

**North American Division of
Seventh-day Adventists®**
**ADVENTIST COMMUNITY
SERVICES®**



**Radio Communications For
ACS DR - A Primer**

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INTRODUCTION

ACS DR teams have been called upon to manage a variety of Donations Management situations, from assisting with Points of Distribution (PODS) to Community Collections Centers to Multi-Agency Warehouses, and Emergency Distribution Centers.

When the operation is quite small, communication among team leaders may be easily done by just walking over to the other person and having a face-to-face conversation. However, when the operation is larger, using radios may be more effective.

This course is intended to be a basic introduction to several radio classes/services. It is by no means intended to be thorough for any of the radio classes discussed. There is much more that can be learned about each radio class through further study. The intent here is to provide some basic information, so team leaders will be able to more effectively choose the most appropriate radio class/service for their situation, or at least, be more familiar with a radio system currently being used in an ACS DR operation they join.

The three radio classes/services introduced in this course are:

FRS (Family Radio Service)

VHF (Very High Frequency) Radio Service

Amateur Radio (A.K.A. Ham Radio) Service

EXPLANATION OF RADIO CLASSES

Family Radio Service

The Family Radio Service (FRS) replaced the old Citizen’s Band (CB) radio service. There are many more restrictions regarding equipment design compared to the old CB service.

These radios are commonly called “walkie-talkies”. That name is not fully correct, since any radio that is handheld is considered a “walkie-talkie”, or “portable”.

The physical FRS radios that are typically available from many stores actually include two radio systems. The primary system is the FRS frequencies. The secondary system is called GMRS (General Mobile Radio Service). Technically, the GMRS radio service requires the operator to have a license from the United States (U. S.) Federal Communications Commission (FCC). The “small print” in the instructions for these radios usually contains a statement about the user obtaining the appropriate FCC license in order to legally use the GMRS frequencies included in the radio. It is rare that any user actually reads these instructions and applies for such a license. Obtaining such a license is somewhat complicated, and expensive.

The table below indicates which channels in these radios are designated for which service.

FRS and GMRS Frequencies prior to 2017 Part 95 Reform

Channel	Type	Frequency
1	FRS / GMRS	462.5625
2	FRS / GMRS	462.5875
3	FRS / GMRS	462.6125
4	FRS / GMRS	462.6375
5	FRS / GMRS	462.6625
6	FRS / GMRS	462.6875
7	FRS / GMRS	462.7125
8	FRS	467.5625
9	FRS	467.5875
10	FRS	467.6125
11	FRS	467.6375
12	FRS	467.6625
13	FRS	467.6875
14	FRS	467.7125
15	GMRS	462.5500
16	GMRS	462.5750
17	GMRS	462.6000
18	GMRS	462.6250
19	GMRS	462.6500
20	GMRS	462.6750
21	GMRS	462.7000
22	GMRS	462.7250

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Notice that some channels (frequencies) are listed as available for both FRS and GMRS, others are only FRS, and still others are only for GMRS.

You can gather from the channels listed that all these radios come with the above 22 channels. Unless all the operators have a GMRS license, it is best to not use channels 15 – 22. In most cases, no one would be monitoring to see if the users announce their license call sign when using channels 15 – 22. In some regions of the U. S., there are radio enthusiasts that do monitor these channels and may report the user to the FCC.

It must be noted that these radios have very low transmission power. This means their effective communication range is very limited; less than ½ mile is common, more than that may become questionable. On rare occasions, communication may occur over a mile or slightly more, depending on the terrain and building structure.

Mis-guiding information about FRS Radios

Marketing folks like to “sell” the customer what they consider as “features” of their product. In the case of the FRS radios, you will hear, or read, about what is called a “private line”, or PL. The first thing to understand about using any radio: there is no such thing as a “private line”. Not only can others within your group often hear what you say, so might the neighbors across the street, certainly within the range of the transmission.

The FRS radio has a feature that allows the operator to set a code on a channel to only receive a signal from another radio when both radios have the same special code set. The advantage of this is that those radios set to the chosen channel, will only receive a signal (a call) from a radio with the matching code. This avoids each person in that code group from hearing all the “chatter” from other radios using that same channel. If other radios have a different code set for the same channel, they will only hear calls from radios using their matching code. Also, any radio that has no code (code 0) set for that channel, still hears all the calls on that channel. Thus, there is great opportunity for plenty of radio “collision” on that channel.

The best way to control the messages (a.k.a. radio traffic) on a given channel is to assign channels for specific purposes: one channel for safety, another for parking lot traffic control, one for receiving, another for floor management, and perhaps one for facility management (custodial and maintenance). The center management staff may want to set their radio in the “scan” mode, so they can hear all the channels, in a “rotating” fashion.

VHF (VERY HIGH FREQUENCY) RADIO SERVICE

This just indicates the frequency band used by this class of radio. The more common name for this radio class is “business band”; that is, the band or part of the radio spectrum used by many businesses.

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These radios are considerably more expensive, and use different frequencies than the FRS, or other, radio services. Depending on the frequencies and transmission power of the radio, a federal license may be required.

A few of our conferences have some of these radios. In one or two cases, that is because their leadership was very perceptive and budgeted for the purchase of such equipment. In other cases, it was by a special corporate donation following a very large disaster.

In one case, the hosting state government loaned several radios to the ACS DR warehouse operation. In that case, the government was responsible for any license requirements. Since it is very unlikely our volunteers will have access to these radios, other communication options (a.k.a. FRS) should be considered.

When equipped for non-license use, any radios will also have very low transmission power. Therefore, the communication range is limited similar to FRS radios.

AMATEUR RADIO SERVICE

This special class of radio, and the related license requirement, is very versatile. Depending on the design of the particular radio, this service can be used for short-range, point-to-point communication, similar to the FRS and VHF radios; or it may be designed for long-range communication.

The largest share of this radio service is used for short-to-medium distance communication, using portable (hand-held) or mobile equipment. This class of equipment is authorized to use significantly higher transmission power than the FRS and other unlicensed VHF services.

This increased power can be useful, but is often not required, to provide effective communication. Depending on the band, exact frequencies, and other methods being used, there is a special system, called repeaters, that provides a “networking” effect. This allows a radio with lower transmission power to communicate over much longer distances.

The convenience of using this repeater system is that a hand-held radio, which is by definition, completely portable, and having lower transmission power available, to communicate over many miles. This is one of the most common methods of communication using this class of equipment and license.

The repeater equipment used for this special networking system is usually permanently set up in the local community. Portable repeater equipment can also be set up following a disaster, so emergency communication can be quickly established.

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The amateur radio system has been accepted by the U. S., and many other national governments, as the official emergency communication system, when commercial telephone service (landline and cell) systems are temporarily down, due to the disaster.

A number of ACS DR volunteers through the years have participated in providing such emergency communication. Seventh-day Adventist amateur radio operators have formed an international organization (<http://www.aarai.org/>), where they share experiences and capabilities.

In the past ten years or so, many U. S.-based ACS DR volunteers have studied and become licensed amateur radio operators. Everyone is encouraged to explore this radio service, so our larger communities can be better served following disasters.

As indicated above, this radio service does require a special federal license, issued by the applicant's federal government. This system is so well established that virtually all federal governments around the world have a licensing process for their residents.

A TRANSMISSION RESTRICTION THAT APPLIES TO ALL RADIOS

All radio transmitters, whether of the types described above, or your commercial radio and TV transmitters, have one restriction in common. They have a limited transmission range. In the case of trying to establish two-way communication, as is the case with the above radio systems, the transmitters must be within range of the radio being called, or additional equipment, such as repeaters, must be used to extend the range.

Appendix 01 explains how this works.

APPENDIX 1

AN EXPLANATION OF TRANSMISSION RANGE RESTRICTION

As indicated above, when two, or more, radios need to communicate with each other, they must be within the transmission range allowed by several factors, including the transmission power, the antenna system, the terrain, “PL” Codes, and many other factors.

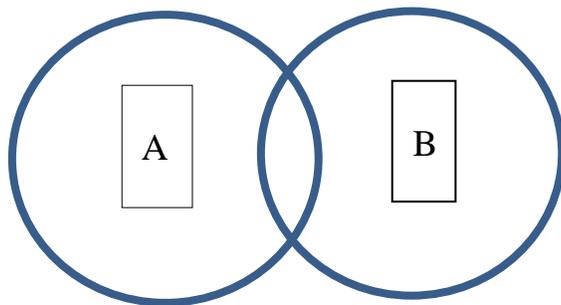
The illustrations below are intended to help the reader understand why their attempted communication may not happen, or it may be interfered with by other radio transmissions. The illustrations will also suggest possible solutions. The following examples are based on all the radios being FRS radios, except where noted otherwise, and on the same channel (frequency).

Direct and “Repeated” Communication options

The circles represent radios and their respective transmission range.

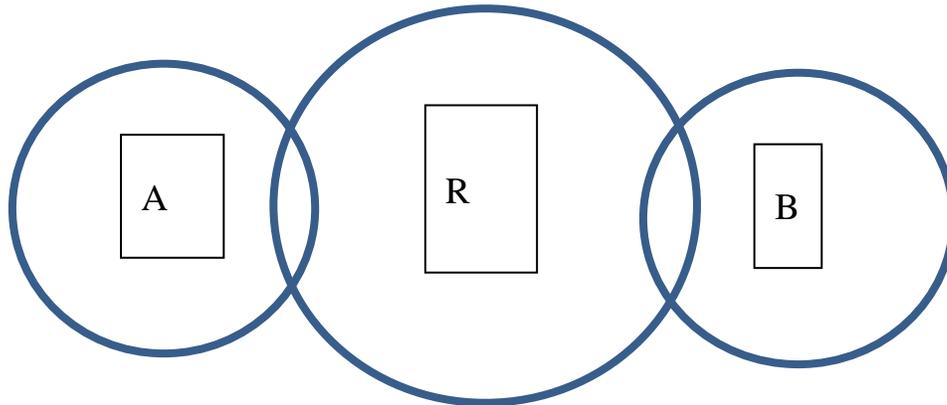


The radios illustrated above are separated by a distance beyond which they can communicate directly with each other.



Since the radios illustrated above are now close enough to have their respective transmission ranges overlap, they can directly communicate with each other.

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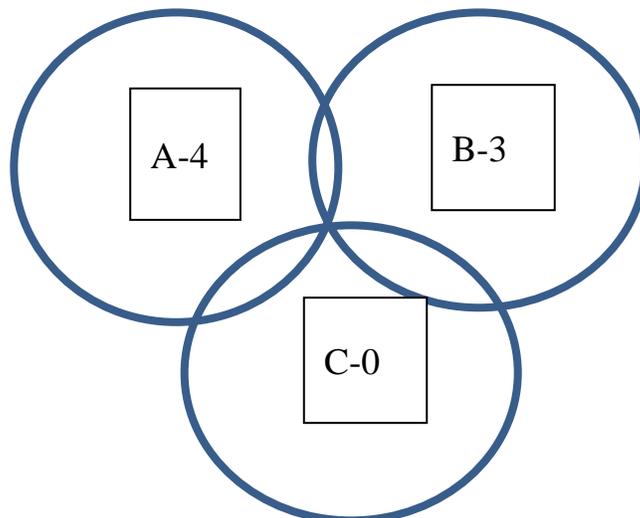


In the above illustration, The “R” radio is a repeater that could be available for certain bands (frequencies) of the amateur radio class. As suggested by the larger circle for the repeater, the repeater often has more transmission power, thus greater range, than the other radios.

Repeaters are not available for the FRS radio class. Any VHF radios used by ACS DR would likely not have access to a repeater system.

Radios used by law enforcement, EMS, fire departments, and other government agencies all use powerful repeater systems. They also operate in another band and spectrum of the overall radio system. It is highly unlikely that ACS DR would have access to such radios.

Using the “PL” (Private Line) Codes



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In the illustration above, it would appear that all three radios could hear each other, since they are within each other's transmission range. However, this is not the case.

Radio "A" has its privacy code set to "4". Radio "B" has its code set to "3". Therefore, they will not be able to hear each other. Radio "C" has its code set to "0". This allows radio "C" to hear both radio "A" and radio "B", and any other radio within range. However, when radio "C" transmits, neither "A" nor "B" would hear the radio "C" transmission, because they have privacy codes set at other than "0".

As you see, using the "PL" codes can be troublesome.

Let's assume that radios "A" and "B" are using the same code, but not "0". They would hear each other's transmissions. They would not hear radio "C" transmissions. They think they are having a "private" conversation. However, radio "C", with its code set to "0", would be hearing the other radios. Further, any other radio with its PL Code set to match any of the other radios in the system will be able to listen to those transmissions. There is no such thing as a private conversation in the radio world. The only attempt to provide privacy is to encrypt the transmission. Encryption is used by various government agencies, but is not an option with the radios ACS DR would likely use.

APPENDIX 2

RADIO TYPES ILLUSTRATED

The pictures below illustrate the three radio types discussed in this manual.



FRS Radio



Amateur "ham" Radio

VHF Business Band Radio →



APPENDIX 3

RADIO COURTESY

Using Clear Language

When we use radios, as with all our communications, we must be professional in our conversation. Proper language and courtesy must be used. One of the best ways to assist in this is to be brief (concise) with the communication.

Radio messages should focus on communicating mission-specific information. General conversation and words not directly related to the message should be avoided. This is not the time for “chit-chat”.

As with U. S. government agencies and other organizations, we should use standard “clear English” language, not abbreviations and codes that may not be understood by all.

Radio Unit Identifiers

When an ACS DR operation is large enough to justify using radios, appropriate radio identifiers should be assigned. It may be as simple as calling a person by name, or it may be better to assign unit numbers, or other task-oriented identifiers.

Assigning numeric identifiers is easy. Try to make them relate to the person’s position or assignment. For example, the Center Manager may be “Unit 1”, the Assistant Manager may be “Unit 2”, etc. If the Receiving Supervisor has been assigned as “Unit 5”, and she needs to speak with the Floor Manager, who was assigned as “Unit 3”, the call may begin as “Unit 5 calling Unit 3”, or “Unit 3, this is Unit 5 calling”. It should be noted here that all radio licenses issued by the federal government contain a station/operator call sign. This applies to both Amateur Radio and GMRS licenses. In those cases, the call sign is used instead of Unit Numbers, as suggested above.

When using the FRS, or other non-licensed radio system, the Center Manager and the other managers and supervisors should discuss what identification method works best for them. There is no right or wrong method. The method chosen must be clearly explained to all radio users, and used consistently throughout the operation.

When a call is ending, each person involved (there may be more than two) should announce that they are “clear”, i.e., “Unit 5 clear”. That simply means they have ended their involvement in this call.