



Crossband Repeaters

What they are, how they work, setting them up...

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Today We Will
Cover:

1. Getting your Signal Out there
2. What is/how does a repeater work?
3. What is a crossband repeater?
4. Using crossband repeaters

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Getting Your Signal Out There

- What determines your ability to reach another station?
 - Frequency
 - Distance
 - Line of Sight / Obstructions
 - Power
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What is a Repeater? How does it Work?

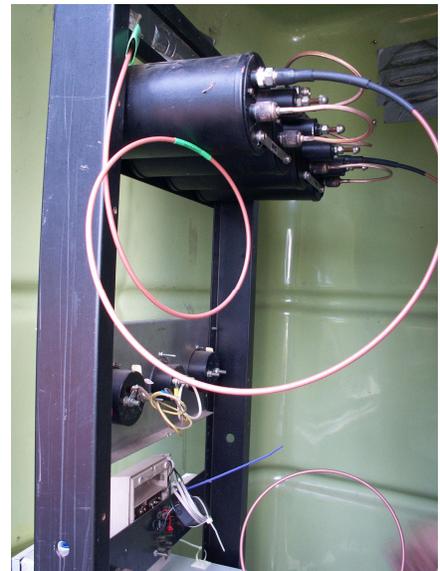
- Repeaters rebroadcast transmissions on an output frequency shifted either up or down from the input frequency (“offset”) – these are also called “duplexing repeaters”
 - Repeaters are usually located at a high spot which aids in line-of-sight issues.
 - In the repeater “box” at minimum, are two transceivers and a controller which handles things like CTCSS/DCS, station identification, ability for remote reset, etc.
 - Established repeaters usually have “cans” or narrowly tuned bandpass filters to eliminate interference.
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Repeater Example: Boynton



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What is a Crossband Repeater?

- A crossband repeater uses two different bands to transmit signals. These are not duplexing and have some special issues you must contend with.
 - Often, a crossband repeater utilizes the 70cm and 2M bands.
 - Technically, crossband repeaters are not mentioned in Part 97 rules and fall into a strange grey area – more on this later.
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Special Considerations

- These fall under “remote control” rules – you must remember to identify on both sides of the repeater system.
 - If the system goes haywire, you need to be able to shut down spurious transmissions within 3 minutes (don’t have it a mile away) – repeater controllers have this built in with time-out-timers (TOT) and other tools.
 - Crossband repeaters are a temporary solution to a problem and are not appropriate for long-term use.
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Using Crossband Repeaters

- Minimum of 3 radios required – you need a dual band/dual receive radio capable of crossband repeating and every other person needs a radio at their disposal.
 - The 2m frequency is the “main” frequency and the 70cm frequency is the short-range/repeater frequency.
 - You use the 70cm frequency to make the short hop to a more powerful radio to transmit on the 2m frequency. Anything transmitted on 2m will be rebroadcast on the 70cm frequency.
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How do I set one up?

1. Gather your information – you need:
 - a) The main operating frequency with any PL tone it may have (check your ICS 205)
 - b) At least two (2) choices of input frequencies (have a backup)
 - c) A PL tone for your input frequency.

Keep notes of what you are using and what you need. Plan your frequencies ahead of time and I suggest a “dry run” before an actual event if possible.

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2. Program your “repeater”

- a) On one side put in the operating frequency
- b) On the other side put in the input frequency and tone
- c) Activate crossband ability
- d) If possible, you may want to consider high power for the operating frequency and low power for your input frequency.

The ORRC has a range of frequencies in the 70cm band for crossband inputs, please use these channels (in Oregon – other places have other guidelines)

441.425 - 441.450 - 441.475
446.425 - 446.450 - 446.475

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- For the VHF side of the repeater, ORRC suggests using open use frequencies (146.420-146.600, 147.400-147.580 MHz except for 146.520 – the national Calling Frequency).
 - Use a VHF frequency in simplex portion of the band plan. Consider adding a tone to reduce interference.
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Ways to set up a XBAND Repeater

- Many dual-receive radios have cross band capability. Some radios are trickier than others to set up – make sure you know how/bring the manual or a checklist!
 - Build your own with HT's and a wiring kit.
 - Different radios have different characteristics. Make sure you test your radio first so you can use the crossband effectively.
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CARES' XBAND Frequencies

- In the GREEN Plan, there are two assigned cross band (XBAND) frequencies:
 - #73, XBAND1 – 446.425 tone 103.5
 - #74, XBAND2 – 446.450 tone 103.5
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3. Program your HT

- a) Put in your input frequency and tone
 - b) Set power levels appropriate for reliable communications with your repeater.
 - c) LOCK your keypad on your HT to prevent going off frequency.
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So... What good are these things?

- Let's look at a couple of real-world examples where crossband repeaters have been used by members of our organization.
 - Both of these examples help highlight at least one major advantage of having this capability.
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Case-Study: Ultramarathon

- Race Operations runs on 2m simplex. Your task as an operator is to relay information between your assigned aid station and NCS.
 - You need to be available at your radio at all times.
 - To reach NCS, a handheld just won't do... You need more power (at least 25 W) and a better (and higher) antenna than your little HT can handle.
 - Great solution: set up a crossband repeater!
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Case Study: Teddy Bear Parade

- Your assigned location along the parade route ends up being in a radio "shadow" from NCS. A better antenna, more power, and a slightly different location would effectively solve all of your problems, but you need to remain at your assigned position.
 - Use your mobile radio in your car as a crossband repeater. Low power between your HT and the vehicle radio and more power between the vehicle and NCS.
 - Crossband repeater increases your getting out of a dead zone.
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Best Practices

- Main frequency should be an OPEN 2m simplex frequency, the repeater frequency should be 70cm.
 - Follow the CARES “GREEN” plan
 - Do NOT use the calling frequency (very rude and un-ham-like)
 - Listen, listen, listen – do not interrupt others using the frequency, be prepared to move.
 - Use a PL tone on the 70 cm side at least, one is recommended on the 2m side as well.
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