December 16, 2024 - LeeCARES Training Net:

Cross Band Repeating

Presented by Jason Korb, KI5ABB

Cross Band Repeating

Crossband Repeating is the process where a Ham transmits a low power signal using one band (UHF), to another radio with a better antenna and higher power output. The other radio then re-transmits (VHF) to a repeater or other far away radio system. This is very handy when you need to use an HT for mobility but cannot reach the end destination with the HT. Using your HT along with your mobile rig can solve this problem.

This training will cover this topic in a general way since the Crossband Repeating setup is very dependent on the specific equipment used and your specific needs.

Not every radio can support crossband operations. Things to look for in the selection of mobile radio capabilities for use in Crossbanding are:

- Tone squelch
- Split sides
- Split tones
- Remote control
- Crossband capable

CAUTIONS IN USING CROSSBAND

Never crossband between two repeaters. This can cause both repeaters to remain transmitting and make the system unusable for everyone. Always use tone squelch to prevent a radio from receiving a signal and re-transmitting it unless the PL tone is received. Your crossband radio will become part of a repeater system so you need to ensure that any random input signal to your crossband rig does not enter the system. Ensure that you get a UHF frequency assigned to you from NET Control so that you do not interfere with another Amateur operator close by using the same frequency. Also refer to the band plan for your state for each frequency.

Remote Control of your crossband rig from your HT is handy to shut off your crossband repeat if necessary. Study the specifics about your radios to set this up properly.

Split Sides/Split Frequencies: some dual band radios (mobile or HT) can transmit on VHF and receive on UHF or vice-versa on the same side of the radio. Typical radios can have one frequency on the left side (UHF), and a different frequency on the right side (VHF). A few radios will allow you to program a VHF frequency on one side and create a split so the same side can re-transmit UHF.

Split Tones: Some radios also have split tones. For example, transmit a PL tone but be configured with a different tone squelch.

Power Supply: Be sure to have enough battery power and adequate cooling because your mobile radio may get heavy use during an assignment with lots of radio traffic.

Types of Crossbanding

Half Duplex is the easiest to set up. This is where you transmit simplex from your HT to your crossband repeater using UHF and your crossband repeater re-transmits to the main repeater via VHF. When you stop transmitting from your HT your mobile radio stops transmitting. This is used where you are close enough to the main repeater to receive the repeater signal directly on your HT.

Half Duplex set up:
1. Configure your dual band HT to transmit UHF with a PL tone.
2. Configure the HT to receive the main repeater VHF frequency.

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3. Set your mobile radio to receive on UHF with the same PL tone as set in 1 above.
4. Set your mobile radio to re-transmit on VHF with the main repeater PL tone.
5. Place the mobile radio in crossband repeat mode. Check the power levels to ensure they are at minimal levels to conserve power and reduce heat.

Now, when you key up your HT, it will transmit on UHF to the mobile. The mobile, hearing the proper signal, and the proper tone, will open, and re-transmit the signal on VHF with a PL tone but your mobile will not respond to VHF from the main repeater or re-transmit it via UHF to your HT.

Full Duplex crossband repeating is more difficult to set up. If your situation allows, use Half Duplex. In Full duplex your radio will be working almost 100 percent of the time since it transmits in both directions. Only use this setup if your HT can not hear the main repeater directly and consistently.

In full duplex, when you key up your HT, it will transmit on UHF to the mobile. The mobile, hearing the proper signal and the proper tone will open and re-transmit the signal on VHF with a PL tone. When the main repeater transmits on VHF, the mobile re-transmits the signal from the repeater via UHF to your HT using the proper private tone (use low power).

Full Duplex set up:

1. Configure your dual band HT to transmit and receive on one UHF simplex frequency with the PL tone of your mobile repeater.
2. Set up your mobile radio to receive the UHF and re-transmit on VHF with the same PL tone as set in 1 above.
3. Program the VHF side of the radio to receive on the main repeater with the proper PL tone and re-transmit to you HT via UHF.
4. Use the time-out timer on your equipment if it is available.
5. Place the mobile radio in crossband repeat mode. Check the power levels to make sure they are at minimal levels.
6. Some mobile radios have the capability to automatically ID. Use this feature to meet FCC requirements. (NOTE: Most nets require that all completed interactions finish with your callsign which would satisfy FCC requirements.)

When setting up a crossband repeater make sure to carefully follow the instructions in your radio’s manual. Also, learn how to turn off the crossband repeat before attempting normal operations on that rig.

This training was “borrowed” from the Harris County ARES website without any acknowledgement of an author or source.