

Using Repeaters

In some areas you can talk on your UHF/VHF handi-talkie without having to worry about setting up repeaters. This method of point-to-point communication is known as simplex. As you travel, listen to 146.52, which is the National Calling Frequency. The way this works is to establish contact on this frequency and then move to another frequency or to a local repeater once contact is established to keep the calling frequency open. You will probably not hear much on this frequency as most people use repeaters.

Repeaters are radio devices that are usually mounted high on a mountain top or else in a location that is convenient to access. They receive a weak signal from a handheld or mobile transmitter, amplify it, and then retransmit the signal. Repeaters allow us to talk over further distances than we could if we were talking direct between two transceivers.

Repeaters are usually available for free for everyone to use, even though they are owned by a club or organization and are primarily intended for use by their members. This is yet another good example of the "good nature" of ham radio operators who would rather give you something rather than withhold something from you! There are a few exceptions (not many), and your repeater directory (discussed below) will let you know which ones are free and which are membership only.

Most of the communications on the popular UHF and VFF bands (the 2 meter band, 144-148 MHz, the 1 ¼ meter band, 222-225 MHz, and the 70 centimeter band, 420-450 MHz) happen on repeaters. You should get a good local repeater directory, either in print version at the store, or lookup the information online, and program your radio for all the frequencies in your home area. Most of us eventually establish a "home" repeater that we monitor on a regular basis so that if anyone wants to contact you, they will know that you are usually listening to this particular repeater. For example, if you are ever in the San Diego County area, you can find me (AA6TS) on 146.64 (-) with a PL tone of 107.2. The "-" means that the frequency that you program to get "into" the repeater is 600 kHz lower than the frequency you listen to, so you would program the "input" to 146.040 and the "output" to 146.640, and then also tell it to use a tone of 107.2, one of a list of standard tone frequencies that are used. If you were to listen to this on a receiver, you would dial to 146.640.

On the 2 meter ham band the offset frequencies are 600 kHz (600 kilohertz) apart. On other bands, the offsets are different. With a few exceptions, if the output frequency (transmit frequency, the frequency that you listen to) of the repeater is below 147 MHz, then the input frequency (listening frequency, the frequency that you must transmit on to contact the repeater) is 600 kilohertz lower. This is referred to as a negative (-) offset. If the output is 147 MHz or above, then the input is 600 kilohertz higher. This is referred to as a positive (+) offset.

Most ham radios sold today automatically set the offset once you have chosen the operating frequency. For example: If the repeater output is 146.840 MHz, the input, or the frequency it listens on, is 146.240 MHz (600 kilohertz lower). If you have your radio

tuned to 146.840 MHz, (the repeater's output frequency), when you push the microphone button, your radio automatically transmits on 146.240 MHz, 600 KC down from 146.840. When you release the microphone button to listen, your radio switches back to 146.840 MHz to listen on the repeater's output frequency. There are exceptions to the rule so check local repeater listings.

You can usually hear the output of the repeater without a tone, but you need the tone to "talk to" the repeater, so any scanner can monitor the frequencies. By requiring a certain tone to access the frequency, you won't be interrupted by other users on the frequency – only those that are using the same tone. This allows for a certain amount of privacy so that you will only hear transmissions from other people using the same tone. Almost all repeaters use tone squelch, so you will need a radio that allows you to program a tone into a memory along with the frequency of the repeater. Your radio manual will explain how to do this, and the repeater directory will have the information that you need. The tone that we refer to is usually referred to as a "PL" tone, which is an abbreviation of the Motorola Trademark "Private Line." The generic name for this "tone" is "Continuous Tone-Coded Squelch System" (CTCSS). There are other types of tones that will mute the audio (squelch), but these are less common. If your radio allows for a variety of different tone squelch methods, refer to the repeater guide, as it will tell you if you need to use any less common type of tone, which will rarely be needed.

I use software that makes programming easier, especially if you travel a lot and will be changing frequencies often. Leave a lot of memory channels open so that you can program them for repeaters in areas you will be traveling through, and then either change them as you move on, or leave them in memory for the next time you are in that area. You can "lock out" the frequency until you need it again. You can search for these frequencies online, such as by using a search phrase similar to "San Diego repeaters" or you can get the ARRL repeater directory (or a national repeater directory from a different company) which covers the whole country. There is also software available for about \$40 that makes it easier to find repeaters. If you have trouble finding local repeaters as you travel, there are some web sites such as [K1IW Amateur Repeater and Broadcast Transmitters Database Websearch](http://rp.tr.amateur-radio.net/arn/rptr) at <http://rp.tr.amateur-radio.net/arn/rptr> with repeater search engines to help you find repeaters in areas that you will be traveling through.

As you travel, just choose a repeater that looks like a likely candidate, key up and say "(call sign", mobile, monitoring" - I would say "AA6TS, mobile, monitoring." This is like saying CQ, but adapted to the VHF/UHF etiquette. This is an invitation that you would like to talk to someone, so once you announce your call sign, listen for another ham to respond to your call. Of course, if you want to contact a specific user, you can use the traditional method of "KJ6NTB, this is AA6TS," which means "KJ6NTB, are you there? This is AA6TS, and I'm trying to get in touch with you." Once the other party responds, carry on a normal conversation, announce your call sign every ten minutes, and give your call sign again when you are finished with your conversation. It is not necessary to give your call sign every time you say something, only every ten minutes, according to FCC regulations.

And while you are still interested in ham radio, try to keep studying and try to get your General license, and then Extra class license. This will open up many more communication opportunities on the "HF" bands (160 meters through 10 meters) and also the 6 meter VHF band at 50-54 MHz. It is not really that hard to upgrade your license. I studied one month for the General class exam, and then got my Extra the following month. Now I am relieved that I don't have to study anymore! I am trying to add more articles for beginners here on my website at <http://radio.tomsmerk.com>. I hope you will continue to use this site to connect to the many other resources that will give you the information you need to better enjoy your new hobby as a ham radio operator!