Guide to Cuyahoga Falls Amateur Radio Club (CFARC) Repeaters & Programming Your FM VHF/UHF Radio

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The club has two repeaters– one on 2 Meters and the other on 70 cm. Both are located in an apartment building in Cuyahoga Falls on East Portage Trail. Both have the callsign of W8VPV. When listening to repeaters, you can distinguish between the two by the courtesy tone transmitted at the end of each conversation (the 440 repeater has a higher-pitched tone).

2M Repeater
Output Frequency- **147.270 MHz** *(frequency you tune your radio to listen to the repeater)*
Input Frequency- **147.870 MHz** *(frequency your radio transmits on to the repeater)*
Offset standard 2M + offset of 0.600 MHz
CTCSS- 110.9 (also commonly known as PL or PrivateLine™ Tone)
70 cm (440) Repeater
Output Frequency- **444.850 MHz** *(frequency you tune your radio to listen to the repeater)*
Input Frequency- **449.850 MHz** *(frequency your radio transmits on to the repeater)*
Offset standard 70 cm + offset of 5.000 MHz
CTCSS- 110.9

CTCSS Tone TX (Transmit) [some manufacturers refer to it as CTCSS Encode] should be enabled on your radio for use with either repeater during normal operating hours.

Using the Repeaters

After programming your radio for the receive frequency, turning on the radio's transmit offset (+), and enabling the CTCSS tone (see instructions for specific models of radios below) you can use the repeaters.

There are no special procedures for using the CFARC repeaters, but you should use the same common courtesy and FCC rules for any Amateur Radio operation:

1. Identification
    a. Please give your callsign on your first transmission
    b. At least once every 10 minutes
    c. At the end of your final transmission

2. Initiating a contact on the repeater
    a. Answering another station that is calling
        i. Wait until they have completed their call, then give your callsign (i.e., “this is W8ABC”)
    b. To call for other stations, we do not use the typical HF calling method of “CQ”; instead, most stations will say something along the lines of (assuming your call is W8ABC):
        i. “This is W8ABC listening.” Use this for a general call
        ii. “W8EZT, this is W8ABC.” Use this for calling a specific station (substitute their callsign for W8EZT)
        iii. “This is W8ABC I need assistance with _____” Use this if you need assistance- a simple check of your radio, requesting an emergency service 911 call, using various aspects of the repeater, etc.
        iv. In case of emergency or urgent need, add the term “Break” to your request (i.e., “Break Break this W8ABC with urgent request”)
3. Whenever you are in conversation with one or more stations on the repeater, always leave a short pause after each station and before your next reply to allow emergency or urgent traffic to break in.
4. There are a few main variations on use policies.
    a. During a Directed Net (like our Monday Nets), please listen for and follow the instructions of the Net Control Station.
    b. During Public Services Events
        i. Please do not tie up the repeater
        ii. Follow instructions from the Event Control Station
    c. During Emergency Situations or Weather Watches
        i. Please do not tie up the repeater
        ii. Follow instructions from the Event Control Station
5. If you would like to check what your own signal sounds like, you can use a special playback feature of the repeater controller
    a. Key your mic and say “W8ABC testing with tones”
    b. With your mic still keyed, use your radio’s DTMF touchpad to send “81”
    c. Release the PTT button and listen for the repeater to respond “Ready”
    d. If the repeater responds with a beep or nothing at all, you may be out of range. Try moving a bit and/or increasing power, and try again.
    e. Push PTT and say a 3 to 5-second test message with your call (Example: This is W8ABC testing 1, 2, 3)
    f. Release the PTT button, and the repeater will echo back the signal as it was received.

Nets Using the Repeaters

CFARC has a weekly VHF/UHF net using both of the repeaters. The two are linked together during the Nets, so you can use either one to check into the net or listen. The nets are held every Monday and preceded by an 8:01 PM playback of the "Amateur Radio Newsline" broadcast. The actual nets begin at 8:30 PM. These are directed nets, and the Net Control Station (using W8VPV for the callsign) will call the Net to order, provide general information, and make club announcements. They will describe how they will take and acknowledge check-ins. The first stations invited to check in are club officers or other members, with further announcements to follow for the net. The net control will then take general check-ins. If, when checking in, you can not remain on the net or have no comments for the net, you can say checking in and out or no traffic. The net control will then ask the checked-in stations to give comments.

If you do not have a radio to listen to the net or are out of range, the audio is rebroadcast on the Internet (with a slight delay) at this *Online Link*. Plans include the addition of an *EchoLink* or other node to the repeater.

Information & Resources on VHF/UHF & Buying Radios

You will need an Amateur Radio capable of operating Analog FM to communicate on the CFARC repeaters. *Note: There are a variety of VHF/UHF radios with different types of modulation; the most common type is Analog FM (other types include multimode [SSB/CW/DigitalData/FM] and Digital FM [DMR, D-Start, Fusion, etc.] and are beyond the scope of this article).* These radios may have one [single band] or multiple bands [dualband, triband, quadband, etc.] The most common are dual-band 2-meter/70-centimeter radios. Your license allows you to operate Simplex (directly from one radio to another) or Duplex (from one radio to another radio via a Repeater). Even though your radio may cover the entire band, portions of the band are reserved for specific modes and types of contacts; please follow appropriate guidelines (a.k.a. Band Plans), see below.

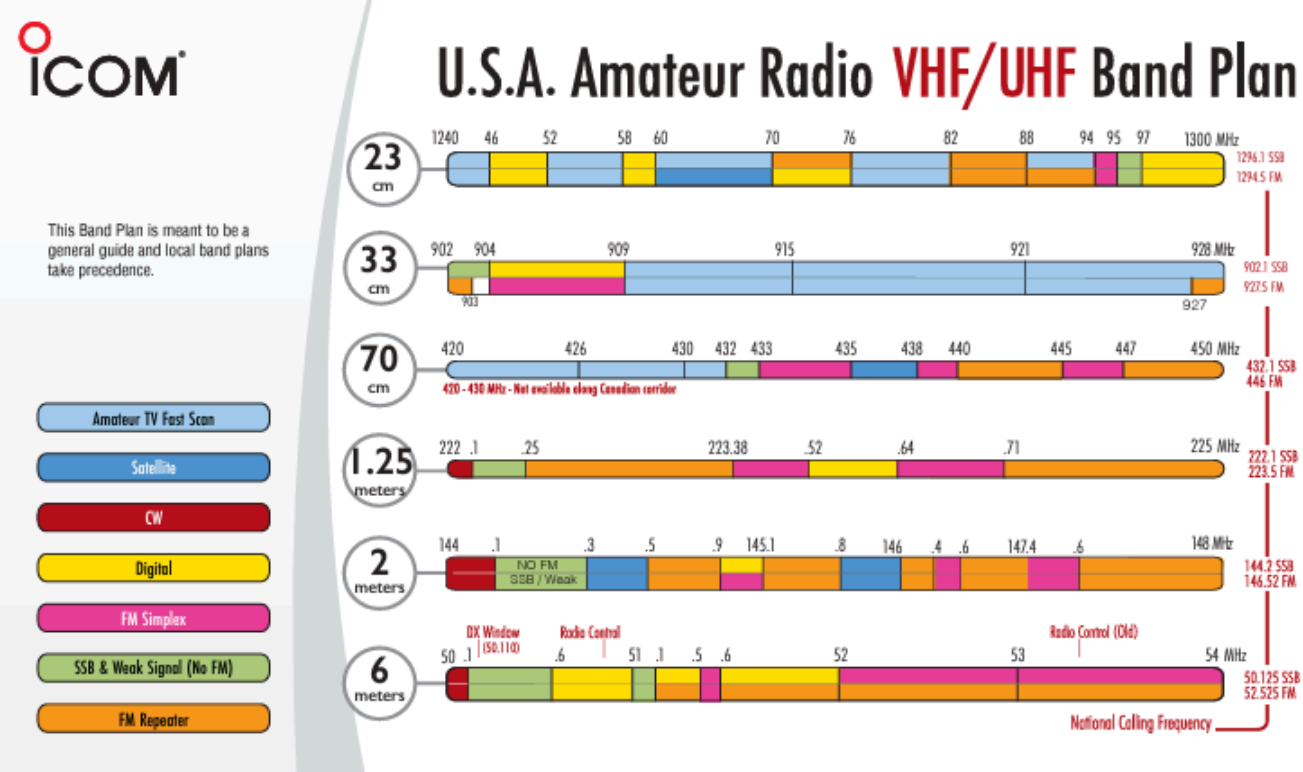
The most common bands for terrestrial FM repeaters & FM Simplex are 2 Meters (144.6-148.0 MHz FM) and 440 (70 cm, 442.0 to 450.0 MHz). There are also less frequently used bands: 1.25 Meters (222.25 - 224.98 MHz), 6 Meters (FM from 51.5 - 53.9 MHz), 33 cm (FM from 927 to 928 MHz), and 23 cm (also known as 1.2 GHz, FM from 1270 - 1295 MHz).

There are also additional modes other than Analog FM and specific services on these bands, so you should always follow the suggested band plan for where to operate FM on these bands. For this and other operating tips, it is strongly suggested that you take a look at the resources below:

- **"Beginner's Introduction to VHF/UHF"** Four-Part Video Recordings
  - **Week 1**- *youtu.be/mUXQg_9cDPU*
  - **Week 2**- *youtu.be/23mBr3wMqxs*
  - **Week 3**- *youtu.be/wiGISL1Eob8*
  - **Week 4**- *youtu.be/1CEzFauXmJI*
  - **Slideshow** from the presentations, including clickable links and resources, is available at *tiny.cc/bgvhf*.
- "**Beginner Ham's Home VHF/UHF Station"-** *tiny.cc/homevhf*
- "**Exploring VHF/UHF FM Simplex"-** *document*
- **Buying Amateur Radio Transceivers**
  - Slideshow- *tiny.cc/buyar*
  - Supplemental Spreadsheet- *tiny.cc/buyar-ss*
- ***What Frequency Do I Use on 2 Meters?***

2 Meter Band Plan & Suggestions		
Frequency	**Designation**	**Notes**
144.000 - 144.05	EME (CW)	CW Only by FCC Rule
144.050 - 144.10	General CW and weak signals	
144.100 - 144.20	EME and weak-signal SSB	SSB
144.200	National SSB calling frequency	
144.200 - 144.275	General SSB operation	
144.275 - 144.300	Propagation beacons	CW
144.300 - 144.500	New OSCAR sub band	Satellites
144.500 - 144.600	Linear translator inputs	
144.600 - 144.900	FM repeater inputs	FM
144.900 - 145.100	Weak signal and FM simplex	
145.01,03,05,07,09	FM simplex freqs widely used for packet	
145.100 - 145.200	Linear translator outputs	
145.200 - 145.500	FM repeater outputs	FM
145.500 - 145.800	Miscellaneous and experimental modes	
145.800 - 146.000	OSCAR sub band	Satellites
146.010 - 146.370	Repeater inputs	
146.400 - 146.580	Simplex	FM
146.52	National Simplex Calling Frequency	
146.610 - 146.97	Repeater outputs	
147.000 - 147.39	Repeater outputs	
147.420 - 147.57	Simplex	
147.600 - 147.99	Repeater inputs	

- USA VHF/UHF Sample Band Plan



Other Repeaters

Find Local & Other Repeater Frequencies

- *RepeaterBook.com*
- *Levinecentral.com*
- *RadioReference.com*
- *Ohio Area Repeater Council*
- *Interactive Worldwide Map of Amateur Radio Repeaters*
- *Amateur Radio Repeater Map (mostly Western USA)*
- *ARRL Repeater Directory*

Programming Your Radio

There are four main ways to program your Analog Handheld, Mobile or Base VHF/UHF FM Radio.

1. **Manually** (via the radio's pushbuttons, keypad, knobs and/or menus)
2. Using **Programming Software** and a Radio<>Computer **Interface Cable**
3. Using Programming Software or an online App and your radio's **Bluetooth Interface** (a newer feature just starting to be added to some radios)
4. **Cloning**. First, a radio is programmed. Then, other radios (typically of the same manufacturer and model) are cloned using radio-to-radio cloning functionality, an

interface cable, or programming software, along with a radio-to-computer interface cable.

There are four main types of programming software. *Please note that CFARC assumes no responsibility for the use of any software listed below. Please use it at your own risk.*

1. Software supplied by the radio manufacturer (either free or paid), see their websites below for details
2. ***CHIRP*** is a free, open-source tool for programming your radio. It supports a wide range of manufacturers and models, and provides a means to interface with multiple data sources and formats.
    a. *CHIRP Programming PMR easy steps for NON-computer experts*
    b. *CHRIP-NEXT How-to video*
    c. *CHIRP Basics* (Classic Chirp)
    d. *How do I find the COM port for Chirp?*
3. Commercial Cloning software and interface cable supplier- ***RT Systems***
4. Other third-party commercial software

Manual Programming Instructions by Manufacturer & Model

Alinco	*Icom* • *IC-T7H HT*	*Radioddity*
Anytone	*Kenwood*	*Wouxun*
Baofeng • *UV-5 (and variants)*	*TYT* • *TYT 9800 Mobile* • *TYT TH-UV88* • *Explorer QRZ-1*	*Yaesu* • *FT 65* • *FT 60*
Quansheng/Quesum	*TIDRadio*	*Xiegu*

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A. *Alinco*

B. *Anytone*

C. *Baofeng*

a. *UV-5 (and variants)-*

1. Power on your Baofeng
2. Hit the VFO/Memory button to enter "frequency mode"(VFO)
3. Hit the menu button, enter the number 7. You will want to hit the Menu button again and select OFF.
4. Now you type in your RX frequency.
5. Hit the menu button, enter the number 25. You will want to hit the Menu button again and select the desired +, -, or OFF for your repeater offset (For the CFARC repeater, it will be the +).
6. Hit the menu button, enter the number 26. You will want to hit the Menu button again and enter the actual offset of the repeater. (example: .600 for 2m repeaters)
7. Hit the menu button, enter the number 13. This is where you will enter the PL tone/CTSS. You will want to hit Menu, and you can type in the PL tone, or you can select it manually with the up and down arrow.
8. Hit the menu button, enter the number 27. You will want to hit the Menu button again and type in the channel number that you wish to the frequency stored on.

The next step is where people mess it up! This is VERY important.
After you have programmed the frequency into the desired channel, your Baofeng "lady" should say "transmitting memory". After she says that you will want to hit exit and go back to the screen where you originally entered your desired frequency. You must now push the * button(SCAN) and make sure there is an R on your screen next to the (+,-). You should also notice a CT symbol light up. If you have done the steps up until this point correct, your radio should display the offset frequency! This will be your receiving memory.

9. Hit the menu button, enter the number 27. You will want to hit the Menu button again and type in the SAME channel number as you used in step 9! If you used "004" then you must program this into "004" otherwise it will NOT work.

After your Baofeng lady says "receiving memory" you may hit Exit and go back to MR (Memory Mode). Go to the channel you have programmed and hit your PTT button.(Only if you are a licensed Ham). You should key up to the repeater and if you did it right you will know. Some repeaters have courtesy tones, others do not. Sometimes you may not be able to hit a repeater due to distance.

How to manually program a simplex channel

- ***Step 1. Press [VFO/MR] and enter Frequency Mode.***
- ***Step 2. Press [A/B] and choose the A Side (upper display).***
  The A side must be used to program channels into the radio. Programming data entered on the B Side (lower display) will not be saved.
- ***Step 3. Press [BAND] for the frequency band.***
  Toggle [BAND] to choose 136 MHz (VHF) or 470 MHz (UHF).
  If the incorrect band is chosen for the frequency entered in Step 5, the radio will cancel the operation.

- ***Step 4. Disable TDR (Dual Watch/Dual Standby).***
  Press [MENU] 7 [MENU] [press up/down arrow keys] OFF [MENU] [EXIT]
  It is highly advised to turn TDR off when programming directly from the radio.
- ***Step 5. Enter the frequency.***
  Use the keypad to enter the frequency into the radio.
- ***Step 6. optional - Enter the transmit CTCSS/DCS code.***
    - *CTCSS - [MENU] 13 [MENU] [enter/choose code XXXX] [MENU] [EXIT]*
    - *DCS - [MENU] 12 [MENU] [choose code XXXXX] [MENU] [EXIT]*
- ***Step 7. Assign the frequency to a channel.***
  [MENU] 27 [MENU] [enter channel number XXX] [MENU] [EXIT]

How to manually program a repeater channel

- ***Step 1. Press [VFO/MR] and enter Frequency Mode.***
- ***Step 2. Press [A/B] and choose the A Side (upper display).***
  Like the simplex channels, the A side must be used to program the repeater channels into the radio. Programming data entered on the B Side (lower display) will not be saved.
- ***Step 3. Press [BAND] for the frequency band***
  Toggle [BAND] to choose 136 MHz (VHF) or 470 MHz (UHF).
  If the incorrect band is chosen for the frequency entered in Step 6, the radio will cancel the operation.
- ***Step 4. Disable TDR (DualWatch/Dual Standby).***
  Press [MENU] 7 [MENU] [press up/down arrow keys] OFF [MENU] [EXIT]
  It is highly advised to turn TDR off when programming directly from the radio.
- ***Step 5. Enter the repeater output (your receiving) frequency.***
  Use the keypad to enter the frequency into the radio.
- ***Step 6. Input the repeater frequency offset.***
  Press [MENU] 26 [MENU] [enter the offset for 2 meter (0.600)or 70 cm repeater (1.00)] [MENU] [EXIT]
- ***Step 7. Enter the Transmit Frequency Shift.***
  Press [MENU] 25 [MENU] [enter 1 for positive shift] [MENU][EXIT]
- ***Step 8. - Enter the transmit CTCSS code.***
    - *CTCSS - [MENU] 13 [MENU] [enter/choose code XXXX] [MENU] [EXIT]*
- ***Step 9. Assign the receive frequency entered in Step 7 to the channel.***
  [MENU] 27 [MENU] [enter channel number XXX] [MENU] [EXIT]
- ***Step 10. Press the [*Scan] button to activate Reverse Mode and display the transmit frequency.***
- ***Step 11. Assign the transmit frequency to the channel.***
  Press [MENU] 27 [MENU] [enter the same memory channel entered in step 12] [MENU] [EXIT]
- ***Step 12. Press the [*Scan] button to exit Reverse Mode.***

To add more channels, simply repeat the steps above. If these step-by-step instructions are followed correctly, you should be able to program all 128 channels (000-127) in your Baofeng UV-5R as you need.

b.

D. *Icom*

a. *IC-T7H HT*

Programming an ICOM IC-T7H Handy Talkie for the CFARC Repeaters

As with many (but not all) brands of Amateur transceivers, programming a channel on an Icom IC-T7H can be achieved through the keypad on the front of the unit by:

a) putting the unit into VFO mode,

b) selecting the proper operational settings (frequency, offset and direction, transmit pl tone (CTCSS), and perhaps an optional receive CTCSS and/or the power setting, etc.),

c) testing the settings (if possible) to make sure they are correct, and

d) storing the settings in a memory channel by:

1) putting the unit into Memory Write mode,

2) selecting the memory channel to update, and

3) writing the settings to the selected memory channel (this will overwrite any previous settings for that channel).

e) Once programmed, those settings can be retrieved at any time by putting the unit into Channel mode and dialing up the channel by number.

Before starting, at a minimum, you need to know is the repeater transmit frequency, the receive offset and direction, and the CTCSS (also known as PL Tone) frequency.

For our VHF (2 meter) repeater, the repeater transmit frequency is 147.27 MHz, the receive offset is 600 KHz positive (147.87 is the repeater input) and the CTCSS (PL Tone) frequency is 110.9 Hz.

For our UHF (70 cm.) repeater, the repeater transmit frequency is 444.85 MHz, the receive offset is 5 MHz positive (449.85 is the repeater input) and the CTCSS (PL Tone) frequency is 110.9 Hz.

The specific programming steps are as follows (keypad and radio controls are in shown in italics):*

Specific steps to program a channel for our repeater:

Achieving a) above:

1) Push and hold Power for 2 seconds to turn the radio on. It will display battery voltage, then a frequency.

2) Unlock the keyboard if necessary (it's the slide switch above Moni button).

3) Push VFO to get into VFO Mode.

Achieving b) above:

4) Push Band until a VHF or UHF frequency is displayed (depending on which repeater you want to program).

5) Set the HT receive frequency by using the numeric keypad to key in all 6 digits, including a decimal point, so that the display reads 147.270 (for VHF) or 444.850 (for UHF).

6) Go into SET mode by pressing and holding briefly (approximately 1 second) the H/L button.

7) Repeatedly press the H/L button until the menu item showing “ct” (to the right of the display) appears.

8) Turn the Dial (on top) until 110.9 appears (this selects a CTCSS frequency of 110.9 Hz.). Both our repeaters use 110.9 Hz.

9) Press the H/L button until the right two characters display “ow” (offset wavelength?)

10) Make sure it says 0.600 for VHF or 5.000 for UHF. If not, use the Dial (on top) to set it to 0.600 (VHF) or 5.000 (UHF).

11) Momentarily press the PTT key to leave setup mode. You should see the HT receive frequency in the display.

12) Momentarily push Tone until a small “T” appears above the 2 of the frequency. This turns on CTCSS tones. Make sure the SQL feature is not enabled.

13) Then push and hold briefly (approximately 1 second) the Tone button until “DUP” appears to the left of the “T” set in 12 above. This enables positive offset duplex mode. You do not want “-DUP”!

14) Finally, set transmit power by momentarily pressing H/L (High/Low) until the desired power is shown on the display.

Achieving c) above:

15) Test the settings by bringing up the repeater (if you are within range). Remember to ID yourself.

Achieving d) above:

16) Momentarily press S.MW. This enables updating a channel memory. The right side of the display will be flashing and displaying a two digit channel number, along with the current settings programmed into that channel.

17) Use the Dial (on top) to select the channel (by number) that you wish to program. Caution: The existing contents of that channel will be overwritten.

18) When you have selected the channel to be overwritten, push and hold briefly (approximately 1 second) the S.MW button. A double beep indicated the programming is complete.

Achieving e) above:

19) To access a previously programmed channel, press MR.

20) Turn the Dial control until the desired channel number appears.

21) Press PTT to initiate a transmission. You should see the HT displayed frequency shift from the receive to the transmit frequency.

The procedure is the same for either our VHF or UHF repeater. The only differences are in frequency, offset frequency, and of course program it into a different channel.

* Many keyboard buttons have dual meanings, the white printing on top if momentarily pressed, and the green alternate function if pressed and held for a second.

E. *Kenwood*

a.

F. *Quansheng/Quesum*

G. *Radioddity*

H. *TYT*

a. **TYT 9800 Mobile** - *Manual*

1. Power on radio
2. Select Band
    a. Short press tuning knob on desired side of radio
    b. Short press Left Volume knob, radio will display only one frequency
    c. Use keypad on microphone to enter Repeater Receive Frequency
        i. or alternatively, choose band press and long hold (1/2 second) tuning knob on desired side of radio to step through bands (remember left VFO has 29, 50, 144 & 440 but right VFO has only 144 & 440)
        ii. Use tuning knob select freq in the chosen band
    d. If APRS is on (the default offset will automatically be chosen). You can also turn it on it is Menu #2
    e. If APRS is off you will need to manually select the offset
        i. Short press ■ [SET] to enter menu mode
        ii. Rotate tuning knob dial to Menu #24 “(RPT.MOD)
        iii. Short press tuning knob and select RTP+
        iv. Short press tuning knob to return to menu
        v. Rotate tuning knob dial to Menu #27 “(SHIFT)
        vi. Short press tuning knob and rotate to correct offset frequency (0.60 for 2 Meters or 5.00 for 70cm)
        vii. Short press ■ [SET] to exit menu
    f. Set CTCSS
        i. Short press ■ [SET] to enter menu mode
        ii. Rotate tuning knob to Menu #30 “(TONE.F) (freq)
        iii. Short press tuning knob and select TONE FREQ of 110.9
        iv. Short press tuning knob to return to menu

v. Rotate tuning knob to Menu #31 “(TONE.M)(Mode)
vi. Short press tuning knob and rotate to TONE MODE ENC (encode a.k.a. transmit)
vii. Short press ■ [SET] to exit menu

b. **TYT TH-UV88- Manual / Explorer QRZ-1- Manual**

1. To manually select a new frequency in the QRZ-1, you must be in VFO mode (press [# Radio] to toggle between VFO mode and Memory mode). Use the number keypad to enter the repeater’s transmit frequency (**1-4-7-2-7-0** or **4-4-4-8-5-0** MHz for CFARC 2-meter or 70cm repeaters, respectively).

2. To select the offset direction:
    1. Go to menu #3 (Repeater) by pressing [MENU] followed by the number 3. Use [▢] / [▢] to choose the offset direction for the repeater (for CFARC Shift is **+**) , press [MENU] to save your change, and then the PTT button to exit the menu.

3. CTCSS (a.k.a PL Tone) is used on most repeaters to prevent interference from other repeaters on the same frequency. To enter the repeater’s CTCSS information:
    1. Go to menu #1 (Tone Mode) by pressing [MENU] followed by the number **1** and selecting “TX” mode using [▢] / [▢] , then press to save your change and press the PTT button to exit the menu.
    2. Go to menu #2 (Tone Sel) by pressing [MENU] followed by the number **2**. Use [▢] / [▢] to select the correct tone frequency for the repeater (**110.9** for CFARC Repeaters), press [MENU] to save your change, and press the [A/B] button to exit the menu.

4. Save Repeater to Memory Channel
    1. Long Press [MENU] until the digits blink at the top right of the LCD
    2. Press [▢] / [▢] to select the desired memory number
    3.)Press [# Radio] to store this channel. The LCD display will now show your newly saved channel in Memory Mode.

I. *Wouxun*

J. *Xiegu*

K. *Yaesu*

a. FT 65

A. Turn on the radio and make sure the radio is in the VFO Mode (toggle with ***V/M** button)

B. Note: To use Menus (Settings)
   i. Press and Hold 🅵 Key on the side of radio
   ii. Use Up △ or Down ▽ arrow keys to select menu item
   iii. Short press 🅵 Key again to change Menu Item
   iv. Use Up △ or Down ▽ arrow keys to select desired Setting
   v. Long press 🅵 key to save Setting

C. Type in digits for frequency with the keypad
   i. `For 2 Meters   1 4 7 2 7 0`
   ii. `For 70 cm      4 4 4 8 5 0`

4. The offset should automatically be selected if **APRS** is turned on (the default Menu)
   i. If not turned on you can activate it by going to **Menu #24 REPEATER**
   ii. Set it to "**ARS: On**"
5. Set **Menu #29 SQ TYPE** (Squelch Type) to**"T-Tone"** to send CTCSS tone on Transmit
6. Set **Menu #8 CTCSS** to
   i. **Tx to 110.9**
   ii. **Rx to Off**
7. Test radio by transmitting, repeater should respond
8. If everything works you can save setting and freq to a Memory Channel
9. Press and hold ***V/M** button until display changes to show 🅼 in reverse video
   i. To choose a channel number use the Up △ or Down ▽ arrow keys, and stop when you get to desired channel #
   ii. To enter a tag short press 🅵 Key
      1. Using the numeric keypad [2] -> [9] enter letters or numbers for a label ("tag") for the channel by pressing the corresponding keypad key with the desired numbers or letters. The options cycle through the digit on the key, the upper-case letters on the key, and then the lower-case letters, and then back around.
      2. When the desired letter or number appears, press the 🅵 key to advance to the next character.
      3. Repeat as desired.
   iii. When ready to save to memory, Press and hold ***V/M** button to write memory along with tag you enter
      1. The screen flashes **MEM-IN** briefly to confirm that the programmed channel has been saved to the selected memory channel
      2. Once the channel is saved, you remain in VFO mode, pressing ***V/M** will put you in memory mode, and you can review your programmed channels by pressing the Up or Down keys.

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b. *FT60-*

Yaesu FT-60R Step-by-Step Programming Guide Noji Ratzlaff

1. Set the radio to communicate with a repeater at 147.270+ MHz, 110.90 Hz
2. Turn on the radio and make sure it's unlocked
3. Press V/M once or twice until the display reads MEMORY, then once more
4. Set the frequency 1 - 4 - 7 - 0 - 8 - 0 3.
    i. If the + sign appears at the top, skip to step 7
5. Get into the menu F/W - 0
6. Go to ARS (item 4)
7. Set the auto repeater shift F/W - ARS.ON - F/W - PTT
8. Set the squelch type F/W - 1 - TONE - F/W
9. Set the tone F/W - 2 - 77.0 - F/W
10. Your radio is now set to transmit as specified Store and name the current repeater and tone settings in memory channel 0.

B. Store and Name current repeater in memory channel

4. Follow the procedure above to set your radio for the frequency of your choice
5. Press and hold F/W 2. Within ten seconds of releasing F/W, you must select the memory channel to store the frequency.
6. If the channel you want isn't displayed, rotate the DIAL knob to select it.
7. Press F/W to store the frequency The frequency is now stored in radio memory 4. Press V/M to enter Memory mode, then select the channel you want named
8. Get into the menu F/W - 0 6. Go to NM WRT (item 28)
9. Press F/W once to enter Edit mode then press F/W again to erase the existing name, if any 8. Rotate DIAL until the character you want appears, then press F/W. If you make a mistake, press the down arrow.
10. Press and hold F/W for one second
11. Press PTT to save the name The stored memory channel now has a name

C. Recall a stored memory setting

i. Press V/M once or twice until the display reads MEMORY
ii. Turn the knob until you reach the desired channel The stored channel is now ready for use