

Ten things to do, with a handheld radio

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This series of articles are intended to give the newcomer to ham radio an insight into some of the things you can do with a handheld dual band radio.

1: Repeaters

Radio signals of frequencies in the VHF band and higher struggle to escape the clutter of urban buildings, making long distance communication unreliable. A technique to overcome this limitation is to use a “repeater” on a high point near an urban area, which has an almost line of sight path to the radio users in town. The repeater consists of a receiver connected to a transmitter, and is able to receive a signal from a distant user and simultaneously re-transmit it, thus increasing the radio coverage many fold.



Figure 1 An alpine repeater

The equipment is supplied, maintained and quite often paid for by the local radio club or NZART branch, therefore a repeater user should seriously think about joining and supporting the NZART.

Local and national

Most repeaters serve a local area, such as a town or city and its immediate surroundings. On the medium scale, some pairs of local repeaters are linked to increase the coverage area. However, New Zealand also has a nationwide network of linked repeaters covering most of the populated areas; this is called the “National System”. A map of the sites can be found on the NZART web page:

<http://www.nzart.org.nz/info/repeaters/national-system/>

A call into *any* node of the system will be heard on the output of *every* node, and a conversation can be had with any Ham within the coverage areas.

On the move

Most amateurs use repeaters when they are mobile or portable, as they will give good operating coverage for low power users that are unlikely to have directional antennas on vehicles or handheld radios. However, a handheld radio antenna inside the car will not be as good as an external car antenna.

Two frequencies

A repeater's receive and transmit frequencies will be different to avoid it "hearing itself", which would have obvious feedback problems. The users set their radios to receive the repeater "output" frequency, and setup a transmit/receive frequency different, called a "split", so their radio will automatically change it's transmit frequency to match the repeater "input". In this way two or more users can communicate through the repeater, with everyone transmitting on the repeater "input" and receiving its "output".

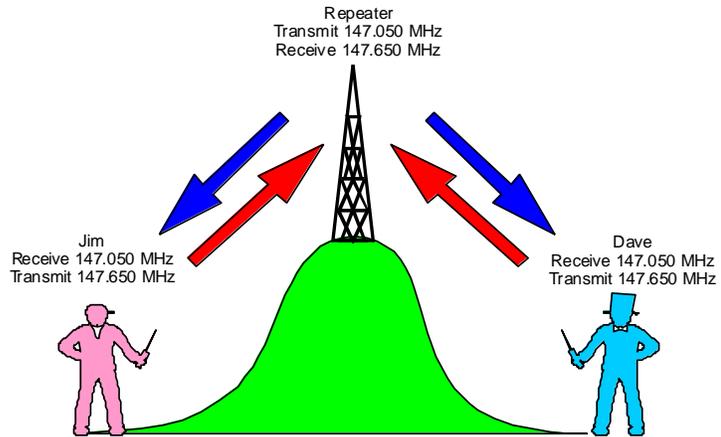


Figure 2 Typical frequencies of a 2m repeater

Shift up or down

When your radio transmits, the frequency shift can be set higher than your receiver (positive split) or lower (negative split); by convention frequencies below 147MHz need a negative split. Repeaters in the 2 metre band use a 600kHz split, while in the 70cm band they use a negative 5MHz split.

The transmitter tail

Normally a repeater will sit on the hilltop listening for signals from users, and only turn on its transmitter when a signal is received, to save power. The transmitter will usually hang on for a second after the signal has gone; this is called the "tail" and can be heard on a user's radio after they have finished speaking, and is a useful method to know your signal is reaching the repeater.

Tones you cannot hear

To increase their rejection of spurious signals, some repeaters only accept signals that contain specific sub-audible tones, called CTCSS (Continuous Tone-Coded Squelch System) codes. Most modern handheld radios can transmit these tones and can be programmed into each repeater channel as required.

A few repeaters may need you to transmit for a few seconds before they acknowledge your transmissions, this is another way the repeater can reject noise and other spurious signals.

What to say

It can be a little daunting to make a call through a repeater knowing it will be relayed over a wide area. Legally there is no correct way of making a call as long as you

announce your callsign as per the rules (¹**Error! Bookmark not defined.**). Normally, Ham radio operators say something like “This is ZL3XYZ listening 705 for a call” where the number is an abbreviation of the VHF repeater output frequency, in this case 147.050MHz. If you were listening to a UHF repeater you may say “850 “ when the repeater output is 438.500MHz. When using the national system you just need to say “..... listening the national system for a call”.

When you are chasing your first fifty contacts, it is worth changing the call to “This is ZL3XYZ listening national system for my first fifty contacts” and this will spur other Hams to help you in your quest.

Time out for good behaviour

Many repeaters will “time out” if you transmit for too long without a break, this is to safeguard against spurious signals taking over the repeater for hours on end. It is also good manners to leave a break before replying to calls to you, as this allows other users to signal their presence and join in.

Finding information

To discover where your nearest repeaters are, as well as what radio frequency and CTCSS codes they require, go to the NZART website

<http://www.nzart.org.nz/info/repeaters/>

The NZART band plan diagrams are here

http://www.nzart.org.nz/assets/bandplan/Bandplan_Chart.pdf

¹ Your callsign must be transmitted at the start, end and at least every 15 minutes of a contact