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Maritime Radio Transmitters and Receivers in the Band 156-162.5 MHz

Preface

Radio Standards Specification RSS-182, Issue 5, *Maritime Radio Transmitters and Receivers in the Band 156-162.5 MHz*, replaces RSS-182, Issue 4, dated September 2003.

This document will be in force as of the publication of notice SMSE-001-12 in *Canada Gazette*, Part I. Upon publication, the public has 120 days to submit comments. Comments received will be taken into account in the preparation of the next version of the document.

Listed below are the changes:

1. General reformatting and editorial changes have been made. Material common to most RSSs has been moved to RSS-Gen, *General Requirements and Information for the Certification of Radio Apparatus*.
2. The “Licensing Requirements” section has been updated to clarify that on-board ship equipment is exempt from licensing requirements.
3. Equipment with the designator “S” has been removed.
4. The Automatic Identification System – Search and Rescue Transponder (AIS-SART) operating in the band 156-162.5 MHz has been added.
5. All VHF radiotelephones, except portable VHF radiotelephones, are required to be GMDSS-compliant or GMDSS-compatible.
6. Requirements for transmitters with transmit power not exceeding 120 mW have been removed.
7. Requirements for a minimum standard of audio filter attenuation have been removed.
8. Annex A (Data Modem Certification) has been removed. The requirements in this annex are included in RSS-310, *Licence-exempt Radio apparatus (All Frequency Bands): Category II Equipment*.
9. The spurious emission limit (using radiated measurement method) for receivers at frequencies above 1610 MHz has been removed. The 960-1610 MHz limit is now applicable to all receiver spurious emissions at frequencies above 960 MHz as per RSS-Gen.
10. The requirement that RSS-Gen shall be used in conjunction with this issue of RSS-182 is stated.

11. The list of related documents has been updated.

Issued under the authority of
the Minister of Industry

Marc Dupuis
Director General
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Contents

1.	Scope.....	1
2.	General.....	1
2.1	Licensing Requirements	1
2.2	Transport Canada Acceptance	1
2.3	VHF Radiotelephone Types.....	2
2.4	Inquiries Concerning Transport Canada Requirements.....	2
2.5	Related Documents	2
2.6	Definitions	6
3.	General Requirements.....	7
3.1	RSS-Gen Compliance	7
4.	Certification Requirements.....	7
4.1	Declaration of Compliance for the Use of Distress and Safety Frequencies.....	7
4.2	DSC Equipment Compliance	7
4.3	Transport Canada Requirements.....	7
4.4	Equipment Designators.....	8
5.	Measurement Methods	8
5.1	Frequency Stability	8
5.2	Transmitter Power.....	9
6.	General Standard Specifications	9
6.1	User Manual.....	9
7.	Transmitter and Receiver Standard Specifications.....	9
7.1	Frequency Plan and Channel Spacing	9
7.2	Required Operating Frequencies	9
7.3	Types of Modulation and Equipment Characteristics.....	10
7.4	Frequency Stability	11
7.5	Transmitter Output Powers.....	11
7.6	Transport Canada Specifications	12
7.7	VHF AIS Transponders	13
7.8	FM Modulation Limiting and Audio Low-Pass Filter for Coast Station Equipment (Voice Modulation).....	13
7.9	Transmitter Unwanted Emissions	13
7.10	Data Modem.....	14
7.11	Receiver Spurious Emissions.....	14

1. Scope

This Radio Standards Specification (RSS) sets out the requirements for certification of transmitters and receivers in the maritime service in the band 156-162.5 MHz, including AIS-SART operating on AIS-1 and AIS-2.

2. General

Equipment certified under this standard is classified as Category I equipment and a technical acceptance certificate (TAC), issued by the Certification and Engineering Bureau of Industry Canada, or a certificate issued by a certification body (CB), is required.

2.1 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 http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/h_sf01775.html.

2.2 Transport Canada Acceptance

Radio equipment required to be carried on Canadian ships is subject to regulations pursuant to the *Canada Shipping Act*, the *Arctic Waters Pollution Prevention Act* and the *Radiocommunication Act*. Transport Canada is responsible for the *Canada Shipping Act* and the *Arctic Waters Pollution Prevention Act* regulations relating to radio equipment.

Certification of equipment by Industry Canada signifies that the equipment has met the requirements of the above-mentioned Acts (refer to Section 4.3 for Transport Canada requirements). With respect to the requirements set by Transport Canada-Marine Safety, when equipment has already been type accepted by an Administration that is a party to the *International Convention for the Safety of Life at Sea (SOLAS)* as complying with the appropriate standards, its test report and acceptance certificate can be sent directly to Industry Canada with proof of type acceptance, name, address, telephone number and contact person of that Administration.

For equipment that has not been type accepted, proof that the equipment complies with the required standards and that it has passed the necessary tests should be submitted to Transport Canada-Marine Safety for review. (**Note:** Applicants may send the application fees for Industry Canada certification portion directly to Industry Canada.) Once the information has been reviewed, Transport Canada-Marine Safety forwards the test report with its evaluation result to the Certification and Engineering Bureau of Industry Canada. Proof of compliance submitted for Transport Canada-Marine Safety review shall be in the form of documentation issued by a classification society or a recognized independent testing establishment. See Section 2.4 for Transport Canada-Marine Safety's contact information.

2.3 VHF Radiotelephone Types

Four types of shipborne VHF radiotelephones are allowed in the maritime service depending upon the application. The applicable Transport Canada standards and the assigned designator for each type are identified in Table 4. The four types are the following:

- (a) VHF radiotelephones capable of DSC and *compliant* with the GMDSS;
- (b) VHF radiotelephones capable of DSC and *compatible* with the GMDSS;
- (c) portable VHF radiotelephones, with or without DSC; and
- (d) VHF radiotelephones for survival craft.

2.4 Inquiries Concerning Transport Canada Requirements

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, Ontario
Canada K1A 0N8
Tel.: 613-991-3134
Fax: 613-993-8196
E-mail: ope-epe@tc.gc.ca

2.5 Related Documents

In addition to related documents specified in RSS-Gen, *General Requirements and Information for the Certification of Radio Apparatus*, the documents in the following sections should be consulted.

Any mention of a standard or document incorporated by reference refers to that standard or document as amended from time to time.

2.5.1 Industry Canada Documents

All Spectrum Management and Telecommunications publications are available on Industry Canada's website at <http://www.ic.gc.ca/spectrum>, under *Official Publications*.

RBR-2 *Technical Requirements for the Operation of Mobile Stations in the Maritime Service*

2.5.2 International Maritime Organization (IMO) Documents

Copies of IMO resolutions may be obtained from:

International Maritime Organization
4, Albert Embankment
London, England, SE1 7SR
United Kingdom
Tel: +44 (0)20 7735 7611

IMO Resolution A.694(17)	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.802 (19)	Performance standards for survival craft radar transponders for use in search and rescue operations
IMO Resolution A.803 (19)	Performance standards for shipborne VHF radio installations capable of voice communications and digital selective calling (DSC)
IMO Resolution MSC.149(77)	Revised performance standards for survival craft portable two-way VHF radiotelephone apparatus
IMO Resolution A.813 (19)	General requirements for electromagnetic compatibility (EMC) for all electrical and electronic ship's equipment
IMO Resolution MSC.74(69) Annex 3	Recommendation on performance standards for a universal shipborne automatic identification system (AIS)
IMO MSC/Circ.862	Clarifications of certain requirements in IMO performance standards for GMDSS equipment
IMO Resolution MSC.246(83)	Adoption of performance standards for survival craft AIS search and rescue transmitters (AIS-SART) for use in search and rescue operations

2.5.3 International Telecommunication Union (ITU) Documents

Copies of the ITU-R *Radio Regulations* and of the recommendations may be obtained from:

International Telecommunication Union
Place des Nations, CH-1211
Geneva 20, Switzerland
Tel: +41 22 730 6141 (English)
Tel: +41 22 730 6142 (French)

ITU-R Recommendation M.489	Technical characteristics of VHF radiotelephone equipment operating in the maritime mobile service in channels spaced by 25 kHz
ITU-R Recommendation M.493	Digital selective-calling system for use in the maritime mobile service
ITU-R Recommendation M.541	Operational procedures for the use of digital selective-calling equipment in the maritime mobile service
ITU-R Recommendation M.1084	Interim solutions for improved efficiency in the use of the band 156-174 MHz by stations in the maritime mobile service
ITU-R Recommendation M.1371	Technical characteristics for an automatic identification system using time-division multiple access in the VHF maritime mobile band
ITU-R Radio Regulations Article 31	Frequencies for the global maritime distress and safety system (GMDSS)
ITU-R Radio Regulations Article 32	Operational procedures for distress and safety communications in the global maritime distress and safety system (GMDSS)
ITU-R Radio Regulations Article 51	Conditions to be observed in the maritime services
ITU-R Radio Regulations Article 52	Special rules relating to the use of frequencies
ITU-R Radio Regulations Appendix 15	Frequencies for distress and safety communications for the Global Maritime Distress and Safety System (GMDSS)
ITU-R Radio Regulation Appendix 18	Table of transmitting frequencies in the VHF maritime mobile band

2.5.4 International Electrotechnical Commission (IEC) Documents

Copies of the IEC's documents may be obtained from:

International Electrotechnical Commission
Central Office
3, rue de Varembe
Geneva, Switzerland
Tel: +41 22 919 02 11

IEC 60533	Electrical and electronic installations in ships – Electromagnetic compatibility
IEC 60945	Maritime navigation and radiocommunication equipment and systems – General requirements – Methods of testing and required test results
IEC 61097-14	Global maritime distress and safety system (GMDSS) – Part 14: AIS search and rescue transmitter (AIS-SART) – Operational and performance requirements, methods of testing and required test results
IEC 61097-3	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 (1994)
IEC 61097-7	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 (1996)
IEC 61097-8	Global maritime distress and safety system (GMDSS) – Part 8: Shipborne watchkeeping receivers for the reception of digital selective calling (DCS) in the maritime MF, MF/HF and VHF bands – Operational and performance requirements, methods of testing and required test results
IEC 61097-12	Global maritime distress and safety system (GMDSS) – Part 12: Survival craft portable two-way VHF radiotelephone apparatus – Operational and performance requirements, methods of testing and required test results (1996)
IEC 61162	Maritime navigation and radiocommunication equipment and systems – Digital interfaces – Part 1: Single talker and multiple listeners
IEC 61993-2	Maritime navigation and radiocommunication requirements – Automatic identification systems (AIS) – Part 2: Class A shipborne equipment of the universal automatic identification system (AIS) – Operational and performance requirements, methods of test and required test results

- IEC 62238 Maritime navigation and radiocommunication equipment and systems – VHF radiotelephone equipment incorporating class “D” Digital Selective Calling (DSC) – Methods of testing and required test results
- IEC 62287-1 Maritime navigation and radiocommunication equipment and systems – Class B shipborne installation of the automatic identification system (AIS) – Part 1: Carrier-sense time division multiple access (CSTDMA) techniques

2.5.5 European Telecommunications Standards Institute (ETSI) Documents

Copies of the EN and I-ETS documents may be obtained from:

European Telecommunications Standards Institute
650, Route des Lucioles
06921 Sophia-Antipolis Cedex
Valbonne, France
Tel: +33 (0)4 92 94 42 00

- ETS 300 162 Electromagnetic compatibility and Radio spectrum Matters (ERM); Radiotelephone transmitters and receivers for the maritime mobile service operating in the VHF bands; Technical characteristics and methods of measurement
- ETS 300 225 Radio Equipment and System (RES); Technical characteristics and methods of measurement for survival craft portable VHF radiotelephone apparatus
- EN 300 338 Electromagnetic compatibility and Radio spectrum Matters (ERM); Technical characteristics and methods of measurement for equipment for generation, transmission and reception of Digital Selective Calling (DSC) in the maritime MF, MF/HF and/or VHF mobile service
- EN 301 025 Electromagnetic compatibility and Radio spectrum Matters (ERM); Technical characteristics and methods of measurements for VHF radiotelephone equipment for general communications and associated equipment for Class “D” Digital Selective Calling (DSC)
- EN 301 033 Electromagnetic compatibility and Radio spectrum Matters (ERM); Technical characteristics and methods of measurement for shipborne watchkeeping receivers for reception of Digital Selective Calling (DSC) in the maritime MF, MF/HF and VHF bands

2.6 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; receives automatically 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.

On-board Communication Station is a low-powered mobile station in the maritime mobile service intended for use for internal communications on board a ship, or between a ship and its lifeboats and liferafts during lifeboat drills or operations, or for communication with a group of vessels being towed or pushed, as well as for line handling and mooring instruction.

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.

3. General Requirements

3.1 RSS-Gen Compliance

RSS-182 shall be used in conjunction with RSS-Gen for general specifications and information relevant to the equipment for which this standard applies.

4. Certification Requirements

4.1 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 7.3.

4.2 DSC Equipment Compliance

All fixed DSC equipment shall comply with applicable IEC and/or EN standards. Furthermore, equipment must comply with the latest version of ITU-R Recommendation M.493, independent of the reference version stipulated in the applicable IEC and/or EN standards.

4.3 Transport Canada Requirements

Only shipborne radio equipment requires approval from Transport Canada as meeting that department's operational requirements before the applicant can submit the equipment to Industry Canada for certification; non-shipborne and coast station equipment do not. Transport Canada's operational requirements for VHF radio equipment are summarized in Table 4.

4.4 Equipment Designators

Maritime radio equipment and VHF AIS transponders are required to be classified with equipment designators according to their capability and usage. The equipment designator will be added as a suffix to the equipment certificate number. Applicants must specify which type of equipment they want to apply for so that the appropriate designator can be assigned to the equipment certificate number.

4.4.1 Maritime Radio Equipment

Maritime radio equipment is classified with the following designators:

- (i) **G** to indicate IMO GMDSS compliance (see Section 7.6); and
- (ii) **D** to indicate IMO GMDSS compatible (see Section 7.6).

4.4.2 VHF AIS Transponder

VHF AIS transponders are classified with the following designators:

- (i) **A** to indicate IMO compliance; and
- (ii) **B** to indicate the AIS equipment is compatible, but not compliant with Class A AIS equipment.

5. Measurement Methods

5.1 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})	$V_{nom}+10\%$
Type G protected from weather	-15°C	+20°C	+55°C
Type G portable equipment	-20°C	+20°C	+55°C
Type G exposed to weather	-25°C	+20°C	+55°C
Type D equipment	+20°C	-15°C, +20°C, +55°C	+20°C

5.2 Transmitter Power

For FM or PM modulation, 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.

5.2.1 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.

6. General Standard Specifications

6.1 User Manual

If the radio terminal has a data port, the user manual shall contain the manufacturer's technical parameters for interfacing external data sources, as follows:

- (a) the input voltage (volts peak-to-peak) required from a modem for proper modulation;
- (b) the maximum recommended data rate; and
- (c) the designed impedance for this port.

7. Transmitter and Receiver Standard Specifications

7.1 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*.

7.2 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 designated with a “D” 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.

7.3 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) frequency modulation with a pre-emphasis of 6 dB/octave (phase modulation (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; and
- (f) the authorized channel bandwidth for data shall be 20 kHz.

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).

7.4 Frequency Stability

With the exception of DSC emissions, the RF 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 100 watts ±2.5 ppm for transmitter power exceeding 100 watts
Ship stations	±10 ppm

7.5 Transmitter Output Powers

The output power shall be within ±1.0 dB of the manufacturer's rated power and not exceed the limits listed in Table 3, unless indicated otherwise.

Table 3 lists typical transmitter output powers for equipment certified under this standard.

Table 3 - Transmitter Power

Stations	Typical Power
Coast stations	50 W
Ship stations Minimum: Maximum:	6 W 25 W
Hand-held portable transmitters	5 W
Survival two-way radiotelephones	Should have a minimum e.i.r.p. of 0.25 watt

Ship station transmitters shall have power control features implemented to reduce the carrier power to one watt 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.

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.

7.6 Transport Canada Specifications

Transport Canada's operational requirements for VHF radio equipment are summarized in Table 4.

VHF DSC equipment that meets the European standard EN 301 025 or IEC standard 62238 is certified as GMDSS-*compatible* but *not* GMDSS-*compliant*, as it does not fully meet the relevant IMO standards.

All VHF radiotelephone models, with the exception of portable equipment, shall be GMDSS-compliant or meet the requirements of either IEC 62238 or EN 301 025 (GMDSS-compatible).

Table 4 - Transport Canada Requirements for Marine VHF Radio Equipment¹

Equipment Designator	Type of Marine VHF Radio Equipment	Applicable International or ETSI Standards ²
G	VHF radiotelephone capable of DSC and GMDSS <i>compliant</i> (International SOLAS)	IMO A.803 and A.694 and IEC 61097-7 for Radiotelephone IEC 61097-3 for DSC IEC 61097-8 for Watchreceivers or EN 300 338 for DSC EN 301 033 for Watchreceivers ETS 300 162 for Radiotelephone
	VHF radiotelephone for survival craft (GMDSS type)	IMO MSC 149(77), IMO A.694 and IEC 61097-12 tested under IEC 60945 or ETS 300 225
D	VHF radiotelephone with DSC and <i>compatible</i> with the GMDSS (allowed on domestic ships, but does not meet SOLAS standards)	EN 301 025 or IEC 62238
n/a	Portable VHF radiotelephone capable of distress alerting on VHF channel 70	IMO MSC/Circ.862, ITU-R M.493 and IEC 61162
n/a	Portable VHF radiotelephone (voice only)	Portable VHF radiotelephone not capable of DSC
A	AIS VHF transponder Class A	ITU 1371, IEC 61993-2 IMO Resolution MSC.74, Annex 3
B	AIS VHF transponder Class B	IEC 62287-1 or IEC 62287-2 and ITU 1371

¹ The *Ships Station (Radio) Regulations*, 1999, administered by Transport Canada, should be consulted for ship carriage requirements.

² Equipment intended for use on-board ships subject to the SOLAS Convention must also meet relevant specifications of IMO A.813(19), and of IEC 60945 and IEC 60533 (previously known as IEC 945 and IEC 533 respectively).

7.7 VHF AIS Transponders

The VHF AIS equipment shall comply with the following characteristics.

Transmitter frequency:	161.975 MHz (channel 87B) 162.025 MHz (channel 88B)
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

7.8 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.

7.9 Transmitter Unwanted Emissions

Equipment with 25 kHz channel spacing (equipment designator G and D) shall comply with emission mask B. Radio equipment with 12.5 kHz channel spacing, with or without an audio low-pass filter, shall comply with emission mask C.

7.9.1 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 $43 + 10 \log_{10} p(\text{watts})$ dB, measured with a bandwidth of 30 kHz.

7.9.2 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 f_c 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 $50 + 10 \log_{10} p(\text{watts})$ 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.

7.10 Data Modem

A radio terminal's internal data modem shall contain the level adjustment and pulse shaping circuitry. The modem shall be tested and must comply with the masks in Section 7.9 that are appropriate to the data rate. External data modems can be certified as stand-alone equipment using the procedures in RSS-310.

7.11 Receiver Spurious Emissions

The receiver spurious emission shall comply with the limits specified in RSS-Gen.
