

Radio Frequencies

Available AM Frequencies		
Helicopter Operations	122.975 122.850 123.025 123.050 123.075	Available nationwide on a first user basis for any private or government helicopter operation. 122.975, 122.850, 123.025, and 123.075 are for air-to-air only. 123.050 is for air-to-ground only. On incidents, appropriate frequencies may be used temporarily for Helicopter Flight Following, Helicopter Air-to-Air, or Take-Off and Landing Control. Must be replaced as soon as possible.
Natural Resource Agency	122.925	Authorized for air-to-air or air-to-ground use by any Federal Natural Resource Agency on a first-come-first-served basis. On incidents, it may be used temporarily for Fixed-wing or Helicopter Air-to-Air, Helicopter Flight Following, or Take-Off and Landing Control. Must be replaced as soon as possible. This frequency cannot be assigned to an incident.
Air-to-Air	***.***	Assigned to Air Tanker Base Zones - only during fire season. Obtained from dispatchers. Additional frequencies may be made available for incidents.
Commercial Airports	***.***	Assigned to Air Traffic Control Towers, Ground Controllers, and Flight Service Stations. Shown on aeronautical charts and other publications.
Unicom Airports	***.***	Used by all pilots to receive advisories at limited control airports. 122.800 is commonly used.
Multicom Airports	122.900	Used by all pilots for communication in transit and advisories at uncontrolled airstrips.
ELT	121.500	Emergency Locator Transmitter - sends an audio tone for 48 hours after activation in a crash.
Ramp	***.***	Some government ramps have different frequencies assigned (NIFC non-tanker base ramp 135.975) other than the National Ramp frequency of 123.975

Available FM Frequencies		
Air Guard	168.625 TX Tone 110.9	Monitored by all pilots flying for UDSA/USDI. Used for in-flight emergency contact, emergency ground to air contact, initial call, recall, and redirection.
Local Air Dispatch	168.650	If it is not practical to dispatch aircraft on the agency dispatch frequency, dispatch centers and tanker bases may use 168.650.
National Interagency Incident Contact	168.550	Initial contact frequency for land-mobile units arriving at incidents. Also used for smokejumper parachute operations.
FCC Common User Frequency	163.100 168.350	Authorized by FCC for use by any US citizen for ground communications. Available on a first use basis and may be tone encoded. 123.0 is the suggested tone. Do not use these frequencies while airborne.
National Incident Radio Support Cache	3 Tac 1 Command Pair 5 Air Tactical 166.675 169.150 169.200 167.950 170.000	These frequencies are sent to incidents with Incident Starter Kits. Portable radios are programmed with three Tactical frequencies, a Command and Command Repeat pair, and five Air Tactical frequencies. Each kit contains one of two different sets of Tactical frequencies, and one of six different Command pairs. Air Tactical frequencies are the same in all kits. Air Tactical frequencies are authorized for use west of longitude 100 west for air-to-air or air-to-ground communications. 170.000 usually does not provide good reception.
Agency Dispatch	***.***	Dispatch frequencies are listed in the National Interagency Aviation Frequency Guide.
Emergency Medical Services	***.***	Contact local dispatch for EMS Helicopter services.

Radio Programming

Technisonic TFM-138 VHF-FM Radio

Direct Channel – Allows rapid loading of simplex frequency. Duplex frequencies cannot be loaded. Direct channel is automatically loaded in channel “000.” Direct channel cannot be scanned or toggled between programmed channels.

Programmed Channels – 120 possible channels, all containing receive & transmit frequencies (simplex or duplex), receive & transmit tones, and settings for band, display, and scan. All standard CTCSS tones are available. Channel bandwidth can be set to 25.0 kHz (wideband) or 12.5 kHz (narrowband). There are 9 spaces for alphanumeric displays settings. Early S/N radios (1-1499) have scan either on or off. Later S/N radios (1500 & up with F14 software) also have 5 scan groups available. Note: All federal VHF-FM frequencies must be 12.5 kHz (narrowband) on January 1, 2005.

Tones – Assigned by channel. All standard CTCSS tones are available along with a number of non-standard tones. Tone 64 is used as “no-tone”. Digital tones (DPL) are also available. Note: Do not use both CTCSS and DPL tones on the same entry for a frequency. They are not compatible.

Guard – The guard receiver is independent from the main receiver; however, they both use the main transmitter. Both guard receiver pre-sets must be set to 168.625 MHz (Air Guard). This is the National Interagency Fire emergency channel. Set guard 1 to 25.0 kHz wideband and guard 2 to 12.5 kHz narrowband. All aircraft and most ground forces monitor Air Guard.

Additional Information

1. **MN/GD switch** – Sets transmitter to main (upper window) or guard (lower window).
2. **G1/G2 switch** – Selects presets for guard 1 or guard 2.
3. **HI/LOW switch** – Selects HI (10 watts – normal) or LOW (1 watt) power output.
4. **Time-Out-Timer** – Automatically shuts off transmissions after 90 seconds. Select by pushing FUNC then M.UP. Use M.UP & M.DN to toggle between off/on and push ENTER. To continue transmitting after 90 seconds, release & push PTT again.
5. **Display Brightness** – Adjustable by pressing UP (brighter) and DN (dimmer).
6. **Keypad Lockout** – Locks out all keypad entries. Push FUNC then LOCK. To return keypad to normal operation hold LOCK until “UNLOCK” is displayed.
7. **Enable Scan** – Push FUNC then SCAN. New radios (+1500) will want to know which scan group (1-5) to operate on. To stop scanning push SCAN. Scanning will stop when a signal is received on a scanned channel and resume 5 seconds after the transmission has ended.
8. **MAFFS Programming Note** – TFM-138B's cannot be programmed through SCNS.

Changing Channels

Press M.UP or M.DN (radio scrolls through channels).

Or

Press RCL, then three-digit channel number (i.e. 023), then ENTER.

Loading a New Direct Channel

1. Press FUNC
2. Type in a frequency (i.e. 168.650) & press ENTER.
3. Select bandwidth (Normally 25.0) & press ENTER.

Programming Channels

1. Press FUNC, then PROG.
2. Type in receive frequency & ENTER.
3. Type in transmit frequency & ENTER.
4. Select bandwidth (Normally 25.0) with M.UP & M.DN, then ENTER.
5. Change alpha/numeric display with M.UP & M.DN. Press ENTER to load each of 9 characters.
6. Set Channel to "SCAN" (scan on) or "LOCKOUT" (scan off) with M.UP & M.DN, then ENTER. (Assign scan groups (1-5) on radios S/N 1500 and up).
7. Enter 3-digit channel number & ENTER twice. (do not change G?).

Loading Tones

1. Change to the channel requiring tone.
2. Press FUNC, then TONE.
3. Change main receive tone with M.UP & M.DN, then ENTER. (normally no tone is used - number 64).
4. Change main transmit tone with M.UP & M.DN, then ENTER.
5. Change G1 transmit tones with M.UP & M.DN, then ENTER. (should not need modification from tone 110.9 - number 15). Repeat for G2.
6. Change main and guard receive & transmit DPL tones (not normally used). Set to "000" & press ENTER for all four entries.

King KFM 985 VHF-FM Radio

Channel Programming – Following are instructions for programming channels within a group. Most groups can be pre-programmed, however at least one group should be reserved for incident frequencies. A 0 or invalid entry in any receive frequency may cause the radio to malfunction. Radio can also be cloned one group at a time to a master radio.

1. Select MAIN or AUX radio with toggle.
2. Turn radio on.
3. Adjust squelch.
4. Turn SCAN and PRI off - toggles down.

5. # once – current group number displays.
twice – current group label displays.
#, then number – to change group.
6. FCN for 3 seconds to access program mode.
7. Enter password – 000000.
8. ENT – (Ch 00) displays.
9. Enter channel number to be programmed.
10. FCN – current RX frequency displays.
If correct – FCN, go to step 16.
If incorrect, CLR.
Key in new frequency numbers.
ENT – loads new RX frequency.
11. Repeat step 10. for RX CG, TX Frequency, and TX CG.
12. Current Channel Label displays.
If correct – FCN, go to step 17.
If incorrect – CLR.
PRI to first character.
FCN – loads first character.
Repeat for other characters.
for period after a character.
13. ENT – Channel number displays.
FCN back to Channel Number – reviews channel settings.
14. CLR, then key in numbers of next channel to program.
15. Repeat steps 10-13 for all channels in the group.
16. Turn radio off to store program changes.

Operation – Following are instructions for operating a KFH 985 radio that has been setup with the National Audio Support Cache recommended settings during initial setup.

1. **Starting Radios**
Select MAIN or AUX radio with toggle.
Turn both radios on. Adjust both squelches. Adjust volumes.
Set A/B toggles in A position.
2. **Selecting a Group**
Select MAIN for groups 1-7, AUX for 8-15.
Turn SCAN and PRI off – down.
once to display current group number.
twice to display label current group label.
#, then key in number of group desired.
3. **Transmitting**
Select appropriate radio, MAIN or AUX.
Select appropriate group.
Rotate knob to desired channel number.
Select FM on the audio panel and press the PTT to transmit.
Red light glows and TX is displayed.

4. **Receiving**

MAIN and AUX receive one group each simultaneously.

Channels selected are always received.

PRI light glows when radios receive.

If incorrect code is received, PRI light glows but message is not heard.

Scan list channels in selected group are received when SCAN toggle is up.

5. **Scanning**

If channels are not code guarded, adjust SQ to threshold.

If channels are code guarded, adjust SQ to CG.

Put the SCAN toggle up.

All channels on the Scan List in the selected group are received.

When display is in channel label mode, SCN flashes while scanning.

If a channel is active, its label displays.

When the display is in channel number mode, -- flashes while scanning.

If a channel is active, its number displays right of current number.

Scan delay time is 2 seconds at end of scanned message.

6. **Changing the Scan List**

Turn SCAN and PRI off - toggles down.

Select a channel.

Press ENT to add channel to list, SCN is displayed.

Press CLR to delete channel from list, SCN disappears.

7. **Using Priority Scan**

Turn SCAN and PRI on - toggles up.

Channel selected is the priority channel.

If priority channel is active, scanning function locks on it.

Technisonic TDFM-136 Radio

The TDFM-136 is programmed in layers (Levels), similar to a Windows based computer operating system. Think of the TDFM-136 as a computer that performs as a radio, not just a radio. **These TDFM-136 Programming instructions are intended only for radios having the same software version** (displayed when first turned on or see Level 3-Key 4).

There can be up to 200 Preset Main channels. TDFM-136 software allows disabling non-activated channels for quick wraparound channel changes. NIFC activates channels 1 to 15. Channels 16 to 200 can be user activated by programming a new channel (Level 2 - Key 1).

The TDFM-136 has 3 levels of user programmable functions. Level 1 has the most commonly used functions. Levels 2 and 3 are accessed using the “0/PROG” button. Some of Level 1 & 2’s functions are disabled by NIFC.

Consult the TDFM-136 Command Matrix to see where to go *and then* use the individual Level instructions to see how to do it. Set MN/GD switch to MN before programming.

TDFM-136 Command Matrix (Software Version R1V40)			
KEY	Level 1	Level 2	Level 3
1 CHAN	Select Main Channel	Program New Channel Guard	Select Boot Channel
2 ↑	Display – Brighter	Disabled	Data Upload
3 MODE	Edit Mode (W/N/P25)	Disabled	Not Used
4 ←	Preset – Memory Down	Edit P25 NAC Code Disabled for Guard	Display Software Revision
5 SCAN	Disabled	Disabled	Not Used
6 →	Preset – Memory Up	Edit Channel Description – Disabled for Guard	Set PTT Timer
7 FREQ	Edit Frequency – Disabled for Guard	Not Used	Set Sidetone Level
8 ↓	Display Brightness – Dimmer	Disabled	Data Download from PC
9 SQL	Edit Squelch – Disabled for Guard	Set Noise Squelch Level	Display Squelch Value
0 PROG	Go to Next Level	Go to Next Level	Not Used
# ENTER	Save Changes – Disabled for Guard	Not Used	Not Used
* ESC	Abandon Changes	Go to Previous Level	Go to Previous Level

Matrix Notes:

Bolded ‘Disabled for Guard’ – Function disabled for Guard entries. Main radio editing functions normal.

Bolded Disabled – Function disabled.

LEVEL 1 - (Direct/Standard). Requires only the desired key to be pressed.Key Function

- 1 Select Main Channel** (Same as TFM-138B Recall). Selects any pre-programmed channel. Will select only valid channels having pre-programmed frequencies.
 - A. Press 1.
 - B. Press desired preset channel number (i.e. 034).
 - C. Press ENTER or ESC.
- 2 Display Brightness Up.** Press 2 (hold down to rapidly increase brightness).
- 3 Selects Mode.** Allows modification of mode using any pre-programmed channel's existing information.
 - A. Press 3/MODE.
 - B. Keep pressing MODE key to select "w", "n", or "D".
 - "w" for 25 kHz analog wide-band, - "n" for 12.5 kHz analog narrow-band, - "D" for 12.5 kHz P25 Digital.
 - C. Press ENTER once to use change. Press ENTER a second time to store the change into the pre-programmed channel in use.
- 4 Preset Memory Down.** Press 4 (hold down to rapidly decrease channels).
- 5 SCAN ON/OFF – DISABLED.**
 - A. SCAN ON - Keep pressing SCAN for desired scan group and press ENTER.
 - B. SCAN OFF - Press SCAN or ESC.
- 6 Preset Memory Up.** Press 6 (hold down to rapidly increase channels).
- 7 Edit Frequency** Allows modification of frequency using any pre-programmed channel's existing information.
 - A. Press 7/FREQ.
 - B. Keep pressing MODE key to select "S", "R" or "T" then press ENTER:
 - "S" to set Simplex frequency - "R" to change Receive frequency - "T" to change Transmit frequency.
 - C. Push keys corresponding to desired frequency.
 - D. Press ENTER once to use change. Press ENTER a second time to store the change into the pre-programmed channel in use.
- 8 Display Brightness Down.** Press 8 (hold down to rapidly decrease brightness).

LEVEL 1 - (Direct/Standard) – CONTINUEDKey Function

- 9 Edit Squelch & Talkgroup.** Allows modification of squelch using any pre-programmed channel's existing information.
- A. Press 9/SQL.
 - B. Keep pressing MODE key to select "S", "R" or "T" then press ENTER:
 - "S" to set Simplex frequency Tones
 - "R" to change Receive frequency Tones
 - "T" to change Transmit frequency Tones.
 - C. Keep pressing SQL key to select "t", "c", "g", or "x" then press ENTER:
 - "t" to select CTCSS Tones (analog frequencies only) "c" to select DPL Tones (analog frequencies only)
 - "g" to select P25 Digital Talk Groups (Digital frequencies only) "x" to select Noise Squelch (no tones).
 - D1. ANALOG – Scroll to the desired "t" or "c" analog values using the 2 and 8 keys.
 - D2. DIGITAL – Scroll to the desired "g" talkgroup value using the 2 and 8 keys while moving the cursor left and right with the 4 and 6 keys.
 - E. Press ENTER once to use change. Press ENTER a second time to store the change into the pre-programmed channel in use.

- 0 Change Programming Level.** Level indication between guard channel number and guard channel text.
- Level "1" for Direct Entries (no Level indicator).
 - Level "2" for Programming Entries.
 - Level "3" for Configuration Entries.
 - Must enter second Level key within 5 seconds or display resets to Level 1.

Enter. Accepts entry and returns to standard display.

* **Escape.** Abandons entry and returns to standard display.

LEVEL 2 - (Programming). Requires 0/PROG to be pressed before the second key is pressed (i.e. 0-1-etc).

Key Function

- 1 Program New Channel** (Same idea as TFM-138B Programming). Dependent upon MN/GD and G1/G2 switches.
- A. Press 0/PROG then 1/CHAN.
 - B. Enter channel number to Preset (i.e. "021") and press ENTER.
 - C. Scroll through SCAN List numbers (1-5) by continuing to press SCAN. Enable SCAN by pressing PROG to toggle between SCAN ON (large number-2) and SCAN OFF (small number-2) then press ENTER.
 - D. Enter Text using the 2 and 8 keys while moving the cursor left and right with the 4 and 6 keys and press ENTER.
 - Press MODE to select between upper case (A-Z), lower case (a-z), numbers (0-9), and special symbols (!-*) (see lower right corner of display).

- E. Enter operating Mode using MODE key and press ENTER.
- "w" for wide-band, - "n" for narrow-band, - "D" for P25 digital
- F. Enter receive frequency (Rx) and press ENTER.
- G. Enter transmit frequency (Tx) and press ENTER.

ANALOG OPERATION

- 3. H1. Enter receive squelch (Rx) using SQL key and press ENTER.
- "t" for CTCSS, - "c" for DPL, - "x" for noise squelch
- 4. I1. Change squelch values using the 2 and 8 keys then press ENTER.
J1. Repeat H1 and I1 for transmit squelch (Tx).
K1. Done.

DIGITAL OPERATION

- H2. Enter receive squelch (Rg) using SQL key and press ENTER. "g" for P25 digital squelch, or "x" for noise squelch
- I2. Scroll to the desired "g" talkgroup values using the 2 and 8 keys while moving the cursor left and right with the 4 and 6 keys then press ENTER.
- J2. Repeat H2 and I2 for transmit squelch (Tg).
- K2. Select receive P25 digital NAC values using the 2 and 8 keys while moving the cursor left and right with the 4 and 6 keys then press ENTER.
- L2. Repeat K2 for transmit NAC value.
M2. Done

2 Copy GUARD to MAIN – DISABLED. Press 0 then 2.

- 3 Lock Keypad – DISABLED.** Lock's out keypad.
 - A. Press 0/PROG then 3/MODE to lock keypad.
 - B. Hold */ESC to unlock keypad.

LEVEL 2 - (Programming) – CONTINUED

Key Function

- 4 Change P25 digital Network Access Code (NAC).** Allows modification of three character NAC code (i.e. F7F) using any pre-programmed channel's existing information.
 - A. Press 0/PROG then 4.
 - B. Keep pressing MODE key to select S, R, or T then press ENTER:
 - "S" to set Simplex frequency NAC code.
 - "R" to change Receive frequency. NAC code
 - "T" to change Transmit frequency NAC code.
 - C. Press the 2 and 8 keys while moving the cursor left and right with the 4 and 6 keys.
 - D. Press ENTER once to use change. Press ENTER a second time to store the change into the pre-programmed channel in use.

5. **EDIT SCAN List - DISABLED.** You must be on the pre-programmed channel requiring editing.
- Press 0/PROG then 5/SCAN.
 - Toggle between SCAN ON (large number-2) and SCAN OFF (small number-2) by pressing PROG.
 - Scroll through SCAN lists (1-5) by pressing SCAN. SCAN number "0" is no SCAN list on channel.
 - Press ENTER once to use change. Press ENTER a second time to store the change into the pre-programmed channel in use.
- 6 **Edit Channel Text.** Allows modification of text using any pre-programmed channel's existing information.
- Press 0/PROG then 6.
 - Keep pressing MODE key to select A, a, 0 or <space> then press ENTER (see lower right corner of display).
 - "A" to set Upper Case letters (A-Z).
 - "a" to set lower case letters (a-z).
 - "0" to set numbers (0-9).
 - <space> to set blank space and special symbols (!-*).
 - Enter Text using the 2 and 8 keys while moving the cursor left and right with the 4 and 6 keys.
 - Press ENTER once to use change. Press ENTER a second time to store the change into the pre-programmed channel in use.
- 7 **Not Functional.**
- 8 **Copy MAIN to GUARD – DISABLED** (Same as TFM-138B Func-7).

LEVEL 2 - (Programming) – CONTINUED

Key Function

- 9 **Set Noise Squelch Level – AVOID USE.** Adjusts radio squelch level.
- Press 0/PROG then 9/SQL.
 - Press 2 and 8 to adjust value. "00" is lowest and "10" is highest.
- 0 **Change Programming Level.**
- Level indication between guard channel number and guard channel text.
 - Level "1" for Direct Entries (no Level indicator).
 - Level "2" for Programming Entries.
 - Level "3" for Configuration Entries.
 - Must enter second Level 2 key (2-1) within 5 seconds or display resets to Level 1.
- # **Enter.** Accepts entry and returns to standard display.
- **Escape.** Abandons entry and returns to standard display.

LEVEL 3 - (Configuration). Requires 0/PROG to be pressed twice before the second key is pressed (i.e. 0-0-4-).

Key Function

- 1 **Select Boot Channel.** Selects which Preset channel will be displayed when radio first turned on.
 - A. Press 0/PROG twice then press 1/CHAN.
 - B. Continue to press 1 to switch between “last used” and “last programmed”.

- 2 **Data Upload to PC.**
 - A. Connect PCDL-136 Programming cable. TFM-138 & TFM-500 cables will not work.
 - B. Start TDP-136 software program and configure for proper COM port.
 - C. Select “Upload (from radio)” on the computer within 20 seconds of pressing 2 (below).
 - D. Press 0/PROG twice then press 2.
 - E. Select “OK” after upload complete.

- 4 **Display Radio Software Version.** Press 0/PROG twice then press 4 & hold.

- 6 **PTT Timer.** Selects PTT timer for off, 30, 60, or 90 seconds.
 - A. Press 0/PROG twice then press 6.
 - B. Press 2 and 8 to change number.
 - C. Press ENTER or ESC.

- 7 **Sidetone Adjust – AVOID USING.** Adjusts radio sidetone level.
 - A. Press 0/PROG twice then press 7/FREQ.
 - B. Adjust Guard volume knob for desired sidetone level.
 - C. Press FREQ to save setting.
 - D. Press ESC twice to return to normal operation.

8. **Data Download from PC.**
 - A. Connect PCDL-136 Programming cable. TFM-138 & TFM-500 cables will not work.
 - B. Start TDP-136 software program and configure for proper COM port.
 - C. If desired, erase all radio channel information (reset to default) prior to loading new information by:
 - a. Selecting “Purge” on computer.
 - b. Follow steps E through G below.
 - c. Select “Unpurge” on computer.

LEVEL 3 - (Configuration) – CONTINUED

either

D1.Edit information displayed on screen.

or

D1. Open existing file on computer by selecting “Open File”.

D2. Locate existing “.136” file then select “Open”.

then

E. Press 0/PROG twice then press 8.

F. Select “Download (to radio)” on the computer within 20 seconds of pressing 8 (above).

G. Select “OK” after download complete.

H. Turn radio OFF then back ON once programming is complete (reboots using new information).

9 Display Channel Squelch Information. Displays squelch information for channel currently active.

A. Press 0/PROG twice then press 9/SQL & hold.

- Upper window for Receive data. Bottom window for Transmit data.

- “t” for CTCSS tone - “c” for DPL - “G” for Talkgroup - “N” for NAC code

NOTE: Displayed values present on every channel but active only when enabled.

Additional Information – TDFM 136

1. **Programming Level.** Level 1 (Direct/Standard) programming functions do not require a level number being used prior to performing Level 1 functions. Level 2 (Programming) functions WILL require the level number for Level 2 functions (i.e. for Programming Channels press 0/PROG – 1/FREQ - etc.).
2. **P25 Digital.** Normally, P25 Digital channels will also receive standard analog wide-band and analog narrow-band communications. **This radio will not receive both P25 digital and analog simultaneously.** The transmitter will transmit whatever mode the channel is currently programmed for (digital, wide-band or narrow-band). P25 cannot transmit CTCSS or DPL tones. P25 must use NAC codes and talkgroups.
3. **NAC codes.** Think of NAC codes as the digital equivalent of CTCSS tones. To operate any P25 radio you **MUST** have the same NAC code (and talkgroup) as the people you are trying to talk with. Open NAC code is **F7F**.
4. **Talkgroups.** A talkgroup is a sub-group of a NAC code. You will not hear anyone unless you are on the same talkgroup. Open talkgroup is **FFFF**. There can be thousands of talkgroups and hundreds of NAC codes all operating on the same frequency. Obviously you will need to have standard NAC and talkgroups or effective communications will be impossible.
5. **Switches**
 - A. MN/GD switch. Selects transmitter to main (upper window) or guard (lower window) use.
 - B. G1/G2 switch. Selects guard 1 or guard 2 preset channel.

- C. HI/LOW switch. Selects HI (10 watts – normal) or LOW (1 watt) power output.
- D. Scratchpad channel. Channels with small numbers (001) indicate that channel has been modified (scratchpad). Any channel can be a scratchpad channel. Press ENTER once to use changes made to preset channel (001). Press ENTER a second time to accept change for loading into the pre-programmed channel (001) or ESC to abandon changes.

Northern Airborne Technology NPX Programming Guide

Display

1. **Upper Row** – Selected channel information.
2. **Lower Row** – Functions information. Normally shows power level settings and tones. Other settings may be displayed by entering the status edit mode.

Normal Operation

1. **EDIT Switch** – Must be in center position for **NORMAL** operations. Functions of edit control switches (connected by lines on panel) are those labeled above them.
2. **MN Knob** – Sets Main Rx volume. Turns Main radio off.
3. **Main LED** – Lights green if Main is keyed. Lights amber if a signal is received.
4. **SCAN-NORM-GD Tx Switch**
 - a. **NORM** – Main radio transmitter is selected and scanning is disabled.
 - b. **SCAN** – Main radio transmitter is selected and scanning is enabled.
 - c. **GD TX** – Guard (G1 or G2) radio transmitter is selected.
5. **GD Knob** – Guard Rx volume. Cannot be turned off – preset minimum level.
6. **Guard LED** – Lights amber when Guard radio is active.
7. **GD1/GD2 Switch** – Selects active guard channel. GD1 is preset to 168.625, GD2 is preset to 167.950. Transmit frequencies of Guard channels are programmable.
8. **DISP Switch** – Each channel has three data lines (ID, RX and TX).
 - a. **ID** – Channel number, label, scan flag, and priority scan flag.
 - b. **RX** – Channel number, Rx frequency and tone. “r” is for receive frequency.
 - c. **TX** – Channel number, Tx frequency and tone. “t” is transmit frequency.
 In **SIMPLEX** mode, radio’s Tx data is changed to match Rx data. Tx data remains in radio, but is unused until radio is switched back to duplex mode. “s” indicates radio is in simplex mode.
9. **CHAN Switch** – Press left or right (- or +) to increment by one channel. Press and hold left or right (- or +) to scroll through channels.
10. **BRIGHT Switch** – Press left or right (- or +) to change display brightness.
11. **SQ Button** – Press to monitor activity on radio when tones prevent squelch from opening, or to verify settings or radio function.

Channel Editing

1. **EDIT Switch** – Must be in **CH** position for channel editing. Functions of edit control switches (connected by lines on panel) are those labeled **below** them.
2. **DISP Switch** – Select information to be edited (ID, RX, or TX).
3. **SELECT Switch** – Cycles up or down (+/-) through list of available numbers/characters that can be entered at position of blinking edit cursor.
4. **NEXT Switch** – Moves the edit cursor one position to the right (+) or left (-).
5. **HELP Switch** – Press to access help during initial power-up. If help is required after the radio is already on, cycle the radio off and then back on again.

Tones

1. **Tone Display** – On far right side of RX and TX lines.
2. **Tone Selection** – Use Channel Edit mode to select tones for each channel. Different tones can be set for Rx and Tx. If no tone is needed it can be set to “-”.

Status Editing

1. **EDIT Switch** – Must be in **ST** position for status editing. Functions of edit control switches (connected by lines on panel) are those labeled **below** them.
2. **SELECT Switch** – Step to previous/next available setting for the current function.
3. **NEXT Switch** – Press left or right to move to the previous/next function.
4. **TX MODE-DUPLEX** means both RX and TX frequencies programmed in selected channel will be used. **SIMPLEX** means RX frequency programmed in selected channel will be used for both RX and TX. TX data is stored and will become effective when mode is changed back to duplex.
5. **POWER** – Radio can transmit at HI (10 watt) or LO (1 watt) power setting. Many radio station licenses have power restrictions at altitude, and must be set to low TX power above 5,000 feet for legal operation. This may also be required to prevent repeater interference at altitude, or to permit secure operations.
6. **TONES** – Radio tones can be set globally to **ON**, **OFF**, or **TX ONLY**.
7. **Tone DISP** – Tone presentation: **FREQ** = tone frequency (most common – decimals are truncated e.g., 103.5 Hz becomes 103, **1-38** = sequential numbers for EIA tones, **MCODES** = Motorola codes, and **WCODES** = Wulfsberg codes.
8. **SCAN** – At present, there is only one scan mode available (**LIST**).
9. **PWR-UP SCAN** – Channel on power up. Can be set to PDC (Power-Down Channel) the channel that was selected when the radio was turned off.

Scanning

1. **General** – Radio stops on flagged channels. There may be no audible signal if tones do not match. Tones should be set to **OFF** during scanning.

2. **Activation** – Move **SCAN/NORM/GUARD Tx Switch** to **SCAN** position. The “home” channel is the channel the radio was on before scanning was activated.
3. **Message** – **SCANNING** appears on the upper row of the display. When radio finds an active channel, display shows channel data (**ID**, **RX**, or **TX**).
4. **Keyed Mic** – If radio is scanning, radio will go to “home” channel. If radio is locked on a channel, transmission will occur on that channel.
5. **Scan List** – A dash (-) in second to last space on channel ID line means the channel is not in the list. If the scan flag (~c) is displayed, the channel is in the list.
6. **Scanning Activated** – Radio moves through flagged channels until a carrier is detected. It remains on that channel until traffic stops, then waits 2-3 seconds for operator to reply. If no further activity, radio continues scanning.
7. **Scan Turned Off** – Radio resumes normal operation on the home channel.
8. **Deleting Nuisance Channels** – When radio locks on a channel not wat

Note: Radio programming instructions can be found at: www.fs.fed.us/fire/niicd/avionics

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