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General Radio Service (GRS)

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Preface

Radiocommunication Information Circulars are issued for the guidance of those engaged in radiocommunications in Canada. The information contained in these circulars is subject to change without notice. It is therefore suggested that interested persons consult the nearest district office of Industry Canada for additional details. While every reasonable effort has been made to ensure accuracy, no warranty is expressed or implied. As well, these circulars have no status in law.

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All Spectrum Management and Telecommunications publications are available on the following website: <http://ic.gc.ca/spectrum>.

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1. Purpose

This circular describes, in general terms, procedures, policies and general information concerning the General Radio Service (GRS).

2. Regulatory Requirement

The GRS is exempt from licensing. Radio Standards Specification 136 (RSS-136) prescribes the technical requirements applicable to radio apparatus operating in the GRS.

Radio standards, procedures and various official publications can be obtained on Industry Canada's Spectrum Management and Telecommunications website at http://www.ic.gc.ca/epic/site/smt-gst.nsf/en/h_sf01841e.html#info.

3. Background

The relatively low cost and simple operation of equipment used in the GRS in Canada, also known as the Citizen Band (CB), provides access to a radiocommunications medium that was previously unavailable to the general public. Originally, there were 23 channels. In 1977, 40 channel allocations were established in the 26.960 to 27.410 MHz frequency band. Prior to the late 1970s when synthesized CB radios were introduced, CB radios were controlled by plug-in quartz crystals and most CB radios only used amplitude modulation (AM).

4. GRS Equipment

4.1 General Operation

Prior to operating a GRS radio, it is important to learn its controls, accessories, other functions and which options are desirable or useful for your intended operations.

The basic building blocks of any GRS radio station are:

- a **transceiver**, a combination transmitter and receiver, usually supplied with a microphone, power cord and mobile mounting bracket;
- an **antenna**, used for the transmission and reception of GRS radio frequency signals;
- a **feed line**, to connect the transceiver to the antenna; and
- an **electrical supply**.

4.2 Industry Canada Certification Number and Label

The Industry Canada radio equipment certification number shall be permanently displayed on each transmitter, receiver, or inseparable combination thereof, as well as the applicant's name, manufacturer's name, trade name or brand name, and model number. This information shall be affixed in such a manner as to not be removable.

4.3 Amplitude Modulation (AM) or Single Sideband (SSB)

The terms AM and SSB describe two different methods of modulating sound impulses from a microphone onto the carrier signal produced by the transmitter.

4.4 Receiver Sensitivity, Selectivity and Stability

The three important characteristics of a good radio receiver are referred to as the "3 Ss": Sensitivity, Selectivity and Stability.

Sensitivity is the ability of the radio to receive very weak signals clearly. Selectivity is the ability to screen out signals from adjacent channels. A radio with good selectivity can reject a strong signal on an adjacent channel, allowing you to listen to a weak signal on the desired channel. Stability is the ability of the radio to stay on its operating frequency.

5. Antenna Structures

Industry Canada recognizes the importance of considering the potential impact of antennas and their supporting structures on the local surroundings. As such, it has instituted procedures outlined in Client Procedures Circular, *Radiocommunication and Broadcasting Antenna Systems* (CPC-2-0-03), as amended from time to time, for proponents of antenna systems to follow. Although radio station licences are not required for GRS stations, operators must ensure that they comply with all antenna siting requirements outlined in CPC-2-0-03.

5.1 Feed Lines

Coaxial cable should be used to connect the GRS radio to an antenna. The electrical characteristics of the cable should match those of both the transmitter output circuit and the GRS antenna. Type RG58/U is commonly used for mobile installations. RG8/U is best suited for permanent outdoor installations and where a longer length of coaxial cable is required.

Special connectors should be attached to the coaxial cable at each end. It is important to follow instructions carefully in order to assemble connectors properly. Coaxial cable may also be purchased with ready-made connections.

6. Going on the Air

It is the duty of the operator of a radio station to know the rules before going on the air.

GRS Licence or Certificate

Operators are not required to have an operator's certificate or radio station licence to operate GRS equipment, including any GRS model-control equipment.

Identification

Industry Canada no longer requires GRS operators to use an assigned call sign for identification.

Before You Transmit

Remember that anything said on a GRS radio can be easily overheard by others. GRS radio does not offer privacy.

Some Restrictions

Operators must, at all times and on all channels, give priority to emergency communications.

Industry Canada will not assign any channel for the private or exclusive use of any particular GRS station or group of stations. Some GRS clubs or individuals regularly monitor or use specific channels of their own choosing. No one has a right to declare that any such channel belongs to any group or individual, or to tell another user to vacate a channel on such grounds. Informal local arrangements, however, if made with the general consent of most users in the area - and not abused - may be useful in providing a meeting place for those sharing common interests.

For example:

- Channel 9 should only be used for emergency communications, i.e. communications involving a real or imminent threat to the life or safety of any person, or the immediate protection of property.
- Channel 11 is widely used as a calling channel.
- Channels 13 and 23 are used for land and sea search and rescue operations.
- Channel 19 is used in many areas as a road information channel.

Operators must share each channel with other users and must not wilfully interfere with conversations already under way. A good basic rule is "listen before you talk." Courtesy dictates that necessary communications should be given preference. Courteous operators will yield to those with messages to pass, information to share, questions to ask or other business to conduct. Many GRS operators use a procedure code to reduce air time on congested channels.

Subject to applicable laws or regulations, operators may operate a GRS station anywhere in Canada and the United States.

Operators may not operate a GRS station on any aircraft or vessel without permission of the appropriate aircraft or vessel officer.

The legal radio frequency (RF) power output limits for a GRS transmitter are:

- 12 watts peak envelope power for single sideband;
- 4 watts carrier power for other types of emissions.

Section 30 of the *Radiocommunication Regulations* states that a person may operate radio apparatus in respect of which a radio authorization has been issued only where the person complies with the terms and conditions of the authorization. For example, the use of a power amplifier capable of boosting the output power of a GRS transmitter is forbidden. These devices are also known as linear amplifiers, boots, linears, etc.

RSS-136 prescribes the minimum technical standards applicable to radio apparatus operating in the GRS. Technical requirements for remote control equipment are found in Radio Standards Specification 210 (RSS-210).

GRS stations must not be used:

- in connection with any activity that is against federal laws, provincial laws or municipal bylaws;
- to transmit abusive, obscene, indecent or profane words, language or meaning;
- to interfere maliciously with the communications of another station;
- to transmit music, whistling, sound effects or any material to amuse, entertain or attract attention;
- to communicate with, or attempt to communicate with, a GRS beyond the normal coverage range of your station.

Any person, who knowingly transmits, or causes to be transmitted, any false or fraudulent distress signal, call or message is guilty of an offence under the *Radiocommunication Act*.

7. Handling an Emergency

Channel 9

GRS Channel 9 is reserved for communications involving emergencies, i.e. situations where something has happened, or is about to happen, that presents a threat to someone's property, personal safety or life. The reporting of road accidents, downed power lines, medical emergencies and fires are all examples of situations for which Channel 9 should be used. This, however, does not preclude passing emergency messages on other channels.

Emergency messages must be given priority over all other kinds of communications.

8. Radio Interference

Prevention

In order to reduce interference, the Department recommends the following:

- Before erecting a GRS antenna, remember the importance of good relations with your neighbours. The fact that you have an antenna in your backyard will make you automatically suspect in the minds of some if they experience any kind of interference.
- Prior to transmitting, try to avoid interference complaints before they arise. Install your station carefully, keeping all connections well fitted. Use good grounding techniques for towers, antennas and GRS equipment. Try to keep both your radio and antenna as far as possible from neighbouring TV or FM antennas and places where hi-fi stereos and similar equipment are being used.
- Conduct radio and TV reception checks in your own home. Operate your GRS set for brief test transmissions on a quiet channel while someone else checks TV sets in your house on all the channels. Repeat this procedure while transmitting on another GRS channel.
- Operators must not make, or have someone else make, any internal modification to a certified GRS transmitter (technical acceptance certificate - TAC). Any such modification voids the Industry Canada certification of the radio apparatus.

Interference

Information on interference resolution can be found on Industry Canada's Spectrum Management and Telecommunications website at http://www.ic.gc.ca/epic/site/smt-gst.nsf/en/h_sf06086e.html. The brochure entitled *Cutting Through . . . Interference from Radio Transmitters* is primarily for GRS radio operators. It provides basic information to help you install and maintain your station.

Annex A: Phonetic Alphabet

People will understand you better if you pronounce your words clearly and slowly. Words of similar length, such as “care” and “pear,” which contain the same vowel sounds, tend to sound alike.

When radio conditions are particularly difficult, or if an individual word or name is especially important, spell it out. For example, to get across an uncommon spelling of the surname “Smyth,” say: “Surname Smyth. I spell: S-Sierra - M-Mike – Y-Yankee – T-Tango – H-Hotel.” The following phonetic alphabet can be very useful.

A	Alfa	N	November
B	Bravo	O	Oscar
C	Charlie	P	Papa
D	Delta	Q	Quebec
E	Echo	R	Romeo
F	Foxtrot	S	Sierra
G	Golf	T	Tango
H	Hotel	U	Uniform
I	India	V	Victor
J	Juliett	W	Whiskey
K	Kilo	X	X-ray
L	Lima	Y	Yankee
M	Mike	Z	Zulu

Typical Procedure Code

10-1	Receiving poorly.
10-2	Receiving well.
10-3	Stop transmitting.
10-4	OK, message received (acknowledgment).
10-5	Relay message.
10-6	Busy, please standby (unless urgent).
10-7	Out of service, leaving air.
10-8	In service, subject to call.
10-9	Repeat message.
10-10	Transmission completed, standing by.
10-11	Talking too quickly.
10-12	Visitors (non-CBers) present.
10-13	Advise weather and road conditions.
10-16	Make pick-up at . . .
10-17	Urgent business.
10-18	Anything for us? (Any assignment?)
10-19	Nothing for you, return to base or station.
10-20	My location is . . .
10-21	Call by telephone or get in touch (but not by radio).
10-22	Report in person to . . .
10-23	Standby.
10-24	Completed last assignment.
10-25	Can you contact . . .
10-26	Disregard last message.
10-27	I am moving to channel . . .
10-28	Identify your station.
10-29	Time is up for contact.
10-30	Does not conform to Industry Canada rules.
10-32	I will give you a radio check.
10-33	EMERGENCY at this station.
10-34	Trouble at this station, help needed.
10-35	Confidential information which cannot be discussed on radio.
10-36	Correct time is . . .
10-37	Wrecker needed at . . .
10-38	Ambulance needed at . . .
10-39	Your message delivered.
10-41	Moving to another channel. Please tune to channel . . .
10-42	Traffic accident at . . .
10-43	Traffic tie-up at . . .
10-44	I have a message for you . . .
10-45	All units within range, please report (or identify).
10-46	Assist motorist.
10-50	Break channel.
10-60	What is the next message number?
10-62	Unable to copy, use telephone.
10-63	Network directed to . . .
10-64	Network clear.

- 10-65 Awaiting next message (or assignment).
- 10-67 All units comply.
- 10-70 Fire at . . .
- 10-71 Proceed with transmission in sequence.
- 10-73 Speed trap at . . .
- 10-75 You are causing interference.
- 10-77 Negative contact.
- 10-81 Reserve hotel room at . . .
- 10-82 Reserve room for . . .
- 10-84 My telephone number is . . .
- 10-85 My address is . . .
- 10-89 Radio repairman needed at . . .
- 10-90 I have TVI (television interference).
- 10-91 Talk closer to microphone.
- 10-92 Your transmission is out of adjustment.
- 10-93 Check my frequency on this channel.
- 10-94 Please give me a long count.
- 10-95 Transmit dead carrier for 5 seconds.
- 10-99 Mission completed, all units secure.
- 10-100 Time out for rest room.
- 10-200 Police needed at . . .

Annex B: General Radio Service (GRS) Channels

Channel	Frequency Megahertz	Channel	Frequency Megahertz
1.....	26.965	21.....	27.215
2.....	26.975	22.....	27.225
3.....	26.985	23.....	27.235
4.....	27.005	24.....	27.245
5.....	27.015	25.....	27.255
6.....	27.025	26.....	27.265
7.....	27.035	27.....	27.275
8.....	27.055	28.....	27.285
9.....	27.065	29.....	27.295
10.....	27.075	30.....	27.305
11.....	27.085	31.....	27.315
12.....	27.105	32.....	27.325
13.....	27.115	33.....	27.335
14.....	27.125	34.....	27.345
15.....	27.135	35.....	27.355
16.....	27.155	36.....	27.365
17.....	27.165	37.....	27.375
18.....	27.175	38.....	27.385
19.....	27.185	39.....	27.395
20.....	27.205	40.....	27.405

Radio Standards Specification 136 (RSS-136) prescribes the minimum technical standards applicable to radio apparatus operating in the GRS.

Annex C: Self-evaluation Questionnaire

As an operator of a General Radio Service (GRS) station, you must ensure that your station operates according to the applicable regulations and practices. Answer the following questions with true or false:

- | | | | |
|-----|--|---|---|
| 1. | You may use Channel 9 (27.065 MHz) for everyday communications. | T | F |
| 2. | Provincial or municipal emergency communications have priority over all other communications on Channel 23 (27.255 MHz). | T | F |
| 3. | When you receive messages from users on Channel 9 that involve non-emergency communications, you must go on the air and interrupt them. | T | F |
| 4. | You must listen before transmitting to ensure that you will not cause interference to transmissions already in progress. | T | F |
| 5. | You may use a linear amplifier to increase the power of your mobile GRS set. | T | F |
| 6. | Microphones with amplifiers are often necessary for a better modulation. | T | F |
| 7. | Your GRS installation may cause various problems. The following equipment is most likely to be affected: radar, VHF radio (taxi) and microwave oven. | T | F |
| 8. | An aluminium rod buried .6 m in the ground is considered a proper ground system for the operation of a GRS station. | T | F |
| 9. | Industry Canada may not restrict your hours of operation. | T | F |
| 10. | Industry Canada requires a method of identification for GRS stations even though they are exempted from having a licence. | T | F |
| 11. | No licence is required to operate a GRS station. | T | F |
| 12. | The federal government may impose restrictions on the height of GRS base station antennas. | T | F |

Your neighbour asks you for some advice on how to install a television reception system at home that will reduce the risks of harmful interference. You say that:

- | | | | |
|-----|--|---|---|
| 13. | The use of “rabbit ears” and an outdoor antenna simultaneously does not cause reception problems. | T | F |
| 14. | “Rabbit ear” type of antennas are used to receive signals from local and distant stations. | T | F |
| 15. | For your neighbour’s receiving system, coaxial cable is preferable because it reduces the risks of interference. | T | F |

You receive a complaint that your neighbour’s stereo system picks up your communications, which can also be heard on the telephone.

- | | | | |
|-----|--|---|---|
| 16. | It is not necessary to check your radio installation. | T | F |
| 17. | The problem is caused by a deficiency in your neighbour’s equipment. | T | F |

You receive a complaint that your station interferes with your neighbour's television reception.

18. If your neighbour's television is connected to cable, there is no need to worry about it. T F
19. You should inform your neighbour that this is impossible because you are not using your equipment. T F
20. If you have a directional antenna, it is less likely that your station is the cause of the interference. T F
21. You are not responsible since you were not operating the station when the interference occurred. T F
22. You should take the steps necessary to prevent the interference. T F
23. Since your station does not cause interference in your own television, you cannot be responsible for the interference caused in your neighbour's set. T F
24. If your neighbour notices that the interference affects primarily Channel 2, suggest that a low-pass filter be installed between the television and its antenna. T F
25. If the interference affects all the television channels, you must install a high-pass filter between your GRS set and your antenna. T F

You operate a GRS station and you experience harmful interference.

26. If it is electrical interference, you should contact Industry Canada. T F
27. Dimmer switches, electric blankets, aquarium heaters, fluorescent lights and heating pads may cause clicking, humming or buzzing sounds in your GRS receiver. T F
28. Every time your fellow GRS operators transmit, your station experiences cross-modulation effects; this means that they are using a linear amplifier. T F
29. If the signal picked up by your transceiver is accompanied by a high level of noise, you can reduce it by turning down the volume. T F

Answers

1. **FALSE** It may only be used for radiocommunications that involve the immediate protection of lives or property.
2. **TRUE**
3. **FALSE** You should not concern yourself with it, but when you have to transmit emergency messages, you should remind them politely that Channel 9 is officially limited to emergencies.
4. **TRUE**
5. **FALSE** In fact, the regulations prohibit you, even as a GRSer, to have this type of equipment in your possession.
6. **FALSE** Microphones with amplifiers are often a source of interference and overmodulation. In certain cases, they could be required, for example, by someone with a speech impediment.
7. **FALSE** A GRS set is more likely to interfere with televisions, organs, radios and amplifiers.
8. **FALSE** A proper ground system consists of a copper rod buried at least 2.4 m into the ground, since frost penetrates to 1.2 m. Furthermore, the ground wire should be made of copper tie wire of at least No. 12 gauge.
9. **FALSE** If your station causes interference, the Department may restrict the operating hours of your station.
10. **FALSE**
11. **TRUE**
12. **TRUE** If the antenna structure is erected within 3 km of an airport or is higher than 15 m at any location, contact the nearest Industry Canada office. In certain municipalities in Canada, antenna structures must be approved by the municipality before they are erected.
13. **FALSE** This type of installation is as susceptible to GRS interference as it is to being affected by ghost images.
14. **FALSE** This type of antenna is not adequate to capture signals from distant stations.
15. **TRUE** This type of cable is less prone to pick up undesirable signals.
16. **FALSE** You should check your own installation, in particular the ground system, the standing-wave ratio (SWR) and the adjustment of your preamped microphone. (if it is being used).
17. **FALSE** The stereo equipment is not defective. Rather, it lacks immunity. In order to correct this situation, your neighbour's stereo equipment dealer should be contacted. Interference problems with the telephone equipment should be brought to the attention of the dealer or manufacturer, or the telephone company's service centre.

18. **FALSE** You should check your own radio installation and suggest that your neighbour contact the cablevision company.
19. **FALSE** You should inform your neighbour that your station is not in operation and offer to do a test transmission.
20. **FALSE** This type of antenna is more likely to cause interference. The Department may require that a lower gain antenna be used should this prove to be the most acceptable solution to correct interference problems.
21. **FALSE** You are responsible for the control and operation of your station at all times.
22. **TRUE** You should cooperate with the person affected by the interference in order to find a solution to the problem.
23. **FALSE** Owing to the radiation characteristics of antennas, it is possible that your neighbour's reception is affected by signals from your station, while yours is not.
24. **FALSE** The interference is probably caused by the 2nd harmonic generated by the GRS equipment. The low-pass filter is therefore installed between the GRS transmitter and the antenna.
25. **FALSE** This blocking problem can be eliminated by the installation of a high-pass filter between the television and its antenna. If a television preamplifier is used, the filter is installed between the preamplifier and the antenna.
26. **FALSE** You should report the interference to the customer services section of your electric utility company. You can find the telephone number of this service on your electricity bill.
27. **TRUE** These are the most common electrical devices likely to be a source of interference. Note that other electrical appliances can also be a source of harmful radiation. The Department publishes a brochure on how to identify these sources of interference.
28. **FALSE** A linear amplifier is not necessarily involved. In fact, close proximity of high-gain antennas contributes to this cross-modulation problem.
29. **FALSE** You can only reduce it by using the noise limiter.