

**11th CSPCWG - 1st NCWG MEETING
Rostock, Germany 27-30 April 2015**

Paper for Consideration by Nautical Cartography Working Group (NCWG)

Proposal to Define ENC Symbology for Virtual AIS Aids to Navigation (V-AIS AtoN)

Submitted by:	USA (NOAA)
Executive Summary:	Report on the survey responses received in reply to DIPWG Letter 2-2014, "Proposed New S-101 Symbols for Virtual AIS Aids to Navigation (V-AIS AtoN)," the subsequent discussion of the survey results at the February 2015 DIPWG7 meeting, and modified recommendations for NCWG to consider, based on DIPWG and TSMAD feedback.
Related Documents:	DIPWG Letter 2-2014 , "Proposed New S-101 Symbols for Virtual AIS Aids to Navigation" TSMAD29/DIPWG7-10.1A , "S-101 Symbols for Virtual AIS Aids to Navigation" S-4 , <i>Regulations for International (INT) Charts and Chart Specifications of the IHO</i> S-57 , <i>Appendix B.1, Annex A, Use of the Object Catalogue for ENC</i>
Related Projects:	S-100/S-101 Testbed

Introduction / Background

In July 2013, the combined DIPWG Presentation Bulletin 10 / TSMAD Encoding Bulletin 52 was posted on the IHO website. In June 2014, the bulletin information was incorporated into the *S-57, Appendix B.1, Annex A, "Use of the Object Catalogue for ENC,"* section 12.14.1.1 (see annex C). This describes an interim solution for encoding a dozen types of virtual AIS Aids to Navigation (V-AIS AtoN) using the NEWOBJ object while S-57 remains "frozen." It also specifies the symbology to be used to portray the objects, a combination of S-52 symbols that are already installed in operational ECDIS systems.

In August 2014 [DIPWG Letter 2-2014](#) presented a number of options for DIPWG to consider for a permanent solution for portraying V-AIS AtoNs. The letter provided a survey and survey responses were received from five member states, Australia, France, Japan, Norway and USA; from one OEM, Jeppesen; and a set of eight comments were also received through the Australian Maritime Safety Authority (AMSA) from "mariners and marine related cartographers" within the AMSA and marine pilots external to the AMSA.



An analysis of the survey results was presented at the joint TSMAD29/DIPWG7 meeting (Ottawa, Feb 2015) in paper [TSMAD29/DIPWG7-10.1A](#), which presented a narrowed down set of options (see Annex B) for consideration by the working groups.

You are strongly encouraged to read [TSMAD29/DIPWG7-10.1A](#), as you would an annex to any CSPCWG/NCWG paper. The discussion below addresses the joint meeting participants' reactions to the paper's recommendations.

Analysis/Discussion/Conclusions

Agreement on basic components




Four components of the symbol designs presented in the DIPWG letter were nearly universally preferred by survey respondents and attendees at the February 2015 TSMAD29/DIPWG7 meeting. These were:

1. Use of the S-52 magenta circle symbol for radio station, SY(RDOSTA02).
2. Use of the S-52 traditional, "paper chart" symbols for beacon topmarks.
3. Centring the topmark elements within the magenta circle , as opposed to placing the topmark above a position circle as is specified in S-4, §B-489.1. 
4. Use of the "V-AIS" label in the 3 o'clock (right side, centred vertically) position.




The discussion at the meeting also reinforced the idea that the centred topmark symbols should be enlarged slightly and that use of coloured topmarks made identification of the aids purpose easier on a busy ECDIS display. Use of colour also addresses a growing concern about the abundant use of magenta on nautical charts. Unfortunately the group could not come to a consensus on the set of symbols as a whole. There were a few who thought that the original symbols proposed for the S-57 NEWOBJ implementation should be retained, because

they were already in use and changing them could lead to confusion. The majority of the others thought that the existing symbols could be improved and that they should reflect the look of the real-world counterparts to the virtual aids.

There are several reasons to support the changing the symbols:

- Although the NEWOBJ symbols were defined in May 2013, not that many V-AIS AtoNs have been implemented, so mariners do not have much experience with the existing symbols to begin with. Once a decision has been made for the symbols to be used for S-101 ENC, these symbols could be considered for implementation in S-57 ENCs before use of the aids becomes more widespread.
- The magenta circle, the "V-AIS" label, and use of topmarks are all being carried forward from the NEWOBJ symbols into the new symbol designs, so mariners familiar with the old symbols should be able to quickly grasp the meaning of the new ones.
- The NEWOBJ symbols made use of the S-52 "simplified" symbols that included the tilted lateral buoy symbols , when an upright symbol would be more appropriate for a "fixed" virtual aid.
- S-52 "simplified" symbols for cardinal beacons  are also specified for the NEWOBJ implementation, which are colored yellow. All the other topmarks proposed use the "real world" colour traditionally used on the actual marks, thus the cardinal marks should be black, not yellow.
- Also, the use of the geometric "simplified" symbols will be illuminated in the symbology implemented for S-101. Therefore, the connection between the centred component of the NEWOBJ symbol and the analogous symbol for the physical aid with the same purpose will be lost.
- The NEWOBJ symbols specify the same  symbol for both special purpose and emergency wreck marking buoys. The new set (with a modified emergency wreck marking symbol) has different symbols for each, based on their traditional real-world topmark shape and colour.

Special Purpose Mark and Emergency Wreck Marking Symbols

Several designs were offered in the DIPWG Letter for the virtual AIS special purpose mark, because it was thought that the ECDIS symbol for isolated danger  could be confused with the magenta version of the special purpose topmark  and that use of the traditional yellow colour for the topmark  might not provide enough contrast against a white background. The black-outlined yellow topmark symbol was preferred by DIPWG letter respondents and by members present at the TSMAD/DIPWG meeting. It was also suggested at the meeting that the same approach be used for the emergency wreck marking V-AIS AtoN symbol.

Recommendations

Given the feedback received, the symbols shown in the far right column on Annex A are recommended for adoption for the ECDIS display of S-101 ENC virtual AIS aids to navigation.

These same symbols should also be approved for use in the ECDIS display of S-57 ENC data in systems currently deployed.

Justification and Impacts

New symbols are needed to portray V-AIS AtoN for S-101 data. The recommended symbols provide distinct, unambiguous depictions for these features.

Action Required of NCWG




















































NCWG is invited to:

- a. endorse the recommended S-101 ENC virtual AIS aids to navigation symbols,
- b. forward the symbols to the S-100WG to evaluate on the S-100/S-101 testbed,
- c. forward the symbols to the ENCWG to implement as an amendment to S-52 presentation library to be used in conjunction with the S-57 NEWOBJ encoding for virtual AIS AtoNs.

V-AIS AtoN Symbols Recommended to CSPCWG / NCWG

Annex A












(The larger size topmarks for the safe water and lateral marks are not shown in this example, but enlarging these centred symbols is recommended. TSMAD/DIPWG also suggested adding black outlines to the coloured lateral and safe water marks, such as those use in the NEWOBJ symbols)

Purpose of Virtual Aid	S-4 §B-489.1.	Current S-52 NEWOBJ	S-101 Proposal made at TSMAD29 /DIPWG7	Modified proposal for CSPCWG11 /NCWG1
No known IALA-defined function	 V-AIS		 V-AIS	 V-AIS
North Cardinal	 V-AIS	 V-AIS	 V-AIS	 V-AIS
South Cardinal	 V-AIS	 V-AIS	 V-AIS	 V-AIS
East Cardinal	 V-AIS	 V-AIS	 V-AIS	 V-AIS
West Cardinal	 V-AIS	 V-AIS	 V-AIS	 V-AIS
Safe Water	 V-AIS	 V-AIS	 V-AIS	 V-AIS
Isolated Danger	 V-AIS	 V-AIS	 V-AIS	 V-AIS
Starboard Lateral (IALA A)	 V-AIS	 V-AIS	 V-AIS	 V-AIS
Starboard Lateral (IALA B)	 V-AIS	 V-AIS	 V-AIS	 V-AIS
Port lateral (IALA A)	 V-AIS	 V-AIS	 V-AIS	 V-AIS
Port lateral (IALA B)	 V-AIS	 V-AIS	 V-AIS	 V-AIS
Emergency Wreck Marking	 V-AIS	 V-AIS	 V-AIS	 V-AIS
Special Purpose	 V-AIS	 V-AIS	 V-AIS	 V-AIS

S-101 Symbol Design Options for Virtual AIS Aids to Navigation

Annex B

As presented in DIPWG Letter 2-2014

Purpose of Virtual Aid	S-52 NEWOB J	S-101 SVG Symbol Name	S-4	S-101 Magenta	S-101 Black	S-101 Coloured		
No known IALA-defined function		VAISTM00	 V-AIS	 V-AIS				
North Cardinal	 V-AIS	VAISTM25	 V-AIS	 V-AIS	 V-AIS			
South Cardinal	 V-AIS	VAISTM26	 V-AIS	 V-AIS	 V-AIS			
East Cardinal	 V-AIS	VAISTM27	 V-AIS	 V-AIS	 V-AIS			
West Cardinal	 V-AIS	VAISTM28	 V-AIS	 V-AIS	 V-AIS			
Safe Water	 V-AIS	VAISTM30	 V-AIS	 V-AIS	 V-AIS	 V-AIS		
Isolated Danger	 V-AIS	VAISTM32	 V-AIS	 V-AIS	 V-AIS			
Starboard Lateral (IALA A)	 V-AIS	VAISTM22	 V-AIS	 V-AIS	 V-AIS	 V-AIS		
Starboard Lateral (IALA B)	 V-AIS	VAISTM23	 V-AIS	 V-AIS	 V-AIS	 V-AIS		
Port lateral (IALA A)	 V-AIS	VAISTM34	 V-AIS	 V-AIS	 V-AIS	 V-AIS		
Port lateral (IALA B)	 V-AIS	VAISTM35	 V-AIS	 V-AIS	 V-AIS	 V-AIS		
Emergency Wreck Marking	 V-AIS	VAISTM86	 V-AIS	 V-AIS	 V-AIS			
Special Purpose	 V-AIS	VAISTM85	 V-AIS	 V-AIS	 V-AIS	 V-AIS	 V-AIS	 V-AIS
Special Purpose symbol option with buoy X shape				 V-AIS	 V-AIS	 V-AIS	 V-AIS	 V-AIS
Isolated Danger (shown for comparison)		ISODGR01						

Use of the Object Catalogue for ENC

A.111

12.14.1.1 Virtual AIS aids to navigation (see S-4 – B-489.2)

Given that AIS technology is increasingly being used for aids to navigation purposes, it is considered that there is a requirement to implement an interim solution to enable the encoding of Virtual AIS aids to navigation in ENC. Accordingly, the IHO Hydrographic Standards and Services Committee (HSSC) has approved the use of the **NEWOBJ** object class for this purpose (see clause 16).

If it is required to encode a Virtual AIS aid to navigation, it must be done using the object class **NEWOBJ**.

Geo object: New object (**NEWOBJ**) (P)
 Attributes: CLSNAM CLSDEF DATEND DATSTA STATUS INFORM
 NINFOM NOBJNM OBJNAM TXDSC NTXTDS SCAMIN
 SORIND SORDAT SYMINS

The following table shows the combinations for the mandatory attributes CLSDEF, CLSNAM and SYMINS that must be populated, according to the purpose of the Virtual AIS aid to navigation and the corresponding portrayal for each encoding:













<u>Purpose of Virtual Aid</u>	<u>CLSDEF</u>	<u>CLSNAM</u>	<u>SYMINS</u>	<u>PORTRAYAL</u>
North Cardinal	A Virtual object which indicates navigable water lies northwards	Virtual AtoN, North Cardinal	SY(BRTHNO01);SY(BCNCAR01);TX("V-AIS",3,2,2,'15110',2,0,CHMGD,11)	 V-AIS
East Cardinal	A Virtual object which indicates navigable water lies eastwards	Virtual AtoN, East Cardinal	SY(BRTHNO01);SY(BCNCAR02);TX("V-AIS",3,2,2,'15110',2,0,CHMGD,11)	 V-AIS
South Cardinal	A Virtual object which indicates navigable water lies southwards	Virtual AtoN, South Cardinal	SY(BRTHNO01);SY(BCNCAR03);TX("V-AIS",3,2,2,'15110',2,0,CHMGD,11)	 V-AIS
West Cardinal	A Virtual object which indicates navigable water lies westwards	Virtual AtoN, West Cardinal	SY(BRTHNO01);SY(BCNCAR04);TX("V-AIS",3,2,2,'15110',2,0,CHMGD,11)	 V-AIS
Port lateral (IALA A)	A Virtual object marking the port side of a channel	Virtual AtoN, Port Lateral	SY(BRTHNO01);SY(BOYLAT24);TX("V-AIS",3,2,2,'15110',2,0,CHMGD,11)	 V-AIS
Starboard Lateral (IALA A)	A Virtual object marking the starboard side of a channel	Virtual AtoN, Starboard Lateral	SY(BRTHNO01);SY(BOYLAT13);TX("V-AIS",3,2,2,'15110',2,0,CHMGD,11)	 V-AIS
Port lateral (IALA B)	A Virtual object marking the port side of a channel	Virtual AtoN, Port Lateral	SY(BRTHNO01);SY(BOYLAT23);TX("V-AIS",3,2,2,'15110',2,0,CHMGD,11)	 V-AIS
Starboard Lateral (IALA B)	A Virtual object marking the starboard side of a channel	Virtual AtoN, Starboard Lateral	SY(BRTHNO01);SY(BOYLAT14);TX("V-AIS",3,2,2,'15110',2,0,CHMGD,11)	 V-AIS
Isolated Danger	A Virtual object marking an isolated danger	Virtual AtoN, Isolated Danger	SY(BRTHNO01);SY(BCNID21);TX("V-AIS",3,2,2,'15110',2,0,CHMGD,11)	 V-AIS
Safe Water	A Virtual object marking safe water	Virtual AtoN, Safe Water	SY(BRTHNO01);SY(BOYSAW12);TX("V-AIS",3,2,2,'15110',2,0,CHMGD,11)	 V-AIS
Special Purpose	A Virtual object used to mark an area or feature referred to in nautical documents	Virtual AtoN, Special Purpose	SY(BRTHNO01);SY(BOYSPP11);TX("V-AIS",3,2,2,'15110',2,0,CHMGD,11)	 V-AIS
Emergency Wreck Marking	A Virtual object marking a wreck	Virtual AtoN, Wreck Marking	SY(BRTHNO01);SY(BOYSPP11);TX("V-AIS",3,2,2,'15110',2,0,CHMGD,11)	 V-AIS

table 12.6

For reasons of backward compatibility the mandatory attribute INFORM must contain the values of CLSNAM and CLSDEF for the object; e.g. *Virtual AIS AtoN, North Cardinal*; *A virtual object which indicates navigable water lies northwards* for a Virtual AIS aid to navigation performing the function of a north cardinal mark.