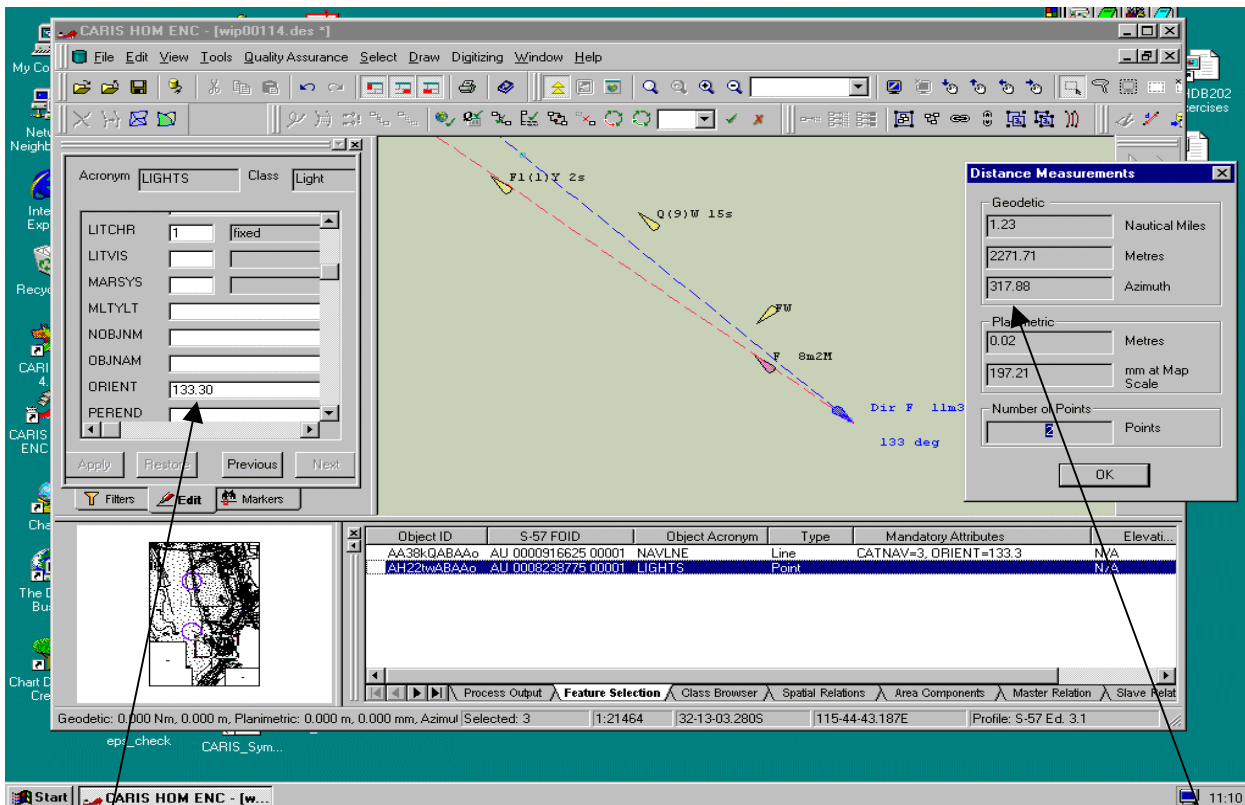


## Issue with directional lights on ECDIS display

Background.

Australia believes there is a problem with the display of directional lights on ECDIS, at least when captured from paper charts based on the Transverse Mercator projection. The graphic below illustrates the exact issue and some further explanations.



The red line is an S-57 object **NAVLNE** created from a spatial feature in a Transverse Mercator chart.

Its attribute **ORIENT** = 133.3. The bearing also reads 133.3 when queried in CARIS HOM. All appears to be correct.

The blue line is **software generated** based on the attribute **ORIENT** (is also 133.3) of a directional light created as an S-57 object **LIGHTS** (see pop up window above).

The bearing of the blue line when queried in CARIS HOM is 137.88 degrees, not 133.3 degrees. (CARIS display has been used to highlight the issue. Some ECDIS which extend directional lights over long distances also display this issue (a plot will be shown at the actual CSMWG meeting. However when an OEM displays a short line for the directional light, usually in conjunction with other coloured sectors, the discrepancy cannot be seen as the emerging gap widens the further out from the light you go).

The source of the discrepancy is unknown. It may be because the source was a large scale Transverse Mercator paper chart, it could be caused by a mathematical formula

used in the Presentation Library, it may be an OEM issue if they create the bearing of the directional light using their own algorithm, or it may be caused by some OEMs re-projecting the display to a certain projection, rather than leaving the display projectionless. (S-57 datasets are Lat/Long based and projectionless).

Australia believes that the S-52 Presentation Library should be amended to remove the automatic generation of the line representing the bearing of the directional light (shown blue above, but the colour appears to alter between various ECDIS). It also suggests that S-58 (the Recommended ENC Validation Checks) should be amended to provide a WARNING that all directional lights should be associated with a **NAVLNE**. This check is only to be a WARNING, not an ERROR because in Australia and probably other nations as well, we have some directional lights with a very narrow highly intensified sector, which we encode as **CATLIT=1** directional, together with **SECTR1** and **SECRT2** for the narrow intensified sector. In the more common case of directional lights, a **NAVLNE** will be encoded, but NOT in the case of these narrow highly intensified sectors.

Some TSMAD members will be reviewing a possible new edition of S-58 in May 2006 before the CSMWG meeting. It may be possible to include this check if we all agree that this is the best way to go? If there is agreement, the CSMWG could then remove the CSP that automatically generates the bearing line. It is emphasised that when Australia encodes a narrow highly intensified sector, the ECDIS presentation will actually conflict with the ENC encoding, which is another reason to remove the part of the CSP that creates the bearing on ECDIS.

This issue was circulated to the Chairmen of CSMWG, TSMAD, CARIS support and the IC-ENC as there are many bodies with an interest in this type of change, if approved. We need to share our opinions before any action is taken.

The issue will probably involve some more research on CSMWG's part to see how the bearing is calculated in ECDIS. Australia is concerned how the bearing of sector lines are also calculated on ECDIS as this may also be a related issue? One would expect that the sector line on the de-projected ECDIS would be curved as it is straight on the Mercator projection charts?

It would also appear that some OEMs actually project their ECDIS as Mercator or Equidistant Cylindrical, which is apparently used to create the seamless nature of the SENCs in the ECDIS display. This can be seen in the 'Chart information panels' for the S-57 E3.1.1 test graphics. Perhaps this display projection is causing the bearing issue?

Holger Fasterding ([holger.fasterding@bsh.de](mailto:holger.fasterding@bsh.de)) from BSH conducted some independent tests in June 2005 and his report follows:

In our waterways spontaneously two directional lights cross my mind, one in the approach of Wismar and one in Stralsund. Both have **ORIENT** set to unknown and are defined by **SECTR1** and **SECTR2** as a narrow sector. In the visualisation tools I know, **ENCDesigner**, **ORCAMaster**, **dkartinspector** and **ECPINS** there are no display problems caused by the open **ORIENT** value. For the purpose of testing, I have modified the light Lieps by substituting the **SECTR1** and **2** values by **ORIENT**. On all systems (see attachment) the direction of the bearing line is correct. The only difference to Australian cells is that our paper charts, that were used as source, have a simple Mercator Projection and not a Transversal, but that should not make a difference. My assumption is that the display at the CARIS system is erroneous.

Therefore I would recommend not to do any changes at all. Particularly I do not see any sense in creating **C\_AGGR** objects between **NAVLNE** and **LIGHTS** especially because we principally do not create such objects.

Best regards

Holger Fasterding

So BSH could not detect this issue with the software they have available. From Australia's observations, it appears to be a display issue for both CARIS and the S-52 Presentation Library. As the 'line' of the directional light is not selectable on ECDIS, a simple solution may be to not symbolise directional lights with the bearing line. This issue was discussed at C&S14 and the concern was that HOs were not trusted to encode the navigational line for directional lights and that the PL would continue to generate the line automatically (C&S14 Minutes, section 12.4). The paper C&S14-12D was from Mike Eaton to C&S14 meeting. It mentions only a clutter issue but in fact (as can be seen from the above graphic), it is a mis-alignment of the bearings issue, which is far more serious. Perhaps there is something wrong with the software that automatically generates the bearing line on the ECDIS?

CARIS has suggested that S-58 be updated to include a check that all **LIGHTS** with a **CATLIT=1**, must have a **NAVLNE** associated with it. This is the same suggestion that Richard Carpenter came up with at the C&S14 meeting (see Minutes). But note there is now an issue with narrow highly intensified sectors (see background information above). As S-58 is in review, and is not within the S-57 'freeze', it may be possible to update it, which in turn would allow the CSMWG to remove the section of the CSP that automatically generates the bearing for directional lights.

On 6/06/05 Mike Brown, Chairman of TSMAD wrote:

At first look, I think that it is reasonable to add this to S-58. In fact, since the S-57 UOC 12.8.6.5 Directional lights states "The recommended track must be encoded by the method described in clause 10.1" (clause 10.1 is Leading, clearing and transit lines and recommended tracks). I'm surprised that there isn't already a check due to the 'must.' In order for the test to work, the line(s) and the light must be aggregated, which is already required under UOC 10.1.2 and tested by 1682. I would suggest that an encoding bulleting might also be produced to emphasize that if these rules are not followed, an ECDIS will not display the recommended track (assuming that the symbolization based on the light is removed from the PL).

Looking at the existing test 1756 in S-58, I wonder exactly how it is implemented in testing software. It isn't clear to me that the test requires an **ORIENT** value for a directional light; however test 507 does check for mandatory attributes and **ORIENT** is mandatory for directional **LIGHTS**. What would the effect be of encoding the **ORIENT** as unknown (i.e., null) on the light? Does that result in a '?' on the display? If not, could the issue be solved with an Encoding Bulletin that points out the problem with the solution of an 'unknown' **ORIENT** on the **LIGHTS** and a mandatory recommended track? This would then be an encoding fix with no PL change required.