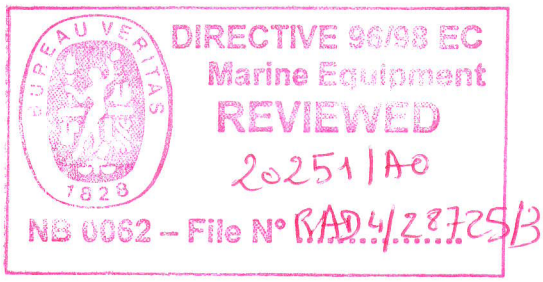
TEST REPORT

No 203 900 RADIO

NAVTEX Receiver
NT-1800
Japan Marina Co.

RADIO

SPECIFICATIONS : **IEC 61097-6 Ed. 2**



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1 SCOPE

This part of IEC 61097 specifies the minimum performance requirements, technical characteristics and type-testing requirements for narrowband telegraph equipment for the reception of navigational and meteorological information as required by Regulation IV/7.1.4 of the 1988 amendments to the 1974 International Convention for Safety of Life at Sea (SOLAS), and which is associated with IEC 60945. When a requirement in this standard is different from IEC 60945, the requirement in this standard takes precedence. This standard incorporates the performance standards of IMO Resolution MSC.148(77), the technical characteristics of ITU-R Recommendation M.540, takes account of the IMO Resolution A.694(17) and conforms with the ITU Radio Regulations where applicable. All text of this standard, whose meaning is identical to that in IMO Resolution MSC.148(77) and ITU-R Recommendation M.540 will be printed in *italics* and the Resolution/Recommendation and paragraph number indicated between brackets.

Another report covers the EMC Directive. Report n° 203 869 EMC

2 NORMATIVE REFERENCES

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60945, *Marine navigation and radio communication equipment – General requirements -Methods of testing and required test results*
IEC 61162-1, *Maritime navigation and radiocommunication equipment and systems – Digital interfaces – Part 1: Single talker and multiple listeners*
IEC 61162-2; *Maritime navigation and radiocommunication equipment and systems – Digital interfaces – Part 2: Single talker and multiple listeners, high-speed transmission* IMO *Safety of Life at Sea (SOLAS) Convention* (1974), as amended (GMDSS) IMO Resolution A.694(17) (1991) *General requirements for shipborne radio equipment forming part of the global maritime distress and safety system (GMDSS) and for electronic navigational aids* IMO Resolution MSC.148(77) (2003) *Revised performance standards for narrow-band direct-printing telegraph equipment for the reception of navigational and meteorological warnings and urgent information to ships (NAVTEX)*
IMO Publication – *NAVTEX Manual*
IMO Resolution MSC/Circ.1122 *Adoption of the revised NAVTEX manual*
61097-6/FDIS © IEC(E) – 11 –
ITU-R Recommendation M.540-2:1990, *Operational and technical characteristics for an automated direct printing telegraph system for promulgation of navigational and meteorological warnings and urgent information to ships*

ITU-R Recommendation M.625-3:1995, *Direct-printing telegraph equipment employing automatic identification in the maritime mobile service*

3 DEFINITIONS AND ABBREVIATIONS

For the purposes of this document, the following definitions and abbreviations apply.

3.1 DEFINITIONS

3.1.1 LORAN-C
long range radio-navigation system operating on an assigned frequency of 100 kHz

3.1.2 NAVTEX
system for the broadcast and automatic reception of maritime safety information by means of narrow-band telegraphy

3.1.3 Test script
text file containing a number of NAVTEX messages formatted as defined in 5.5 The STF is a particular example of a test script

3.1.4 Abbreviations
ASCII American Standard Code for Information Interchange
CER character error rate
EMC electromagnetic compatibility
EUT equipment under test
HMI human-machine interface
INS integrated navigation system
IMO International Maritime Organization
ITU International Telecommunication Union
PC performance check
PT performance test
RTC real time clock
SAR search and rescue
STF standard test file
STS standard test signal
USB Universal Serial Bus
UTC Co-ordinated Universal Time

4 INTRODUCTION

This Radio report contains the result of the tests conducted by KENTA ELECTRONIC

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Technical Manager : Mr. CHRISTIEN

Bureau Veritas certificate numer : SMS.L.I/50130/B.O

4.1 CLIENT INFORMATION

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Tokyo 150-0042

Country : Japan

Phone : (03)3461-3606
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People in charge : Hisashi ICHIKAWA

4.2 MANUFACTURER INFORMATION

Company : Japan Marina Co., Ltd.
Address : 36-2-1001 Udagawacho, Shibuya-ku
Tokyo 150-0042

Country : Japan

Phone : (03)3461-3606
Fax : (03)3496-2078

5 TEST EQUIPMENTS

Radiocommunication Analyser Rohde & Schwarz	CMTA 84	826269/009
Signal Generator Rhode & schwarz	SMHU	835-8011-58
Climatic Chamber Vötsch	HT 4010	
Power supply Philips	PE 1642	STK 10691
Spectrum Analyser Advantest	R-3271	150 50 102
Log Periodic Antenna n°1		
Coaxial cable n°1		
Coaxial cable n°2		
Anechoïd room		
Rotating board		

6 PERFORMANCE REQUIREMENTS

6.1 GENERAL

(148/A.1.1) *The equipment, in addition to meeting the requirements of the Radio Regulations, the provisions of Recommendation ITU-R M.540 applicable to shipborne equipment and the general requirements set out in resolution A.694(17)*, and specified in IEC 60945 shall *comply with the* revised IMO performance standards for NAVTEX equipment Resolution MSC 148(77).

(148/A.2.1) *The equipment* shall *comprise radio receivers, a signal processor and: either*

a) an integrated printing device; or Not applicable

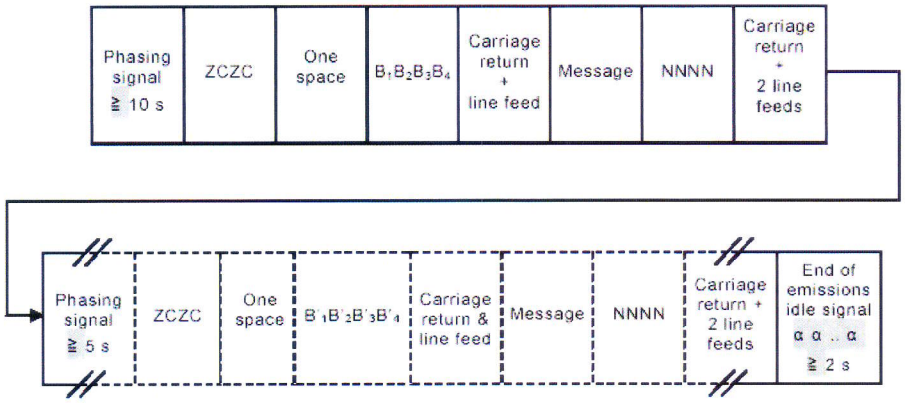
b) *a dedicated display device, printer output port and a non-volatile message memory; or* 5.7" color TFT, QVGA

NOTE *Where there is no printer, the dedicated display device shall be able to be located in the position from which the ship is normally navigated.*

c) *a connection to an integrated navigation system (INS) and a non-volatile message memory.* YES

6.2 GENERAL CHARACTERISTICS

(540/AII.2) The equipment shall be capable of receiving messages in *the collective B-mode of the direct printing system specified in ITU-R Recommendation M.625*, Annex I,4. (540/AII.3) *The technical format of the transmission* shall be in accordance with ITU-R Recommendation M.540, Annex II,3 as follows:



where
ZCZC defines the end of the phasing period
B1 character is a letter (A-Z) identifying the transmitter coverage area.
B2 character is a letter (A-Z) for each type of message as follows:

A navigational warning
B meteorological warning
C ice report
D search and rescue information/piracy and armed robbery
E meteorological forecast
F pilot message
G AIS
H LORAN-C message
I reserved presently not used
J SATNAV message
K other electronic navigational aid system message
L navigational warning (additional)
M to Y reserved presently not used
Z QRU (no message on hand)

B3B4 characters are the serial number of the message between 01 and 99.

6.3 SPECIFIC CHARACTERISTICS

6.3.1 B1 and B2 characters

(540/AII.2.1) The B1 characters *identifying the different transmitter coverage areas and the B2 characters identifying the different types of messages are defined by IMO and chosen from table I of ITU-R Recommendation M.625, combination numbers 1-26.*

a) Ship equipment shall be capable of automatically rejecting unwanted information using character B1.

COMPLIANT

b) Ship equipment shall be capable of disabling print-out, transmission to the INS port or display of selected types of messages using character B2 with the exception of messages with B2 characters A, B, D and L

COMPLIANT

c) If any facility is rejected (transmitter coverage area) or disabled (type of message) the extent of any such limitation shall be clearly indicated to the user.

COMPLIANT

6.3.2 B3 and B4 characters

(540/AII.2.2) *B3 B4 is a two-character serial number for each B2, starting with 01 except in special cases where the serial number 00 is used.*

COMPLIANT

6.3.3 Preamble

(540/AII.3) *The printer* or message store shall *only be activated if the preamble B1 B2 B3 B4 is received without errors.*

COMPLIANT

6.3.4 Repetition of printing/display

(540/AII.4) *Facilities* shall *be provided to avoid printing, storage or display of the same message several times on the same ship, when such a message has already been satisfactorily received.*

(540/AII.5) *The necessary information for* these *measures* shall *be deduced from the sequence B1 B2 B3 B4.*

COMPLIANT

6.3.5 Mandatory printing/display

(540/AII.6) *A message* shall *always be printed,* stored and displayed *if B3 B4 = 00* and if it is transmitted by a coast station that the equipment is programmed to select.

(540/AII.2.3) *The characters ZCZC B1 B2 B3 B4 need not be printed*/displayed.

COMPLIANT

6.3.6 Reception of messages with character errors

6.3.6.1 Messages with character error rate of >4 % and ≤33 %

The EUT shall store the message (non-printing EUTs) or message identification (printing EUTs) but shall allow the message/message identification to be replaced if it is subsequently received with lower error rate.

An EUT with an integral printer shall print the messages indicating a character error rate of ≤33 %.

An EUT with an integral display shall display the messages indicating a character error rate of ≤33 %.

COMPLIANT

6.3.6.2 Messages with character error rate of >33 %

The EUT shall not store or print messages if the received character error rate >33 %.

COMPLIANT

6.3.7 Controls and indicators

(148/A.3.1) *Details of the coverage areas and message categories which have been excluded by the operator from reception and or display* shall *be readily available.*

It shall be possible to exclude at least four different message categories. It shall not be possible to exclude message categories A, B, D and L.

COMPLIANT

6.3.8 Programmable control memories

(148/A.6.3) *Information for location (B1) and message (B2) designators in programmable memories* shall be permanently stored in non-volatile memory and shall *not be erased by interruptions in the power supply of less than 6 h.*

Default programmable settings shall be, for the location (B1) designators set to all characters and for the message (B2) designators set to characters ABCDEFHJKLVZ.

NOTE Location (*B1*) and message (*B2*) designators are described in 4.2.

COMPLIANT

6.3.9 Alarms

6.3.9.1 Generation of alarms

(148/A.7) *The receipt of search and rescue information (B2 = 'D')* shall *give an alarm at the position from which the ship is normally navigated. It* shall *only be possible to reset this alarm manually.*

The EUT may either contain an integral alarm sounder or a pair of relay contacts for the provision of an external sounder.

If an additional alarm is provided at the equipment to indicate, for example, the reception of navigational and/or meteorological warnings, it shall be capable of being suppressed.

If an additional alarm is provided it shall be distinguishable from a search and rescue alarm.

The audible volume of the alarm shall be 75 dBA to 85 dBA.

If a pair of relay contacts is provided to switch an external sounder on for an alarm condition then the relay contacts shall be free of earth.

The alarm condition shall be reported via an ALR command on the INS serial port.

COMPLIANT

6.3.9.2 Using the ALR formatter

An ALR command shall be used to report the reception of a search and rescue alarm, navigational or meteorological warnings or to indicate a failure or malfunction that will reduce the integrity of the NAVTEX receiver.

Alarm messages shall be IEC 61162-1 compliant "$--ALR" sentences and shall contain the local alarm numbers and alarm text shown in the following table:

Table 1 – Alarm conditions signaled using the ALR sentence formatter

Alarm number	Alarm text
001	"NAVTEX: Navigational warning"
002	"NAVTEX: Meteorological warning"
003	"NAVTEX: Search and rescue information"
004	"NAVTEX: Receiver malfunction" [a]
005	"NAVTEX: Built in self test failure" [b]
006	"NAVTEX: General failure"
[a] The text may be extended to indicate which receiver has the malfunction [b] The text may be extended to indicate the nature of the test failure	

COMPLIANT

6.3.9.3 Repetition of alarm conditions

Whilst any alarm conditions persist, the NAVTEX receiver shall repeat the appropriate ALR sentences once every 30 s until acknowledged.

When all the alarm conditions are acknowledged (but still active), the NAVTEX receiver shall stop the output of any audible alarm indication (whether by integral sounder or by relay contacts) but shall continue to repeat the ALR sentences once every 30 s.

When the alarm condition has returned to "healthy", an ALR sentence with the status set to "V" shall be sent out at one minute intervals.

When there are no active alarms, the NAVTEX receiver may send out a single ALR sentence with alarm number 006 and a status of "V" once every minute as an indication that all is well.

6.3.10 Test facilities

(148/A.8) *The equipment* shall *be provided with a facility to test that the radio receiver, the display device/printer and non-volatile message memory are functioning correctly.* Equipment with a dedicated display shall include a visual or aural alert if a malfunction or general failure occurs.

COMPLIANT

6.4 INTERFACES

(148/A.9.1) *The equipment* shall *include at least one interface for the transfer of received data to other navigation or communication equipment.*
(148/A.9.2) *All interfaces provided for communication with other navigation or communication equipment* shall *comply with IEC 61162 series of standards.*
As a minimum the equipment shall be capable of communicating with the sentences ACK, ALR, NRM and NRX with the electrical signal characteristics given in IEC 61162-1. The equipment shall also be capable of responding to query sentences as defined in IEC 61162-1 for the NRM and NRX sentences.
(148/A.9.3) *If there is no integrated printer, the equipment* shall *include a standard printer interface* (for example an RS232, Centronics, USB interface for an FX80 type printer, or other serial protocols and support for other printer types).

COMPLIANT

RS-232C, RS-422 and I/O port

6.5 RECEIVER

6.5.1 Number of receivers

(148/A.4.1) *The equipment* shall *contain one receiver operating on the frequency prescribed by the Radio Regulations for the international NAVTEX system* (518 kHz). *The equipment* shall *contain* at least *a second receiver capable of working at the same time as the first* one *on at least two other frequencies recognised for the transmission of NAVTEX information. The first receiver* shall *have priority in the display or printing of received information. Printing or displaying of messages from one receiver* shall *not prevent reception by the other receiver.*

COMPLIANT

Dual channel receiver

6.5.2 Receive frequencies

The recognised receive frequencies shall be 490 kHz, 518 kHz and 4209,5 kHz.
Where the second receiver can be switched between operating frequencies, this shall be done both manually and via the INS port.

COMPLIANT

6.5.3 Sensitivity

(148/A.4.2) The receiver sensitivity shall be such that for a source with an e.m.f. of 2 µV in series with a non-reactive impedance of 50 (equivalent to –107 dBm), the character error rate is below 4 %.

6.6 DISPLAY

6.6.1 General

If a display is included as part of the EUT then the following requirements shall be met.

COMPLIANT

6.6.1.1 User interface

There shall be a display mode that clearly shows the user which transmitter coverage area (*B*1) and message types (*B*2) are currently selected for each receiver.

YES Message/Station Selection Key "SEL"

There shall be controls for adjusting the display illumination and contrast settings.

Yes Screen Brightness Key "BRT"

There shall be an indication of which receiver(s) are currently receiving.

YES On Operating Status Line

- 1ST RCVR First receiver, 518kHz
- 2ND RCVR1 Second receiver, 490kHz
- 2ND RCVR2 Second receiver, 4209.5kHz

New search and rescue (SAR) messages shall be displayed immediately that they are received and stored, and shall cause an alarm to be set. SAR messages shall be displayed until they are acknowledged by the cancellation of the alarm.

YES

The reception and storage of new messages other than SAR messages shall be clearly indicated to the user by a method declared by the manufacturer.

YES New Message Tag "NEW MESSAGE"
Alarm Tag "ALARM"

It shall be possible to select transmitter coverage area (*B*1) and message types (*B*2) independently for message storage to non-volatile memory, for message output to the INS port and for message output to the printer port.

YES Menu Key "MEN" Option "4: MAKE SEL/REJ SETTINGS"

COMPLIANT

6.6.1.2 Number of characters displayed per line

(148/A.5.1) *The display device* shall *be able to display a minimum of 32 characters per line.*

NOTE Designers of displays should note that some NAVTEX messages have lines with 40 characters or more.

COMPLIANT

40 characters per line

6.6.1.3 Number of lines displayed

(148/A.5.3) *The display device* shall *be able to display at least 16 lines of message text.*

COMPLIANT

18 lines of message text

6.6.1.4 Display requirements

(148/A.5.2) *If a dedicated display device is used, the following requirements* shall *be met:*

a) an indication of newly received selected *messages* shall *be immediately displayed until acknowledged or until 24 h after receipt;*

YES

b) newly received selected *messages* shall *also be* capable of being *displayed;* and

YES

c) stored messages shall be capable of being displayed and searchable by location (station) designators and type of message designators.

YES Menu key "MEN" Option "5: SEARCH FOR STORED MESSAGE"

COMPLIANT

6.6.1.5 Visibility of display

(148/A.5.4) *The design and size of the display device shall be such that displayed information is easily read under all conditions by observers at normal working distances and viewing angles.* This requirement shall apply for all displayed information received from any of the receivers, whether in English or in any other national language or any other supported alphabet.

COMPLIANT

6.6.1.6 Automatic line feed

(148/A5.5) *If automatic line feed entails division of a word, this* shall *be indicated in the displayed text.*

YES by ↓

COMPLIANT

6.6.1.7 End of message display

(148/A.5.6) *When displaying received messages on a display device, a clear indication of the end of a message* shall *be given by automatically adding line feeds after the message or including some other form of delineation.*

COMPLIANT

6.6.1.8 Corrupt characters

(148/A.5.7) *The equipment* shall *display an asterisk if the character is received corrupted.*

COMPLIANT

6.6.1.9 Printer interface message selection requirements

(148/A.5.8) *Where the printer is not integrated, it* shall *be possible to select the following data to be output to the printer* interface*:*

a) *all messages as they are received;*

YES Menu key "men" Option "4: MAKE SEL/REJ SETTING

b) *all messages stored in the message memory;*

YES Menu key "men" Option "6: SELECT OUTPUT MESSAGES"

c) *all messages received on specified frequencies, from specified locations or having specified message designators;*

YES Menu key "men" Option "6: SELECT OUTPUT MESSAGES"

d) *all messages currently displayed; and*

YES Menu key "men" Option "6: SELECT OUTPUT MESSAGES"

e) *individual messages selected from those appearing on the display.*

YES Menu key "men" Option "6: SELECT OUTPUT MESSAGES"

6.7 INTEGRAL PRINTER

Not applicable

6.7.1 General

If a printer is included as part of the EUT then the following requirements shall be met.

6.7.1.1 Number of characters printed per line

(148/A.5.1) *The printer* shall *be able to print a minimum of 32 characters per line.*

6.7.1.2 Automatic line feed

(148/A5.5) *If automatic line feed entails division of a word, this* shall *be indicated in the printed text.*

6.7.1.3 End of message display

(148/A.5.6) *The printer or printer output* shall *automatically insert line feeds after completing print of the received message.*

6.7.1.4 Corrupt characters

(148/A.5.7) *The equipment* shall *print an asterisk if the character is received corrupted.*

6.7.1.5 Printer requirements

The integral printer:

a) shall print easily legible signs and produce a level of acoustic noise <60 dBA;

b) shall print the message received on paper. Changing the paper or printing mechanism, if required, shall be a simple operation. The paper and printing capacity shall be sufficient to enable at least 200 000 characters to be printed;

c) shall be provided with an alarm to indicate that the paper has nearly run out or has run out;

d) shall provide temporary storage for partially printed messages. If any message is incompletely printed because the paper has run out or the printer is out of order, the message shall be stored in the memory and printed once new paper has been loaded. Memory storage of further new message identifications shall be inhibited if there is no paper available in the printing device.

6.7.1.6 Printer message selection requirements

It shall be possible to select the following data to be output to the integral printer:

a) all messages as they are received;

b) all messages received on specified frequencies, from specified transmitter coverage areas or having specified message type designators.

6.8 NAVTEX MESSAGE MEMORY

6.8.1 Equipment without integral printers

These requirements shall apply to equipment that does not contain an integral printer such as devices incorporating an integral display.

6.8.1.1 Number of messages

(148/A.6.1.1) *For each receiver fitted it* shall *be possible to record at least 200 messages of average length 500 characters (printable and non-printable) in non-volatile message memory. It* shall *not be possible for the user to erase messages from memory. When the memory is full, the oldest messages* shall *be overwritten by new messages.*

It shall be possible to record individual messages up to 8000 characters in length.

200 messages for each frequency

COMPLIANT

6.8.1.2 Message tagging

(148/A.6.1.2) *The user* shall *be able to tag individual messages for permanent retention. These messages may occupy up to 25 % of the available memory* (i.e. up to 50 of the required minimum of 200 x 500 character message slots) *and* shall *not be overwritten by new messages.*

When no longer required, the user shall *be able to remove the tag on these messages which may then be overwritten in normal course.*

The message tagging function does not need to be supported on a NAVTEX receiver which does not have a dedicated display device.

50 messages can be protected

COMPLIANT

6.8.1.3 Automatic erasure

(148/A.6.2.2) *After between 60 h and 72 h, a* message and *message identification* shall *automatically be erased from the store* (unless tagged for permanent retention). *If the*

number of received messages exceeds the capacity of the store, the oldest message and *message identification shall be erased.*

Erasure after 60 hours form message received

COMPLIANT

6.8.2 Equipment with integral printer

These requirements shall apply only to equipment that contains an integral printer.

Not applicable

6.8.2.1 Number of messages

(148/A.6.2.1) *The equipment* shall *be capable of internally storing at least 200 message identications for each receiver provided.*

6.8.2.2 Automatic erasure

After between 60 h and 72 h, a message shall automatically be erased from the store. If the number of received messages exceeds the capacity of the store, the oldest message shall be erased.

6.9 POWER SUPPLIES

The equipment shall be powered from one of the ship's main sources of electrical energy (power) as defined by the manufacturer.

24VDC (11VDC to 40VDC)

COMPLIANT

6.10 SOURCE OF UTC

The equipment may optionally use an externally provided source of UTC or an internal RTC to provide timing data for handling message ageing. Not applicable

7 TEST CONDITIONS

7.1 GENERAL

The EUT shall, unless otherwise agreed, be set up by the test laboratory following instructions contained in the user/installation manual. The test laboratory shall ensure that the EUT is operating normally before testing commences.

The tests to this standard may be performed on one or more units of the EUT as agreed between manufacturer and test laboratory. At least one EUT shall in addition to its normal operation be provided with

a) a test point at the processor output to the printing device (EUTs with an INS or printer interface shall utilize them for the tests); the level and format of the signal shall be stated by the manufacturer;
b) suitable means to either output to the printing device or give access to examine with an external device the contents of the message storage and/or message identifier storage; the means shall be stated by the manufacturer;
c) a method of clearing all stored messages and/or message identifiers from non-volatile memory; and
d) a method of pre-loading a message and/or message identifier file into non-volatile memory by an external device so that the non-volatile memory may be filled or nearly filled with messages. This file shall be provided by the manufacturer and shall be referred to as the 'standard test file (STF)' in this document.

The test laboratory shall be capable of

a) generating NAVTEX transmissions, on each specified receive frequency, with all possible variations of B1 B2 B3 B4 characters in accordance with the technical format specified in ITU-R Recommendation M.540. The calibrated apparatus shall also be capable of generating incorrect signals, and
b) generating the standard test signals contained in 5.5 for transmission to the EUT.

No adjustments are permitted to the EUT throughout the complete test program except for removal and application of primary power as required by the test procedures, changing of paper rolls where appropriate and changes to internal settings where required to allow the test to be conducted.

A performance test is required at various points in the test sequence. An inability to meet the performance test or failure of any test required by the test procedure shall be considered a critical failure, and the test shall be terminated.

A performance check is required at various points in the test sequence. An inability to meet the performance check or failure of any test required by the test procedure shall be considered a critical failure, and the test shall be terminated.

The values of all parameters of EUT conditions/states measured or observed, respectively, during each of the tests prescribed in the procedures of this standard, shall be duly recorded and submitted to the appropriate national authority as part of the required test approval data set. The measurement accuracy of each value (or set of values) shall also be reported in the test data. A completed summary of test results shall also be submitted to the appropriate national authority.

Except as specified by the test procedures, opening of the unit is not allowed.

7.2 PERFORMANCE TEST

The performance test (PT) is a receiver call sensitivity test (refer to 9.1) with the test signal at the applicable STS level.

7.3 PERFORMANCE CHECK

A performance check (PC) is a receiver call sensitivity test (refer to 9.1) with the test signal

+6 dB relative to the applicable STS level.

7.4 NORMAL AND EXTREME CONDITIONS

7.4.1 Normal test conditions

7.4.2 Temperature and humidity

The normal test conditions are defined in terms of temperature, humidity and supply voltage. Temperature and humidity shall be within following range:

Temperature +15 °C to +35 °C

Humidity 20 % to 75 %

When it is impractical to carry out the test under the conditions stated above, a note to this effect, stating the actual temperature and relative humidity during the tests, shall be added to the test report.

7.4.2.1 Power supply

The normal test power supply voltage shall be within a tolerance of ± 3 % relative to the nominal voltage of one (or any) of the ship's power supplies for which the equipment is designed.

For a.c. supplies, the test power supply frequency shall be within ±1 Hz of the nominal frequency. Refer to 5.2.1 of IEC 60945.

The nominal supply voltage and frequency are the declared or any of the declared voltages or frequencies for which the EUT is designed.

7.4.3 Extreme test conditions

7.4.3.1 Power supply

Table 2 – Extreme power supply variation

Power supply	Voltage variation %	Frequency variation %
a.c.	±10	±5
d.c.	+30 −10	Not applicable

Refer to 5.2.2 of IEC 60945 for further information.
These conditions exceed the extreme test conditions in which the EUT is required to operate, with or without performance degradation, as indicated herein.

a) Excessive current is defined as greater than normal working current.
b) Excessive voltage is defined as 50 % greater than the nominal voltage.

Protection shall be provided against such excesses at an appropriate level chosen by the manufacturer and, when activated, may require the EUT to be reset, for example by fuse replacement. The power supply shall be adjusted to cause activation of the protection and after EUT reset, a performance check under normal test conditions shall be carried out. Power supply miss-connections are also regarded as excessive conditions. Where appropriate, the EUT shall be subjected to an input from a power supply of reversed d.c. polarity or improper a.c. phase sequence for a period of 5 min. After completion of the test, and reset of the protection of the EUT, if required, the power supply shall be connected normally and a performance check shall be carried out.

7.5 STANDARD TEST SIGNAL

The standard test signal (STS) shall be in accordance with ITU-R Recommendation M.625, Annex I,4, collective B-mode. It shall consist of an F1B radio-frequency signal modulated with a frequency shift of ±85 Hz centered on the receive frequency (490 kHz, 518 kHz or 4209,5 kHz), (540/AII.10) *The transmitter frequency tolerance for the mark and space signals shall be better than ± 10 Hz.*
The technical format of the transmission shall be in accordance with ITU-R Recommendation M.540, Annex II,3 and shall contain the following traffic information signals as the message content:
For 490 kHz :
(figure shift) 4 9 0 (space)
(letter shift) K H Z (space) (carriage return) (line feed)
(letter shift) A B C D E F G H I J (space)
(letter shift) K L M N O P Q R S T (space)
(letter shift) U V W X Y Z (figure shift) 1 2 3 4 (space)
(figure shift) 5 6 7 8 9 0 ? : . , (space)
(figure shift) - ( ) ' =/+ (space) (carriage return) (line feed) For 518 kHz :
(figure shift) 5 1 8 (space)
(letter shift) K H Z (space) (carriage return) (line feed)
(letter shift) A B C D E F G H I J (space)

(letter shift) K L M N O P Q R S T (space)
(letter shift) U V W X Y Z (figure shift) 1 2 3 4 (space)
(figure shift) 5 6 7 8 9 0 ? : . , (space)
(figure shift) - ( ) ' =/+ (space) (carriage return) (line feed) For 4209,5 kHz :
(figure shift) 4 2 0 9 (space)
(letter shift) K H Z (space) (carriage return) (line feed)
(letter shift) A B C D E F G H I J (space)
(letter shift) K L M N O P Q R S T (space)
(letter shift) U V W X Y Z (figure shift) 1 2 3 4 (space)
(figure shift) 5 6 7 8 9 0 ? : . , (space)
(figure shift) - ( ) ' =/+ (space) (carriage return) (line feed)
Each message shall be preceded by '*ZCZC B1B2B3B4*' and followed by 'NNNN'.
The STS shall be of sufficient length for the measurements to be performed or it shall be possible to repeat the message (with the correct period of phasing between messages) without interruption for as long as is required for the test to be performed.
The level of the STS at the source including the associated network shall be –107 dBm (2 µV e.m.f. for an artificial antenna type a) and 5 µV e.m.f. for an artificial antenna type b)).

7.6 STANDARD TEST FILE

The standard test file (STF) shall consist of a series of unique identifiable messages each 500 characters long. The STF is intended to be used to fill the declared memory capacity of the EUT exactly and shall be downloaded directly into the EUT's memory via the INS port or some other method declared by the manufacturer.

7.7 ARRANGEMENT FOR TEST SIGNAL APPLIED TO THE RECEIVER INPUT

Sources of test signals for application to the EUT input shall be connected through a network so that the impedance presented to the EUT input is equal to the impedance of the artificial antenna specified in 5.8, irrespective of whether one or more test signals are applied to the EUT simultaneously.
In the case of multiple test signals, steps shall be taken to prevent any undesirable effects due to interactions between signals in the generators or other sources.

7.8 ARTIFICIAL ANTENNAS

Where specified, tests shall be carried out with the EUT, connected as appropriate, to the following artificial antennas:

a) a non-reactive resistance of 50 , or
b) a resistance of 10 in series with a capacitance of 150 pF.

7.9 MEASUREMENT UNCERTAINTY

Absolute measurement uncertainties, maximum values:
Receiver sensitivity ±3 dB
Conducted emission ±3 dB
Radiated emission ±6 dB
For the test methods according to this standard, the uncertainty figures are valid to a confidence level of 95 %.

7.10 INTERPRETATIONS OF MEASUREMENT RESULTS

The interpretation of the results recorded in a test report for the measurements described in this standard shall be as follows:

a) the measured value related to the corresponding limit shall be used to decide whether an EUT meets the requirements of the standard;

b) the measurement uncertainty value for the measurements of each parameter shall be stated in the test report; and

c) the recorded value of the measurement uncertainty shall, for each measurement, be equal to or lower than the figures in 5.9.

7.11 EMC TEST EXCLUSION BANDS

The frequencies on which NAVTEX receivers are intended to operate, shall be excluded from conducted and radiated RF immunity tests.

There shall be no frequency exclusion bands applied to emission measurements of NAVTEX receivers, and/or associated ancillary equipment.

The immunity test exclusions are referred to as "exclusion bands" and are defined in 7.11.1.

7.11.1 Exclusion bands for receivers

The exclusion band for NAVTEX receivers operating at 518 kHz is the frequency range 490 kHz to 546 kHz.

The exclusion band for NAVTEX receivers operating at 490 kHz is the frequency range 462 kHz to 518 kHz.

The exclusion band for NAVTEX receivers operating at 4209,5 kHz is the frequency range 3969 kHz to 4449 kHz.

7.12 NARROW BAND RESPONSES ON RECEIVERS

The requirements of Clause 10 of IEC 60945 shall apply with the following modifications.

No immunity tests shall be carried out on frequencies of identified narrow band responses on NAVTEX receivers.

An increase of the character error rate (CER) above the value of 4 % shall be used as criterion for the identification of narrow band responses.

The nominal frequency offset to be used for the identification of narrowband responses shall be ±1 kHz for the first part of the identification procedure, and ±1,25 kHz for its second part.

All narrowband responses shall be disregarded from immunity tests.

8 ENVIRONMENTAL TESTS REQUIRED

The EUT shall be subjected to the tests in IEC 60945 required for equipment protected from exposure to weather, unless the manufacturer has stated that the equipment is intended for use in exposed locations in which case rain and spray testing is also required. When a requirement in this standard is different from IEC 60945, the requirement in this standard shall take precedence.

COMPLIANT Refer to environmental test report

9 SERIAL INTERFACE TESTS

(See 6.4.)

9.1 INS INPUT ELECTRICAL TESTS

9.1.1 Method of test

The INS input port configured in accordance with IEC 61162-1 and IEC 61162-2, shall be tested according to the relevant standard with regard to minimum and maximum voltage and current at the input terminals.

9.1.2 Required results

The interfaces shall fulfil the applicable requirements of IEC 61162-1 and IEC 61162-2.

COMPLIANT

9.2 INS INPUT PERFORMANCE TESTS

9.2.1 Method of measurement

Operate the input with simulated data that represent the receiver control functions defined in Annex C, including messages with invalid and unavailable data formatters. This test shall include loading the EUT input with 100 % of the interface's capacity for a period of not less than 5 min. Check for correct operation of the EUT.

9.2.2 Required results

Verify that the displayed data/EUT operation agrees with the simulated input data and that invalid and unavailable data formats do not stop/inhibit the correct operation of the EUT.

COMPLIANT

9.3 INS OUTPUT ELECTRICAL TESTS

9.3.1 Method of test

The INS output port configured in accordance with IEC 61162-1 and IEC 61162-2, shall be tested according to the relevant standard with regard to minimum and maximum voltage and current driving capability at the output terminals.

9.3.2 Required results

The interfaces shall fulfil the applicable requirements of IEC 61162-1 and IEC 61162-2.

COMPLIANT

9.4 INS OUTPUT PERFORMANCE TESTS

9.4.1 Method of measurement

Set the EUT to output to the INS port so that it is loaded with 100 % of the interface's capacity. Check for correct operation of the EUT.

9.4.2 Required results

Verify that the output data/EUT operation agrees with the requested output data.

COMPLIANT

9.5 PRINTER OUTPUT ELECTRICAL TESTS

These tests are only applicable for EUTs that do not contain an integral printer. These tests shall be conducted against the standard that the manufacturer has declared this interface will meet.

9.5.1 Method of test

The printer output port configured in accordance with the manufacturer's data, shall be tested according to the relevant standard with regard to minimum and maximum voltage and current driving capability at the output terminals.

9.5.2 Required results

The interfaces shall fulfil the applicable requirements of the relevant standard.

NOT APPLICABLE

9.6 PRINTER OUTPUT PERFORMANCE TESTS

9.6.1 Method of measurement

Set the EUT to output to the printer port so that it is loaded with 100 % of the interface's capacity.

Check for correct operation of the EUT.

9.6.2 Required results

Verify that the output data/EUT operation agrees with the requested output data.

NOT APPLICABLE

10 GENERAL AND SIGNAL PROCESSING TESTS

10.1 EXCLUSION OF STATIONS

(See 6.3.1.)

10.1.1 Method of measurement

The EUT shall be programmed to select all *B*2 characters and specific *B*1 characters. A test signal +6 dB relative to the STS level, with the *B*1 and *B*2 characters varied at random over 25 repetitions of the STS, shall be applied to the EUT. *B*3*B*4 = 00 shall not be used.

The test shall be repeated for other selected *B*1 characters.

10.1.2 Results required

For each value of *B*1 not selected, the EUT shall neither display nor print the test message.

COMPLIANT

10.2 EXCLUSION OF MESSAGE CATEGORIES

(See 6.3.1)

10.2.1 Method of measurement

The EUT shall be programmed to select all *B*1 characters and specific *B*2 characters. A test signal +6 dB relative to the STS level, with the *B*1and *B*2 characters varied at random over 25 repetitions of the STS, shall be applied to the EUT. *B*3*B*4 = 00 shall not be used. The test shall be repeated for other selected *B*2 characters.

10.2.2 Results required

The EUT shall display or print the messages with the currently programmed *B*2 characters, and also the messages with the *B*2 characters A, B, D and L.

COMPLIANT

10.3 RECEIVER TEST FACILITY

(See 6.3.10)

10.3.1 Method of measurement

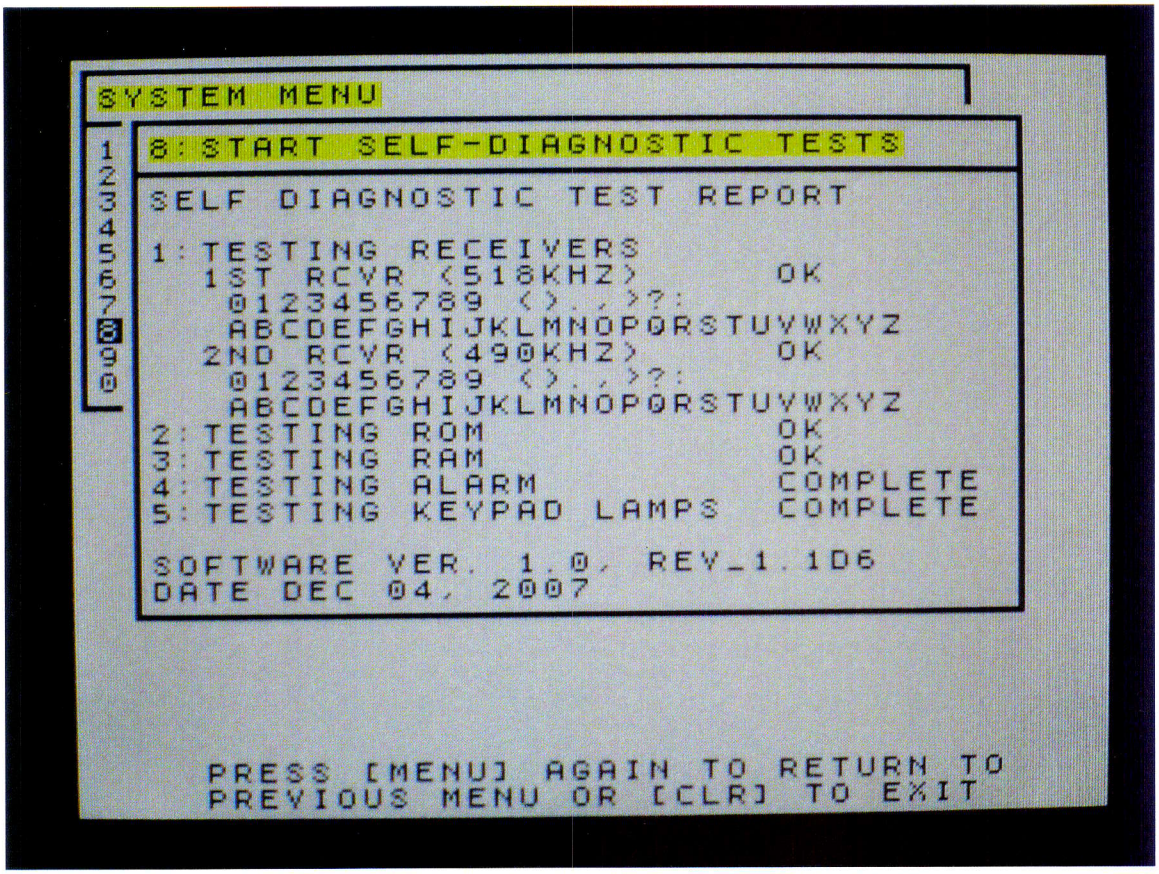
By inspection of the manufacturer's test data and documentation and actuating the test facility.

10.3.2 Results required

The test display/print-out shall contain at least 36 valid characters and an indication of whether the test passed or failed.

The test data shall be displayed but not stored in memory.

COMPLIANT



10.4 SEARCH AND RESCUE (SAR) ALARM PROVISION AND RESET

(See 6.3.9)

10.4.1 Method of measurement

An STS with *B*2 = D is input to the EUT once only.

10.4.2 Results required

An alarm shall be activated. The EUT shall be examined for the means whereby an alarm is generated.

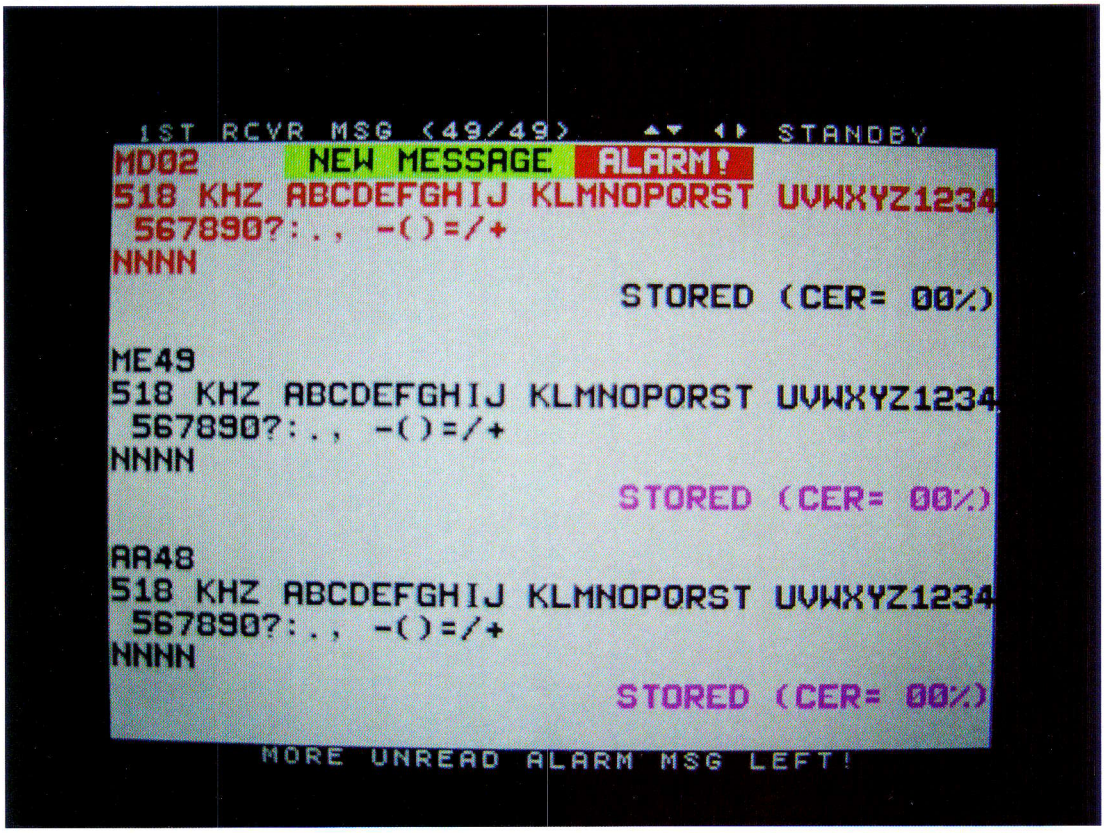
It shall be demonstrated that this alarm can be reset manually via the user interface in the case of an EUT with integral display.

YES Alarm stop key "STOP ALM" One key press stop the audible alarm
Second key press removes the alarm tag

It shall be demonstrated that this alarm can be reset via the INS port and the use of the IEC 61162 'ACK' sentence.

The audible level of the alarm signal shall be measured to be between 75 dBA to 85 dBA.

COMPLIANT



10.5 ADDITIONAL ALARMS

10.5.1 Method of measurement

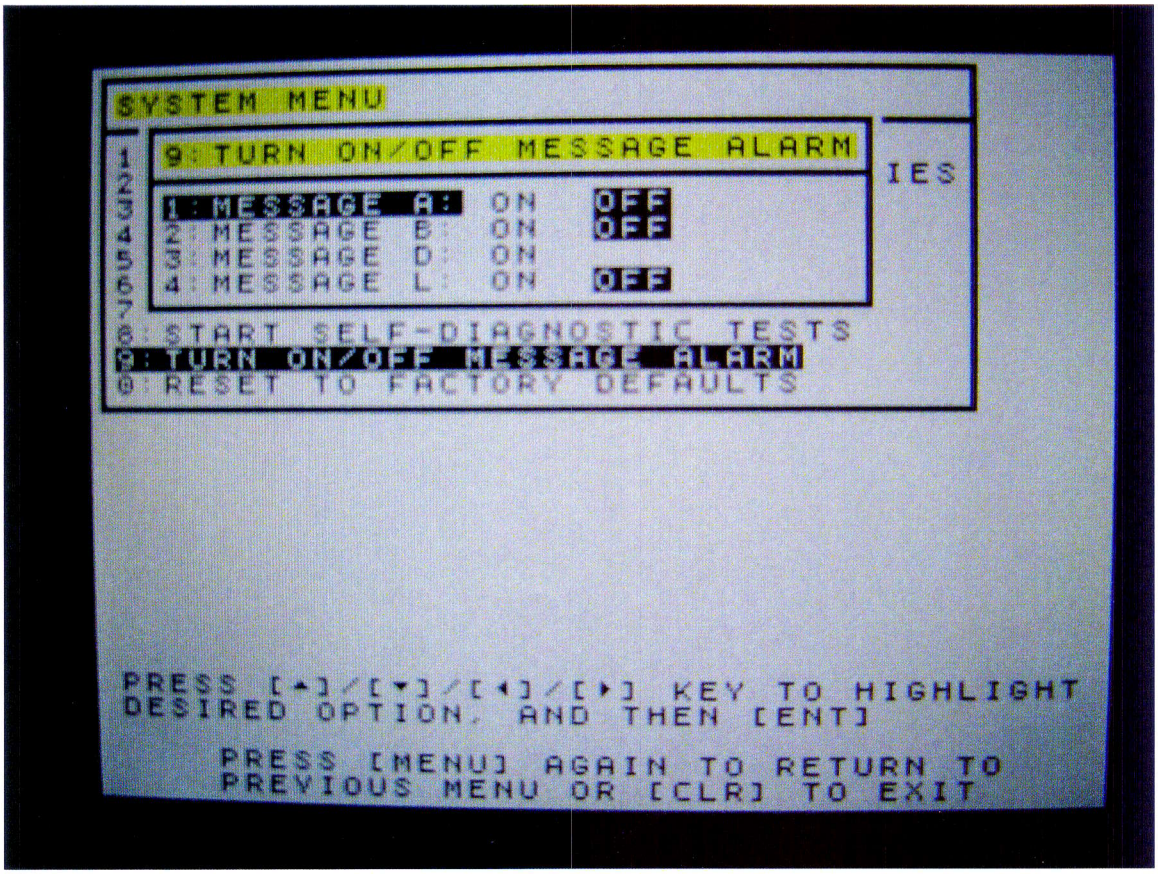
The manufacturer shall declare any additional alarms available.

Alarm type A, B and L

10.5.2 Results required

It shall be demonstrated that such additional alarms can be suppressed.
It shall be demonstrated that such additional alarms can be reset.

COMPLIANT


SYSTEM MENU
9: TURN ON/OFF MESSAGE ALARM
IES
1: MESSAGE A: ON OFF
2: MESSAGE B: ON OFF
3: MESSAGE D: ON
4: MESSAGE L: ON OFF
8: START SELF-DIAGNOSTIC TESTS
9: TURN ON/OFF MESSAGE ALARM
0: RESET TO FACTORY DEFAULTS
PRESS [▲]/[▼]/[◀]/[▶] KEY TO HIGHLIGHT
DESIRED OPTION, AND THEN [ENT]
PRESS [MENU] AGAIN TO RETURN TO
PREVIOUS MENU OR [CLR] TO EXIT