

## DuPage Amateur Radio Club

# Repeater FAQs



**Q:** I hear that all cable is going digital so 145.250 shouldn't have problems in the near future. Why did we move knowing that was going to happen?

**A:** While it is true that Comcast has said they plan to go "all digital" we haven't heard the same from RCN and WOW, two other cable operators in the area. There are also numerous other small systems in apartment houses that may elect to convert digital signals back to analog for the benefit of their tenants. While digital TV is definitely coming, other than the February 2009 deadline for broadcasters to switch, there is no specific time frame for cable to move. DARC has been seeking a frequency move for many years but only recently have pairs become available that we could move to. Club members elected to make the move now rather than miss the opportunity.

**Q:** OK, so the cable TV noise is gone but now I hear this really strong repeater system all the time when W9DUP is off the air. I'm not sure if this is any better than the cable interference.

**A:** The repeater you are most likely to hear is the AA9DG system in Elkhart, Indiana and its signal strength varies from S0 to S9, depending on propagation and your antenna height. That system transmits a 131.8Hz so if you set your rig to use CTCSS (PL) squelch of 107.2Hz you may hear only bursts of audio from that system when our repeater unkeys. We have capture over our entire coverage area so you should not hear Elkhart when our system is up. Considering that cable leakage ALWAYS caused a heterodyne on 145.250, making it unusable in many areas, the quietness of 145.430 provides a welcome relief. Hearing Elkhart when we're off the air is a minor inconvenience.

**Q:** Someone also told me that CTCSS eliminates interference but that isn't happening.

**A:** You were given incorrect information. CTCSS only prevents you (or the repeater) from hearing co-channel traffic. Interference is prevented or, more appropriately, "managed" by adjusting distances between systems, while accounting for power levels and antenna height above average terrain. The frequency coordinator, in our case the Illinois Repeater Association, performs that management function. Our systems do not experience harmful interference from each other even though it is possible for us to hear Elkhart on occasion and they undoubtedly hear us as well.

**Q:** I was able to bring up the Elkhart machine from my house when I didn't have CTCSS turned on. What gives?

**A:** The Elkhart machine does not run CTCSS decode because the trustee tells me that he wants to keep the machine "open". That means that our base stations (not HTs) may bring up that machine but that is AA9DG's problem to solve if he so chooses. Repeater coordinating bodies strongly recommend that all systems run full time CTCSS. You can elect not to do that but you will not be afforded any protection from co-channel users.

**Q:** Wait a minute, if we unintentionally bring up the Elkhart machine, isn't that considered interference?

**A:** No more so than their machine unquenching your rig. CTCSS allows repeaters to effectively share channels because it allows you to selectively use one machine while not hearing or keying up co-channel systems. This works well with FM because the strongest signal "captures" your receiver so you won't hear the weaker signals. Since the amateur service does not have a large number of channels available for repeater use it is not reasonable to think that any one system can have exclusive use of a frequency over as many miles as its signal can possibly reach. Of course, "band openings" increase coverage of all systems so you'll hear various systems pop up from time to time. This is why all frequency coordinators strongly advocate the use of CTCSS. Also, if a system operator complains to their coordinator or FCC about interference and is not running CTCSS, the coordinator and FCC will simply advise them to apply CTCSS.

**Q:** Someone said I should never run more than low power to keep from interfering with the other system. Is that true?

**A:** Keep in mind that FCC Rule 97.313(a) says, "An amateur station must use the minimum transmitter power necessary to carry out the desired communications." So, if you can make it into our repeater effectively with 2 Watts, you are violating that rule if you run 50 Watts to do the same thing. Keeping your power as low as necessary is not only required by law it also reduces the chances that you'll interfere with other users. That doesn't mean you shouldn't crank it up if you NEED to but don't just pump out the Watts simply because you can.

**Q:** If DARC is running CTCSS, how come I can bring up the machine with NO PL?

**A:** The 2 Meter and 220 machines have employed a little "trick" for quite awhile. If the machine has been idle for more than 60 seconds, CTCSS (107.2Hz on 2 Meters, 110.9Hz on 220) is required to bring up the machine. However, once the machine is up you can continue to use it without CTCSS. When you hear the "For Club Information..." message, the machine has gone back to requiring CTCSS to key up. This gives us a fairly good compromise of co-channel protection while making the machine more "open". Of course, you can always dial "75" to switch off CTCSS if your rig does not have encode capability. NOTE: We will continue to operate this way as long as we do not experience undue

problems with co-channel users keeping the system up. Our control operators can suspend this feature at any time and require full time CTCSS, even during nets, if necessary. We recommend that you program your rigs to always use at least CTCSS encode.

**Q:** But CTCSS tones make my audio sound lousy!

**A:** The Amateur Service is a communications service, not a broadcast service. Good communications practice is to keep voice audio energy in the range of 300Hz to 3kHz. CTCSS tones are in the range of about 65Hz to 250Hz so they can be filtered out without affecting your audio. Our repeaters filter out the CTCSS tone from your rig, insert accurate, low distortion, CTCSS tone on the transmit audio, and keep your audio bandwidth within the 300-3000Hz range. We also apply over-modulation limiting and a bit of compression to boost up the level of stations with weaker audio. As part of our 2 Meter frequency change we installed a lower distortion FM modulator so the CTCSS tone is much less audible than it was before. It's not "broadcast quality" but it is excellent communications quality.

**Q:** So what's happening to 145.250 -- aren't we simulcasting?

**A:** On June 29 DARC officially took 145.250 QRT and have advised the frequency coordinator of that action. We talked about possibly simulcasting but the expense and trouble involved with doing that were not insignificant. We elected to publicize the heck out of the move (i.e., repeater, website, and net announcements) and it looks like that was very successful. As to 145.250, look for a new repeater (KB9LWY) to appear on that frequency in Joliet. For more Illinois frequencies see: <http://www.ilra.net/DirByFreq.html>

**Q:** Is 145.430 quieter than 145.250? Even though cable interference was never a problem for me it just seems quieter.

**A:** We note that the noise level on this channel pair is somewhat lower and there are several probable reasons. Even though cable interference in your area may not have been really noticeable it is possible that leakage in other areas raised the overall noise level in your location. Another possibility is that 145.250, being directly on a 25kHz multiple (i.e. .225, .250, .275, etc.), was susceptible to harmonics generated by other equipment that generated RF on similar multiples.

**Q:** Why does the 440 machine have much greater range than the 2 meter machine?

**A:** In a word, "gain". It is MUCH easier to get very high antenna gain on a 440 system than it is on 2 Meters. For instance, a 5dBd gain antenna on 2 Meters is about the same height as a 10dBd gain antenna on 440 -- we have a 10dBd gain antenna on 440. It is also possible that you have more gain on your antenna. We are also running with a compromise antenna on 2 meters that allows us to operate 2 meters and 220 from the same "stick". It has only about 3dBd gain on 2 Meters. We plan to change that this summer which should improve 2 Meter coverage.