

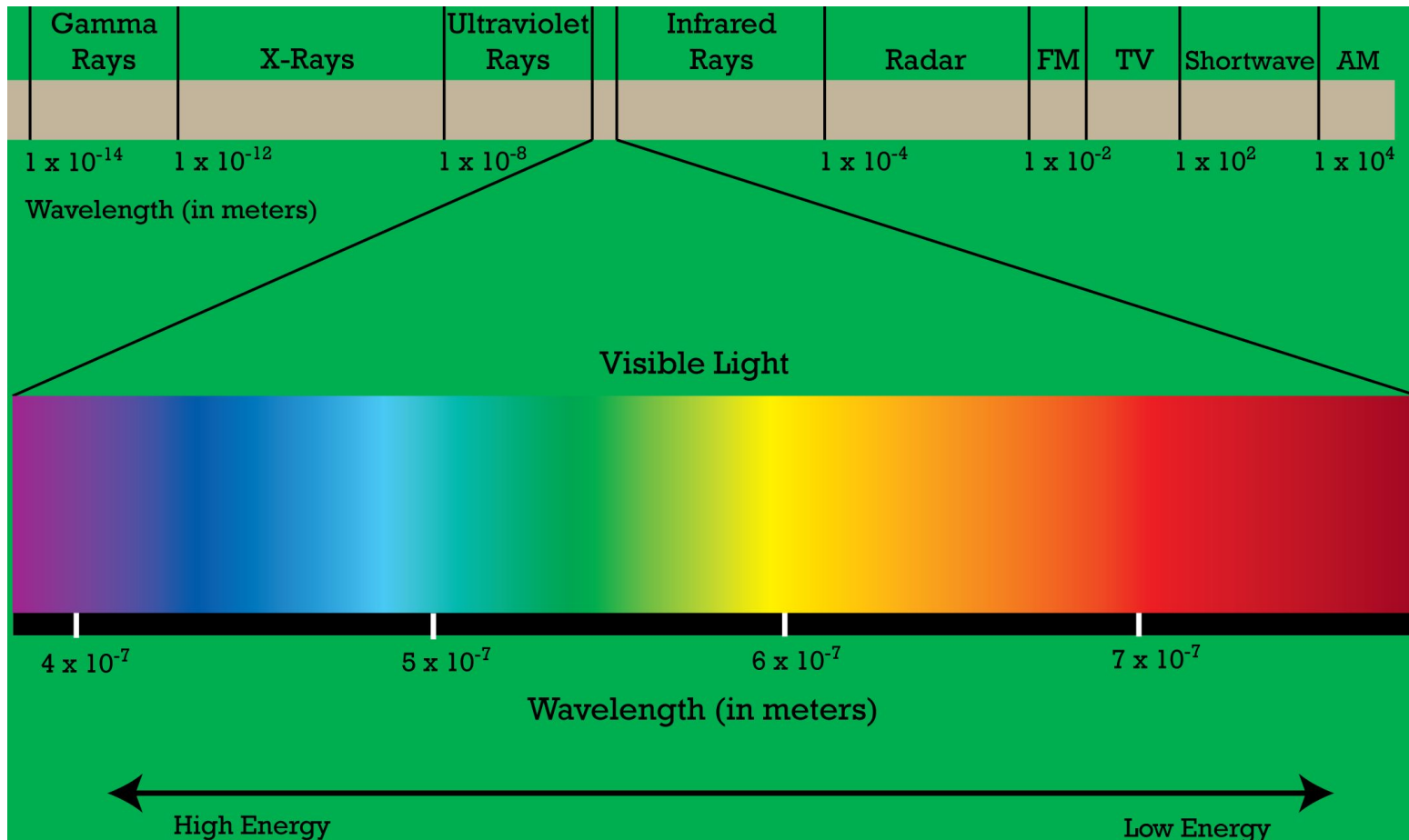


Amateur Radio Basics

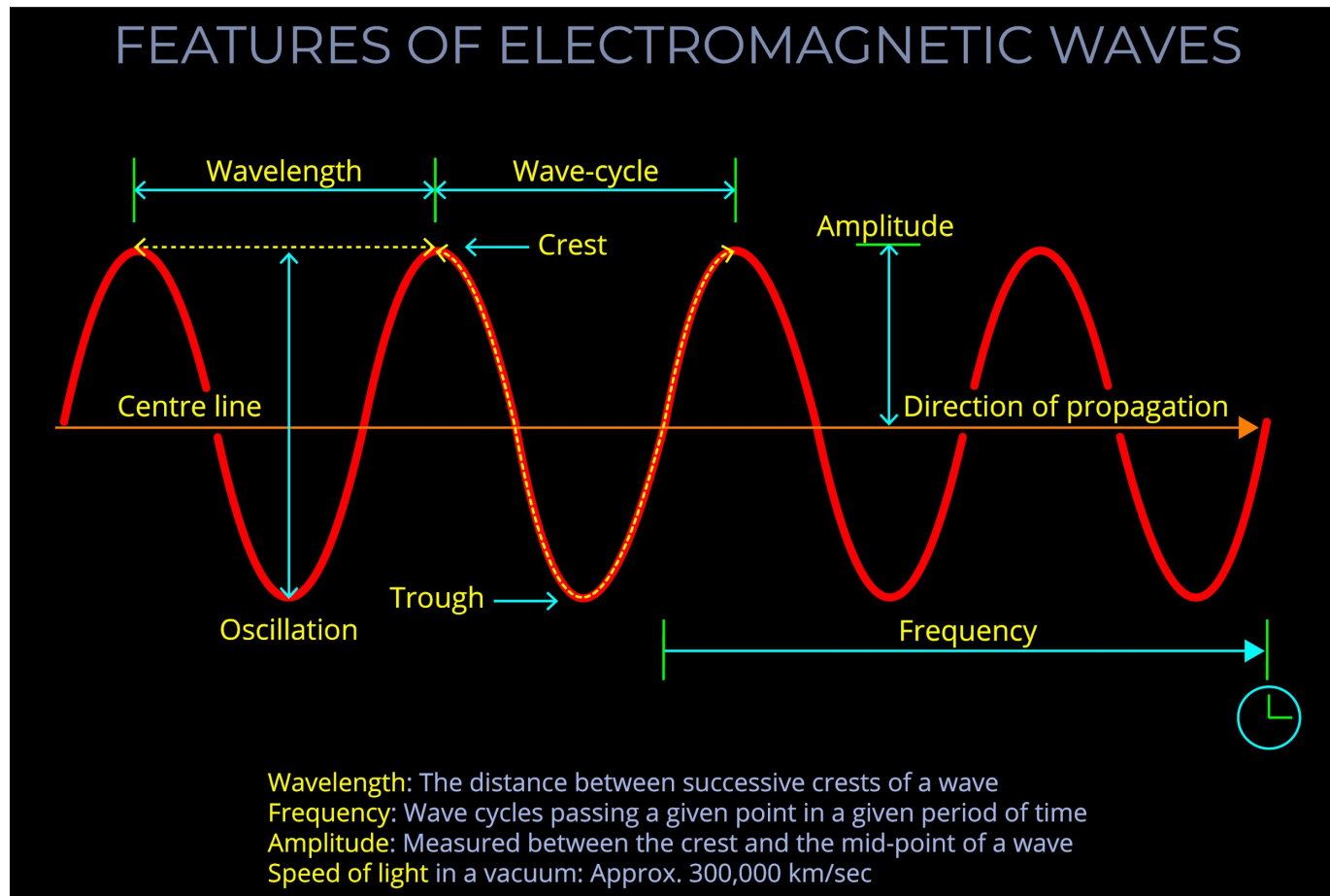
Introduction to Handheld Radios



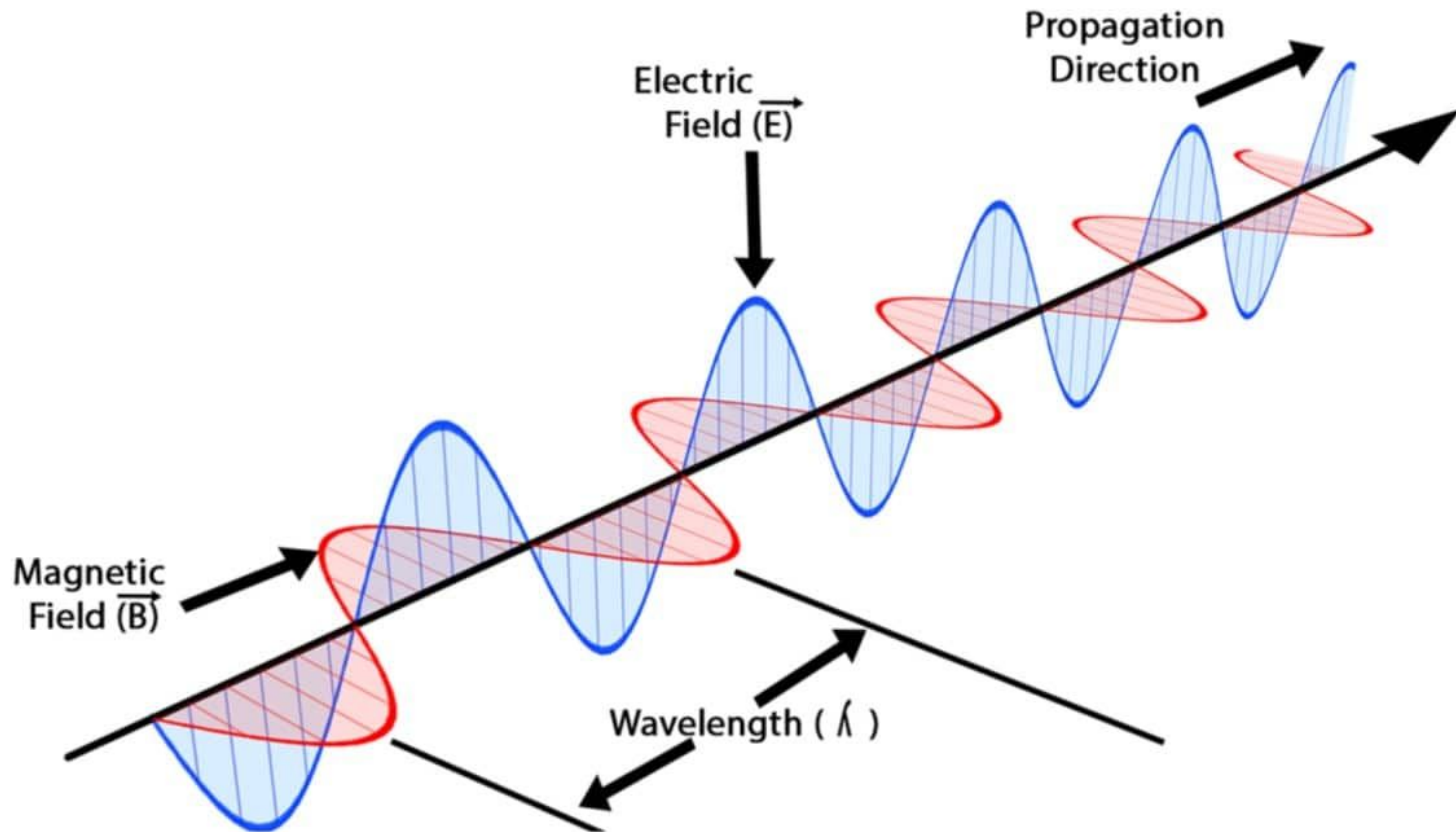
Electromagnetic Spectrum



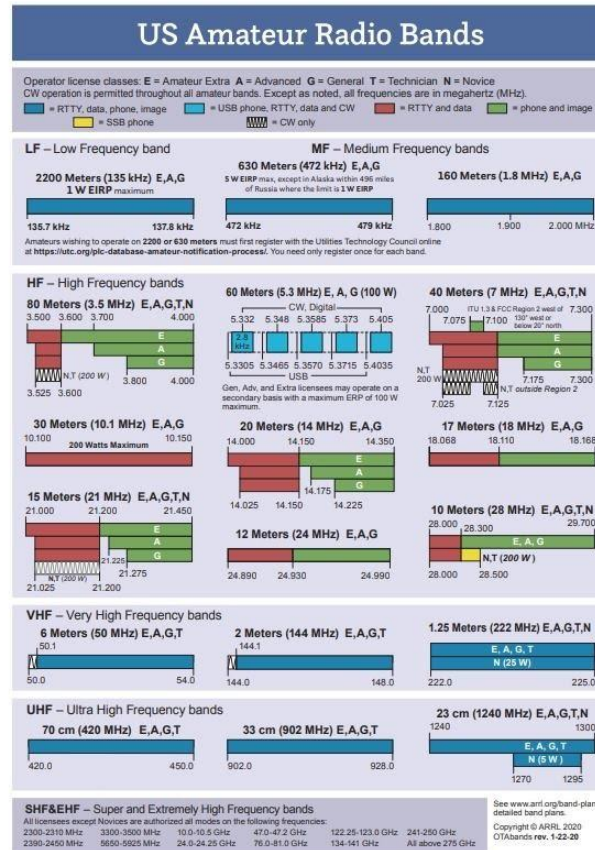
Electromagnetic Waves



Electronic Magnetic Field



Amateur Radio: FCC Part 97

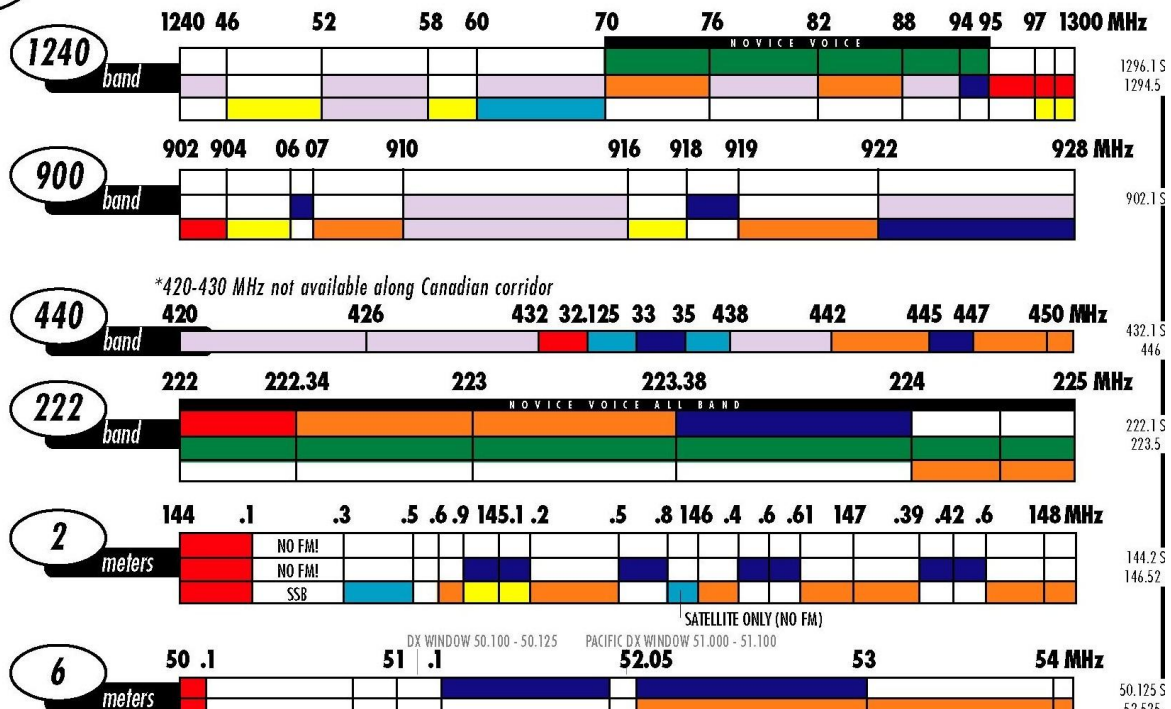


Frequencies 2-Meter & 70 CM

AMATEUR RADIO BAND PLAN

UHF/VHF

- NOVICE VOICE AND DATA*
- AMATEUR TELEVISION FAST SCAN
- SATELLITE (NO FM)
- CW AND WEAK SIGNAL (NO FM)
- DIGITAL
- FM SIMPLEX
- SSB
- FM REPEATER



Dual Band HTs



Transceivers that handle 2 Bands: (UHF & VHF)

- UHF Frequency (Left)

Dual Watch (Right)

- Top Frequency-UHF
- Bottom Frequency-VHF

HT Display: (Baofeng)



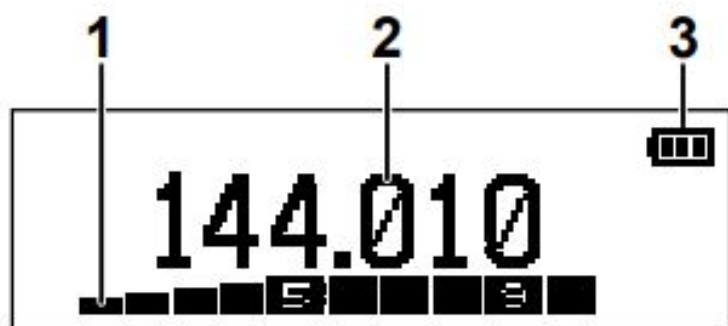
Frequency Mode:

- Press the VFO/MR button to change mode.
- No channel # to the right of the frequency.
- Use A/B Button switch between top and bottom frequency in dual watch mode.
- **When field programming a radio make sure to have the A (top) entry selected.**

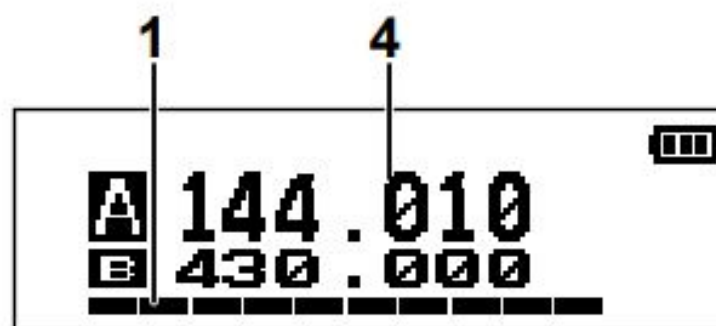
**Use the keypad to enter a six digit frequency.
(Example: 147480)**

Yaesu FT-XX Models

Normal operation display




Single Display Mode (Default)



Dual Display Mode

1 S & PO Meter  22

2 Operating Frequency  21

3 Battery Indicator  19

4 VFO-A / VFO-B  24

Frequency Mode (VFO) vs. Channel Mode

- Frequency mode allows you to enter a frequency and set options. (See repeater slide.)
- If in dual display mode, make sure to first select the top (A) entry. (Use A/B button on Baufeng.)
- Test it out by transmitting and then store the settings in a channel.
- Use channel mode to quickly recall these settings.



Controlling Common Radio Options

<u>Baufeng Name & How to Access</u>	<u>Yaesu Name & How to Access</u>	<u>Purpose & Notes:</u>
Menu Mode	Set Mode	Choose different options and settings
(Press the menu button)	(Press and hold the bottom left side button)	Yaesu: Bottom left side button is the function button, called F.
Use the up and/or down arrow or enter a 2 digit number to bring up the desired option.	Use the up and down arrow to bring up the desired option.	
Press menu button to change selected setting.	Press the F to change selection (Don't hold it.)	Next use the up and down arrows to select desired option setting.

Example: Change Transmit Power

On Baufeng:	On Yaesu:	Comment:
1. Press the menu button	1. Press and hold the F button	Yaesu: Bottom left side button is the function button now being called F.
2. Press 02.	2. Goto #32. (Use the up and/or down arrow.)	
3. Press menu again & Use the up/down buttons to choose transmit power	3. Press the F button & Use the up/down buttons to choose.	
4. Press the menu button again to select.	4. Press the F button to select.	
5. Press the Exit button to exit the menu.	5. Press the PTT button (top left) to Exit.	PTT stands for: Push to Talk

Change from Dual to Single display (or vice versa)

On Baofeng:	On Yaesu:	Comment:
1. Press the menu button	Press the * V/M button.	Some models have slightly different options.
2. Press 07.	Switches from Channel Name display to dual watch	
3. Press menu again & Use the up/down buttons to choose on or off.	Select dual watch (2 frequencies listed.)	Yaesu: You may press *V/M again to swap top and bottom.
4. Press the menu button again to choose.	Press again to return to name display, if you wish.	
5. Press the Exit button to exit the menu.		PTT stands for: Push to Talk



Dual Watch Capability:

- Most HTs can be in Single Watch or Dual watch mode.
- Users with less experience, or if you must hear all transmissions a particular frequency, then leave your radio in single watch mode. This means that you are only monitoring one frequency at a time.
- Single watch mode is best to keep you from missing the traffic on that frequency.



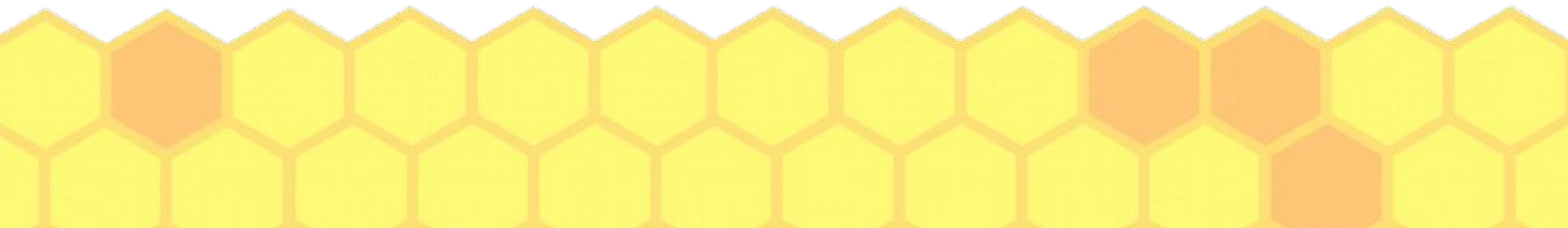
What is Squelch?

- Squelch is normally on by default.
- When squelch is on you do not hear anything coming out of your speaker.
- When a certain strength signal is received, your squelch “opens up” your speaker so that you can hear what is on the frequency.
- You can open up you squelch manually to listen for very weak transmissions.



Squelch (Continued)

- Your squelch can be set to a low setting, in which case a weaker signal will turn on your speaker. (Example SQL setting 1 or 2.)
- Your squelch can be set to a high setting, in which case a stronger signal is required to turn on your speaker. (Example Sql setting of 8 or 9)
- If your squelch is disengaged (Turned off) you will always hear what is on the selected frequency. **When no one is transmitting you hear static.**



Example: Change Squelch Setting

On Baufeng:	On Yaesu:	Comment:
1. Press the menu button	1. Press and hold the F button	On Yaesu the bottom left side button will be called F
2. Press 00.	2. Press the middle left side button.	
3. Press menu again & Use the up/down buttons to choose a squelch setting.	3. Use the up and/or down arrow to select a setting between 0 (min) and 15 (max)	Set to lowest # where you don't hear static for sensitivity to weak signals.
4. Press the menu button again to select.	4. Press the PTT button (top left) to Exit.	PTT stands for: Push to Talk
5. Press the Exit button to exit the menu.		

A different type of Squelch

- Our radios also have another type of squelch called “Tone” squelch.
- When this squelch is engaged, you won’t hear audio on your speaker, unless the receiver is hearing the correct sub-audible tone in the signal. (Range is from 67 Hz to 254.1 Hz)
- This is often used when entering a repeater frequency.



Other types of Squelch

- Radios have other types of squelch including one called DCS. (Digitally coded squelch)
- Leave DCS off unless you know you need it. Most local infrastructure doesn't need it.
- Transmit Squelch: TX-Sql allows you to specify a sub-audible tone on your transmission, which will open up the squelch on another radio or repeater. The correct value must be specified.



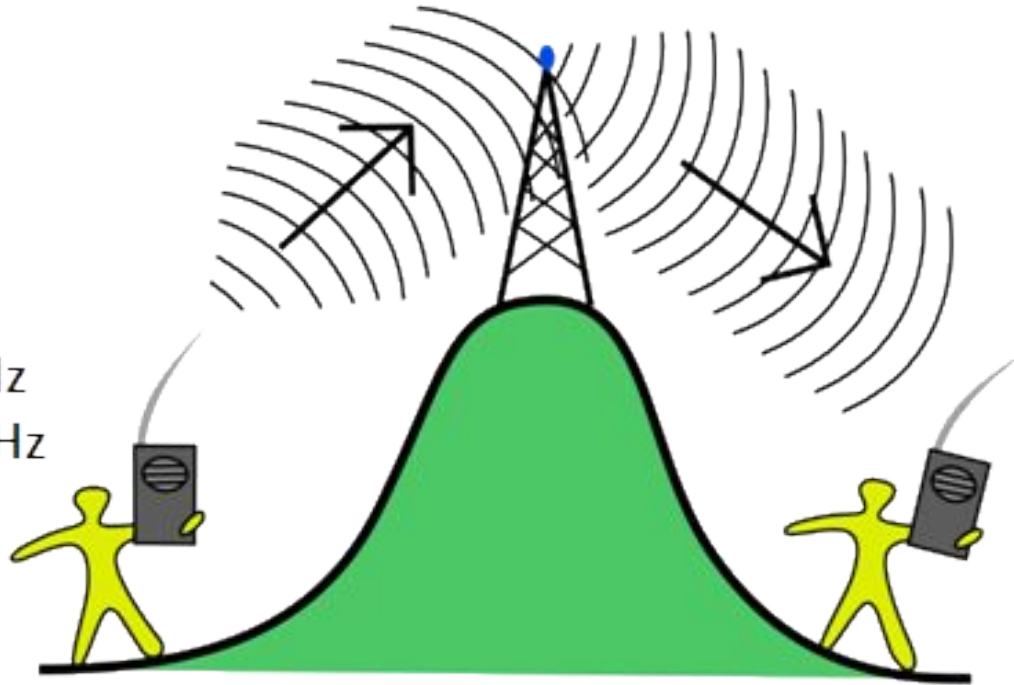
Repeaters:

Repeater

Output: 146.76 MHz

Input: 146.16 MHz

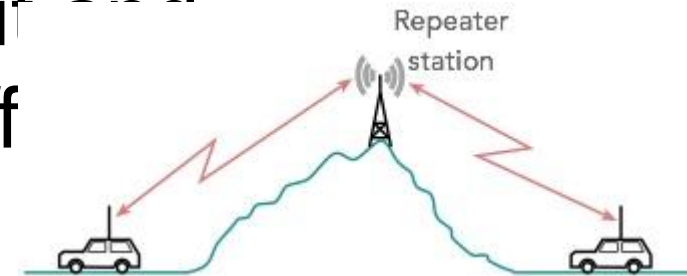
Jim
Input: 146.76 MHz
Output: 146.16 MHz



Tony
Input: 146.76 MHz
Output: 146.16 MHz

How Repeaters Work:

- The input frequency receives the transmission from your radio.
- If your Tx-Tone setting is correct, your signal is rebroadcast on the repeater output frequency.
- The difference between the input and output frequency is called the offset.



Repeaters (Offset)

- In the USA we use “standard” offsets.
 - For VHF it is 600 KHz, which is the same as 0.6 MHz.
 - For UHF it is 5 MHz.
- Offset can be either negative or positive.
- Example Kulani Cone Repeater
 - Output frequency: 146.760
 - Input Frequency: 146.160

(In this example it is a Negative offset of 0.6 MHz)



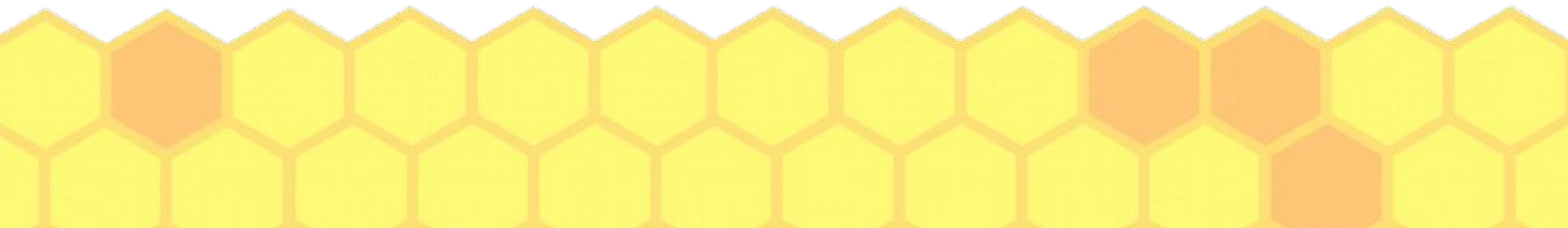
Linked Repeater Systems:

- Repeaters can be linked together so that a signal received by one is sent out to the others. (Locally, island wide, statewide, or even worldwide.)
- This can be done via RF or the internet.
- Repeaters with backup power and that link via radio, are more likely to remain functional in a disaster than those without backup power.



Repeaters vs. Simplex:

- Repeaters on Mountain Tops have a great coverage range, but high winds can damage antennas, potentially causing it to fail.
- Repeaters located at the homes of amateur radio operators have good range. Often damage due to a disaster can be repaired in a timely way, so it remains functional.
- Simplex transmissions (One radio to another) do not depend on any infrastructure which might fail. The range depends on the antenna and output power of the radio.



Additional HT Settings:

- The amount of spectrum used by a signal is called bandwidth.
- HTs can use Narrow or Wide bandwidth. Generally repeaters and many people use wide bandwidth locally. (25 KHz)
- If the future we may move to narrow mode to allow us to have more “channels” in the Amateur Radio area of the VHF band.



Entering Frequencies:

- Radios have a frequency step (size) feature.
 - In frequency mode, the step size will control how much the frequency increases or decreases when you press the up or down arrow.
 - When entering a frequency the radio rounds to the nearest frequency based upon the step size.
 - **If you have trouble entering a frequency, you may need to change the step size.**



Change Frequency Step

On Baufeng:	On Yaesu:	Comment:
1. Press the menu button	1. Press and hold the F button.	
2. Press 01.	2. Use the up and/or down button to choose step size. (or choose auto)	
3. Press menu again & Use the up/down buttons to choose a step size setting. (2.5 Khz to 50 Khz)	3. Press the F button to save	Set to the smallest size or auto for max. flexibility in frequency entry.
4. Press the menu button again to select.	4. Press the PTT button (top left) to Exit.	PTT stands for: Push to Talk
5. Press the Exit button to exit the menu.		

Entering repeater Info:

Baufeng:	Yaesu:	Comment:
1. Enter VFO Mode (VFO/MR) and enter the desired frequency.	1. Enter VFO mode (* V/M) and enter the desired frequency.	On Yaesu *V/M toggles between memory and VFO modes.
2. Select Menu option #11, choose receive tone, press menu.	2. Press and hold F, move to 29. SQL Type. press F. Choose T-Tone, or TSQL. Press F	
3. Select Menu option #13. choose transmit tone, press menu.	3. Move to 8. Press F. Use up/down and F to set values. (Hold F to exit)	The correct tone “opens” the repeater so it “repeats” your signal.
4. Select Menu option #25 (SFT-D) Choose +, or - press menu	4. Navigate to 24. press F Set ARS to on. You can set Mode or Shift if needed.	On Yeasu, Mode & shift is usually set to the correct value when ARS is on.
5. Use option #26 to set offset. Press Menu.		On Baufeng enter 000600 (VHF) or 005000 (UHF)

Channel Memory:

- It is convenient to store frequencies, including the offset and tone settings for repeaters into memory.
- Once store, Memory mode allows you to pick an existing channel where this information is stored and your ready to operation.
- Baofeng has 128 slots for storage, Yaesu radios have 200, plus what they call the home channel.



Determine memory “slot” to use & make sure it is empty

Baufeng:	Yaesu:	Comment:
1. Make sure the “slot” you wish to use is empty.	1. Same. Press and hold F. Navigate to 18. Press F.	
2. Press menu 27, menu. Use up/down to look. Entries showing CH-XXX have existing data. If only XXX is shown it is empty.	2. Look through the channels displayed. If the “slot” you wish to use is listed, press F to delete it.	On Yaesu *V/M toggles between mem and VFO.
3. To delete, from VFO press menu 28, menu. Use up/down to find “slot” and press menu, menu, exit.	3. Press PTT to return to VFO mode. Make sure the frequency, tone, and offset show what is needed.	
4. From VFO mode hold PTT to transmit	4. From VFO mode hold PTT to transmit	Transmit you callsign and say “looking for a radio check” (or similar)
		Talk to another station to make sure it is working.

Store Info in VFA (A) to memory

Baufeng:	Yaesu:	Comment:
1. Press menu 27, menu. Use up/down to look.	1. Press and hold the *V/M button.	
2. Use up/down to choose the channel for storage.	2. Memory channel shows. Use up/down to select the one you wish.	On Yaesu *V/M toggles between mem and VFO.
3. Press Menu, Exit	3. Name Channel and use F button to advance to next letter.	Press numeric key multiple time to enter each desired letter.
4. Press VFO/MR button to enter channel mode. Select the new channel.	4. Press and hold the *V/M button. It displays "Mem-In"	Transmit you callsign and say "looking for a radio check" (or similar)
5. Use up/down arrows to select this channel and test by asking for a radio check.	5. Press *V/M button (Twice) to return to channel mode.	Talk to another station to make sure it is working.

