HOW TO OPERATE THROUGH A REPEATER

A WIN System 'White Paper'

By Shorty, K6JSI

Howdy Newcomers,

And welcome to amateur radio. I have been asked to write a White Paper outlining the steps to successfully operate through a repeater. The first thing you need to know is the repeater output frequency, its offset, and PL tone.

Our WIN System repeater frequencies, off-sets, and PL Tones are all listed on the "Repeaters" section of our winsystem.org website, and they are accurate and up-to-date for the most part.

You need **three** **(3)** things to successfully operate through a repeater:

One 1) You must have the correct ***receive frequency*** in your radio VFO. For instance let's say you were trying to use our Northern California Loma Prieta Repeater, you would need to enter 442.900 MHz into your radio VFO. Since virtually all new radios come with the VFO "channel steps" set to 25 kHz frequency steps, you should find the menu option for changing the frequency "channel steps" and be certain it is set to 25 kHz steps. If you were in Southern California, the channel steps on UHF (440 MHz) are in 20 kHz steps, so you would want to change your channel step to either 5 kHz or 20 kHz channel steps, instead of 25 kHz channel steps in order to get on a 20 kHz channel, like or Santiago Repeater which is 448.060 MHz.

If you want to change the channel steps to 20 kHz steps, be certain you make the change when your VFO is on an **even channel**. For instance, you should have you VFO channel on 448.000, or 448.100, or 448.100, some **even** channel. The reason for this is that the VFO will place your channel 'step' in the increment you choose on the 'channel step' menu from your present channel. If you have your VFO set for an odd channel, like 448.025, or 448.050, or 448.075, then the new 'channel step' you program will begin with whatever is **'in'** your VFO at that time. Let's say

you have your VFO on 448.025 when you move your 'channel step' from 25 kHz to 20 kHz. Your VFO would then begin counting 20 kHz from your starting point of 448.025, which would result in your channel steps to be 448.025, then 448.045, then 448.065, and so forth, every click of your channel step will increase or decrease you frequency by 20 kHz, which would end up on a x25 channel, simply because you started on an un-even x25 channel, and they will all be useless. Be sure you start on an even channel, so you end up stepping your channels at 448.000, then 448.020, then 448.040 and so forth. That will work.

Two 2) You must have the correct transmit frequency ***"Offset"***. Since all repeaters use two radios at the repeater site, one to receive on, and one to transmit on, repeaters are, by nature duplex devices, which means they receive your signal on one frequency and simultaneously re-transmit your signal on another frequency, at the same time. In fact, how they work is that they take your signal (which they receive on let's say 447.900) and re-transmit it on a different frequency (let's say 442.900), at the same time. So, in the Loma Prieta case above, our repeater transmitter operates at 442.900, which is where your radio receiver VFO must be tuned to so you can hear us. Our Loma Prieta repeater receiver listens 5 MHz above that, or 447.900 MHz, which is where your transmitter must be transmitting on so we can hear you.

That is called the "Repeater Offset" and you must make sure two things are set properly in your radio to assure we can hear you:

(1) That the direction of the "Repeater Offset" is "UP" or plus (+), and not "DOWN" or negative (-). The Repeater "Offset" in your radio usually automatically moves your transmit frequency DOWN or UP from your receive frequency that you set in your VFO display depending on whether you see a little "Minus" (-) sign, or a little "Plus" (+) sign in your display. That tells you if your Repeater "Offset" is turned ON, and it also tells you which direction it is going.

You can confirm this by pressing the PTT switch on your radio and transmitting. Look at the transmit frequency when you are transmitting (it normally changes from the receive frequency displayed that you are receiving). It should display 447.900 when transmitting, and 442.900 when receiving.

(2) The "Offset" needs to be 5.000 MHz, not 0.600 MHz. On the UHF Band (440-450 MHz) the Offset is 5.000 MHz. On the 2-meter Band (144-148 MHz) the Offset it 0.600 MHz. So, it must be 5.000 MHz UP, or (+) i9n this case.

Three 3) You must have the correct ***CTCSS*** tone (which stands for Continuous Tone Coded Squelch System), or sub-audible tone. Which is really two operations:

(1) the CTCSS is turned ON and there is a little "T" or "Enc" for Encode displayed in your window; and

(2) that it is set to the correct tone, which is 162.2 Hz in our case at Loma Prieta. CTCSS Tone can be run in Encode, which means it is present when you transmit (which is what we want); or Decode which means the repeater must be sending CTCSS Tone for you to hear it (which we don't want). We don't normally send CTCSS out our repeater transmitters, so you would not hear WIN System repeaters in Decode mode. You should simply use Encode, or Tone, not Decode.

So, that's it. You need three things to successfully operate through a repeater:

(1) The correct receive frequency;

(2) The correct Offset; and

(3) The correct CTCSS (or PL) Tone.

That's all there is to it.

Our Loma Prieta repeater is listed as: 442.900 (-) 162.2 Hz. With that information, you should now know how to set up your radio properly.

Good luck.

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