

Encoding of location information for NAVTEX

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SUMMARY

Executive Summary: This paper explains the current situation around attempts to integrate NAVTEX information with other navigational instruments available in the bridge. This paper has a vision of an improved situation in order to initiate discussion within IHO WWNWS to find solutions to improve the situation". This paper has been created as collaboration between Sweden, Finland and Hannu Peiponen (Chair of IEC TC80 for 4th edition of IEC 61174 ECDIS and Chair of IEC TC80 from 1st Sep 2015)

Action to be taken: 16

Related documents: IMO NAV 59/19
IMO MSC 95/22
IEC 62288 Ed.2 (2014)
IEC 61174 Ed.4 (2015)

Introduction / Background

1. NAVTEX as a method is still feasible to use in the future. The infrastructure is available and working. Origin of NAVTEX was printing paper slips from where mariners were able to read important textual notes for navigation safety. Printed slips were also very useful tools when the mariner used a pen to draw the location information from an MSI message into his paper chart.

2. Electronic alternatives for charts have been penetrating navigation for many years. IMO has declared also many years ago mandatory carriage requirement of an ECDIS. Already all SOLAS class new buildings will include the ECDIS. Mandatory retrofit program of ECDIS is scheduled by vessel type and size. Last vessels will get their mandatory ECDIS by summer 2018. Obviously mariner can still use the printed slip from NAVTEX to enter location of the MSI by manual typing. Manual typing is an ugly method and it is not looking up-to-date today. Further such a manual method is subject to easy human mistakes.

3. NAVTEX equipment already has an output port for MSI information. IEC 61162-1 standard already describes messages for NAVTEX to send MSI information to other instruments. This is well established and can be used to replace printing of paper slips by electronic viewing of the received NAVTEX messages. However one detail require improvement. The location information within NAVTEX messages is free text. This means that each source of MSI information and each individual person within those organizations encode the location information as they will. The result is human readable location, but not always suitable for reliable machine reading.

4. IMO has modernization of GMDSS under progress. As part of that dissemination of MSI has been discussed. Current method is NAVTEX and a new method called NAVDAT has been under discussion. Within the IMO the expert level discussion about modernization goes through Correspondence Group and Joint IMO + ITU Expert Group meetings. In the recent Oct 2014 meeting of the IMO + ITU Expert Group it was noted that NAVTEX

would still be a feasible solution for MSI, if the location information would be machine readable to enable graphical display of the MSI. The meeting noted that specifying of the encoding of location information is not in the hands of IMO, but it is handled by a joint IHO, WMO and IMO workgroup.

5. In recent RTCM annual meeting, May 2015, Chris Janus/NGIA (US government agency) had a presentation about problems in NAVTEX. The issue was that MSI through NAVTEX consist of Navarea warnings, Coastal warnings and Metarea warnings. For US and close-by US waters only Navarea warnings use proper encoding based on the available document (IHO S-53, Joint IHO/IMO/WMO Manual on MSI, July 2009). Coastal warnings and Metarea warning use totally random free style. This documented evidence is a good example of current free will encoding practices used with NAVTEX:

6. Recent IMO MSC 95 meeting, June 2015, set a task for IMO NCSR sub-committee to develop symbology to be used to display NAVTEX (and other information received from communication equipment) in navigational displays (for example ECDIS, INS, etc.) under output name "Guidelines for the harmonized display of navigation information received via communications equipment". Obviously this work for standardized symbols is in vain unless computers can read and understand the encoded location information.

7. There has been some concerns that using ECDIS or similar navigational equipment to show MSI information from NAVTEX is not safe. Especially there are concerns that current ECDIS systems are not safe enough as the positions in NAVTEX messages not always are given in a correct way and in some cases are omitted. There are concerns that this may cause that some messages are improperly displayed or missing on ECDIS. This concern highlights the need to apply universal encoding method for location information within MSI.

8. Another detail to note is that still today, 29th July 2015, the valid edition of the IEC 61174 EDCIS standard is 3rd edition from year 2008 and it does not include any rule for connection of NAVTEX to the ECDIS and therefore there is no common minimum functionality supported by existing ECDIS.

9. IEC TC80 begun a process to revise IEC 61174 ECDIS standard in 2012. This process is now in the final stage. The FDIS (Final Draft International Standard) was approved in June 2015 and the target date of publishing is 15th Aug 2015. This new 4th edition of the IEC 61174 defines rules about interfacing and using of NAVTEX information. This revised standard, when applied very soon in the type approval, will set basic rules for safe and uniform implementation of the MSI information from NAVTEX. Below is a copy of clause "4.12.6 Connection with NAVTEX or SafetyNET for MSI"

If provided, an interface with either NAVTEX (IEC 61097-6) or SafetyNET (IEC 61097-4) shall comply with the following requirements of MSC.148(77) and MSC 306(87) for processing and presentation of MSI messages received via NAVTEX or SafetyNET.

- a) *Provide an indication when a new MSI message is received until it has been displayed or 24 h have passed.*
- b) *This indication may be suppressed if the point/area of the MSI message (first character of NAVTEX message code-field of NRX sentence) does not meet criteria set by the mariner.*
- c) *Means shall be provided for the operator to enter criteria for suppression of indication of new MSI messages based on time and distance from own ship, monitored route or planned route. Default setting is no suppression.*


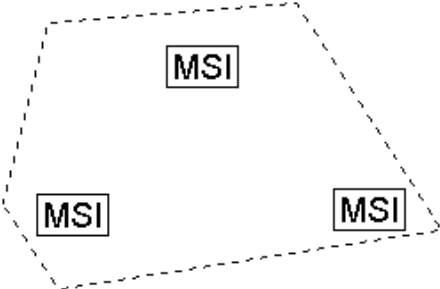
NOTE The criteria set for ECDIS indication of new MSI messages are independent of such settings on the MSI receiver which may optionally be controllable by NRM sentence for NAVTEX.

- d) *Details of the coverage areas and message categories which have been excluded by the operator from reception and/or display should be readily available.*
- e) *For NAVTEX ECDIS shall provide means to view the receiver INS mask set inside the NAVTEX (see IEC 61097-6). Optionally ECDIS may provide means to set the NAVTEX receiver mask(s). The elements of the INS mask are: Frequency, transmitter coverage area and message type (see IEC 61162-1, NRM sentence). The elements of the INS mask shall be provided for display as characters 'A', 'B', etc. (see NRM sentence in IEC 61162-1). ECDIS shall send a query sentence requesting an NRM sentence prior to display of the INS mask.*
- f) *Capability for data storage of MSI messages for at least 255 most recent messages per each source of MSI shall be provided.*

- g) The user shall be able to tag individual messages for permanent retention. These messages may occupy up to 25 % of the available memory and shall not be overwritten by new messages. When no longer required, the user shall be able to remove these messages.
- h) Means shall be provided to view the most recent message, past messages, and to view messages associated with selection of MSI symbols in the graphical display area.
- i) Means for viewing MSI messages shall provide at least 16 lines of message text at a time with a minimum of 4032 characters/line., indicate with a hyphen when words are divided at the end of a line, replace corrupt characters with an asterisk (*) and clearly indicate the end of the message.

One can note that the new 4th edition of the IEC 61174 ECDIS basically require textual display for NAVTEX. Further one can note that the ECDIS will provide methods for suppression of some MSI message, default is no suppression and if suppression is applied then the criteria shall be readily available for the operator.

10. As background information following is already defined by IEC standards for graphical display of the MSI. IEC 62288 Ed.2 (2014) Presentation of navigation-related information on shipborne navigational display specifies the used symbol for MSI as below:

<p>5.4</p>	<p>Maritime Safety Information, MSI</p> <p>MSI point symbol shall be presented as box with the "MSI" inscribed inside it. The box shall be centred at the position derived from MSI message. The box shall not be more than 6 mm in height, drawn using a thick solid line style.</p> <p>MSI area symbol shall be presented as a series of lines bounding a geographic area designated as "caution" to navigation. Connecting lines shall be drawn using thin dashed line style and using same basic colour as the symbol itself. The area shall be filled with a sparse pattern of MSI point symbols separated by 50mm.</p> <p>MSI symbols shall be in a separate user selectable layer or group, removable by single operator action. The removal may be connected to generic removal functionality of non-chart object layers.</p> <p>The user dialog area shall have an indication if MSI notices are available in the area currently displayed, but the MSI layer is not automatically selected for display.</p> <p>MSI symbols may be connected to a date range and in such case each MSI notice symbol shall be displayed only when user selected date is within data range.</p> <p>It shall be possible to cursor pick an MSI symbol for further details.</p> <p>When presentation of MSI point and area symbols are provided as overlay on chart or radar, then means shall be provided for cursor pick of the symbol to provide further information in the user dialog area of the display.</p> <p>Note that the source of MSI maybe NAVTEX, AIS ASM function identifier 22 or 23 (SN.1/Circ. 289), etc.</p>	<p style="text-align: center;">Example of point symbol</p> <div style="text-align: center;">  </div> <p style="text-align: center;">Example of area symbol</p> <div style="text-align: center;">  </div>
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Analysis / Discussion

11. The paragraphs 1 – 10 above clearly explain the current vision, progress and planned actions so that the communication equipment such as NAVTEX could be integrated with navigation equipment such as ECDIS. This integration is assumed to enhance safety of navigation.

12. Current NAVTEX is free text which may include latitude/longitude location information. Free text means for this that every individual person encoding text for NAVTEX may use any method for encoding location

information. Result is difficulties for reliable computer detection of location information. This further means difficulties for reliable graphical presentation of location information.

13. Fortunately this situation can easily be improved. There is already a published encoding method available in IHO S-53, Joint IHO/IMO/WMO Manual on MSI, July 2009. This method should be universally applied for all messages - Navarea warnings, Coastal warnings and Metarea warnings – sent through NAVTEX.

14. Current shortcoming is that the published encoding is not used universally by all organizations related to sending messages through NAVTEX. The reason could be lack of awareness of the published method, lack of training about encoding, lack of checklist before publications, etc.

15. Solving of the current shortcoming would enhance safety of navigation as both the probability of human error by end users is reduced and the end user would have more time for navigation itself.

Action required of workgroup

16. The WWNWS is invited to:

- a) Discuss about shortcomings in the encoding of the location information presented in this paper
- b) Agree suitable methods to strengthen awareness of publishing sources of the MSI about existing IHO S-53 rules about encoding of the location information