

INTERNATIONAL STANDARD

**Global maritime distress and safety system (GMDSS) –
Part 3: Digital selective calling (DSC) equipment – Operational and performance
requirements, methods of testing and required testing results**



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Part 3: Digital selective calling (DSC) equipment – Operational and performance
requirements, methods of testing and required testing results**

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

GLOBAL MARITIME DISTRESS AND SAFETY SYSTEM (GMDSS) –

Part 3: Digital selective calling (DSC) equipment – Operational and performance requirements, methods of testing and required testing results

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International Standard IEC 61097-3 has been prepared by IEC technical committee 80: Maritime navigation and radiocommunication equipment and systems.

This second edition cancels and replaces the first edition published in 1994. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) changes in the operation of DSC which have been developed by IMO and ITU since the first edition was published;
- b) compliance with bridge alert management (BAM);

- c) optional addition of remote operation of the DSC functionality. This facility can also be used for type approval testing of the performance of the DSC equipment;
- d) incorporation of the radio frequency test methods for MF, MF/HF and VHF transceivers and watch receivers for convenience of testing.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
80/861/FDIS	80/866/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts in the IEC 61097 series, published under the general title *Global maritime distress and safety system (GMDSS)*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

A bilingual version of this publication may be issued at a later date.

GLOBAL MARITIME DISTRESS AND SAFETY SYSTEM (GMDSS) –

Part 3: Digital selective calling (DSC) equipment – Operational and performance requirements, methods of testing and required testing results

1 Scope

This part of IEC 61097 specifies the performance requirements, technical characteristics, operational requirements and methods of testing of shipborne DSC equipment for use with MF, MF/HF and VHF installations in the GMDSS, including those required by Chapter IV of the 1974 International Convention for Safety of Life at Sea (SOLAS) as amended, and is associated with IEC 60945 (Shipborne radio equipment forming part of the global maritime distress and safety system and marine navigational equipment).

This document incorporates applicable parts of the performance standards of IMO Resolutions A.803(19), A.804(19) and A.806(19) (DSC facilities for VHF, MF and MF/HF radio installations), IMO MSC/Circ.862 (describing the operation of the distress button), the provisions of the ITU Radio Regulations, the technical characteristics of DSC equipment and the operational procedures for its use contained in Recommendations ITU-R M.493, M.541, M.689, M.821 and M.1082, and takes into account the general requirements contained in IMO Resolution A.694(17).

Recommendation ITU-R M.493-14 describes classes A, B, D, E, H and M of DSC equipment. This document specifies test procedures for DSC equipment of Class A and B which are applicable to the SOLAS requirements:

Class A, which includes all of the facilities defined in Annex 1, 3 and 4 of Recommendation ITU-R M.493-14 and which will comply with the IMO GMDSS carriage requirements for MF/HF installations and/or VHF installations;

Class B, which provides minimum facilities for equipment on ships not required to use Class A equipment and which will comply with the minimum IMO GMDSS carriage requirements for MF and/or VHF installations.

This document also includes requirements and methods of testing for the RF part of the MF, MF/HF and VHF installations, specified in the annexes of this document for reference.

NOTE All text whose meaning is identical to that in IMO Resolution A.803(19), A.804(19), A.806(19), MSC.68(68), and to that in IMO Circular MSC/Circ.862, and to that in Recommendations ITU-R M.493, M.541, M.689, M.821, and M.1082 is printed in italics and the references indicated in brackets. Text referencing IMO Resolution A.803(19) includes references to A.804(19) and A.806(19) unless otherwise stated.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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, *Maritime navigation and radiocommunication equipment and systems - 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*

IEC 61162-450, *Maritime navigation and radiocommunication equipment and systems - Digital interfaces - Part 450: Multiple talkers and multiple listeners - Ethernet interconnection*

IEC 61162-460:2015, *Maritime navigation and radiocommunication equipment and systems - Digital interfaces - Part 460: Multiple talkers and multiple listeners - Ethernet interconnection - Safety and security*

IEC 62288, *Maritime navigation and radiocommunication equipment and systems - Presentation of navigation-related information on shipborne navigational displays - General requirements, methods of testing and required test results*

IEC 61924-2:2012, *Maritime navigation and radiocommunication equipment and systems - Integrated navigation systems - Part 2: Modular structure for INS - Operational and performance requirements, methods of testing and required test results*

Recommendation ITU-R M.493-14:2015, *Digital selective-calling system for use in the maritime mobile service*

Recommendation ITU-R M.541-10:2015, *Operational procedures for use of digital selective-calling equipment in the maritime mobile service*

Recommendation ITU-R M.689-3:2012, *International maritime VHF radiotelephone system with automatic facilities based on DSC signalling format*

Recommendation ITU-R M.821-1:1997, *Optional expansion of the digital selective-calling system for use in the maritime mobile service*

Recommendation ITU-R M.1084-5:2012, *Interim solutions for improved efficiency in the use of the band 156-174 MHz by stations in the maritime mobile service*

Recommendation ITU-R M.1082-1:1997, *International maritime MF/HF radiotelephone system with automatic facilities based on digital selective calling signalling format*

ITU Radio Regulations:2016

IMO Resolution A.694(17), *General requirements for shipborne radio equipment forming part of the global maritime distress and safety system and for electronic navigational aids*

IMO Resolution A.803(19), *Performance standards for shipborne VHF radio installations capable of voice communication and digital selective calling, as amended by Resolution MSC.68(68):1997, Annex 1*

IMO Resolution A.804(19), *Performance standards for shipborne MF radio installations capable of voice communication and digital selective calling, as amended by Resolution MSC.68(68):1997, Annex 2*

IMO Resolution A.806(19), *Performance standards for shipborne MF/HF radio installations capable of voice communication, narrow-band direct-printing and digital selective calling, as amended by Resolution MSC.68(68):1997, Annex 3*

IMO MSC.1/Circ.1389, *Guidance on procedures for updating shipborne navigation and communication equipment*

IMO MSC.68(68):1997, *Adoption of amendments to performance standards for shipborne radiocommunication equipment*

IMO MSC.191(79), *Performance standards for the presentation of navigation-related information on shipborne navigational displays*

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1.1 **acknowledged**

indication that the objective of the initial DSC message has been achieved when used to describe an automated procedure

3.1.2 **active**

automated procedure which has control of the general receiver and transmitter and is thus able to engage in subsequent communications and receive DSC messages on both the watch receiver and general receiver

3.1.3 **automated procedure**

set of actions necessary to complete the objective of an initiating DSC message or non-DSC communication event

3.1.4 **BAM alert**

alert that falls into the concept of bridge alert management (BAM)

3.1.5 **critical errors**

set of information characters obtained from one or more received DSC messages if the automated procedure needs information characters from that set in order to proceed or perform any task, but the required information characters are in error

EXAMPLE An acknowledgement cannot be composed to an individual DSC message that has errors in the sender's MMSI.

3.1.6 **default**

value selected or action taken by the equipment software in the absence of any operator input

3.1.7 **distress alert**

single distress DSC message with the format symbol 112

3.1.8 **distress alert attempt**

set of distress alerts sent by a vessel when in distress

3.1.9**distress DSC message**

DSC message or acknowledgement containing the distress information

3.1.10**distress event**

unique distress situation identified by two (VHF) or three (MF/HF) parameters of the distress information

Note 1 to entry: The parameters are the MMSI of the vessel in distress and the nature of distress, and on MF/HF the mode of subsequent communication.

3.1.11**distress information**

symbols within a DSC message describing a distress situation consisting of the MMSI of the vessel in distress, the nature of distress, the position of the vessel in distress, the UTC time of that position, and the mode of subsequent communication

3.1.12**DX/RX**

notation used to describe the time diversity structure of DSC messages

Note 1 to entry: See Recommendation ITU-R M.493-14:2015, Figure 1.

3.1.13**engaged**

indication that the equipment is busy handling an automated procedure

3.1.14**factory default**

default value that is set by the manufacturer such that the field or behaviour is defined prior to any operator intervention

3.1.15**general receiver**

receiver used for the reception of all subsequent communications and on HF the reception of DSC acknowledgements on the duplex DSC channels

3.1.16**GMDSS alarm**

visual indication and audible annunciation of an alarm generated by, and shown on the equipment covered by this document.

Note 1 to entry: This includes the two-tone distress alarm and the urgency alarm.

Note 2 to entry: "Alarm", "audible alarm" or "aural alarm" in this document in general refers to the audible annunciation of the GMDSS alarm.

3.1.17**identical**

set of information characters where all pairs of corresponding information characters are equal or, if a pair of corresponding information characters is not equal, one of the pair is in error

3.1.18**information characters**

set of symbols in a DSC message that contains the items of interest for the recipient and is used to compute the ECC symbol that terminates the message

Note 1 to entry: These symbols are repeated in the DX/RX time diversity pattern.

3.1.19

initial DSC message

DSC message that starts an automated procedure

3.1.20

non-distress DSC message

DSC messages or acknowledgments that do not contain the distress information

3.1.21

objective

goal or intent of the item when in reference to a DSC message or automated procedure

Note 1 to entry: Usually, this goal or intent is to establish subsequent communications or request information.

3.1.22

on hold

automated procedure which does not have access to the transmitter and general receiver and therefore cannot engage in subsequent communications and is only able to receive DSC messages on the watch receiver

3.1.23

operator options

any choices the operator can make while the automated procedure is engaged

3.1.24

parallel event handling

background process of handling a received DSC message that is not pertinent to the active automated procedure

3.1.25

pertinent to the automated procedure

indication that the message has something to do with the procedure and is therefore "handled" by the procedure

Note 1 to entry: A DSC message is pertinent to an automated procedure if the set of information characters in the DSC message has the correct values.

3.1.26

pertinent to the station

any DSC message that would start an automated procedure if the equipment were in standby

3.1.27

self-terminating alarm

short alarm that stops by itself without operator intervention

Note 1 to entry: The purpose of this alarm is to inform the operator that a DSC message is received but it does not require his immediate attention.

3.1.28

snooping

situation where a station receives and handles DSC messages pertinent to other stations as if it were that station

3.1.29

standby

status of an equipment not handling an automated procedure, either active or on hold, but being able to receive DSC messages

3.1.30**symbol**

<as part of the DSC sentence> 7 binary bits of a 10 bit DSC word that have the information content

3.1.31**toggle**

<between automated procedures> ability to make one automated procedure active assuring that all other procedures go on hold

3.1.32**top level**

items, buttons, or functions present and visible without requiring any action by the operator (such as scrolling, opening up menus, or removing any obscuring covers)

3.1.33**distress alarm**

two tone alarm consisting of a repetition of the 2 200 Hz frequency for 250 ms followed by a 1 300 Hz frequency for 250 ms used for the initiation of the received distress DSC automated procedure

3.1.34**urgency alarm**

alarm consisting of a repetition of the 2 200 Hz frequency for 250 ms followed by 250 ms period of silence used for the initiation of the received non-distress DSC automated procedure when the category of the initiating DSC message is "urgency"

3.1.35**watch receiver**

separate receiver in DSC radios that continuously monitors the DSC distress frequencies on MF/HF, 2 187,5 kHz on MF, and channel 70 on VHF

Note 1 to entry: On MF/HF, it is sometimes referred to as the scanning receiver.

3.1.36**word**

<as part of the DSC sentence> 10 binary bits that make up the coded entities of a transmitted DSC message

Note 1 to entry: The 10 bits consist of a 7 bit "symbol" that gives the information content and 3 bit error check that gives the number of 0 binary bits in the 7 bit symbol.

3.2 Abbreviated terms

AGC	automatic gain control
BAM	bridge alert management
DROBOSE	distress relay on behalf of someone else
DSC	digital selective calling
e.m.f.	electromotive force
ECC	error check character
EUT	equipment under test
HF	high frequency
HMI	human machine interface
MF	medium frequency
MOB	man overboard
MMSI	maritime mobile service identity

NBDP	narrow band direct printing
PGN	parameter group number
RF	radio frequency
RMS	root mean square
SINAD	signal + noise + distortion/ noise + distortion
TE	test equipment
VHF	very high frequency

4 Performance requirements

4.1 Object

Digital selective calling is used in the MF, HF and VHF maritime mobile services for distress alerting, urgency and safety and routine calling in the GMDSS and in connection with public correspondence.

(803/1) *The DSC equipment, in addition to meeting the requirements of the Radio Regulations, the relevant ITU-R Recommendations and the general requirements set out in IMO Resolution A.694(17) as described in IEC 60945, shall comply with the following.*

4.2 Test requirements

4.2.1 General

Tests shall be carried out under normal test conditions and also, where stated, under extreme test conditions.

Tests under normal test conditions shall be carried out using the normal power source voltage as defined in 4.2.6.2 under conditions of normal temperature and humidity as defined in 4.2.6.1.

Tests under extreme test conditions shall be carried out using extreme values of power source voltage as defined in 4.2.6.2 at the extremes of temperature defined in 4.2.6.1.

4.2.2 Test site

The testing facility shall be capable of:

- generating correctly all types of digital selective calls in accordance with Table A1-4 of Recommendation ITU-R M.493-14:2015 and relevant for the EUT. The calibrated apparatus shall also be capable of generating incorrect signals;
- generating the standard test signals contained in 4.2.11 for transmission to the EUT; and
- examining, by means of calibrated apparatus for decoding, the information content of DSC signals generated by the EUT. It shall also be possible to print out the information content of call sequences received.

4.2.3 Environment tests

Environmental tests are intended to assess the suitability of the construction of the EUT for its intended physical conditions of use. After environmental tests, and, if specified also during the test, the EUT shall comply with the requirements of a performance check.

Environmental tests shall be carried out before any other tests. Where electrical tests are required, these shall be done with normal test voltage unless otherwise stated.

Environmental tests, as applicable to the category of equipment, shall be carried out as defined in IEC 60945.

4.2.4 Environmental test procedure

Environmental tests shall be carried out before tests of the same equipment in respect to the other requirements of the present document are performed.

Unless otherwise stated, the equipment shall be connected to an electrical power source during the periods for which it is specified that electrical tests shall be carried out. These tests shall be performed using the normal test voltage specified in 4.2.6.2, and the sequence of testing shall be in the order given.

The following apply to VHF.

- Performance checks shall be carried out on channel 16.
- Transmitter checks shall be carried out with output power set at maximum.

The following apply to MH/MF.

- During the environmental tests, the output of the transmitter may be reduced by 6 dB, but shall exceed 60 W.

4.2.5 Performance checks

4.2.5.1 VHF performance checks

4.2.5.1.1 Telephony transmitter frequency

Arrangements for monitoring the transmitter output are specified in 4.2.10. The carrier frequency shall be measured in the absence of modulation.

The frequency error shall be within $\pm 1,5$ kHz (for a definition of frequency error, see J.3.2).

4.2.5.1.2 Telephony transmitter carrier power

Arrangements for monitoring the transmitter output are specified in 4.2.10. The power delivered to the antenna transmission line shall be measured.

The carrier power shall be between 6 W and 25 W (for a definition of carrier power, see J.3.3).

4.2.5.1.3 Telephony transmitter audio frequency harmonic distortion of the emission

Arrangements for modulating the transmitter are specified in 4.2.9.2. Arrangements for monitoring the transmitter output are specified in 4.2.10.12. The transmitter shall be modulated with normal test modulation as specified in 4.2.9.3. The harmonic distortion of the audio frequency signal shall be measured.

The harmonic distortion shall not exceed 10 % (for a definition of audio frequency harmonic distortion, see J.3.8).

4.2.5.1.4 Telephony receiver sensitivity

A wanted test signal at +12 dB μ V e.m.f., modulated by the normal test modulation as specified in 4.2.9.3, shall be applied to the receiver RF input port as specified in 4.2.11. The receiver output shall be monitored, the SINAD ratio at the receiver audio output shall be measured.

The SINAD ratio shall be at least 20 dB.

4.2.5.1.5 DSC receiver

Check of the calling sensitivity as described in K.5.1 shall be carried out. The input level shall be +6 dB μ V, and the decoded symbol error shall be less than 10^{-2} .

4.2.5.1.6 DSC transmitter

Check of the mean output power of DSC transmitter as described in J.4.3 shall be carried out. The frequency error shall be as described in J.4.1. The decoded call sequences shall be as described in 4.3.3.3.

4.2.5.2 MF/HF performance checks

4.2.5.2.1 Telephony transmitter frequency error

With the transmitter connected to an artificial antenna (see 4.2.10), the transmitter shall be tuned to the frequency 2 182 kHz for MF equipment or 8 291 kHz for MF/HF equipment and operated in J3E mode, and shall be modulated with a signal of 1 000 Hz $\pm$ 0,1 Hz. The 1 000 Hz signal shall be subtracted from the measured frequency to get the transmitter frequency. The transmitter frequency shall be within $\pm$ 10 Hz of the selected frequency.

The output frequency shall be within $\pm$ 10 Hz.

4.2.5.2.2 Telephony transmitter output power

The output power is the value of peak envelope power delivered by the transmitter to the artificial antenna in J3E mode.

With the transmitter connected to an artificial antenna (see 4.2.10), the transmitter shall be tuned to the frequency 2 182 kHz for MF equipment or 8 291 kHz for MF/HF equipment and operated in J3E mode. The transmitter shall be modulated by a test signal consisting of two audio frequency tones, applied simultaneously to the microphone input, at frequencies of 1 100 Hz and 1 700 Hz. The level of the tones shall be adjusted so that they produce equal output power and it shall be possible to obtain an output power of greater than 60 W PEP.

For MF, the output power shall be within 60 W PEP and 400 W PEP.

For HF, the output power shall be within 60 W PEP and 1 500 W PEP.

The level of the input test signal shall be increased until the transmitter power output is not more than 1,5 dB below the rated output power as declared by the manufacturer. The level of the input signal shall then be increased by 10 dB. The peak envelope power shall be measured.

4.2.5.2.3 Telephony receiver sensitivity

With the AGC operative, the receiver shall be adjusted to 2 182 kHz for MF equipment or 8 291 kHz for MF/HF equipment and operated in J3E mode. A test signal as specified in 4.2.11 shall be applied. The level of the input signal shall be adjusted until the SINAD at the output of the receiver is 20 dB, and the output power is at least the standard output power (see K.4.1.3).

The level of the input signal shall be not greater than +22 dB μ V at 2 182 kHz or not greater than +17 dB μ V at 8 291 kHz.

4.2.5.2.4 DSC receiver

Check of the calling sensitivity as described in K.5.1 shall be carried out. The input level shall be +6 dB μ V and the decoded symbol error shall be less than 10^{-2} .

4.2.5.2.5 DSC transmitter

Check of the mean output power of DSC transmitter as described in K.3.2 shall be carried out. The frequency error shall be as described in K.3.1. The decoded call sequences shall be as described in 4.3.3.3.

4.2.6 Normal test conditions

4.2.6.1 Temperature and humidity

The normal temperature and humidity conditions for tests shall be any combination of temperature and humidity within the following ranges:

- temperature: +15 °C to +35 °C;
- relative humidity: 20 % to 75 %.

The test conditions shall be recorded in the test report.

4.2.6.2 Test power source

4.2.6.2.1 AC power source

The normal test voltage for equipment to be connected to the AC power supply shall be the declared voltage or any one of the declared voltages for which the equipment was designed.

The frequency of the test power supply shall be 50 Hz or 60 Hz $\pm$ 1 Hz.

4.2.6.2.2 DC power source

Where the equipment is designed to operate from a battery, the normal test voltage shall be the nominal voltage of the battery (e.g. 12 V, 24 V).

4.2.7 Extreme test conditions

4.2.7.1 Temperature

For tests at extreme temperatures, measurements shall be made at a lower temperature of –15 °C and an upper temperature of +55 °C.

Before making measurements at extreme temperatures, the equipment shall have reached thermal balance in the test chamber. The sequence of measurements shall be chosen, and the humidity content in the test chamber shall be controlled so that excessive condensation does not occur.

4.2.7.2 Test power source

4.2.7.2.1 AC power source

The extreme test voltages for equipment to be connected to an AC power supply shall be the normal voltage $\pm$ 10 %. The frequency of the test power mains shall be 50 Hz or 60 Hz $\pm$ 1 Hz.

4.2.7.2.2 DC power source

When the equipment is intended for operation from a secondary battery power supply, the extreme test voltage shall be 1,3 and 0,9 times the nominal voltage of the battery (e.g. 12 V, 24 V).

4.2.8 Unspecified test conditions

Any requirement for which no test is specified shall be checked by inspection of the equipment, its manufacturing drawings or other relevant documents. The result of the inspection shall be stated in the test report.

4.2.9 General conditions of measurement

4.2.9.1 Receiver squelch facility

Unless otherwise specified, the squelch circuit shall be set inoperative for the duration of the test.

4.2.9.2 Applying test signal to the transmitter input

Unless stated otherwise, a signal generator shall be used to provide the audio frequency signal to modulate the transmitter. The signal generator shall be connected in place of the microphone transducer, and the signal shall be applied to the connection terminals normally used for the microphone transducer.

4.2.9.3 Normal test modulation

For normal test modulation, the modulating frequency shall be 1 kHz and the frequency deviation shall be ± 3 kHz. The test signal shall be substantially free from amplitude modulation.

4.2.9.4 Transmitter output power

Unless otherwise specified, the transmitter output power shall be at maximum for these tests.

4.2.9.5 Test of equipment with duplex filter

If the equipment is provided with a built-in or an external duplex filter, the requirements of this document shall be met when the measurements are carried out using the antenna terminals of the filter.

4.2.10 Artificial antennas

4.2.10.1 Transmitters

For the purpose of conformance testing, the transmitter, at the output of the antenna matching device, shall meet the requirements of the present document when connected to the artificial antennas listed below:

- frequency range 1 605 kHz to 4 000 kHz:
 - the artificial antenna shall consist of a resistance of 10 Ω and a capacitance of 250 pF connected in series;
- all other frequency ranges:
 - the artificial antenna shall consist of a resistance of 50 Ω .

This does not imply that the transmitter shall only work with antennas having these characteristics.

4.2.10.2 Receivers

For the purpose of conformance testing, the receiver shall meet the requirements of this document when connected to sources of test signals so that the impedance presented to the receiver input is 50 Ω resistive. In the frequency range 1 605 kHz to 4 000 kHz, at the request

of the manufacturer, a network consisting of a 10 Ω resistor in series with a 250 pF capacitor may be used.

The arrangement used shall be stated in the test report.

This does not imply that the receiver should operate satisfactorily only with antennas having these impedance characteristics.

4.2.11 Standard test signals

4.2.11.1 Connection of test signals to receiver

4.2.11.1.1 Sources

Test signals shall be connected through a network as specified in 4.2.10.2. This requirement shall be met irrespective of whether one, two or more test signals are applied to the receiver simultaneously. In the case of multiple test signals, steps shall be taken to prevent any undesirable effects due to interaction between the signals in the generators or other sources.

Except where otherwise stated, radio frequency test signals applied to the receiver input shall be as given below:

- Class of emission J3E:
 - An unmodulated signal 1 000 Hz $\pm$ 0,1 Hz above the carrier frequency to which the receiver is tuned.
- Class of emission F1B:
 - DSC and NBDP with analogue interfaces: an unmodulated signal on the assigned frequency.
 - DSC and NBDP with digital interfaces: a signal on the assigned frequency modulated as appropriate.

4.2.11.1.2 Levels

The levels of test input signals shall be expressed in terms of the e.m.f. that would exist at the output terminals of the source including the associated network referred to in 4.2.10.2.

4.2.11.2 DSC test signal

4.2.11.2.1 References to standard DSC signals

Standard DSC signals consist of a series of identical DSC message sequences, each of which contains a known number of information symbols (format specifier, address, category, identification, etc., of Recommendation ITU-R M.493).

4.2.11.2.2 Standard test signal No. 1 (STS-1)

Standard DSC test signal 1 shall be a signal at the nominal receiver DSC frequency with frequency shift of ± 85 Hz and modulated with various types of DSC signals at a modulation rate of 100 Bd. The signals shall be generated by means of calibrated apparatus.

4.2.11.2.3 Standard test signal No. 2 (STS-2)

Standard DSC test signal 2 shall be a signal at the nominal receiver DSC frequency with frequency shift of ± 85 Hz and modulated with a continuous dot pattern at a modulation rate of 100 Bd.

4.2.11.2.4 Standard test signal No. 3 (STS-3)

Standard DSC test signal 2 shall be a signal at the nominal receiver DSC frequency phase modulated with modulation index equal to 2,0. The modulation signal shall have nominal frequency 1 700 Hz and frequency shift of ± 400 Hz modulated with various types of DSC signals at a modulation rate of 1 200 baud. The signal shall be generated by means of calibrated apparatus.

4.2.11.2.5 Symbol error rate at the DSC receiver

The DSC decoder is evaluated by determination of the symbol error rate (SER). The decoded DSC call sequence applied with forward error correction, interleaving techniques and check-sum information is divided into blocks each corresponding to one information symbol in the received signal. The ratio between the numbers of incorrect blocks to the total number of blocks is determined as the symbol error rate.

NOTE IMO Resolutions are phrased in terms of character error ratio. In this document, equivalent bit error ratio measurements are taken to demonstrate compliance with IMO requirements.

Sufficient calls shall be used in each test in order to ensure the statistical significance of the result.

4.2.11.3 Test frequencies

4.2.11.3.1 General test frequencies

Unless otherwise stated, the testing frequencies shall be the following:

- MF band: 2 187,5 kHz or 2 177 kHz;
- HF band: 8 414,5 kHz or 8 436,5 kHz;
- VHF band: 156,525 MHz (channel 70), the lowest frequency usable, the highest frequency usable, channel 16 (156,8 MHz).

4.2.11.3.2 Additional test frequencies for HF equipment

Where stated, the testing frequencies for HF equipment shall additionally be the following:

- for equipment intended for distress/safety purposes, the test frequencies shall be the DSC distress/safety frequencies 4 207,5 kHz, 6 312 kHz, 12 577 kHz and 16 804,5 kHz as applicable for the range of the equipment;
- for the equipment not intended for distress and safety purposes, the test frequencies shall be any of the DSC calling frequencies in each of the 4 MHz, 6 MHz, 12 MHz, 16 MHz, 18 MHz, 22 MHz and 26 MHz bands as applicable for the range of the equipment.

4.2.11.3.3 Transmitter exclusion bands for emissions testing

Frequencies ± 12 kHz of the assigned frequency shall be excluded from test.

For stand-alone transmitters in the transmitter stand-by mode, frequencies within the centre frequency f_c and $f_c + 2,7$ kHz shall be excluded from test.

4.2.12 Measurement uncertainty

Absolute measurement uncertainties: maximum values

RF frequency

- for VHF $\pm 1 \times 10^{-7}$
- for MF/HF $\pm 1 \times 10^{-8}$

RF power

- for VHF $\pm 0,75$ dB
- for MF/HF with 50 Ω load $\pm 1,5$ dB
- for MF/HF with 10 Ω , 250 pF load $\pm 2,5$ dB

Maximum frequency deviation:

- within 300 Hz to 6 kHz of audio frequency ± 5 %
- within 6 kHz to 25 kHz of audio frequency ± 3 %

VHF deviation limitation ± 5 %

Conducted spurious of transmitter ± 4 dB

Audio output power $\pm 0,5$ dB

Sensitivity at 20 dB SINAD ± 3 dB

Conducted emission ± 3 dB

Radiated emission ± 6 dB

Two-signal measurement ± 4 dB

Three-signal measurement ± 3 dB

VHF Receiver desensitization at duplex operation $\pm 0,5$ dB

VHF Transmitter transient time ± 20 %

VHF Transmitter transient frequency ± 250 Hz

For the test methods according to this document, the uncertainty figures are valid to a confidence level of 95 %.

4.2.13 Reference bandwidths for spurious measurements

The reference bandwidths applicable for all spurious measurement are given in Table 1.

Table 1 – Reference bandwidths applicable for spurious measurement

Frequency range	Bandwidth (BW)
9 kHz to 150 kHz	1 kHz
150 kHz to 30 MHz	10 kHz
156 MHz to 165 MHz	10 kHz
30 MHz to 1 GHz	100 kHz
Above 1 GHz	1 MHz
NOTE The BW specified for the frequency range 156 MHz to 165 MHz is only valid for the receive mode of operation.	

The measurement detector shall be a peak detector.

4.2.14 Interpretation of measurement results

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

- The measured value related to the corresponding limit shall be used to decide whether equipment meets the requirements of this document.
- The actual measurement uncertainty of the test laboratory carrying out the measurements, for each particular measurement, shall be included in the test report.
- The values of the actual measurement uncertainty shall be, for each measurement, equal to or lower than the figures given in 4.2.12 (absolute measurement uncertainties).

4.2.15 Testing method terminology

Testing method terminology terms for application to this document are:

- measurement – refers to measurement or calculation of a variable concerning the presentation of information, accuracy, or the equipment performance;
- observation – means to examine or inspect the equipment to confirm that a particular observable condition has been met. Observations can be made by anyone who has the necessary skill to systematically check the presentation of information and make the determination;
- document inspection – means to confirm by inspection that any relevant documented information, facility or function is compliant with the requirement;
- analytical evaluation – requires the informed judgement of equipment performance from a study of observations or measurements by an expert, a suitably qualified person who has the necessary skill and experience to judge the relevant property in the relevant subject. The method is typically used for the evaluation of properties which can be judged only in the context of other information or knowledge.

4.3 Functional requirements

4.3.1 Display of information

4.3.1.1 Requirements

The equipment shall meet the requirements for the presentation of information on shipborne displays set out in Resolution MSC.191(79) as further specified in IEC 62288.

4.3.1.2 Method of test and required results

Verify compliance with the general requirements for the presentation of navigation-related information in accordance with the test methods and required results specified in IEC 62288.

4.3.2 User interface

4.3.2.1 Requirements

(493/5) *Shipborne DSC equipment shall be designed to provide a simplified user interface.*

(541/4) *Ensuring that the equipment shall be simple to operate.*

See Annexes C, D, E, F, G and H of this document.

4.3.2.2 Method of test and required results

See Annexes C, D, E, F, G and H of this document.

4.3.3 Categories of calls

4.3.3.1 Requirements

(803/2.2) *The equipment shall provide for the following categories of calls using DSC:*

- a) *distress, urgency and safety;*
- b) *ship operational requirements; and*
- c) *public correspondence*

The EUT shall be capable of encoding, transmitting, receiving and decoding all categories of calls relevant to the class for which it shall be certified (see Table A1-4 of Recommendation ITU-R M.493-14:2015).

4.3.3.2 Generated call sequence – Method of test and required results

The output of the EUT is connected to a calibrated apparatus for decoding and printing out the information content of the call sequences generated by the EUT.

The EUT is set to transmit DSC calls in order to verify that the requirements of Recommendation ITU-R M.493 regarding message composition and content are met.

The generated calls are analysed with the calibrated apparatus for correct technical format of the call sequence, including time diversity and repetition of calls.

Confirm by observation that the encoder correctly transmits all types of calls applicable to the class to be certified. The observed telecommands used shall be stated in the test report.

4.3.3.3 Correct decoding of call sequences – Method of test and required results

The input of the EUT shall be connected to validated apparatus for generating DSC signals.

DSC calls relevant for the class of EUT are applied to the equipment in order to verify that the requirements of Recommendation ITU-R M.493 regarding message composition and content are met.

The decoded call sequences at the output of the EUT are analysed for correct technical format, including error-check character.

When decoder measurements are made by use of a printer or a computer, a check is made to ensure accordance between EUT display and printer output.

The validated apparatus is then set to generate incorrectly composed DSC signals.

Confirm by observation that the decoder correctly receive all types of calls applicable to the class for which the EUT is to be certified. The telecommands used are stated in the test report.

Confirm by observation that on the receipt of incorrectly composed calls the EUT neither displays nor prints out the information content of such calls. The indication of "information error" in the display is acceptable. See C.4.2.6.2.

4.3.4 General purpose equipment characteristics

(493/3) *General purpose DSC equipment shall be designed in accordance with the characteristics given in Annex 1 of Recommendation ITU-R M.493-14.*

Compliance to this document fulfils the above requirement.

NOTE The types of calls applicable to DSC shipboard equipment Classes A, B, D, E, H and M and the associated telecommands are given in Table A1-4 of Recommendation ITU-R M.493-14:2015.

4.3.5 Construction

4.3.5.1 Requirements

(803/A-2.4.5, 804/A-2.4.5, 806/A-2.4.6) *The DSC equipment may be a separate equipment or be integral part with a radio transmitter and/or a receiver. If the DSC equipment is separated, then dedicated devices are to be specified and tested together as one system.*

This document only deals with equipment integrated or associated with a radio transmitter/receiver and the watchkeeping receiver.

NOTE "Integral part" means that the DSC function is physically integrated into a radio transmitter and/or a receiver so that the DSC functions can only be tested by RF measurements (see also IEC 61097-7 and IEC 61097-9).

(803/A-2.4.6, 804/A-2.4.6, 806/A-2.4.7) *The equipment shall comprise a dedicated DSC watchkeeping facility to maintain a continuous watch on the distress alerting channels.*

(806/A-2.4.7) *For MF/HF where a scanning receiver is employed to watch more than one DSC distress channel, all selected channels shall be scanned within 2s and the dwell time on each channel shall be adequate to allow detection of the dot pattern which precedes each DSC call. The scan shall only stop on detection of a 100 baud dot pattern.*

(803/A-2.6, 804/A-2.5, 806/A-2.5) *A distress alert shall be activated only by means of a dedicated distress button. This button shall not be any key of an ITU-T digital input panel or an ISO keyboard provided on the equipment.*

(MSC/Circ.862/1.1) *This button shall not be any key of an ITU-T digital input panel or an ISO keyboard associated with the equipment and shall be physically separated from functional buttons/keys used for normal operation. This button shall be a single button for no other purpose than to initiate a distress alert.*

(803/A-2.7, 804/A-2.6, 806/A-2.6) The dedicated distress button shall:

- 1) be clearly identified;

(MSC/Circ.862/1.2) *The distress button shall be red in colour and marked "DISTRESS". Where a non-transparent protective lid or cover is used, it shall be also marked "DISTRESS".*

and

- 2) be protected against inadvertent operation, requiring at least two independent actions.

(803/A-2.8, 804/A-2.7, 806/A-2.6) *The distress alert initiation shall require at least two independent actions.*

(MSC/Circ.862/1.4) *Lifting the protective lid or cover is considered as the first action. Pressing the distress button is considered as the second independent action.*

(803/A-2.9, 804/A-2.8, 806/A-2.8) *The equipment shall indicate the status of the distress alert transmission.*

The required protection of the distress button shall be physically mounted on the equipment and consist of a spring loaded lid or cover permanently attached to the equipment by, for example, hinges. It shall not be necessary for the user to remove additional seals or to break the lid or cover in order to operate the distress button.

The operation of the distress button shall generate a visible and audible indication and start a countdown of at least 3 s. To keep the countdown running, the distress button shall be kept pressed for the entire time of the countdown at least 3 seconds. A flashing light and an intermittent acoustic signal shall start immediately. After the 3 seconds countdown is completed, the transmission of the distress alert is initiated and the indication shall become steady.

NOTE These requirements conform to IMO Circular MSC/Circ.862.

(803/A-5) *The equipment shall be operational within 1 min of switching on.*

(806/A-Part B-4, C-5) *The equipment shall be capable of operating within 1 min of switching on.*

(804/A-Part B-4, C-5) *For MF or MF/HF the equipment shall be operating on 2,182 kHz and 2,187.5 kHz within 1 min after switching on.*

See C.6.1.4.

4.3.5.2 Method of test and required results

When the DSC facility is a separate component from the radio transmitter and/or a receiver, then identify and document these separate components and test them as one system.

Confirm that the unit provides a dedicated DSC watchkeeping facility to maintain a continuous watch on the distress alerting channels.

For HF and combined MF/HF equipment confirm that when a scanning receiver is employed to watch more than one DSC distress channel, all selected channels are scanned within 2s and the dwell time on each channel is adequate to allow detection of the dot pattern which precedes each DSC call and that the scan shall only stop on detection of a 100 baud dot pattern.

Confirm that a distress alert is activated only by means of a dedicated distress button. That this button is not any key of an ITU-T digital input panel or an ISO keyboard provided on the equipment is physically separated from functional buttons/keys and is not used for normal operation, and that this button is a single button for no other purpose than to initiate a distress alert.

Confirm that the dedicated distress button:

- is physically mounted on the equipment;
- is clearly identified;
- is protected against inadvertent operation;
- that this button includes a spring loaded lid or cover permanently attached to the equipment. That it is not necessary for the user to remove seals or to break the lid or cover in order to operate the distress button;
- that this button is red in colour and marked "DISTRESS". Where a non-transparent protective lid or cover is used, it is also marked "DISTRESS";
- that the operation of the distress button generates a visible and audible indication;
- that when the distress button is kept pressed for at least 3 s a flashing light and an intermittent acoustic signal are started immediately. After the 3 s, the transmission of the distress alert is initiated and the indication becomes steady.

Confirm that the distress alert activation requires at least two independent actions.

Confirm that the equipment is operational within 1 min of switching on.

See C.6.2.1.

4.3.6 Memory

4.3.6.1 Requirements

Pre-programmed DSC distress alerting frequencies and other information, including the list of nature of distress (see Recommendation ITU-R M.493) inherent to the operation of the equipment, shall be stored in non-volatile devices.

If the equipment contains information in operator programmable memory devices, such devices shall be protected from interruptions in the power supply up to at least 10 h of memory.

4.3.6.2 Method of test and required results

Confirm that the DSC distress alerting frequencies and other information, including the list of nature of distress inherent to the operation of the equipment, are pre-programmed and are stored in non-volatile devices.

Confirm that, if the equipment contains information in operator programmable memory devices, such devices are protected from interruptions in the power supply for at least 10 h duration.

4.3.7 Warm-up period

4.3.7.1 Requirements

The equipment shall be operational and shall meet the requirements of this document 1 min after switching on.

If the equipment includes parts which require to be heated in order to operate correctly, for example crystal ovens, then a warming-up period of 30 min from the instant of application of power to those parts shall be allowed, after which the requirements of this document shall be met.

4.3.7.2 Method of test and required results

Confirm that the equipment is operational and meet the requirements of this document as applicable after switching on.

4.3.8 Protection of the antenna input circuit

4.3.8.1 Requirement

The receiver shall not suffer damage when an unmodulated radiofrequency signal at an input level of 30 V RMS at any frequency in each range in which the receiver is designed to operate is applied to its antenna input terminal for a period of 15 min. See also Annexes I, J and K.

4.3.8.2 Methods of test and required results

Confirm that the receiver does not suffer damage when an unmodulated radiofrequency signal at an input level of 30 V RMS for one frequency in each selectable frequency band in which the receiver is designed to operate is applied to its antenna input terminal for a period of 15 min.

4.3.9 Protection of the transmitter

4.3.9.1 Requirement

The equipment shall be so designed and constructed that the transmitter is protected against damage resulting from disconnection of the antenna or short-circuiting of antenna terminals. If this protection is provided by means of a safety device, that device shall automatically be reset following removal of the antenna open-circuit or short-circuit conditions. See also Annexes I, J and K.

4.3.9.2 Method of measurement and required result

After the transmitter has been turned on, tuned and turned off, the antenna terminals shall be short-circuited. Then the transmitter shall be turned on for a period of 5 min. Then the transmitter shall be turned off, the antenna terminals shall be open-circuited, and the transmitter shall be turned on for a period of 5 min.

The test only needs to be carried out on one frequency and mode of operation.

The transmitter shall not be damaged and it shall be able to operate normally for all available modes of operation.

4.3.10 Antenna static protection

4.3.10.1 Requirement

In order to provide protection against damage due to static voltages that may appear at the input of the receiver, there shall be a DC path from the antenna terminal to ground not exceeding 100 k Ω .

4.3.10.2 Methods of test and required results

Confirm by measurement that, for the protection against damage due to static voltages that may appear at the input of the receiver, a DC path from the antenna terminal to ground does not exceed 100 k Ω .

4.3.11 Safety precautions

4.3.11.1 Power supply

Provision shall be made for protecting the equipment from damage if the power supply is subject to transient voltage changes, from damage due to the accidental reversal of the polarity of the power supply, and from the effects of excessive voltage.

4.3.11.2 Earthing

A means for earthing exposed metallic parts of the equipment shall be provided, but the equipment shall not cause any terminal of the source of electrical energy to be earthed.

4.3.11.3 Access

All parts and wiring in which the direct or alternating voltages or both (other than radio frequency voltages) combine to give a peak voltage greater than 50 V shall be protected against accidental access and shall be automatically isolated from all sources of electrical energy when the protective covers are removed. Alternatively, the equipment shall be so constructed that access to such voltages may only be gained after having used a tool for this purpose (e.g. a spanner or screwdriver) and warning labels shall be prominently displayed both within the equipment and on protective covers.

4.3.12 Compass safe distance

The compass safe distance shall be determined and labelled as specified in IEC 60945.

4.3.13 Audio interface

Transmitters:

- 600 Ω earth free line input;
- microphone input.

Receivers:

- 600 Ω earth free line output (0 dBm $\pm$ 3 dB);
- earphone output;
- loudspeaker output.

The line input/output are not mandatory.

4.3.14 Activation of transmitter and maximum transmission time

4.3.14.1 Requirement

The equipment shall have a manual, non-locking push to talk switch to operate the transmitter with a visual indication that the transmitter is activated and facilities to limit the transmission time to a maximum of 5 min. The 5 min limitation applies only to the manual push to talk switch. A short audible announcement and a visual indication may be provided to show when the transmission will be automatically terminated within the next 10 s. It shall be possible to re-operate the push to talk switch and reactivate the transmitter after a 10 s period.

4.3.14.2 Method of measurement and required result

Confirm by observation that the equipment:

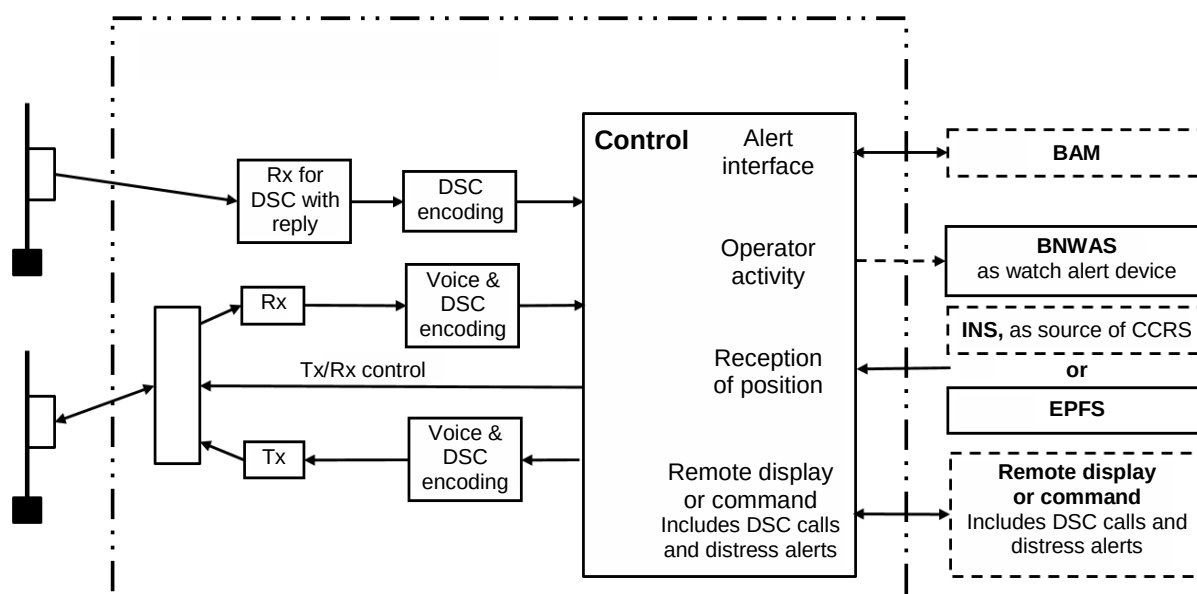
- includes a manual, non-locking push to talk switch;
- includes an indication of activated transmitter;
- limit the transmission time to max 5 min;
- if applicable, provide a short audible announcement and visual indication 10 s before the automatic termination of the transmission;
- is able to re-activate the transmission 10 s after automatic termination of the transmission.

4.3.15 Data interface

4.3.15.1 Requirements

Data interfaces for the connection of electronic navigational aids and for radio control purposes shall be compatible with at least one of IEC 61162-1, IEC 61162-2 and IEC 61162-450. The manufacturer shall specify which alternative of IEC 61162 each physical interface supports (see Figure 2).

Logical interfaces are shown in Figure 1. The manufacturer shall specify if any of the provided logical interfaces share the same physical interface.



Note
Solid line indicates mandatory part
Dashed line indicates optional part

IEC

Figure 1 – Interfaces of a DSC

As a minimum, the IEC 61162-1 sentences GLL, GGA, NSR, RMC and GNS shall be recognised for reception of position information. See Table 2.

Additionally, for remote display and/or command purposes, the equipment may optionally be capable of transmitting and receiving the sentences AUC, AUQ, AUS, CUL, DSC, DSE, ECI, EPV, FSS, NAK, OCC and SFI (see Table 3, Table 4, Annex B and Annex N).

Equipment forming integral parts of a specific radio equipment only may instead utilise other protocols.

Optionally, if provided, the DSC may include an interface to report operator activity in order that the BNWAS can reset the dormant period (see Table 5). The EVE sentence as specified IEC 61162-1 shall be output in response to user-interaction with the DSC under conditions described in the user manual.

Sentences used by a BAM interface are in Table 6 and Table 7.

Digital interface network IEC 61162-3 PGNs equivalent to the specified network IEC 61162-1 sentences are described for information in Annex A.

No connection of, or failure within any connected equipment shall affect the required performance of the DSC equipment.

Table 2 – IEC 61162-1 sentences received by the DSC equipment for position information

Mnemonic	Interface (see Figure 1)	Name	Comment
GLL GGA GNS RMC	INS, as source of CCRS or EPFS	Geographic position – latitude/longitude	
NSR	INS, as source of CCRS	Navigation status report	Plausibility and integrity of CCRS

Table 3 – IEC 61162-1 sentences transmitted by the DSC equipment

Mnemonic	Interface (see Figure 1)	Name	Comment
AUS ^a	Remote display or command	Automated Procedure Status	Report status of the ITU procedure Support for ITU-R M.493:2015, Annexes 3 and 4
CUL ^a	Remote display or command	Cyclic Procedure List	Control proper operation of the ITU procedure Support for ITU-R M.493:2015, Annexes 3 and 4
DSC DSE ECI ^a	Remote display or command	Digital selective calling information	Report a received DSC call detail information
EPV	Remote display or command	Equipment property value	Report equipment property values
FSS ^a	Remote display or command	Frequency selection set	Report setting of DSC
NAK	Remote display or command	Negative acknowledgement	Used to inform commander about refusal to set equipment property values
OCC ^a	Remote display or command	Occupation Control	Control possible multiple command sources Support for ITU-R M.493:2015, Annexes 3 and 4
SFI	Remote display or command	Scanning frequency information	Report setting of DSC
^a See Annex N.			

Table 4 – IEC 61162-1 sentences received by the DSC equipment

Mnemonic	Interface (see Figure 1)	Name	Comment
AUC ^a	Remote display or command	Automated Procedure Control	Used to control the ITU procedure Support for ITU-R M.493:2015, Annexes 3 and 4
AUQ ^a	DSC Automated procedure query information	Automated Procedure Query	Used to query for details of an automated DCS procedure
DSC DSE ECI ^a	Remote display or command	Digital selective calling information	Specifies details of a DSC initiation
EPV	Remote display or command	Equipment property value	Used to control equipment property values
FSS ^a	Remote display or command	Frequency selection set	Used to control DSC
SFI	Remote display or command	Scanning frequency information	Used to set scanning frequencies of DSC
^a See Annex N.			

Table 5 – IEC 61162-1 sentences transmitted by the DSC equipment for BNWAS

Mnemonic	Interface (see Figure 1)	Name	Comment
EVE	BNWAS, as watch alert device	Operator activity	Reset dormant period of the BNWAS

Table 6 – IEC 61162-1 sentences transmitted by the DSC equipment for BAM

Mnemonic	Interface (see Figure 1)	Name	Comment
ALC	BAM	Cyclic alert list	List of current alerts
ALF	BAM	Alert sentence	Details of a new alert
ARC	BAM	Alert command refused	Alert command not accepted
HBT	BAM	Heartbeat	Supports reliable alert related communication

Table 7 – IEC 61162-1 sentences received by the DSC equipment for BAM

Mnemonic	Interface (see Figure 1)	Name	Comment
ACN	BAM	Alert command	Alert command e.g. acknowledge
HBT	BAM	Heartbeat	Supports reliable alert related communication

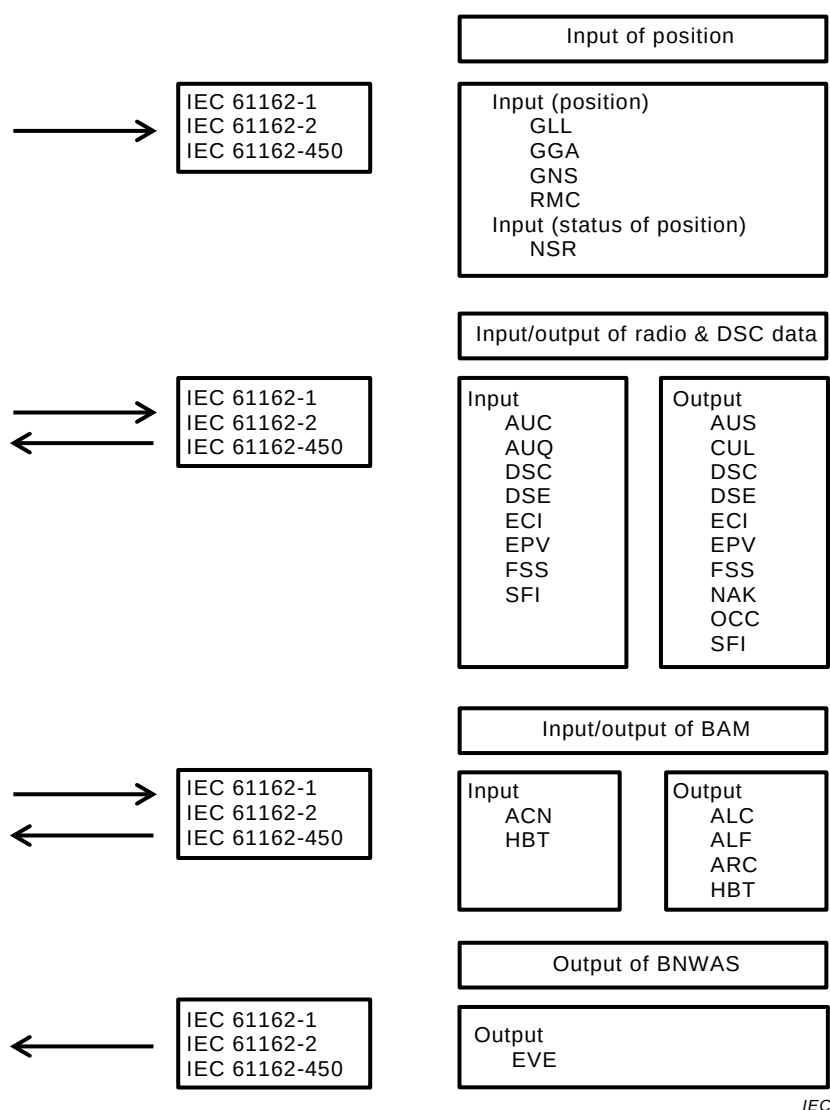


Figure 2 – DSC Interface overview

4.3.15.2 Methods of test and required results

If means for automatic entry of position information and time is provided, confirm by observation that the input characteristics at the EUT comply with the requirements.

If the equipment is intended to control an associated RF transmitter and receiver, particular attention is paid to ensure the correct operation of any control functions between the individual units. Confirm by observation that the interfaces at least comply with the requirements.

If an interface to report operator activity is provided, confirm by inspection of the user manual that it describes the conditions which cause reporting of operator activity and that EVE sentence is sent for each of the described condition.

4.4 Operational requirements

4.4.1 Basic requirements

4.4.1.1 Requirements

(803/A-11.2) *The DSC facility shall comprise:*

- a) (803/A-11.2.1, 804/A-Part D-2.1, 806/A-Part D-2.1) *means to decode and encode DSC messages;*
- b) (803/A-11.2.1, 804/A-Part D-2.2, 806/A-Part D-2.2) *means necessary for composing the DSC message for example (M.541 3.1) manual entry or selection of address, type of call, category and various messages into a DSC sequence;*
- c) (803/A-11.2.3, 804/A-Part D-2.3, 806/A-Part D-2.3) *means to verify the prepared message before it is transmitted (M.541 3.3) and if necessary the correction of such manually or automatically formed sequences;*
 - 1) (803/A-11.2.4) *means to display the information contained in a received call, in plain language;*
 - 2) (804/A Part D-2.4, 806/A-Part D-2.4) *means to display, in plain language with a minimum of 160 characters in two or more lines, the information contained in a received call;*
 - (M.541 3.7.1) *type of received call address (to all stations, to a group of stations, geographical, individual);*
 - (541/3.7.2) *category;*
 - (541/3.7.3) *identity of calling station;*
 - (541/3.7.4) *numerical or alphanumerical type of information, for example frequency information and telecommand;*
 - (541/3.7.5) *type of "end-of-sequence" character;*
 - (541/3.7.6) *detection of errors, if any;*
- d) (803/A-11.2.5, 804/A-Part D-2.5, 806/A-Part D-2.5) *facilities to automatically update the ship's position and the time at which the position was determined from a suitable electronic position-fixing aid which may be an integral part of the equipment. For equipment which does not have an integral position-fixing aid, such facilities shall include a suitable interface conforming to the appropriate international standard;*
- e) (803/A-11.2.6, 804/A-Part D-2.6, 806/A-Part D-2.6) *means for the manual entry of position information and the time at which the position was determined;*
- f) (803/A-11.2.7, 804/A-Part D-2.7, 806/A-Part D-2.7) *means to activate an alert when no position data is received from the electronic position-fixing aid or, in the case of manual input, the position information is over 4 hours old;*
- g) (493/A1-12.7) *If the automatic position update is not available, a displayed and audible reminder to manually update the position shall occur when a) no position information is provided during start up and b) before the position information is 4 hours old. The displayed reminder shall remain until position updating has been carried out;*
- h) (803/11.2.7, 804/A-Part D-2.7, 806/A-Part D-2.7. MSC.68(68), 493/A1-12.7) *Any position information not updated for more than 23 ½ hours shall be erased;*
- i) (803/A-11.4, 804/A-Part D-4, 806/A-Part D-4) *means for initiating a distress alert. It shall be possible to initiate and make distress and safety calls from the position from which the ship is normally navigated;*
- j) (803/A-2.9, 804/A-Part A-2.8, 806/A-Part A-2.8) *means to indicate the status of the distress alert transmission and additionally its other operational status for example transmitting, waiting for acknowledgement, auto retransmit;*
- k) 1. (803/A-11.5, 804/A-Part D-3.5) *Initiation of DSC distress alerting shall supersede any other operation of the facility including the selection of the nature of distress;*
 2. (806/A-Part D-3.5) *Initiation of DSC distress alerting shall take precedence over any other operation of the facility including the selection of the nature of distress;*
- l) (803/A-2.10, 804/A-Part A-2.9, 806/A-Part A-2.9) *It shall be possible to interrupt and initiate distress alerting at any time but it shall not be possible to interrupt a distress alert which is in progress;*

- m) (803/A-11.3.1, 804/A-Part D-3.1, 806/A-Part D-3.1) *If the received messages are not printed immediately, sufficient message storage capacity shall be provided to enable at least 20 received distress messages to be stored in the DSC facility;*
- n) (803/A-11.3.2, 804/A-Part D-3.2, 806/A-Part D-3.2) *These messages shall be stored until read out and shall be erased 48 hours after their reception.*

4.4.1.2 Method of test and required results

Confirm that means are provided:

- a) to decode and encode DSC messages;
- b) to compose a DSC message, for example manual entry or selection of address, type of call, category and various messages, into a DSC sequence;
- c) to verify the prepared message before it is transmitted and that such manually or automatically formed sequences can be corrected if necessary;
 - 1) to display the information contained in a received call in plain language;
 - 2) for MF and HF equipment, to display, as a minimum of 160 characters in two or more lines, the information contained in a received call.

Confirm that

- the type of received call address (to all stations, to a group of stations, geographical, individual),
 - the category,
 - the identity of calling station,
 - the numerical or alphanumerical type of information, for example frequency information and telecommand,
 - the type of "end-of-sequence" character, and
 - the detection of errors, if any,
- are shown.
- d) to automatically update the ship's position and the time at which the position was determined from a suitable electronic position-fixing aid, which may be an integral part of the equipment, and that these means are operational; confirm that for equipment which does not have an integral position-fixing aid, a suitable interface conforming to the appropriate international standard is provided;
 - e) to manual entry of position information and the time at which the position was determined is provided;
 - f) see C.4.1.3 c) and d);
 - g) see C.4.1.3 c) and d);
 - h) to erase any position information not updated for more than 23,5 h;
 - i) to initiate a distress alert. Confirm by inspection of the installation manual that a facility to initiate the distress alerts and safety calls can be provided at the position from which the ship is normally navigated;
 - j) to indicate the status of the distress alert transmission and additionally its other operational status, for example transmitting, waiting for acknowledgement, auto retransmit;
 - 1) to initiate DSC distress alerting which supersedes any other operation of the facility including the selection of the nature of distress;
 - 2) to initiate DSC distress alert which shall take precedence over any other operation of the DSC facility including the selection of the nature of distress;
 - k) to interrupt and initiate distress alerting at any time but that it is not possible to interrupt a distress alert which is in progress;
 - l) for sufficient message storage capacity to enable at least 20 received distress messages to be stored in the DSC facility if the received messages are not printed immediately.

m) to store these messages until read out and that they are erased 48 h after their reception.

4.4.2 Additional requirements

4.4.2.1 Aural alarm

4.4.2.1.1 Requirements

(803/A-11.8) *Provisions shall be made for:*

- a) (803/A-11.8.1, 804/A-Part D-3.8, 806/A-Part D-3.8) *a specific aural alarm and visual indication to indicate receipt of a distress or urgency call or a call having distress category. It shall not be possible to disable this alarm and indication. Provisions shall be made to ensure that they can be reset only manually;*
- b) (493/A1-12.1) *Shipborne alarms shall start softly and increase in volume if not silenced by the operator. This will give the operator the opportunity to acknowledge the alarm without interrupting the ship's current communications. It shall be possible for the operator to disable all audible alarms except those of category distress and urgency;*
- c) (493/A1-12.1) *The audible distress alarm shall have a distinctive two tone alarm. The alarm shall consist of two substantially sinusoidal audio-frequency tones, transmitted alternately. One tone shall have a frequency of 2 200 Hz and the other a frequency of 1 300 Hz. The duration of each tone shall be 250 ms;*
- d) (493/A4-2.25) *The audible urgency alarm shall consist of repetition of the 2 200 Hz frequency for 250 ms followed by 250 ms period of silence.*
- e) (493/A1-12.1) *The reception of a distress alert and urgency call shall activate an alarm and signal a BAM warning;*
- f) (493/A1-12.1) *For HF and MF distress alert, the alarm shall activate only when a distress alert, distress acknowledgement, or a distress alert relay is received and the distress position is within 500 NM (926 km) of the receiving vessel's position, or if the distress position is in the polar areas (latitude greater than 70° N or 70° S). The alarm shall also activate when the call is received and the distance between the vessel in distress and the receiving vessel cannot be determined;*

NOTE Disabling of aural alarm does not affect handling of the call.

- g) (493/A1-12.1) *For geographic area calls, the alarm appropriate to the category shall activate when the receiving station's position is within the area specified by the call or the receiving station's position is not known;*
- h) (493/A1-12.1) *The alarm shall not be activated where duplicate distress alert relay calls are received within one hour. A duplicate distress alert relay call is one having format specifier all ships or geographic area that contains identical message information and an identical distress MMSI;*
- i) (803/A-11.8.2/) *For VHF aural alarms and visual indication for calls other than distress and urgency shall be provided. (541/3.6) The aural alarm(s) may be capable of being disabled.*

4.4.2.1.2 Method of test and required results

Confirm that (see Annexes C and H):

- a) the specific aural alarm and visual indication to indicate receipt of a distress or urgency call or a call having distress category is used and that it is not possible to disable this alarm and indication; provisions are made to ensure that they can be reset only manually;
- b) shipborne alarms start softly and increase in volume if not silenced by the operator;
 - 1) the operator can acknowledge the alarm without interrupting the ship's current communications;
 - 2) the operator can disable all audible alarms except those of category distress and urgency;

- c) distinctive two tone alarms are used for distress and urgency calls. Confirm that one tone has a frequency of 2 200 Hz and the other a frequency of 1 300 Hz and that the duration of each tone is 250 ms;
- d) the audible urgency alarm consists of the 2 200 Hz frequency for 250 ms followed by 250 ms period of silence;
- e) reception of distress alert and urgency call activate an alarm, and signal a BAM warning;
- f) for HF and MF distress alert, the alarm is activate only when a distress alert, distress acknowledgement, or a distress alert relay is received and the distress position is:
 - 1) within 500 NM (926 km) of the receiving vessel's position;
 - 2) in the polar areas (latitude greater than 70° N or 70° S);
 - 3) where the distance between the vessel in distress and the receiving vessel cannot be determined;
- g) for geographic area calls, the alarm appropriate to the category is activated when the receiving station's position is within the area specified by the call or the receiving station's position is not known;
- h) the alarm is not activated where duplicate distress alert relay calls are received within one hour. A duplicate distress alert relay call is one having format specifier all ships or geographic area that contains identical message information and an identical distress MMSI;
- i) the aural alarms and visual indication for calls other than distress and urgency are provided and the aural alarm(s) may be capable of being disabled.

4.4.2.2 Inactivity timer

4.4.2.2.1 Requirements

(493/A1-12.2) During normal operation, the equipment shall include an inactivity timer to return the DSC system display to default or standby mode if the operator is in a menu where DSC call reception is disabled and does not make any selections or changes for 10 min.

4.4.2.2.2 Method of test and required results

Confirm by observation that the display of the EUT returns to default or standby mode after 10 min of no selection or changes by the operator.

4.4.2.3 Automatic switching to a subsequent communications channel

4.4.2.3.1 Requirements

(493/A1-12.5) Automatic switching to a subsequent communications channel on receipt of a DSC call may be implemented on VHF equipment. Prior to an automatic switch to the proposed frequency or channel, the user shall accept the change, which shall be carried out after the acknowledgement.

(493/A1-12.5) Automatic switching to a subsequent communications channel on receipt of a DSC call might in some cases disrupt important ongoing communications. Where such capability exists, a means for disabling that function shall therefore be provided for all calls other than individual station calls of category distress or urgency. The DSC equipment shall provide visual indication that the automatic switching function is disabled.

See C.7.1.7 and C.9.1.6.

4.4.2.3.2 Method of test and required results

See C.7.2 and C.9.2.

4.4.3 Distress alerts

4.4.3.1 General

4.4.3.1.1 Requirements

(541/A1-3.1.1) *The DSC equipment shall be capable of being pre-set to transmit the distress alert with "undesigned" nature of distress on at least one distress alerting frequency.*

See C.6.1.4.

4.4.3.1.2 Method of test and required results

Confirm by observation that the EUT is capable of being pre-set to transmit the distress alert with "undesigned" nature of distress on at least one distress alerting frequency.

See C.6.2.2.

4.4.3.2 Composition of distress alerts

4.4.3.2.1 Requirements

(541/A1-3.1.2) *The distress alert shall be composed in accordance with Recommendation ITU-R M.493. The procedure for transmitting a distress alert is given in Recommendation ITU-R M.541:2015, Annex 3.*

See C.6.1.

4.4.3.2.2 Method of test and required results

See C.6.2.

4.4.3.3 Distress alert attempt

4.4.3.3.1 Requirements

(541/A1-3.1.3) *At MF and HF a distress alert attempt may be transmitted as a single-frequency or a multi-frequency alert attempt. At VHF only single-frequency alert attempts shall be used.*

(541/A1-3.1.3.1) *A single-frequency alert attempt shall be transmitted as 5 consecutive calls on one frequency. To avoid call collision and the loss of acknowledgements, this alert attempt may be transmitted on the same frequency again after a random delay of between 3½ and 4½ min from the beginning of the initial alert. The random delay shall be generated automatically for each repeated transmission, however it shall be possible to override the automatic repeat manually.*

(541/A1-3.1.3.2) *A multi-frequency alert attempt may be transmitted as up to 6 consecutive calls dispersed over a maximum of 6 distress frequencies (1 at MF and 5 at HF). A VHF call may be transmitted simultaneously with an MF/HF call. Equipment transmitting multi-frequency distress alert attempts shall be able to complete the call attempt within 1 minute. Multi-frequency call attempts may be repeated after a random delay of between 3½ and 4½ min from the beginning of the previous call attempt.*

(541/A1-3.3.5) *The automatic repetition of a distress alert attempt shall be terminated automatically on receipt of a DSC distress acknowledgement. It shall also be possible to terminate the automatic repetition manually.*

See C.6.1.

4.4.3.3.2 Method of test and required results

See C.6.2

4.4.3.4 Distress alert acknowledgement and distress relay

4.4.3.4.1 Requirements

(541/A1-3.3) *Acknowledgement of DSC distress alerts shall be initiated manually and transmitted on the same frequency that the distress alert was received; automatic means to acknowledge distress alerts shall be excluded.*

(541/A1-3.3.3) *The acknowledgement of a distress alert shall consist of a single DSC distress acknowledgement call and include the identification of the ship whose distress alert is being acknowledged.*

(541/A1-3.4.1) *A distress alert relay shall use the call format for distress alert relays as specified in Recommendation ITU-R M.493 and the calling attempt shall follow the procedures described in 4.4.3.4.*

See C.7.1.9.

4.4.3.4.2 Method of test and required results

Confirm that an acknowledgement of DSC distress alerts can only be initiated manually and transmitted on the same frequency where the distress alert was received. Confirm that automatic means to acknowledge distress alerts are not available.

Confirm that the acknowledgement of a distress alert consists of a single DSC distress acknowledgement call and includes the identification of the ship whose distress alert is to be acknowledged.

Confirm that a distress alert relay is using the call format for distress alert relays as specified in Recommendation ITU-R M.493 and the calling attempt is in compliance with the procedures described in 4.4.3.4.

See C.7.2.7 and C.7.2.8.

4.4.4 Other calls

4.4.4.1 Composition of calls

4.4.4.1.1 Requirements

It shall be possible to compose all calls applicable to the class of equipment (see Tables A1-4.1 to A1-4.11 of Recommendation ITU-R M.493:2015).

(689/A1-2.1.1)(1082/A1-2.1.1) *If the EUT supports the optional automatic/semi-automatic service it shall be possible for the user to only key in the coast station address and the required subscriber number, all other information being inserted automatically.*

4.4.4.1.2 Method of test and required results

Confirm by observation that it is possible to compose all calls applicable to the class of the EUT.

If the EUT supports the optional automatic/semi-automatic service, confirm by observation that for automatic/semi-automatic calls other information than the coast station information and the subscriber number are applied automatically by the EUT.

See C.4.2.4.

4.4.4.2 Acknowledgement of calls

4.4.4.2.1 Requirements

Acknowledgement calls, except distress acknowledgement calls, may be transmitted automatically.

(541/A2-2.2.2) *When a received call sequence contains an end-of-sequence signal RQ, an acknowledgement sequence shall be composed and transmitted. The format specifier and category information shall be identical to that in the received calling sequence.*

(541/A2-2.2.3) *If an acknowledgement has not been transmitted by a ship's operator within 5 min of receiving the calling sequence the ship station shall transmit a calling sequence to the coast station.*

4.4.4.2.2 Method of test and required results

Confirm by observation that distress acknowledgement calls are not transmitted automatically without operator action.

Confirm by observation that an acknowledgement sequence is transmitted after reception of an end-of-sequence signal RQ.

4.4.4.3 Operation in the automatic/semi-automatic service

4.4.4.3.1 General

Requirements of this clause apply, if the EUT supports the optional automatic/semi-automatic service.

4.4.4.3.2 Requirements

(541/A2-2.2.4) *If the ship is equipped for automatic DSC operation, the ship station shall automatically transmit an acknowledgement with an end-of-sequence signal "BQ". The start of the transmission of this acknowledgement sequence shall be within 30 s for HF and MF or within 3 s for VHF after the reception of the complete call sequence.*

(689/A1-2.2.5) *Fully automated ship stations shall be capable of automatically transmitting on the VHF working channel a DSC call and a carrier for a minimum period of 2 s on receipt of an error-free acknowledgement "able to comply" from the called coast station.*

(689/A1-2.1.3) *If the ship station does not receive a VHF error-free acknowledgement from the called coast station within 5 s, the calling sequence shall be automatically repeated.*

(1082/A1-2.1.3) *If the ship station does not receive a MF or HF error-free acknowledgement from the called coast station within 25 s, the calling sequence shall be manually repeated.*

4.4.4.3.3 Method of test and required results

When fully automatic DSC operation is in use, confirm by observation that the EUT automatically transmits an acknowledgement with an end-of-sequence signal "BQ" within 30 s for HF and MF and within 3 s for VHF.

For fully automatic DSC operation and for VHF, confirm by observation that the EUT automatically transmits a carrier for at least 2 s in working channel after receipt of an error-free acknowledgement "able to comply" from a calling coast station.

For VHF, confirm by observation that the EUT repeats the calling sequence if the EUT does not receive error-free acknowledgement from a calling coast station within 5 s.

For MF and HF confirm that the user has to repeat the calling sequence manually, if the EUT does not receive error-free acknowledgement from a calling station within 25 s

4.4.4.4 Routine testing of the DSC equipment

4.4.4.4.1 Requirements

(803/A-11.7, 804/A-Part D-3.7, 806/A-Part D-3.7) *Means shall be provided to enable routine testing of the DSC facility without radiation of signals.*

The equipment shall additionally provide for a test call facility in accordance with Recommendation ITU-R M.493-14.

4.4.4.4.2 Method of test and required results

Confirm by observation that the EUT has means for routine testing without radiation of signals.

Confirm by observation that the EUT reverts to previous (watchkeeping) condition automatically on completion of the routine test.

4.4.5 Self-identification

4.4.5.1 Requirements

(803/A-11.6, 804/A-Part D-3.6, 806/A-Part D-3.6) *Self-identification data shall be stored in the DSC unit in a non-volatile memory (see 4.3.6). It shall not be possible for the user easily to change these data.*

Facilities shall be included in the EUT to permit an authorized operator (e.g. a manufacturer, dealer or service agent) to delete the MMSI stored in the EUT, so that a new MMSI can be entered in the EUT.

(493/A1-12.4) *DSC equipment shall not transmit any DSC call until own ship's MMSI allocated to the ship by the relevant administration has been configured and stored in the DSC equipment. Once stored, it shall not be possible for the user to change the MMSI without advice from the manufacturer.*

The DSC equipment shall display own ship's MMSI on start-up unless the MMSI has not been configured. If the MMSI has not been configured, the equipment will display a warning that the unit will not transmit any DSC calls until own ship's MMSI is entered. The equipment shall stay in this state until the operator confirms he has read the display and input own ship's MMSI.

The MMSI shall be readily displayed on the HMI when the DSC equipment is on.

See C.4.1.1

4.4.5.2 Method of test and required results

Confirm by observation that it is not possible for the user to change the self-identification data after an initial set up which may only be run a limited number of times. It shall easily be possible to verify the self-identification.

Confirm by observation that there are facilities available for an authorized operator to delete the MMSI so that a new MMSI can be set.

See C.4.2.2.

4.5 Scanning efficiency

4.5.1 Requirements

Scanning efficiency is the ability of the EUT to correctly identify calls preceded by more than 20 bits of a 200-bit dot pattern and transmitted on one frequency whilst scanning up to six frequencies, ignoring all other signals and noise and to generate suitable signals to control an associated scanning receiver.

4.5.2 Method of test and required results

Two standard test signals STS-1 containing a series of call sequences is applied alternately to the decoder at a random interval of 2,5 s to 4 s.

The level of the two STS-1 applied to the receiver is 20 dB μ V. The receiver is set to scan the maximum number of frequencies for which it is designed.

One standard test signal is modulated with a single distress call. The other standard test signal is modulated with DSC calls containing a 20-bit dot pattern.

The number of transmitted distress calls is 200 and the symbol error rate is determined as described in 4.2.11.2.5.

Confirm by observation that the total number of received distress calls is equal to or exceed 95 % of distress calls transmitted and the symbol error rate is $\leq 10^{-2}$.

Confirm by observation that the signals from the decoder to control the scanning receiver comply with the requirements in 4.6 for all DSC distress calls decoded correctly.

4.6 Watch and scanning facilities

4.6.1 Requirements

4.6.1.1 Multi-frequency distress alert attempts and watch receiver capabilities (MF/HF)

The equipment shall either:

- a) be capable of receiving DSC messages on all distress frequencies (except for the transmit frequency in use) whilst the distress alert is being transmitted; or
- b) be able to complete the multi-frequency distress alert attempt within one minute. Then be capable of receiving DSC messages on all distress frequencies.

The decoder shall provide a suitable signal to stop the scanning process on the detection of a dot pattern of more than 20-bit length.

The decoder shall provide a suitable signal to restart the scanning process when the dot pattern continues for more than 3 s, after receipt of a DSC call or, during the reception of a DSC call which is not addressed to the ship, as soon as this is recognised.

Means shall be provided to program the frequencies to be scanned by the watch receiver. The manufacturer shall provide information on how the programming is done. If the remote control interface is supported, the SFI sentence may be used to program the set of DSC distress frequencies in accordance with IEC 61162-1.

The set of frequencies shall at least include the DSC distress frequencies in the 2 MHz band, the 8 MHz band and one additional band. Default shall be all six bands.

The DSC distress frequencies programmed shall correspond with the frequencies on which a multi-frequency distress alert attempt will be transmitted.

4.6.1.2 Watch receiver capabilities (MF and VHF)

The watchkeeping receiver part of the DSC equipment shall be designed for continuous operation on channel 70 (on VHF) and 2 187,5 kHz (on MF) but the receiver need not operate when the transmitter is in use on that channel.

4.6.2 Method of test and required results

4.6.2.1 MF/HF

4.6.2.1.1 Default test method

Program the watch receiver to scan all six distress frequencies. Assure the main receiver is programmed for another frequency than any of the six distress frequencies.

From the TE, send a distress message on any of the distress frequencies.

Validate the call is received correctly by the EUT and the band of which it is received is indicated.

Repeat the test on all remaining distress frequencies. Validate all calls are received on EUT.

On EUT, send a multi-frequency alert attempt.

1 min after the alert attempt has been transmitted, send a distress acknowledgement from TE on any of the used distress frequencies.

Validate the distress acknowledgement is received on the EUT and the band of which it is received is indicated.

Repeat the test, sending first distress acknowledgement from TE on any of the remaining distress frequencies. Validate all distress acknowledgements are received on EUT.

4.6.2.1.2 Alternative test method

If remote control interface is implemented, the watch receiver can be programmed using the SFI sentence, and the currently used watch frequency can be reported using the FSS sentence according to IEC 61162-1.

Program the watch receiver to scan all six distress frequencies. Assure that the main receiver is programmed for another frequency than any of the six distress frequencies.

Let the TE (once) apply a dot pattern of 200 bits length on any of the DSC distress frequencies.

Validate the frequency is reported on FSS with mode "t" (F1B/J2B, receive only, teleprinter/DSC).

Repeat the test on all remaining distress frequencies. Validate that all frequencies are reported by the EUT.

If feasible, apply a continuous dot pattern on two distress frequencies simultaneously.

Validate that the watch receiver is reporting the two frequencies sequentially via FSS sentences within intervals of maximum 5 s.

4.6.2.2 MF and VHF

Validate that any distress message can be received on channel 70 (VHF) or 2 187,5 kHz (on MF) regardless of the frequency tuned to on the main receiver.

4.7 Bridge alert management (BAM)

4.7.1 Classification of BAM alerts

4.7.1.1 Requirements

The DSC equipment shall use the relevant alert classification available in Table 8. The manufacturer shall provide a document listing all available BAM alerts and their classification in the DSC equipment.

The ALF sentence is used to report details of BAM alerts. For easy identification of the origin of distress or other call, the ALF sentence shall be filled as below:

- Field Alert identifier as specified in Table 8 (for example 310, 311);
- Field Alert text for first ALF sentence as specified in Tables 9 to 14 Alert title column (for example "DISTRESS:RX");

NOTE The source of an alert, for example "VHF", "VHF number 1", "MF", "HF", "MF/HF", is available in IEC 61162-1 or IEC 61162-2 as a combination of talker ID and physical serial interface (i.e. configuration parameter within receiver). For IEC 61162-450, the source is available as combination of talker ID and TAG block parameter source identification.

- Field Alert text for second ALF sentence as defined by the manufacturer after consulting Tables 9 to 14 Alert description column. The manufacturer shall provide a detailed description of the text options.

Table 8 – Classification of GMDSS equipment alerts for alert management purposes

GMDSS alarm Source	Cause	BAM Alarm	BAM Warn.	BAM Caut.	Categ. A	Categ. B	Unique identifier at alert source ^a
VHF DSC radio MF/HF DSC radio	Receipt of distress or urgency DSC call		x		x		310
VHF DSC radio MF/HF DSC radio	Receipt of DSC calls other than distress or urgency			x		x	311
VHF DSC radio MF/HF DSC radio	No position data received by equipment			x		x	312
MF/HF DSC radio	Antenna Tuner Error or other detected antenna failure		x			x	313
VHF DSC radio MF/HF DSC radio	Transmission power error or otherwise inhibited transmission		x			x	314
^a Manufacturer specified unique identifiers at alert source are allowed within the range 10 000 to 9 999 999. NOTE 1 Alerts related to the reception of distress and urgency call are categorized as category A, as the OOW has to read the information in the received message before being in a position to acknowledge the alert. NOTE 2 This classification of GMDSS equipment alerts for alert management purposes set out in this table originates from IEC 62940.							

4.7.1.2 Methods of test and required results

Confirm by inspection of the manufacturer's documentation that the classification of BAM alerts follows requirements of 4.7.1.1.

4.7.2 Alert management

4.7.2.1 General requirements

4.7.2.1.1 Requirements

The performance standards for BAM tailor the IMO Code on alerts and indicators to harmonize the priority, classification, handling, distribution and presentation of alerts on bridge equipment.

DSC shall provide bridge alert management handling and an interface compliant with the requirements of BAM Modules A and C as further specified in the state diagram of IEC 61924-2:2012, Annex J.

Alert management requires:

- classification of all alerts available in the EUT (see 4.7.1);
- presentation of the alerts (see IEC 61924-2:2012, Module C);
- reporting of alerts in the BAM interface (see IEC 61924-2:2012, Module C);
- handling of unacknowledged warnings (see 4.7.2.2);
- functionality of remote acknowledge and remote silencing (see 4.7.2.3).