

# GMRS 101

by the Lefty Radio League, [www.leftyrad.io](http://www.leftyrad.io)

## **Introduction**

Whether you want off-line communications for a local disaster or your next protest, GMRS radio is a great way to start. Here's everything you need to know to incorporate GMRS into your comms plan.

## **GMRS: General Mobile Radio Service**

**Simple to Use:** They work just like walkie talkies.

**License "Required":** Anyone can buy a GMRS, but you're supposed to have a license to use one.

- The FCC seemingly never enforces this requirement. (This is not legal advice.)
- The license is \$35, there's no test, it lasts 10 years, and covers everyone in your family.
- Google "how to get a GMRS license" to find the link to get your license, if you so choose.

**30+ Channels:** Channels 23-30 are for repeaters (see below); 31+ are for receiving AM/FM, NOAA, etc.

**Pretty Cheap:** GMRS radios start around \$30. Find good recs at [www.genoak.org/radios](http://www.genoak.org/radios)

**Better than FRS Radios!** In general, GMRS has a higher build quality, more power, and better reliability than FRS radio.

- FRS radios are the cheaper alternative in every sense.
- Avoid FRS if you can!

## **Range, Antennas and You**

Your GMRS radio will have much less range than advertised – basically line of sight. This might translate to 1-5 miles, but you'll get the longest range from a high point ("Height is might") with no obstructions, and shortest when the path between you and the other person is blocked by metal or earth. In dense urban areas, that may be a few blocks or less.

One of the first things you'll want to do is buy a new antenna for your GMRS. The antenna is the single piece of equipment that makes the biggest difference for range. Look online for recommendations – some are elastic and can be twisted in a circle to save space, some are simply longer than the stock "rubber duck" antenna that comes with your radio. (Check the antenna connector on your radio to make sure you buy one that's compatible.)

Finally, if you're having range trouble, try moving yourself. Go upstairs, walk around outside, and see if that doesn't make the difference. Experimentation is part of the fun of radio!

## **Emergency Preparedness Considerations**

If you are interested in emergency communications, here's more features to look for:

- Ruggedness
- Water resistance
- Ability to charge via USB-C
- Ease of use
- Easy to "program"
- Availability and price of extra batteries

## **Radio Etiquette**

Communicating via radio is different from talking on the phone. You don't necessarily know if the person you want to talk to is within range to hear you, or for you to hear them. And two people can't talk at the same time on the same frequency. As a result, there's something called "radio etiquette" that helps people communicate effectively by radio. Here's one common variation:

1. Listen and wait for a pause in radio traffic before talking. (transmitting)
2. Hold down the push-to-talk (PTT) button and *wait 1 second* because the transmitter may take that long to kick in.
  - a. Hold down the PTT button firmly for as long as you are speaking.
  - b. No one else can transmit while you are transmitting, so...
  - c. Keep transmissions short and to the point. Say one thing only each time you transmit. *Don't ramble.*
  - d. You are supposed to state your FCC license/callsign at the end of the transmission (or a series of transmissions), and again after 15 minutes, and every 15 minutes thereafter if still talking.
3. If you are calling a specific person, say their name 2-3 times, and then your own name and call sign. (if you have one)
4. When you are done, say "over" to indicate the other side can talk.
5. To break into a conversation, wait for a break and say "break" and then your name or handle.
  - a. Say "priority" if what you have to say is urgent, "emergency" if it's an emergency.
6. Acknowledge the other side's transmission with "Copy" or "Roger".
  - a. Avoid jargon or code words (including CB lingo) until you know what they mean, and so does whoever you're talking to.
7. When your conversation is over, say your handle and then "clear" to indicate that you're leaving the channel open for others to use.

## **Example of Radio Etiquette**

*"Luke, Luke, Luke – this is Leia Z9ABC – do you hear me? Over."*

*"Leia, this is Luke X7QRS. I hear you. Who is my father? Over."*

*"Luke, you don't really want to know. Leia, clear. Z9ABC."*

*"Copy, Leia. Luke, clear. X7QRS."*

## **Repeaters**

A repeater is basically a radio that receives transmissions on one frequency and automatically retransmits them on another. They're usually installed on top of buildings or mountains (height is might!) or in other places that can extend your range from a few miles to tens, or even hundreds, of miles.

Repeaters used to be limited to Ham (amateur) radio. But more communities are setting up GMRS repeaters for emergencies because the barrier to entry for GMRS is so much lower.

In Oakland, licensed GMRS radio operators can use the GENOAK ([www.genoak.org](http://www.genoak.org)) repeater. In Berkeley, it's the same for their BeCERTAINN repeater. Email them with your callsign to get the details for these repeaters so you can program your GMRS radio to use them.

## **Nets**

Most GMRS repeaters have weekly or monthly "nets" – on-air meetings for anyone with a license. These are invaluable opportunities for real world experience transmitting and receiving with your radio!

## Why Bother Getting Your GMRS License?

You're unlikely to be harassed for transmitting without a license. So why get one?

1. Comms is hard to get right, especially when you're under pressure.
2. The only way to learn is by practicing with the community.
3. If you don't have a call sign, no one will talk to you on a repeater, so you won't get that critical practice.
4. Finally, it's cheap, fast, easy, and the law. (if you care about such things)

## Radio Rules and Limitations

- Encryption, including speaking in code, is forbidden because it may be hiding criminal activity
  - And if used during disasters, it can obscure information about what's happening.
- Anyone on the same frequency can listen to everything you transmit. There is no privacy!
- With a little work, the location you're transmitting from can be tracked down.

## More Licensing Considerations

- You must begin every transmission with your callsign – it's publicly searchable and ID's you.
  - Note: For GMRS, this is only really (socially) enforced on repeaters.
  - Your legal name and address are visible online via your callsign.
  - Consider using a PO Box or community center address on your FCC application.
- If you have a felony conviction, you must explain it to get your license.
  - Historically, about 80% of people who explain their conviction get their license.

<b>Radio for Protests Do's</b>	<b>... and Don'ts</b>
<ul style="list-style-type: none"><li>✓ Use GMRS radios or better</li><li>✓ Have a comms plan for your team</li><li>✓ Have fallback channels if yours is used</li><li>✓ Use channels 15 - 22 when you need maximum transmission power</li><li>✓ Keep your antenna high and clear</li><li>✓ Use a shoulder mic, because protests are loud!</li><li>✓ Use privacy tones for less background chatter</li><li>✓ Switch to Signal, etc. for sensitive info</li><li>✓ Practice using radios during chill protests and marches</li></ul>	<ul style="list-style-type: none"><li>✗ Use FRS radios</li><li>✗ Just hand out radios to people</li><li>✗ ...not have fallback channels</li><li>✗ Use channels 8-14, unless you want <i>minimum</i> transmissions power</li><li>✗ Block the antenna with your body</li><li>✗ Leave the radio in your backpack or pocket</li><li>✗ Mistake privacy tones for encryption!</li><li>✗ Rely on radio for all communications</li><li>✗ Assume it will all go smoothly the first time you use radio at a protest</li></ul>

## **Mobile Radios and Base Stations**

This handout is focused on handheld GMRS radios, but there are other options, too. Mobile radios are designed to go in your car or boat. They look like car stereos and can transmit at higher power, up to 50 watts for GMRS, and use external antennas mounted on your vehicle.

You can do something similar by setting up a GMRS base station. This is a setup that lives more or less permanently in one place in your home, and relies on an external antenna mounted in your window or on your porch or roof.

Mobile and base station units are typically more expensive than handheld radios. But they offer more power, better sound quality transmitting and receiving, and, due to having more power and better antennas, can have much greater range than handheld GMRS units.

### **A Note About GMRS Transmitting Power**

A lot of GMRS handheld radios go up to 8 or even 10 watts of transmitting power; mobile radios go up to 50. But be forewarned that the FCC defined not just the channels GMRS radios work on, but the transmit power allowed on them, too. For example, channels 1-7 only allow 5 watts of power, while channels 8-14 allow a *measly half-watt* of power.

These transmit power limits are enforced by GMRS radio hardware as part of their FCC certification. So don't assume that your radio will perform the same on every GMRS channel! (Some radios can be "jailbroken" to get around these and other limitations. This is generally illegal, but info on it can be found on prepper YouTube channels and elsewhere on the internet.)

<b>GMRS Channel Info</b>		
<b>Channels</b>	<b>Tx Power</b>	<b>Notes</b>
1-7	5 watts	General GMRS/FRS comms
8-14	½ watt	Short range comms only
15-22	50 watts	Highest power; general comms or for receiving repeater traffic
23-30	50 watts	For transmitting to repeaters; only on repeater-ready GMRS's
31+	0 watts	<i>Receive only</i> ; for AM/FM, NOAA weather, Ham traffic, etc.

### **More Bay Area GMRS Resources**

GENOAK (GMRS Emergency Network – Oakland)  
BeCERTAINN (Berkeley)  
LaMorinda CERT

[MyGMRS.com](http://MyGMRS.com)  
and the Lefty Radio League, [www.leftyradio.io](http://www.leftyradio.io)

### **Now Get on the Air!**

The best way to learn radio is by doing. The easiest way to get on the air is to get a few cheap walkie talkies you have lying around, go to the park with some friends, and practice radio etiquette together. You could also buy some GMRS units to use on your next multi-car road trip.

If you're ready to take things to the next level, organize with your neighbors to get GMRS radios. Then schedule a weekly or monthly net to practice your skills. Whatever you do, you'll have fun and be better prepared for your next camping trip or natural disaster. Good luck!