2022-02-21 Hamlet Net - Crossband Repeating

Announcements:

- Test Session Info
  - Next VE session is this Saturday, February 25th. It is an ARRL session, so $15 fee to take the test. The test session will be held at the Clover Building at the Boulder County Fairground.

- The 10 meter band has had a lot of activity lately. Remember that all you need is a Technician license to transmit on at least part of 10 meters! And if you don't have a radio or antenna, but are a LARC member, we have a fully-configured GoBox that contains an ICOM-7300 HF radio as well as a Wolf River Coil HF antenna that you can check out to give it a try! We probably also have a number of members that would be happy to go out with you and help you make some contacts!

- Three options for LARC Saturday breakfasts - have three options: Loveland at Grandpas at 7am, 8am Hidden Cafe in Longmont, 10am at Hidden Cafe in Longmont

- You can start earning your 2023 membership or future renewal by acting as NCS for at least 5 nets this year. You can run either this Tuesday night net or the Thursday night net (or both). We have scripts available for both, so all you need is a good connection into the repeater, and somewhere to keep track of names and call signs as people check in. If you're going to be on the net anyway, why not save some dough at the same time! There are four free memberships available for 2023, so don't wait to get started!

- Chuck has set a goal for the Club of running at least one activity a month. This can be a hands-on construction activity, an operating activity like Field Day, a fox hunt, or a special event station. The goal is to get people together to have fun with amateur radio! We have multiple locations at our disposal, as well as lots of Club equipment, so if you have an idea for something you think others hams would like to do, please let us know, and if you're willing to run it, even better!

- The Club is also looking for presentation topics for 2023. If you have any ideas, or better yet, would like to present, please let Chuck know and we'll get you on the schedule!

- All club activities are open to anyone - members and non-members. ~~If you have questions, ask them on a net or~~ **send email to elmer@w0eno.org**

- Club breakfast Saturday mornings at 8am at the Hidden Cafe in Longmont

  - Come meet other Club members and discuss amateur radio

Presenter: Bryan, AF0W

Topic: Cross Band Repeating

- We are using a repeater right now for the net, but if you've ever seen a picture of one, you know they are fairly large, heavy devices, comprised of multiple components

    a. These components include a receiver and transmitter, a controller, and various filtering devices such as duplexers, circulators and isolators

- But what if you are working an event such as a bicycle race in the mountains and are unable to access the repeater being used by the event from your location with your HT?

- This is where a mobile radio with crossband repeater functionality will come in very handy

- When operating as a cross band repeater, a radio will receive on a frequency in one band (say, UHF) and transmit on another (say, VHF)

- You can use your HT to transmit a signal on UHF to your crossbanding mobile installed in your vehicle. That radio will retransmit your signal on VHF on the repeater's input frequency

- Since your mobile radio has a better antenna and is higher powered than your HT, it will have a better chance of hitting the repeater

- You also have some control over where you locate your vehicle. Perhaps you are at an aid station down in a canyon, but can park your vehicle with crossbanding radio at an elevated location that is accessible to both the repeater and your HT.

- This handles the path from your HT to the repeater, but what about the output of the repeater?

- There are two ways to handle this - you can operate in half or full duplex

- If your HT can receive the output of the repeater directly, you can operate in half duplex crossband repeat mode.

    a. Repeaters typically have high-powered transmitters, so it is likely you will be able to hear the repeater on your HT, even if it cannot hear you

    b. To do this, you set up your HT to receive the signal directly from the repeater

    c. Your crossband radio does not perform any function when the repeater is transmitting

    d. Note that your radio will have to allow you to transmit on one band, and receive on another.

- - - ■ Some radios, such as the Yaesu FT-60 support memory channels with "split" bands

    - ■ I do not believe the Baofeng UV-5R radios allow you to do this with a single memory location but you can program VFO A with the input frequency of your crossband repeater, and VFO B with the output frequency of the repeater

    - ■

- If your HT cannot directly receive the output signal of the repeater, then you can operate in full duplex mode

    a. In this case, your crossbanding radio handles signal in both directions

    b. You transmit into the UHF frequency just as with the half duplex configuration

    c. You also set your receive to the same UHF frequency

    d. When you transmit from your HT, the signal goes to your crossbanding radio over UHF, and it simultaneously transmits into the repeater's VHF input frequency

    e. When the repeater transmits a signal that is received by your crossbanding radio, it will retransmit the signal simultaneously on the UHF crossbanding frequency.

Issues

- There are a few issues you need to be aware of when operating in crossband mode

- First, in full duplex mode, your mobile will be transmitting 100% of the time there is a signal to or from the repeater. This will both tax your vehicle's battery, and may overheat your radio. Most mobile radios are not designed to transmit continuously.

    a. Because of this, you should use the lowest transmit power setting on your crossband radio that will contact the repeater and your HT

    b. You ma-y also want to run your radio from a battery other than your vehicle's battery so that you don't get stranded at the end of the day unable to start your car

- FCC regulations require all stations to identify their transmissions every 10 minutes and at the end of a conversation. Crossbanding radios are no exception.

- In either crossbanding configuration, when you identify yourself in your own outgoing transmission from your HT, that ID will also be transmitted by your crossbanding radio. This handles the ID requirement for transmissions directed toward the repeater.

- In the half duplex configuration, you are listening directly to the repeater's output frequency. The ID for this side of the transmission is handled by the repeater's controller.

- The problem comes when operating in full duplex mode. Remember, in this mode, the repeater's transmissions are being retransmitted by your crossbanding radio.

- The repeater's ID will be transmitted by your radio, but this does not cover the outgoing transmission from your crossband radio - this transmission needs to be ID'd with your callsign

  a. Some radios such as the Kenwood TM-D710 and V71 can be programmed to transmit your callsign using either Morse code or voice (if an optional voice board is installed)

  b. For radios without this feature, you would have to add an external device that would cause the crossbanding radio to transmit your callsign at the appropriate intervals

- Another potential issue is that you must be able to exert control over the crossband radio in case it somehow gets stuck in transmit mode, which could effectively jam the repeater you are communicating with

  a. Again, some radios have the ability to be controlled remotely in crossband mode, such as the Kenwood V71 and some models of the D710 via DTMF tones transmitted by your HT

  b. If you are close to your vehicle, you can of course manually control your crossbanding radio, if needed.

  c. If you have parked your vehicle at a trailhead and are using it's crossbanding mobile via an HT you are taking with you on a hike, you will need to have some other method of controlling the radio

  d. Many radios have a time out timer that will prevent the radio from continuously transmitting. This can be used to cut off a long transmission.

- Some radios open the microphone when crossbanding. If yours does this, consider removing the microphone when crossbanding to prevent local noise from getting into the transmission

- Another thing to consider is preventing your radio from crossbanding signals from other HT or mobile users. This can be addressed by setting a CTCSS tone or DCS code on your HT and mobile radio. That way, your mobile will only crossband transmissions with the proper tones.

- If you are using full duplex mode, you can run into issues if the repeater has a long hang time or squelch tail. The problem is that while the repeater is transmitting its squelch tail - so is your crossband radio. This means that it is not able to listen for your HT, so you have to wait until the squelch tail drops before you can speak.

    a. Even worse, if someone else jumps on the repeater before the squelch tail drops, you will not be able to break in. You will have to wait until everyone allows the squelch tail to drop.

- Finally, you must never attempt to use your crossbanding mobile to connect two repeaters. You will almost certainly cause looping between the two systems due to the courtesy tones and squelch tail at the end of transmissions.

- If you do plan on crossbanding to a repeater, you should always get permission from the repeater's trustee so that they will know what is going on if your station is misconfigured or otherwise negatively affects the repeater.

    a. Be prepared for them to tell you not to use crossbanding with their repeater - and if they do, be sure to respect their wishes

- When choosing frequencies to use for crossbanding, check with your state's frequency coordination group to see which frequencies they've allocated for simplex or crossband use.

    a. In Colorado, that group is the Colorado Council of Amateur Radio Clubs, or CCARC. Their web site is at: https://ccarc.net

- You will likely have to add pauses when operating using a crossband repeater.

    a. When transmitting, press the PTT button and wait two seconds before speaking to make sure the crossband repeater is transmitting.

    b. When someone finishes transmitting, wait two seconds for the repeater to drop before transmitting again

- There are some handhelds that support crossband repeat such as the Wouxun KG-UV9D Plus, but you'll lose the higher transmit power and possibly better antenna setup you'd have with a mobile radio.

- Crossband functionality doesn't only apply to repeaters - you could use the functionality to extend your simplex range as well.

- Also,while it could be used as an impromptu repeater for an event, participants would have to configure their radios to receive on one band and transmit on another.

- Setting up your radio for crossbanding can be a bit involved, and since it is something you probably won't do very often, it is a good idea to test it out before you need it to

make sure you know how to properly configure it, and perhaps write a cheat sheet that you can store near your mobile.

Questions:
- **The question for the week is:** Do you have a radio capable of crossbanding? Have you ever used it, and if so, how?

- **In my case,** I've got two crossband-capable radios - a Kenwood TM-D710 and an ICOM IC-2350H mobiles, although I've never actually used that mode on either of them.

More Info:
- Icom Crossband repeating: http://www.icomcanada.com/techbulletin/tb1/crossband_repeat_info.pdf

- Crossband Repeaters; http://www.emrg.ca/EMRG-403_Crossband_Repeaters.pdf

- https://scarcs.ca/howto/xband

- http://wvraclub.org/technical-documents/cross-band-repeaters/

- Ham Clock: https://www.clearskyinstitute.com/ham/HamClock/

- HAMRS (logging - Mac/Windows/Linux/Android/iOS): https://hamrs.app/

- RUMLogNG (logging - Mac only): https://dl2rum.de/rumsoft/RUMLog.html

Notes:
- If you have ideas for net topics or general meeting topics / presenters, please let us know! Tell us on a net, or send email to k0itp@w0eno.org

Email to elmer@w0eno.org

1. K0ITP - Chuck - Firestone
2. K0DBL - Don - Mead
3. KE0EE - Don - Longmont
4. WA7EM - Ed - Erie
5. KN6CFI - John - Longmont
6. KV0N - Raman - Lafayette
7. KM6SJA - Steve - N of Longmont
8. AF0W - Bryan - El Paso via Echolink
9. W0DRZ - Chris - Lyons

Net closed at 7:52pm