Cross Band Repeater Operation

7/11/2023

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Cross band repeaters can be a great asset however they can also be an unnecessary source of interference.

Here are my points on what I consider to be proper cross band repeater operation to give adequate performance and greatly reduce the chances of unwanted interference.

For this particular write-up we are presuming you are using your cross band repeater in the FM mode to talk locally on UHF in order to talk into a distant VHF repeater or a VHF simplex frequency. If you are using your cross band repeater in any other bands and/or modes the basic rules here would still apply.

Also, there are two sides of a cross band repeater and for purposes of this discussion I will call the "distant" side the side of the cross band repeater on the frequency you are trying to get boosted to reach, such as a distant repeater or a simplex frequency, in this discussion it would be the VHF frequency. The other side is what I will call the "local" side, which is what you will talk on locally to the cross band repeater with your portable, in this discussion it would be the UHF frequency.

- Never ever (**NEVER EVER**) use any of the National Simplex Frequencies such as 52.525, 146.520, 223.500, 446.000, 1294.500, etc. for the local side of your cross band repeater.
  Just don't do it!!!

- Here in Texas the frequency coordinator, the Texas VHF-FM Repeater Society band plan, says that the following frequencies should be used for the local side of your cross band repeaters:
  - 440.750 - 440.975 Cross Band Repeat – Fixed
  - 445.750 - 445.975 Cross Band Repeat – Mobile

- This means that for the local UHF side if your cross band repeater is not mobile you should be using one of the following frequencies:
  - 440.750
  - 440.800
  - 440.825
  - 440.850
  - 440.900
  - 440.925
  - 440.950
  - 440.975

Cross Band Repeater Operation (cont'd)

- Plan ahead. Listen (with your CTCSS receive tone turned off) at least a few days ahead of time to the frequency you are going to use for your local side of the cross band repeater. Make sure the frequency is clear to use and it isn't a chat frequency for some local folks. Be sure to listen on the day of the week and the time period of the event for other traffic. Don't use indoor antennas on your cross band repeater as these indoor antennas cause the receivers to pick up all sorts of indoor interference from computers, chargers, even processors in toasters. These garbage signals have even been known to cause CTCSS tone and DCS digital decoders to decode. Use a good outdoor dual band or separate antennas mounted in the clear.

- To prevent unwanted signals you must **(MANDITORY MUST)** use CTCSS tone squelch on the local UHF receive side. Failure to do this is the leading cause of unwanted interference from cross band repeaters. Set your CTCSS local UHF receiver tone to something different than the tone (if used) on the distant VHF side of the cross band repeater. Do not use 136.5, 118.8 or 179.9 Hz as these tones can have issues.

- **Verify!** Once you set up your cross band repeater test it with your portable or mobile radio to make sure your local UHF receiver CTCSS receive squelch tone actually works. Transmit on your UHF frequency without the transmit CTCSS tone or with an incorrect tone to verify that your cross band repeater will not repeat without the correct tone. Open the local UHF receiver squelch to make sure your cross band repeater will not repeat. There are some radios out there such as the Kenwood TM-D700 that will appear to allow you to set them up properly with CTCSS receive tone however it doesn't actually work and will pass any signals or noise in the cross band repeat mode. If your radio does not work correctly you can't use it. **Verify!**

- Don't set your receivers squelch controls on the hairy edge. Run them moderately tight. If your signals are so weak you have to run the squelch that loose you need to do something else to communicate.

- Set both your VHF and UHF transmitter power levels as low as possible to still be able to have reliable communication. If you do cause interference and are running high power chances are nobody can talk over your interference.

- If there is a time out timer setting in your radio then set it to 1 or at most 2 minutes. Some radios may have an overall time out timer for the transmitter or some may also have a time out timer for the cross band repeat function. You might want to set the timer to minimum time and test into a dummy load to see how the timer behaves in the cross band repeat mode.

- Have a reliable power source for your cross band repeater. A sagging battery can cause some radios to do funny things and you don't want your funny things causing problems.

Cross Band Repeater Operation (cont'd)

- If you are operating a cross band repeater for an event, a net operation or such, you must notify and possibly get permission from the technical officer or net control ahead of time. Those folks must **(MUST)** know of your cross band repeater operation and know how to contact you (think cell phone number) during the operation and if necessary tell you to immediately turn off your interferer.

- For an event, your cross band repeater must **(MUST)** be coordinated with any other cross band repeaters used at the event/area so you and the other cross band repeaters don't interfere with each other and cause unwanted interference. This should be coordinated through the event technical planners. You must use discrete frequencies, different CTCSS tones will not prevent RF interference.

- Remember – in this example, if your VHF-UHF cross band repeater is locked up and causing interference to the VHF repeater you will hear nothing on your local UHF channel and you will think everything is just fine, while you are jamming the VHF repeater. It would be a good idea if you can monitor the distant side VHF repeater or simplex frequency in the background if you can in order to be able to hear if your cross band repeater is causing a problem on the VHF distant side.

- The NCTC System, and likely most other interconnected Amateur Radio systems, do not allow the use of cross band repeaters on their system. One problem will, and has, tied up the whole network! The system operators will likely not know where the problem is coming from and who is doing it to get it stopped. Don't be that jammer. If you want or need some kind of a boost to get into a networked system contact the administrators of that system for their suggestions.