

Australian/New Zealand Standard™

Radiotelephone transmitters and receivers for the maritime mobile service operating in the VHF bands— Technical characteristics and methods of measurement

Part 1: Shipborne equipment and limited coast stations (including DSC) (IEC 61097-7:1996, MOD)

[IEC title: Global maritime distress and safety system (GMDSS), Part 7: Shipborne VHF radiotelephone transmitter and receiver—Operational and performance requirements, methods of testing and required test results]



AS/NZS 4415.1:2003

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Australian/New Zealand Standard™

Radiotelephone transmitters and receivers for the maritime mobile service operating in the VHF bands— Technical characteristics and methods of measurement

Part 1: Shipborne equipment and limited coast stations (including DSC) (IEC 61097-7:1996, MOD)

Originated as part of AS/NZS 4415:1996.
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PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee RC-004, Radiocommunications Equipment—Maritime and Safety of Life, as one of a series of Standards intended to provide specifications for spectrum management and minimum radio equipment performance. It supersedes AS/NZS 4415:1996 in part.

This Standard incorporates Amendment No. 1 (June 2004). The changes required by the Amendment are indicated in the text by a marginal bar and amendment number against the clause, note, table, figure or part thereof affected.

The objective of this Standard is to provide manufacturers, suppliers, testing facilities and operators with the minimum requirements for performance, technical characteristics and methods of testing for VHF maritime transmitters and receivers, to facilitate design and confirmation of compliance with Australian and New Zealand radiofrequency spectrum and maritime regulatory requirements.

The scope of the Standard includes shipborne equipment and limited coast stations.

This Standard is reproduced from IEC 61097-7:1996, *Global maritime distress and safety system (GMDSS), Part 7: Shipborne VHF radiotelephone transmitter and receiver—Operational and performance requirements, methods of testing and required test results* and has been modified to reflect Australian/New Zealand conditions. This Standard differs from IEC 61097-7:1996 in that some requirements are varied to reflect local conditions and usage.

Variations to IEC 61097-7:1996 are indicated at the appropriate places throughout this Standard. Strikethrough (~~example~~) identifies IEC tables, figures and passages of text which, for the purposes of this Australian/New Zealand Standard, are deleted. Where Australian/New Zealand tables, figures or passages of text are added, each is set in its proper place and identified by shading (**example**). Added figures are not themselves shaded, but are identified by a shaded border.

This Standard is Part 1 of AS/NZS 4415 series, *Radiotelephone transmitters and receivers for the maritime mobile service operating in the VHF bands—Technical characteristics and methods of measurement*, which is published in parts as follows:

- Part 1: Shipborne equipment and limited coast stations (including DSC) (this Standard)
- Part 2: Major coast stations, limited coast stations, ship stations and hand held stations (non DSC)

As this Standard is reproduced from an International Standard the following applies:

- (a) Its number appears on the cover and title page while the European Standard number appears only on the cover.
- (b) In the source text ‘this part of IEC 61097’ should read ‘this Australian/New Zealand Standard’.
- (c) A full point substitutes for a comma when referring to a decimal marker.
- (d) French text on figures should be ignored..

The terms ‘normative’ and ‘informative’ have been used in this Standard to define the application of the annex to which they apply. A ‘normative’ annex is an integral part of a Standard whereas an ‘informative’ annex is only for information and guidance.

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STANDARDS AUSTRALIA/STANDARDS NEW ZEALAND

Australian/New Zealand Standard**Radiotelephone transmitters and receivers for the maritime mobile service operating in the VHF bands—Technical characteristics and methods of measurement****Part 1: Shipborne equipment and limited coast stations (including DSC) (IEC 61097-7:1996, MOD)**

Any IEC table, figure or passage of text that is struck-through is not part of this Standard. Any Australian/New Zealand table, figure or passage of text that is added (and identified by shading) is part of this Standard.

1 Scope

~~This part of IEC 1097 specifies the minimum performance requirements, technical characteristics and methods of testing with required test results for VHF radio installations capable of voice communication and digital selective calling as required by chapter IV of the 1988 amendments to the 1974 International Convention for Safety of Life at Sea (SOLAS), and which is associated with IEC 945. When a requirement in this standard is different from IEC 945, the requirement in this standard shall take precedence.~~

This standard applies to shipborne and limited coast station equipment.

Part one of this Standard does not apply to hand held, portable or major coast station equipment.

This Standard incorporates the applicable part of the performance standards included in IMO Resolution A.524(13) and A.803(19), as amended by MSC Circ 68(68), the technical characteristics included in Recommendation ITU-R M.489-2 (formerly CCIR Recommendation 489-1), and takes account of IMO Resolution A.694(17), and conforms with the ITU Radio Regulations where applicable.

NOTE – All text of this standard, whose wording is identical to that in IMO Resolution A.524(13) and A.803(19) and Recommendation ITU-R M.489-2 is printed in *italics* and the Resolution/Recommendation and clause numbers are indicated in brackets.

The requirements for the DSC and/or watchkeeping receiver, when integrated in the equipment, are in IEC 1097-3 and the future IEC 1097-8 respectively.

For the purposes of this Standard the following definitions apply:

A major coast station is a station established on land primarily for the purpose of communicating with ship stations, including transmission and reception of messages on behalf of the public.

A limited coast station is a station established on land for the purpose of communicating with ship stations and is not used for the transmission and reception of messages on behalf of the public.

A handheld station is a station designed to be carried on the person and deriving primary power from a replaceable or rechargeable internal battery.

A ship station is a station established aboard a ship and is used primarily for communicating with land stations and other stations established aboard ships.

The equipment referred to as complying with the Standard shall be defined in classes as follows:

- (a) Class 1, being equipment designed to provide full compliance with International Maritime Organization (IMO) GMDSS carriage requirements for VHF installations. Class 1 equipment shall meet all requirements of this Standard, that of IEC 1097-3, and the requirements as defined for 'Class A' equipment in International Telecommunications Union (ITU) Resolution ITU-R M.493.
- (b) Class 2, being equipment designed to provide radiotelephony and a minimum DSC alerting capability for ships not required to comply with GMDSS carriage requirements. Class 2 equipment shall meet the requirements of International Telecommunications Union (ITU) Resolution ITU-R M.493
Class 2, shipborne equipment shall have the DSC functions integrated into the transceiver.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of IEC 1097. At the time of publication, the editions indicated were valid. All normative documents are subject to revision, and parties to agreements based on this part of IEC 1097 are encouraged to investigate the possibility of applying the most recent edition of the normative documents indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 945: 1994, Marine navigational equipment – General requirements – Methods of testing and required test results

IEC 1097-3: 1994, Global maritime distress and safety system (GMDSS) – Part 3: Digital selective calling (DSC) equipment – Operational and performance requirements, methods of testing and required test results

IEC 61162-1: 1995, *Maritime* navigation and radiocommunication equipment and systems – Digital interfaces – Part 1: Single talker *and multiple listeners*

IMO International Convention for the Safety of Life At Sea (SOLAS): 1974, as amended in 1988 (GMDSS) – *Chapter IV: Radiocommunications*

IMO Resolution A.524(13):1983, Performance standards for VHF multiple watch facility

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 A.803(19): 1995, Performance standards for shipborne VHF radio installations capable of voice communication and digital selective calling **as amended by MSC Circ 68 (68)**

ITU Radio Regulations: **1995/2001**, Appendix S3: Table of maximum permitted spurious emission power levels

ITU Radio Regulations: **1990/2001**, Appendix 18: Table of transmitting frequencies in the band 156-174 MHz for stations in the maritime mobile service

ITU-R M.489-2: 1995, Technical characteristics of **VHF** radiotelephone equipment operating in the maritime mobile service in channels spaced by 25 kHz

ITU-R M.493-9: 1998, Digital selective-calling system for the use in the maritime mobile service

ITU-R M.541-8: 2001, Operational procedures for the use of digital selective-calling (DSC) equipment in the maritime mobile service

ITU-T V.11: 1993, Electrical characteristics for balanced double-current interchange circuits operating at data signalling rates up to 10 Mbit/s

ITU-T V.24: 1993, List of definitions for interchange circuits between data terminal equipment (DTE) and data circuit terminating equipment (DCE)

ITU-T V.28: 1993, Electrical characteristics for unbalanced double-current interchange circuits

3 Performance requirements

3.1 Introduction

Performance requirements described in this clause are specified by referring to IMO Resolutions and ITU Recommendations.

3.2 General

3.2.1 (A.803(19)/1) *The VHF radio installation, in addition to meeting the requirements of the Radio Regulations, the relevant ITU-R Recommendations and the general requirements set out in Resolution A.694(17) and detailed in IEC 945, shall comply with the following requirements and with the technical characteristics contained in clause 4 of this standard.*

3.2.2 (A.803(19)/2.1) *The installation, which may consist of more than one piece of equipment, shall be capable of operating on single-frequency channels or on single or two-frequency channels. For two-frequency channels the Radio Regulations require a separation of 4,6 MHz between the transmitting frequency and the receiving frequency.*

3.2.3 (A.803(19)/2.2) *The equipment shall provide for the following categories of calls using both voice and digital selective calling (DSC):*

- .1 distress, urgency and safety;
- .2 ship operational requirements; and
- .3 public correspondence.

For Class 2 equipment DSC requirements refer to clause 4.5.

3.2.4 (A.803(19)/2.3) *The equipment shall provide for the following categories of communication using voice:*

- .1 distress, urgency and safety;
- .2 ship operational requirements; and
- .3 public correspondence.

3.3 General requirements

3.3.1 Composition

3.3.1.1 (A.803(19)/2.4) *The equipment shall comprise at least:*

- .1 a transmitter/receiver including antenna;
- .2 an integral control unit or one or more separate control units;
- .3 a microphone with a press-to-transmit switch, which may be combined with a telephone in a handset;
- .4 an internal or external loudspeaker;

- .5 an integral or separate digital selective calling facility (For Class 2 equipment DSC requirements refer to clause 4.5.); and
- .6 a dedicated DSC watchkeeping facility to maintain a continuous watch on channel 70 (For Class 2 equipment DSC requirements refer to clause 4.5)

3.3.1.2 (A.803(19)/2.5) *The installation may also include additional receivers.*

3.3.2 Controls and indicators

3.3.2.1 (A.803(19)/4.1.3) *An on/off switch shall be provided for the entire installation with a visual indication that the installation is switched on.*

3.3.2.2 (A.803(19)/4.2.1) *Provision shall be made for changing from transmission to reception by use of a press-to-transmit switch. Additionally, facilities for operation on two-frequency channels without manual control may be provided.*

3.3.2.3 (A.803(19)/4.2.2) *The receiver shall be provided with a manual volume control by which the audio output may be varied.*

3.3.2.4 (A.803(19)/4.2.3) *A squelch (mute) control shall be provided on the exterior of the equipment.*

3.3.2.5 (A.803(19)/4.1.5) *The equipment shall indicate the channel number, as given in the Radio Regulations, to which it is tuned. It shall allow the determination of the channel number under all conditions of external lighting. Where practicable, channels 16 and 70 shall be distinctively marked.*

3.3.2.6 (A.803(19)/4.1.4) *A visual indication that the carrier is being transmitted shall be provided. The indication shall operate for power levels of 0.1 Watt or greater.*

3.3.2.7 (A.803(19)/4.1.6) *Control of the equipment shall be possible at the position from which the ship is normally navigated. Control from that position shall have priority if additional control units are provided. When there is more than one control unit, indication shall be given to the other units that the equipment is in operation.*

3.3.2.8 Channel selection by a digital input panel shall require the operator only to key the desired channel numbers.

3.3.2.9 Change of frequencies, except for automatic DSC or multiple watch operation may be initiated by channel selector controls only.

3.3.2.10 (A.803(19)/2.6) *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.*

3.3.2.11 (A.803(19)/2.7) *The dedicated distress button shall:*

- .1 be clearly identified; and
- .2 be protected against inadvertent operation.

3.3.2.12 (A.803(19)/2.8) *The distress alert initiation shall require at least two independent actions.*

For Class 2 equipment, provided the circuitry has appropriate design to debounce the control switches, two independent operations of the same switch within three seconds shall be deemed to comply with the requirement.

3.3.2.13 (A.803(19)/2.9) *The equipment shall indicate the status of the distress alert transmission.*

3.3.2.14 (A.803(19)/2.10) *It shall be possible to interrupt and initiate distress alerts at any time.*

3.3.3 Loudspeaker and handset

3.3.3.1 (A.803(19)/10.1) *The receiver output shall be suitable for use with a loudspeaker and/or a telephone handset. The audio output shall be sufficient to be heard in the ambient noise level likely to be encountered on board ships.*

3.3.3.2 (A.803(19)/10.2) *It shall be possible to switch off the loudspeaker without affecting the audio output of the telephone handset, if provided. Not applicable to Class 2 equipment.*

3.3.3.3 (A.803(19)/10.3) *In the transmit condition during simplex operation the output of the receiver shall be muted.*

3.3.4 Switching time

3.3.4.1 (A.803(19)/4.1.1) *Change of channel shall be capable of being made as rapidly as possible, but in any event within 5 s.*

3.3.4.2 (A.803(19)/4.1.2) *The time taken to switch from the transmit to the receive condition, and vice versa, shall not exceed 0,3 s.*

3.3.5 Safety precautions

(A.803(19)/6) *The equipment, when operating, shall not be damaged by the effects of open-circuited or short-circuited antenna terminals.*

3.3.6 Frequency bands

3.3.6.1 (A.803(19)/3.1) *The equipment shall be designated for operation on one or more channels selected from and in accordance with appendix 18 of the Radio Regulations.*

A device shall be capable of operation only on a channel designated in the first column of Table 1A, being a channel whose transmit and receive nominal carrier frequency is specified in the second and third column respectively.

Where an alternate set of channels, in addition to those specified in this Clause is available, the device shall—

- (a) provide a clear indication of which set of channels is in use; and
- (b) be designed so that the channel set on which the device operates at switch-on corresponds to that specified in this Clause.

A device shall operate on only one channel at any one time with the exception of simultaneous watch facilities on channel 70 for DSC, if fitted.

Refer to part two of this standard for information for major coast stations and handheld equipment as it is not included in Table 1A below.

Table 1A – Channel operation

Channel number	Ship station, limited coast station and handheld		Major coast station	
Column 1	Column 2	Column 3	Column 4	Column 5
	Transmit	Receive	Transmit	Receive
60	156.025	160.625	160.625	156.025
01	156.050	160.650	160.650	156.050
	61	156.075	160.675	156.075
02	156.100	160.700	160.700	156.100
	62	156.125	160.725	156.125
03	156.150	160.750	160.750	156.150
	63	156.175	160.775	156.175
04	156.200	160.800	160.800	156.200
	64	156.225	160.825	156.225
05	156.250	160.850	160.850	156.250
	65	156.275	160.875	156.275
06	156.300	156.300	—	—
	66	156.325	160.925	156.325
07	156.350	160.950	160.950	156.350
	67	156.375	156.375	156.375
08	156.400	156.400	—	—
	68	156.425	156.425	156.425
09	156.450	156.450	156.450	156.450
	69	156.475	156.475	156.475
10	156.500	156.500	156.500	156.500
	70 ¹⁾	156.525	156.525	156.525
11	156.550	156.550	156.550	156.550
	71	156.575	156.575	156.575
12	156.600	156.600	156.600	156.600
	72	156.625	—	—
13	156.650	156.650	156.650	156.650
	73	156.675	156.675	156.675
14	156.700	156.700	156.700	156.700
	74	156.725	156.725	156.725
15	156.750	156.750	156.750	156.750
	75	156.775	—	—
16	156.800	156.800	156.800	156.800
	76	156.825	—	—
17	156.850	156.850	156.850	156.850
	77	156.875	—	—
18	156.900	161.500	161.500	156.900
(continued)				

(continued)

A1

Table 1A (continued)

Channel number	Ship station, limited coast station and handheld		Major coast station	
Column 1	Column 2	Column 3	Column 4	Column 5
	Transmit	Receive	Transmit	Receive
78	156.925	161.525	161.525	156.925
19	156.950	161.550	161.550	156.950
79	156.975	161.575	161.575	156.975
20	157.000	161.600	161.600	157.000
80	157.025	161.625	161.625	157.025
21	157.050	161.650	161.650	157.050
81	157.075	161.675	161.675	157.075
22	157.100	161.700	161.700	157.100
82	157.125	161.725	161.725	157.125
23	157.150	161.750	161.750	157.150
83	157.175	161.775	161.775	157.175
24	157.200	161.800	161.800	157.200
84	157.225	161.825	161.825	157.225
25	157.250	161.850	161.850	157.250
85	157.275	161.875	161.875	157.275
26	157.300	161.900	161.900	157.300
86	157.325	161.925	161.925	157.325
27	157.350	161.950	161.950	157.350
87 ²⁾	157.375	157.375	—	—
28	157.400	162.000	162.000	157.400
88 ²⁾	157.425	157.425	—	—
AIS 1 ²⁾	162.975	161.975	161.975	161.975
AIS 2 ²⁾	162.025	162.025	162.025	162.025

NOTES

1) Ch 70 restricted to digital selective calling for distress, safety and calling.

2) Channels 87 and 88 revert from duplex to simplex operation as per Appendix 18 (WRC2000) and the remaining (upper pair) frequencies become channels AIS 1 and AIS 2, to be used for an automatic ship identification and surveillance system. Ref: ITU-RM 1371.

3.3.6.2 (A.803(19)/3.2) The equipment shall be capable of operating as follows:

- 1 in the band 156,3 MHz to 156,875 MHz on single-frequency channels as specified in appendix 18 to the Radio Regulations including at least 156,3 MHz (CH 6), 156,65 MHz (CH 13), 156,8 MHz (CH 16), and 156,525 MHz (CH 70);
- 2 in the band 156,025 MHz to 157,425 MHz for transmitting and the band 160,625 MHz to 162,025 MHz for receiving on two-frequency channels as specified in appendix 18 to the Radio Regulations with the exception of channels 87, 88, AIS1 and AIS2;
- 3 the equipment shall be so designed that the use of channel 70 for purpose other than DSC is prevented (see Recommendation ITU-R M.493-9[4] and Recommendation ITU-R M.541-8[5]); and
- 4 the equipment should be so designed that the use of channels AIS1 and AIS2 for purposes other than ship automatic identification systems (AIS) is prevented.

3.3.7 Marking and identification

Marking and identification shall be in accordance with IEC 945.

3.3.8 Warming-up period

(A.803(19)/5) *The equipment shall be operational within 1 min of switching on.*

3.3.9 DSC facilities

(A.803(19)/3.3) *The digital selective calling facility shall be at least capable of operating on channel 70, and conform to the requirements of IEC 1097-3.*

The DSC facility may be physically integrated into the equipment or form an independent unit.

For Class 2 equipment DSC requirements refer to clause 4.5.

3.3.9.1 DSC signal input and output

If the DSC facility is not integrated, the equipment shall have DSC signal input and output impedances of 600 Ω , symmetrical and free of earth, with a closed-circuit level adjustable to 0,775 V (r.m.s.) ± 10 dB for connection to the AF terminals of an independent DSC facility.

Alternatively, an input and output may be provided for DSC signals at logic levels. The electrical characteristics of the input and output shall be compatible with ITU-T V.11 and the definition of functions shall comply with IEC 1162-1. The B-state shall be the logic "0", and the Y-state shall be the logic "1".

Additionally, DSC signals may be provided with V.24/V.28 signals (EIA-232-D).

3.3.9.2 Printer interface

For equipment with an integrated DSC facility, the electrical characteristics of an interface/output for an external printer, if required, shall be a CENTRONICS type interface/output or be compatible with ITU-T V.28 and the definition of function shall comply with ITU-T V.24. Voluntarily other types of printer interfaces may be provided.

3.3.9.3 Data interface

For equipment with an integrated DSC facility, data interfaces, if provided, for the connection of electronic navigational aids shall be compatible with IEC 1162-1.

If the DSC facility is not integrated, the equipment shall have data interfaces for radio control purposes compatible with IEC 1162-1. Equipment forming integral parts of a specific radio installation only, may instead utilize other protocols for radio control purposes.

3.3.10 Multiple watch facilities

(A.524(13)/1) *VHF radiotelephone equipment having multiple watch facilities shall comply with the following requirements:*

3.3.10.1 (A.524(13)/2.1) The equipment shall include a provision for the automatic scanning of a priority channel and one additional channel only.

The additional channel may change after each return to the priority channel.

3.3.10.2 (A.524(13)/2.2) *The priority channel is that channel which will be sampled even if there is a signal on the additional channel and on which the receiver will lock during the time a signal is detected.*

3.3.10.3 (A.524(13)/2.3) *The additional channel is that channel which will be monitored during the periods the equipment is not sampling or receiving signals on the priority channel.*

3.3.10.4 (A.524(13)/2.4) *Provision shall be included to switch the scanning facility on and off by means of a manually operated control. In addition it shall be ensured that the receiver remains on the same channel as the transmitter for the entire duration of any communication with the ship, e.g. the scanning facility shall be switched off automatically when the handset is off its hook. The scanning facility shall be switched on automatically when the handset is replaced on its hook.*

3.3.10.5 (A.524(13)/2.5) *Selection of the additional channel and, if provided, of the priority channel shall be possible at the operating position of the equipment. If the selection of the priority channel is not provided, the priority channel shall be channel 16.*

3.3.10.6 (A.524(13)/2.6) *When the scanning facility is in operation, the channel number of both channels on which the equipment is operating shall be clearly indicated simultaneously.*

For Class 2 equipment, as an alternative to simultaneous display the sequential display of channel numbers is also permitted.

3.3.10.7 (A.524(13)/2.7) *In a transceiver, transmission shall not be possible when the scanning facility is operating. When the scanning facility is switched off, both transmitter and receiver shall be tuned automatically to the selected additional channel.*

3.3.10.8 (A.524(13)/2.8) *A transceiver shall be provided with a single manual control (e.g. push-button) in order to switch the equipment quickly for operation on the priority channel.*

3.3.10.9 (A.524(13)/2.9) *At the operating position of a transceiver the selected additional channel shall be clearly indicated as being the operational channel of this receiver.*

3.4 Environmental requirements and electromagnetic compatibility

Unless otherwise stated in this standard, the equipment shall comply with the requirements of the environmental and electromagnetic conditions specified in IEC 945.

For Class 2 equipment EMC requirements are currently under consideration.

4 Technical characteristics

4.1 General

4.1.1 The equipment shall be designed to operate satisfactorily with a channel separation of 25 kHz in accordance with appendix 18 of the Radio Regulations.

4.1.2 (A.803(19)/4.1.7) *The equipment shall not be able to transmit during channel switching operation.*

4.1.3 (A.803(19)/4.1.8) *Operation of the transmit/receive control shall not cause unwanted emissions.*

4.1.4 (489-2/1.1.4) *Where duplex or semi-duplex systems are in use, the performance of the equipment shall continue to comply with the requirements of this standard.*

4.1.5 When using digital selective calling the equipment shall have the following capabilities:

- .1 sensing* to determine the presence of a signal on 156,525 MHz (CH 70); and
- .2 automatic prevention of the transmission of a call, except for distress and safety calls, when the channel is occupied by calls.

* Sensing may be achieved by an associated DSC watchkeeping receiver.

4.2 Class of emission and modulation characteristics

4.2.1 (A.803(19)/3.4) Class of emission shall comply with appendix 19 of the Radio Regulations (ITU-R.M 829-2:1995)

4.2.2 (489-2/1.1.1 and .3) *The class of emission shall be G3E (frequency modulation with a pre-emphasis characteristic of 6 dB/octave) for voice communication. It shall be phase modulation G2B for DSC signalling.*

4.2.3 (489-2/1.1.2) *The necessary bandwidth shall be 16 kHz.*

4.3 Transmitter

4.3.1 (489-2/1.2.1) *The frequency tolerance for ~~ship station~~ transmitters shall not exceed 10 parts in 10⁶. For practical reasons, the frequency error shall be within ±1,5 kHz.*

~~4.3.2 (A.803(19)/7.1) *The transmitter output power shall be between 6 and 25 W.*~~

4.3.2 (A.803(19)/7.1) The nominal transmitter output power shall be between 10 and 25 Watts for shipborne equipment and limited coast stations.

4.3.3 (A.803(19)/7.2) *Provision shall be made for reducing the transmitter output power to a value of between 0,1 W and 1 W. However, this reduction of the power is optional on channel 70, except for a routine all-ships call where the output power shall not exceed 1 W.*

4.3.4 The frequency deviation corresponding to 100 % modulation shall approach ±5 kHz as nearly as practicable.

4.3.5 (489-2/1.2.5) *The upper limit of the audiofrequency band shall not exceed 3 kHz.*

4.3.6 (A.803(19)/6) *The transmitter, when operating, shall not be damaged by the effects of open-circuited or short-circuited antenna terminals.*

4.3.7 (A.803(19)/10.4) *In the transmit condition during duplex operation, only the telephone handset shall be in circuit. Care shall be taken to prevent harmful electrical or acoustic feedback, which could cause singing.*

4.3.8 (489-2/1.2.2) *Spurious emissions on discrete frequencies, when measured in a non-reactive load equal to the nominal output impedance of the transmitter, shall be in accordance with the provisions of Appendix S3 of the Radio Regulations. The power of any conducted spurious emission on any discrete frequency shall not exceed 0,25 µW.*

4.3.9 (489-2/1.2.6) *The cabinet radiated power shall not exceed 25 µW. In some radio environments, lower values may be required. The equipment shall meet the requirements of IEC 945 for radiated interference.*

For Class 2 equipment EMC requirements are currently under consideration.

4.3.10 Time-out timer (TOT)

A TOT is required for Class 2 equipment and is desirable for Class 1 equipment.

4.3.10.1 Definition

A facility that disables the transmitter after a preset transmission period. Re-activation of the transmitter (following disabling by the TOT) is initiated only after the de-activation and re-activation of the transmit control circuitry.

4.3.10.2 Requirements

The TOT circuitry shall be enabled when utilizing a manually operated press-to-talk (PTT) switch.

The TOT shall activate within 5 minutes of constant transmission.

4.4 Receiver

4.4.1 (A.803(19)/8.1) *The maximum usable sensitivity of the receiver shall be equal to or better than 2 μ V e.m.f. for a signal-to-noise and distortion (SINAD) ratio of 20 dB.*

4.4.2 (489-2/1.3.2) *The adjacent channel selectivity shall be at least 70 dB.*

4.4.3 (489-2/1.3.3) *The spurious response rejection ratio shall be at least 70 dB.*

4.4.4 (489-2/1.3.4) *The radiofrequency intermodulation rejection ratio shall be at least 65 dB.*

4.4.5 (489-2/1.3.5) *The power of any conducted spurious emission, measured at the antenna terminals, shall not exceed 2,0 nW at any discrete frequency in the frequency range 9 kHz to 2 GHz.*

4.4.6 (A.803(19)/8.3) *The immunity to interference of the receiver shall be such that the wanted signal is not seriously affected by unwanted signals.*

4.4.7 *Scanning characteristics of multiple watch facilities (see also 3.3.10)*

4.4.7.1 (A.524(13)/3.1) *When the scanning facility is switched on, the priority channel shall be sampled with a sampling frequency of not less than once per 2 s. If a signal is detected on the priority channel the receiver shall remain on this channel for the duration of that signal.*

4.4.7.2 (A.524(13)/3.2) *If a signal is detected on the additional channel the sampling of the priority channel shall continue, thus interrupting the reception on the additional channel for periods as short as possible and not greater than 150 ms.*

The design of the receiver shall provide for its proper functioning during the period the priority channel is sampled since the receiving conditions on the priority channel may differ from those on the additional channel.

4.4.7.3 (A.524(13)/3.3) *In the absence of a signal on the priority channel and during reception of a signal on the additional channel, the duration of each listening period on this channel shall be at least 850 ms.*

4.4.7.4 (A.524(13)/3.4) *Means shall be provided to indicate the channel on which a signal is being received.*

4.5 DSC facility

For Class 1 equipment clauses 4.5.1, 4.5.2 and 4.5.3 shall apply.

Class 2 shipborne equipment, shall have the DSC functions integrated into the transceiver and the following DSC requirements apply:

(a) *Transmission requirements*

NOTE: The numbers in brackets indicate the applicable symbols from the ITU resolution.

- (i) **Format specifiers**
 - (A) Distress (112).
 - (B) All ships (116).
 - (C) Individual stations call (120).
- (ii) **Category**
 - (A) Distress (112).
 - (B) Routine (100).
- (iii) **First telecommand**
 - (A) F3E simplex TP (100).
 - (B) Unable to comply (104).
- (iv) **Second telecommand**
 - (A) No information (126).
- (v) **Self identification automatically inserted**
- (vi) **Messages**
 - (A) Nature of distress (distress call) defaulting to undesignated distress.
 - (B) Distress coordinates (distress call), defaulting to 9999999999 if no coordinates are available.
 - (C) Distress time, in UTC, defaulting to 8888 if no time is available.
 - (D) Frequency or channel (all ships or individual call), defaulting to Channel 16 if no channel selected.
- (vii) **End of sequence and error check characters**
- (viii) **Distress call transmission.**

A distress call will contain the following:

 - (A) The format specifier distress (112) automatically inserted.
 - (B) Self ID automatically inserted.
 - (C) Nature of distress undesignated (107) automatically inserted.
 - (D) Distress coordinates and time that the coordinates were updated (in UTC), defaulting to 9999999999 and 8888 respectively, if no automatic input or manual update is available.
 - (E) Telecommand indicating subsequent communications by F3E (100) automatically inserted.
 - (F) End of sequence (EOS) and error check characters automatically inserted.
- (ix) **Routine individual call transmission.**

A routine individual call will contain the following:

 - (A) The format specifier individual stations (120), automatically inserted.
 - (B) The destination MMSI manually entered.
 - (C) The category routine (100) automatically inserted.
 - (D) Self ID automatically inserted.
 - (E) The telecommand indicating subsequent communications by F3E (100) automatically inserted.
 - (F) The channel number of the associated voice channel manually inserted.
 - (G) End of sequence (ACK RQ) and error check characters inserted automatically.