



Innovation, Science and
Economic Development Canada

Innovation, Sciences et
Développement économique Canada

RSS-182
Issue 6
November 2020
Draft v.1

Spectrum Management and Telecommunications

Radio Standards Specification

Maritime Radio Equipment Operating in the Band 156-162.5 MHz

DRAFT

Preface

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

Listed below are the main changes:

1. revised power levels for handheld maritime portable transmitters
2. removed section on receiver spurious emission as this is covered in RSS-Gen (as such, the title of the standard has been revised accordingly)
3. removed requirements that are governed by Transport Canada
4. removed references to documents for IMO, ETSI, IEC & ITU as compliance with international standards is ensured with the acceptance letter from Transport Canada
5. revised Table 2 - frequency stability limits
6. modernized to reflect the current Radio Standards Specification structure
7. made editorial changes and clarifications, as appropriate

Issued under the authority of the Minister of Industry

Martin Proulx
Director General
Engineering, Planning and Standards Branch

Contents

1.	Scope	1
2.	Purpose and application	1
3.	General requirements and references	1
	3.1 Coming into force and transition period	1
	3.2 Certification requirements	1
	3.3 Licensing requirements	2
	3.4 Declaration of compliance for the use of distress and safety frequencies	2
	3.5 DSC equipment compliance	2
	3.6 Transport Canada Acceptance Letter.....	2
	3.7 RSS-Gen compliance	3
	3.8 Related documents	3
4.	Definitions	3
5.	Transmitter specifications.....	3
	5.1 Measurement methods	3
	5.1.1 Frequency stability	3
	5.1.2 Transmitter power	4
	5.1.3 Voice FM transmitters	4
	5.2 Frequency plan and channel spacing	4
	5.3 Required operating frequencies.....	4
	5.4 Types of modulation and equipment characteristics	5
	5.5 Frequency stability	6
	5.6 Transmitter output power	6
	5.7 VHF AIS transponders	7
	5.8 FM modulation limiting and audio low-pass filter for coast station equipment (voice modulation)	7
	5.9 Transmitter unwanted emissions	7
	5.9.1 Emission mask B for equipment with 25 kHz channel spacing	7
	5.9.2 Emission mask C for equipment with 12.5 kHz channel spacing	8

1. Scope

This Radio Standards Specification (RSS) sets out the requirements for certification of radio equipment used for maritime service in the band 156-162.5 MHz, including Automatic Identification System – Search and Rescue Transponders (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 various types of equipment covered by this standard:

- VHF radiotelephone with Digital Selective Calling (DSC) and *compliant* with the Global Maritime Distress and Safety System (GMDSS) (meets International Safety of Life at Sea [SOLAS] standards);
- VHF radiotelephone with DSC and *compatible* with the GMDSS (allowed on domestic ships, but does not meet SOLAS standards);
- VHF radiotelephone for survival craft (GMDSS type);
- Portable VHF radiotelephone capable of distress alerting on the DSC distress channel (VHF channel 70);
- Portable VHF radiotelephone (voice only);
- AIS VHF transponder Class A; and
- AIS VHF transponder 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 upon publication on Innovation, Science and Economic Development Canada's (ISED) website. However, a transition period of six (6) months following its publication will be provided, within which certification under RSS-182, issue 6, or issue 5 will be accepted. After this period, only applications for certification of equipment under RSS-182, issue 6, will be accepted 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 (as chosen from the list presented in [section 2](#)), as well as whether the equipment is to be used shipborne or as a coast station.

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 the 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](#) webpage.

3.4 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](#).

3.5 DSC equipment compliance

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

3.6 Transport Canada Acceptance Letter

Shipborne radio equipment requires verification from Transport Canada as meeting that department's operational requirements before the applicant can submit the equipment to ISED for certification under this RSS. Non-shipborne and coast station equipment do not require this Acceptance Letter. Transport Canada requirements can be found at <https://laws-lois.justice.gc.ca/eng/regulations/SOR-2020-216/index.html>

Once equipment has met Transport Canada requirements, the Acceptance Letter issued by Transport Canada shall be included as part of the certification application sent to the CEB or a recognized CB.

Inquiries concerning Transport Canada's requirements should be directed to:

Manager, Navigation Safety and Radiocommunications
Marine Safety, Transport Canada
10th Floor
Tower C, Place de Ville
330 Sparks Street
Ottawa ON. K1A 0N8
Email: TC.NavRadio.TC@Tc.gc.ca

3.7 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](#).

3.8 Related documents

ISED documents are available in the [Official publications](#) section of the Spectrum Management and Telecommunications website.

The following documents should be consulted in conjunction with this RSS:

- RBR-2, [Technical Requirements for the Operation of Mobile Stations in the Maritime Service](#)

4. Definitions

Automatic Identification System (AIS) is a maritime navigation safety communication system standardized by the International Telecommunication Union (ITU) and adopted by International Maritime Organization (IMO) that 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; automatically receives such information from similarly fitted ships; monitors and tracks ships; and exchanges data with shore-based facilities.

Coast Station is a land station in the maritime mobile service.

Digital Selective Calling (DSC) is a synchronous system developed by the International Telecommunication Union Radiocommunication (ITU-R) Sector, used to establish contact with a station or groups of stations automatically by means of radio.

Ship Station is a mobile station in the maritime mobile service located on board a vessel which is not permanently moored, other than a survival craft.

5. Transmitter specifications

The provisions of this section are specific to the transmitter specifications.

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. A sufficient

stabilization period at each temperature shall be used prior to each frequency measurement.

Table 1 - Environmental conditions for frequency stability test

Equipment type	Voltage Conditions		
	V _{nom} -10%	nominal voltage (V _{nom})	V _{nom} +10%
GMDSS <i>Compliant</i> equipment protected from weather	-15°C	+20°C	+55°C
GMDSS <i>Compliant</i> portable equipment	-20°C	+20°C	+55°C
GMDSS <i>Compliant</i> equipment exposed to weather	-25°C	+20°C	+55°C
GMDSS <i>Compatible</i> equipment	+20°C	-15°C, +20°C, +55°C	+20°C

5.1.2 Transmitter 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.

5.1.3 Voice FM transmitters

For equipment with voice audio input and FM modulation type, 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 Frequency plan and channel spacing

The channel spacing for maritime VHF radio communication is 25 kHz. However, equipment with a spacing of 12.5 kHz is permitted provided that the equipment has a mode which can inter-operate with the 25 kHz standard channel spacing and that the equipment complies with all 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 and 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 band 156-162.5 MHz.

Equipment for radiotelephony used in ships other than survival craft shall be able to transmit and receive standard IMO class G3E emissions on the 156.8 MHz (channel 16, distress), 156.3 MHz (Channel 6, inter-ship safety) and 156.65 MHz (channel 13, bridge-to-bridge) frequencies, as well as on all the frequencies necessary for their service.

VHF radiotelephone equipment which is IMO GMDSS compatible shall be able to transmit and receive standard IMO class G3E/F3E emissions on the 156.8 MHz (channel 16, distress), 156.3 MHz (channel 6, inter-ship safety) and 156.65 MHz (channel 13, bridge-to-bridge) frequencies, as well as on all the frequencies necessary for their service.

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:

- (a) 25 kHz channel spacing;
- (b) FM with a pre-emphasis of 6 dB/octave PM shall be used;
- (c) the frequency deviation corresponding to 100% modulation shall approach 5 kHz as nearly as practicable and in no event shall the frequency deviation exceed ± 5 kHz;
- (d) the audio-frequency band shall be 3000 Hz;
- (e) the authorized channel bandwidth for voice shall be 16 kHz;
- (f) the authorized channel bandwidth for data shall be 20 kHz; and
- (g) the VHF radio transmitters shall be equipped with an automatic timing device that deactivates the transmitter and reverts the transmitter to the receive mode after an uninterrupted transmission period of five minutes, plus or minus 10 percent. Furthermore, these transmitters shall have a device that indicates when the automatic timer has deactivated the transmitter.

Equipment having channel spacing less than 25 kHz, or modulation techniques other than PM/FM will be permitted in Canada provided that the radio equipment has a mode to inter-operate with the current IMO standard FM channels of 16 kHz authorized bandwidth. In addition, the operating frequencies shall 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:

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 & 161.6 MHz	(channel 20);
157.3 & 161.9 MHz	(channel 26);
157.4 & 162.0 MHz	(channel 28);
161.65 MHz	(channel 21B); and
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

Type of Equipment	Frequency stability limit
Coast stations	± 10.0 ppm for transmitter power less than 3 watts ± 5.0 ppm for transmitter power between 3 and 50 watts
Ship stations	± 10 ppm

5.6 Transmitter output power

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

Table 3 - Transmitter output power

Station Type	Maximum Power
Coast stations	50 W
Ship stations	25 W
Shipborne hand-held portable transmitters	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 eirp of 0.25 Watt.

5.7 VHF AIS transponders

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

Table 4 – VHF AIS Transponders Characteristics

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 FM modulation limiting and audio low-pass filter for coast station equipment (voice modulation)

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

5.9 Transmitter unwanted emissions

Equipment with 25 kHz channel spacing shall comply with emission mask B described in [5.9.1](#). Radio equipment with 12.5 kHz channel spacing, with or without an audio low-pass filter, shall comply with emission mask C described in [5.9.2](#).

5.9.1 Emission mask B for equipment with 25 kHz channel spacing

This mask is for FM or PM modulation equipment with 25 kHz channel spacing, an authorized bandwidth of 16 kHz for voice or 20 kHz for data, and equipped with or without an audio low-pass filter. The power of any emission shall be attenuated below the transmitter output power (P) in dBW as follows:

- (a) on any frequency removed from the carrier frequency by more than 50%, but not more than 100% of the authorized bandwidth: at least 25 dB, measured with a bandwidth of 300 Hz;
- (b) on any frequency removed from the carrier frequency by more than 100%, but not more than 250% of the authorized bandwidth: at least 35 dB, measured with a bandwidth of 300 Hz; and
- (c) on any frequency removed from the carrier frequency by more than 250% of the authorized bandwidth: at least $43 + 10 \log_{10} p$ (watts) dB, measured with a bandwidth of 30 kHz.

5.9.2 Emission mask C for equipment with 12.5 kHz channel spacing

This mask is for equipment with channel spacing of 12.5 kHz, an authorized bandwidth of 11.25 kHz, equipped with or without an audio low-pass filter. The power of any emission shall be attenuated below the transmitter power (P) in dBW as follows:

- (a) on any frequency removed from the carrier frequency up to a displacement frequency of 5.625 kHz: 0 dB, measured with a bandwidth of 100 Hz;
- (b) 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: at least $7.27 (f_d - 2.88 \text{ kHz})$ dB, measured with a bandwidth of 100 Hz; and
- (c) on any frequency removed from the carrier frequency by a displacement frequency (f_d in kHz) of more than 12.5 kHz: at least $50 + 10 \log_{10} p$ (watts) dB or 70 dB, whichever is the lesser attenuation, measured with a bandwidth of 100 Hz for a displacement frequency of more than 12.5 kHz, but no more than 50 kHz, and measured with a bandwidth of 10 kHz for a displacement frequency of more than 50 kHz.