

# **Torrance Amateur Radio Association**



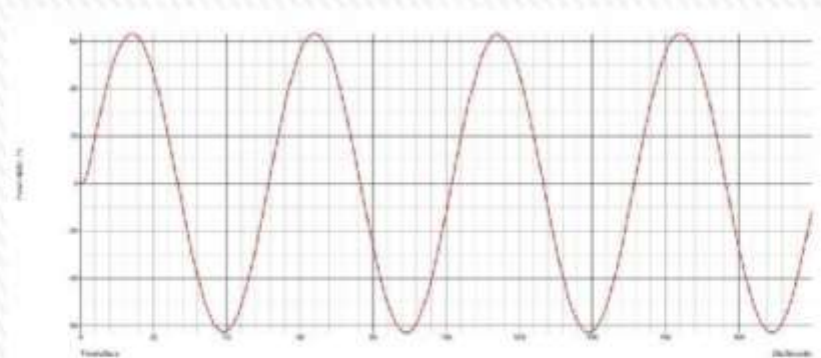
## **Radio Primer**

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May 9, 2015**



# Radio basics

- ❖ Basic radio telephony (voice) works by modulating a single carrier frequency with the sound of a human voice.
- ❖ We start with a carrier frequency. Which is an electromagnetic signal, oscillation at a fixed frequency.

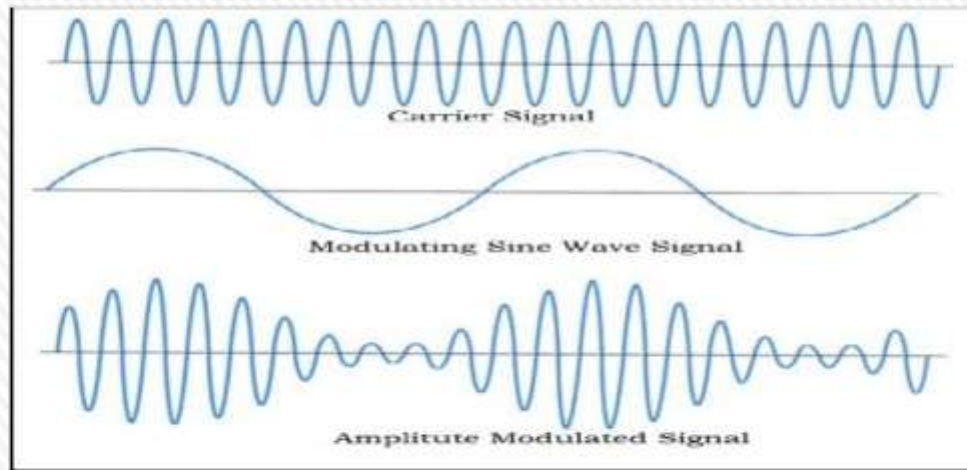


- ❖ Frequency is the number of times per second it cycles.
  - For example, KNX 1070, cycles 1,070,000 times per second.
  - Our 220 repeater cycles 223,880,000 cycles per second.

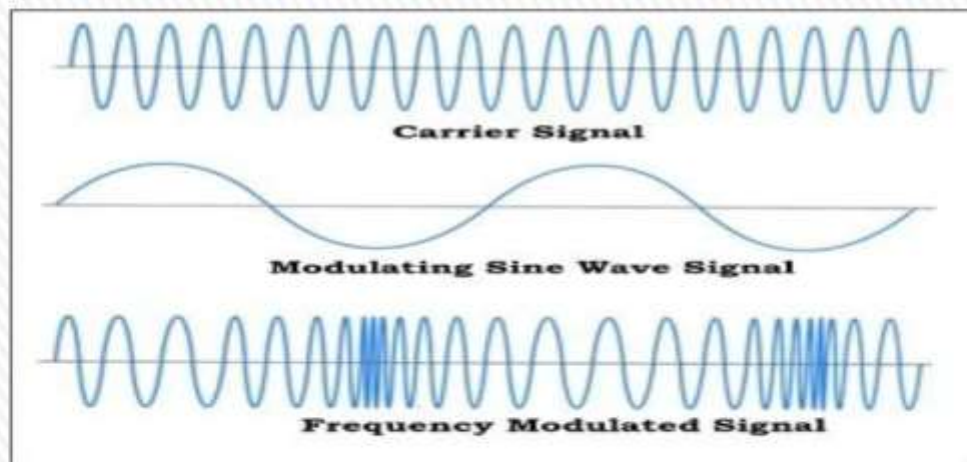


# Modulation Modes

- ❖ **Amplitude Modulation (AM) - KNX 1070, KFI 640**

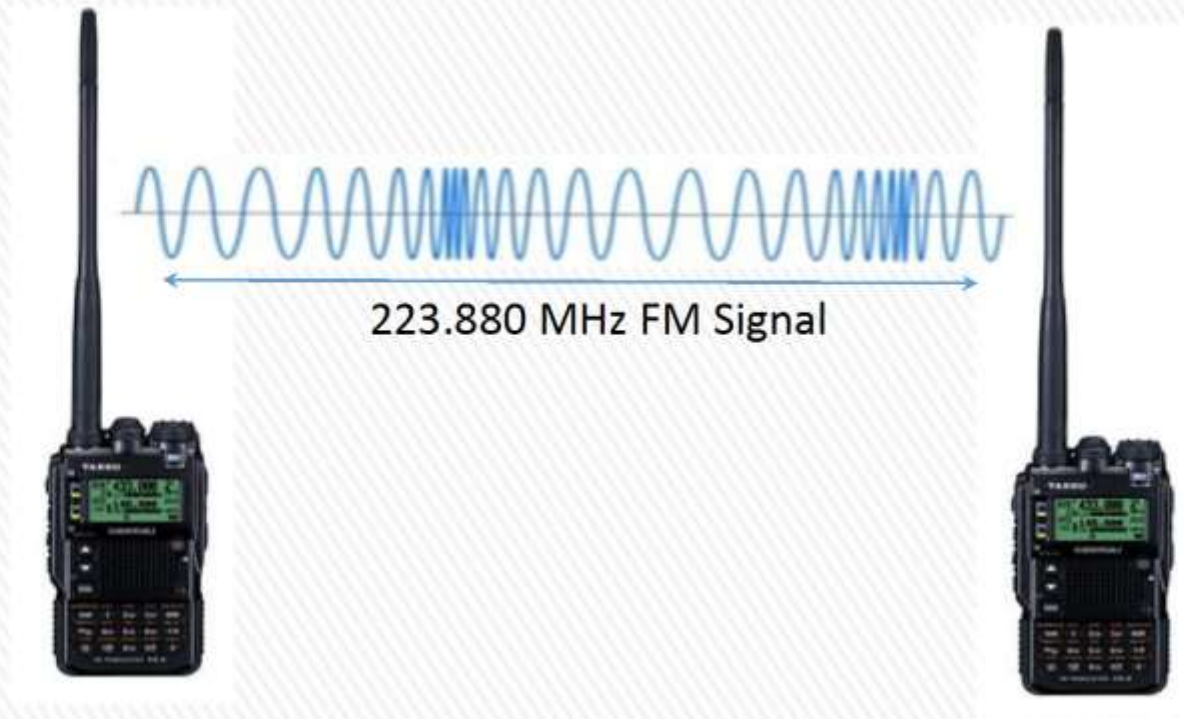


- ❖ **Frequency Modulation (FM) – KRTH, KLOS, and TARA!**



# Simplex Operation

- ❖ No repeater. Direct person to person.



- ❖ Both radios are set to transmit and receive on the same frequency. Example: 223.440 MHz.
- ❖ Used to communicate with your ADC.



# Duplex Operation, Repeater

## ❖ Simplified example

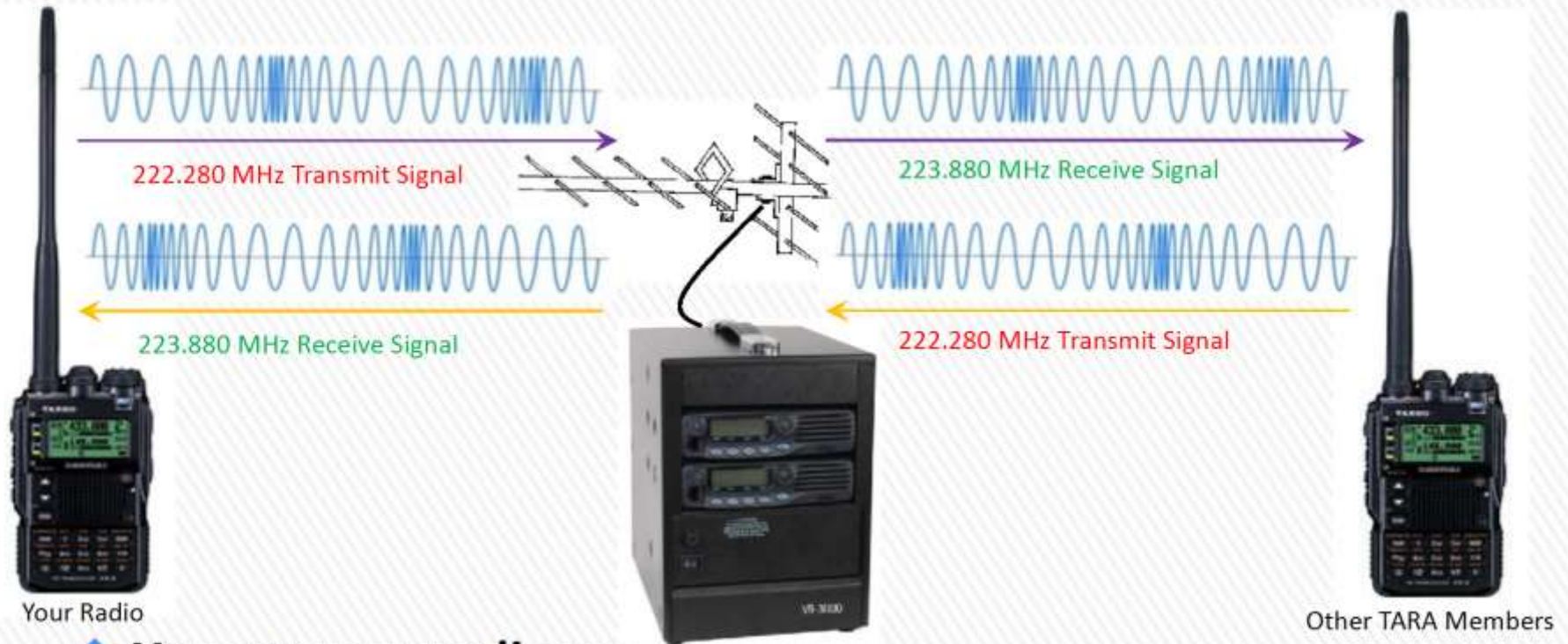


- ❖ The left radio receives 222.280 MHz
- ❖ The received audio is retransmitted on 223.880 by the right radio
- ❖ The difference in frequency is called the offset
- ❖ For the 220 band it is -1.6 MHz.
- ❖ The filter keeps the transmit signal out of the receive radio.
- ❖ Normally, one antenna is used with a duplexer.



# Duplex Operation, the TARA User

## ❖ Using the repeater.



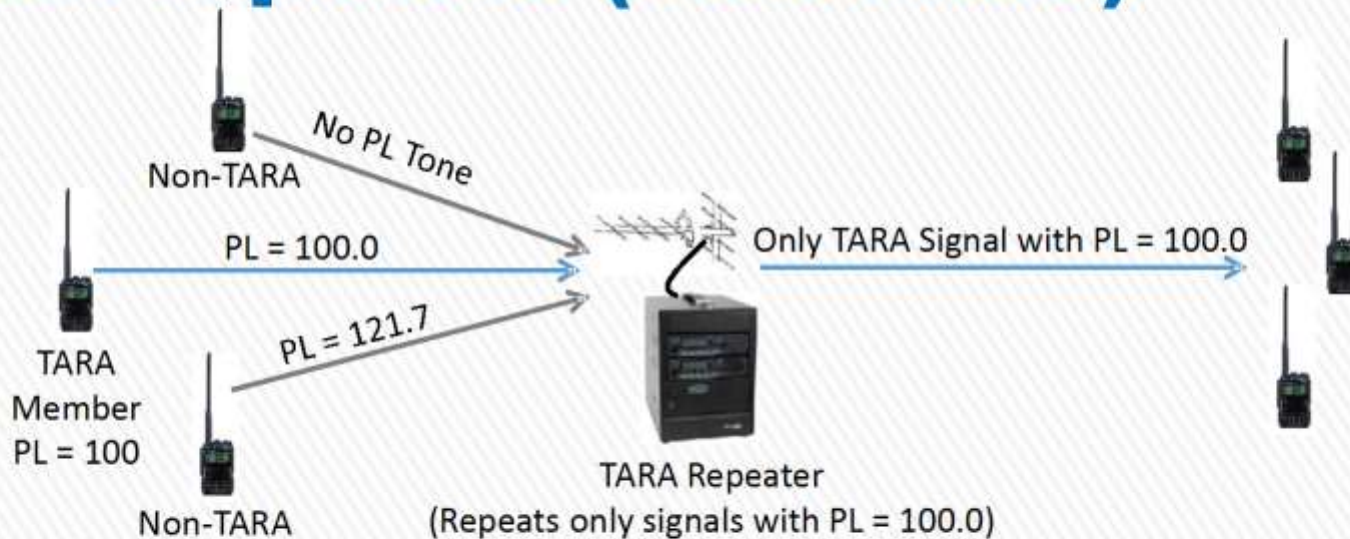
## ❖ You set your radio to:

- 223.880 MHz with a “minus offset” of 1.6MHz.
- You transmit on 222.280 MHz to the repeater
- You receive on 223.880 MHz on your radio.





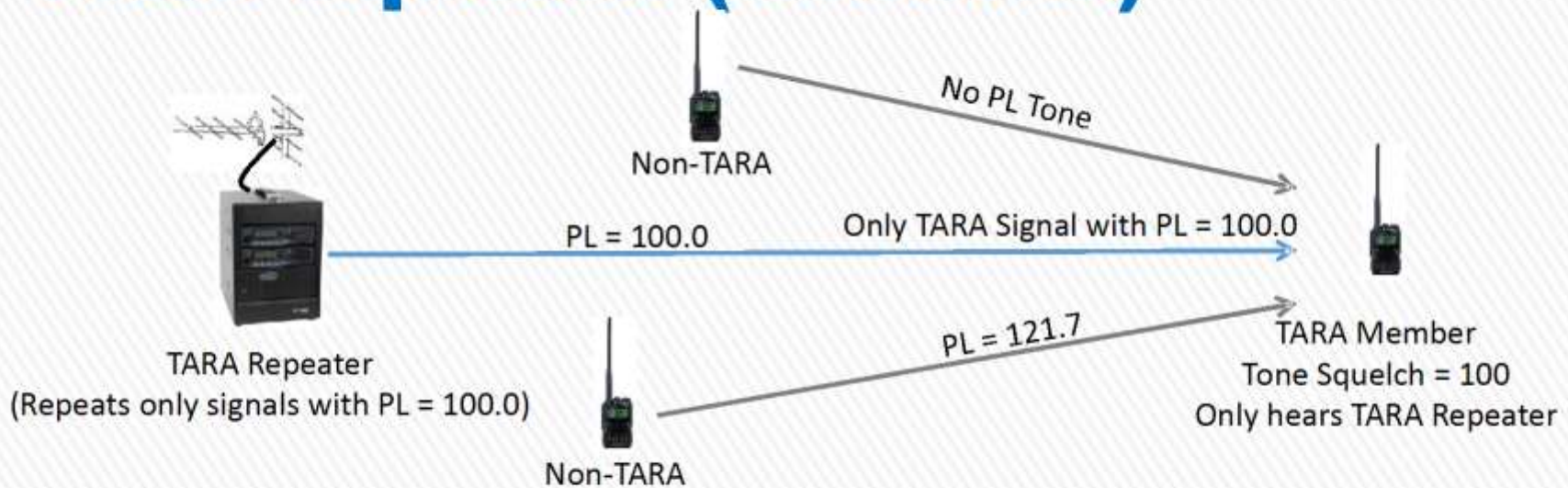
# Tone Squelch (Transmit)



- ❖ **Continuous Tone Coded Squelch Tone (or PL Tone)**
- ❖ **A “CT” will appear in your radio display when enabled.**
- ❖ **When there are multiple users on a frequency, you want to keep others from accessing your repeater.**
- ❖ **You set the frequency of the tone to be added on your radio.**
  - **The TARA repeater uses 100 Hz.**
- ❖ **A tone decoder in the repeater will only allow signals with that tone to be retransmitted to all listeners.**



# Tone Squelch (Receive)



- ❖ CT Mode on the Kenwood radios
- ❖ Use when there are multiple users on a frequency, you want to only hear your TARA repeater.
- ❖ You have to set your tone frequency
  - The TARA repeater uses 100 Hz.
- ❖ The tone decoder in the repeater will only allow signals with that tone to come out of the speaker.



# Kenwood TH-6F



- ❖ **Three Bands:**
  - ✓ 2 meters, 220 MHz and 440 MHz Bands
- ❖ **Dual Receive**
- ❖ **Hand-Held Transceiver**

# Kenwood TH-6F

## ❖ Accessories you should have

- AA dry-cell battery case PN: (BT-13) \$24.95
  - With a supply of AA batteries.
- 12 volt car adaptor PN: PG-3J \$36.95
- Headset with Microphone PN: KHS-22 \$32.95
- Speaker Microphone PN: SMC-34 \$32.95
- SMA to PL239 adaptor Comet-NCG HS-05 \$11.95





# Kenwood TH-6F



- ❖ This is really two radios in one.
- ❖ It has two receivers (bands), A and B
- ❖ You can listen to 2 frequencies at once!
  - Unless you are very comfortable with this radio, it is recommended that only one receiver be selected at a time.
- ❖ Both receivers A and B can be used for ham radio operations.
- ❖ The B receiver is broad band and can receiver police and fire calls.

# Kenwood TH-6F

## ❖ Antennas

- **An extended SMA radio antenna.**
    - Comet SMA-3 \$39.95 ant HRO
  - **Magnetic mount car antenna**
    - MFJ-1723 220MHz with cable and magnet \$39.95
- Or
- Purchase a 144/220/440 antenna and mag mount
    - More useful, but costs around \$150.



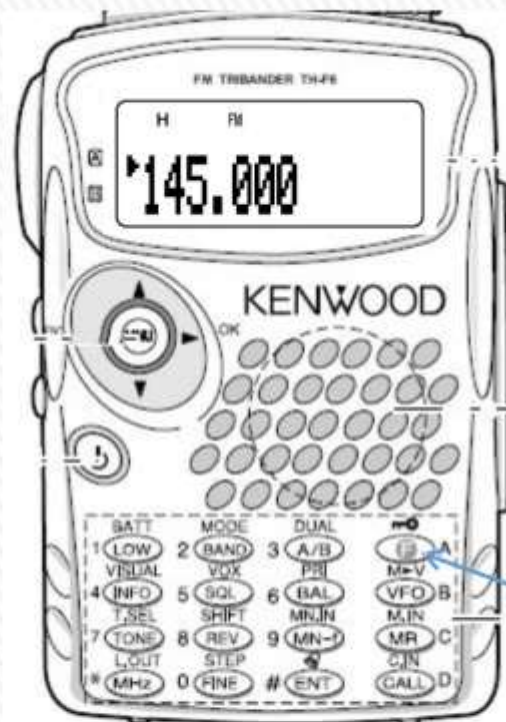


# Kenwood TH-6F

## ❖ The Buttons:

All of the buttons on the key pad have 3 names:

1. The name on the button function activated by pressing the button.
2. The name above the button is the function activated by pressing the **F** button *plus* the button of the desired function.
3. Numbers. Used during numeric entry (automatic)



F Button

# Kenwood TH-6F

## ❖ Receiver Operation

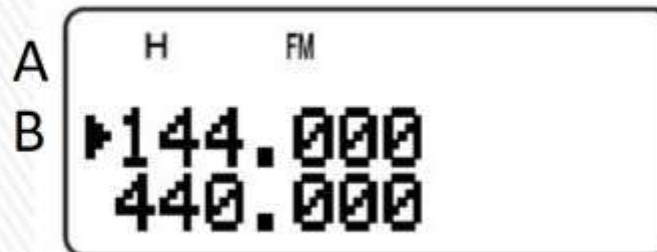
- Single Receiver Mode, Receiver A



- Single Receiver Mode, Receiver B



- Dual Receiver Mode, A and B  
Arrow indicates which frequency will transmit.





# Kenwood TH-6F

## ❖ Receiver Operation Selection

- Single Receiver Mode, Receiver A



Press the A/B button to select band A or B

Press the F key while pressing the A/B (Dual) button for both bands.

# Kenwood TH-6F

❖ If you are not comfortable with multi-band operation, leave your radio in Single Band (A) mode.

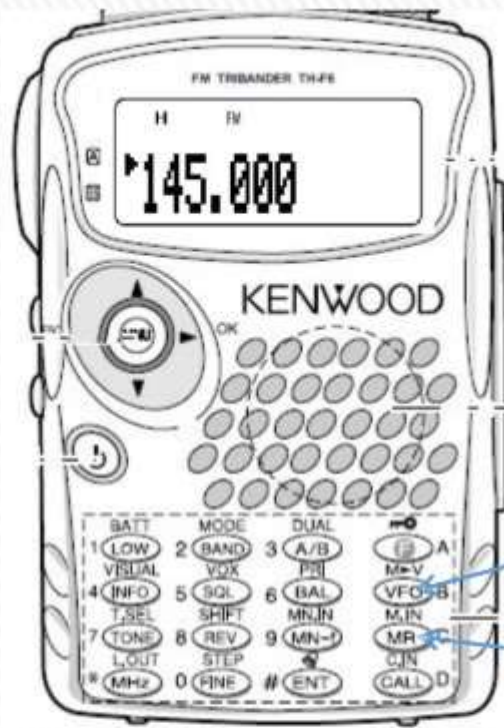
- Single Receiver Mode, Receiver A





# Kenwood TH-6F

## ❖ Variable Frequency Operation (VFO) vs. Memory Operation (MR)



- **VFO mode** is like tuning your car radio. Either with the tuning knob, or entering the frequency.
- **Memory mode** is like the preset buttons to remember your favorite stations

VFO Button

MR Button.

# Kenwood TH-6F

## ❖ To enter a frequency

1. Press the **VFO** button (to put the radio in VFO mode).
2. Press the **Enter Key** (to enable entry)
3. Type in the frequency on the keypad (All 6 digits).  
(Do not type in the decimal point.)

**Example: to enter 223.880 MHz**

Press **2-2-3-8-8-0**

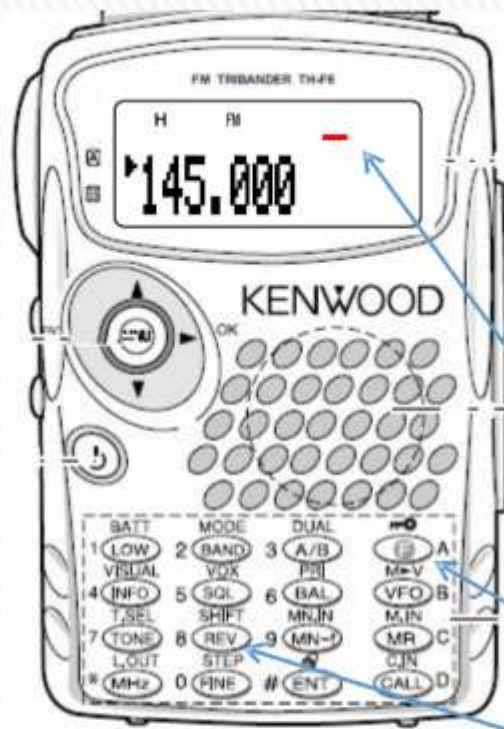
A < **223.880**  
B



# Kenwood TH-6F

## ❖ To set the Offset (shift minus) for Duplex Operation

- So that the radio transmits 1.600 MHz below the receive frequency.



1. With the radio in VFO mode, and the frequency entered
2. Press the **F** button then the **Shift (Rev)**
3. Repeat until the desired offset shows up on the screen (+, -,)
4. Blank is no offset.
5. If an **R** appears, press the **Shift (Rev)** button to clear

**Offset indicator (+, -, or blank)**

**F Button**

**Shift (Rev) Button.**

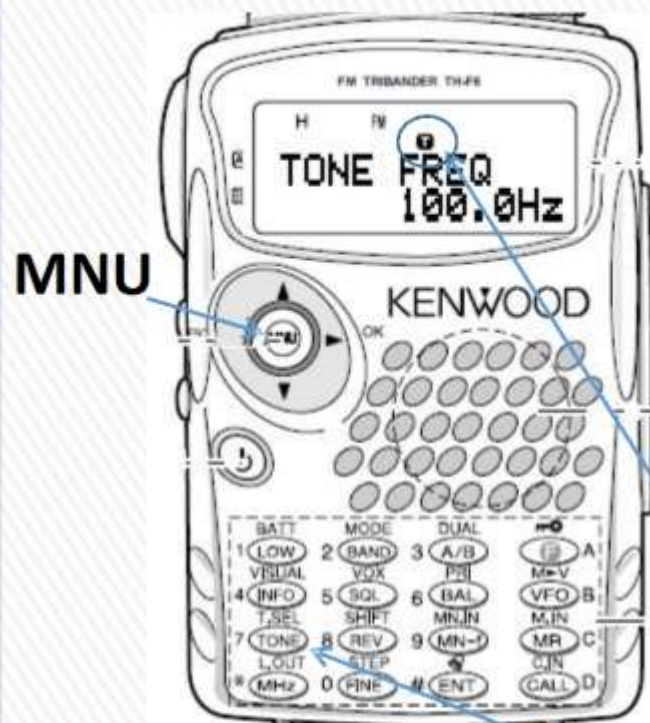


# Kenwood TH-6F

## ❖ Turn on/off the PL Tone

- So that the radio transmits PL Tone to access a the repeater.

1. With the radio in VFO mode, and the frequency entered
2. Then press the **Tone** button until the desired mode appears in the display. (T or CT)
3. If you wish to block out non-TARA signals, press it again so it shows **CT**. That turns on the Tone Squelch on your radio.
4. Blank is tone = off.



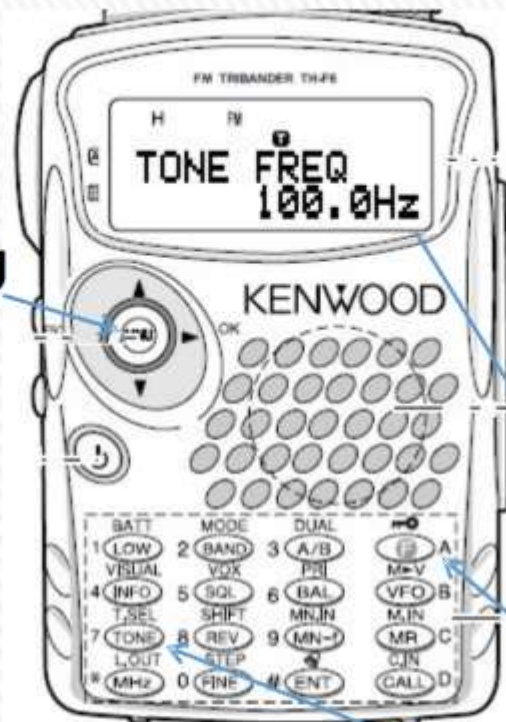
**PL Tone Indicator**  
**Tone(T.SEL) Button.**



# Kenwood TH-6F

## ❖ To set the PL Tone

- So that the radio transmits PL Tone of xxx Hz to access the repeater.



1. With the radio in VFO mode, and the frequency entered
2. Press the **F** button
3. Then press the **Tone(T.SEL)**
4. The PL Tone display will appear.
5. Rotate the top knob until 100 appears.
6. Press MNU button to complete.

**PL Tone frequency**

**F Button**

**Tone(T.SEL) Button.**



# Kenwood TH-6F

## ❖ Save to Memory

- Allows quick access to the TARA frequency.

1. Be sure the frequency, offset, tone, and tone frequency are set in the VFO.
2. Press the **F** button
3. Rotate the knob to channel 01 (or the channel of your choice).
4. Press **MR(M.IN)** button.
5. The channel is now saved.
6. Press **MR(M.IN)** button again to see the channel



**VFO settings**

**F Button**

**MR(M.IN) Button.**

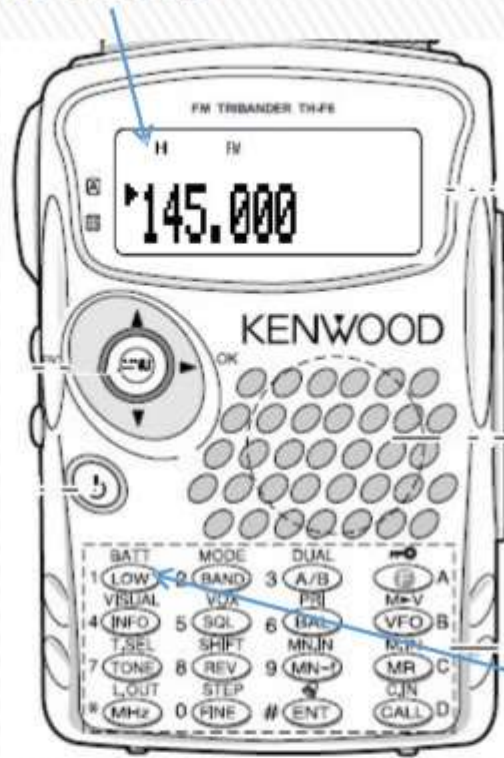


# Kenwood TH-6F

## ❖ Output Power

- Set the power to **High, Low, and Extra Low.**

### Power Level



1. Most of the time you need to be in **High Power!**
2. To change the power level press the **Low** button until the desired power level appears in the display.
3. Extra Low is only good for talking to someone near by.

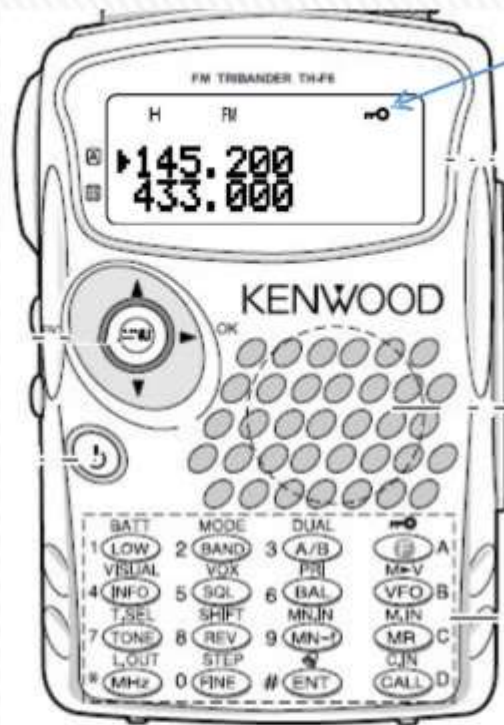
**Low Button**

# Kenwood TH-6F


## ❖ Keyboard Lock

- Locks the buttons so you cannot accidentally change them.

### Lock Symbol



### To Lock

1. Press the **F** button until the Lock symbol  appears.

### To Unlock

1. Press the **F** button until the Lock symbol  disappears.



# Kenwood TH-6F

- ❖ How can you become more proficient with your radio?
  - ❖ RTDM – Read The Darned Manual
  - ❖ Look up police, fire and aircraft frequencies and practice entering them and listening.
  - ❖ Check into local club nets as a guest. Most are happy to have you.
  - ❖ Practice, practice, Practice.
  - ❖ Its like a toy, have fun with it.

# Kenwood TH-6F

## ❖ Programming Review



# Kenwood TH-6F

## ❖ Set-up Summary for using the TARA repeater:

1. Select VFO mode by pressing the **VFO** button
2. Press the **Enter** button
3. Key in the frequency **223880** (all 6 digits)
4. Press the **F** button and then the **Rev(Shift)** button. Repeat until a **-** is displayed.
5. Press the **Tone(T.SEL)** button until **CT** is shown to enable tone or tone squelch.
6. Press **F** button followed by the **Tone(T.SEL)** button and turn knob until **100 Hz** is displayed.
7. Press **MNU** to finish.
8. Press **F** button, rotate knob to **CH 01**, and press **MR(M.IN)** button to save to memory.
9. Press **MR(M.IN)** button again to be in MEM mode



# Kenwood TH-6F

## ❖ Set-up Summary for using the TARA frequency in Simplex:

1. Select VFO mode by pressing the **VFO** button
2. Press the **Enter** button
3. Key in the frequency **223880** (all 6 digits)
4. Press the **F** button and then the **Rev(Shift)** button. Repeat until a **no + or -** is displayed.
5. Press the **Tone(T.SEL)** button until **CT** is shown to enable tone or tone squelch.
6. Press **F** button followed by the **Tone(T.SEL)** button and turn knob until **100 Hz** is displayed.
7. Press **MNU** to finish.
8. Press **F** button, rotate knob to **CH 00**, and press **MR(M.IN)** button to save to memory.
9. Press **MR(M.IN)** button again to be in MEM mode



# Kenwood TH-6F

## ❖ Set-up Summary for Simplex frequencies for your event:

1. Select VFO mode by pressing the **VFO** button
2. Press the **Enter** button
3. Key in the frequency **22xxxx** (all 6 digits)
4. Press the **F** button and then the **Shift** button and repeat until neither **+** or **-** is displayed.
5. Press the **Tone(T.SEL)** button until **CT** is shown to enable tone or tone squelch.
6. Press **F** button followed by the **Tone(T.SEL)** button and turn knob until **141.3 Hz** is displayed.
7. Press **MNU** to finish.
8. Press **F** button, rotate knob to **CH 03** (or your desired channel), and press **MR(M.IN)** button to save to memory.

## **Drill - Mission**

- 1. Set-up a simplex net with tone squelch on.**
  - ❖ Frequency: 223.400 MHz**
  - ❖ Offset (Shift): None**
  - ❖ Tone Squelch: On, CT mode**
  - ❖ Tone frequency 141.3 Hz**
- 2. Contact AB6YS, net control when finished.**



# Drill - Kenwood TH-6F set-up

❖ Set-up Summary for Simplex frequencies for your event:

1. Select VFO mode by pressing the **VFO** button
2. Press the **Enter** button
3. Key in the frequency **223400** (all 6 digits)
4. Press the **F** button and then the **Shift** button and repeat until neither **+** or **-** is displayed.
5. Press the **Tone(T.SEL)** button until **CT** is shown to enable tone or tone squelch.
6. Press **F** button followed by the **Tone(T.SEL)** button and turn knob until **141.3 Hz** is displayed.
7. Press **MNU** to finish.
8. Call AB6YS with your call sign to test!