Communications Academy 2019

Basic Radio Series

“I have my radio, now how do I turn it on?”

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Session Overview

- Owner’s Manual Review
- Basic Radio Controls
- Setting Frequency, Offset, Tone
- Memory Operations
- Using Repeaters
- Programming Software
- Advanced Functions
- Frequency Lists and “Cheat Sheets”
Target Audience

The beginners’ series has been developed to fill the gap in training between what you learned to pass your license exam, and what you need to actually get on the air and enjoy Amateur Radio.
Target Audience

- New Technician Licensees
- Using VHF / UHF Handheld Radios
- FM Simplex and Repeater operations

Most of this material will apply to mobile radios as well. HF radios have additional functions that will not be covered in this session.

D-Star/Fusion/DMR and other digital voice modes are also not covered. They require their own class.
Critical Concepts

You must understand these concepts, and be able to do them without the aid of your owner's manual!

- Basic controls
  - power, volume, squelch, PTT, etc
- Switching between VFO and Memory modes
- Entering a desired operating frequency
- Setting transmitter offset (repeater operation)
- Setting transmit and receive tone (CTCSS)
- Saving to a memory location
Owners Manual

- Download the PDF
  - Just in case you lose the original
  - Build your own cheat sheet using copy and paste
- Consider the translation
  - And what was lost in it
- Is there a quick start section in the beginning?
  - Or a Quick Guide at the end?
- Where are the specs?
  - Power output, duty cycle, charging
Basic Controls

- Power button
  - Powers radio on/off (mostly)
- Volume
  - Increase/decrease received audio
- Squelch
  - Silences speaker when no signal is received
- Function Knob
  - Performs many functions
- Push To Talk
  - Causes radio to transmit (release to listen!)
Basic Controls

- Keypad
  - Controls additional functions during receive
  - Sends DTMF (touch tones) during transmit
- “F” button
  - Like a shift key to access other functions
- Lock
  - Disables most controls
- Charging
Basic Functions

- VFO Mode
  - Directly tune to a specific frequency
- Memory Mode
  - Recall a saved frequency/mode/options
- Shift/Offset/Duplex/Simplex
  - Changes the transmit frequency (repeater operation)
- Tone/CTCSS/DCSS
  - Turns Tone on/off
  - Sets the Tone frequency
Basic Functions

- **Step**
  - Sets the tuning rate
  - Beginners leave this at 5KHz

- **Band/Dual**
  - Switches bands on multiband radios
  - Turns second receiver on/off

- **Menus**
  - Easy access to many functions
Basic Functions

The next slides show control layouts for several popular radios

- Layout varies by manufacturer and model
  - No two radios are the same!
- Most buttons have two, three or even four functions
- Many radios use a menu/settings system to access functions
- Learn the concept of what you want to achieve first (like set VFO mode), then learn the buttons to do that
Control Layout
ICOM ID-51A

- Selector
- Volume
- Most functions accessed via menu system
- Speaker/Mic
- VFO/Power
- Call/Memory
- Quick Menu
- Charge/Data

PTT
Menu/Lock
Main/Dual
Menu Navigation And D-Star Functions
Control Layout
Baofeng UV-5R

Most functions accessed via menus, with keypad shortcuts to menu function.

- Volume
- Speaker/Mic
- PTT
- VFO/Memory
- Upper/Lower Band
- Menu
- Band Select
- Menu Exit
- Squelch
- Lock

Menu Shortcuts
Press Menu-numbers
Control Layout
Kenwood TH-F6A

- Function
- Volume
- Display
- Mic Jack
- Charge
- F/Lock
- VFO
- Memory
- Call
- PTT
- Monitor
- Menu
- Power
- Shift/Duplex
- Tone
- Keypad
Control Layout
Yaesu FT-60R

PTT
Volume/Power
Function
Squelch
Display
Speaker/Mic
Charge
Keypad
Call/Home Channel
F Key
Menu/Settings
VFO/Memory
Tone
Monitor
Most functions accessed via settings menu
Getting on Frequency

- Must start in “VFO” Mode
  - Use the Function Knob
  - Direct Entry on the Keypad/Mic
- Set Transmit Offset
  - Simplex or Plus/Minus (repeater operation)
- Set Tone on and tone frequency (if needed)
- Save to a memory location
Simplex Operations
Direct Radio to Radio

What do we need to know?

- Frequency both stations will use
  - Set with VFO
- No Transmit offset or shift
  - Set to no offset, or S (simplex)
- Tone/PL/CTCSS on(if needed)
  - Set with function keys/menus
- Tone frequency
  - Set with function keys/menus
Simplex Operations
Direct Radio to Radio

- Stations must be within range of each other
- Frequency choice must be in band plan as a “simplex” channel
- Transmit and Receive on the same frequency
- Tone is not usually used
Repeater Operations
Radio to Repeater to Radio

What do we need to know?

- Repeater output frequency
  - Set with VFO
- Transmit offset or shift either + or -
  - Set with function keys/menus
- Tone/PL/CTCSS on (usually required)
  - Set with function keys/menus
- Tone frequency (for the repeater)
  - Set with function keys/menus
Repeater Operations
Radio to Repeater to Radio

- Stations must be within range of the repeater
- Frequency/Tone set by owner and local frequency coordination group
- Transmit and Receive on different frequencies (transmit offset)
- Tone is almost always used
Simplex Operations
• No Offset
• Tone Optional

Offset
Tone
Freq
Receive/Transmit Frequency
Selector
VFO

Detector
Repeater Operations

• Offset Required
• Tone Usually Required
Memory Operations

- Use memories to store favorite/frequently used “channels”:
  - Receive Frequency
  - Transmit Offset
  - Transmit and Receive Tone
  - Power output (some radios)
  - Familiar Name (limited character length)
- Can be arranged in “banks”
  - Radios may have 1000 memory slots available
Memory Channel

Selector

Mic

147.260
+ DUP TONE

Memory

Memory Channel

Number

Memory

Name

MplVly

MR 010

Name/

Frequency Call

Name/

Frequency

Memory

Call

Call
Programming Software

- Used to program memories and radio settings from a computer
  - There may be over 1000 channels to program
- Requires a special cable
  - From the manufacturer
  - e-Bay
  - Build it yourself
- May require a “serial” or “COM” port on the computer (use a USB to serial dongle, avoid Prolific devices, use FTDI chipset instead)
- Keep multiple program files for different situations/locations
Programming Software

Available Choices

- CHIRP
- RT Systems
- Radio Manufacturer Supplied
- Ham “Shareware” Developed
Advanced Radio Operations

- Call Channel
  - One button “quick” memory

- Scan Functions
  - Scan through frequencies or memories, stop on active ones

- Dual Band Operations
  - Like having two radios in one box
  - Dual receive

- Battery Save/Automatic Power Off (APO)
  - Not advised for EM-COMM operations
Advanced Radio Operations

- DTMF (Touch Tones)
  - For controlling something at the receiving station
- Out of band receive
  - Public Safety, FRS, GMRS, Marine
  - Listen only, no transmit permitted (careful with Chinese radios)
- Band Scope
  - Gives a graphic view of band activity
Advanced Radio Operations

- **Attenuator**
  - Reduces receive sensitivity to prevent receiver overload from strong local stations

- **CTCSS Receive**
  - Silences the speaker unless there is both a signal present, and the signal contains the correct tone (Note, this does not make a “private” channel, but does allow you to only hear the stations you want to hear)
Advanced Radio Operations

- WIRES 🤕
  - Wide-Coverage Internet Repeater Enhancement System
  - Developed by Yaesu, incorporated on most Yaesu radios
  - Easily turned on by mistake! Learn how to turn it off

Cheat Sheets

- A quick guide to common functions
  - Copy pages from the user manual
  - Make your own
  - Purchase commercial guides
- Nifty Accessories
  - http://www.niftyaccessories.com/
- Ham Radio for Dummies
  - http://www.dummies.com/go/hamradio
## Cheat Sheets

### Kenwood TH-F6A 144/220/440 Triband Transceiver

<table>
<thead>
<tr>
<th>Operation</th>
<th>Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Storing a frequency in memory</strong></td>
<td></td>
</tr>
<tr>
<td>1. Select VFO Mode</td>
<td>Press [VFO]</td>
</tr>
<tr>
<td></td>
<td>Press [A/B] to select the A Band</td>
</tr>
<tr>
<td>2. Enter Frequency</td>
<td>Press [ENT]. Direct enter the frequency</td>
</tr>
<tr>
<td>3. Select Offset</td>
<td>Press [F] [REV] toggles through +, - none</td>
</tr>
<tr>
<td>4. Activate Tone</td>
<td>Press [TONE]. Verify T is displayed</td>
</tr>
<tr>
<td>5. Select Tone Freq</td>
<td>With Tone=ON, Press [F] [TONE]</td>
</tr>
<tr>
<td></td>
<td>Turn Tuning control or [▲]/[▼] controls to select</td>
</tr>
<tr>
<td></td>
<td>Press [▲]/[OK] or [MNU] to accept</td>
</tr>
<tr>
<td>6. Store in Mem Channel</td>
<td>Press [F]. Mem Channel Number blinks</td>
</tr>
<tr>
<td></td>
<td>Turn Tuning control or [▲]/[▼] controls to select</td>
</tr>
<tr>
<td></td>
<td>Press [▲]/[OK] or [MR] to save</td>
</tr>
<tr>
<td>7. Select Memory Mode</td>
<td>Press [MR]</td>
</tr>
<tr>
<td><strong>Other Operations</strong></td>
<td></td>
</tr>
<tr>
<td>Clear Mem Channel</td>
<td>Select the memory channel to clear</td>
</tr>
<tr>
<td></td>
<td>Turn Power Off</td>
</tr>
<tr>
<td></td>
<td>Press [MR] + (Power)</td>
</tr>
<tr>
<td></td>
<td>Press [MR] or [▲]/[OK] or [MNU] to clear</td>
</tr>
<tr>
<td>Copy Mem to VFO</td>
<td>To Cancel Clear, press any other key</td>
</tr>
<tr>
<td>Set Power</td>
<td>Press [LOW] cycles thru H, L, EL</td>
</tr>
<tr>
<td>Lock the Keyboard</td>
<td>Press [F] and hold until the Lock symbol appears.</td>
</tr>
<tr>
<td></td>
<td>Repeat to unlock</td>
</tr>
</tbody>
</table>

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### Nifty! Quick-Reference™

**Quick-Reference Symbol Key**

- ① An informational item.
- [4 ▼ DUP] Press a function key.
- [Key] 1 sec: Press key 1 sec or more.
- [DIAL] Rotate Dial knob.

**Basic Controls & Functions**

1. Press [VFO/MHZ] to select VFO mode.
2. Press [BAND] as required to step thru bands.
3. Select an Operating Mode (AM, FM, SSB, etc.)
5. Entering & Exiting Dual Watch Operation
   - Press [MAIN/DUAL] 1 sec to toggle on/off.
6. Selecting the Main Band
   - Press [MAIN/DUAL] to toggle between A & B.
7. Setting the Squelch Level
   - Hold [SQL] and [DIAL] to set level.
8. Locking & Unlocking Keyboard
   - Press [MENU] 1 sec (alternate action).
   - ① key icon displays when locked.
Frequency Lists

Where do we find something to put in all those memories?

- ARRL Repeater Directory/CD

Internet sites:

- Local Frequency Coordination Group
  - https://www.wwara.org/
- Repeaterbook Repeater Database
  - http://www.repeaterbook.com
- Mike and Key Club Website
  - http://www.mikeandkey.org/repeater.htm
Frequency List Apps

There’s an App for that: (IOS/Android)

- **Rfinder ($12.99)** by ITWeRKS
- **Repeater Locator (free)** by ZBM2 Software
- **RepeaterBook (free)** by ZBM2 Software
What is the repeater coverage?

RF path from East Auburn to Federal Way Repeaters

- Lots of terrain/vegetation gets in the way
What is the repeater coverage?

Same site to Tiger Mountain Repeaters

- Clear path to the site
What is the repeater coverage?

Auburn Repeater heat map

- Low level repeaters have a small footprint
What is the repeater coverage?

- Tiger Mountain heat map
- Auburn Repeater heat map
Radio coverage examples

Simplex Operations
- Handheld to handheld – only a mile or two
- Base station to base station – tens of miles

Repeater Operations
- Handheld to low level repeater – 5-10 miles
- Handheld to mountain top repeater – 25+ miles
- Base station to mountain top repeater – 90+ miles
Get on the Air!

- Local Nets
  - http://www.mikeandkey.org/nets.htm
- Local Clubs
  - http://www.mikeandkey.org/otherclubs.htm
- Local Repeaters
  - http://www.mikeandkey.org/repeater.htm
- EM Comm
  - http://www.aresofkingcounty.org/
  - http://www.wastateares.org/
Questions?