. However, perhaps there should be an option to add ‘(see Note)’ adjacent to the light description. In S-4, we could add ‘highlighting’ as an example in B-478.2 plus a brief explanation and the option of a note at the currently empty space at B-478.4.

DENMARK

Action 12: **iii.** and **iv.:** DK agrees with the comments from NO and GR that the options should be ‘reversed’...

Chairman: See response to GR.

v.: DK uses both the red and the yellow flare on lighted platforms and will probably continue to do so in the future. Production platforms are shown in only one Danish chart (INT 1044) in scale 1:375000 and we have not yet experienced problems with clutter in this chart.

Chairman: The WG agreed to magenta flares for platforms, although it was by no means unanimous (10/7 – see responses to WG Letter 6/11). The phrase about adopted charts will be removed.

In general DK is a bit reluctant to introduce the use of the generic magenta flare in Danish charts as long as the use of true colours do not cause any clutter. We are concerned that the introduction of a magenta flare would cause unnecessary confusion instead.

Chairman: In smaller scale charts in many offshore parts of the world (eg W Africa, Caribbean) clutter is a real issue and would be cartographically ‘incontinent’ where the lighting of platforms is uniform. The task for the majority of chart producers to overturn decades of precedent in their charts would be impossible to justify.

FINLAND

Action 12: **v.** and **xi.** – FI recognises that this has been agreed on previously, but we still are not comfortable with such a direct guidance to substitute the true colour flare with a generic magenta flare just based on the nature of the light. As stated by DK, why change if the true colours do work? We would rather see the generic magenta flare as an alternative in these cases.

Chairman: See response to DK. We understood previously from FI that using several different coloured flares at a single light star was ‘misinterpreted by chart users’ (FI response to WG Letter 6/11).

FRANCE

Action 37: France considers that the main information is the characteristics of the navigational light. How the light is made visible, considering all the possible devices, is not the purpose of the charts but of the lists of lights (“It

does not seem appropriate to try and devise methods of separately charting all these (and future) possibilities”).

Chairman: Agree. See also response to AU.

GERMANY

Action 12: We still have a problem to chart a magenta flare on a multicoloured chart if the principle navigational light is a white light. In this case we would chart a yellow flare. With the first and the last point under v) we only confuse the cartographer and therefore we propose to delete them. Also we have problems with the restriction vi) – we chart several flares together where sectors are not appropriate. Perhaps we have misunderstood the case of vi) and therefore need some chart examples. Attached you find an example of a combined light with multicoloured flares and sectors ([chart DE 1622](#)).

Chairman: I cannot see anything confusing about the points in ‘v’. The first point was agreed in response to Letter 6/2011. The last point is no change from existing practice, in accordance with S-4 Part C. With regards to vi, we could consider changing ‘must’ to ‘should’ – see summary.

Action 37: We should not invent a new symbol but if helpful for navigation in the light description could be added an attribute abbreviation like illum for illuminated.

Chairman: ‘illuminated’, or equivalent, or the symbol P63 would certainly be an option in some cases, but perhaps not for all – including the arc-pointer.

GREECE

Action 12: iii. Sector limits should be fine continuous line, but may be shown as fine dashed lines.

Chairman: sector limits have always been charted as fine dashed lines, except where the limits are emphasised by a continuous line to represent fairway limits (B-475.1 refers). There has not been any proposal to change it and I cannot see any reason to do so.

iv. Sector arcs should be solely coloured arcs, but may be shown as fine dashed lines.

Chairman: sector arcs have always been charted as fine dashed lines (B-475.1 refers) on standard charts. However, the purpose of multicoloured charts is to show coloured sector arcs but we have not made that clear in the text. I agree therefore that the coloured arcs should be given priority, the black dashes as an optional extra. We will amend to ‘Sector arcs should be shown by coloured arcs, which may be supplemented by fine black dashes.’

JAPAN

Action 37: (b, c)

When a navigation light is installed, Japan choose its colour and intensity considering its surroundings. Its detailed information is described in the List of Lights. The method to show ‘highlighted’ navigation lights on charts should depend on conditions in each country, due to indefiniteness of ‘highlighted’ or ‘highlighters’.

Chairman: Agree.

LATVIA

Action 37b: Could be with the additional legend.

Chairman: See response to AU.

NETHERLANDS

Action 37: only use an abbreviation, no new symbol

Chairman: See response to AU.

NORWAY

Action 12: iv. Sector arcs should be shown solely by coloured arcs, but may be fine dashed lines.

Chairman: See response to GR.

Action 37: a Not relevant in Norwegian charts at the moment.

b: In Norway we have a lot of highlighted structures that also may include a navigational light on the very top of the structure. Highlighted parts are the rock on which the structure is situated, and the white board with a number (two last figures in List of lights if the installation also is an AtoN light).



If *navigation light is 'highlighted'* means that the navigation light is intensified, we should maybe write it in other words.

Chairman: We are not talking about 'intensified', which can only apply to a sector – that is already covered (P46). The light supports you illustrate above are really floodlit, which you show correctly by P63. That may be a suitable symbol in some cases of 'highlighting', but would not work for the arc-pointer, for example. See response to AU.

NEW ZEALAND

Action 37b. We would like to see these added to charts as they are designed to be highly visible from seaward. We have not been able to come up with any clever suggestion of how to chart them. Our only suggestion is to add the text '(with pointer)' at the end of the light description.

Chairman: See response to AU.

SPAIN

We agree to insert a text legend (arc-pointer) next to the light description and a note in the List of Lights or Sailing Directions, rather than a new symbol.

Chairman: See response to AU.

SWEDEN

Action 12: SE agrees in general with the draft rewording, but would prefer (as already commented by NO, DK and GR) a revised order regarding dashed and continuous lines in iii. We also agree with NO, DK and GR to change iv. to something like 'Sector arcs should be shown solely by coloured arcs, but may be shown additionally with fine dashed lines'.

Chairman: See response to GR.

TURKEY

Action Item 37: It might be put a legend close to the light which is highlighted.

Chairman: See response to AU.

US(NOAA)

Action 12: subpart vi, second bullet- NOAA does not produce multi-coloured charts, so I'm still somewhat baffled by the standards for them; so please bear with me. According to B-470.4a, subpart ii, a magenta light flare represents a red light or a violet light on a multi-coloured chart. So I suppose, the mariner has a reasonable expectation that when he/she sees a magenta flare on a multi-coloured chart, the colour of the light is red or violet.

Now, look at B-470.4a, subpart vi, second bullet. I've lost this argument before, but I still think that when a generic magenta flare is used on a multi-coloured chart in association with two different coloured lights on the same light star, a note, such as (*see note*) should be referenced clarifying to the chart user that the generic magenta flare does not represent the red or violet light expected at first glance at the chart, since magenta is generally used on multi-coloured charts for a red or violet light. Subpart vi strays from the practice expected from subpart ii. The mariner might not immediately recognize the textual characteristics of the light. This is a multi-coloured chart. Isn't he or she looking primarily for the colour of the flare? The flare is magenta, but the lights aren't necessarily red. A note would be helpful.

Chairman: See response to DE and summary. If we need to put 'see Note' to explain a symbol, then the symbol is not very useful. We have already agreed to include a note about the generic flare in INT1 (at next edition).

Action 37: Text may be added to the navigation light [such as "highlighted", "arc-pointer" or "(see note)"] to assist the mariner in identifying which charted aid to navigation is being highlighted. Captain: "I see an arc of light pointing to a navigation light. Pull the List of Lights. What do you mean, you can't find it? Is it on the web? I'd look it up in the Sailing Directions but this class of vessel isn't required to carry one. I'll look at the nautical chart to see which aid it is pointing to. I hope the chart does not show a non-intuitive symbol. Oh, look, my chart shows the word "highlighted" next to Harbour Light #2. Thank goodness for cartographers."

Chairman: I think this means you would like to see a legend adjacent to the light description either describing succinctly the type of highlight, eg '(arc-pointer)' or '(see Note)' with more details in the note. This agrees with AU (and others) view.

Draft wording of S-4 B-470.4a as proposed in CSPCWG Letter 08/2012

The following is a revised text for B-470.4a, including additional clarifications from CSPCWG correspondence (see Letter 06/2011) and discussions at CSPCWG8. New guidance and changes from existing guidance is in italics; this will revert to upright type when approved and published in S-4.

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. The following specifications should be adhered to on multicoloured charts, to achieve conformity. For further guidance on placing sectors, see IHO Specs B-475. *Note that charts of scale smaller than 1:2 000 000 should be produced in the standard four colours and conform to the specifications in Part C.*

- i. **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.
- ii. **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. *For another use of magenta flares on multicoloured lights, see (vi) below.*
- iii. **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 B-475.1, B-475.5 and INT1 P41.2).
- iv. **Sector arcs** should be fine dashed lines, but may be shown solely by coloured arcs. *Additionally:*
 - Coloured sector arcs (or circles for all-round, ie 360°, lights; see (v) below) should be 1mm wide. Faint sectors may be 0.5mm wide *and/or distinguished by the legend ‘Faint’*. 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. A *major light is not defined by range, but by the importance of the light in the context of the chart - a matter of cartographic judgement*. Leading lights (with narrow sectors) and minor lateral lights should usually be shown by flares.
 - The **international abbreviation** for the colour or character of the light should be added *on the arc*, in case the colour is difficult to distinguish under a vessel’s bridge lights. For omission of the colour abbreviation in the light description, see B-472.3.
 - Where coloured arcs (including circles for all-round, ie 360°, lights) are *placed within 30mm of the light star; shown*, the flare(s) *may should* be omitted. *In the latter case, coloured flares should be located at the light star.*
 - Coloured sector arcs should be situated to avoid conflict with significant detail. 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. *Avoid clashes with legends, soundings and symbols if possible; consider the*

possibility of moving legends. If unavoidable, yellow may overprint black or magenta, but other coloured bands should be broken.

- v. **Major all-round navigational lights** should normally be surrounded by a circular 1mm band of the appropriate colour, radius approximately 10mm. No attempt should be made to make the radius of the circle proportional to the range of the light. The circle should continue across land and be unbroken if possible, including through dark sectors invisible from the sea. The following exceptions are marked by flares instead of circles:
- Lighted platforms usually have a 15M white light, but also have lower power red lights. They should have a single magenta flare; where necessary, the flare(s) on adopted charts should be changed accordingly. Note that renewable energy devices, such as wind turbines, marked according to IALA convention have only yellow navigation lights and therefore should have yellow flares.
 - Major floating lights should be treated as buoys and marked by a flare of the appropriate colour.
 - Lights without descriptions on small-scale charts are conventionally shown by a light star with a flare but no description. They are the only lights on the chart, and the flare is simply there to draw attention to the existence of a major light rather than give information about its character. They should continue to be charted with a generic magenta flare.
- vi. **Multicoloured lights.** If a light is multicoloured and the sectors (or circles for all-round lights) are not charted, a single magenta flare must be used, except as follows:
- Where there is a major all round light, with a separate red sector light covering a danger, this should normally be symbolised by the all round light circle around the light, with the red light symbolized separately by its sector, with red arc, covering the danger. If the chart scale is too small to show the red sector, then omit the associated light description too.
 - Where two or more separate and different coloured lights are charted at the same light star (because they are on the same structure or because of scale), separate flares for each colour should normally be shown. If this would obscure detail, then a single 'generic' magenta flare may be shown.
 - Where lights include subsidiary 'reserve' lights of a different colour, use the flare colour for the main light only; reserve lights should not be charted.
- vii. **Alternating and oscillating** lights should be shown by parallel ~~or overlapping~~ different coloured arcs (or circles for all-round lights), normally with no gap between (P30.4). Exceptionally, if a light alternates between blue and green, a visible but small gap should be left, to assist perception that there are two separate colours.
- viii. The **Moiré effect** symbol (P31) should be charted by a magenta triangle.
- ix. The **floodlit** (illuminated) symbol (P63) should be yellow/orange.
- x. The **strip light** symbol (P64) should be coloured as appropriate to the light.
- xi. **Aero navigation lights** (P60) may be single or multicolour (often alternating colours) and are assumed to be all-round. However, as they are not intended for marine navigation (and information may not be available as to status of the light), it is not appropriate to give undue prominence to these lights. They should therefore be charted with a generic magenta flare.
- xii. Unusual lights, or other lights which do not readily conform to the instructions above, may need to be explained by a charted note.

Draft wording of S-4 B-470.4a as amended
from responses to CSPCWG Letter 08/2012

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. The following specifications should be adhered to on multicoloured charts, to achieve conformity. For further guidance on placing sectors, see B-475. Note that charts of scale 1:2 000 000 and smaller should be produced in the standard four colours and conform to the specifications in Part C.

- i. **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.
- ii. **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 should be used for violet lights.

If the light is multicoloured and the sectors are not charted, a single magenta flare must [or should?] be used.

- iii. **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 B-475.1, B-475.5 and INT1 P41.2).

iv. **Sector arcs** should be shown by coloured arcs, which may be supplemented by fine black dashes:

- Coloured sector arcs (or circles for all-round, ie 360°, lights; see (v) below) should be 1mm wide. Faint sectors may be 0.5mm wide and/or distinguished by the legend ‘Faint’. 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, ie 360°, lights; see (v) below) should be used on all major lights. A major light is not defined by range, but by the importance of the light in the context of the chart - a matter of cartographic judgement. Leading lights (with narrow sectors) and minor lateral lights should usually be shown by flares.
- The **international abbreviation** for the colour or character of the light must be added *on the arc*, in case the colour is difficult to distinguish under a vessel’s bridge lights, see also B-475.2. For omission of the colour abbreviation in the light description, see B-472.3.
- Where coloured arcs (including circles for all-round, ie 360°, lights; see (v) below) are shown, the flare(s) should be omitted.
- Coloured sector arcs should be situated to avoid conflict with significant detail. 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. Avoid clashes with legends, soundings and symbols if possible; consider the

possibility of moving legends. If unavoidable, yellow may overprint black or magenta, but other coloured bands should be broken.

- v. **Major all-round navigational lights** should normally be surrounded by a circular 1mm band of the appropriate colour, and should be situated to avoid conflict with significant charted detail. No attempt should be made to make the radius of the circle proportional to the range of the light. The circle should continue across land and be unbroken if possible, including through dark sectors invisible from the sea. The following exceptions are marked by flares instead of circles:
- Lighted platforms usually have a 15M white light, but also have lower power red lights. They should have a single magenta flare. Note that renewable energy devices, such as wind turbines, marked according to IALA convention have only yellow navigation lights and therefore should have yellow flares.
 - Major floating lights should be treated as buoys and marked by a flare of the appropriate colour.
 - Lights without descriptions on small-scale charts are conventionally shown by a light star with a flare but no description. They are the only lights on the chart, and the flare is simply there to draw attention to the existence of a major light rather than give information about its character. They should continue to be charted with a generic magenta flare, see C-414.
- vi. **Multiple lights of different colours exhibited from the same structure** (or charted at the same light star due to scale) should be shown as described above, except as follows:
- Where there is a major all-round light, with separate sectors, eg a red sector covering a danger, this should normally be symbolized by the all round light circle around the light, with the red light symbolized separately by its sector, with red arc, covering the danger. If the scale of the chart is too small to show the red sector, the associated light description at the light star must also be omitted (see also B-472.4).
 - Where two or more separate and different coloured lights are charted at the same light star, separate flares for each colour should normally be shown. If this would obscure other charted detail, then a single 'generic' magenta flare may be shown.
 - Where lights include subsidiary 'reserve' lights of a different colour, the main light only should be shown; reserve lights should not be charted.
- vii. **Alternating and oscillating** lights should be shown by parallel different coloured arcs (or circles for all-round lights), normally with no gap between (P30.4). Exceptionally, if a light alternates between blue and green, a visible but small gap should be left, to assist perception that there are two separate colours.
- [insert example] (suggested by FR)
- viii. The **Moiré effect** symbol (P31) should be charted by a magenta triangle.
- ix. The **floodlit** (illuminated) symbol (P63) should be yellow/orange.
- x. The **strip light** symbol (P64) should be coloured as appropriate to the light.
- xi. **Aero navigation lights** (P60) may be single or multicolour (often alternating colours) and are assumed to be all-round. However, as they are not intended for marine navigation (and information may not be available as to status of the light), it is not appropriate to give undue prominence to these lights. They should therefore be charted with a generic magenta flare.
- xii. Unusual lights, or other lights which do not readily conform to the instructions above, may need to be explained by a charted note.

Draft new specification: B-478.4

B-478.4 Highlighting of navigation lights. Light pollution, such as street lighting, harbour area floodlighting, architectural lighting and lit signage can cause serious problems for a mariner trying to identify an important navigation light.

There are various options available for highlighting navigation lights to make them more easily detected and identified. Some are more useful close up, others further out to sea. Some options, such as choosing a colour which contrasts with the background or rival lights, may not be available because the navigational purpose of the light dictates its colour (ie red, green, yellow or white). Even so, some adjustment to the precise colour may be useful, eg a 'bluey-white' light, such as a white LED, may contrast sufficiently with yellowy-white sodium street lights. Similarly, a rhythmic light is usually more easily seen, but again, the character may be dictated by the navigable purpose. Also, there may be scope for using a faster flash rate, which is more easily detected than a slow one.

Many methods of increasing the conspicuity of a light are covered the light characteristics which can be included in standard light descriptions. These include:

- rapidly alternating colours (as on emergency wreck marking buoys) (see B-466.2f);
- increased intensity (see B-471.1);
- faster rhythm (see B-471.2 and B-471.5);
- alternating flashing pairs of lights (similar to road lights at a level crossing) (see B-471.2 and B-471.8);
- the disposition (see B-471.8);
- floodlighting the structure (possibly by a different colour from the background lights) (see B-478.2);
- synchronizing (including sequencing) groups of lights (see B-478.3).

Other methods of increasing the conspicuity of a light (some still experimental) would be difficult to chart using current methods; these include:

- Flickering the navigation light within the flash profile at a frequency of around 10Hz
- Exhibiting a high intensity strobe light next to the navigation light at the beginning of its rhythmic sequence can have the effect of drawing the observer's eye to the navigation light.
- 'Pointer' lights. This device is an arc of light that is installed on the shore next to an existing navigation light. The arc-pointer displays a circular sequence of lights that gives the user the impression of a moving pointer. This is used to 'point' to the position of an navigation light. The arc-pointer is not itself a navigation light but can be used as such by the mariner until the actual navigation light is identified. This 'arc-pointer' is more conspicuous than background light because of its shape, colour and the apparent movement caused by the sequenced flashing. Also, since the arc is oriented perpendicular to the direction of approach to the port, the observed shape of the arc can also give an indication of position: if the mariner is taking a direct approach to the

port entrance, a circular shaped arc will be seen; if the mariner is taking an oblique approach, the mariner will see an elliptical shaped arc.

- **Shape of Light Source.** A lit shape can provide a very conspicuous marker, used either as a pointer to an AtoN or as an AtoN in its own right.
- **Flashing floodlights on and off, or repeatedly changing the colour of the floodlight, can significantly enhance conspicuity.**
- **Contour Lighting.** Highlighting the outline shape of a structure with low luminance strips of light can be useful for two reasons: it provides a recognizable shape and it gives an impression of size and distance.

This is not an exhaustive list, and further devices may be invented. There is no generic symbol to chart these (and future) possibilities. Instead, details should be provided in the Lists of Lights. A legend '(see Note)' may be added to the light description, with a description of the method of highlighting being given in the note or a reference to the List of Lights.