Innovation, Science and Economic Development Canada
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RSS-182
Issue 6
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Spectrum Management and Telecommunications

Radio Standards Specification

Maritime Radio Equipment Operating in the 156-162.5 MHz Band

Amendment (September 2023)

Changes made to section 3.2.3 to no longer require an acceptance letter from Transport Canada for Portable VHF Radiotelephones (voice only)

Aussi disponible en français – CNR-182

Canada

Preface

Radio Standards Specification RSS-182, issue 6, *Maritime Radio Equipment Operating in the 156-162.5 MHz Band*, replaces RSS-182, issue 5, dated January 2012.

The main changes are listed below:

1. revised power levels for hand-held maritime portable transmitters
2. removed the section on receiver-spurious emissions because this topic is covered in RSS-Gen, and revised the title of RSS-182 accordingly
3. removed requirements that are imposed by Transport Canada
4. removed references to documents published by the IMO, ETSI, IEC and ITU because the acceptance letter from Transport Canada ensures compliance with international standards
5. revised Table 2: Frequency stability limits
6. modernized the structure to reflect the current RSS structure
7. made editorial changes and clarifications, as appropriate

Inquiries may be submitted by one of the following methods:

1. Online using the General Inquiry form (in the form, select the Directorate of Regulatory Standards radio button and specify "RSS-182" in the General Inquiry field)

2. By mail to the following address:

   Innovation, Science and Economic Development Canada
   Engineering, Planning and Standards Branch
   Attention: Regulatory Standards Directorate
   235 Queen Street
   Ottawa ON K1A 0H5
   Canada

3. By email to ic.consultationradiostandards-consultationnormesradio.ic@canada.ca

Comments and suggestions for improving this standard may be submitted online using the Standard Change Request form or by mail or email to the above addresses.

All documents related to spectrum and telecommunications are available on ISED's Spectrum Management and Telecommunications website.

Issued under the authority of
the Minister of Innovation, Science and Industry

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Martin Proulx
Director General
Engineering, Planning and Standards Branch

Contents

1. Scope

This Radio Standards Specification (RSS) sets out the requirements for certification of radio equipment used for maritime service in the 156-162.5 MHz band, including automatic identification system – search and rescue transmitters (AIS-SART) operating on AIS-1 and AIS-2.

2. Purpose and application

Various types of shipborne very high frequency (VHF) radiotelephones and equipment are allowed in the maritime service, depending upon the application. The following list presents the types of equipment covered by this standard:

- VHF radiotelephones with digital selective calling (DSC) and **compliant** with the Global Maritime Distress and Safety System (GMDSS) (i.e. they meet International Convention for the Safety of Life at Sea [SOLAS] standards);
- VHF radiotelephones with DSC and **compatible** with the GMDSS (i.e. they are allowed on domestic ships, but do not meet SOLAS standards);
- VHF radiotelephones for survival craft (GMDSS-type);
- portable VHF radiotelephones capable of distress alerting on the DSC distress channel (VHF channel 70);
- portable VHF radiotelephones (voice only);
- AIS/VHF transponders Class A (including AIS-SART); and
- AIS/VHF transponders Class B.

3. General requirements and references

This section sets out the general requirements and references related to this RSS.

3.1 Coming into force and transition period

This document will be in force as of its publication on Innovation, Science and Economic Development Canada's (ISED) website.

However, a transition period of six months from the publication date will be provided. During this period, all applications for certification under RSS-182, issue 6 or issue 5, will be accepted. After this period, all applications for the certification of equipment will be accepted under RSS-182, issue 6 only, and equipment manufactured, imported, distributed, leased, offered for sale, or sold in Canada shall comply with this present issue.

A copy of RSS-182, issue 5, may be requested by email.

3.2 Certification requirements

Equipment covered by this standard is classified as Category I equipment. Either a technical acceptance certificate (TAC) issued by the Certification and Engineering Bureau (CEB) of ISED or a certificate issued by a recognized certification body (CB) is required.

At the time of application for certification with ISED, the applicable equipment type must be identified (using types listed in section 2), as well as the equipment's intended use (i.e. shipborne or coast station).

3.2.1 Declaration of compliance for the use of distress and safety frequencies

Applicants shall include, in the application for certification, a statement declaring that the radio equipment does not employ a modulation other than the internationally adopted modulation for maritime use when it operates on the distress and safety frequencies specified in section 5.4.

3.2.2 Compliance of digital selective calling equipment

For ship station radio equipment with DSC capability, the applicant shall provide a statement indicating that the equipment's DSC capability complies with the latest version of International Telecommunication Union Radiocommunication (ITU-R) Recommendation M.493-15, *Digital selective-calling system for use in the maritime mobile service*.

3.2.3 Transport Canada acceptance letter

Shipborne radio equipment requires verification from Transport Canada (TC) that it meets TC's operational requirements before the applicant can submit the equipment to ISED for certification under this RSS. Non-shipborne equipment, portable VHF radiotelephones (voice only) and coast station equipment do not require this acceptance letter. TC requirements can be found in the *Navigation Safety Regulations, 2020*.

The acceptance letter issued by TC, confirming that the equipment has met TC requirements, shall be included as part of the certification application sent to the CEB or a recognized CB.

Inquiries concerning TC's requirements should be directed to:

Manager, Navigation Safety and Radiocommunications
Marine Safety, Transport Canada
Tower C, Place de Ville
330 Sparks Street, 10th Floor
Ottawa ON K1A 0N8

Email: TC.NavRadio.TC@Tc.gc.ca

3.3 Licensing requirements

Radio equipment covered by this standard is subject to licensing pursuant to subsection 4(1) of the *Radiocommunication Act*. However, in some cases, radio equipment that is operated on board a ship or vessel in the performance of maritime service is exempt from licensing requirements pursuant to subsections 15.2, 34(1), 34(2) and 34.2 of the *Radiocommunication Regulations*. For further information, consult the Licensing exemptions web page.

3.4 RSS-Gen compliance

Equipment being certified under this standard shall also comply with the general requirements set out in RSS-Gen, *General Requirements for Compliance of Radio Apparatus*.

3.5 Related documents

ISED documents are available in the Published documents section of the Spectrum Management and Telecommunications website.

Regulation by Reference RBR-2, *Technical Requirements for the Operation of Mobile Stations in the Maritime Service*, should be consulted in conjunction with this RSS.

4. Definitions

An **automatic identification system (AIS)** is a maritime navigation safety communication system standardized by the ITU and adopted by the International Maritime Organization (IMO) that:

i. automatically provides vessel information (including the vessel's identity, type, position, course, speed, navigation status and other safety-related information) to appropriately equipped shore stations, other ships and aircraft;
ii. automatically receives such information from similarly fitted ships;
iii. monitors and tracks ships; and
iv. exchanges data with shore-based facilities.

A **coast station** is a land station in the maritime mobile service.

Digital selective calling (DSC) is a type of synchronous system developed by the ITU-R Sector that is used to establish contact with a station or groups of stations automatically by means of radio equipment.

A **ship station** is a mobile station in the maritime mobile service located on board a vessel that is not permanently moored (which does not include survival craft).

5. Transmitter specifications

This section provides transmitter specifications.

Systems that cannot conform to the limits in section 5.6 may be eligible to be licensed on a case-by-case basis. Those systems will be evaluated by the appropriate district office. For district office contact information, refer to Radiocommunication Information Circular RIC-66, *Addresses and Telephone Numbers of District Offices*.

5.1 Measurement methods

All measurements shall be performed in accordance with the requirements of RSS-Gen unless otherwise specified in the following subsections.

5.1.1 Frequency stability

In addition to the measurement method described in RSS-Gen, the equipment's unmodulated carrier frequency shall be measured under the conditions specified in table 1. At each temperature, the frequency shall be measured after a sufficient stabilization period has passed.

Table 1: Environmental conditions for frequency stability test

Equipment type	**Voltage conditions**		
	V_{nom}-10%	nominal voltage (V_{nom})	V_{nom}+10%
Equipment protected from weather (GMDSS **compliant)**	-15°C	+20°C	+55°C
Portable equipment (GMDSS **compliant**)	-20°C	+20°C	+55°C
Equipment exposed to weather (GMDSS **compliant**)	-25°C	+20°C	+55°C
GMDSS **compatible** equipment	+20°C	-15°C, +20°C , +55°C	+20°C

5.1.2 Transmitter output power

For frequency modulation (FM) or phase modulation (PM), the transmitter carrier output power shall be measured with the unmodulated carrier. For single sideband emission (SSB), the peak envelope output power (PEP) shall be measured.

To measure the transmitter output power of equipment with voice audio input and FM modulation, the transmitter shall be modulated with a 2.5 kHz tone at a voltage level 16 dB higher than that required to produce 50% of the desired frequency deviation.

5.2 Channel spacing and frequency plan

The channel spacing for maritime VHF radio communication is 25 kHz. However, radio equipment with a spacing of 12.5 kHz is permitted provided the equipment shall:

i. have a mode that can inter-operate with the 25 kHz standard channel spacing; and
ii. comply with all the technical requirements of this RSS.

The channel frequency plan for Canadian maritime radiocommunications, based on the 25 kHz channel spacing, is set forth in RBR-2. The frequency plan for international maritime radiocommunications is set forth in appendix 18 of the ITU's *Radio Regulations*.

5.3 Required operating frequencies

Equipment for radiotelephony used in survival craft stations shall be able to transmit and receive standard IMO class G3E emissions on the 156.8 MHz (channel 16, distress) frequency and at

least one other frequency in the 156-162.5 MHz band.

Equipment for radiotelephony used in ships other than survival craft shall be able to transmit and receive standard IMO class G3E emissions on these frequencies (and on all frequencies necessary for their service):

i. 156.8 MHz (channel 16, distress);
ii. 156.3 MHz (channel 6, inter-ship safety); and
iii. 156.65 MHz (channel 13, bridge-to-bridge).

VHF radiotelephone equipment that is IMO-GMDSS compatible shall be able to transmit and receive standard IMO class G3E/F3E emissions on these frequencies (and on all frequencies necessary for their service):

i. 156.8 MHz (channel 16, distress)
ii. 156.3 MHz (channel 6, inter-ship safety); and
iii. 156.65 MHz (channel 13, bridge-to-bridge).

DSC equipment shall be able to transmit and receive standard IMO class G2B emissions on the 156.525 MHz (channel 70) frequency.

5.4 Types of modulation and equipment characteristics

VHF radiocommunication shall employ G3E or F3E modulation for voice communication and G2B for DSC signals.

Maritime VHF transceivers shall have the following characteristics:

i. the channel spacing shall be 25 kHz or 12.5 kHz (see section 5.2);
ii. FM with a pre-emphasis of 6 dB/octave or PM shall be used;
iii. the frequency deviation corresponding to 100% modulation shall approach 5 kHz as nearly as practicable and the frequency deviation shall not exceed ±5 kHz;
iv. the audio-frequency band shall be 3000 Hz;
v. the authorized channel bandwidth for voice shall be 16 kHz; and
vi. the authorized channel bandwidth for data shall be 20 kHz.

The VHF radio transceivers shall be equipped with an automatic timing device that deactivates the transmitter and reverts the transceiver to the receive mode after an uninterrupted transmission period of five minutes, plus or minus 10%. Furthermore, these transceivers shall have a device that indicates when the automatic timer has deactivated the transmitter.

Radio equipment that has channel spacing of less than 25 kHz or that uses modulation techniques other than PM/FM will be permitted in Canada provided the equipment shall:

i. have a mode to inter-operate with the current IMO-standard FM channels of 16 kHz authorized bandwidth; and
ii. operate on frequencies that comply with the frequency plan specified in RBR-2.

Such equipment shall not use narrowband modulation for distress or safety channels or for channels affecting the safety of international shipping, including the following channels:

- 156.2 MHz (channel 4A)
- 156.275 MHz (channel 65A)
- 156.3 MHz (channel 6)
- 156.4 MHz (channel 8)
- 156.5 MHz (channel 10)
- 156.65 MHz (channel 13)
- 156.8 MHz (channel 16)
- 157.0 and 161.6 MHz (channel 20)
- 157.3 and 161.9 MHz (channel 26)
- 157.4 and 162.0 MHz (channel 28)
- 161.65 MHz (channel 21B)
- 161.85 MHz (channel 25B)

5.5 Frequency stability

With the exception of DSC emissions, the carrier frequency shall not depart from the reference frequency in excess of the limits listed in table 2.

Table 2: Frequency stability limits

Radio equipment type	Frequency stability limit
Coast station	± 10.0 ppm for transmitter power less than 3 W ± 5.0 ppm for transmitter power between 3 and 50 W
Ship station	± 10 ppm

5.6 Transmitter output power

The transmitter output power for equipment certified under this standard shall not exceed the limits specified in table 3.

Table 3: Transmitter output power

Radio equipment type	Maximum power
Coast station	50 W
Ship station	25 W
Shipborne hand-held portable transmitter	6 W

Ship station transmitters shall have power control features implemented to reduce the carrier power to 1 W or less for use at short ranges, except for DSC equipment operating on the 156.525 MHz (channel 70) frequency, for which the power reduction facility is optional.

Survival two-way radiotelephones should have a minimum equivalent isotropically radiated power (e.i.r.p.) of 0.25 W.

5.7 Automatic identification system (AIS) / very high frequency (VHF) equipment

The AIS/VHF equipment shall comply with the characteristics specified in table 4.

Table 4: Characteristics of AIS/VHF equipment

Equipment characteristic	Specification
Transmitter frequency	161.975 MHz (channel AIS1) 162.025 MHz (channel AIS2)
Channel spacing	25 kHz or 12.5 kHz
Modulation scheme	GMSK/FM
Modulation index	0.5 max. for 25 kHz channel spacing 0.25 max. for 12.5 kHz channel spacing
Transmission rate	9600 bps

5.8 Frequency modulation limiting and filtering

Coast station transmitters shall be equipped with a limiter followed by an audio low-pass filter. A 6 dB pre-emphasis network is required and it should be connected before the deviation limiter in the transmit path.

5.9 Unwanted emissions

Radio equipment with 25 kHz channel spacing shall comply with emission mask B described in section 5.9.1. Equipment with 12.5 kHz channel spacing and with or without an audio low-pass filter shall comply with emission mask C described in section 5.9.2.

5.9.1 Emission mask B for equipment with 25 kHz channel spacing

Emission mask B is for FM or PM equipment with 25 kHz channel spacing and an authorized bandwidth of 16 kHz for voice or 20 kHz for data, with or without an audio low-pass filter. The power of unwanted emissions shall be attenuated below the transmitter's output power "p" (dBW) as follows:

i. at least 25 dB, measured with a bandwidth of 300 Hz, on any frequency removed from the carrier frequency by more than 50%, but not more than 100% of the authorized bandwidth;

ii. at least 35 dB, measured with a bandwidth of 300 Hz, on any frequency removed from the carrier frequency by more than 100%, but not more than 250% of the authorized bandwidth; and

iii. at least 43 + 10 $\log_{10}$ p (W) dB, measured with a bandwidth of 30 kHz, on any frequency removed from the carrier frequency by more than 250% of the authorized bandwidth.

5.9.2 Emission mask C for equipment with 12.5 kHz channel spacing

Emission mask C is for equipment with channel spacing of 12.5 kHz and an authorized bandwidth of 11.25 kHz, with or without an audio low-pass filter. The power of unwanted emissions shall be attenuated below the transmitter's output power "p" (dBW) as follows:

i. 0 dB, measured with a bandwidth of 100 Hz, on any frequency removed from the carrier frequency up to a displacement frequency of 5.625 kHz;

ii. at least 7.27 (f_d - 2.88 kHz) dB, measured with a bandwidth of 100 Hz, on any frequency removed from the carrier frequency by a displacement frequency (f_d in kHz) of more than 5.625 kHz, but no more than 12.5 kHz; and

iii. at least 50 + 10 $\log_{10}$ p (W) dB or 70 dB, whichever is the lesser attenuation, on any frequency removed from the carrier frequency by a displacement frequency (f_d in kHz) of more than 12.5 kHz, and measured as follows:
   - with a bandwidth of 100 Hz for a displacement frequency of more than 12.5 kHz, but no more than 50 kHz; and
   - with a bandwidth of 10 kHz for a displacement frequency of more than 50 kHz.