

Technician Licensing Class

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Special thanks to K3DIO

The Plano Amateur Radio Klub (TX)

Much of this material is from them



How to Operate a HAM Radio

- Sub-agenda goes here

Definitions

- Transmitter: Transmits radio signals
 - Just like a FM radio station
- Receiver: Receives radio signals
 - Just like a FM radio
- Transceiver: Does Both

Definitions

- Microphone: Converts sounds to electric signals
- Speaker: Converts electric signals to sounds
- Headphones: Speakers for your ears!
 - Really really useful in noisy areas



Audio

- Audio Feedback:
 - A microphone picks up speaker output
 - That high pitched noise at a presentation!
- Sound Card
 - Computer interface for sending/receiving
 - Can be connected to a transceiver
- Microphone
 - Not needed for digital work (packet radio)
 - If gain (output signal) is too high: distortion can occur

Definitions

- Power supply:
 - Converts
- Regulated power supply:
 - Ensures output is consistent
 - Protects electronics from voltage fluctuations

Definitions

- **Filter:** Removes portions of signals
 - **Notch:** Removes a middle segment
 - **Band Pass:** Leaves just the middle
 - **High Pass:** Removes lower frequencies
 - **Low Pass:** Removes higher frequencies
 - **Noise Blanker:** Special processing to remove repeating noise
- **Filters can be used:**
 - **Input:** To filter incoming signals
 - **Example:** Notch filter can be used to remove RF overload from a 2m signal to a TV
 - **Output:** Reduce spurious emissions

Radio Controls

- Change operating frequency
 - Using the keypad (if there is one)
 - Using the VFO knob
 - Many microphones have up/down buttons
- All modern radios store “memories”
 - Transmit and Receive Frequency
 - CTCSS Tones Frequencies and DTS codes
 - Transmit Power Level
 - ...
- Put favorites in memory!



Radio Controls: frequency

- Changing the operating frequency
 - Using the keypad (if there is one)
 - Using the VFO knob
 - Many microphones have up/down buttons
- “Shift” control separates receive/transmit frequencies
- “Step” menu changes size of up/down
 - EG: .005 vs .015MHz
 - Different area band plans have different FM channel steps like .015 vs .020MHz apart.



Radio Controls: Others

- Function or “F” key is like an alt-key
 - Makes a button do something different.
- Noise blanker:
 - Useful to remove “repeating” noises
 - Useful to remove car ignition noise
 - (Spark plugs make noise when they fire)



Radio Controls

- Receiver Incremental Tuning (RIT)
 - Fine control over frequency
 - (Not used in FM)
- Squelch
 - Quiets the radio when no signal is present

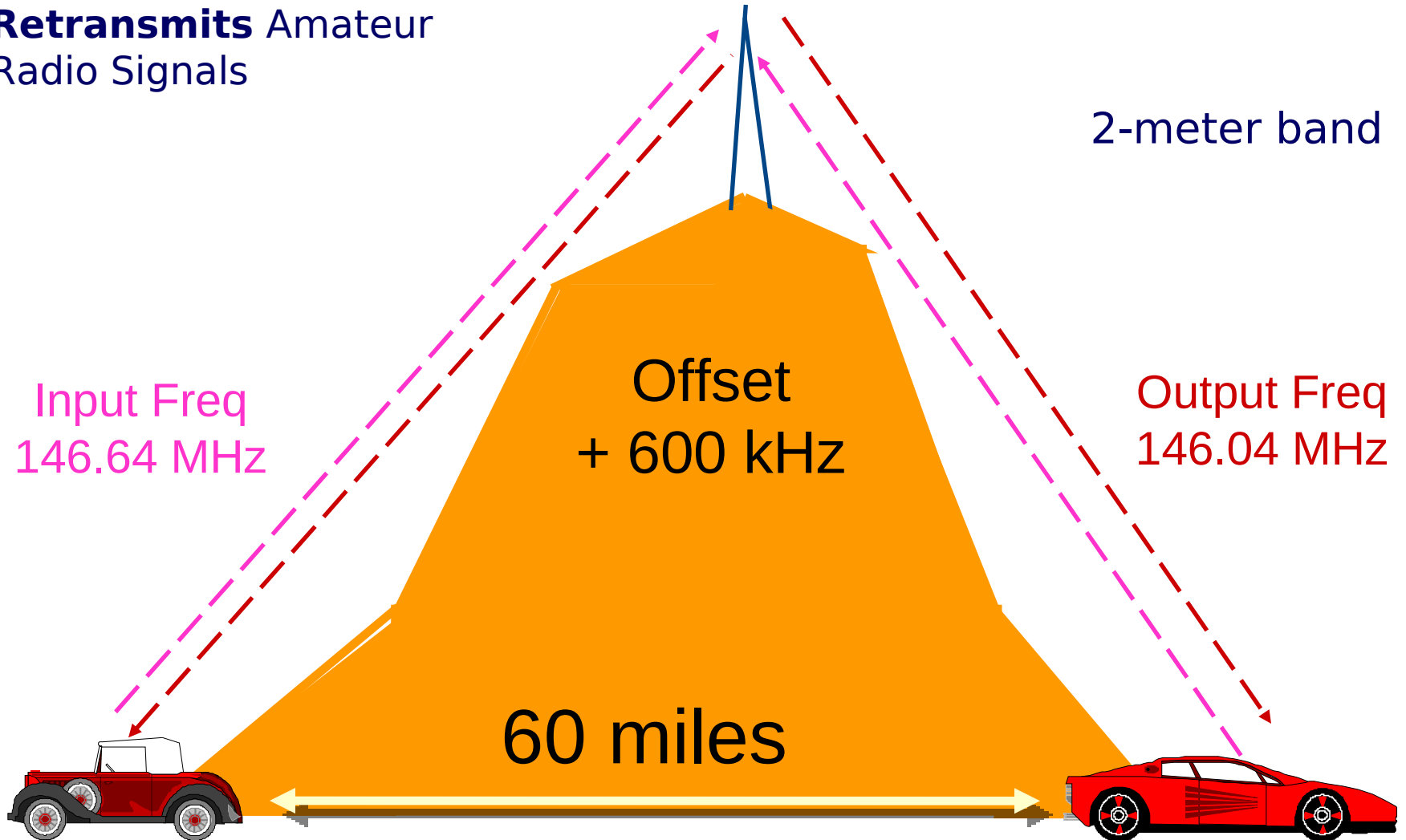


Communicating

- Simplex
 - Direct communication between stations
 - Should be used instead of repeaters when possible to avoid tying up a repeater
 - You can learn that you can communicate over simplex when chatting on a repeater if you listen to the input frequency to see if you can hear them
 - No one has exclusive use of a frequency except in emergencies

Repeaters

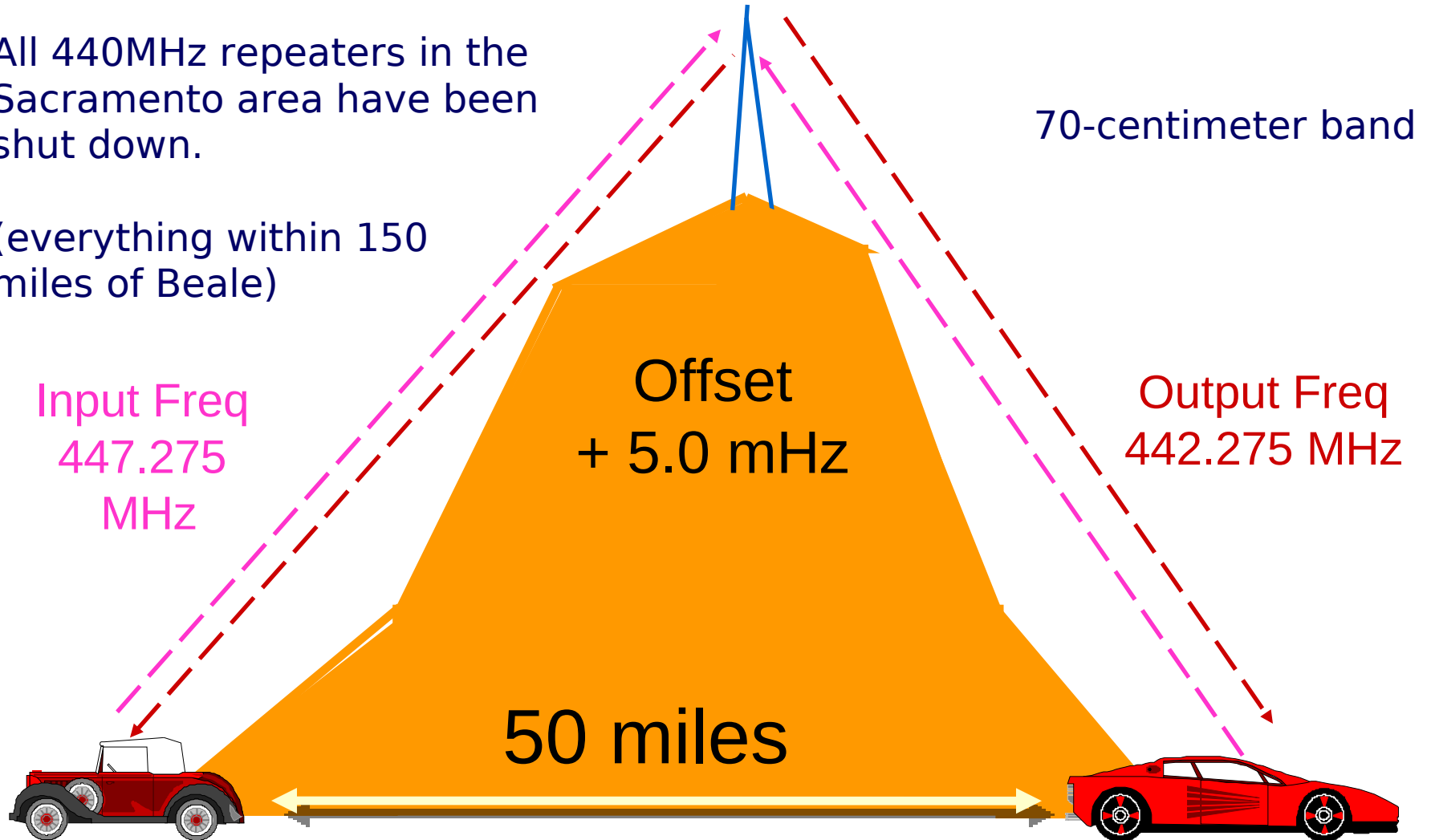
Retransmits Amateur
Radio Signals



Repeaters: 440MHz

All 440MHz repeaters in the Sacramento area have been shut down.

(everything within 150 miles of Beale)



Repeaters: Offsets

- Repeaters listen on one frequency and transmit on another.
 - Offsets are standardized on each band
 - 2m repeaters: +/- 0.6 MHz
 - 70cm repeaters: +/- 5MHz
- Terms
 - Input frequency: Repeater listens on (most important to know)
 - Output Frequency: Repeater transmits on

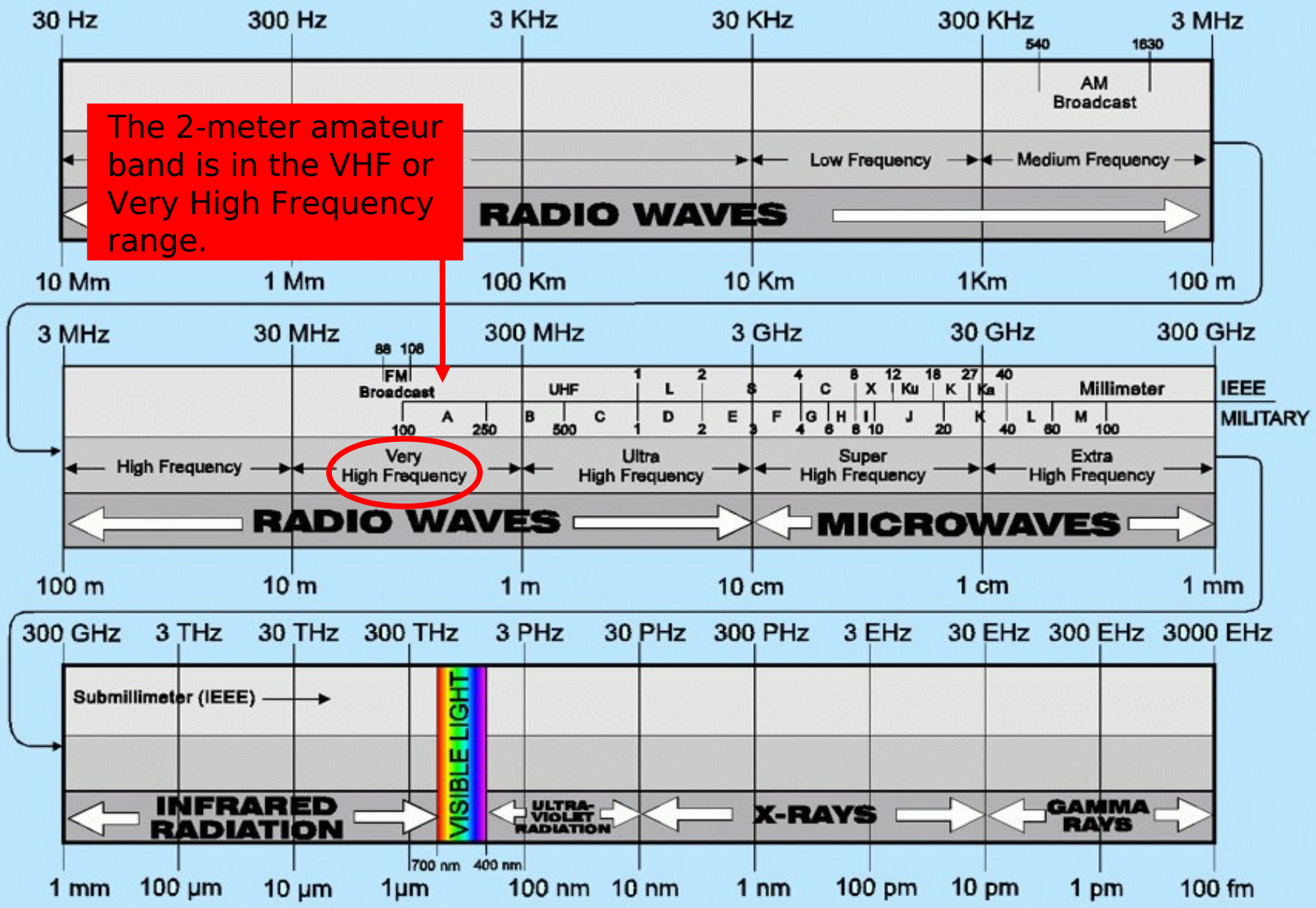
Repeaters: Tones and DTS Codes

- Most repeaters listen for special codes
 - Selective hearing
 - Repeaters only retransmit signals for them
 - Important with neighboring repeaters
 - CTCSS Tones
 - A low frequency below your hearing
 - Many repeaters remove it when retransmitting
 - DTS Codes
 - Modern digital equivalent
 - Less common than CTCSS still

Repeaters

- Extends usable range of portable devs.
- Courtesy tones often trail repeated transmissions indicating completion
- Pause briefly before talking
 - Lets anyone else jump in if they need to
- Linked repeaters connect multiple repeaters together
 - Radio linking
 - Internet linking: IRLP, EchoLink
- Repeater access may be restricted
 - (“Closed” to a group or club)

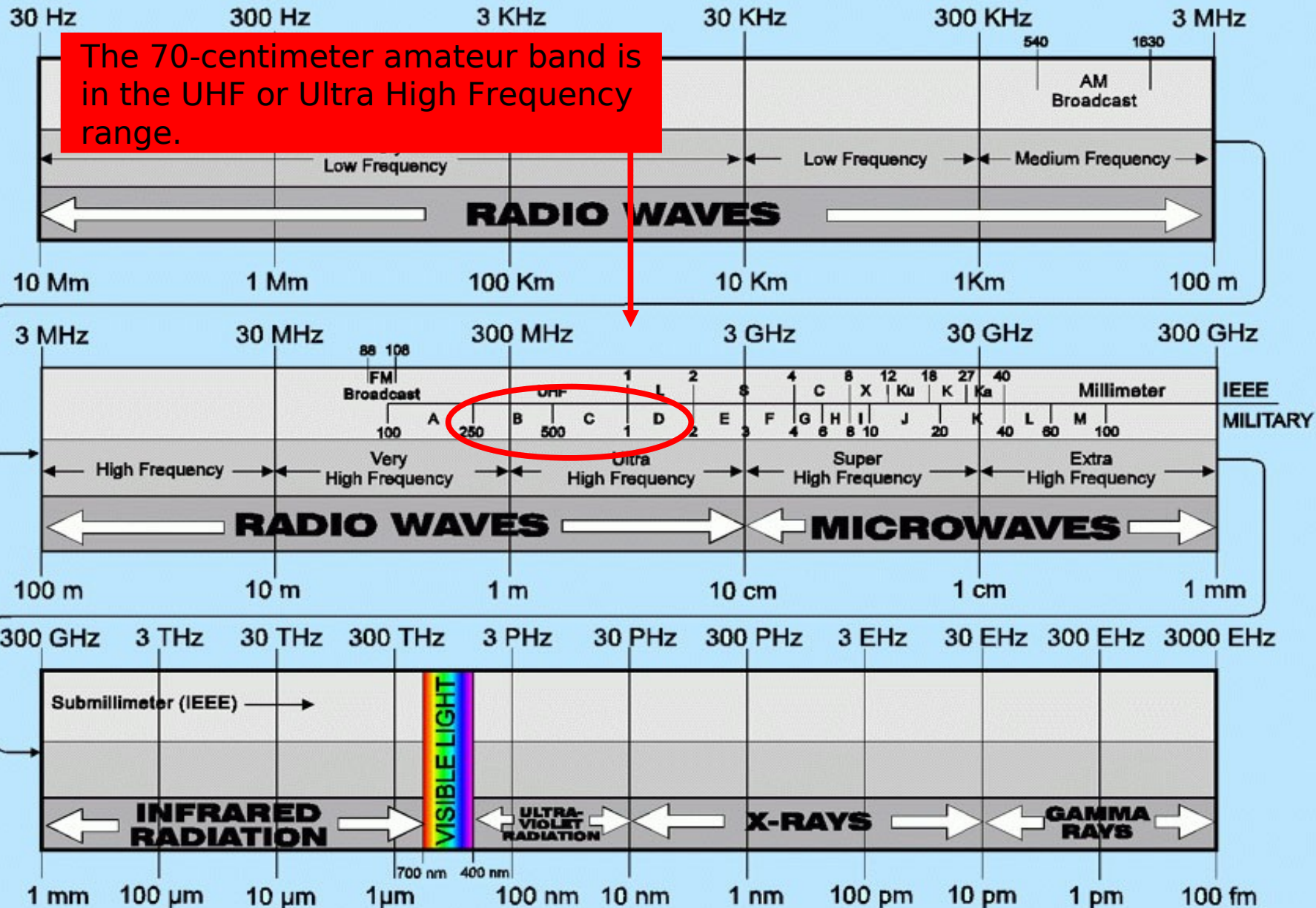
RADIO FREQUENCY SPECTRUM



The 2-meter amateur band is in the VHF or Very High Frequency range.

Very High Frequency

RADIO FREQUENCY SPECTRUM



Technician Bands and Frequencies

(there are test questions about these; * = secondary user)

- 6 meters 50 to 54 MHz
- 2 meters 144 to 148 MHz
- 1.25 meters 222 to 225 MHz
219 to 220 MHz secondary use only for
point to point digital message
forwarding.
- 70 centimeters* 420 to 450 MHz
no 420 to 430 MHz north of line A
(just south of Canada.)
- 33 centimeters* 902 to 928 MHz
- 23 centimeters* 1240 to 1300 MHz
- Plus higher

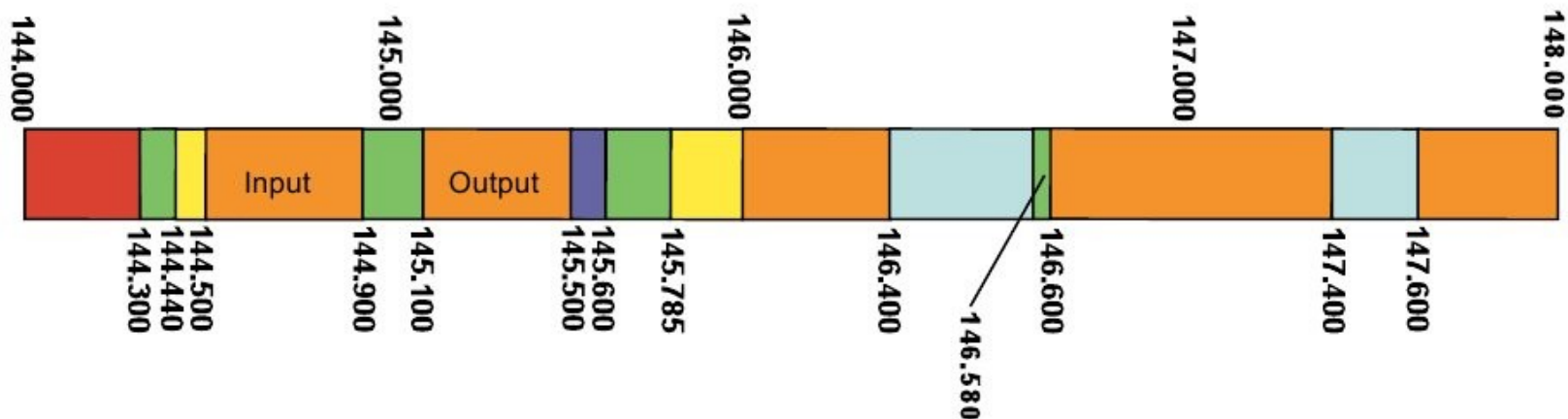
Mode restrictions







- The 6-meter, 2-meter, and 1-1/4-meter bands available to Technician class licensees have restrictions:
 - 6M: 50.0-50.1 Only CW (Morse Code)
 - 2m: 144.0-144.1 Only CW (Morse Code)
 - 1.25m: Only CW and data in restricted portion

Band Plans

- The FCC designates frequency ranges
 - Amateurs self-coordinate inside that
- Band Plans break down frequency ranges into sub-pieces
 - Simplex vs Repeaters vs Digital vs ...
 - Promotes “efficient use of the spectrum”
 - A “voluntary guideline”
 - Regional differences
 - Repeater frequencies are also coordinated
 - reduce interference and promote proper use of spectrum

Northern California 2 Meter Band Plan



| Legend | |
|---|--------------|
|  | Satellite |
|  | Digital |
|  | Experimental |
|  | Simplex |
|  | Weak Signal |
|  | FM Repeaters |

For Repeater coordination in Northern California contact NARCC
www.narcc.org

For weak signal info see the Western States Weak Signal Society
<http://www.wswss.org/>

For satellite information see Amsat
www.amsat.org

Specific Frequency info
 FM Channel spacing
 20 kHz below 146.00
 15 kHz above 146.00

144.000-144.100 CW only
 144.200 SSB calling
 144.390 APRS
 146.58 Digital
 145.51 SSTV
 146.52 Nationwide FM calling.
 FM Simplex frequencies:
 146.415, 146.430, 146.445,
 146.460, 146.475, 146.490, 146.505,
 146.520, 146.535, 146.550, 146.565,
 146.595, 147.405, 147.420, 147.435,
 147.450, 147.465, 147.480, 147.495,
 147.510, 147.525, 147.540, 147.555,
 146.570, 147.585

Communicating

- Chose a frequency
- Listen for a while
 - Ensure it's not being used
 - Frequently you can only hear one side of a conversation
- Calling CQ “seek you”
 - Indicates you want to talk to anyone
 - “Calling any station”
 - On a repeater, often just saying your callsign is the same or “is monitoring”

Interrupting a conversation

- Wait for a pause and say your callsign
- Similarly, when holding a conversation
 - Leave pauses!
 - Especially on repeaters

Calling other people

- Say their callsign followed by yours
 - Also when responding to a CQ
- Avoid using cute phrases
 - Not easily understood by some operators
 - Use ITU phonetics instead
- ITU Phonetics
 - Internationally standardized

ITU Phonetic Alphabet

| | | | |
|------------------|-------------------|------------------|------------------|
| A Alpha | H Hotel | O Oscar | V Victor |
| B Bravo | I India | P Papa | W Whiskey |
| C Charlie | J Juliet | Q Quebec | X X-ray |
| D Delta | K Kilo | R Romeo | Y Yankee |
| E Echo | L Lima | S Sierra | Z Zulu |
| F Foxtrot | M Mike | T Tango | |
| G Golf | N November | U Uniform | |

Emergency Usage

- Emergency
 - Immediate threat to life or property
- If you hear an emergency call
 - Drop all other conversation until it is clear
 - Assume all emergencies are real
- Placing emergency calls
 - “Mayday Mayday Mayday”
 - “Any station come in please” and identify
 - In an emergency: anything goes
 - Any frequency (including fire and other services)
 - Including non-HAMs

Emergency Restrictions

- Don't transmit personal information
 - Avoid names, addresses, etc
 - Use morse code digital modes to help protect sensitive information

Emergency Drills

- Using Tactical Call Signs
 - Examples:
 - “Command Center”
 - “CERT Team 2”
 - They're more efficient
 - Better coordination with emergency staff
 - ID with callsign at the end of communication
- Participating in drills to test your ability!
- Don't use “idle chit chat”
 - (It interferes with important traffic)

Net Control

- Check into net control
 - Then don't transmit unless called
 - Emergency traffic takes priority
- In a large scale emergency:
 - If no net control exists
 - Start one and ask for checkins
- Running Net Controls
 - A strong clear signal is primary concern
 - If someone breaks in with emergency traffic, stop other net traffic till handled

Emergency Preperation

- Emergency response equipment
 - Check it twice a year
 - Make sure you have an alternate power source if the power goes out
 - Solar Panel
 - Battery from a Car or Truck
 - Bicycle Generator
 -

False Emergency Penalties

- You could have your license revoked
- You could be fined a large sum of money
- You could be sent to prison

Declared Emergencies

- The FCC can declare “a communication emergency”
 - Will include emergency-only frequencies
 - They're legally required to restrict frequencies
 - Don't use them unless you're participating
 - May include special conditions and rules
- You **may not** transmit news for a reporter

Emergency Organizations

- RACES

- Restricted to serving local, state, and federal government emergency management agencies
- Must register with a civil defense organization



- ARES

- Supports agencies like the Red Cross, Salvation Army, and National Weather Service
- Must have an Amateur License



Emergency Organizations

- Both RACES and ARES
 - Provide communication during emergencies
- FCC Rules still apply when using amateur radio
 - At the request of emergency services
 - On scene of an emergency

Questions?

